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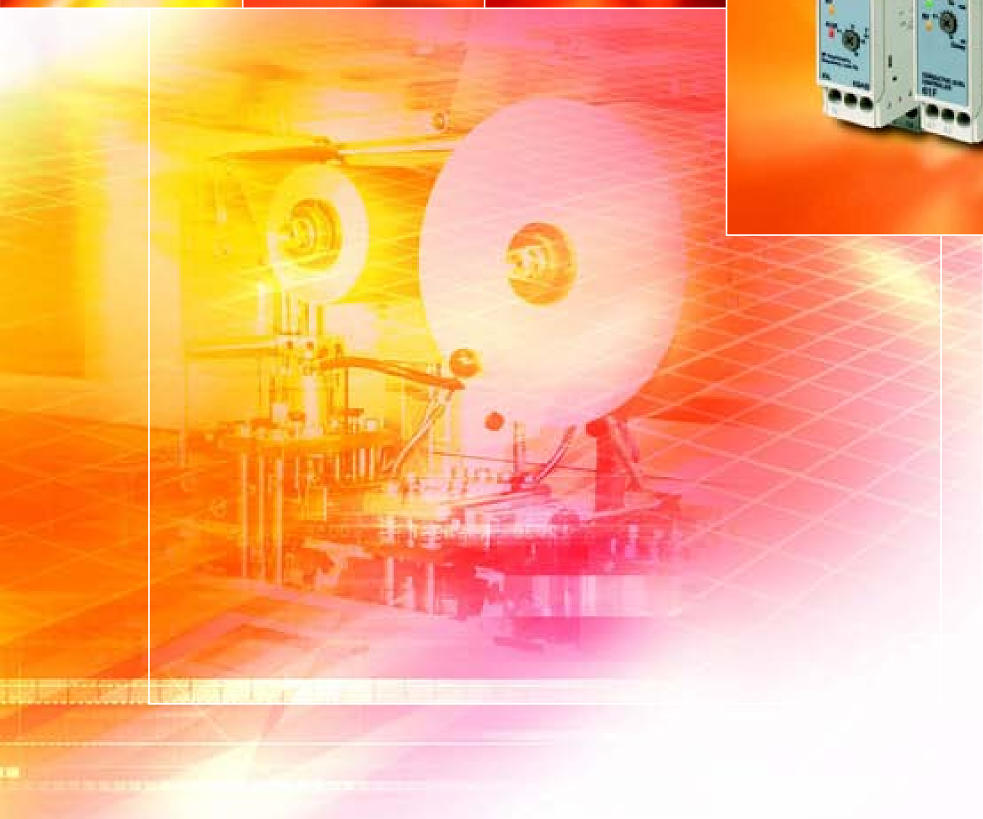
GENERAL CATALOGUE 2006/2007

Control & Switching Components



realizing

Advanced Industrial Automation

OMRON

GENERAL CATALOGUE 2006/2007

Control & Switching Components

www.omron-industrial.com

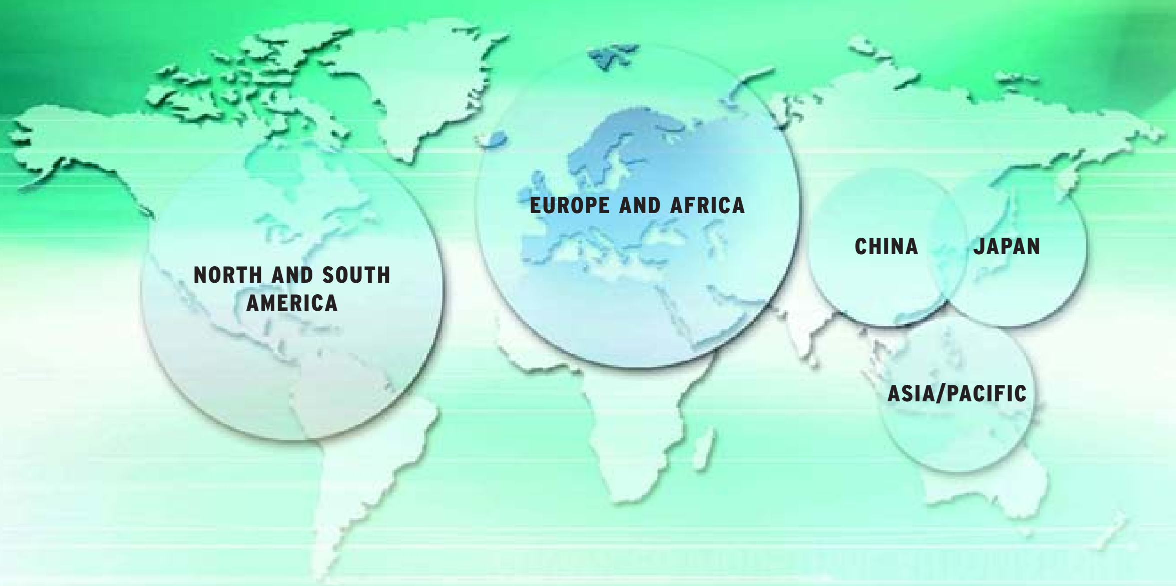
Control & Switching Components

This catalogue features products that are ideally suited for use in today's control panels. What makes our products so special is that they are designed to deliver high performance and total reliability. With Omron's control and switching components in your automation system your products never fail, and your production never stops.

The attached CD-ROM contains comprehensive information of our control and switching components. In addition you can find our latest innovations on www.omron-industrial.com or give us a call!

Omron – a global corporation

...right on your doorstep



Omron Corporation

Omron Industrial Automation is a leading manufacturer of technologically advanced industrial automation products and worldwide supplier of application expertise.
It is part of the global Omron Corporation, which has been anticipating and meeting social needs since 1933. Using pioneering technology Omron has developed into a $5 billion global manufacturing company in sensing and control.

Omron continues to make significant contributions in a wide variety of fields such as industrial automation, electronic and automotive components, and healthcare. Omron Industrial Automation technologies can be found in factories and machines all over the world. Our solutions continue to be flexible and innovative, but our standards remain rigid: never stop, never fail, just create!

Omron Industrial Automation Europe

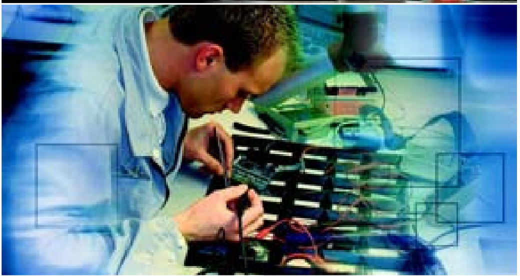
In Europe we have maintained a leading position in machine and industrial automation for over 30 years. Our infrastructure is designed to think globally while acting locally. From sales, application knowledge and support to R&D and customised production, we can support your needs wherever you are located, and through every step of your manufacturing process.
You'll find Omron's expertise in control systems, motion & drives, sensing, safety and control components.

- 50 years in industrial automation
- Over 24,000 employees
- Support in every European country
- Over 1,800 employees in 18 European countries
- 8% of turnover invested in R&D
- More than 200,000 products
- More than 6,950 patents registered to date

Application support

As an Omron customer you have unprecedented support from our application engineers, who can advise you on-site anywhere in Europe. We can carry out tests on your design on-site or demonstrate a new product without disturbing or halting your production process.

"From the moment you contact Omron you get direct access to our application expertise, wherever and whenever you need it..."



European manufacturing

Omron has manufacturing sites in s'Hertogenbosch, the Netherlands and Nufringen, Germany where, in addition to our standard product range, we can provide fast and flexible customised solutions using on-site R&D facilities and expertise. Both factories meet very strict quality assurance standards, and are the forefront of meeting global environmental standards. Omron actively welcomes visitors to these facilities.

Online support

Omron's website is designed to provide fast, no-nonsense support, enabling you to quickly find the latest information on manuals, data sheets and brochures, read about our latest product releases, and check out the most frequently asked questions. You can also download our latest software versions or patch upgrades along with 2-D and 3-D CAD drawings. All the support you need is available on www.omron-industrial.com.

European Repair Centre

Omron has set up a special repair service with DHL that enables your product to be collected, repaired and returned within 5 days. This repair service is totally free of charge for products under Omron's warranty conditions, and includes a direct collection and delivery at your site. You can get more information about this service at www.repair.europe.omron.com.

Smart Platform

One software – One connection – One minute

Total machine integration with the robustness offered by PLCs and the flexibility of the IPC. What was a dream in the eighties, a vision in the nineties is now materialising into reality.

Enabling complete machine and plant automation from one single platform without having to worry about field-buses, integration of various software and above all without being locked with one dominant supplier. FDT/DTM, messaging across networks and Internet are the main contributors.

Our aim is to minimize the time and effort you spend in automation and focus your resources in creativity. Hence our motto JUST CREATE!

The Smart Platform concept is built around three major advantages for the user:

- One software
- One connection
- One minute

Easy programming and configuration with Omron's CX-One software.

For a demonstration and to order your 30 days' trial version for free please visit **www.smartplatform.info**

One software

CX-one allows you to control, visualise, position, detect and regulate from one automation suite.

One connection

No matter what device, what fieldbus and what task you are performing, one connection is all you need to give you full access to your machine.

One minute

Drag & drop, plug and work in minutes to control, visualise and maintain your machine.

... just create

Why Smart Platform?

Smart Platform can help you increase the flexibility and efficiency of your machines or production lines. It provides:

- A single software environment for your machine covering sensing, regulation, control, motion, and visualisation.
- Easy drag & drop object-based programming and configuration of the complete system.
- Communications and architecture that is network independent.
- Distributed intelligent devices that are self-reporting and self-maintaining to reduce downtime and identify the source of production problems.

New products

G3ZA – Multi-channel power controller

Main features and benefits

- Compact size
- Capable of driving up to eight SSRs
- Connects to RS-485 Compoway-F network (ModBus in preparation)
- Better performance with standard SSRs
- Lower noise than with Phase Angle (SCR) control
- Lower peak current when using offset control

Compact and easy to integrate!

The G3ZA can control up to 8 solid state relays (SSRs) via a single RS-485 2-wire link to your PLC or PC. There's no need for conversion units or digital output cards – the G3ZA automatically converts the power control signal into a more manageable trigger signal for standard SSRs.

This multi-channel power controller uses a special trigger method and offset control to provide precise heater power regulation. It's faster than standard SSR switching, and it's less noisy and more cost-effective than phase angle control. Available in four versions, the compact G3ZA is easy to install, program and operate.

E5_N series – Temperature controllers

UPDATE

COLOUR CHANGE DISPLAY

Main features and benefits

- High-intensity LCD display with a wide viewing angle
- 3 colour change PV for easy status recognition
- 11-segment display for easy-to-understand text
- Unique 2-PID for optimum control performance
- Easy set-up and operation
- Customisable menus and parameter protection
- PC software tools for parameter cloning, setting and tuning
- Basic (2-step) programmer
- (Partial) heater-break and SSR short-circuit detection system, for 1- or 3-phase configurations
- Loop break alarm and sensor break alarm (with forced MV option)

Evolution in temperature control

Based on the success of the new E5CN series, Omron has introduced upgrades of the E5AN and E5EN temperature controllers.

Each model's back-lit LCD display gives better resolution and sharper digits with a wide viewing angle. These E5_N models are easy to install, configure and operate. They provide maximum temperature control performance, thanks to Omron's unique 2-PID control.

K8 series – Monitoring relays

The smart way to protect your system

The K8 series offers a complete range of first-class quality monitoring products, all in compact 22.5 mm wide DIN-rail housing. The K8 series includes single-phase relays that monitor current or voltage variations, three-phase relays that monitor phase-sequence, phase asymmetry, phase-loss or voltage variations, and a conductive level controller.

With innovative features, these relays provide timely warnings of system errors. This series of just eight models offers you a flexible one-stop-shopping solution for your monitoring requirements.

Typical applications include monitoring generator voltages, providing chain breakage protection for conveyors, checking battery voltage, protecting pumps against idle running, monitoring phase sequence or phase loss on escalators, and monitoring liquid levels in tanks.

Main features and benefits

- LED status indication
- Clear setting of SV, HYS, output ON, delay timer and start-up timer
- Compact 22.5 mm DIN-rail housing, with a depth of 100 mm and a height of 90mm
- Space-saving design of K8AB-PA, -PM, and -PW
- Full installation details on side of product
- Configuration DIP switches
- This new range has been certified for CE approval; UL certification is pending

K8AB-TH – Temperature monitoring relay

Protect your heating application

The K8AB-TH is a temperature-monitoring relay that embodies both temperature-alarm functionality and simple ON/OFF temperature control. The unit is designed specifically for monitoring abnormal temperatures to prevent excessive temperature increases and to protect equipment. It comes in a slim housing with a width of just 22.5 mm suitable for DIN-rail or direct panel mounting. Settings are selected by DIP switches, making the K8AB-TH easy to configure.

Main features and benefits

- Flexibility: simple and intelligent features for temperature alarm
- Easy to set up, field-configurable DIP switch for multi-input and unit selection
- Space-saving design, compact and slim (22.5 mm wide) DIN-rail & direct panel mounting
- Only 4 application-specific models, high- and low-temperature range, 24 V or 100-240 V
- Change-over type output relay, with or without latching and front button reset
- Self protecting against power or unit failure thanks to selectable relay fail-safe mode
- Clear status indication; one LED for power and SV protection, one LED for alarm and unit condition

S8VM – Power supplies

For fast and accurate action to minimise machine downtime

Featuring a new undervoltage alarm with a unique troubleshooting function, S8VM power supplies provide not only a clear indication that a DC output voltage drop has occurred, but also indicate the likely cause – allowing fast, effective corrective action to be taken.

The S8VM series is also designed for direct, easy DIN-rail mounting. And supporting today's trend towards ever-greater downsizing in industrial equipment, the series comes in a new ultra-compact housing that, depending on output power, can be up to 40 % smaller than conventional 'compact' power supplies.
Excellent reasons then, for choosing Omron's new S8VM power supplies. Designed by Omron to provide optimum quality management of your industrial processes and ease of maintenance.

Main features and benefits

- Timely, efficient on-site troubleshooting for optimum quality management
- New ultra-compact housing supports cabinet downsizing
- Early-warning system
- Easy installation
- Broad product range of DC output voltages from 5 V up to 24 V and in powers from 15 W to 150 W

E5CSV – Temperature controller

Main features and benefits

- Easy setting-up using DIP and rotary switches
- End-user friendly since the menu only has 3 parameters
- Meets broad range of basic temperature-control requirements with only 4 models
- No expert knowledge needed to optimise performance because of Self- and Auto-Tuning functions

The easy way to perfect temperature control

The E5CSV temperature-controller series is the enhanced successor to our E5CS series, the most widely sold temperature-controller that has established itself throughout the world as the ideal choice for simple, cost-effective temperature control.

The new series shares many of the outstanding features that made its predecessor such a success – including easy setting up, a large 7-segment LED display and choice of control with Self-Tuning.

Building on the success of the previous E5CS, however, the new E5CSV series offers much more. Like an Auto-Tune function and the fact that as standard you can now select multiple input types (thermocouple/RTD).

A new 3.5 digit display also means that E5CSV can show a larger range, now extending up to 1999 °C. The series also meets new RoHS requirements and complies with the stringent IP66 standard. What's more, depth has been reduced to a mere 78 mm.

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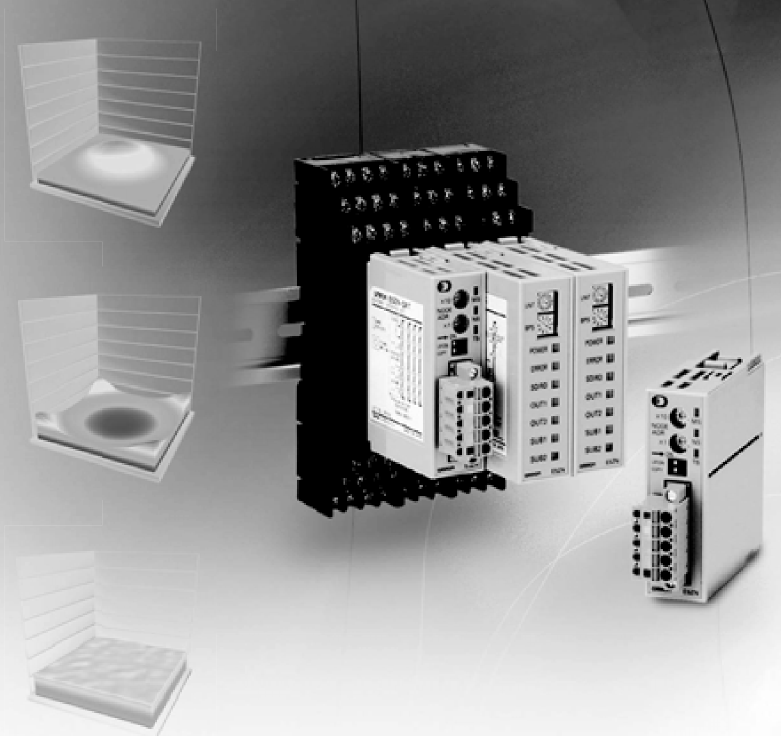
Temperature controllers

Temperature uniformity made easy

With E5ZN temperature controllers, all temperatures are equal

Omron's E5ZN temperature controllers feature GTC, the innovative new gradient temperature control technology.
GTC provides perfectly-controlled 2D temperature profiles over any size sheet and eliminates all irregularities in sheet-processing temperature to provide faster throughput and high, consistent quality and yield. E5ZN types are available with inputs for thermocouple or PRT signals and with voltage, transistor or analogue outputs.

Up to five E5ZN controllers can be connected together to apply GTC to up to 10 heating elements and a DeviceNet communications unit is available to provide centralised control. E5ZN – the perfect solution for 2D processing temperature control.



How many loops are required?

Single loop

What type of control is needed?

Basic

What type of output?

- Relay
  - No display
    - **K8AB-TH** — CD
    - **E5C2** — Page A-5
  - Single digital display
- Voltage (pulse)
  - Single digital display
    - **E5CSV** — Page A-11

General purpose

What type of output?

- Voltage (pulse) / relay / mA linear
  - Dual digital display
    - **E5_N** — Page A-23

Programmer

- Digital display
  - **E5_K-T** — CD

K8AB-TH

CD

E5C2

Page A-5

E5CSV

Page A-11

E5_N

Page A-23

E5_K-T

CD

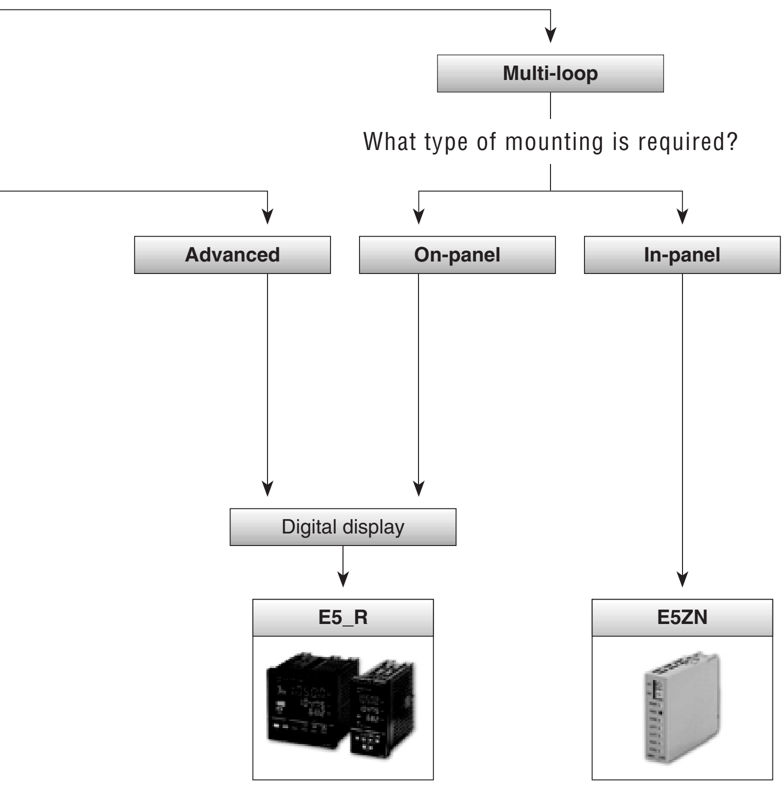
The E5_N series – evolution in temperature control

Now available in a choice of dimensions!

Omron's best-selling E5CN temperature controller is now joined by the upgraded versions of the E5AN and E5EN, offering the same superb features. The E5_N series includes a bright LCD display that gives a clear read-out, even under a wide viewing angle and harsh lighting conditions. They feature a colour change display with process values in three colours for easy status recognition, and an 11-segment display that makes text easy to understand.

The unique 2-PID provides optimum control performance. Plus, the E5_N series is easy to set up and operate. It has customisable menus and parameter protection, as well as PC software tools for parameter cloning, setting and tuning. Trust Omron to set the pace in temperature control evolution!

COLOUR CHANGE DISPLAY



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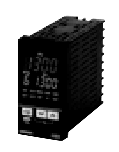
Selection table

Category		Basic temperature controller			General purpose controllers			
Selection criteria								
	Model	**K8AB-TH**	**E5C2**	**E5CSV**	**E5GN**	**E5CN**	**E5EN**	**E5AN**
	Type	Basic			General purpose			
	Panel	In-panel type	In- & on-panel type		On-panel type			
	Loops	-	Single loop					
	Size	22.5 mm wide	1/16 DIN	1/16 DIN	1/32DIN	1/16 DIN	1/8 DIN	1/4 DIN
Control mode	**ON / OFF**	■	■	■				■
	PID		■ *1					
	2-PID *2			■	■	■	■	■
	Operation *3		H	H / C	H & C	H & C	H & C	H & C
	Position proportional *4							
Features	**Accuracy**	±2%		±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
	Auto-tuning			■	■	■	■	■
	Self-tuning			■	■	■	■	■
	Transfer output							
	Remote input							
	Number of alarms	1		2	1	3	3	3
	Heater burnout				□	□ *5	□	□
	IP rating front panel	IP20	IP40	IP65	IP66	IP66	IP66	IP66
	Display	Rotary switch	SV dial	Single 3.5 digit	Dual 4 digit	Dual 4 digit colour change	Dual 4 digit colour change	Dual 4 digit colour change
Supply voltage	**110 / 240 VAC**	■	■	■	■	■	■	■
	24 VAC / VDC	■		□	□	□	□	□
Comms *6	**RS-232**						□	□
	RS-485				□	□	□	□
	Event IP	■				□	□	□
	QLP port					■	■	■
	DeviceNet							
Control output	**Relay**	■	■	■	■	■	■	■
	SSR							
	Voltage (pulse)		■	■	■	■	■	■
	Linear voltage							
	Linear current					■	■	■
Input type - linear	**mA**				□	□	□	□
	mV				■	■	■	■
	V					■	■	■
Input type - thermocouple	**K**	■	■	■	■	■	■	■
	J	■		■	■	■	■	■
	T	■		■	■	■	■	■
	E	■			■	■	■	■
	L		■	■	■	■	■	■
	U			■	■	■	■	■
	N			■	■	■	■	■
	R	■		■	■	■	■	■
	S	■			■	■	■	■
	B	■			■	■	■	■
	W							
	PLII	■						
Input type - RTD	**Pt100**	■	■	■	■	■	■	■
	JPt100			■	■	■	■	■
	THE		■	□				
	Page	CD	A-5	A-11	A-23	A-31	A-45	A-55

*1 P only
*2 2-PID is Omrons unique high-performance PID control
*3 H = heat, H / C = heat or cool, H & C = heat and cool
*4 Position proportional = valve control (relay up & down)
*5 Heater alarm = heater burnout & SSR failure detection
*6 Profibus communication option via gateway for E5_N, E5_R, E5ZN, ask your local Omron representative.
*7 Fuzzy PID available

Temperature controllers

General purpose controller	Advanced controller								
									
E5ZN	E5CK	E5EK	E5AK	E5CK-T	E5EK-T	E5AK-T	E5ER	E5AR	E5ZE
Modular	Universal			Universal / programmer			Advanced		Multi-point
In-panel type	On-panel type								In-panel type
Multi-loop	Single loop							Multi-loop	
22.5 x 130 mm	1/16 DIN	1/8 DIN	1/4 DIN	1/16 DIN	1/8 DIN	1/4 DIN	1/8 DIN	1/4 DIN	65 x 253 mm
■	■	■	■	■	■	■	■	■	■
									■*7
■	■	■	■	■	■	■	■	■	
H&C	H&C	H&C	H&C	H&C	H&C	H&C	H&C	H&C	H&C
		■	■		■	■	■	■	
±0.5%	±0.3%	±0.3%	±0.3%	±0.3%	±0.3%	±0.3%	±0.1%	±0.1%	±0.3%
■	■	■	■	■	■	■	■	■	■
	■	■	■	■	■	■			
■	□	□	□	□	□	□	■	■	
		□	□				■	■	■
2	3	3	3	3	3	3	4	4	2
■	Loop burnout	□	□	Loop burnout	□	□			■
	IP66	IP66	IP66	IP66	IP66	IP66	IP66	IP66	
□ Dual 4 digit	Dual 4 digit	Dual 4 digit	Dual 4 digit	Dual 4 digit	Dual 4 digit	Dual 4 digit	Triple 5 digit	Triple 5 digit	□ Dual 4 digit
	■	■	■	■	■	■	■	■	
■	□	□	□	□	□	□	□	□	■
	□	□	□	□	□	□			□
■	□	□	□	□	□	□	□	□	□
■	□	□	□	□	□	□	■	■	
	■	■	■	■	■	■	■	■	
□		□					□	□	□
	■	■	■	■	■	■	■	■	■
		■	■		■	■			
■	■	■	■	■	■	■	■	■	■
	■	■	■	■	■	■			
■	■	■	■	■	■	■	■	■	■
□	■	■	■	■	■	■	■	■	
■									
	■	■	■	■	■	■	■	■	
■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■
	■	■	■	■	■	■	■	■	■
	■	■	■	■	■	■			■
■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■			■
A-65	CD	CD		CD			A-87		CD

■ Standard □ Available ☐ No / not available

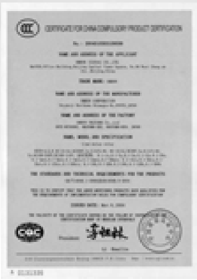
LEADING IN SERVICE

Focussed, progressive, distinctive. Be assured, choose Omron

At Omron we set high standards for ourselves. Our products are known all over the world for their unrivalled quality. But we offer more than just excellent quality. In an environment that places ever greater demands with regard to service, quality and costeffectiveness, other things are important too. Providing a top-quality service is what we do every day, including extra service as standard. This helps to ensure that we can provide tailor-made solutions for applications more effectively and more quickly.

More and more companies are choosing Omron as they seek to work in a partnership that is based on reliability and certainty.

Omron – the reassuring choice.



International standards and approvals

Our products carry all relevant international standards and approvals, including CCC (Chinese Compulsory Certification), which makes exporting your system much easier.

- Reliability, also for your customers
- Maximum flexibility
- Confidence

5-day repair service

More and more people are choosing Omron, as a high degree of reliability is a key feature of its products. You can always rely on Omron. Even if a product unexpectedly malfunctions, our repair team is ready to swing into action.

- Product repaired and returned to you within 5 days, including collection and delivery
- You can track the status of your repair on-line
- Repairs within warranty are completely free-of-charge

For more information please visit the Service & Support section at http://omron-industrial.com

EPLAN for Omron products

The majority of standard Omron products are provided in digital EPLAN format, which means that a few clicks of your mouse are all that is needed to design the right product into your switching panel.

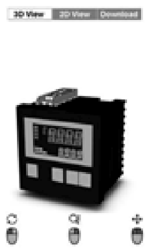
For more information please visit: http://omron-industrial.com/en/eplan/

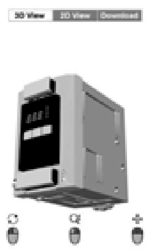
- Very easy to use
- Always the right product
- Reduced engineering time

Downloadable 2-D and 3-D CAD drawings

Designers of switching panels and machines can download clear 2-D and 3-D CAD drawings for all current products from http://omron-industrial.com/en/2D3D, which can easily be incorporated into your design.

- Large number of formats supported for greater flexibility
- Readily available
- Convenience that saves you time





Analogue Temperature Controller E5C2

DIN-sized (48 x 48 mm) Temperature Controller with Analog Setting

- Compact, low-cost Temperature Controller.
- Incorporates proportional control and reset adjustment function.
- Consecutive mounting possible using mounting adapter.
- Incorporates a plug-in socket, thus allows to DIN-rail and flush mounting.

Model Number Structure

■ Model Number Legend

E5C2- □ □ □ □
1 2 3 4 5

1. **Model name**
2. **Control output**
   R: Relay
   Q: Voltage
3. **Control method**
   20: ON-OFF control
   40: P control
4. **Input type**
   K: K-type thermocouple
   L: J-type thermocouple
   P: Platinum resistance thermometer (PT100)
   G: Thermistor (THE)
5. **Special type**
   Blank: Standard type
   D, DIN: Special types

Ordering Information

■ Temperature Controllers

Setting method	Indication method	Control mode	Output	Model			
				Thermocouple		Platinum resistance thermometer Pt100	Thermistor THE
				K (CA) Chromel vs. alumel	L (IC) Iron vs. constantan		
Analog setting	No indication	ON/OFF	Relay	E5C2-R20K	E5C2-R20L-D	E5C2-R20P-D	E5C2-R20G
		P	Relay	E5C2-R40K	E5C2-R40L-D	E5C2-R40P-D	---

Note: When placing an order, specify the standard temperature range and supply voltage in addition to the model number.
(e.g., E5C2-R20K 0°C to 200°C 100/110 VAC)

■ Accessories (Order Separately)

Name	Model
Front Connecting Socket	P2CF-08
Back Connecting Socket (for flush mounting)	P3G-08
Front Connecting Socket with Finger Protection	P2CF-08-E
Protective Cover (for finger protection)	Y92A-48G

Specifications

■ Ratings

Supply voltage	100/110/120 VAC (common), 200/220/240 VAC (common) (See note.) 50/60 Hz (common)
Operating voltage range	90% to 110% of rated supply voltage
Power consumption	Approx. 2 VA
Input	Thermocouple (with sensor burnout detection circuit), platinum resistance thermometer, or thermistor
Control mode	ON/OFF or P control
Setting method	Analog setting
Indication method	No indication
Control output	Relay output: SPDT, 3 A at 250 VAC, resistive load (switching capacity: 330 VA)

Note: Specify either 100/110/120 VAC or 200/220/240 VAC when ordering.

■ Input Ranges

Input		Thermocouple		Platinum resistance thermometer	Thermistor (see note 2)
		K (CA) Chromel vs. alumel	L (IC) Iron vs. constantan	Pt100	THE
Range	**°C**	0 to 200 (5), 0 to 300 (10), 0 to 400 (10), 0 to 600 (20), 0 to 800 (20), 0 to 1,000 (25), 0 to 1,200 (25)	0 to 200 (5), 0 to 300 (10), 0 to 400 (10)	–50 to 50 (2), –20 to 80 (2), 0 to 50 (1), 0 to 100 (2), 0 to 200 (5), 0 to 300 (10), 0 to 400 (10)	–50 to 50 (2) (6 kΩ at 0°C), 0 to 100 (2) (6 kΩ at 0°C), 50 to 150 (2) (30 kΩ at 0°C)
	°F	32 to 392 (10), 32 to 572 (20), 32 to 752 (20), 32 to 1,112 (40), 32 to 1,472 (50), 32 to 1,832 (50), 32 to 2,192 (50)	32 to 392 (10), 32 to 572 (20), 32 to 752 (20)	32 to 212 (5), 32 to 392 (10)	---

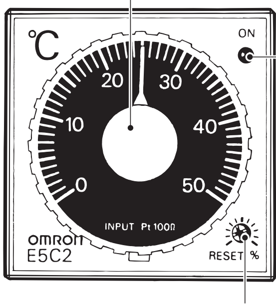
Note: 1. Values in ( ) are the minimum unit.
2. Values in ( ) are the thermistor resistive value.

■ Characteristics

Setting accuracy	±2% FS max.
Hysteresis	Approx. 0.5% FS (fixed)
Proportional band	3% FS (fixed)
Control period	Approx. 20 s
Reset range (see note 1)	5 ±1% FS min.
Insulation resistance	20 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between charged terminals and uncharged metallic parts
Vibration resistance	Malfunction: 10 to 55 Hz, 0.15-mm single amplitude for 10 min each in X, Y, and Z directions Destruction: 16.7 Hz, 2-mm double amplitude for 2 hrs each in X, Y, and Z directions
Shock resistance	Malfunction: 147 m/s^2, 3 times each in 6 directions Destruction: 294 m/s^2, 3 times each in 6 directions
Life expectancy	Electrical: 100,000 operations min. (3 A at 110 VAC, resistive load)
Ambient temperature	Operating: –10°C to 55°C (with no icing or condensation)
Ambient humidity	Operating: 45% to 85%
Degree of protection	Front panel: IEC standard IP40 (see note 2) Terminals: IEC standard IP00
Weight	Approx. 200 g (with flush-mounting adapter)

Note: 1. No reset function is incorporated by any E5C2 model with ON/OFF control.
2. The model number of the special watertight cover conforming to IP66, NEMA4 is Y92A-48B.

Nomenclature

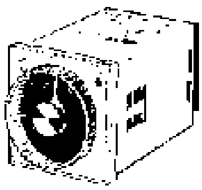


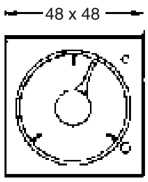
Operation Indicator

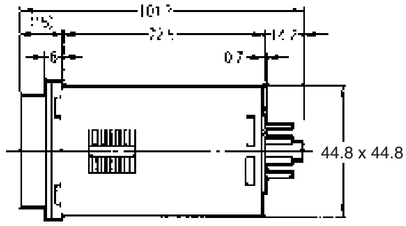
Indicator		Output
Red	Lit	ON
	Not lit	OFF

Dimensions

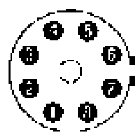
Note: All units are in millimeters unless otherwise indicated.



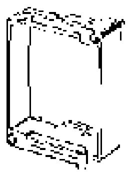


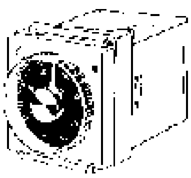


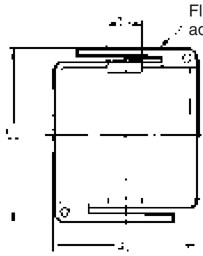
Terminal Arrangement (Bottom View)

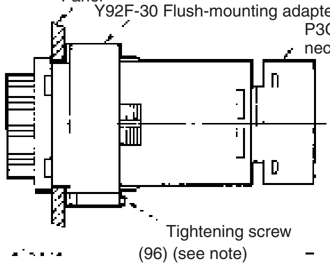


Dimensions with Flush-mounting Adapter (Accessory), and Back Connecting Socket (Sold Separately)



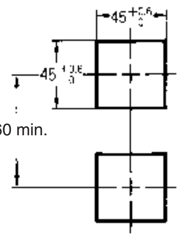




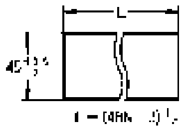


Note: 109 mm for US08 Back Connecting Socket

Panel Cutout



Side-by-side Mounting of N Controllers

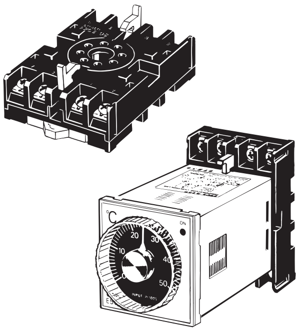


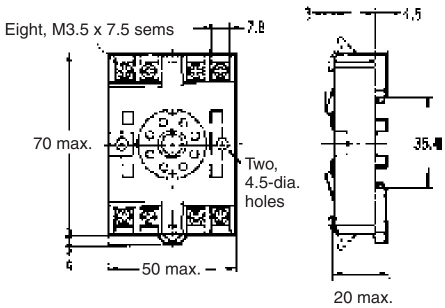
N	2	3	4	5	6
L	93^{+1}_{0}	141^{+1}_{0}	189^{+1}_{0}	237^{+1}_{0}	285^{+1}_{0}

Note: 1. Recommended panel thickness is 1 to 4 mm.
2. Close side-by-side mounting is possible (in a single direction).

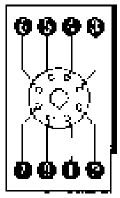
Accessories (Order Separately)

P2CF-08 Front Connecting Socket





Terminal Arrangement/ Internal Connections (Top View)

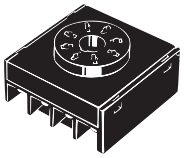


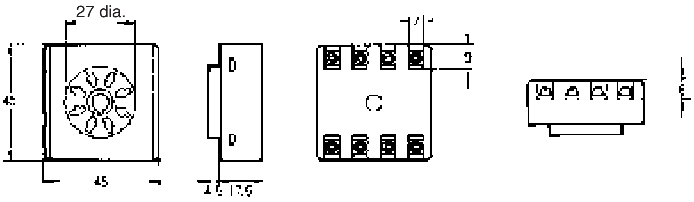
Mounting Holes

Note: Can also be mounted to a DIN track.

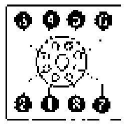
Note: A finger-protection model (P2CF-08-E) is also available.

P3G-08 Back Connecting Socket (for Flush Mounting)





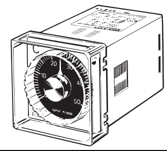
Terminal Arrangement/ Internal Connections (Bottom View)



Note: A Protective Cover for finger protection (Y92A-48G) is also available.

Protective Cover Y92A-48

The protective cover protects the front panel, particularly the setting section, against dust, dirt, and water drip. It also prevents the set values from being altered due to accidental contact with the setting keys.

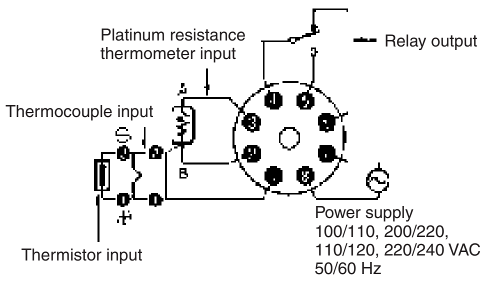
Appearance	
Model	Y92A-48B

Installation

■ Connections

Input

Connect a thermocouple, the E52-THE□ Thermistor or platinum resistance thermometer to the E5C2 as shown in the following illustration.



Output

If the load circuit is a heating control system, be sure to connect the load to terminals 4 and 5. If the load circuit is a cooling control system, be sure to connect the load to terminals 4 and 6. If the heating control system is connected to terminals 4 and 6 or the cooling control system is connected to terminals 4 and 5, the temperature of the heating control system or cooling control system will be abnormal and a serious accident may result.

If the E5C2 is in frequent operation, such as proportional operation, add an appropriate external relay to the E5C2 by considering the capacity of the load and the life of the relay.

Power Supply

If a single power supply is used for the E5C2 and the load, the supply voltage of the power supply may vary greatly when the load is open or closed if the capacity of the power supply is not large enough. Make sure that the capacity of the power supply is large enough so that the supply voltage range will be always from 90% to 110% of the rated supply voltage.

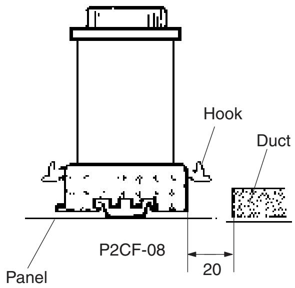
The E5C2 operates at either 50 or 60 Hz.

Precautions

Mounting

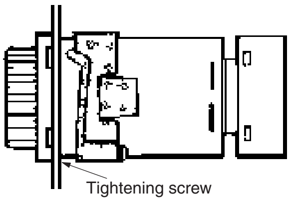
DIN-rail mounting (E5C2 with P2CF-08)

When mounting two or more E5C2 models with DIN-rail mounting sockets, leave a space of approximately 20 mm on both sides of the sockets where hooks are located.

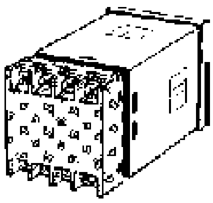


Flush Mounting

Insert E5C2 into the square hole of the panel and insert an adapter from the back so that there will be no space between E5C2 and the panel. Then, secure the E5C2 with a screw.

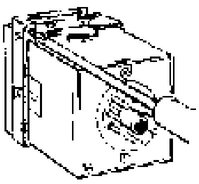


The P3G-08 can be wired in the same way as the P2CF-08.



Dismounting

If flush mounted, loosen the screw of the adapter and disengage the hooks for dismounting.



Temperature Setting

Do not turn the temperature setting knob of the E5C2 with excessive force, otherwise the stopper of the knob may break.

Others

Do not remove the housing of the E5C2, otherwise the housing may break.

To clean the surface of the E5C2, use a soft cloth wet with neutral detergent or alcohol. Do not use any organic solvent, such as paint thinner or benzine, strong acid or strong alkali to clean the surface of the E5C2, otherwise the surface of the E5C2 will become damaged.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. H081-E2-02

OMRON

Temperature Controllers
E5CSV

Easy Setting Using DIP Switch and Simple Functions in DIN 48 x 48 mm-size Temperature Controllers

- Easy setting using DIP and rotary switches.
- Multi-input (thermocouple/platinum resistance thermometer).
- Clearly visible digital display with character height of 13.5 mm.
- RoHS compliant.

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NEW

Model Number Structure

■ Model Number Legend

Models with Terminal Blocks

E5CSV-□1T□-500
1 2 3 4 5

1. **Output type**
   R: Relay
   Q: Voltage for driving SSR
2. **Number of alarms**
   1: 1 alarm
3. **Input type**
   T: Thermocouple/platinum resistance thermometer (multi-input)
4. **Power supply voltage**
   Blank: 100 to 240 VAC
   D: 24 VAC/VDC
5. **Terminal cover**
   500: Finger protection cover

Ordering Information

■ List of Models

Size	Power supply voltage	Number of alarm points	Control output	TC/Pt multi-input Incl. terminal cover
1/16 DIN 48 x 48 x 78 mm (W x H x D)	100 to 240 VAC	1	Relay	E5CSV-R1T-500
			Voltage (for driving SSR)	E5CSV-Q1T-500
	24 VAC/VDC	1	Relay	E5CSV-R1TD-500
			Voltage (for driving SSR)	E5CSV-Q1TD-500

■ Accessories (Order Separately)

Protective Front Cover

Type	Model
Hard Protective Cover	Y92A-48B

Specifications

■ Ratings

Supply voltage		100 to 240 VAC, 50/60 Hz	24 VAC/VDC, 50/60 Hz
Operating voltage range		85% to 110% of rated supply voltage	
Power consumption		5 VA	3 VA/2 W
Sensor input		Multi-input (thermocouple/platinum resistance thermometer) type: K, J, L, T, U, N, R, Pt100, JPt100	
Control output	**Relay output**	SPST-NO, 250 VAC, 3A (resistive load)	
	Voltage output (for driving the SSR)	12 VDC, 21 mA (with short-circuit protection circuit)	
Control method		ON/OFF or 2-PID (with auto-tuning)	
Alarm output		SPST-NO, 250 VAC, 1A (resistive load)	
Setting method		Digital setting using front panel keys (functionality set-up with DIP switch)	
Indication method		3.5 digit, 7-segment digital display (character height: 13.5 mm) and deviation indicators	
Other functions		• Setting change prohibit (key protection) • Input shift • Temperature unit change (°C/°F) • Direct/reverse operation • Control period switching • 8-mode alarm output • Sensor error detection	
Ambient temperature		-10 to 55°C (with no condensation or icing)	
Ambient humidity		25% to 85%	
Storage temperature		-25 to 65°C (with no condensation or icing)	

■ Characteristics

Setting accuracy		Thermocouple (See note 1.): (±0.5% of indication value or ±1°C, whichever is greater) ±1 digit max. Platinum resistance thermometer (See note 2.): (±0.5% of indication value or ±1°C, whichever is greater) ±1 digit max.
Indication accuracy (ambient temperature of 23°C)		
Influence of temperature		R thermocouple inputs: (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Other thermocouple inputs: (±1% of PV or ±4°C, whichever is greater) ±1 digit max. Platinum resistance thermometer inputs: (±1% of PV or ±2°C, whichever is greater) ±1 digit max.
Influence of voltage		
Hysteresis (for ON/OFF control)		0.1% FS
Proportional band (P)		1 to 999°C (automatic adjustment using auto-tuning/self-tuning)
Integral time (I)		1 to 1,999 s (automatic adjustment using auto-tuning/self-tuning
Derivative time (D)		1 to 1,999 s (automatic adjustment using auto-tuning/self-tuning)
Alarm output range		Absolute-value alarm: Same as the control range Other: 0% to 100% FS Alarm hysteresis: 0.2°C or °F (fixed)
Control period		2/20 s
Sampling period		500 ms
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		2,000 VAC, 50/60 Hz for 1 min between current-carrying terminals of different polarity
Vibration resistance	**Malfunction**	10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions
	Destruction	10 to 55 Hz, 0.75-mm single amplitude for 2 hr each in X, Y, and Z directions
Shock resistance	**Malfunction**	100 m/s² min., 3 times each in 6 directions
	Destruction	300 m/s² min., 3 times each in 6 directions
Life expectancy	**Electrical**	100,000 operations min. (relay output models)
Weight		Approx. 120 g (Controller only)
Degree of protection		Front panel: Equivalent to IP66; Rear case: IP20; Terminals: IP00
Memory protection		EEPROM (non-volatile memory) (number of writes: 1,000,000)
EMC		EMI Radiated: EN 55011 Group 1 Class A EMI Conducted: EN 55011 Group 1 Class A ESD Immunity: EN 61000-4-2: 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Radiated Electromagnetic Field Immunity: EN 61000-4-3: 10 V/m (80-1000 MHz, 1.4-2.0 GHz amplitude modulated) (level 3) 10 V/m (900 MHz pulse modulated) Conducted Disturbance Immunity: EN 61000-4-6: 3 V (0.15 to 80 MHz) (level 2) Noise Immunity (First Transient Burst Noise): EN 61000-4-4 Burst Immunity: 2 kV power-line (level 3), 1 kV I/O signal-line (level 3) Surge Immunity: EN 61000-4-5: Power line: Normal mode 1 kV; Common mode 2 kV Output line (relay output): Normal mode 1 kV; Common mode 2 kV Voltage Dip/Interrupting Immunity: EN 61000-4-11 0.5 cycle, 100% (rated voltage)
Approved standards		UL 61010C-1 (listing), CSA C22.2 No.1010-1
Conformed standards		EN 61326, EN 61010-1, IEC 61010-1, VDE 0106 Part 100 (finger protection), when the terminal cover is mounted.

Note: 1. The following exceptions apply to thermocouples.
- U, L: ±2°C ±1 digit max.
- R: ±3°C ±1 digit max. at 200°C or less

2. The following exceptions apply to platinum resistance thermometers.
Input set values 0, 1, 2, 3 for E5CSV: 0.5% FS ±1 digit max.
Input set value 1 for E5CSV: 0.5% FS ±1 digit max.

Installation

- All models in the E5CSV Series conform to DIN 43700 standards.
- The recommended panel thickness is 1 to 4 mm.
- Be sure to mount the E5CSV horizontally.

Mounting the E5CSV

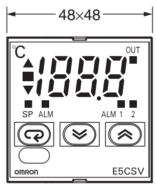
1. For waterproof mounting, waterproof packing must be installed on the Controller. Waterproofing is not possible when group mounting several Controllers.
2. Insert the E5CSV into the mounting hole in the panel.
3. Push the adapter from the terminals up to the panel, and temporarily fasten the E5CSV.
4. Tighten the two fastening screws on the adapter. Alternately tighten the two screws little by little to maintain a balance. Tighten the screws to a torque of 0.29 to 0.39 N·m.

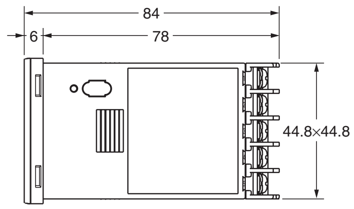
Dimensions

Note: All units are in millimeters unless otherwise indicated.

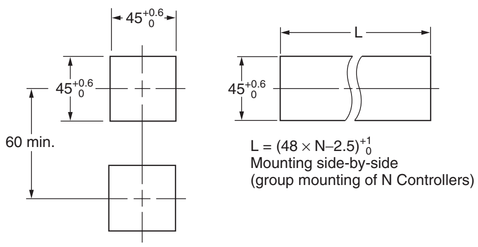
■ Controller

E5CSV



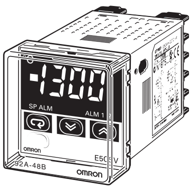


Panel Cutout Dimensions



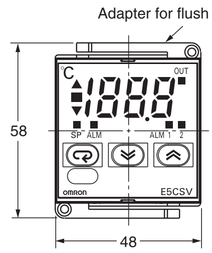
Note: Terminals cannot be removed.

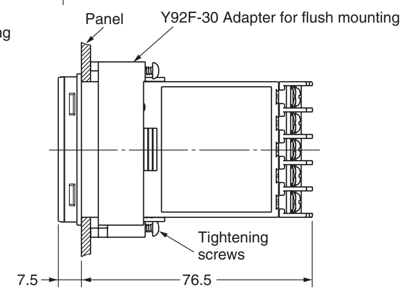
Hard Protective Cover



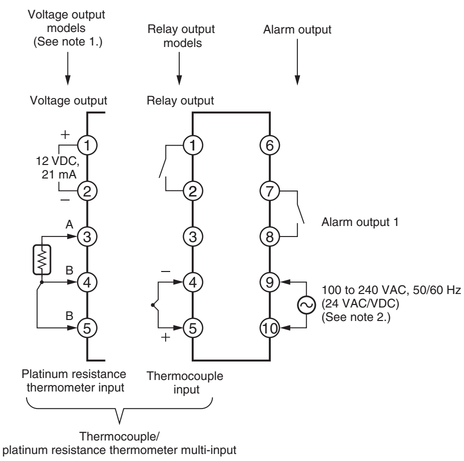
The Y92A-48B Protective Cover (hard type) is available for the following applications.

- To protect the set from dust and dirt.
- To prevent the panel from being accidentally touched causing displacement of set values.
- To provide effective protection against water droplets.



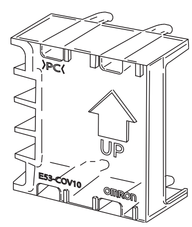


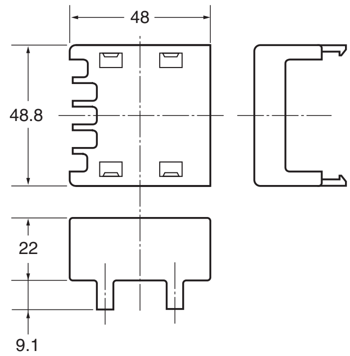
Note: 1. The recommended panel thickness is 1 to 4 mm.
2. Group mounting is possible in one direction only.



Terminal Cover

E53-COV10

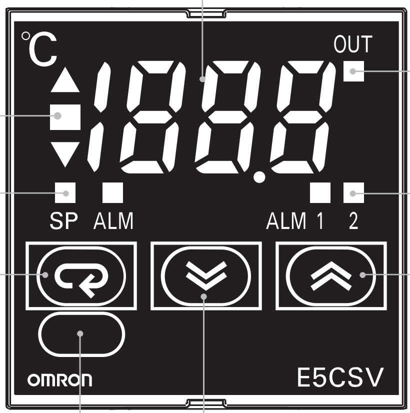




Note: 1. The voltage output (12 VDC, 21 mA) is not electrically isolated from the internal circuits. When using a grounding thermocouple, do not connect output terminals 1 or 2 to ground. Otherwise, unwanted current paths will cause measurement errors.
2. Models with 100 to 240 VAC and 24 VAC/VDC are separate. Models using 24 VDC have no polarity.

Operation

E5CSV



Deviation indicators

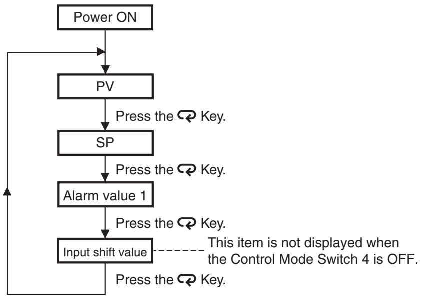
The △ indicator lights when the PV is greater than the SP and the ▽ indicator lights when the PV is less than the SP. The □ indicator (green) lights when the deviation is less than 1% FS (0.25% FS for multi-input models). These indicators flash during ST (self-tuning)/AT (auto-tuning).

Mode indicators

The SP indicator lights when the setting temperature is being displayed. The ALM indicator lights when the alarm value 1 is being displayed.

Mode Key

When the power is turned ON, normally the display will use the display items in the following order each time the Mode Key is pressed.



Lock Release Key

When the protect switch is ON, the set value can be changed by pressing the Up and Down Keys while holding down the Lock Release Key.

PV, SP, Alarm Value, Input Shift Display

The display switches each time the ⟲ Key is pressed.

Output indicator

Lights when the control output is ON.

Alarm indicators

ALM1 (Alarm 1): Lights when the alarm 1 output is ON.
ALM2 (Alarm 2): For future use.

Up Key

Pressing the Up Key increases the SP/alarm value display. Keeping the Up Key pressed continues to increase the display value. When the internal protect switch is ON, press the Up Key while holding down the Lock Release Key.

Down Key

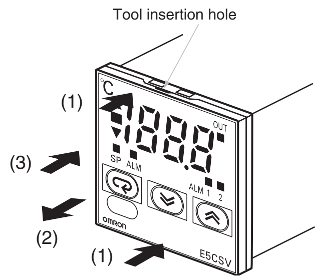
Pressing the Down Key decreases the SP/alarm value display. Keeping the Down Key pressed continues to decrease the display value. When the internal protect switch is ON, press the Down Key while holding down the Lock Release Key.

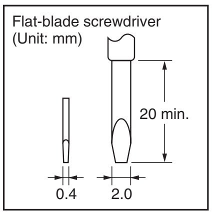
Settings before Turning ON the Power

E5CSV

Remove the E5CSV from the case to make the settings.

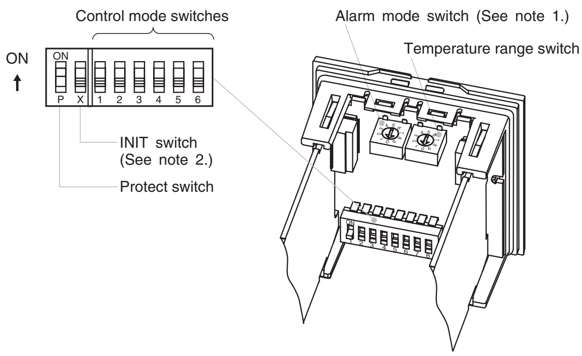
1. Insert the tool into the two tool insertion holes (one on the top and one on the bottom) and release the hooks.





2. Insert the tool in the gap between the front panel and rear case, and pull out the front panel slightly. Grip the front panel and pull out fully. Be sure not to impose excessive force on the panel.

3. When inserting the E5CSV, check to make sure that the sealing rubber is in place and push the E5CSV toward the rear case until it snaps into position. While pushing the E5CSV into place, push down on the hooks on the top and bottom surfaces of the rear case so that the hooks are securely locked in place. Make sure that electronic components do not come into contact with the case.



Note: 1. The INIT switch is always OFF during normal operation.

1. Sensor Type Specification

Multi-input (Thermocouple/Platinum Resistance Thermometer) Models

• Using Thermocouple Sensors, Control Mode Switch 5: OFF

Setting number	Input	SP range (upper limit)	SP range (lower limit)
0	K	1,300	-99
1	K	199.9	0.0
2	J	850	-99
3	J	199.9	0.0
4	L	850	-99
5	T	400	-99
6	T	199.9	0.0
7	U	400	-99
8	N	1,300	-99
9	R	1,700	0

• The control range is -20°C to +20°C of the input temperature range.

Note: 1. The input indication range is the range that can be displayed for the control range (-99 to 1999). If the input is within the control range but exceeds the display range (-99 to 1999), values below -99 will be displayed as "ccc" and values above 1,999 will be displayed as "ɔɔɔ."

2. If unit is changed to 1 degree when the SP and alarm value for the temperature range are displayed in 0.1-units from 0.0 to 199.9 or 0.0 to 99.9, the values will be multiplied by 10 (e.g., 0.5 becomes 5). If the unit is changed in the reverse direction, the values will be divided by 10. After changing the range, set the SP and alarm value again.

• Using Platinum Resistance Thermometers, Control Mode Switch 5: ON

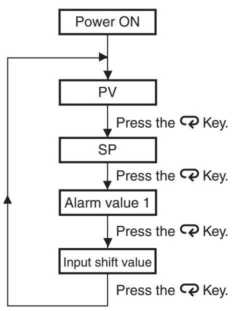
Setting number	Input	SP range (upper limit)	SP range (lower limit)
0	Pt100	850	-99
1	Pt100	199.9	0.0
2	Pt100	99	-99
3	Pt100	200	0
4	Pt100	400	0
5	JPt100	500	-99
6	JPt100	199.9	0.0
7	JPt100	99	-99
8	JPt100	200	0
9	JPt100	400	0

• The control range is -20°C to +20°C of the input temperature range.

Note: 1. The input indication range is the range that can be displayed for the control range (-99 to 1999). If the input is within the control range but exceeds the display range (-99 to 1999), values below -99 will be displayed as "ccc" and values above 1,999 will be displayed as "ɔɔɔ."

2. If unit is changed to 1 degree when the SP and alarm value for the temperature range are displayed in 0.1-units from 0.0 to 199.9 or 0.0 to 99.9, the values will be multiplied by 10 (e.g., 0.5 becomes 5). If the unit is changed in the reverse direction, the values will be divided by 10. After changing the range, set the SP and alarm value again.

Mode Key Display Order



• If the SP falls outside the temperature range when the temperature range is changed, the SP will be displayed first. The SP will be changed automatically either to the minimum value or the maximum value, whichever is nearest.

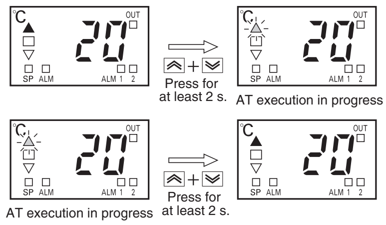
• If the alarm value falls outside the temperature range when the temperature range is changed, the alarm value will be displayed first. The alarm value will be changed automatically to the maximum value in the new temperature range.

ST (Self-tuning) Features

ST (self-tuning) is a function that finds PID constants by using step response tuning (SRT) when Controller operation begins or when the set point is changed. Once the PID constants have been calculated, ST is not executed when the next control operation is started as long as the set point remains unchanged. When the ST function is in operation, be sure to turn ON the power supply of the load connected to the control output simultaneously with or before starting Controller operation.

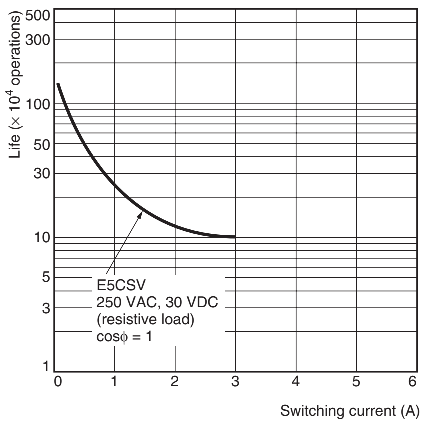
Executing AT (Auto-tuning)

AT (auto-tuning) is executed by pressing the Up and Down Keys for at least 2 s while the PV is displayed. The deviation indicators flash during auto-tuning (AT) execution. AT will be cancelled by performing the same operation that AT is executing during AT operation. Flashing stops when AT is completed.



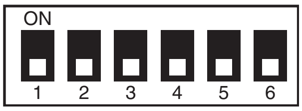
Note: One of the deviation indicators (▲■▼) will flash.

■ Electrical Life Expectancy Curve for Relays (Reference Values)



2. Operation Settings

Use the control mode switches ( ) to change the control mode. (All switches are OFF for the default settings.)

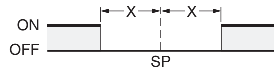
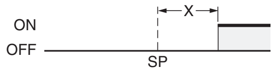
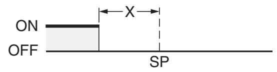
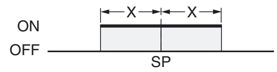
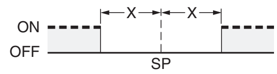
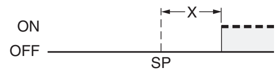
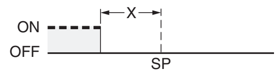
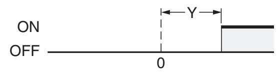


Function selection		1	2	3	4	5	6
ON/OFF PID	**PID control**	ON					
	ON/OFF control	OFF					
Control period	**2 s**		ON				
	20 s		OFF				
Direct/ reverse opera-tion	**Direct operation (cooling)**			ON			
	Reverse operation (heating)			OFF			
Input shift display	**Enabled**				ON		
	Disabled				OFF		
Tempera-ture Sensor selection	**Platinum resistance thermometer input**					ON	
	Thermocouple input					OFF	
Temper-ature unit	**°F**						ON
	°C						OFF

Note: The previous name Pt100 has been changed to JPt100 in accordance with revisions to JIS. The previous name J-DIN has been changed to L in accordance with revisions to DIN standards.

3. Alarm Modes

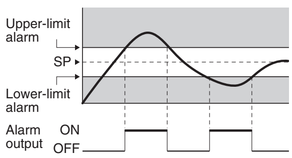
Select the number of the alarm mode switch when changing the alarm mode. (The default is 2).

Set value	Alarm type	Alarm output operation
0, 9	Alarm function OFF	OFF
1	Upper- and lower-limit	
2	Upper-limit	
3	Lower-limit	
4	Upper- and lower-limit range	
5	Upper- and lower-limit with standby sequence (See note 2.)	
6	Upper-limit with standby sequence (See note 2.)	
7	Lower-limit with standby sequence (See note 2.)	
8	Absolute-value upper-limit	

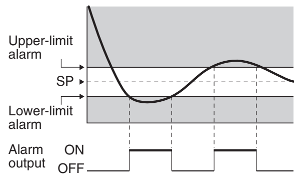
Note: 1. No alarm. The alarm value (alarm operation display) will not be displayed when the setting is 0 or 9 even if the selection key is pressed.
Alarm Setting Range
X: 0 to FS (full scale); Y: Within temperature range
The value of X is the deviation setting for the SP (set point).

2. Standby Sequence Function (The standby sequence operates when the power is turned ON.)

Rising Temperature



Dropping Temperature



Note: Turn OFF the power before changing the DIP switch settings on the E5CSV. Each of the switch settings will be enabled after the power is turned ON.

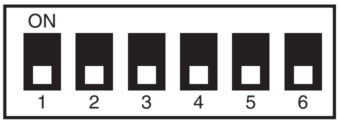
For details on the position of the temperature range switch, control mode switches, and alarm mode switch, refer to page A-14.

4. Using the Control Mode Switches

(1) Using ON/OFF Control and PID Control

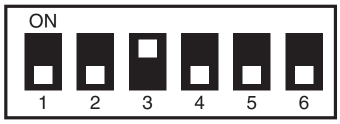
(1.1) ON/OFF Control

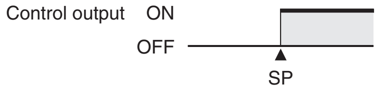
The control mode is set to ON/OFF control as the default setting.



Switch 1 OFF: ON/OFF control

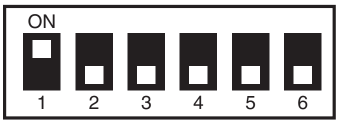
To perform cooling control of freezers, etc., turn ON switch 3.





(1.2) PID Control

Turn ON switch 1 to use PID control.

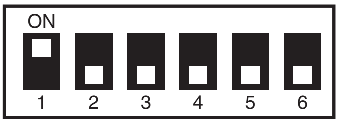


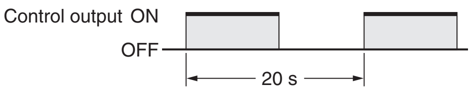
Switch 1 ON: PID control

1. Set the control period.

<u>Performing Control via Relay Output, External Relay, or Conductor</u>

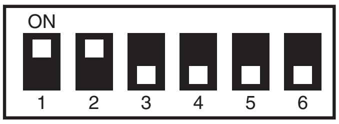
Switch 2: OFF (control period: 20 s)

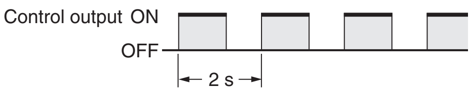




<u>Quick Control Response Using an SSR</u>

Switch 2: ON (control period: 2 s)

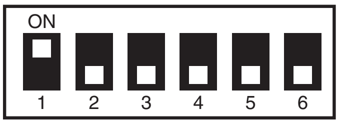


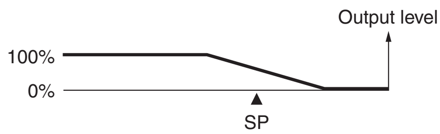


2. Set direct/reverse operation for the output.

<u>Performing Heating Control for Heaters</u>

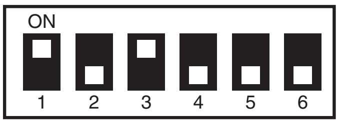
Switch 3: OFF

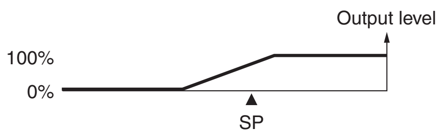




<u>Performing Cooling Control for Freezers</u>

Switch 3: ON

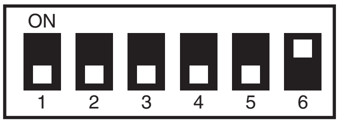




(2) Using the E5CSV in Devices for Fahrenheit-scale Users

(Displaying in °F)

Turn ON switch 6 to display temperatures in °F.



Temperature Range for °F

The temperature is set to °F using the same temperature range switch as °C.

Multi-input (Thermocouple/ Platinum Resistance Thermometer)
Control mode switch 5: OFF

Setting	°F	
0	K	-99 to 1999
1		0.0 to 199.9
2	J	-99 to 1500
3		0.0 to 199.9
4	L	-99 to 1500
5	T	-99 to 700
6		0.0 to 199.9
7	U	-99 to 700
8	N	-99 to 1999
9	R	0 to 1999

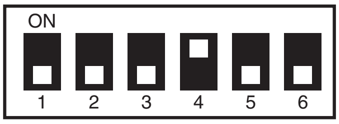
Multi-input (Thermocouple/ Platinum Resistance Thermometer)
Control mode switch 5: ON

Setting	°F	
0	Pt100	-99 to 1500
1		0.0 to 199.9
2		-99 to 99
3		0 to 200
4		0 to 400
5	JPt100	-99 to 900
6		0.0 to 199.9
7		-99 to 99
8		0 to 200
9		0 to 400

Note: The control range for multi-input (thermocouple/platinum resistance thermometer) models is -40 to +40°F of each temperature range.
The previous name J-DIN has been changed to L in accordance with revisions to DIN standards.

(3) Setting Input Shift

Turn ON switch 4, and after turning ON the power, press the Mode Key until H0 (indicates input shift of 0) is displayed. Press the Up and Down Keys to set the shift value.



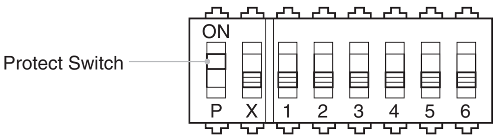
Shift Example

Input shift display	Measured temperature	Temperature display
H0 (no shift)	100°C	100°C
H9 (+9°C shift)	100°C	109°C
L9 (-9°C shift)	100°C	91°C

Note: When control mode switch 4 is turned OFF (no input shift display), the input shift is not displayed but the shift value is enabled. To disable input shift, set the input shift value to H0. The shift range depends on the setting unit.

Setting unit	1°C	0.1°C
Compensation range	-99 to +99°C	-9.9 to +9.9°C
Input shift display	L99 to H99	L9.9 to H9.9

5. Protect Switch



When the protect switch is ON, Up Key and Down Key operations are prohibited to prevent setting mistakes.

Error Displays and Causes

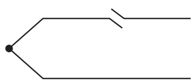
In addition to the alarm indicator, errors notification is provided on the display. Be sure to remove the cause of the error promptly.

Display status	Cause	Control output
PV displayed as FFF	The process value is higher than the control temperature range (overflow).	Heating control (reverse operation): OFF Cooling control (direct operation): ON
PV displayed as ---	The process value is lower than the control temperature range (underflow).	Heating control (reverse operation): ON Cooling control (direct operation): OFF
FFF flashing	(1) Thermocouple models and platinum resistance thermometer models: The process value is higher than the overflow temperature, or a Sensor error has occurred. (2) Multi-input (Thermocouple/platinum resistance thermometer) models: The process value is higher than the control temperature range or a Sensor error has occurred.	OFF
--- flashing	(1) Thermocouple and platinum resistance thermometer input: The process value is lower than the underflow temperature, or a Sensor error has occurred. (2) Thermocouples: The polarity is reversed. (3) Multi-input (Thermocouple/platinum resistance thermometer) models: The process value is lower than the control temperature range or a Sensor error has occurred.	OFF
E11 is displayed	A memory error (E11) has occurred. Turn the power ON again. If the display remains the same, the Controller must be repaired.	The control outputs and alarm outputs turn OFF.

Note: In models with an alarm, FFF appears or flashes on the display to indicate that the temperature has exceeded the maximum display temperature and the output is set according to the alarm mode. In the same way, --- appears or flashes on the display to indicate that the temperature has exceeded the minimum display temperature and the output is set according to the alarm mode.

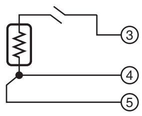
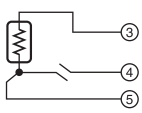
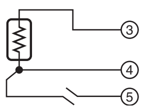
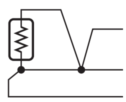
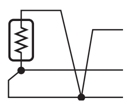
Sensor Error Displays and Causes

■ Thermocouple

Status		Display	Control output
Burnout		FFF flashing	OFF

Note: The room temperature is displayed if an input short-circuit occurs.

■ Platinum Resistance Thermometer

Status		Display	Control output
Burnout	 	FFF flashing	OFF
		--- flashing	OFF
	2 or 3 wires disconnected	FFF flashing	OFF
Short-circuit	 	--- flashing	OFF

Note: The resistance value for platinum resistance thermometers is 100 Ω at 0°C and 140 Ω at 100°C.

Precautions

⚠ CAUTION

Do not touch the terminals while power is being supplied. Doing so may occasionally result in minor injury due to electric shock.

Do not allow pieces of metal, wire clippings, or fine metallic shavings or filings from installation to enter the product. Doing so may occasionally result in electric shock, fire, or malfunction.

Do not use the product where subject to flammable or explosive gas. Otherwise, minor injury from explosion may occasionally occur.

Never disassemble, modify, or repair the product or touch any of the internal parts. Minor electric shock, fire, or malfunction may occasionally occur.

CAUTION - Risk of Fire and Electric Shock

a) This product is UL listed as Open Type Process Control Equipment. It must be mounted in an enclosure that does not allow fire to escape externally.
b) More than one disconnect switch may be required to de-energize the equipment before servicing the product.
c) Signal inputs are SELV, limited energy. (See note 1.)
d) Caution: To reduce the risk of fire or electric shock, do not interconnect the outputs of different Class 2 circuits. (See note 2.)

If the output relays are used past their life expectancy, contact fusing or burning may occasionally occur. Always consider the application conditions and use the output relays within their rated load and electrical life expectancy. The life expectancy of output relays varies considerably with the output load and switching conditions.

Loose screws may occasionally result in fire.
Tighten terminal screws to the specified torque of 0.74 to 0.90 N·m.

Unexpected operation may result in equipment damage or accidents if the settings are not appropriate for the controlled system. Set the Temperature Controller as follows:

- Set the parameters of the Temperature Controller so that they are appropriate for the controlled system.
- Turn the power supply to the Temperature Controller OFF before changing any switch setting. Switch settings are read only when the power supply is turned ON.
- Make sure that the INIT switch in the control mode switches is turned OFF before operating the Temperature Controller.

A malfunction in the Temperature Controller may occasionally make control operations impossible or prevent alarm outputs, resulting in property damage. To maintain safety in the event of malfunction of the Temperature Controller, take appropriate safety measures, such as installing a monitoring device on a separate line.

Faulty terminal contact or decreased waterproofing capability may result in a fire or equipment malfunction. When inserting the Temperature Controller into the rear case after setting the switches, check the watertight packing and make sure that the top and bottom hooks are locked securely in place.

Note: 1. A SELV circuit is one separated from the power supply with double insulation or reinforced insulation, that does not exceed 30 V r.m.s. and 42.4 V peak or 60 VDC.

2. A class 2 power supply is one tested and certified by UL as having the current and voltage of the secondary output restricted to specific levels.

■ Precautions for Safe Use

Be sure to observe the following precautions to prevent operation failure, malfunction, or adverse affects on the performance and functions of the product. Not doing so may occasionally result in unexpected events.

1. The product is designed for indoor use only. Do not use the product outdoors or in any of the following locations.
   - Places directly subject to heat radiated from heating equipment.
   - Places subject to splashing liquid or oil atmosphere.
   - Places subject to direct sunlight.
   - Places subject to dust or corrosive gas (in particular, sulfide gas and ammonia gas).
   - Places subject to intense temperature change.
   - Places subject to icing and condensation.
   - Places subject to vibration and large shocks.
2. Use and store the product within the rated temperature and humidity ranges.
   Group-mounting two or more Temperature Controllers, or mounting Temperature Controllers above each other may cause heat to build up inside the Temperature Controllers, which will shorten their service life. In such a case, use forced cooling by fans or other means of air ventilation to cool down the Temperature Controllers.
3. To allow heat to escape, do not block the area around the product. Do not block the ventilation holes on the product.
4. Use the specified size (M3.5, width of 7.2 mm or less) crimped terminals for wiring. To connect bare wires to the terminal block, use copper braided or solid wires with a gage of AWG24 to AWG18 (equal to a cross-sectional area of 0.205 to 0.832 mm^2). (The stripping length is 5 to 6 mm.) Up to two wires of the same size and type, or two crimp terminals can be inserted into a single terminal.
5. Be sure to wire properly with correct polarity of terminals. Do not wire any of the I/O terminals incorrectly.
6. Do not wire the terminals that are not used.
7. The voltage output (control output) is not electrically isolated from the internal circuits. When using a grounded temperature sensor, do not connect any of the control output terminals to ground. Otherwise unwanted current paths will cause measurement errors.
8. To avoid inductive noise, keep the wiring for the Temperature Controller's terminal block away from power cables carrying high voltages or large currents. Also, do not wire power lines together with or parallel to Temperature Controller wiring. Using shielded cables and using separate conduits or ducts is recommended.
   Attach a surge suppressor or noise filter to peripheral devices that generate noise (in particular, motors, transformers, solenoids, magnetic coils or other equipment that have an inductance component).
   When a noise filter is used at the power supply, first check the voltage or current, and attach the noise filter as close as possible to the temperature controller.
   Allow as much space as possible between the Temperature Controller and devices that generate powerful high frequencies (high-frequency welders, high-frequency sewing machines, etc.) or surge.

9. Use the product within the rated load and power supply.
10. Use a switch, relay, or other contact so that the power supply voltage reaches the rated voltage within 2 seconds. If the applied voltage is increased gradually, the power supply may not be reset or malfunctions may occur.
11. When using PID operation (self-tuning), turn ON the power supply to the load (e.g., heater) at the same time or before turning the power supply to the Temperature Controller ON. If power is turned ON for the Temperature Controller before turning ON power supply to the load, self-tuning will not be performed properly and optimum control will not be achieved.
12. Design the system (e.g., control panel) to allow for the 2 seconds of delay required for the Temperature Controller's output to stabilize after the power is turned ON.
13. A switch or circuit breaker should be provided close to this unit. The switch or circuit breaker should be within easy reach of the operator, and must be marked as a disconnecting means for this unit.
14. Approximately 30 minutes is required for the correct temperature to be displayed after turning the power supply to the Temperature Controller ON. Turn the power supply ON at least 30 minutes prior to starting control operations.
15. Be sure that the platinum resistance thermometer type and the input type set on the Temperature Controller are the same.
16. When extending the thermocouple lead wires, always use compensating conductors suitable for the type of thermocouple. Do not extend the lead wires on a platinum resistance thermometer. Use only low-resistance wire (5 Ω max. per line) for lead wires and make sure that the resistance is the same for all three wires.
17. When drawing out the Temperature Controller from the case, do not apply force that would deform or alter the Temperature Controller.
18. When drawing out the Temperature Controller from the case to replace the Temperature Controller, check the status of the terminals. If corroded terminals are used, contact faults with the terminals may cause the temperature inside the Temperature Controller to increase, possibly resulting in fire. If the terminals are corroded, replace the rear case as well.
19. When drawing out the Temperature Controller from the case, turn the power supply OFF first, and absolutely do not touch the terminals or electronic components or apply shock to them. When inserting the Temperature Controller, do not allow the electronic components to come into contact with the case.
20. Static electricity may damage internal components. Always touch grounded metal to discharge any static electricity before handling the Temperature Controller. When drawing out the Temperature Controller from the case, do not touch the electronic components or patterns on the board with your hand. Hold the Temperature Controller by the edge of the front panel when handling it.
21. Do not use paint thinner or similar chemical to clean with. Use standard grade alcohol.
22. Use tools when separating parts for disposal. Contact with the sharp internal parts may cause injury.

■ Precautions for Correct Use

Service Life

Use the Temperature Controller within the following temperature and humidity ranges:

Temperature: -10 to 55°C (with no icing or condensation)
Humidity: 25% to 85%

If the Controller is installed inside a control board, the ambient temperature must be kept to under 55°C, including the temperature around the Controller.

The service life of electronic devices like Temperature Controllers is determined not only by the number of times the relay is switched but also by the service life of internal electronic components. Component service life is affected by the ambient temperature: the higher the temperature, the shorter the service life and, the lower the temperature, the longer the service life. Therefore, the service life can be extended by lowering the temperature of the Temperature Controller.

When two or more Temperature Controllers are mounted horizontally close to each other or vertically next to one another, the internal temperature will increase due to heat radiated by the Temperature Controllers and the service life will decrease. In such a case, use forced cooling by fans or other means of air ventilation to cool down the Temperature Controllers. When providing forced cooling, however, be careful not to cool down the terminals sections alone to avoid measurement errors.

Measurement Accuracy

When extending or connecting the thermocouple lead wire, be sure to use compensating wires that match the thermocouple type. Do not extend the lead wire of the platinum resistance thermometer. If the lead wire of the platinum resistance thermometer must be extended, be sure to use wires that have low resistance and keep the resistance of the three lead wires the same.

Mount the Temperature Controller so that it is horizontally level.

If the measurement accuracy is low, check whether the input shift has been set correctly.

Waterproofing

The degree of protection is as shown below. Sections without any specification on their degree of protection or those with IP□0 are not waterproof.

Front panel: IP66, rear case: IP20, terminals: IP00

Warranty and Application Considerations

Read and Understand this Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability.*

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. H138-E2-01-X

In the interest of product improvement, specifications are subject to change without notice.

Digital Temperature Controllers E5GN

Compact and Intelligent Temperature Controllers
1/32 DIN with Communications Function

- Various temperature inputs: Thermocouple, platinum resistance thermometer, infrared temperature sensor, and analog inputs.
- Auto-tuning and self-tuning available. Auto-tuning is possible even while self-tuning is being executed.
- Heating or heating/cooling control is available.
- Water-resistant construction (NEMA4X: equivalent to IP66).
- Conforms to UL, CSA, and IEC safety standards as well as CE marking.

48(W) x 24(H) x 100(D) mm

Model Number Structure

■ Model Number Legend

E5GN- □ □ □ □ -FLK
1 2 3 4 5

1. **Output type**
   R: Relay
   Q: Voltage (for driving SSR)
2. **Number of alarms**
   Blank: No alarm
   1: One alarm
3. **Communications**
   Blank: No communications function
   03: RS-485
4. **Input type**
   TC: Thermocouple
   P: Platinum resistance thermometer
5. **CompoWay/F serial communications**
   -FLK: CompoWay/F serial communications

Ordering Information

■ Standard Models

Size	Power supply voltage	No. of alarm points	Control output	Thermocouple model	Platinum resistance thermometer model
1/32 DIN 48(W) x 24(H) x 100(D) mm	100 to 240 VAC	---	Relay	E5GN-RTC	E5GN-RP
			Voltage (for driving SSR)	E5GN-QTC	E5GN-QP
		1 (see note 1)	Relay	E5GN-R1TC	E5GN-R1P
			Voltage (for driving SSR)	E5GN-Q1TC	E5GN-Q1P
	24 VAC/VDC	---	Relay	E5GN-RTC	E5GN-RP
			Voltage (for driving SSR)	E5GN-QTC	E5GN-QP
		1 (see note 1)	Relay	E5GN-R1TC	E5GN-R1P
			Voltage (for driving SSR)	E5GN-Q1TC	E5GN-Q1P

Note 1. If the heating/cooling function is used, ALM1 will be used for control output and so alarm output will not be available.
2. Control output 2 for heating/cooling control is relay output.
3. Specify the power supply specifications when ordering.

■ Communication Models

Size	Power supply voltage	Communication function	Control output	Thermocouple model	Platinum resistance thermometer model
1/32 DIN 48(W) x 24(H) x 100(D) mm	100 to 240 VAC	RS-485	Relay	E5GN-R03TC-FLK	E5GN-R03P-FLK
			Voltage (for driving SSR)	E5GN-Q03TC-FLK	E5GN-Q03P-FLK
	24 VAC/VDC		Relay	E5GN-R03TC-FLK	E5GN-R03P-FLK
			Voltage (for driving SSR)	E5GN-Q03TC-FLK	E5GN-Q03P-FLK

Note: Specify the power supply specifications when ordering.

Specifications

■ Ratings

Supply voltage		100 to 240 VAC, 50/60 Hz	24 VAC, 50/60 Hz/24 VDC
Operating voltage range		85% to 110% of rated supply voltage	
Power consumption		7 VA	4 VA/2.5 W
Sensor input		Thermocouple: K, J, T, E, L, U, N, R, S, B Platinum resistance thermometer: Pt100, JPt100 Infrared temperature sensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, 160 to 260°C Voltage input: 0 to 50 mV	
Control output	**Relay output**	SPST-NO, 250 VAC, 2 A (resistive load), electrical life: 100,000 operations	
	Voltage output	12 VDC (PNP), max. load current: 21 mA, with short-circuit protection circuit	
Alarm output		SPST-NO, 250 VAC, 1 A (resistive load), electrical life: 100,000 operations	
Control method		2-PID or ON/OFF control	
Setting method		Digital setting using front panel keys	
Indication method		7-segment digital display and single-lighting indicator Character height: PV: 7.0 mm; SV: 3.5 mm	
Other functions		According to controller model	
Ambient temperature		–10 to 55°C (with no condensation or icing)	
Ambient humidity		25% to 85%	
Storage temperature		–25 to 65°C (with no condensation or icing)	

Input Ranges

Platinum Resistance Thermometer Input/Thermocouple Input

Input type	Name	Temperature range (upper)	Temperature range (lower)	Set value
Platinum resistance thermometer input: Platinum resistance thermometer	Pt100	850	−200	0
	Pt100	500.0	−199.9	1
	Pt100	100.0	0.0	2
	JPt100	500.0	−199.9	3
	JPt100	100.0	0.0	4

Input type	Name	Temperature range (upper)	Temperature range (lower)	Set value
Thermocouple input: Thermocouple	K	1300	−200	0
	K	500.0	−20.0	1
	J	850	−100	2
	J	400.0	−20.0	3
	T	400	−200	4
	T	400.0	−199.9	17
	E	600	0	5
	L	850	−100	6
	U	400	−200	7
	U	400.0	−199.9	18
	N	1300	−200	8
	R	1700	0	9
	S	1700	0	10
	B	1800	100	11
Thermocouple input: ES1A Infrared Temperature Sensor	K10 to 70°C	70	0	12
	K60 to 120°C	120	0	13
	K115 to 165°5C	165	0	14
	K160 to 260°C	260	0	15
Thermocouple input: Analog input	0 to 50 mV	Usable in the following ranges by scaling: −1999 to 9999 or −199.9 to 999.9		16

Temperature range scale: 1800, 1700, 1600, 1500, 1400, 1300, 1200, 1100, 1000, 900, 800, 700, 600, 500, 400, 300, 200, 100, 0, −100, −200

Applicable standards by input type are as follows:

K, J, T, E, N, R, S, B: JIS C1602-1995
L: Fe-CuNi, DIN 43710-1985
U: Cu-CuNi, DIN 43710-1985
JPt100: JIS C1604-1989, JIS C1606-1989
Pt100: JIS C1604-1997, IEC751

Shaded ranges indicate default settings.

ES1A models with a temperature range of 160°C to 260°C have been discontinued.

■ Characteristics

Indication accuracy	Thermocouple: (±0.5% of indicated value or ±1°C, whichever greater) ±1 digit max. (see note) Platinum resistance thermometer: (±0.5% of indicated value or ±1°C, whichever greater) ±1 digit max. Analog input: ±0.5% FS±1 digit max. CT input: ±5% FS±1 digit max.
Hysteresis	0.1 to 999.9 EU (in units of 0.1 EU)
Proportional band (P)	0.1 to 999.9 EU (in units of 0.1 EU)
Integral time (I)	0 to 3999 s (in units of 1 s)
Derivative time (D)	0 to 3999 s (in units of 1 s)
Control period	1 to 99 s (in units of 1 s)
Manual reset value	0.0% to 100.0% (in units of 0.1%)
Alarm setting range	–1999 to 9999 (decimal point position depends on input type)
Sampling period	500 ms
Insulation resistance	20 MΩ min. (at 500 VDC megger)
Dielectric strength	2000 VAC, 50 or 60 Hz for 1 min (between different charging terminals)
Vibration resistance	10 to 55 Hz, 10 m/s^2 for 2 hours each in X, Y and Z directions
Shock resistance	300 m/s^2, 3 times each in 3 axes, 6 directions (relay: 100 m/s^2)
Weight	Approx. 90 g Mounting bracket: approx. 10 g
Degree of protection	Front panel: NEMA4X for indoor use (equivalent to IP66), rear case: IP20, terminals: IP00
Memory protection	EEPROM (non-volatile memory) (number of writes: 100,000)
EMC	Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A Immunity ESD: EN61000-4-2: 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Immunity RF-interference: ENV50140: 10 V/m (amplitude modulated, 80 MHz to 1 GHz) (level 3) 10 V/m (pulse modulated, 900 MHz) Immunity Conducted Disturbance: ENV50141: 10 V (0.15 to 80 MHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power-line (level 3) 2 kV I/O signal-line (level 4)
Approved standards	UL3121-1, CSA22.2 No. 142, E.B.1402C Conforms to EN50081-2, EN50082-2, EN61010-1 (IEC61010-1) Conforms to VDE0106/part 100 (Finger Protection), when the terminal cover is mounted.

Note: The indication of K thermocouples in the –200 to 1300°C range, and T and N thermocouples at a temperature of –100°C or less, and U and L thermocouples at any temperature is ±2°C±1 digit maximum. The indication of B thermocouples at a temperature of 400°C or less is unrestricted.
The indication of R and S thermocouples at a temperature of 200°C or less is ±3°C±1 digit maximum.

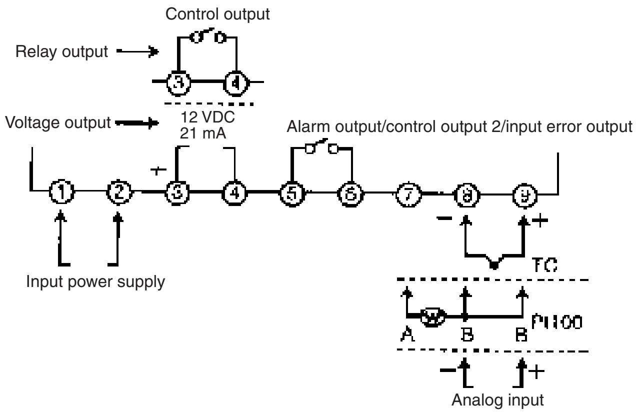
■ Communications Specifications

Transmission path connection	Multiple points
Communications method	RS-485 (two-wire, half duplex)
Synchronization method	Start-stop synchronization
Baud rate	1,200/2,400/4,800/9,600/19,200 bps
Transmission code	ASCII
Data bit length (see note)	7 or 8 bits
Stop bit length (see note)	1 or 2 bits
Error detection	Vertical parity (none, even, odd) Frame check sequence (FCS): with SYSWAY Block check character (BCC): with CompoWay/F
Flow control	Not available
Interface (see note)	RS-485
Retry function	Not available
Communications buffer	40 bytes

Note: The baud rate, data bit length, stop bit length, or vertical parity can be individually set using the communications setting level.

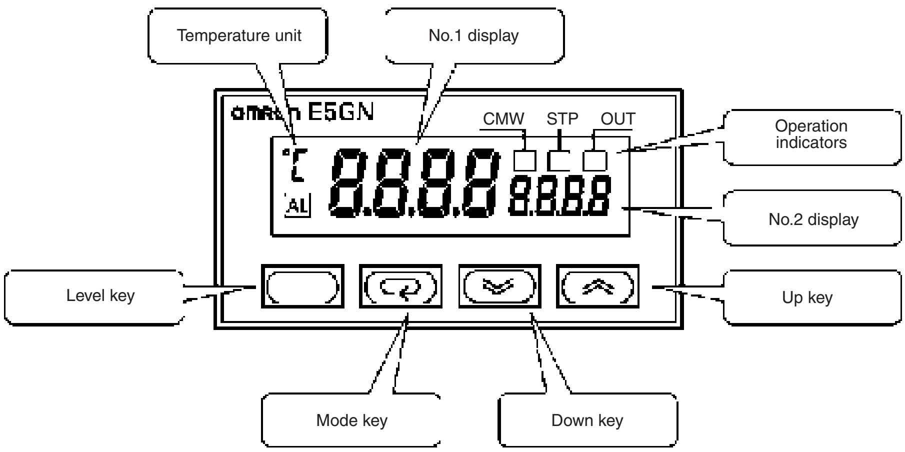
Wiring Terminals

- The voltage output (control output) is not electrically insulated from the internal circuits. When using a grounding thermocouple, do not connect the control output terminals to the ground. If the control output terminals are connected to the ground, errors will occur in the measured temperature values as a result of leakage current.
- Standard insulation is applied to the power supply I/O sections. If reinforced insulation is required, connect the input and output terminals to a device without any exposed current-carrying parts or to a device with standard insulation suitable for the maximum operating voltage of the power supply I/O section.



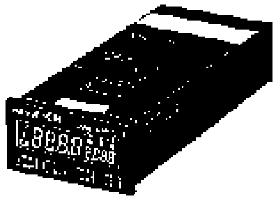
Two input power supplies are available:
100 to 240 VAC or 24 VAC/VDC (no polarity).
Recommended power supply for 24VDC;
eg. OMRON S8VS.

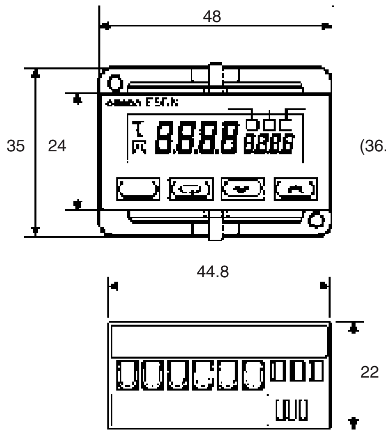
Nomenclature

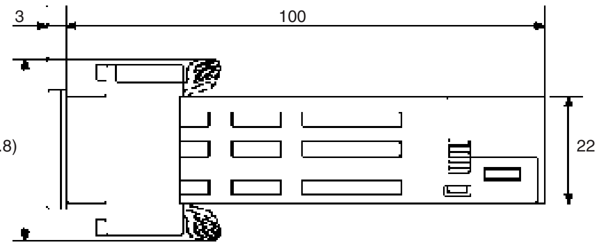


Dimensions

Note: All units are in millimeters unless otherwise indicated.



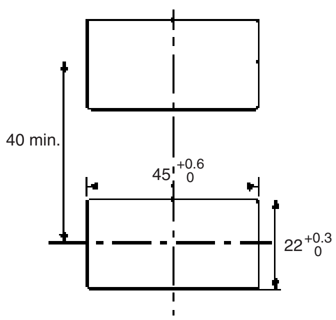




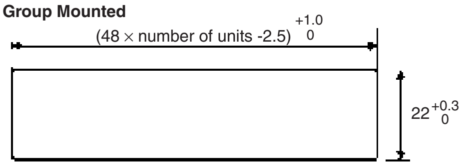
*When carrying out maintenance on the E5GN, only the terminal plate can be drawn out with the terminal leads still attached.

Panel Cutout

Mounted Separately



Group Mounted



Mounting separately does not allow waterproofing.

- Insert the Controller through the hole in the panel from the front and push the adapter on from the rear. Push the adapter up to the back of the panel ensuring that the controller is pushed all the way in, removing any gap between the Controller, panel, and adapter. Finally, use the two screws on the adapter to secure the unit in place.
- To mount the E5GN so that it is waterproof, insert the waterproof packing onto the E5GN.
- When two or more E5GN Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature given in the specifications.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Digital Temperature Controllers
E5□N

1/16, 1/8, and 1/4 DIN Temperature Controllers Join the Best-selling E5□N Series

- Models available with either temperature inputs or analog inputs.
- A wide range of functions, such as three-phase heater burnout detection, two control outputs, manual outputs, and transfer outputs.
- Easy-to-read 11-segment display.
- Faster sampling at 250 ms.
- Setting Tool port provided as a standard feature for easy connection to personal computers.

E5□N Series

E5AN	E5EN	E5CN
		
1/4 DIN	1/8 DIN	1/16 DIN

Contents

Digital Temperature Controllers

Lineup

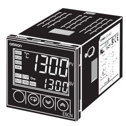
E5CN
(48 × 48 mm)

Page 3

- Controllers with Temperature Inputs
  - · No alarm outputs
  - · Two alarm outputs
  - · Two alarm outputs (including HB alarm)
    · Two event inputs
  - · Two alarm outputs (including 3-phase HB alarm)
    · RS-485 communications
  - · Two control outputs
    · Two alarm outputs (including HB alarm)
  - · Two alarm outputs (including HB alarm)
    · ES1B external power supply
  - · Two alarm outputs
    · Two event inputs
    · ES1B external power supply
- Controllers with Analog Inputs
  - · No alarm outputs
  - · Two alarm outputs
  - · Two alarm outputs (including HB alarm)
    · Two event inputs
  - · Two alarm outputs (including HB alarm)
    · RS-485 communications
  - · Two control outputs
    · Two alarm outputs (including HB alarm)
    · RS-485 communications

E5CN-U
Plug-in-type Controllers
(48 × 48 mm)

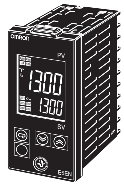
Page 3



- Controllers with Temperature Inputs
  - · No alarm outputs
  - · One alarm output
  - · Two alarm outputs

E5EN
(48 × 96 mm)

Page 16



- Controllers with Temperature Inputs
  - · One alarm output
  - · Three alarm outputs (including 3-phase HB alarm)
    · Two event inputs
  - · Three alarm outputs (including HB alarm)
    · RS-485 communications or RS-232C communications
  - · Two control outputs
    · Three alarm outputs (including HB alarm)
    · Two event inputs
  - · Three alarm outputs
    · Two event inputs
    · ES1B external power supply
- Controllers with Analog Inputs
  - · Three alarm outputs (including HB alarm)
  - · Three alarm outputs (including HB alarm)
    · Two event inputs

E5AN
(96 × 96 mm)

Page 27

- Controllers with Temperature Inputs
  - · One alarm output
  - · Three alarm outputs (including 3-phase HB alarm)
    · Two event inputs
  - · Three alarm outputs (including HB alarm)
    · RS-485 communications or RS-232C communications
  - · Two control outputs
    · Three alarm outputs
    · Two event inputs
- Controllers with Analog Inputs
  - · Three alarm outputs (including HB alarm)
    · Two event inputs

Digital Temperature Controllers

E5CN/E5CN-U

This Best-selling General-purpose 48×48 mm Temperature Controller Is Now Even Better. USB-Serial Conversion Cable and Support Software Are Also Available.

- Controllers now available with analog inputs.
- Faster sampling at 250 ms.
- Transfer output provided for easy output to recorders.
- Voltage outputs (to drive SSRs) for both heating and cooling control. Can be used for alarms to provide three alarm outputs.
- Models available with three-phase heater burnout detection and SSR fault detection.
- Easy setting with 11-segment displays.
- Connect to either a thermocouple or platinum resistance thermometer with the same model.
- Easily see the status from a distance with PV display with three-color switching function.
- Setting protection indicator informs operator when protection is enabled.
- Manual output provided.
- Controller available with long-life relay output.
- Models available with external power supply for ES1B Infrared Thermosensor.

Note: Refer to Precautions on CD.

Note: Refer to Common on CD for information on changes in comparison to previous models.

Features

Improved Functions for a Wider Range of Application

Control Analog Values, such as Pressures, Flowrates, and Levels

The E5CN Series now also includes models that accept analog inputs, enabling control applications other than for temperature, including pressure, flowrate, level, humidity, and weight control.

Note: E5CN-☐L (Models with Analog Inputs)

Faster Sampling at 250 ms

The previous sampling time of 500 ms has been reduced by half to 250 ms. This enables the E5CN to handle application requiring even greater response speed and accuracy.

Easy Connector to a Recorder

A transfer output now makes it easy to connect to a recorder or PLC Analog I/O Unit.

Note: E5CN-C☐ (Models with Current Outputs)

Voltage Outputs (to Drive SSRs) for Both Heating and Cooling Control. Can Be Used for Alarms to Provide Three Alarm Outputs.

Voltage outputs can be used for both heating and cooling for Models with Two Control Outputs. Also, control output 2 can be set for use as an alarm output, to enable using up to three alarm outputs.

Note: E5CN-☐Q (Option Board)

Three-phase Heater Burnout Detection

With Models with Three-phase Heater Burnout and SSR Failure Detection, two current transformers can be connected to detect both heater burnout and SSR failure at the same time, reducing costs because a separate heater burnout alarm device is not required. SSR failure detection can be used even with Models with Single-phase Heater Burnout Alarms.

Note: E5CN-☐HH☐ (Option Board)

E58-CIFQ1 USB-Serial Conversion Cable for Computer Connection

A personal computer connection is possible for models without communications.

The CX-Thermo Support Software (sold separately) can be used to set parameters, monitor operation, and parameter masks. The free ThermoMini Parameter Copy Software can be used to reach E5CN parameters using communications and copy them to another E5CN to increase onsite productivity.

Specifications: page 35, Dimensions: page 41

Model Number Structure

■ Model Number Legend

Controllers

E5CN-□□M□-500
1 2 3 4

1. **Output type**
   R: Relay
   Q: Voltage (for driving SSR)
   C: Current
   Y: Long-life relay
2. **Number of alarms**
   Blank: No alarm
   2:Two alarms
3. **Option Unit**
   M:Option Unit can be mounted
4. **Input type**
   T: Thermocouple/platinum resistance thermometer (multi-input)
   L: Analog input

Option Units

E53-CN-□N
1

1. **Functions**
   H03: Communications and heater burnout/SSR failure detection
   03: Communications
   HB: Heater burnout/SSR failure detection and event inputs
   B: Event inputs
   HH03: Communications and 3-phase heater burnout/SSR failure detection
   Q03: Communications and control output 2 (voltage output)
   QH: Heater burnout/SSR failure detection and control output 2 (voltage output)
   PB: External power supply for ES1B and event inputs
   PH: External power supply for ES1B and heater burnout/SSR failure detection.

Note: 1. The heating and cooling function is available for models with two alarm points.
2. Current transformers (CTs) are not provided with the Units. Be sure to order CTs when ordering the E5CN and the Option Units.
3. Specify the power supply specifications when ordering.

This data sheet is provided as a guideline for selecting products. Be sure to refer to the following user manuals for application precautions and other information required for operation before attempting to use the product.

E5CN/E5CN-U/AN/EN Temperature Controller User's Manual (Cat. No. H134)

E5CN/EN/AN Temperature Controller Communications User's Manual (Cat. No. H135)

Ordering Information

■ Controllers with Temperature Inputs (Multi-input)

Size	Power supply voltage	Number of alarm points	Control outputs	Model
1/16 DIN 48 × 48 × 78 (W × H × D)	100 to 240 VAC	0	Relay	E5CN-RMT-500
			Voltage (for driving SSR)	E5CN-QMT-500
			Current	E5CN-CMT-500
		2	Relay	E5CN-R2MT-500
			Voltage (for driving SSR)	E5CN-Q2MT-500
			Current	E5CN-C2MT-500
			Long-life relay	E5CN-Y2MT-500
	24 VAC/VDC	0	Relay	E5CN-RMT-500
			Voltage (for driving SSR)	E5CN-QMT-500
			Current	E5CN-CMT-500
		2	Relay	E5CN-R2MT-500
			Voltage (for driving SSR)	E5CN-Q2MT-500
			Current	E5CN-C2MT-500

■ Controllers with Analog Inputs

Size	Power supply voltage	Number of alarm points	Control outputs	Model
1/16 DIN 48 × 48 × 78 (W × H × D)	100 to 240 VAC	0	Relay	E5CN-RML-500
			Voltage (for driving SSR)	E5CN-QML-500
			Current	E5CN-CML-500
		2	Relay	E5CN-R2ML-500
			Voltage (for driving SSR)	E5CN-Q2ML-500
			Current	E5CN-C2ML-500
			Long-life relay	E5CN-Y2ML-500
	24 VAC/VDC	2	Relay	E5CN-R2ML-500
			Voltage (for driving SSR)	E5CN-Q2ML-500
			Current	E5CN-C2ML-500

■ Option Units

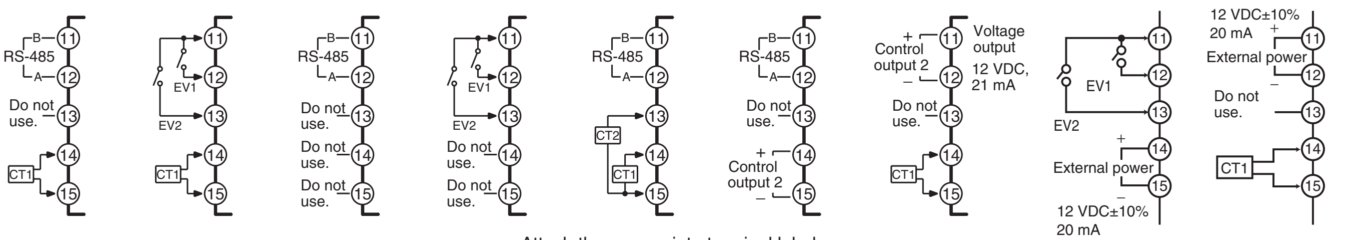
The E5CN provides optional functionality when one of the following Option Units is mounted.

Functions				Model
Communications	Heater burnout/SSR failure detection			E53-CNH03N
Communications				E53-CN03N
	Heater burnout/SSR failure detection	Event inputs		E53-CNHBN
		Event inputs		E53-CNBN
Communications	3-phase heater burnout/SSR failure detection			E53-CNHH03N
Communications			Control output 2 (voltage output)	E53-CNQ03N
	Heater burnout/SSR failure detection		Control output 2 (voltage output)	E53-CNQHN
		Event inputs	External power supply for ES1B	E53-CNPBN (See note 1.)
	Heater burnout/SSR failure detection		External power supply for ES1B	E53-CNPHN (See note 1.)

Note: 1. E53-CNPBN and E53-CNPHN cannot be mounted on E5CN-C□□ (current output models).

2. Option Units cannot be used for Plug-in models.
These Option Units can be used for the new E5CN models only.

E53-CNH03N Communications/CT; E53-CNHBN Event inputs/CT; E53-CN03N Communications; E53-CNBN Event inputs; E53-CNHH03N Communications/Two CTs; E53-CNQ03N Communications/Control output 2; E53-CNQHN Control output 2/CT; E53-CNPBN Event inputs/External power supply for ES1B; E53-CNPHN External power supply for ES1B/CT



Attach the appropriate terminal labels.

Model Number Structure

■ Model Number Legend (Plug-in-type Controllers)

E5CN-□□□U
1 2 3 4

1. **Output type**
   R: Relay
   Q: Voltage
2. **Number of alarms**
   Blank: No alarm
   1:One alarm
   2:Two alarms
3. **Input type**
   T: Thermocouple/platinum resistance thermometer (multi-input)
4. **Plug-in type**
   U: Plug-in type

Ordering Information (Plug-in-type Controllers)

■ Controllers with Temperature Inputs (Multi-input)

Size	Power supply voltage	Number of alarm points	Control outputs	Model
1/16 DIN	100 to 240 VAC	0	Relay	E5CN-RTU
			Voltage (for driving SSR)	E5CN-QTU
		1	Relay	E5CN-R1TU
			Voltage (for driving SSR)	E5CN-Q1TU
		2	Relay	E5CN-R2TU
			Voltage (for driving SSR)	E5CN-Q2TU
	24 VAC/VDC	0	Relay	E5CN-RTU
			Voltage (for driving SSR)	E5CN-QTU
		1	Relay	E5CN-R1TU
			Voltage (for driving SSR)	E5CN-Q1TU
		2	Relay	E5CN-R2TU
			Voltage (for driving SSR)	E5CN-Q2TU

Note: Option Units (E53-CN□□N) cannot be used for Plug-in models.

■ Accessories (Order Separately)

USB-Serial Conversion Cable

Model
E58-CIFQ1

Terminal Cover

Connectable models	Terminal type
Model	E53-COV10

Note: The Terminal Cover comes with the E5CN-□□□**-500** models.

Current Transformers (CTs)

Model	E54-CT1	E54-CT3
Hole diameter	5.8 dia.	12.0 dia.

Adapter

Connectable models	Terminal type
Model	Y92F-45

Note: Use this Adapter when the panel has been previously prepared for the E5B□.

Sockets (for Models with Plug-in Connectors)

Model	P2CF-11	P2CF-11-E	P3GA-11	Y92A-48G
Type	Front-connecting Socket	Front-connecting Socket with Finger Protection	Back-connecting Socket	Terminal Cover for Finger Protection

Specifications

■ Ratings

<table>
<tr><th colspan="2">Item / Power supply voltage</th><th colspan="2">100 to 240 VAC, 50/60 Hz</th><th>24 VAC, 50/60 Hz or 24 VDC</th></tr>
<tr><td colspan="2">Operating voltage range</td><td colspan="3">85% to 110% of rated supply voltage</td></tr>
<tr><td rowspan="2">Power consumption</td><td>E5CN</td><td colspan="2">7.5 VA max. (E5CN-R2T: 3.0 VA at 100 VAC)</td><td>5 VA/3 W max. (E5CN-R2T: 2.7 VA at 24 VAC)</td></tr>
<tr><td>E5CN-U</td><td colspan="2">6 VA max.</td><td>3 VA/2 W max.</td></tr>
<tr><td colspan="2" rowspan="2">Sensor input</td><td colspan="3">Models with temperature inputs
Thermocouple: K, J, T, E, L, U, N, R, S, or B
Platinum resistance thermometer: Pt100 or JPt100
Infrared temperature sensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, or 160 to 260°C
Voltage input: 0 to 50 mV</td></tr>
<tr><td colspan="3">Models with analog inputs
Current input: 4 to 20 mA or 0 to 20 mA
Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V</td></tr>
<tr><td colspan="2">Input impedance</td><td colspan="3">Current input: 150 Ω, Voltage input: 1 MΩ (Use a 1:1 connection when connecting the ES2-HB.)</td></tr>
<tr><td rowspan="5">Control output</td><td rowspan="2">Relay output</td><td>E5CN</td><td colspan="2">SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA</td></tr>
<tr><td>E5CN-U</td><td colspan="2">SPDT, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA</td></tr>
<tr><td>Voltage output</td><td>E5CN
E5CN-U</td><td colspan="2">Output voltage: 12 VDC ±15% (PNP), max. load current: 21 mA, with short-circuit protection circuit</td></tr>
<tr><td>Current output</td><td>E5CN</td><td colspan="2">4 to 20 mA DC/0 to 20 mA DC, load: 600 Ω max., resolution: approx. 2,700</td></tr>
<tr><td>Long-life relay output</td><td>E5CN</td><td colspan="2">SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 1,000,000 operations, load power supply voltage: 75 to 250 VAC (DC loads cannot be connected.), minimum applicable load: 5 V, 10 mA, leakage current: 5 mA max. (250 VAC, 60 Hz)</td></tr>
<tr><td colspan="2">Alarm output</td><td colspan="3">SPST-NO, 250 VAC, 1 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 1 V, 1 mA</td></tr>
<tr><td rowspan="3">Event input</td><td>Contact input</td><td colspan="3">ON: 1 kΩ max., OFF: 100 kΩ min.</td></tr>
<tr><td>Non-contact input</td><td colspan="3">ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.</td></tr>
<tr><td></td><td colspan="3">Outflow current: Approx. 7 mA per point</td></tr>
<tr><td colspan="2">External power supply for ES1B</td><td colspan="3">12 VDC ±10%, 20 mA, Short-circuit protection provided.</td></tr>
<tr><td colspan="2">Control method</td><td colspan="3">ON/OFF control or 2-PID control (with auto-tuning)</td></tr>
<tr><td colspan="2">Setting method</td><td colspan="3">Digital setting using front panel keys</td></tr>
<tr><td colspan="2">Indication method</td><td colspan="3">11-segment digital display and individual indicators (7-segments displays also possible)
Character height: PV: 11 mm, SV: 6.5 mm</td></tr>
<tr><td colspan="2">Other functions</td><td colspan="3">Manual output, heating/cooling control, transfer output (on some models), loop break alarm, multi SP, MV limiter, input digital filter, self-tuning, temperature input shift, run/stop, protection functions, etc.</td></tr>
<tr><td colspan="2">Ambient operating temperature</td><td colspan="3">–10 to 55°C (with no icing or condensation), for 3-year warranty: –10 to 50°C</td></tr>
<tr><td colspan="2">Ambient operating humidity</td><td colspan="3">25% to 85%</td></tr>
<tr><td colspan="2">Storage temperature</td><td colspan="3">–25 to 65°C (with no icing or condensation)</td></tr>
</table>

■ Input Ranges

Thermocouples/Platinum Resistance Thermometers (Multi-inputs)

Input Type	Platinum resistance thermometer					Thermocouple													Infrared temperature sensor				Analog input
Name	Pt100			JPt100		K		J		T		E	L	U		N	R	S	B	10 to 70°C	60 to 120°C	115 to 165°C	160 to 260°C	0 to 50 mV
Temperature range (°C)	850	500.0	100.0	500.0	100.0	1300	500.0	850	400.0	400	400.0	600	850	400	400.0	1300	1700	1700	1800	90	120	165	260	Usable in the following ranges by scaling: –1999 to 9999 or –199.9 to 999.9
	–200	–199.9	0.0	–199.9	0.0	–200	–20.0	–100	–20.0	–200	–199.9	0	–100	–200	–199.9	–200	0	0	100	0	0	0	0	
Setting number	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

The applicable standards for the input types are as follows:

K, J, T, E, N, R, S, B: IEC584-1

L: Fe-CuNi, DIN 43710-1985

U: Cu-CuNi, DIN 43710-1985

Pt100: IEC 751

Shaded settings are the default settings.

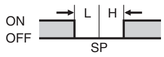
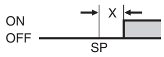
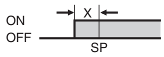
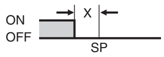
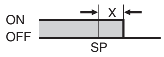
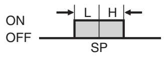
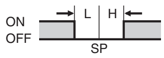
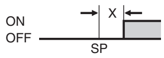
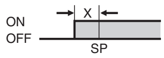
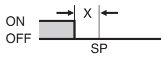
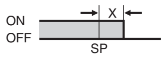
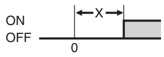
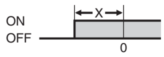
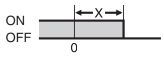
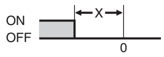
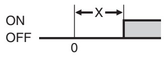
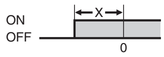
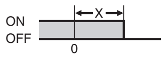
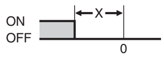
Models with Analog Inputs

Input Type	Current		Voltage		
Input specification	4 to 20mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V
Setting range	Usable in the following ranges by scaling: –1999 to 9999, –199.9 to 999.9, –19.99 to 99.99 or –1.999 to 9.999				
Setting number	0	1	2	3	4

Shaded settings are the default settings.

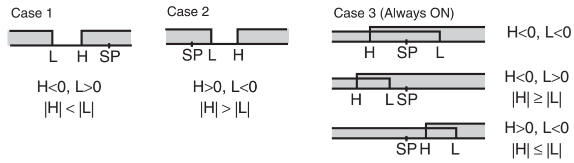
■ Alarm Types

Select alarm types out of the 12 alarm types listed in the following table.

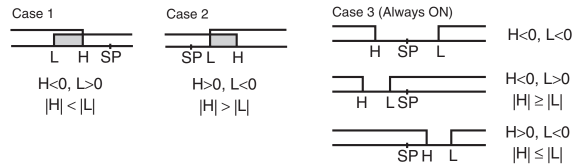
Set value	Alarm type	Alarm output operation: When X is positive	Alarm output operation: When X is negative
0	Alarm function OFF	Output OFF	
1 (See note 1.)	Upper- and lower-limit		(See note 2.)
2	Upper limit		
3	Lower limit		
4 (See note 1.)	Upper- and lower-limit range		(See note 3.)
5 (See note 1.)	Upper- and lower-limit with standby sequence	 (See note 5.)	(See note 4.)
6	Upper-limit with standby sequence		
7	Lower-limit with standby sequence		
8	Absolute-value upper-limit		
9	Absolute-value lower-limit		
10	Absolute-value upper-limit with standby sequence		
11	Absolute-value lower-limit with standby sequence		
12 (See note 6.)	LBA (for alarm 1 only)	---	

Note: 1. With set values 1, 4 and 5, the upper and lower limit values can be set independently for each alarm type, and are expressed as "L" and "H."

2. Set value: 1, Upper- and lower-limit alarm



3. Set value: 4, Upper- and lower-limit range



4. Set value: 5, Upper- and lower-limit with standby sequence
For Upper- and Lower-Limit Alarm Described Above
- Case 1 and 2
  Always OFF when the upper-limit and lower-limit hysteresis overlaps.
- Case 3: Always OFF

5. Set value: 5, Upper- and lower-limit with standby sequence
Always OFF when the upper-limit and lower-limit hysteresis overlaps.

6. Set value: 12, LBA can be set only for alarm 1.

Set the alarm types for alarms 1 to 3 independently in the initial setting level. The default setting is 2 (upper limit).

■ Characteristics

Indication accuracy		Thermocouple: (See note 1.) E5CN: (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max. E5CN-U: (±1% of indicated value or ±2°C, whichever is greater) ±1 digit max. Platinum resistance thermometer: (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max. Analog input: ±0.5% FS ±1 digit max. CT input: ±5% FS ±1 digit max.
Influence of temperature (See note 2.)		R, S, and B thermocouple inputs: (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Other thermocouple inputs: (±1% of PV or ±4°C, whichever is greater) ±1 digit max. *±10°C for −100°C or less for K sensors Platinum resistance thermometer inputs: (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog inputs: (±1% of FS) ±1 digit max.
Influence of voltage (See note 2.)		
Hysteresis		Models with thermocouple/platinum resistance thermometer (multi-input) input: 0.1 to 999.9 EU (in units of 0.1 EU) Models with analog input: 0.01 to 99.99% FS (in units of 0.01% FS)
Proportional band (P)		Models with thermocouple/platinum resistance thermometer (multi-input) input: 0.1 to 999.9 EU (in units of 0.1 EU) Models with analog input: 0.1 to 999.9% FS (in units of 0.1% FS)
Integral time (I)		0 to 3999 s (in units of 1 s)
Derivative time (D)		0 to 3999 s (in units of 1 s) (See note 3.)
Control period		0.5, 1 to 99 s (in units of 1 s)
Manual reset value		0.0 to 100.0% (in units of 0.1%)
Alarm setting range		−1999 to 9999 (decimal point position depends on input type)
Sampling period		250 ms
Affect of signal source resistance		Thermocouple: 0.1°C/Ω max. (100 Ω max.) (See note 4.) Platinum resistance thermometer: 0.4°C/Ω max. (10 Ω max.)
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		2,000 VAC, 50 or 60 Hz for 1 min (between terminals with different charge)
Vibration resistance	**Malfunction**	10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions
	Destruction	10 to 55 Hz, 0.75-mm single amplitude for 2 hrs each in X, Y, and Z directions
Shock resistance	**Malfunction**	100 m/s² min., 3 times each in X, Y, and Z directions
	Destruction	300 m/s² min., 3 times each in X, Y, and Z directions
Weight	**E5CN**	Controller: Approx. 150 g, Mounting Bracket: Approx. 10 g
	E5CN-U	Controller: Approx. 110 g, Mounting Bracket: Approx. 10 g
Degree of protection	**E5CN**	Front panel: NEMA4X for indoor use (equivalent to IP66) Rear case: IP20, Terminal section: IP00
	E5CN-U	Front panel: Equivalent to IP50, rear case: IP20, terminals: IP00
Memory protection		Non-volatile memory (number of writes: 1,000,000 operations)
EMC		Emission Enclosure: EN55011 Group1 Class A Emission AC Mains: EN55011 Group1 Class A Immunity ESD: EN61000-4-2 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Immunity RF-interference: EN61000-4-3 10 V/m (80-1000 MHz, 1.4-2.0 GHz amplitude modulated) (level 3) 10 V/m (900 MHz pulse modulated) Immunity Conducted Disturbance: EN61000-4-6 3 V (0.15 to 80 MHz) (level 2) Immunity Burst: EN61000-4-4 2 kV Power-line (level 3) 1 kV I/O signal-line (level 3) Immunity Surge: EN61000-4-5 1kV line to line Power line, output line (relay output) 2 kV line to ground Power line, output line (relay output) 1 kV line to ground Input line (communication) Immunity Voltage Dip/Interrupting: EN61000-4-11 0.5 cycle, 100% (rated voltage)
Approved standards		UL 61010C-1 CSA C22.2 No.1010.1
Conformed standards		EN61326, EN61010-1, IEC61010-1 VDE0106 Part 100 (Finger protection), when the terminal cover is mounted.

Note: 1. The indication accuracy of K thermocouples in the −200 to 1300°C range, T and N thermocouples at a temperature of −100°C max., and U and L thermocouples at any temperature is ±2°C ±1 digit maximum. The indication accuracy of the B thermocouple at a temperature of 400°C max. is not specified. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit max.

2. "EU" stands for Engineering Unit and is used as the unit after scaling. For a temperature sensor, the EU is °C or °F.

3. When robust tuning (RT) is ON, the differential time is 0.0 to 999.9 (in units of 0.1 s).

4. B, R, and S sensors: 0.2°C/Ω max. (100 Ω max.)

■ USB-Serial Conversion Cable

Applicable OS	Windows 2000/XP
Applicable software	Thermo Mini, CX-Thermo
Applicable models	E5CN/E5CN-U/E5AN/E5EN
USB interface standard	Conforms to USB Specification 1.1.
DTE speed	38400 bps
Connector specifications	Computer: USB (type A plug) Temperature Controller: Serial
Power supply	Bus power (Supplied from USB host controller.)
Power supply voltage	5 VDC
Current consumption	70 mA
Ambient operating temperature	0 to 55°C (with no condensation or icing)
Ambient operating humidity	10% to 80%
Storage temperature	−20 to 60°C (with no condensation or icing)
Storage humidity	10% to 80%
Altitude	2,000 m max.
Weight	Approx. 100 g

Note: A driver must be installed in the personal computer. Refer to installation information in the operation manual for the Conversion Cable.

■ Communications Specifications

Transmission line connection method	RS-485 multipoint
Communications	RS-485 (two-wire, half duplex)
Synchronization method	Start-stop synchronization
Baud rate	1200, 2400, 4800, 9600, 19200, or 38400 bps
Transmission code	ASCII
Data bit length	7 or 8 bits
Stop bit length	1 or 2 bits
Error detection	Vertical parity (none, even, odd) Frame check sequence (FCS) with SYSWAY Block check character (BCC) with CompoWay/F or CRC-16 Modbus
Flow control	None
Interface	RS-485
Retry function	None
Communications buffer	40 bytes
Communications response wait time	0 to 99 ms Default: 20 ms

Note: The baud rate, data bit length, stop bit length, and vertical parity can be individually set using the Communications Setting Level.

■ Current Transformer (Sold Separately)

Ratings

Dielectric strength	1,000 VAC for 1 min
Vibration resistance	50 Hz, 98 m/s^2
Weight	E54-CT1: Approx. 11.5 g, E54-CT3: Approx. 50 g
Accessories (E54-CT3 only)	Armatures (2) Plugs (2)

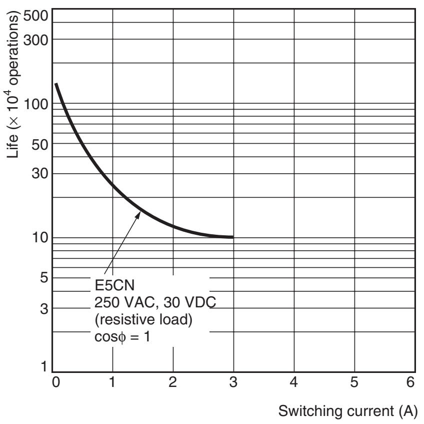
■ Heater Burnout Alarms and SSR Failure Detection Alarms

Maximum heater current	50 A AC
Input current indication accuracy	±5% FS ±1 digit max.
Heater burnout alarm setting range	0.1 to 49.9 A (in units of 0.1 A) 0.0 A: Heater burnout/SSR failure alarm output turned OFF. 50.0 A: Heater burnout/SSR failure alarm output turned ON. Minimum detection ON time: 190 ms (See note 1.)
SSR failure detection alarm setting range	0.1 to 49.9 A (in units of 0.1 A) 0.0 A: Heater burnout/SSR failure alarm output turned ON. 50.0 A: Heater burnout/SSR failure alarm output turned OFF. Minimum detection OFF time: 190 ms (See note 2.)

Note: 1. If the ON time of control output 1 is less than 190 ms, heater burnout detection and the heater current will not be measured.

2. If the OFF time of control output 1 is less than 190 ms, SSR failure detection and the heater current will not be measured.

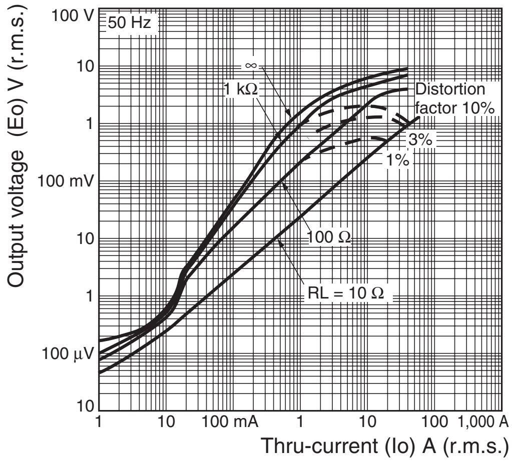
■ Electrical Life Expectancy Curve for Relays (Reference Values)



Note: Do not connect a DC load to a Controller with a Long-life Relay Output.

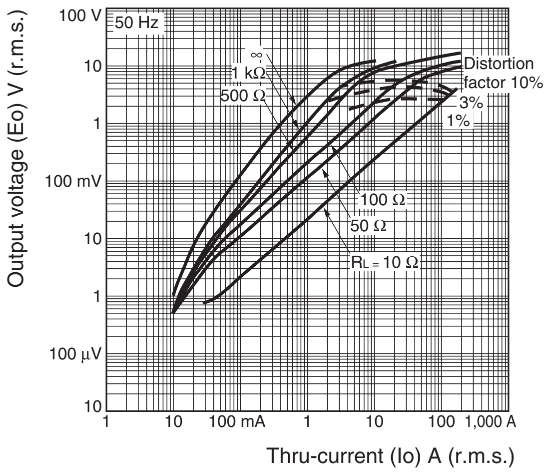
E54-CT1
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

Maximum continuous heater current: 50 A (50/60 Hz)
Number of windings: 400±2
Winding resistance: 18±2 Ω



E54-CT3
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

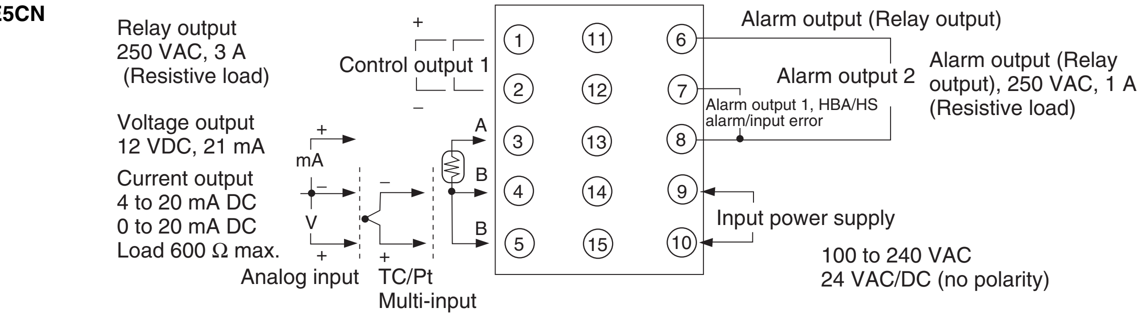
Maximum continuous heater current: 120 A (50/60 Hz)
(Maximum continuous heater current for an OMRON Temperature Controller is 50 A.)
Number of windings: 400±2
Winding resistance: 8±0.8 Ω

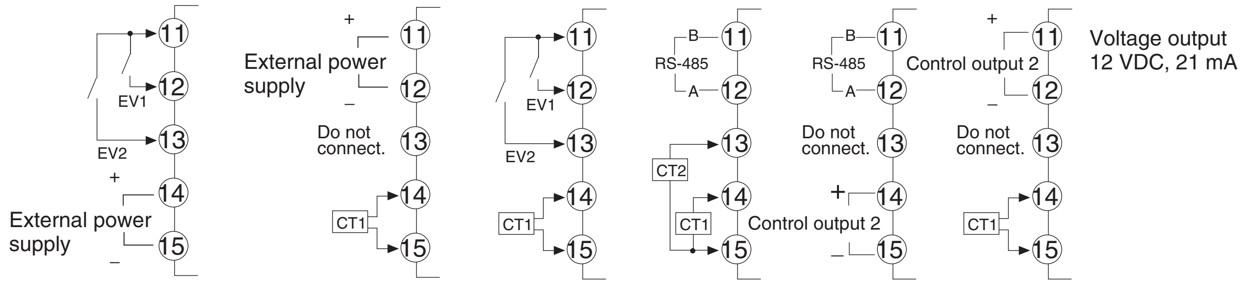


External Connections

- A voltage output (control output) is not electrically insulated from the internal circuits. When using a grounding thermocouple, do not connect any of the control output terminals to ground. If the control output terminals are connected to ground, errors will occur in the measured temperature values as a result of leakage current.
- Standard insulation is applied between any of the following: power supply terminals, input terminals, output terminals, and communications terminals (for models with communications). If reinforced insulation is required, provide additional insulation, such as spacial distance or material insulation, as defined by IEC 60664 suitable for the maximum operating voltage.
- Consult with your OMRON representative before using the external power supply for the ES1B for any other purpose.

E5CN





Event inputs, External power supply for ES1B*

External power supply for ES1B*, One CT

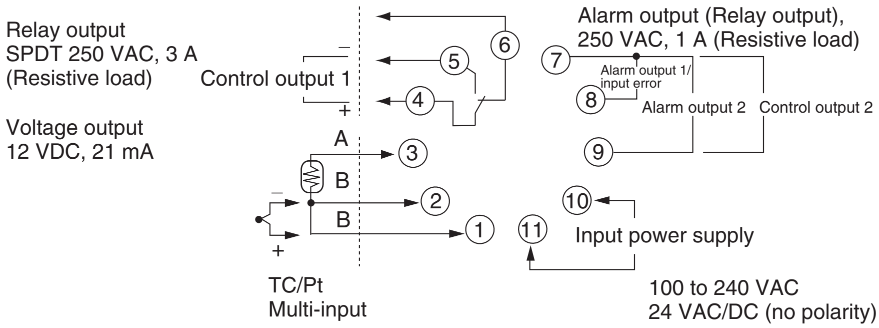
Event inputs, One CT

Communications, Two CTs

Communications, Voltage output

Voltage output One CT

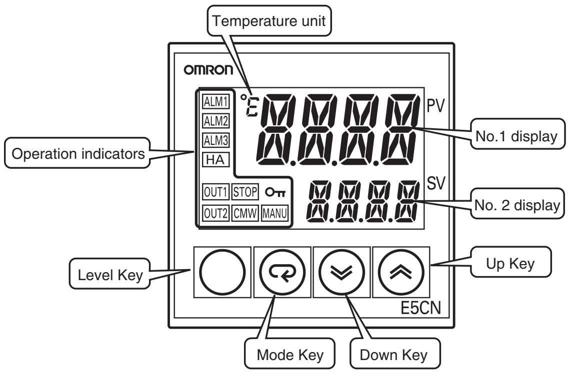
E5CN-U



Nomenclature

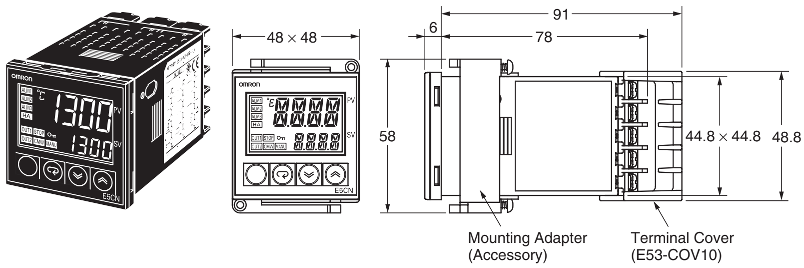
E5CN
E5CN-U

The front panel is the same for the E5CN and E5CN-U.



Dimensions

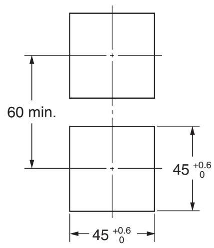
E5CN
Terminal Models



Note: The terminal block cannot be removed.
The suffix "-500" is added to the model number of each Controller provided with a E53-COV10 Terminal Cover.

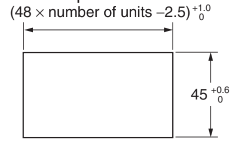
Panel Cutout

Mounted Separately



Group Mounted

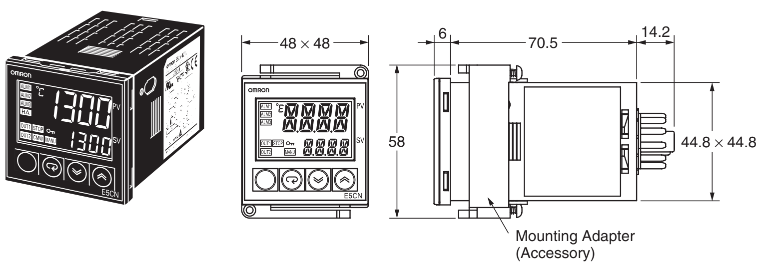
(48 × number of units −2.5) $^{+1.0}_{0}$



Group mounting does not allow waterproofing.

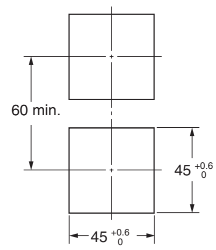
- Recommended panel thickness is 1 to 5 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

E5CN-U
Plug-in Models



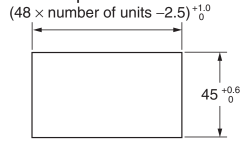
Panel Cutout

Mounted Separately



Group Mounted

(48 × number of units −2.5) $^{+1.0}_{0}$

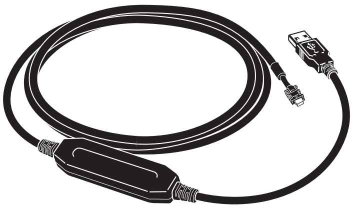


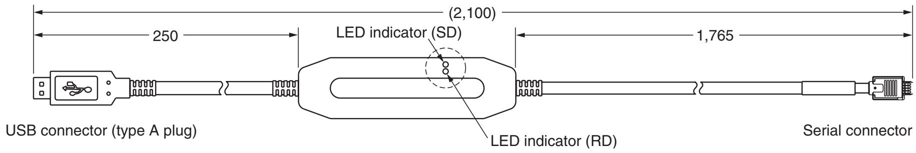
- Recommended panel thickness is 1 to 5 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

■ Accessories

USB-Serial Conversion Cable (Sold Separately)

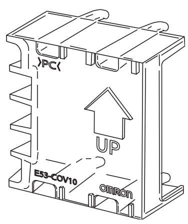
E58-CIFQ1

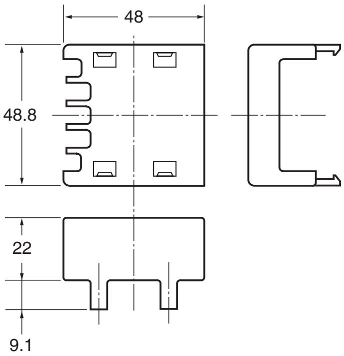




Terminal Cover

E53-COV10

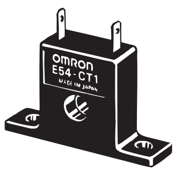


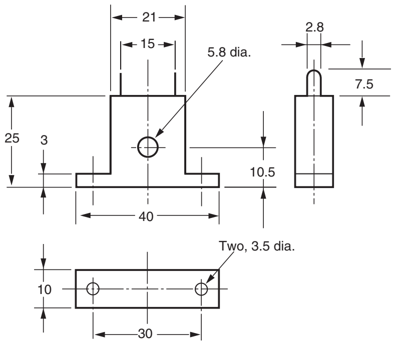


Note: The suffix "-500" is added to the model number of each Controller provided with a E53-COV10 Terminal Cover.

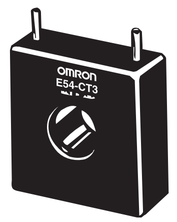
Current Transformers (Sold Separately)

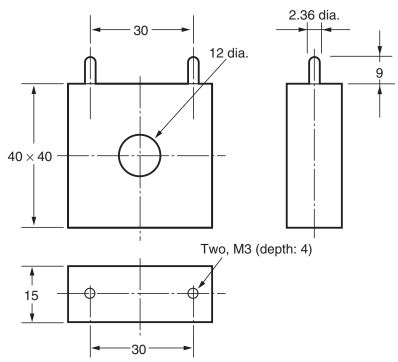
E54-CT1





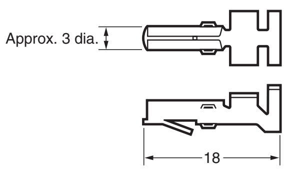
E54-CT3



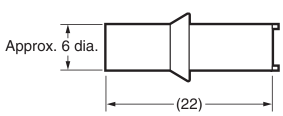


E54-CT3 Accessory

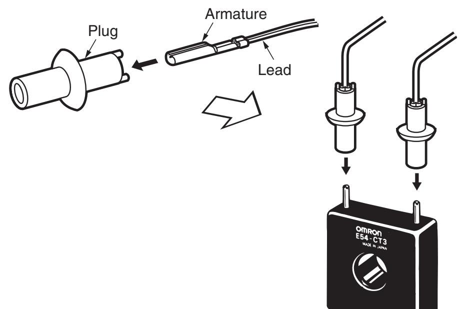
- **Armature**



- **Plug**



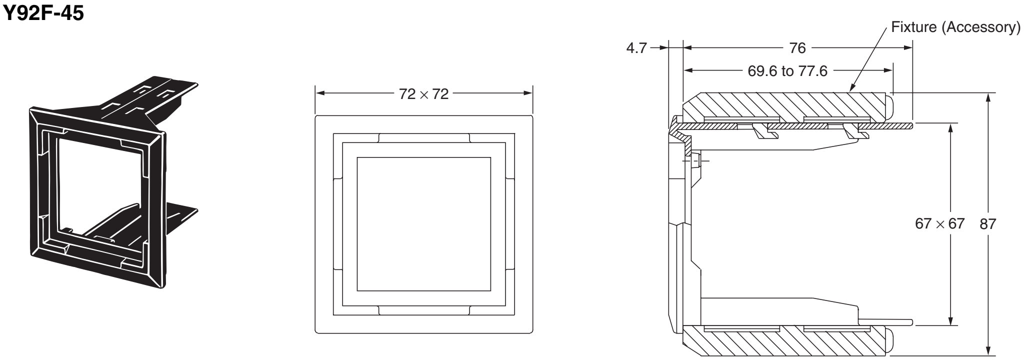
Connection Example



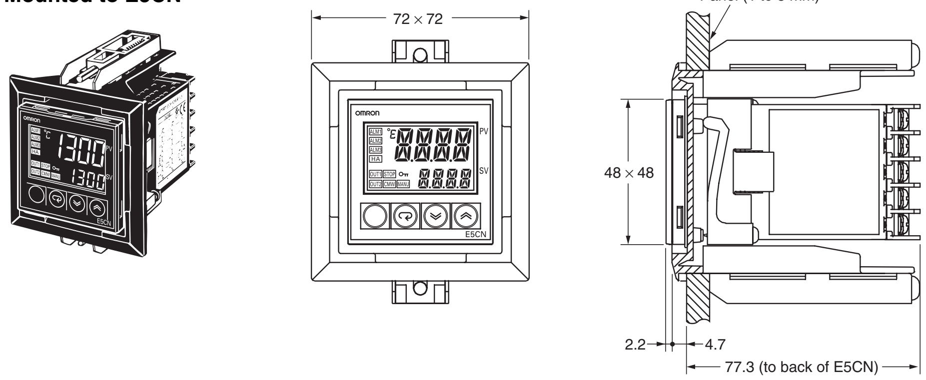
Adapter (Sold Separately)

Note: Use this Adapter when the panel has already been prepared for the E5B□.

Y92F-45



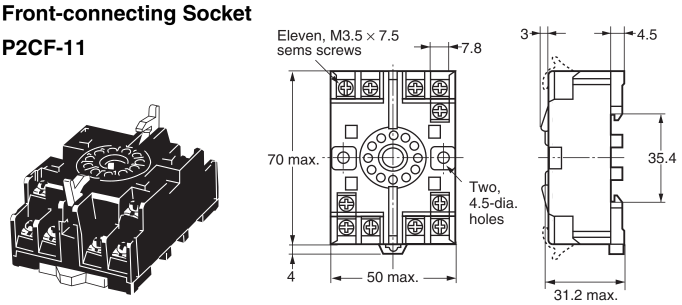
Mounted to E5CN



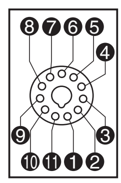
E5CN-U Wiring Socket (Sold Separately)

Front-connecting Socket

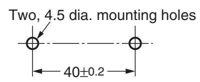
P2CF-11



Terminal Layout/Internal Connections
(Top View)



Mounting Holes

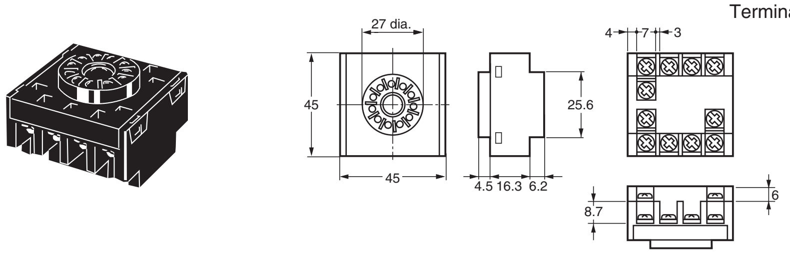


Note: Can also be mounted to a DIN track.

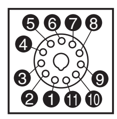
Note: A model with finger protection (P2CF-11-E) is also available.

Back-connecting Socket

P3GA-11



Terminal Layout/Internal Connections
(Bottom View)



Note: 1. Using any other sockets will adversely affect accuracy. Use only the specified sockets.

2. A Protective Cover for finger protection (Y92A-48G) is also available.

Digital Temperature Controllers
E5EN

This Best-selling General-purpose Temperature Controller Is Now Even Better. USB-Serial Conversion Cable and Support Software Are Also Available.

- Controllers now available with analog inputs.
- Faster sampling at 250 ms.
- Transfer output provided for easy output to recorders.
- Voltage outputs (to drive SSRs) for both heating and cooling control.
- Models available with three-phase heater burnout detection and SSR fault detection.
- Manual output provided.
- Controller available with long-life relay output.
- Models available with external power supply for ES1B Infrared Thermosensor.
- Easy setting with 11-segment displays.
- Connect to either a thermocouple or platinum resistance thermometer with the same model.
- Easily see the status from a distance with PV display with three-color switching function.

Note: Refer to Precautions on CD.

NEW

Note: Refer to Common on CD for information on changes in comparison to previous models.

Features

Improved Functions for a Wider Range of Application

Control Analog Values, such as Pressures, Flowrates, and Levels

The E5EN Series now also includes models that accept analog inputs, enabling control applications other than for temperature, including pressure, flowrate, level, humidity, and weight control.

Faster Sampling at 250 ms

The previous sampling time of 500 ms has been reduced by half to 250 ms. This enables the E5EN to handle application requiring even greater response speed and accuracy.

Easy Connector to a Recorder

A transfer output now makes it easy to connect to a recorder or PLC Analog I/O Unit.

Voltage Outputs (to Drive SSRs) for Both Heating and Cooling Control.

Voltage outputs can be used for both heating and cooling for Models with Two Control Outputs.

Three-phase Heater Burnout Detection

With Models with Three-phase Heater Burnout and SSR Failure Detection, two current transformers can be connected to detect both heater burnout and SSR failure at the same time, reducing costs because a separate heater burnout alarm device is not required. SSR failure detection can be used even with Models with Single-phase Heater Burnout Alarms.

E58-CIFQ1 USB-Serial Conversion Cable for Computer Connection

A personal computer connection is possible for models without communications.

The CX-Thermo Support Software (sold separately) can be used to set parameters, monitor operation, and parameter masks. (CX-Thermo support of the E5EN is scheduled for March 2005.)

Specifications: page 47, Dimensions: page 53

Model Number Structure

■ Model Number Legend

E5EN-□□□□M□-500
1 2 3 4 5 6

1. **Output 1 type**
   R: Relay
   Q: Voltage for driving SSR
   C: Current
2. **Number of alarms**
   3: 3 alarms
3. **Heater burnout/SSR failure**
   H:Heater burnout/SSR failure detection (1 CT)
   HH:Heater burnout/SSR failure detection (2 CT)
   Blank:Not available
4. **Output 2/External power supply for ES1B**
   Q: Voltage for driving SSR
   Y: Long-life Relay
   P: External Power supply for ES1B
   Blank:Not available
5. **Option Unit**
6. **Input type**
   T: Thermocouple/platinum resistance thermometer (multi-input)
   L: Analog input

Ordering Information

■ Temperature Input (Multi Input) Standard Models

Size	Power supply voltage	Number of alarm points	Control output	Heater alarm	Model
1/8 DIN 48 × 96 × 78 (W × H × D)	100 to 240 VAC	3	Relay	No	E5EN-R3MT-500
				Yes (1 CT)	E5EN-R3HMT-500
				Yes (2 CT)	E5EN-R3HHMT-500
			Voltage (for driving SSR)	No	E5EN-Q3MT-500
				Yes (1 CT)	E5EN-Q3HMT-500
				Yes (2 CT)	E5EN-Q3HHMT-500
			Current	No	E5EN-C3MT-500
	24 VAC/VDC	3	Relay	No	E5EN-R3MT-500
				Yes (1 CT)	E5EN-R3HMT-500
			Voltage (for driving SSR)	No	E5EN-Q3MT-500
				Yes (1 CT)	E5EN-Q3HMT-500
			Current	No	E5EN-C3MT-500

■ Temperature Input (Multi Input) 2 Outputs Models

Size	Power supply voltage	Number of alarm points	Control output 1	Control output 2	Power supply for ES1B	Model
1/8 DIN 48 × 96 × 78 (W × H × D)	100 to 240 VAC	3	Relay	Voltage (for driving SSR)	No	E5EN-R3QMT-500
			Voltage (for driving SSR)	Voltage (for driving SSR)		E5EN-Q3QMT-500
				Ling-life Relay		E5EN-Q3YMT-500
			Current	Voltage (for driving SSR)		E5EN-C3QMT-500
				Ling-life Relay		E5EN-C3YMT-500
			Relay	No	Yes	E5EN-R3PMT-500
			Voltage (for driving SSR)			E5EN-Q3PMT-500

Analog Input Models

Size	Power supply voltage	Number of alarm points	Control output 1	Heater alarm	Control output 2	Model
1/8 DIN 48 × 96 × 78 (W × H × D)	100 to 240 VAC	3	Relay	No	No	E5EN-R3ML-500
			Voltage (for driving SSR)	No		E5EN-Q3ML-500
			Current	No		E5EN-C3ML-500
			Relay	Yes (1 CT)		E5EN-R3HML-500
			Voltage (for driving SSR)	Yes (1 CT)		E5EN-Q3HML-500
			Voltage (for driving SSR)	No	Long-life Relay	E5EN-Q3YML-500

Option Units

Name	Function	Model
Communication Unit	RS-232C Communication	E53-EN01
	RS-485 Communication	E53-EN03
Event Input Unit	Event Input	E53-AKB

Specifications

Ratings

Item	Power supply voltage	100 to 240 VAC, 50/60 Hz	24 VAC, 50/60 Hz or 24 VDC
Operating voltage range		85% to 110% of rated supply voltage	
Power consumption		Approx. 10 VA	Approx. 5.5 VA (24 VAC)/approx. 4 W (24 VDC)
Sensor input		Models with temperature inputs Thermocouple: K, J, T, E, L, U, N, R, S, or B Platinum resistance thermometer: Pt100 or JPt100 Infrared temperature sensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, or 160 to 260°C Voltage input: 0 to 50 mV	
		Models with analog inputs Current input: 4 to 20 mA or 0 to 20 mA Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V	
Input impedance		Current input: 150 Ω, Voltage input: 1 MΩ (Use a 1:1 connection when connecting the ES2-HB.)	
Control output	Relay output	SPST-NO, 250 VAC, 5 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA	
	Voltage output	Output voltage: 12 VDC +15%/–20% (PNP), max. load current: 40 mA, with short-circuit protection circuit (max. load current of control output 2: 21 mA)	
	Current output	4 to 20 mA DC/0 to 20 mA DC, load: 600 Ω max., resolution: approx. 2,700	
	Long-life relay output	SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 1,000,000 operations, load power supply voltage: 75 to 250 VAC (DC loads cannot be connected.), minimum applicable load: 5 V, 10 mA, leakage current: 5 mA max. (250 VAC, 60 Hz)	
Alarm output		SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 1 V, 1 mA	
Event input	Contact input	ON: 1 kΩ max., OFF: 100 kΩ min.	
	Non-contact input	ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.	
		Outflow current: Approx. 7 mA per point	
External power supply for ES1B		12 VDC ±10%, 20 mA, Short-circuit protection provided.	
Control method		ON/OFF control or 2-PID control (with auto-tuning)	
Setting method		Digital setting using front panel keys	
Indication method		11-segment digital display and individual indicators (7-segments displays also possible) Character height: PV: 14 mm, SV: 9.5 mm	
Other functions		Manual output, heating/cooling control, transfer output (on some models), loop break alarm, multi SP, MV limiter, input digital filter, self-tuning, temperature input shift, run/stop, protection functions, etc.	
Ambient operating temperature		–10 to 55°C (with no icing or condensation), for 3-year warranty: –10 to 50°C	
Ambient operating humidity		25% to 85%	
Storage temperature		–25 to 65°C (with no icing or condensation)	

Input Ranges

Thermocouples/Platinum Resistance Thermometers (Multi-inputs)

Input Type	Platinum resistance thermometer					Thermocouple														Infrared temperature sensor				Analog input
Name	Pt100			JPt100		K		J		T		E	L	U		N	R	S	B	10 to 70°C	60 to 120°C	115 to 165°C	160 to 260°C	0 to 50 mV
Temperature range (°C) (upper)	850	500.0	100.0	500.0	100.0	1300	500.0	850	400.0	400	400.0	600	850	400	400.0	1300	1700	1700	1800	90	120	165	260	Usable in the following ranges by scaling: –1999 to 9999 or –199.9 to 999.9
Temperature range (°C) (lower)	–200	–199.9	0.0	–199.9	0.0	–200	–20.0	–100	–20.0	–200	–199.9	0	–100	–200	–199.9	–200	0	0	100	0	0	0	0	
Setting number	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

The applicable standards for the input types are as follows:

K, J, T, E, N, R, S, B: IEC 584-1

L: Fe-CuNi, DIN 43710-1985

U: Cu-CuNi, DIN 43710-1985

Pt100: IEC 751

Shaded settings are the default settings.

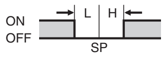
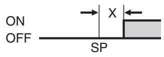
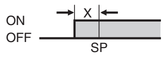
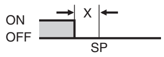
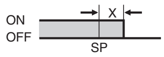
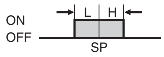
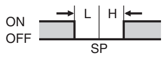
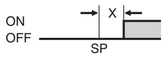
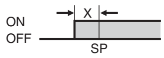
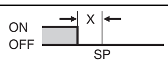
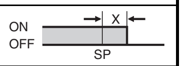
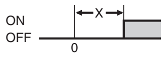
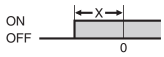
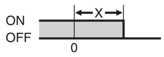
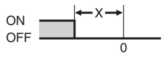
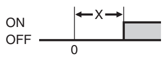
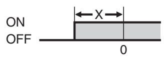
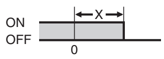
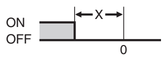
Models with Analog Inputs

Input Type	Current		Voltage		
Input specification	4 to 20mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V
Setting range	Usable in the following ranges by scaling: –1999 to 9999, –199.9 to 999.9, –19.99 to 99.99 or –1.999 to 9.999				
Setting number	0	1	2	3	4

Shaded settings are the default settings.

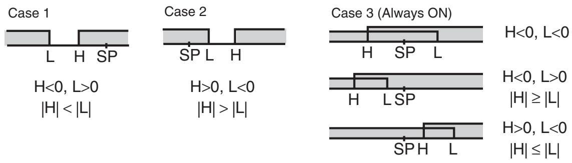
■ Alarm Types

Select alarm types out of the 12 alarm types listed in the following table.

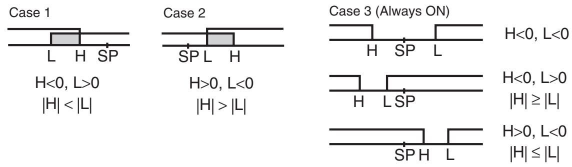
Set value	Alarm type	Alarm output operation	
		When X is positive	When X is negative
0	Alarm function OFF	Output OFF	
1 (See note 1.)	Upper- and lower-limit		(See note 2.)
2	Upper limit		
3	Lower limit		
4 (See note 1.)	Upper- and lower-limit range		(See note 3.)
5 (See note 1.)	Upper- and lower-limit with standby sequence	 (See note 5.)	(See note 4.)
6	Upper-limit with standby sequence		
7	Lower-limit with standby sequence		
8	Absolute-value upper-limit		
9	Absolute-value lower-limit		
10	Absolute-value upper-limit with standby sequence		
11	Absolute-value lower-limit with standby sequence		
12 (See note 6.)	LBA (for alarm 1 only)	---	

Note: 1. With set values 1, 4 and 5, the upper and lower limit values can be set independently for each alarm type, and are expressed as “L” and “H.”

2. Set value: 1, Upper- and lower-limit alarm



3. Set value: 4, Upper- and lower-limit range



4. Set value: 5, Upper- and lower-limit with standby sequence
For Upper- and Lower-Limit Alarm Described Above
- Case 1 and 2
  Always OFF when the upper-limit and lower-limit hysteresis overlaps.
- Case 3: Always OFF

5. Set value: 5, Upper- and lower-limit with standby sequence
Always OFF when the upper-limit and lower-limit hysteresis overlaps.

6. Set value: 12, LBA can be set only for alarm 1.

Set the alarm types for alarms 1 to 3 independently in the initial setting level. The default setting is 2 (upper limit).

Characteristics

Indication accuracy		Thermocouple: (See note 1.) (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max. Platinum resistance thermometer: (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max. Analog input: ±0.5% FS ±1 digit max. CT input: ±5% FS ±1 digit max.
Influence of temperature (See note 2.) **Influence of voltage (See note 2.)**		R, S, and B thermocouple inputs: (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Other thermocouple inputs: (±1% of PV or ±4°C, whichever is greater) ±1 digit max. *±10°C for –100°C or less for K sensors Platinum resistance thermometer inputs: (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog inputs: (±1% of FS) ±1 digit max.
Hysteresis		Models with thermocouple/platinum resistance thermometer (multi-input) input: 0.1 to 999.9 EU (in units of 0.1 EU) (See note 3.) Models with analog input: 0.01 to 99.99% FS (in units of 0.01% FS)
Proportional band (P)		Models with thermocouple/platinum resistance thermometer (multi-input) input: 0.1 to 999.9 EU (in units of 0.1 EU) (See note 3.) Models with analog input: 0.1 to 999.9% FS (in units of 0.1% FS)
Integral time (I)		0 to 3999 s (in units of 1 s)
Derivative time (D)		0 to 3999 s (in units of 1 s) (See note 4.)
Control period		0.5, 1 to 99 s (in units of 1 s)
Manual reset value		0.0 to 100.0% (in units of 0.1%)
Alarm setting range		–1999 to 9999 (decimal point position depends on input type)
Sampling period		250 ms
Affect of signal source resistance		Thermocouple: 0.1°C/Ω max. (100 Ω max.) (See note 5.) Platinum resistance thermometer: 0.4°C/Ω max. (10 Ω max.)
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		2,000 VAC, 50 or 60 Hz for 1 min (between terminals with different charge)
Vibration resistance	**Malfunction**	10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions
	Destruction	10 to 55 Hz, 0.75-mm single amplitude for 2 hrs each in X, Y, and Z directions
Shock resistance	**Malfunction**	100 m/s² min., 3 times each in X, Y, and Z directions
	Destruction	300 m/s² min., 3 times each in X, Y, and Z directions
Weight		Controller: Approx. 260 g, Mounting Bracket: Approx. 100 g
Degree of protection		Front panel: NEMA4X for indoor use (equivalent to IP66) Rear case: IP20, Terminal section: IP00
Memory protection		Non-volatile memory (number of writes: 1,000,000 operations)
EMC		Emission Enclosure: EN55011 Group1 Class A Emission AC Mains: EN55011 Group1 Class A Immunity ESD: EN61000-4-2 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Immunity RF-interference: EN61000-4-3 10 V/m (80-1000 MHz, 1.4-2.0 GHz amplitude modulated) (level 3) 10 V/m (900 MHz pulse modulated) Immunity Conducted Disturbance: EN61000-4-6 3 V (0.15 to 80 MHz) (level 2) Immunity Burst: EN61000-4-4 2 kV Power-line (level 3) 1 kV I/O signal-line (level 3) Immunity Surge: EN61000-4-5 1kV line to line Power line, output line (relay output) 2 kV line to ground Power line, output line (relay output) 1 kV line to ground Input line (communication) Immunity Voltage Dip/Interrupting: EN61000-4-11 0.5 cycle, 100% (rated voltage)
Approved standards		UL 61010C-1 CSA C22.2 No.1010.1
Conformed standards		EN61326, EN61010-1, IEC61010-1 VDE0106 Part 100 (Finger protection), when the terminal cover is mounted.

Note: 1. The indication accuracy of K thermocouples in the –200 to 1300°C range, T and N thermocouples at a temperature of –100°C max., and U and L thermocouples at any temperature is ±2°C ±1 digit maximum. The indication accuracy of the B thermocouple at a temperature of 400°C max. is not specified. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit max.

2. Conditions: Ambient temperature: –10°C to 23°C to 55°C, Voltage range: –15% to +10% of rated voltage

3. "EU" stands for Engineering Unit and is used as the unit after scaling. For a temperature sensor, the EU is °C or °F.

4. When robust tuning (RT) is ON, the differential time is 0.0 to 999.9 (in units of 0.1 s).

5. B, R, and S sensors: 0.2°C/Ω max. (100 Ω max.)

USB-Serial Conversion Cable

Applicable OS	Windows 2000/XP
Applicable software	Thermo Mini, CX-Thermo
Applicable models	E5CN/E5CN-U/E5AN/E5EN
USB interface standard	Conforms to USB Specification 1.1.
DTE speed	38400 bps
Connector specifications	Computer: USB (type A plug) Temperature Controller: Serial
Power supply	Bus power (Supplied from USB host controller.)
Power supply voltage	5 VDC
Current consumption	70 mA
Ambient operating temperature	0 to 55°C (with no condensation or icing)
Ambient operating humidity	10% to 80%
Storage temperature	–20 to 60°C (with no condensation or icing)
Storage humidity	10% to 80%
Altitude	2,000 m max.
Weight	Approx. 100 g

Note: A driver must be installed in the personal computer. Refer to installation information in the operation manual for the Conversion Cable.

Communications Specifications

Transmission line connection method	RS-485 multipoint RS-232C
Communications	RS-485 (two-wire, half duplex), RS-232C
Synchronization method	Start-stop synchronization
Baud rate	1200, 2400, 4800, 9600, 19200, or 38400 bps
Transmission code	ASCII
Data bit length (See note.)	7 or 8 bits
Stop bit length (See note.)	1 or 2 bits
Error detection	Vertical parity (none, even, odd) Frame check sequence (FCS) with SYSWAY Block check character (BCC) with CompoWay/F or CRC-16 Modbus
Flow control	None
Interface	RS-485, RS-232C
Retry function	None
Communications buffer	40 bytes
Communications response wait time	0 to 99 ms Default: 20 ms

Note: The baud rate, data bit length, stop bit length, and vertical parity can be individually set using the Communications Setting Level.

Current Transformer (Sold Separately)

Ratings

Dielectric strength	1,000 VAC for 1 min
Vibration resistance	50 Hz, 98 m/s²
Weight	E54-CT1: Approx. 11.5 g, E54-CT3: Approx. 50 g
Accessories (E54-CT3 only)	Armatures (2) Plugs (2)

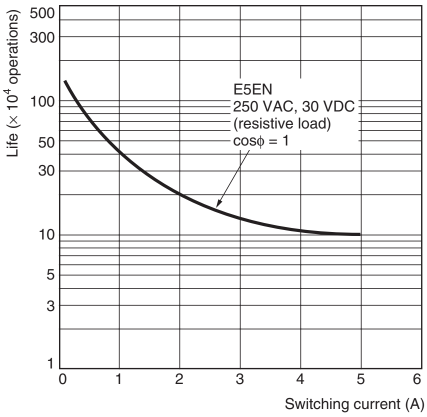
■ Heater Burnout Alarms and SSR Failure Detection Alarms

Maximum heater current	50 A AC
Input current indication accuracy	±5% FS ±1 digit max.
Heater burnout alarm setting range	0.1 to 49.9 A (in units of 0.1 A) 0.0 A: Heater burnout/SSR failure alarm output turned OFF. 50.0 A: Heater burnout/SSR failure alarm output turned ON. Minimum detection ON time: 190 ms (See note 1.)
SSR failure detection alarm setting range	0.1 to 49.9 A (in units of 0.1 A) 0.0 A: Heater burnout/SSR failure alarm output turned ON. 50.0 A: Heater burnout/SSR failure alarm output turned OFF. Minimum detection OFF time: 190 ms (See note 2.)

Note: 1. If the ON time of control output 1 is less than 190 ms, heater burnout detection and the heater current will not be measured.

2. If the OFF time of control output 1 is less than 190 ms, SSR failure detection and the heater current will not be measured.

■ Electrical Life Expectancy Curve for Relays (Reference Values)

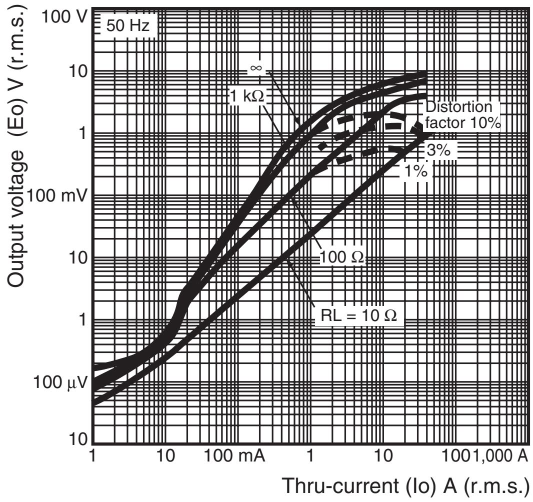


Note: Do not connect a DC load to a Controller with a Long-life Relay Output.

E54-CT1

Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

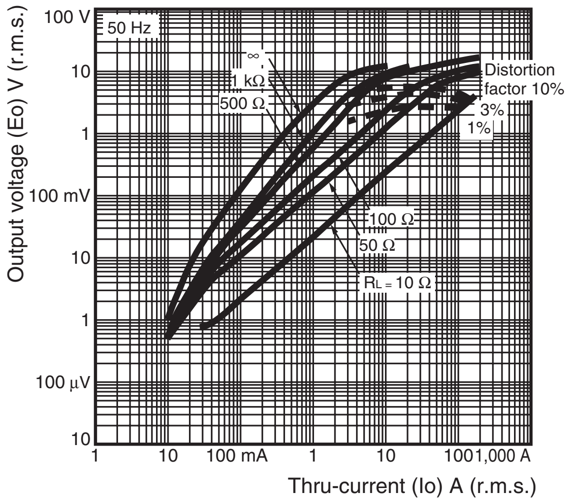
Maximum continuous heater current: 50 A (50/60 Hz)
Number of windings: 400±2
Winding resistance: 18±2 Ω



E54-CT3

Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

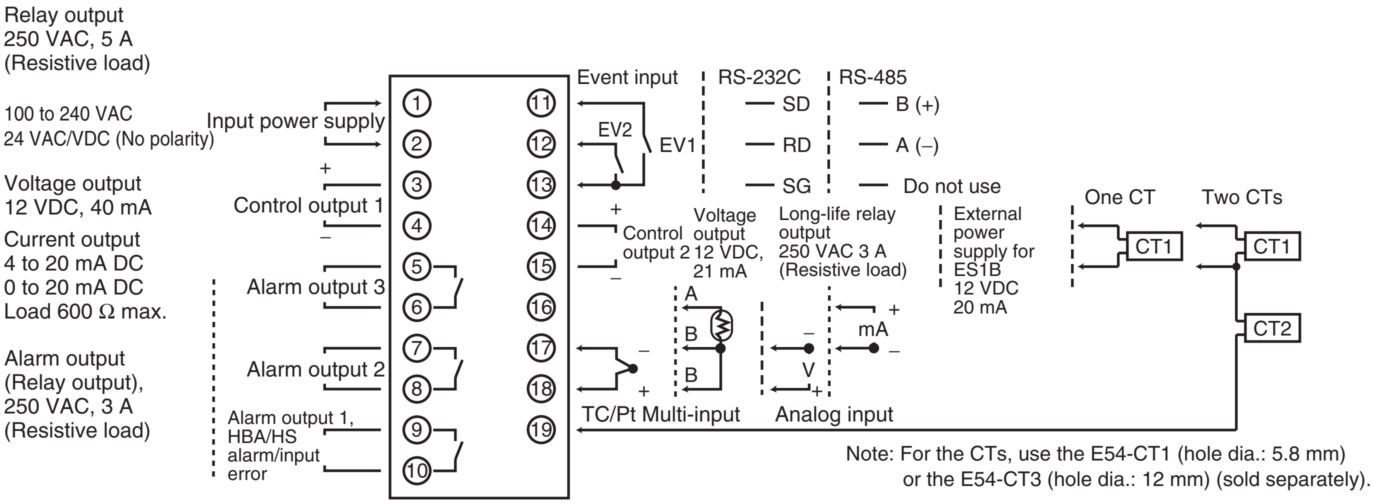
Maximum continuous heater current: 120 A (50/60 Hz)
(Maximum continuous heater current for an OMRON Temperature Controller is 50 A.)
Number of windings: 400±2
Winding resistance: 8±0.8 Ω



External Connections

- The voltage output for control output 1 is not electrically insulated from the internal circuits. When using a grounding thermocouple, do not connect any of the control output terminals to ground. If the control output terminals are connected to ground, errors will occur in the measured temperature values as a result of leakage current.
  The voltage output for control output 2 is electrically insulated from the internal circuits with standard insulation.
- An R on the end of the lot number indicates that reinforced insulation is provided between the input power supply, relay outputs, and other terminals.
- Consult with your OMRON representative before using the external power supply for the ES1B for any other purpose.

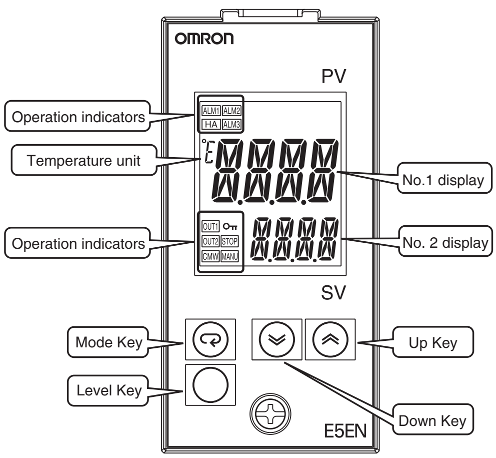
E5EN



Note: For the CTs, use the E54-CT1 (hole dia.: 5.8 mm) or the E54-CT3 (hole dia.: 12 mm) (sold separately).

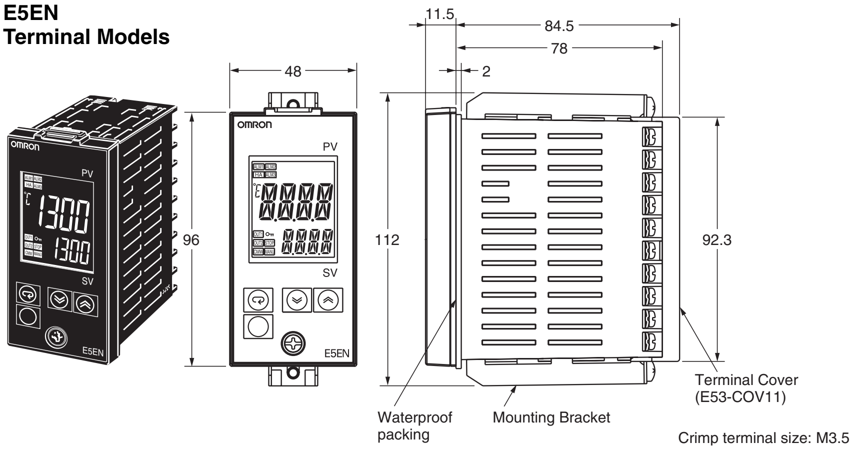
Nomenclature

E5EN



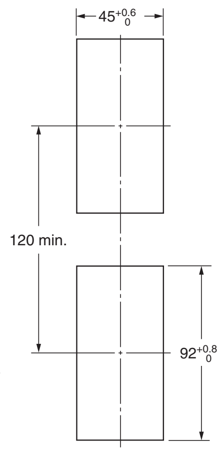
Dimensions

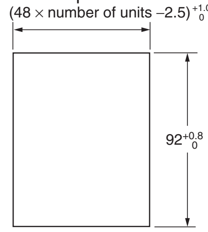
E5EN
Terminal Models



Note: To remove the Controller from the case, loosen the screw at the bottom of the front panel with a screwdriver while pressing down on the hook at the top of the front panel.

Panel Cutout





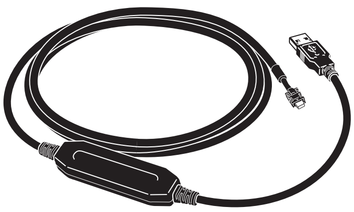
Group mounting does not allow waterproofing.

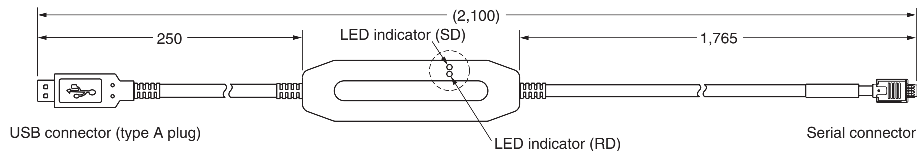
- Recommended panel thickness is 1 to 8 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

■ Accessories

USB-Serial Conversion Cable (Sold Separately)

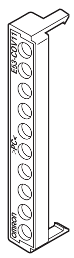
E58-CIFQ1

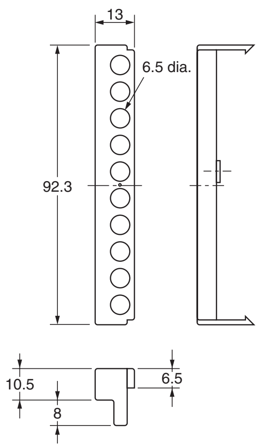




Terminal Covers

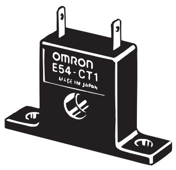
E53-COV11
(Two Covers provided.)

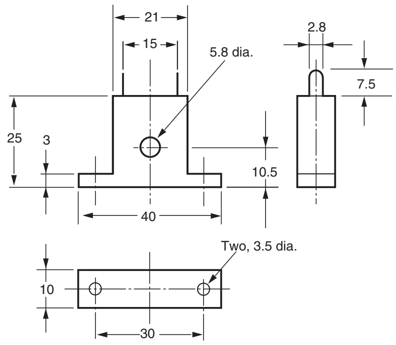




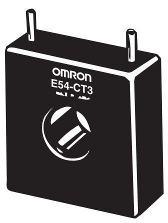
Current Transformers (Sold Separately)

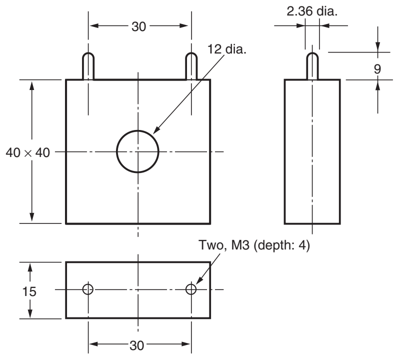
E54-CT1





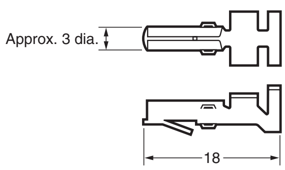
E54-CT3



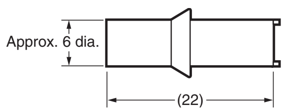


E54-CT3 Accessory

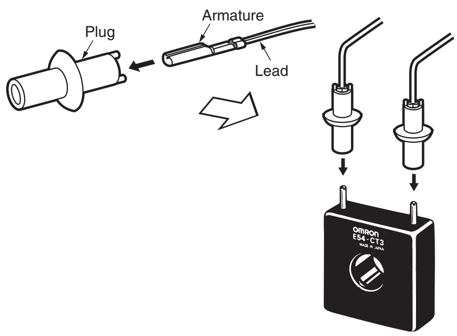
• Armature



• Plug



Connection Example



Digital Temperature Controllers
E5AN

This Best-selling General-purpose Temperature Controller Is Now Even Better. USB-Serial Conversion Cable and Support Software Are Also Available.

- Controllers now available with analog inputs.
- Faster sampling at 250 ms.
- Transfer output provided for easy output to recorders.
- Voltage outputs (to drive SSRs) for both heating and cooling control.
- Models available with three-phase heater burnout detection and SSR fault detection.
- Manual output provided.
- Controller available with long-life relay output.
- Easy setting with 11-segment displays.
- Connect to either a thermocouple or platinum resistance thermometer with the same model.
- Easily see the status from a distance with PV display with three-color switching function.

Note: Refer to Precautions on CD.

Note: Refer to Common on CD for information on changes in comparison to previous models.

Features

Improved Functions for a Wider Range of Application

Control Analog Values, such as Pressures, Flowrates, and Levels

The E5AN Series now also includes models that accept analog inputs, enabling control applications other than for temperature, including pressure, flowrate, level, humidity, and weight control.

Faster Sampling at 250 ms

The previous sampling time of 500 ms has been reduced by half to 250 ms. This enables the E5AN to handle application requiring even greater response speed and accuracy.

Easy Connector to a Recorder

A transfer output now makes it easy to connect to a recorder or PLC Analog I/O Unit.

Voltage Outputs (to Drive SSRs) for Both Heating and Cooling Control.

Voltage outputs can be used for both heating and cooling for Models with Two Control Outputs.

Three-phase Heater Burnout Detection

With Models with Three-phase Heater Burnout and SSR Failure Detection, two current transformers can be connected to detect both heater burnout and SSR failure at the same time, reducing costs because a separate heater burnout alarm device is not required. SSR failure detection can be used even with Models with Single-phase Heater Burnout Alarms.

E58-CIFQ1 USB-Serial Conversion Cable for Computer Connection

A personal computer connection is possible for models without communications.

The CX-Thermo Support Software (sold separately) can be used to set parameters, monitor operation, and parameter masks. (CX-Thermo support of the E5AN is scheduled for March 2005.)

Specifications: page 57, Dimensions: page 63

Model Number Structure

■ Model Number Legend

E5AN-□□□□M□-500
1 2 3 4 5 6

1. **Output 1 type**
   R: Relay
   Q: Voltage for driving SSR
   C: Current
2. **Number of alarms**
   3: 3 alarms
3. **Heater burnout/SSR failure**
   H: Heater burnout/SSR failure detection (1 CT)
   HH: Heater burnout/SSR failure detection (2 CT)
   Blank:Not available
4. **Output 2 type**
   Q: Voltage for driving SSR
   Y: Long-life Relay
   Blank:Not available
5. **Option Unit**
6. **Input type**
   T: Thermocouple/platinum resistance thermometer (multi-input)
   L: Analog input

Ordering Information

■ Temperature Input (Multi Input) Standard Models

Size	Power supply voltage	Number of alarm points	Control output	Heater alarm	Model
1/4 DIN 96 × 96 × 78 (W × H × D)	100 to 240 VAC	3	Relay	No	E5AN-R3MT-500
				Yes (1 CT)	E5AN-R3HMT-500
				Yes (2 CT)	E5AN-R3HHMT-500
			Voltage (for driving SSR)	No	E5AN-Q3MT-500
				Yes (1 CT)	E5AN-Q3HMT-500
				Yes (2 CT)	E5AN-Q3HHMT-500
			Current	No	E5AN-C3MT-500
	24 VAC/VDC	3	Relay	No	E5AN-R3MT-500
				Yes (1 CT)	E5AN-R3HMT-500
			Voltage (for driving SSR)	No	E5AN-Q3MT-500
				Yes (1 CT)	E5AN-Q3HMT-500
			Current	No	E5AN-C3MT-500

■ Temperature Input (Multi Input) 2 Outputs Models

Size	Power supply voltage	Number of alarm points	Control output 1	Control output 2	Model
1/4 DIN 96 × 96 × 78 (W × H × D)	100 to 240 VAC	3	Relay	Voltage (for driving SSR)	E5AN-R3QMT-500
			Voltage (for driving SSR)	Voltage (for driving SSR)	E5AN-Q3QMT-500
				Long-life Relay	E5AN-Q3YMT-500
			Current	Voltage (for driving SSR)	E5AN-C3QMT-500
				Long-life Relay	E5AN-C3YMT-500

■ Analog Input Models

Size	Power supply voltage	Number of alarm points	Control output	heater alarm	Model
1/4 DIN 96 × 96 × 78 (W × H × D)	100 to 240 VAC	3	Relay	Yes (1 CT)	E5AN-R3HML-500
			Voltage (for driving SSR)	Yes (1 CT)	E5AN-Q3HML-500

■ Option Units

Name	Function	Model
Communication Unit	RS-232C Communication	E53-EN01
	RS-485 Communication	E53-EN03
Event Input Unit	Event Input	E53-AKB

Specifications

■ Ratings

Item	Power supply voltage	100 to 240 VAC, 50/60 Hz	24 VAC, 50/60 Hz or 24 VDC
Operating voltage range		85% to 110% of rated supply voltage	
Power consumption		Approx. 11 VA	Approx. 5.5 VA (24 VAC)/approx. 4 W (24 VDC)
Sensor input		Models with temperature inputs Thermocouple: K, J, T, E, L, U, N, R, S, or B Platinum resistance thermometer: Pt100 or JPt100 Infrared temperature sensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, or 160 to 260°C Voltage input: 0 to 50 mV	
		Models with analog inputs Current input: 4 to 20 mA or 0 to 20 mA Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V	
Input impedance		Current input: 150 Ω, Voltage input: 1 MΩ (Use a 1:1 connection when connecting the ES2-HB.)	
Control output	Relay output	SPST-NO, 250 VAC, 5 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA	
	Voltage output	Output voltage: 12 VDC +15/–20% (PNP), max. load current: 40 mA, with short-circuit protection circuit (max. load current for control output 2: 21 mA)	
	Current output	4 to 20 mA DC/0 to 20 mA DC, load: 600 Ω max., resolution: approx. 2,700	
	Long-life relay output	SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 1,000,000 operations, load power supply voltage: 75 to 250 VAC (DC loads cannot be connected.), minimum applicable load: 5 V, 10 mA, leakage current: 5 mA max. (250 VAC, 60 Hz)	
Alarm output		SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 1 V, 1 mA	
Event input	Contact input	ON: 1 kΩ max., OFF: 100 kΩ min.	
	Non-contact input	ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.	
		Outflow current: Approx. 7 mA per point	
Control method		ON/OFF control or 2-PID control (with auto-tuning)	
Setting method		Digital setting using front panel keys	
Indication method		11-segment digital display and individual indicators (7-segments displays also possible) Character height: PV: 15 mm, SV: 9.5 mm	
Other functions		Manual output, heating/cooling control, transfer output (on some models), loop break alarm, multi SP, MV limiter, input digital filter, self-tuning, temperature input shift, run/stop, protection functions, etc.	
Ambient operating temperature		–10 to 55°C (with no icing or condensation), for 3-year warranty: –10 to 50°C	
Ambient operating humidity		25% to 85%	
Storage temperature		–25 to 65°C (with no icing or condensation)	

■ Input Ranges

Thermocouples/Platinum Resistance Thermometers (Multi-inputs)

Input Type	Platinum resistance thermometer					Thermocouple													Infrared temperature sensor				Analog input
Name	Pt100			JPt100		K		J		T		E	L	U		N	R	S	B	10 to 70°C	60 to 120°C	115 to 165°C	160 to 260°C	0 to 50 mV
Temperature range (°C)	−200 to 850	−199.9 to 500.0	0.0 to 100.0	−199.9 to 500.0	0.0 to 100.0	−200 to 1300	−20.0 to 500.0	−100 to 850	−20.0 to 400.0	−200 to 400	−199.9 to 400.0	0 to 600	−100 to 850	−200 to 400	−199.9 to 400.0	−200 to 1300	0 to 1700	0 to 1700	100 to 1800	0 to 90	0 to 120	0 to 165	0 to 260	Usable in the following ranges by scaling: −1999 to 9999 or −199.9 to 999.9
Setting number	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

The applicable standards for the input types are as follows:

K, J, T, E, N, R, S, B: IEC 584-1

L: Fe-CuNi, DIN 43710-1985

U: Cu-CuNi, DIN 43710-1985

Pt100: IEC 751

Shaded settings are the default settings.

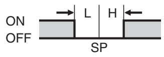
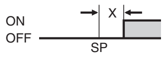
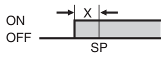
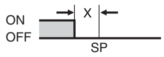
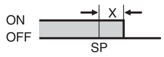
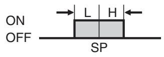
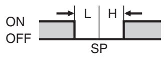
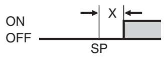
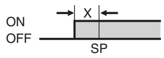
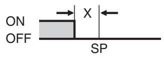
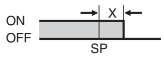
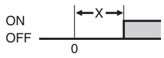
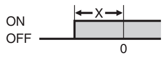
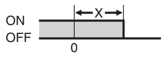
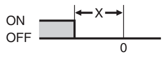
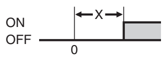
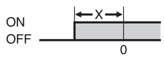
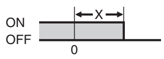
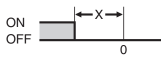
Models with Analog Inputs

Input Type	Current		Voltage		
Input specification	4 to 20mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V
Setting range	Usable in the following ranges by scaling: −1999 to 9999, −199.9 to 999.9, −19.99 to 99.99 or −1.999 to 9.999				
Setting number	0	1	2	3	4

Shaded settings are the default settings.

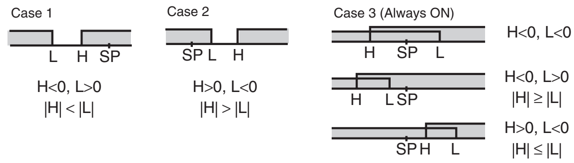
■ Alarm Types

Select alarm types out of the 12 alarm types listed in the following table.

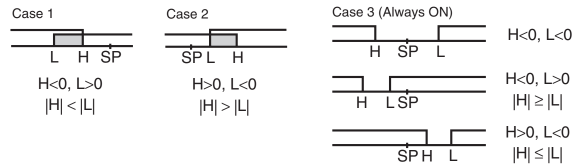
Set value	Alarm type	Alarm output operation	
		When X is positive	**When X is negative**
0	Alarm function OFF	Output OFF	
1 (See note 1.)	Upper- and lower-limit		(See note 2.)
2	Upper limit		
3	Lower limit		
4 (See note 1.)	Upper- and lower-limit range		(See note 3.)
5 (See note 1.)	Upper- and lower-limit with standby sequence	 (See note 5.)	(See note 4.)
6	Upper-limit with standby sequence		
7	Lower-limit with standby sequence		
8	Absolute-value upper-limit		
9	Absolute-value lower-limit		
10	Absolute-value upper-limit with standby sequence		
11	Absolute-value lower-limit with standby sequence		
12 (See note 6.)	LBA (for alarm 1 only)	---	

Note: 1. With set values 1, 4 and 5, the upper and lower limit values can be set independently for each alarm type, and are expressed as "L" and "H."

2. Set value: 1, Upper- and lower-limit alarm



3. Set value: 4, Upper- and lower-limit range



4. Set value: 5, Upper- and lower-limit with standby sequence
For Upper- and Lower-Limit Alarm Described Above
- Case 1 and 2
  Always OFF when the upper-limit and lower-limit hysteresis overlaps.
- Case 3: Always OFF

5. Set value: 5, Upper- and lower-limit with standby sequence
Always OFF when the upper-limit and lower-limit hysteresis overlaps.

6. Set value: 12, LBA can be set only for alarm 1.

Set the alarm types for alarms 1 to 3 independently in the initial setting level. The default setting is 2 (upper limit).

■ Characteristics

Indication accuracy		Thermocouple: (See note 1.) (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max. Platinum resistance thermometer: (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max. Analog input: ±0.5% FS ±1 digit max. CT input: ±5% FS ±1 digit max.
Influence of temperature (See note 2.) **Influence of voltage (See note 2.)**		R, S, and B thermocouple inputs: (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Other thermocouple inputs: (±1% of PV or ±4°C, whichever is greater) ±1 digit max. *±10°C for –100°C or less for K sensors Platinum resistance thermometer inputs: (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog inputs: (±1% of FS) ±1 digit max.
Hysteresis		Models with thermocouple/platinum resistance thermometer (multi-input) input: 0.1 to 999.9 EU (in units of 0.1 EU) (See note 3.) Models with analog input: 0.01 to 99.99% FS (in units of 0.01% FS)
Proportional band (P)		Models with thermocouple/platinum resistance thermometer (multi-input) input: 0.1 to 999.9 EU (in units of 0.1 EU) (See note 3.) Models with analog input: 0.1 to 999.9% FS (in units of 0.1% FS)
Integral time (I)		0 to 3999 s (in units of 1 s)
Derivative time (D)		0 to 3999 s (in units of 1 s) (See note 4.)
Control period		0.5, 1 to 99 s (in units of 1 s)
Manual reset value		0.0 to 100.0% (in units of 0.1%)
Alarm setting range		–1999 to 9999 (decimal point position depends on input type)
Sampling period		250 ms
Affect of signal source resistance		Thermocouple: 0.1°C/Ω max. (100 Ω max.) (See note 5.) Platinum resistance thermometer: 0.4°C/Ω max. (10 Ω max.)
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		2,000 VAC, 50 or 60 Hz for 1 min (between terminals with different charge)
Vibration resistance	**Malfunction**	10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions
	Destruction	10 to 55 Hz, 0.75-mm single amplitude for 2 hrs each in X, Y, and Z directions
Shock resistance	**Malfunction**	100 m/s² min., 3 times each in X, Y, and Z directions
	Destruction	300 m/s² min., 3 times each in X, Y, and Z directions
Weight		Controller: Approx. 310 g, Mounting Bracket: Approx. 100 g
Degree of protection		Front panel: NEMA4X for indoor use (equivalent to IP66) Rear case: IP20, Terminal section: IP00
Memory protection		Non-volatile memory (number of writes: 1,000,000 operations)
EMC		Emission Enclosure: EN55011 Group1 Class A Emission AC Mains: EN55011 Group1 Class A Immunity ESD: EN61000-4-2 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Immunity RF-interference: EN61000-4-3 10 V/m (80-1000 MHz, 1.4-2.0 GHz amplitude modulated) (level 3) 10 V/m (900 MHz pulse modulated) Immunity Conducted Disturbance: EN61000-4-6 3 V (0.15 to 80 MHz) (level 2) Immunity Burst: EN61000-4-4 2 kV Power-line (level 3) 1 kV I/O signal-line (level 3) Immunity Surge: EN61000-4-5 1kV line to line Power line, output line (relay output) 2 kV line to ground Power line, output line (relay output) 1 kV line to ground Input line (communication) Immunity Voltage Dip/Interrupting: EN61000-4-11 0.5 cycle, 100% (rated voltage)
Approved standards		UL 61010C-1 CSA C22.2 No.1010.1
Conformed standards		EN61326, EN61010-1, IEC61010-1 VDE0106 Part 100 (Finger protection), when the terminal cover is mounted.

Note: 1. The indication accuracy of K thermocouples in the –200 to 1300°C range, T and N thermocouples at a temperature of –100°C max., and U and L thermocouples at any temperature is ±2°C ±1 digit maximum. The indication accuracy of the B thermocouple at a temperature of 400°C max. is not specified. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit max.

2. Conditions: Ambient temperature: –10°C to 23°C to 55°C, Voltage range: –15% to +10% of rated voltage

3. "EU" stands for Engineering Unit and is used as the unit after scaling. For a temperature sensor, the EU is °C or °F.

4. When robust tuning (RT) is ON, the differential time is 0.0 to 999.9 (in units of 0.1 s).

5. B, R, and S sensors: 0.2°C/Ω max. (100 Ω max.)

■ USB-Serial Conversion Cable

Applicable OS	Windows 2000/XP
Applicable software	Thermo Mini, CX-Thermo
Applicable models	E5CN/E5CN-U/E5AN/E5EN
USB interface standard	Conforms to USB Specification 1.1.
DTE speed	38400 bps
Connector specifications	Computer: USB (type A plug) Temperature Controller: Serial
Power supply	Bus power (Supplied from USB host controller.)
Power supply voltage	5 VDC
Current consumption	70 mA
Ambient operating temperature	0 to 55°C (with no condensation or icing)
Ambient operating humidity	10% to 80%
Storage temperature	–20 to 60°C (with no condensation or icing)
Storage humidity	10% to 80%
Altitude	2,000 m max.
Weight	Approx. 100 g

Note: A driver must be installed in the personal computer. Refer to installation information in the operation manual for the Conversion Cable.

■ Communications Specifications

Transmission line connection method	RS-485 multipoint RS-232C
Communications	RS-485 (two-wire, half duplex), RS-232C
Synchronization method	Start-stop synchronization
Baud rate	1200, 2400, 4800, 9600, 19200, or 38400 bps
Transmission code	ASCII
Data bit length	7 or 8 bits
Stop bit length	1 or 2 bits
Error detection	Vertical parity (none, even, odd) Frame check sequence (FCS) with SYSWAY Block check character (BCC) with CompoWay/F or CRC-16 Modbus
Flow control	None
Interface	RS-485, RS-232C
Retry function	None
Communications buffer	40 bytes
Communications response wait time	0 to 99 ms Default: 20 ms

Note: The baud rate, data bit length, stop bit length, and vertical parity can be individually set using the Communications Setting Level.

■ Current Transformer (Sold Separately)

Ratings

Dielectric strength	1,000 VAC for 1 min
Vibration resistance	50 Hz, 98 m/s²
Weight	E54-CT1: Approx. 11.5 g, E54-CT3: Approx. 50 g
Accessories (E54-CT3 only)	Armatures (2) Plugs (2)

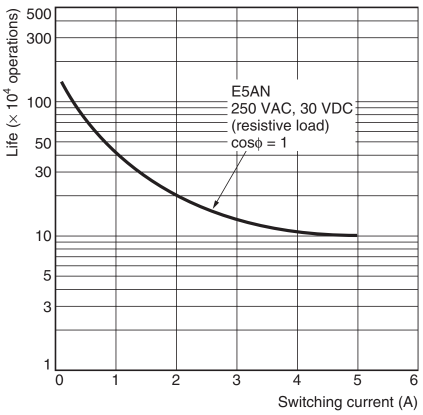
■ Heater Burnout Alarms and SSR Failure Detection Alarms

Maximum heater current	50 A AC
Input current indication accuracy	±5% FS ±1 digit max.
Heater burnout alarm setting range	0.1 to 49.9 A (in units of 0.1 A) 0.0 A: Heater burnout/SSR failure alarm output turned OFF. 50.0 A: Heater burnout/SSR failure alarm output turned ON. Minimum detection ON time: 190 ms (See note 1.)
SSR failure detection alarm setting range	0.1 to 49.9 A (in units of 0.1 A) 0.0 A: Heater burnout/SSR failure alarm output turned ON. 50.0 A: Heater burnout/SSR failure alarm output turned OFF. Minimum detection OFF time: 190 ms (See note 2.)

Note: 1. If the ON time of control output 1 is less than 190 ms, heater burnout detection and the heater current will not be measured.

2. If the OFF time of control output 1 is less than 190 ms, SSR failure detection and the heater current will not be measured.

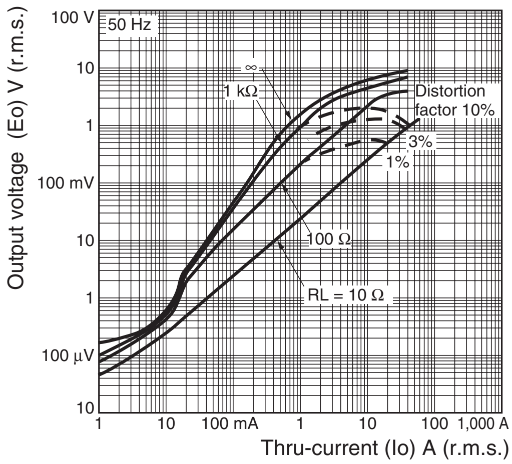
■ Electrical Life Expectancy Curve for Relays (Reference Values)



Note: Do not connect a DC load to a Controller with a Long-life Relay Output.

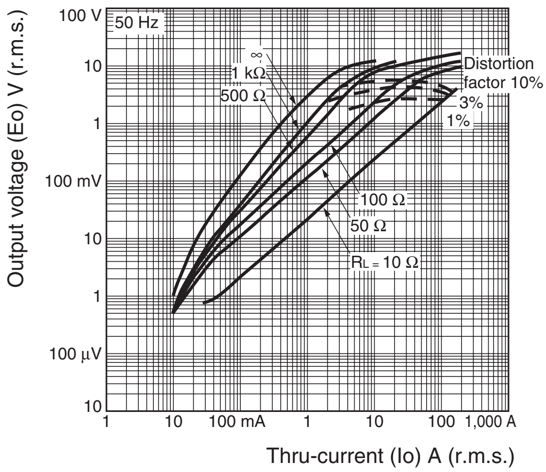
E54-CT1
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

Maximum continuous heater current: 50 A (50/60 Hz)
Number of windings: 400±2
Winding resistance: 18±2 Ω



E54-CT3
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

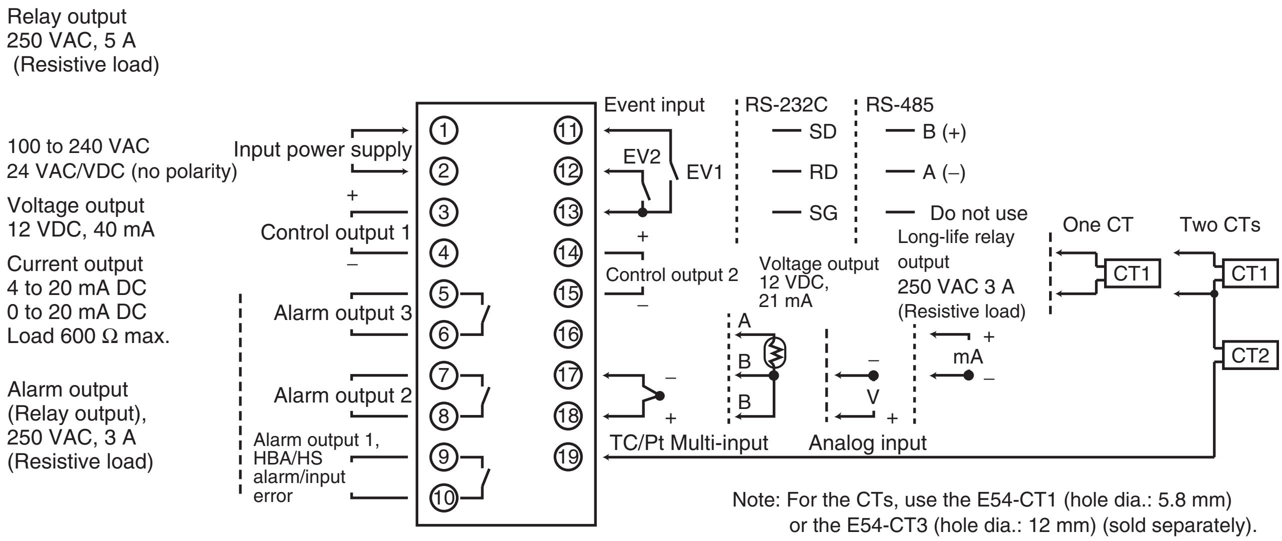
Maximum continuous heater current: 120 A (50/60 Hz)
(Maximum continuous heater current for an OMRON Temperature Controller is 50 A.)
Number of windings: 400±2
Winding resistance: 8±0.8 Ω



External Connections

- The voltage output for control output 1 is not electrically insulated from the internal circuits. When using a grounding thermocouple, do not connect any of the control output terminals to ground. If the control output terminals are connected to ground, errors will occur in the measured temperature values as a result of leakage current.
  The voltage output for control output 2 is electrically insulated from the internal circuits with standard insulation.
- An R on the end of the lot number indicates that reinforced insulation is provided between the input power supply, relay outputs, and other terminals.

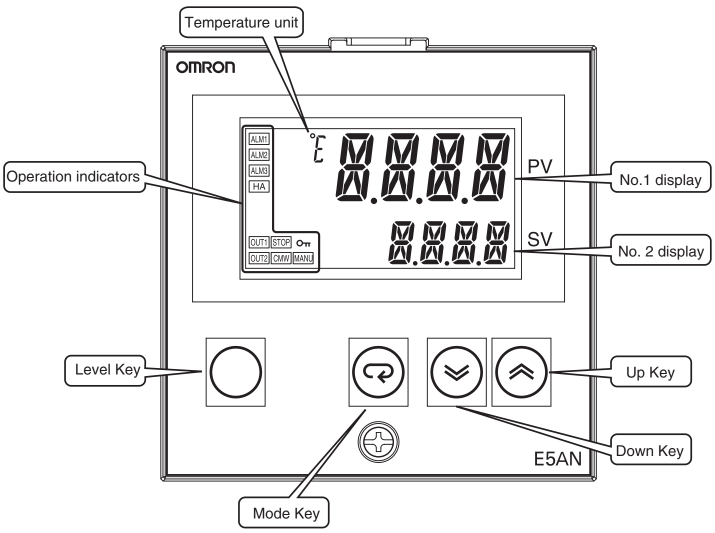
E5AN



Note: For the CTs, use the E54-CT1 (hole dia.: 5.8 mm)
or the E54-CT3 (hole dia.: 12 mm) (sold separately).

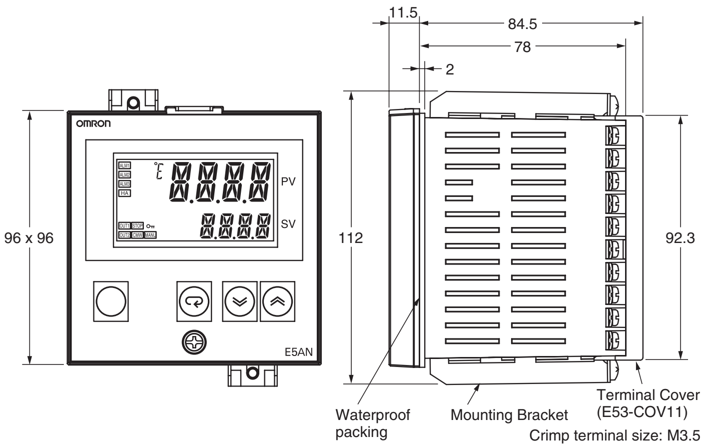
Nomenclature

E5AN



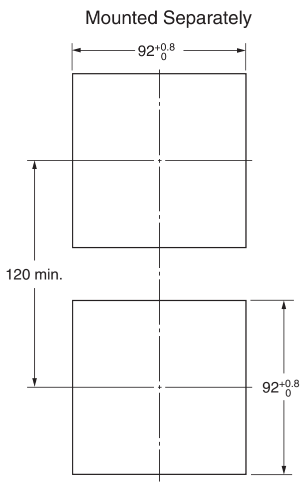
Dimensions

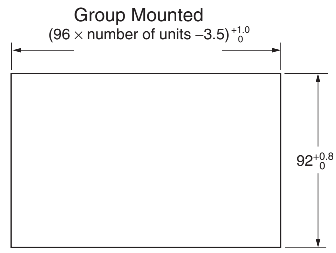
E5AN



Note: To remove the Controller from the case, loosen the screw at the bottom of the front panel with a screwdriver while pressing down on the hook at the top of the front panel.

Panel Cutout





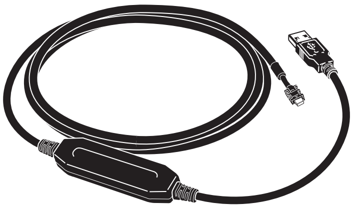
Group mounting does not allow waterproofing.

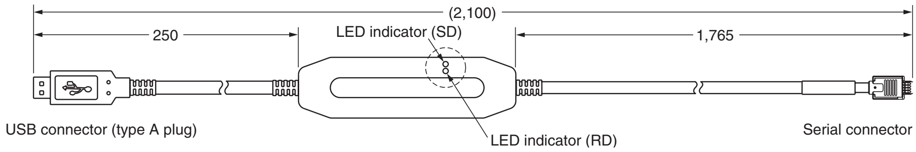
- Recommended panel thickness is 1 to 8 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

■ Accessories

USB-Serial Conversion Cable (Sold Separately)

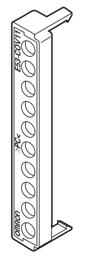
E58-CIFQ1

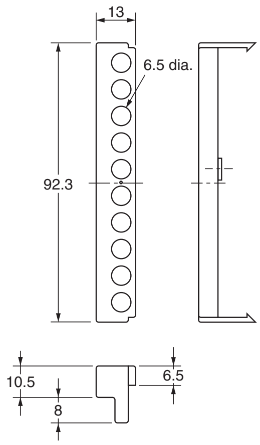




Terminal Cover (Sold Separately)

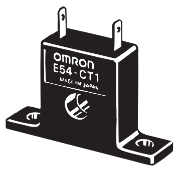
E53-COV11
(Two Covers provided.)

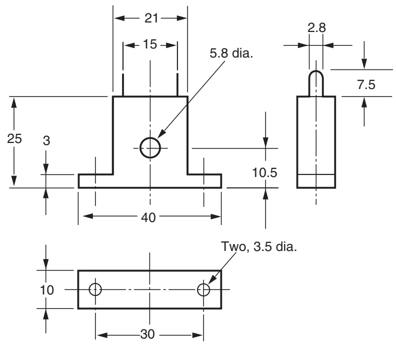




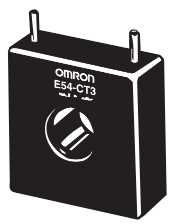
Current Transformers (Sold Separately)

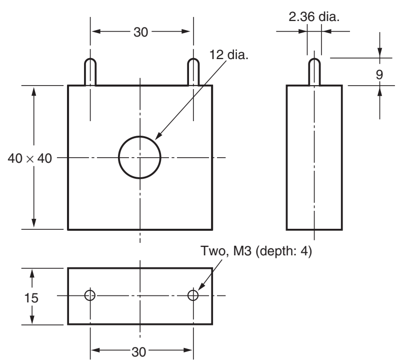
E54-CT1





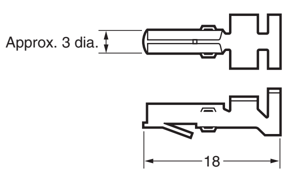
E54-CT3



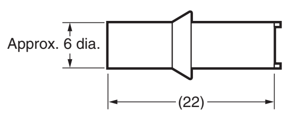


E54-CT3 Accessory

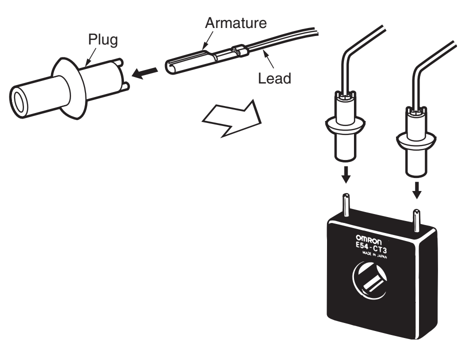
- **Armature**



- **Plug**



Connection Example



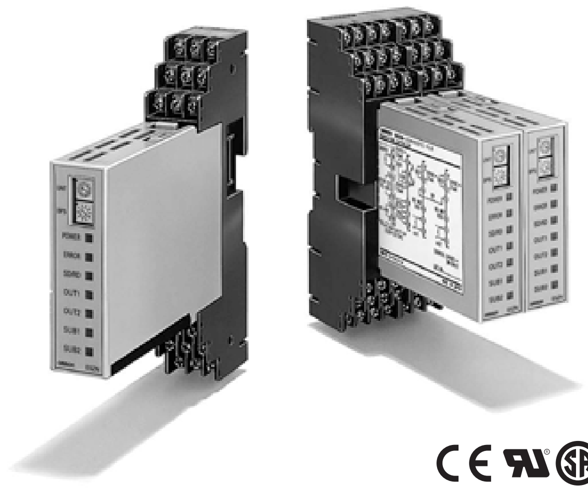
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. H136-E2-01 In the interest of product improvement, specifications are subject to change without notice.

Modular Temperature Controller
E5ZN

New DIN-rail Mounting Temperature Controller

- Two channels of temperature control available despite width of only 22.5 mm.
- The Temperature Controller itself can be replaced without changing terminal wiring.
- Use in combination with a compact Setting Display Unit to reduce communications programming requirements.
- A wide variety of operation indicators (single-color LEDs) enable easy operation monitoring.
- Power supply and communications wiring not required between Units when mounted side-by-side.



Model Number Structure

■ Model Number Legend

E5ZN- 2 □ □ □ □ □ -FLK
1 2 3 4 5 6 7

1. **Control points**
   2: Two points
2. **Control output**
   Q: Voltage (for driving SSR)
   T: Transistor
   C: Current
3. **Auxiliary output**
   P: Transistor (sourcing)
   N: Transistor (sinking)
4. **Option**
   H: Heater burnout alarm
   F: Transfer output
5. **Communications**
   03: RS-485
6. **Input type**
   TC: Thermocouple
   P: Platinum resistance thermometer
7. **CompoWay/F serial communications**
   -FLK: CompoWay/F serial communications

Ordering Information

■ List of Models

Name	Power supply	No. of control points	Control output	Auxiliary output	Functions		Communications functions	Input type (See note 5.)	Model
Temperature Controller (See note 1.)	24 VDC	2	Voltage output (for SSRs)	Transistor output: 2 pts (sinking)	Heater burnout alarm (See note 3.)	Heating or heat/cool control is selectable (See note 4.) Event input: 1 point per Unit	RS-485	Thermocouple	E5ZN-2QNH03TC-FLK
								Platinum resistance thermometer	E5ZN-2QNH03P-FLK
				Transistor output: 2 pts (sourcing)				Thermocouple	E5ZN-2QPH03TC-FLK
								Platinum resistance thermometer	E5ZN-2QPH03P-FLK
			Transistor output	Transistor output: 2 pts (sinking)				Thermocouple	E5ZN-2TNH03TC-FLK
								Platinum resistance thermometer	E5ZN-2TNH03P-FLK
				Transistor output: 2 pts (sourcing)				Thermocouple	E5ZN-2TPH03TC-FLK
								Platinum resistance thermometer	E5ZN-2TPH03P-FLK
			Analog output (current output) (See note 2.)	Transistor output: 2 pts (sinking)	Transfer output (linear voltage output) (See note 2.)			Thermocouple	E5ZN-2CNF03TC-FLK
								Platinum resistance thermometer	E5ZN-2CNF03P-FLK
				Transistor output: 2 pts (sourcing)				Thermocouple	E5ZN-2CPF03TC-FLK
								Platinum resistance thermometer	E5ZN-2CPF03P-FLK

Note: **1.** Terminal Units are required for wiring. Purchase separately.
2. When connecting the load of the controlled system, heat control output or cool control output can be allocated to the control output or auxiliary output. When connecting a recording device or Digital Panel Meter, transfer output can be allocated to control output or auxiliary output 3 or 4 of analog output models.
3. When using the heater burnout alarm, purchase a Current Transformer (CT) separately.
4. When using heating and cooling control functionality, the auxiliary output will be either heating control output or cooling control output.
5. Analog input and infrared temperature sensors (ES1A-A) can also be used with thermocouple models.

Name	No. of terminals	Functions	Model
Terminal Unit (Includes bus system without backplane.)	24	Equipped with communications terminals for power supply, communications, and setting devices.	E5ZN-SCT24S-500
	18 (See note 1.)	Not equipped with communications terminals for power supply, communications, and setting devices.	E5ZN-SCT18S-500

Note: **1.** When using 2 or more E5ZNs mounted side-by-side, use the E5ZN-SCT18S-500 for the second and subsequent Units. When using E5ZNs separately, be sure to use the E5ZN-SCT24S-500.
2. Two End Plates are provided with E5ZN-SCT24S-500 Terminal Units. When mounting to a DIN-rail, be sure to mount End Plates on both sides.

Current Transformer (CT) (Order Separately)

Model	E54-CT1	E54-CT3
Diameter	5.8 dia.	12.0 dia.

Terminal Cover

Model	E53-COV12	E53-COV13
Type	For SCT24S-500 models	For SCT18S-500 models

Note: The Terminal Cover comes with the Terminal Unit and does not have to be purchased separately.

Setting Display Unit (Order Separately)

Name	Power supply	Model
Setting Display Unit (See note.)	24 VDC	E5ZN-SDL

Note: Purchase sockets for wiring (shown on page A-66) separately.

Sockets (for Setting Display Unit - Order Separately)

Model	P2CF-11	P2CF-11-E	P3GA-11	Y92A-48G
Type	Front-connecting socket	Front-connecting socket (with finger protection)	Back-connecting socket	Terminal cover for finger protection

Note: Refer to the following manual for precautionary information and other information necessary to use the E5ZN: E5ZN Temperature Controller Operation Manual (Cat. No. H113).

Specifications

■ Ratings

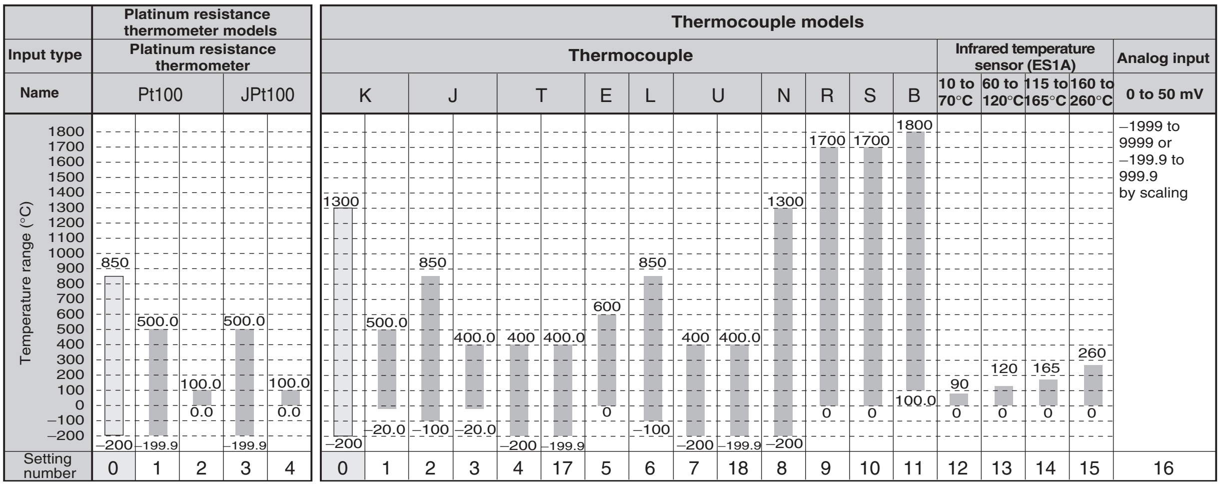
Power supply voltage	24 VDC		
Allowable voltage range	85% to 110% of the rated power supply voltage		
Power consumption	Approx. 3 W		
Sensor input	Thermocouple: K, J, T, E, L, U, N, R, S, B Infrared temperature sensor (ES1A series): 10 to 70×C, 60 to 120×C, 115 to 165×C, 160 to 260×C (See note 1.) Voltage input: 0 to 50 mV		
	Platinum resistance thermometer: Pt100, JPt100		
Control output	Voltage output (for driving SSR)	Output voltage: 12 VDC ±15% (PNP); Maximum load current: 21 mA; Equipped with short-circuit protection circuit	
	Transistor output	Maximum operational voltage: 30 VDC; Maximum load current: 100 mA; Residual voltage: 1.5 V max.; Leakage current: 0.4 mA max.	
	Current output	Current output range: 4 to 20/0 to 20 mA DC; Load: 350 Ω max. (See note 2.)	
Auxiliary output	Transistor output	Sourcing	Maximum operating voltage: 30 VDC; Maximum load current: 50 mA; Residual voltage: 1.5 V max.; Leakage current: 0.4 mA max.
		Sinking	
	Linear voltage output		Voltage output range: 1 to 5/0 to 5 VDC; Load: 10 kΩ min.
Event input	Contact output	ON: 1 kΩ max., OFF: 100 kΩ min. Discharge current: Approx. 7 mA	
	Non-contact output	ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max. Discharge current: Approx. 7 mA	
Number of input and control points	Input points: 2, Control points: 2		
Setting method	Via communications or using the Setting Display Unit (E5ZN-SDL)		
Control method	2-PID or ON/OFF control		
Other functions	Heater burnout detection function, transfer output function Multi-SP and RUN/STOP switching using event input		
Ambient operating temperature	–10 to 55×C (with no icing or condensation) For 3 years of assured use: –10 to 50×C		
Ambient operating humidity	25% to 85%		
Storage temperature	–25 to 65×C (with no icing or condensation)		

Note: 1. ES1A models with a temperature range of 160×C to 260×C have been discontinued.

2. OMRON G32A-EA Cycle Controller Unit (load impedance 352 Ω) can be used.

■ Input Range

Platinum Resistance Thermometer Models and Thermocouple Models



The applicable standards for the input types are as follows:

- K, J, T, E, N, R, S, B: JIS C1602-1995, IEC584-1
- L: Fe-CuNi, DIN 43710-1985
- U: Cu-CuNi, DIN 43710-1985
- JPt100: JIS C 1604-1989, JIS C 1606-1989
- Pt100: JIS C 1604-1997 IEC 751

Shaded parts indicate the settings at the time of purchase.

Note: ES1A models with a temperature range of 160×C to 260×C have been discontinued.

■ Characteristics

Indication accuracy	Thermocouple: (Indicated value ±0.5% or ±1×C, whichever is greater) ±1 digit max. (See note 1.) Platinum resistance thermometer: (Indicated value ±0.5% or ±1×C, whichever is greater) ±1 digit max. (See note 1.) Analog input: ±0.5% or ±1 digit max. CT input: ±5% FS ±1 digit max.
Transfer output	Accuracy: ±0.5% FS (See note 2.)
Hysteresis	0.1 to 999.9 EU (in units of 0.1 EU) (See note 3.)
Proportional band (P)	0.1 to 999.9 EU (in units of 0.1 EU) (See note 3.)
Integral time (I)	0 to 3,999 s (in units of 1 s)
Derivative time (D)	0 to 3,999 s (in units of 1 s)
Control period	1 to 99 s (in units of 1 s)
Manual reset value	0.0 to 100.0% (in units of 0.1%)
Alarm setting range	–1,999 to 9,999 (Position of decimal point depends on input type.)
Sampling period	500 ms
Insulation resistance	20 MW min. (at 500 VDC)
Dielectric strength	600 VAC for 1 minute at 50 or 60 Hz (between unlike terminals of charged parts)
Vibration resistance	10 to 55 Hz, 10 m/s^2 for 2 hrs each in X, Y, and Z directions
Shock resistance	150 m/s^2 max., 3 times each in ±X, ±Y, and ±Z directions
Enclosure rating	Temperature Controller: IP00 Terminal Unit: IP00
Memory protection	EEPROM (non-volatile memory) (Number of write operations: 100,000)
Weight	Temperature Controller: Approx. 90 g Terminal Unit (18): Approx. 80 g Terminal Unit (24): Approx. 100 g
Approved standards (See note 4.)	UL File No.: E200593 CSA File No.: 203889-1140084 CE EMS: ESD EN61326, EN61000-4-2 (4 kV/contact, 8 kV/air) REM field EN61326, EN61000-4-3 (10 V/m) Fast transient EN61326, EN61000-4-4 (2 kV/DC power, 1 kV/I/O) Surge immunity EN61326, EN61000-4-5 (line to ground: 2 kV/DC power 1 kV/I/O line to line: 1 kV/DC power) Conducted RF EN61326, EN61000-4-6 (10 V) EMI: Radiated EN61326 Class A

Note: 1. The indication accuracy for T and N thermocouples at –100×C, and for U and L thermocouples is ±2×C ±1 digit max. There is no specification for the indication accuracy for the B thermocouple used at 400×C max. The indication accuracy for R and S thermocouples at 200×C max. is ±3×C ±1 digit max.

2. The transfer output accuracy for 0 to 4 mA when 0 to 20 mA DC is selected is ±0.5% FS +0.7 mA. The transfer output accuracy for 0 to 1 V when 0 to 5 VDC is selected is ±0.5% FS +0.175 V.

3. "EU" stands for "Engineering Unit."

4. In order to satisfy the EN61326 Class A standard for conducted emissions, install a noise filter (Densei-Lambda MXB-1206-33 or equivalent) in a DC power line as close to the E5ZN as possible.

Communications (Host Communications)

Transmission line connection method	RS-485 multipoint
Communications method	RS-485 (2-wire, half-duplex)
Synchronization method	Start-stop synchronization
Baud rate	4,800, 9,600, 19,200, or 38,400 bps
Transmission code	ASCII
Data bit length (See note.)	7 or 8 bits
Stop bit length (See note.)	1 or 2 bits
Error detection	Vertical parity (none, even, odd)
	BCC (block check character)
Flow control	None
Interface	RS-485
Retry function	None
Number of Units that can be connected in parallel	16 Units max. (32 channels)

Note: The baud rate, data bit length, stop bit length, and vertical parity can all be set independently as host communications settings.

Setting Display Unit (Order Separately) Ratings and Characteristics

Power supply voltage	24 VDC
Allowable voltage range	85% to 110% of the rated power supply voltage
Power consumption	Approx. 1 W
Display method	7-segment digital display and single-color display
Ambient operating temperature	–10 to 55×C (with no icing or condensation) For 3 years of assured use: –10 to 50×C
Ambient operating humidity	25% to 85%
Storage temperature	–25 to 65×C (with no icing or condensation)
Communications method	RS-485 (half-duplex)
Communications format	Fixed
Insulation resistance	20 MW min. (at 500 VDC)
Dielectric strength	1,500 VAC for 1 minute at 50 or 60 Hz (between unlike terminals of charged parts)
Vibration resistance	10 to 55 Hz, 20 m/s^2 for 2 hrs each in X, Y, and Z directions
Shock resistance	300 m/s^2 max., 3 times each in ±X, ±Y, and ±Z directions
Enclosure ratings	Front panel: IP50 Rear case: IP20 Terminal case: IP00
Memory protection	EEPROM (non-volatile memory) (Number of writes: 100,000)
Weight	Approx. 100 g Mounting bracket: Approx. 10 g

Current Transformer (CT) Ratings (Order Separately)

Dielectric strength	1,000 VAC (1 minute)
Vibration resistance	50 Hz, 98 m/s^2
Weight	E54-CT1: Approx. 11.5 g E54-CT3: Approx. 50 g
Accessories (E54-CT3 only)	Armature (2) Plug (2)

Heater Burnout Alarm Characteristics

Maximum heater current	Single-phase, 50 A AC (See note 1.)
Input current readout accuracy	±5% FS ±1 digit max.
Heater burnout alarm setting range	0.0 to 50.0 A (in units of 0.1 A) (See note 2.)
Minimum detection ON time	190 ms (See note 3.)

Note: **1.** Use the K2CU-F□□A-□GS (with GATE input terminal) for burnout detection of 3-phase heaters.

2. If the heater burnout alarm setting is set to 0.0 A, the alarm is always OFF, and if it is set to 50.0 A the alarm is always ON.

3. If the ON time for control output is less than 190 ms, heater burnout detection and heater current measurement will not be performed.

Nomenclature

E5ZN-2

Operation Indicators

POWER
Lights when power is turned ON.

ERROR
Lights when a fatal error (e.g., memory error or sensor error) occurs.

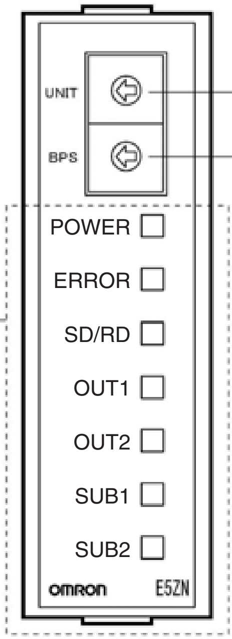
SD/RD (Communications Operation)
Flashes during communications with the host.

OUT1 (Control Output 1)
Lights when the control output 1 is ON.

OUT2 (Control Output 2)
Lights when the control output 2 is ON.

SUB1 (Auxiliary Output 1)
Lights when the auxiliary output 1 is ON.

SUB2 (Auxiliary Output 2)
Lights when the auxiliary output 2 is ON.



Unit Number Setting
Setting range of 0 to F allows up to 16 Units to be set.

Baud Rate

E5ZN-SDL

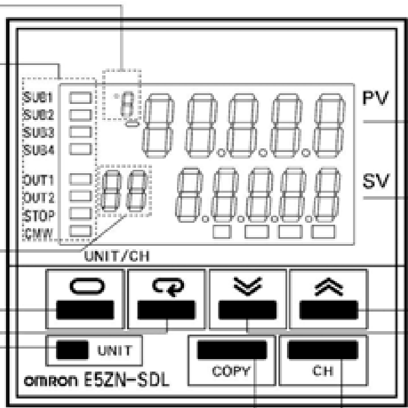
The following diagram shows the names and functions of the E5ZN-SDL parts for when it is connected to the E5ZN-2□□□□□□□.

Operation Indicators
- These indicators indicate the terminal operations for the E5ZN-2□□□□□□□.
- OUT1, OUT2 (Control Output 1, Control Output 2)
  Light when the control output 1 or the control output 2 functions are ON.
- SUB1, SUB2 (Auxiliary Output 1, Auxiliary Output 2)
  Light when the auxiliary output 1 or the auxiliary output 2 functions are ON.
- STOP
  Lights when operation stops. Lights for an event or when RUN/STOP is set to STOP during control. Remains unlit at other times.
- CMW (Communications Write Control)
  Lights when communications write is permitted and remains unlit when it is prohibited.
- SUB3 (Auxiliary Output 3)
  Pulse output models: Always not lit.
  Analog output models: Not lit when the auxiliary output drops to 0% or lower.
  Lit when the auxiliary output is above 0%.
- SUB4 (Auxiliary Output 4)
  Pulse output models: Always not lit.
  Analog output models: Not lit when the auxiliary output drops to 0% or lower.
  Lit when the auxiliary output is above 0%.

Temperature Unit
Displayed when the display unit for setting data is temperature. The display is determined by the setting for temperature unit, with either "°C" or "°F" displayed accordingly.

No. 1 Display
Displays the PV or the type of setting data.

No. 2 Display
Displays the target value, the control variable, or the set value for setting data (setting contents).



Up Key
Each time this key is pressed, the value displayed in No. 2 Display increases. If it is held down, the rate of increase becomes faster.
It can also be used to move to the next setting item.

Down Key
Each time this key is pressed, the value displayed in No. 2 Display decreases. If it is held down, the rate of decrease becomes faster.
It can also be used to return to the previous setting item.

Channel Key
Press this key to change the channel number.

Unit/Channel Indicator
Indicates the unit number and the channel number.

Level Key
Press this key to switch setting levels.

Mode Key
Press this key to switch setting data within the setting level.

UNIT Key
Press to switch the unit number.

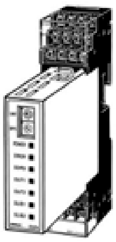
Level Key and Mode Key
Press together to switch to protect mode.

Copy Key
Press this key to read all the settings from the Temperature Controller to the Setting Display Unit, or to write from the Setting Display Unit to the Temperature Controller.

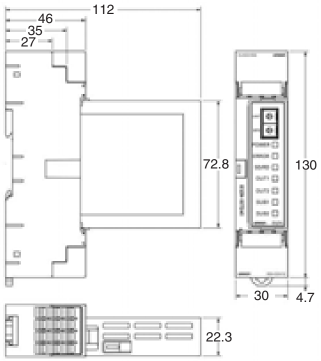
Dimensions

Note: All units are in millimeters unless otherwise indicated.

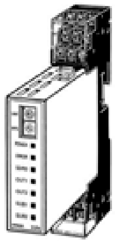
E5ZN-2□□□03□-FLK Connected to E5ZN-SCT24S-500



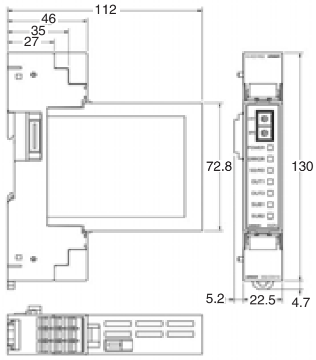
When only using one Unit, purchase the E5ZN-2□□□03□-FLK and the E5ZN-SCT24S-500 together. Also, when using horizontal side-by-side mounting, purchase the first Unit together with the E5ZN-SCT24S-500.



E5ZN-2□□□03□-FLK Connected to E5ZN-SCT18S-500



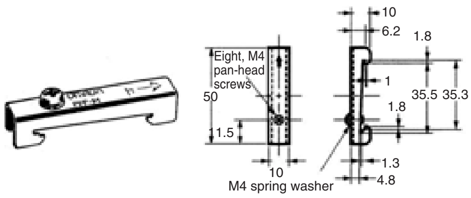
When mounting Units side-by-side, purchase the E5ZN-2□□□03□-FLK together with the E5ZN-SCT18S-500 for the second and subsequent Units.



Note: Refer to the following manual for precautionary information and other information necessary to use the E5ZN: E5ZN Modular Temperature Controller User's Manual (Cat. No. H113).

End Plate

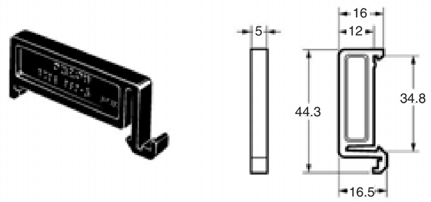
PFP-M



Note: End Plates are provided with the E5ZN-SCT24-500. Be sure to mount End Plates at both ends of Unit blocks.

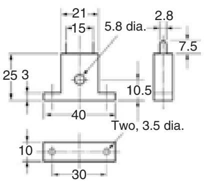
Spacer

PFP-S

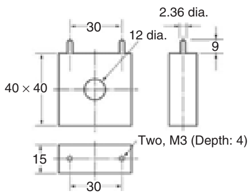


Current Transformer (Order Separately)

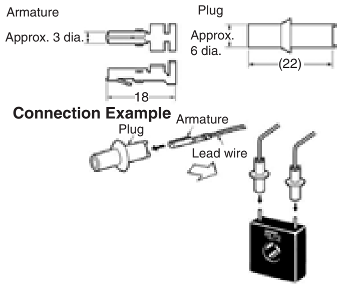
E54-CT1



E54-CT3

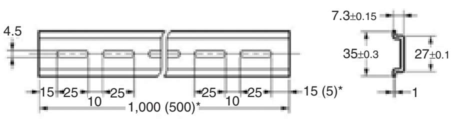


E54-CT3 Accessories



Mounting DIN-rail (for DIN-rail Mounting - Order Separately)

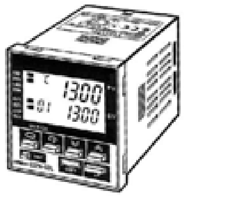
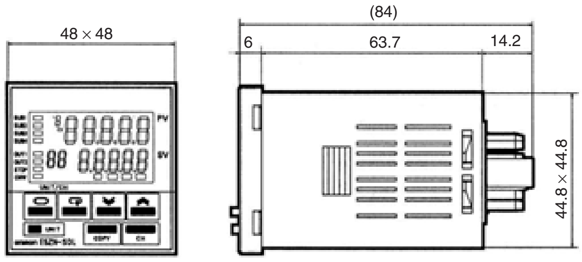
PFP-100N
PFP-50N



* Indicates dimensions for the PFP-50N.

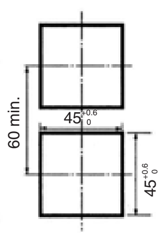
Setting Display Unit

E5ZN-SDL

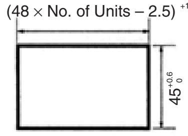



Panel Cutout Dimensions

Individual Mounting



Side-by-side Mounting

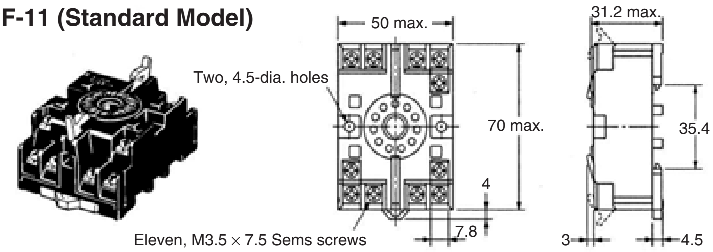


- The mounting panel thickness is 1 to 5 mm.
- Vertical side-by-side mounting is not possible. (Allow sufficient space above and below.)
- When mounting several Units, make sure that the ambient tem-perature specifications are not exceeded.

E5ZN-SDL Wiring Sockets

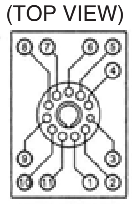
Front-connecting Sockets

P2CF-11 (Standard Model)

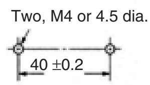


Terminal Arrangement/ Internal Connections

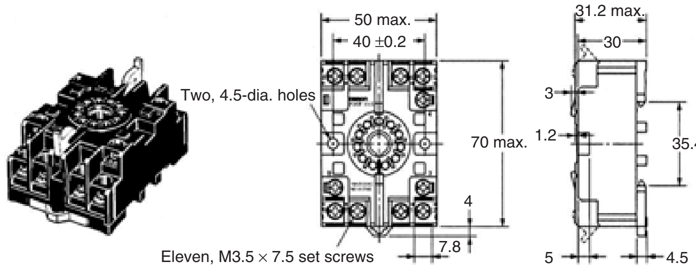
(TOP VIEW)



Mounting Hole Cutout Dimensions



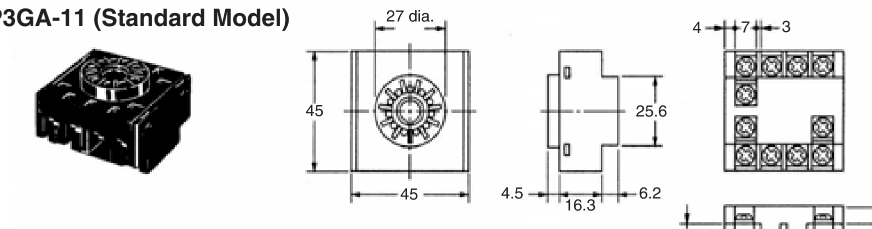
P2CF-11-E (with Finger Protection)

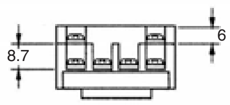


Note: DIN track mounting is also possible.

Back-connecting Sockets

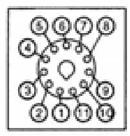
P3GA-11 (Standard Model)





Terminal Arrangement/ Internal Connections

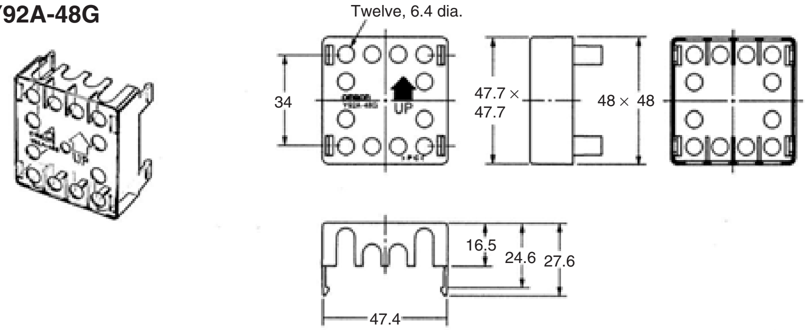
(BOTTOM VIEW)



Note: Use in combination with a Terminal Cover (Y92A-48G) for finger protection.

Terminal Cover

Y92A-48G

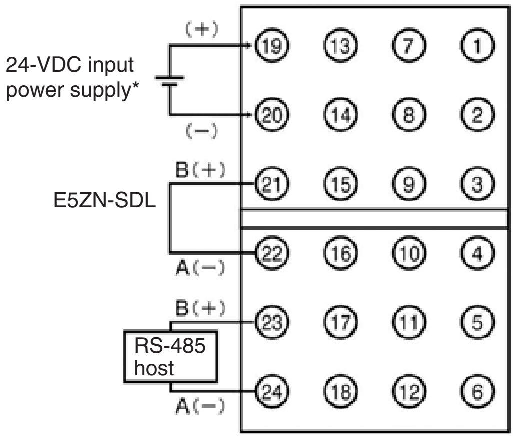


Installation

■ Connection Diagrams

- Voltage output (control output) is not electrically isolated from internal circuitry. Therefore, when using grounded thermocouples, do not ground control output terminals. (Doing so may result in temperature measurement errors due to unwanted current paths.)
- There is basic insulation between the power supply inputs and outputs for this product. If reinforced insulation is required, connect the input and output terminals to equipment without any exposed charge-carrying parts, or to equipment with basic insulation sufficient for the maximum operating voltage of the power supply and the inputs and outputs.

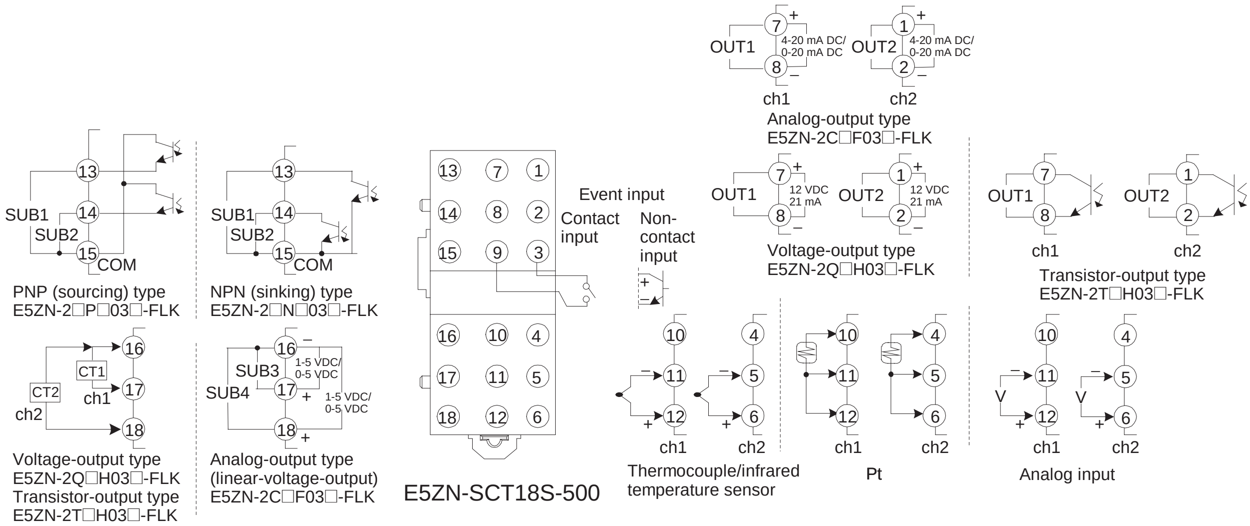
Using with the E5ZN-SCT24S-500



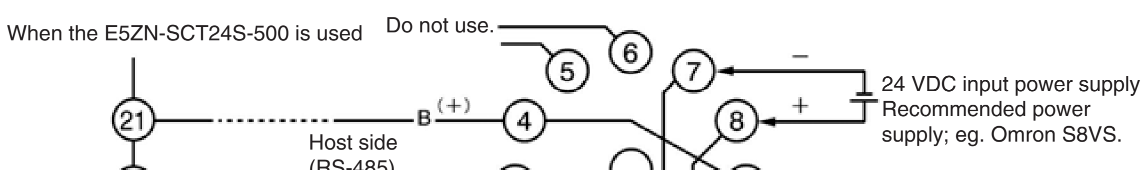
Wiring for terminals 1 to 18 is the same as for the E5ZN-SCT18-500. See below.

*Power supply: recommended power supply; eg. OMRON S8VS

Using with the E5ZN-SCT18S-500



E5ZN-SDL



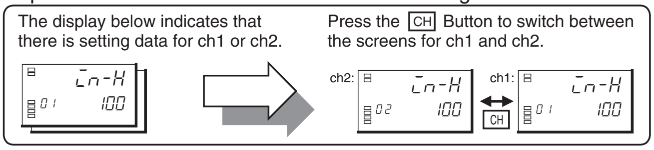
Note: 1. Terminals 4 and 9, 7 and 11, and 8 and 10 are connected internally at the E5ZN-SDL side.
2. Do not connect anything to terminals 1, 2, 5, and 6.

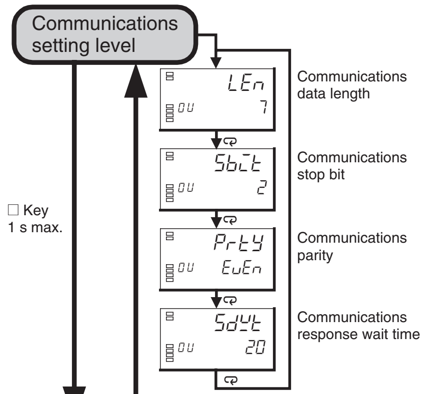
Note: Purchase either a P2CF-11 or a P3GA-11 Socket separately. (Refer to page A-72.)

Operation

■ E5ZN-SDL Setting Data

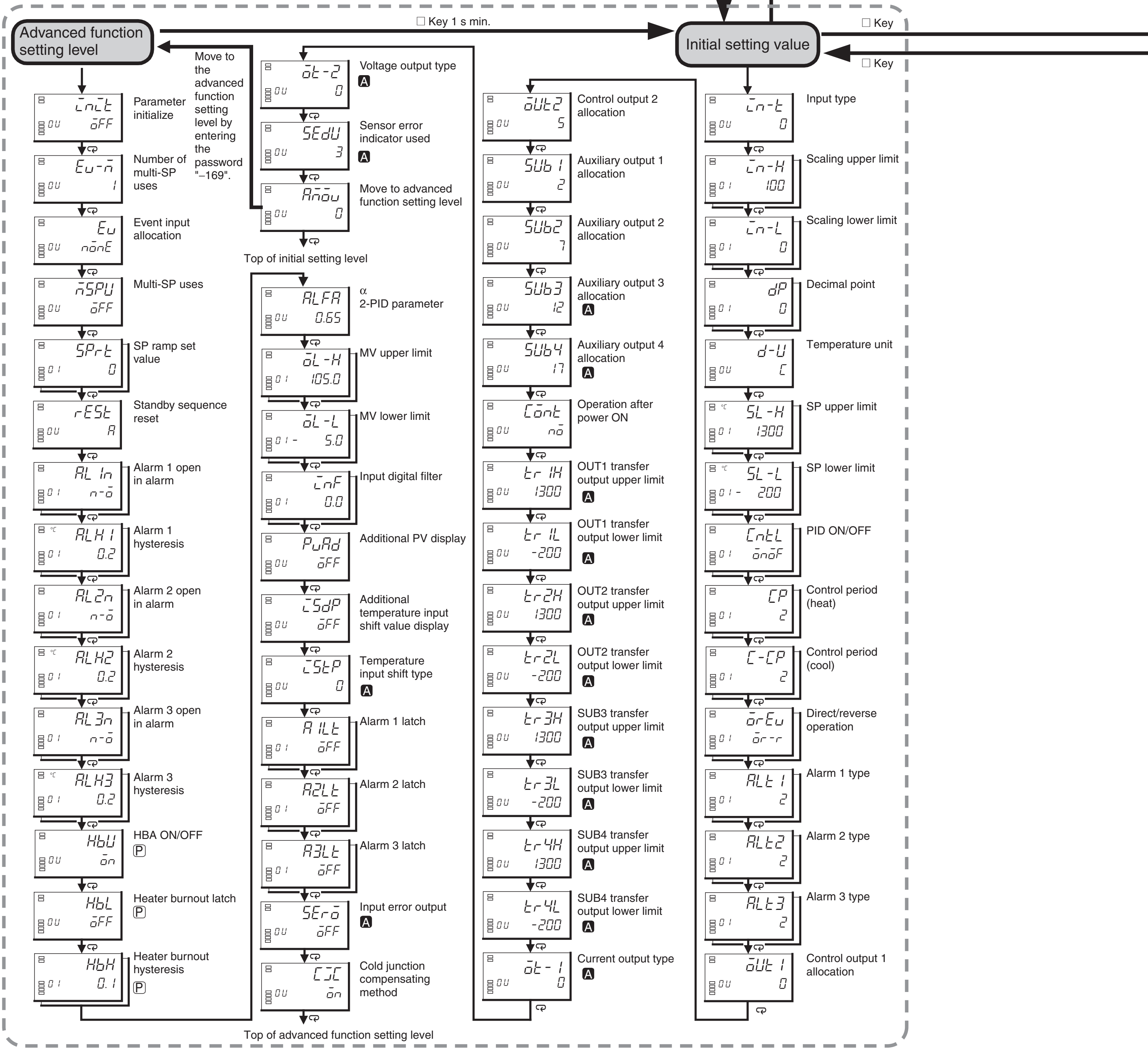
The setting data that can be set from the E5ZN-SDL Setting Display Unit is shown below. Depending on the protection settings and other factors, some settings may not be displayed. A password is required to move to the advanced function setting level.

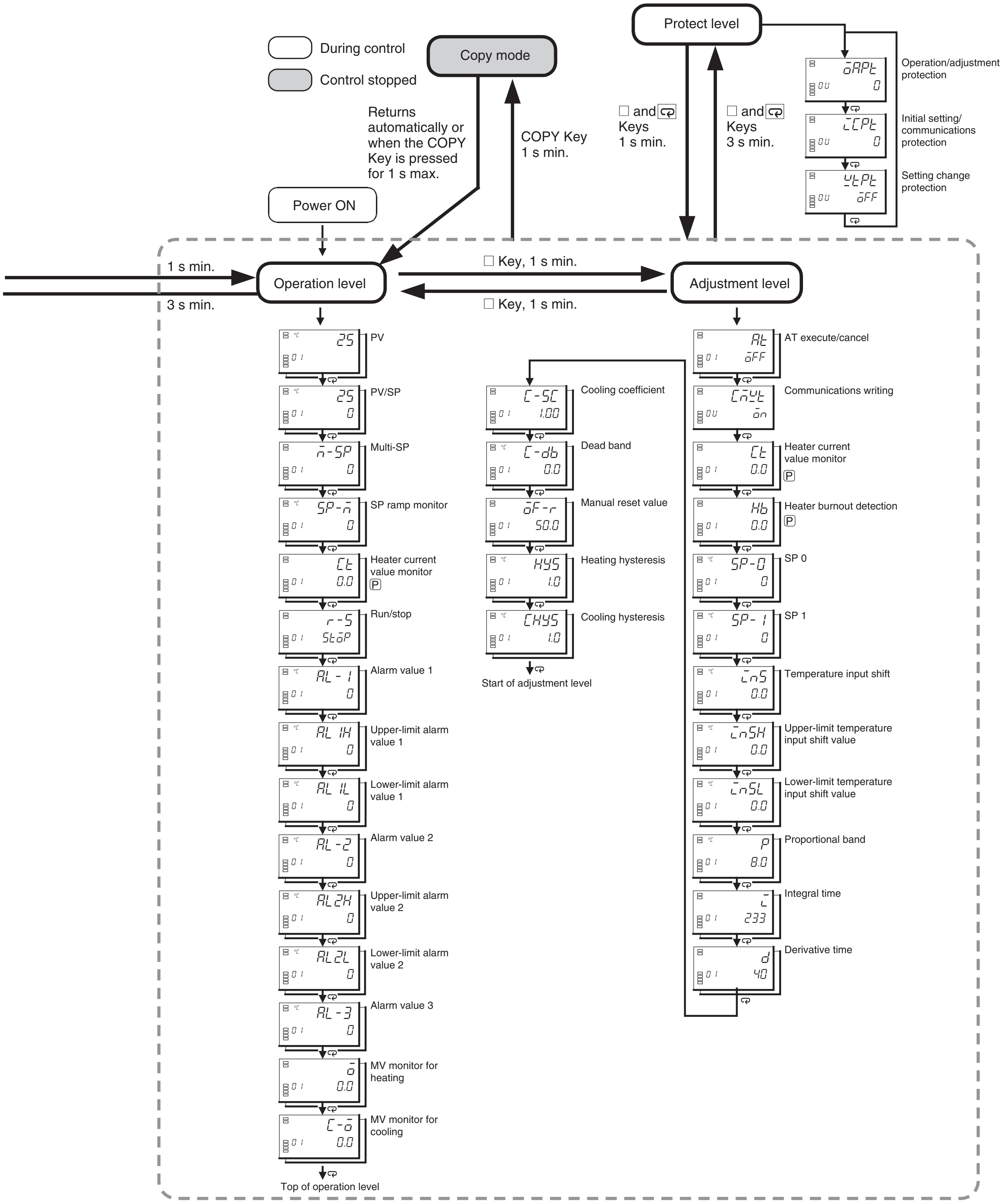




P: This symbol indicates setting data that is displayed only for models with pulse output.
("Models with pulse output" is used here to indicate models with voltage output or transistor output.)

A: This symbol indicates setting data that is displayed only for models with analog output.





During control
Control stopped
Copy mode
Protect level
Returns automatically or when the COPY Key is pressed for 1 s max.
COPY Key 1 s min.
□ and Keys 1 s min.
□ and Keys 3 s min.
Operation/adjustment protection
Initial setting/ communications protection
Setting change protection
Power ON
1 s min.
3 s min.
Operation level
□ Key, 1 s min.
□ Key, 1 s min.
Adjustment level
PV
PV/SP
Multi-SP
SP ramp monitor
Heater current value monitor
Run/stop
Alarm value 1
Upper-limit alarm value 1
Lower-limit alarm value 1
Alarm value 2
Upper-limit alarm value 2
Lower-limit alarm value 2
Alarm value 3
MV monitor for heating
MV monitor for cooling
Top of operation level
Cooling coefficient
Dead band
Manual reset value
Heating hysteresis
Cooling hysteresis
Start of adjustment level
AT execute/cancel
Communications writing
Heater current value monitor
Heater burnout detection
SP 0
SP 1
Temperature input shift
Upper-limit temperature input shift value
Lower-limit temperature input shift value
Proportional band
Integral time
Derivative time

■ Examples of Functions

Using as a Temperature Input Signal Converter

Transfer Output Types

- The ten types of data shown below can be allocated for transfer output using the control output 1 allocation, control output 2 allocation, auxiliary output 3 allocation, and auxiliary output 4 allocation (initial setting level).
- Transfer output is supported by analog output models only.

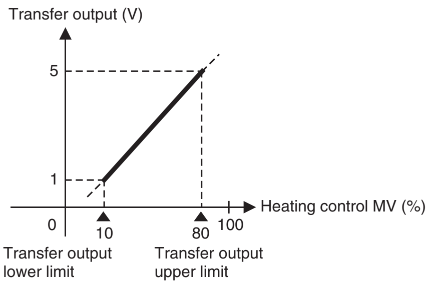
ch1	ch2
Transfer output for ch1 set point	Transfer output for ch2 set point
Transfer output for ch1 ramp set point	Transfer output for ch2 ramp set point
Transfer output for ch1 process value	Transfer output for ch2 process value
Transfer output for ch1 heating control MV	Transfer output for ch2 heating control MV
Transfer output for ch1 cooling control MV	Transfer output for ch2 cooling control MV

Note: Control outputs 1 and 2 use current output and auxiliary outputs 3 and 4 use linear voltage output.

Transfer Output Scaling

- The range set by the transfer output upper limit and transfer output lower limit (initial setting level) can be scaled to the output range for the transfer output (4 to 20 mA DC or 0 to 20 mA DC for control outputs 1 and 2, and to 1 to 5 VDC or 0 to 5 VDC for auxiliary outputs 3 and 4).
- The scale can be expanded by setting a small range between the transfer output upper and lower limits. Reverse scaling can be performed by setting the transfer output upper limit to a value smaller than the transfer output lower limit. The following figure shows a scaling example where the heating control MV transfer output is scaled to 1 to 5 VDC.

Example: Scaling to 1 to 5 VDC



Example 2: Displaying the ch2 Process Values on an External Meter Using Transfer Output

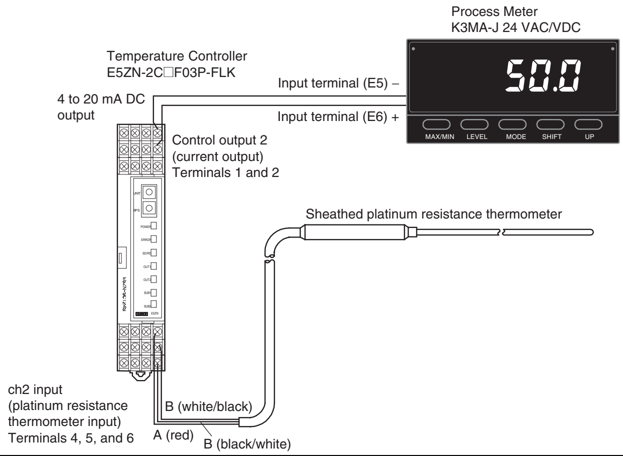
Temperature Controller: E5ZN-2C□F03P-FLK (current output, platinum resistance thermometer input)
Meter: K3MA-J 24 VAC/VDC (Process Meter)

Temperature Controller Settings:

Sensor input type (initial setting level): 2 (platinum resistance thermometer, 0.0°C to 100.0°C)
Control output allocation 2 (initial setting level): 17 (process value transfer output for ch2)
OUT2 transfer output upper limit (initial setting level): 100.0 (°C)
OUT2 transfer output lower limit (initial setting level): 0 (°C)
Current output type (initial setting level): 0 (4 to 20 mA DC)

Meter Setting Example:

Inputs for 4 to 20 mA DC are scaled to 0.0 to 100.0°C.
Input type (initial setting level: in-t): 4 to 20 mA DC (4-20)
Scaling input value 1 (initial setting level: inP.1): 4 mA (4.00)
Scaling display value 1 (initial setting level: dSP.1): 0 (00000)
Scaling input value 2 (initial setting level: inP.2): 20 mA (20.00)
Scaling display value 2 (initial setting level: dSP.2): 100 (01000)
Decimal point (initial setting level: dP): One decimal place (0000.0)



Reading Temperatures for Multiple E5ZN Units

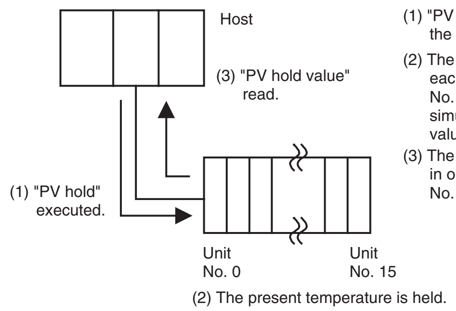
With conventional models, if the present temperature is read from multiple Temperature Controllers using host communications, there are time differences in the process temperatures read from each Temperature Controller, making it difficult to obtain concurrent data.

With the E5ZN, the PV hold function can be used to ensure that the data is concurrent to within 500 ms.

PV Hold

The PV hold function temporarily stores the present temperature for that moment as the PV hold value, when the "PV hold" operation command sent by host communications is received. (See fig. 1.)

Fig. 1



(1) "PV hold" is executed from the host computer.
(2) The present temperature for each E5ZN Unit from Units No. 0 to 15 is written simultaneously to PV hold values.
(3) The PV hold values are read in order, starting with Unit No. 0.

Note:
1. PV hold values are overwritten every time the "PV hold" operation command is executed. Once the PV hold values have been read for channels that require simultaneous reading of present temperatures, execute the next "PV hold" operation command.
2. The "PV hold" operation command cannot be executed and the "PV hold value" cannot be read from the E5ZN-SDL Setting Display Unit.
3. When the power is turned OFF, the PV hold values change to 0.

Precautions

■ General Precautions

The user must operate the product according to the performance specifications described in the operation manual.
Before using the product under conditions that are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.
Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

■ Safety Precautions

Definition of Precautionary Information

⚠ WARNING

The above symbol indicates a situation that may result in injury or property damage.

Warnings

⚠ WARNING

Do not allow metal fragments or lead wire scraps to fall inside this product.
These may cause electric shock, fire, or malfunction.

⚠ WARNING

Do not use the product in locations subject to flammable or explosive gases. Doing so may result in explosion.

⚠ WARNING

Do not touch any of the terminals while the power is ON. Doing so may result in electric shock.

⚠ WARNING

Provide at least one power-interruption switch to ensure that the power is OFF before wiring. Not doing so may result in electric shock.

⚠ WARNING

To maintain safety in the event of a product malfunction, always take appropriate safety measures, such as installing an alarm on a separate line to prevent excessive temperature rises. If a malfunction prevents proper control, a major accident may result.

⚠ WARNING

Do not attempt to disassemble, repair, or modify the product. Any attempt to do so may result in malfunction, fire, or electric shock.

⚠ WARNING

Tighten screws to the specified torques given below.
Loose screws may result in burning or malfunction.
E5ZN-SCT□S-500: 0.40 to 0.56 N·m
E5ZN-SDL: 0.74 to 0.90 N·m

⚠ WARNING

Set all settings according to the control target of the product.
If the settings are not appropriate for the control target, the product may operate in an unexpected manner, resulting in damage to the product or accidents.

■ Application and Operating Environment Precautions

Observe the following points to ensure safe operation.

1. Use and store the product within the specified temperature and humidity ranges. Cool the product (e.g., using fans) where necessary.
2. Do not touch the electronic components or pattern of the PCB. Hold the product by the case.
3. To ensure proper heat dissipation, leave a space around the product. Do not block the product's ventilating holes.
4. Use at the rated power supply voltage with the rated load.
5. Be sure to connect terminals with the correct polarity.
6. Perform wiring using crimp terminals of the specified size. (E5ZN-SCT□S-500: M3.0, width 5.8 mm max.; E5ZN-SDL: M3.5, width 7.2 max.)
7. Be sure to use wires satisfying the following specifications for connection using bare wires.
   Power supply terminals: AWG 22 to 14
   Other terminals: AWG 28 to 16
   (Length of exposed part: 6 to 8 mm)
8. Do not connect anything to unused terminals.
9. Ensure that the rated voltage is reached within 2 seconds of turning power ON.
10. Allow 30 seconds' warm-up time.
11. Install the product as far away as possible from devices that generate strong, high-frequency noise and devices that generate surges.
12. Keep wiring separate from high-voltage power lines or power lines carrying large currents. Do not wire in parallel with or together with power lines.
13. Install switches or circuit-breakers so that the user can turn the power OFF immediately, and indicate these accordingly.
14. Do not use the product in the following locations:
    - Locations subject to dust or corrosive gases (in particular, sulfide gas and ammonia gas)
    - Locations subject to freezing or condensation
    - Locations exposed to direct sunlight
    - Locations subject to vibrations or shocks
    - Locations subject to exposure to water or oil
    - Locations subject to heat radiated directly from heating equipment
    - Locations subject to intense temperature changes
15. When the Terminal Unit is separated from the Temperature Controller, under no circumstances touch the electrical components or apply shock to the Temperature Controller.
16. Do not use solvents to clean the product. Use commercial alcohol.
17. After wiring is completed remove the dust-protection label to allow proper heat dissipation.
18. When mounting the Temperature Controller to the Terminal Unit, make sure that the hook on the side of the Temperature Controller facing the Terminal Unit is inserted properly.
19. Install the DIN-rail vertically.

■ Correct Use

Service Life

Use within the following temperature and humidity ranges:

- Temperature: –10 to 55×C (with no icing or condensation)
- Humidity: 25% to 85%

If the product is installed inside a control panel, the temperature around the product (and not the temperature around the control panel) must be kept below 55×C.

With electronic devices like the E5ZN, the service life will depend not only on the number of switching operations performed by the relay but also on the service life of the internal electronic components. The service life of these components depends on the ambient temperature; it will be shorter if the ambient temperature is high, and longer if the ambient temperature is low. For this reason, the service life of the product can be lengthened by keeping the inside of the E5ZN at a low temperature.

If several Units are mounted side-by-side or are arranged vertically, the heat generated may cause the internal temperature of the Units to rise, reducing service life. To prevent this, take steps to ensure that the Units are cooled, such as installing fans.

Ensure, however, that the terminals are not also cooled, otherwise correct temperature measurement will not be possible.

Measurement Accuracy

When extending the lead wires for thermocouples, use a compensating conductor appropriate for the type of thermocouple used.

When extending the lead wires for platinum resistance thermometers, use lead wires with a low resistance, and make the resistance in the 3 lead wires equal.

Mount the E5ZN horizontally.

If significant errors occur, check that input compensation has been set correctly.

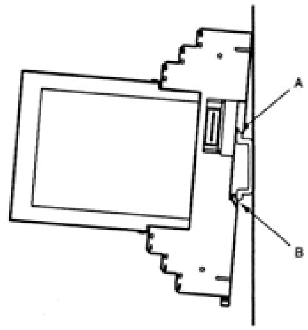
Waterproofing

The enclosure ratings are given below. Parts for which the enclosure rating is not clearly indicated, and parts with IP□0 ratings (where □ is not 0) do not have waterproof specifications.

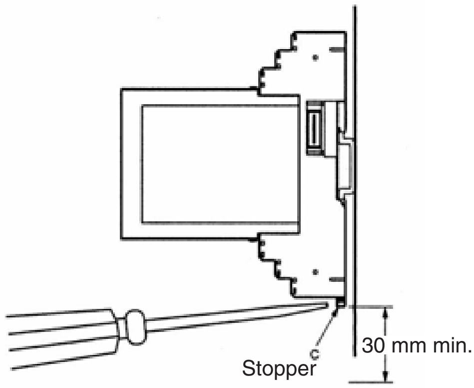
- Temperature Controller: IP00
- Terminal Unit: IP00

Mounting and Dismounting

- To mount using a mounting track, first hook part A (see below) onto the track and then push down on part B.



- To dismount, insert a flat-bladed screwdriver into part C, pull the hook down, and then lift the bottom part of the E5ZN upwards.



- Mount the E5ZN at least 30 mm away from other devices to ensure easy mounting and dismounting.

Note: Refer to the following manual for precautionary information and other information necessary to use the E5ZN: E5ZN Temperature Controller Operation Manual (Cat. No. H113).

Warranty and Limitations of Liability

■ WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

■ LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

■ SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products.

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

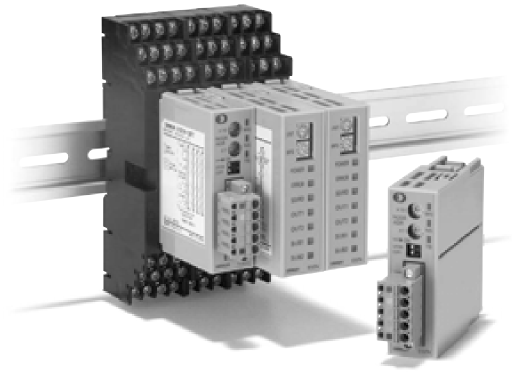
Cat. No. H116-E2-02A

In the interest of product improvement, specifications are subject to change without notice.

DeviceNet Communications Unit

E5ZN-DRT

Connect the E5ZN Modular Temperature Controller to DeviceNet



- The I/O link function allows setting and monitoring (e.g., of present values) for the E5ZN Modular Temperature Controller to be performed without communications programming.
- Up to 16 E5ZN Modular Temperature Controllers can be connected to one Unit.
- All the parameters for the E5ZN can be uploaded or downloaded in one operation using DeviceNet Configurator.

c UL us CE

Ordering Information

■ List of Models

Name	External input power supply voltage	Applicable Temperature Controller	Model
DeviceNet Communications Unit	24 VDC	E5ZN	E5ZN-DRT

Note: A DeviceNet Communications Unit and Terminal Unit are required to connect to DeviceNet. (For details on the Terminal Unit, refer to page A-84 or to the E5ZN Catalog (H116-E2-02).) Two End Plates are provided with E5ZN-SCT24S Terminal Units. When mounting to a DIN-rail, be sure to mount End Plates on both sides.

Specifications

■ Ratings

Power supply voltage	**DeviceNet**	24 VDC (for internal circuits)
	External input power supply	24 VDC (for RS-485 communications circuits and Temperature Controllers)
Allowable voltage range	**DeviceNet**	11 to 25 VDC
	External input power supply	20.4 to 26.4 VDC
Power consumption (See note.)	**DeviceNet**	Approx. 1.1 W (for a current of 45 mA at 24 VDC)
	External input power supply	Approx. 0.5 W (for a current of 20 mA at 24 VDC)
Connectable Temperature Controllers		E5ZN Series
Maximum number of connectable Temperature Controllers		16
Ambient operating temperature		–10 to 55°C (with no icing or condensation)
Ambient operating humidity		25% to 85%
Ambient storage temperature		–25 to 65°C (with no icing or condensation)

Note: The power consumption for the Temperature Controllers is not included.

■ Characteristics

Insulation resistance	20 MΩ min. (at 100 VDC)
Dielectric strength	500 VAC, 50/60 Hz for 1 min between the DIN-rail and all DeviceNet connector terminals and between the DIN-rail and all terminal socket terminals
Vibration resistance	10 to 55 Hz, 10 m/s^2 for 2 hrs each in ±X, ±Y, and ±Z directions
Shock resistance	150 m/s^2, 3 times each in ±X, ±Y, and ±Z directions
Weight	100 g max.
Safety standards	cULus508 EMS: Electrostatic Discharge (ESD) EN61006-2, EN61000-4-2 (4 kV/contact, 8 kV/air) Radiated Electromagnetic Fields EN61006-2, EN61000-4-3 (10 V/m) Electrical Fast transients/BURST EN61006-2, EN61000-4-4 (2 kV/DC power-line, 1 kV/Signal-line) Surge Transients EN61006-2, EN61000-4-5 (line to ground : 1 kV/DC power-line) : 2 kV/Signal-line line to line : 0.5 kV/DC power-line) Conducted Disturbances EN61006-2, EN61000-4-6 (10 V) EMI: Radiated Emissions (electric field) EN50081-2 Class A

■ Communications (for Temperature Controller Expansion)

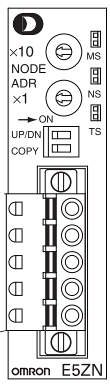
Transmission line connection method	RS-485 multipoint
Communications method	RS-485 (2-wire, half-duplex)
Synchronization method	Start-stop synchronization
Baud rate	38,400 bps
Transmission code	ASCII
Data bit length	7 bits
Stop bit length	2 bits
Error detection	Vertical parity (even)
	BCC (block check character)
Flow control	None
Number of Units that can be connected in parallel	16 Units max. (32 channels)

Connections

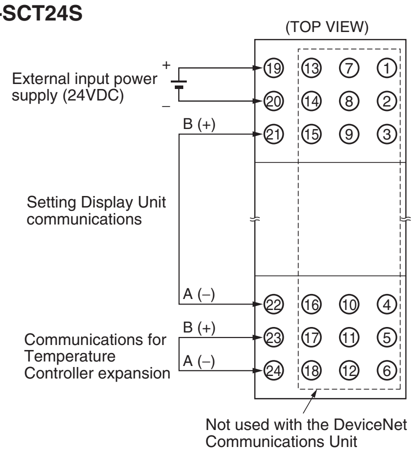
■ Terminal Arrangement

E5ZN-DRT

Color	Signal
Red	Communications power, positive (+V)
White	Communications signal, high (CAN H)
---	Shield
Blue	Communications signal, low (CAN L)
Black	Communications power, negative (–V)



E5ZN-SCT24S



Nomenclature

E5ZN-DRT

Front Panel Rotary Switches

Used to set the node address when functioning as a DeviceNet slave.

Front Panel DIP Switch

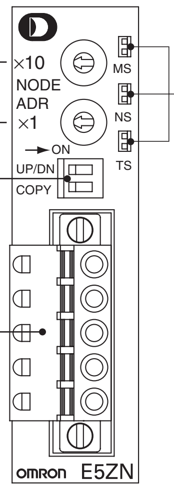
Used to copy (backup) parameters between the Temperature Controllers and DeviceNet.

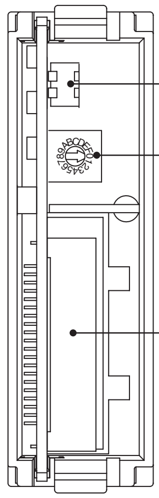
UP/DN (Pin 2): Sets the copy operationmode (i.e., upload or download).

COPY (Pin 1): Starts the copying.

DeviceNet Connector

Connects to DeviceNet communications cables. Power for DeviceNet communications is also supplied though this connector. An FCK2.5/5-STF-5.08AU connector (Phoenix Contact) is provided.





Back Panel DIP Switch

Used to specify whether the connection configuration and I/O allocation is set using simple I/O allocation or Configurator I/O allocation.

Pin 1: I/O allocation setting switch

Pin 2: Not used (Set to OFF.)

Back Panel Rotary Switch

Used to set the maximum unit number when simple I/O allocation is used.

Terminal Unit Connector

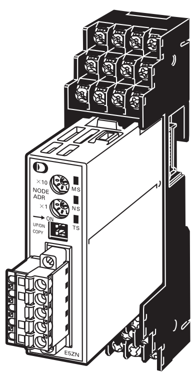
Connects to the E5ZN-SCT24S Terminal Unit.

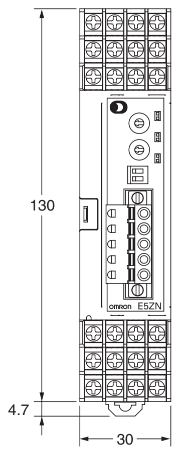
Indicators

Dimensions

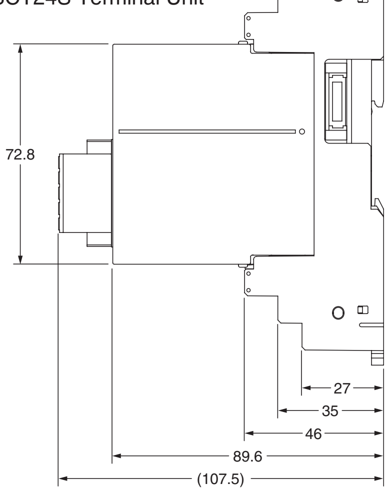
Note: All units are in millimeters unless otherwise indicated.

E5ZN-DRT





Dimensions when Mounted to the E5ZN-SCT24S Terminal Unit



E5ZN Modular Temperature Controllers

■ List of Models

Name	Power supply	No. of control points	Control output	Auxiliary output	Functions		Communi-cations functions	Input type (See note 5.)	Model
Temperature Controller (See note 1.)	24 VDC	2	Voltage output (for SSRs)	Transistor output: 2 pts (sinking)	Heater burnout alarm (See note 3.)	Heating or heat/cool control is selectable (See note 4.) Event input: 1 point per Unit	RS-485	Thermocouple	E5ZN-2QNH03TC-FLK
								Platinum resistance thermometer	E5ZN-2QNH03P-FLK
				Transistor output: 2 pts (sourcing)				Thermocouple	E5ZN-2QPH03TC-FLK
								Platinum resistance thermometer	E5ZN-2QPH03P-FLK
			Transistor output	Transistor output: 2 pts (sinking)				Thermocouple	E5ZN-2TNH03TC-FLK
								Platinum resistance thermometer	E5ZN-2TNH03P-FLK
				Transistor output: 2 pts (sourcing)				Thermocouple	E5ZN-2TPH03TC-FLK
								Platinum resistance thermometer	E5ZN-2TPH03P-FLK
			Analog output (current output) (See note 2.)	Transistor output: 2 pts (sinking)	Transfer out-put (linear voltage out-put) (See note 2.)			Thermocouple	E5ZN-2CNF03TC-FLK
								Platinum resistance thermometer	E5ZN-2CNF03P-FLK
				Transistor output: 2 pts (sourcing)				Thermocouple	E5ZN-2CPF03TC-FLK
								Platinum resistance thermometer	E5ZN-2CPF03P-FLK

Note: 1. Terminal Units are required for wiring. Purchase separately.

2. When connecting the load of the controlled system, heat control output or cool control output can be allocated to the control output or auxiliary output. When connecting a recording device or Digital Panel Meter, transfer output can be allocated to control output or auxiliary output 3 or 4 of analog output models.

3. When using the heater burnout alarm, purchase a Current Transformer (CT) separately.

4. When using heating and cooling control functionality, the auxiliary output will be either heating control output or cooling control output.

5. Analog input and infrared temperature sensors (ES1A-A) can also be used with thermocouple models.

Name	No. of terminals	Functions	Model
Terminal Unit (Includes bus system without backplane.)	24	Equipped with communications terminals for power supply, communications, and setting devices.	E5ZN-SCT24S-500
	18 (See note 1.)	Not equipped with communications terminals for power supply, communications, and setting devices.	E5ZN-SCT18S-500

Note: 1. When using 2 or more E5ZNs mounted side-by-side, use the E5ZN-SCT18S-500 for the second and subsequent Units. When using E5ZNs separately, be sure to use the E5ZN-SCT24S-500.

2. Two End Plates are provided with E5ZN-SCT24S-500 Terminal Units. When mounting to a DIN-rail, be sure to mount End Plates on both sides.

Setting Display Unit (Order Separately)

Name	Power supply	Model
Setting Display Unit (See note.)	24 VDC	E5ZN-SDL

Note: Purchase sockets for wiring separately.

Warranties, Limitations of Liability

WARRANTY

Omron's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY.

In no event shall responsibility of Omron for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the product in the customer's application or use of the product.

Take all necessary steps to determine the suitability of the product for the systems, machines and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Precautions

Definition of Precautionary Information

⚠ WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ Caution

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

⚠ WARNING

Provide safety measures (such as emergency stop circuits, interlock circuits, and limit circuits) in external circuits in order to ensure safety in the system if an abnormality occurs due to malfunction of the PC or another external factor affecting the PC operation. Not doing so may result in serious accidents.

⚠ Caution

Tighten screws to the specified torques given below.
Loose screws may result in burning or malfunction.
Connector screws: 0.25 to 0.3 N · m; Terminal screws: 0.40 to 0.56 N · m

Confirm safety at the destination node before transferring a program to another node or changing contents of the I/O memory area. Doing either of these without confirming safety may result in injury.

Execute online edit only after confirming that no adverse effects will be caused by extending the cycle time. Otherwise, the input signals may not be readable.

Do not touch any of the terminals while the power is being supplied. Doing so may result in electric shock.

Do not attempt to take any Unit apart while the power is being supplied. Doing so may result in electric shock.

Do not allow metal fragments or lead wire scraps to fall inside this product. These may cause electric shock, fire, or malfunction.

Notice

Observe the following points to ensure safe operation.

- Set the communications distance to within the range specified in the E5ZN-DRT User's Manual (Cat. No. H119).
- Do not place communications cables close to or parallel to high-voltage lines or power lines.
- Use the communications cables specified in the E5ZN-DRT User's Manual (Cat. No. H119).
- Do not attempt to disassemble, repair, or modify the product.
- Do not drop the product or expose it to excessive shocks or vibrations. Doing so may result in malfunctions.
- Always use the power supply voltage within the specified range.
- Do not pull on the cables or bend the cables beyond their natural limit.
- Confirm that the power is OFF before wiring.
- Be sure to perform wiring for communications lines and power supplies correctly. Be sure to wire to terminals with the correct polarity. Incorrect wiring may result in malfunctions.
- Confirm that the power is OFF before mounting or removing connectors. Mounting or removing connectors with the power ON may result in malfunctions.
- Double-check all wiring and switch settings before turning ON the power supply.

Notice

- Do not use the product in the following locations
  Locations exposed to direct sunlight
  Locations subject to intense temperature changes
  Locations subject to freezing or condensation
  Locations subject to dust or corrosive gases (in particular, sulfide gas and ammonia gas)
  Locations subject to exposure to water or oil
  Locations subject to vibrations or shocks
- Take appropriate and sufficient countermeasures when installing systems in the following locations:
  Locations subject to static electricity or other forms of noise.
  Locations subject to strong electromagnetic fields.
  Locations subject to possible exposure to radioactivity.
  Locations close to power lines with high voltage or large current.
- Use the product within the specified temperature and humidity ranges.
- Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied in places where the power supply is unstable.
- Do not use solvents to clean the product.
- Confirm that the power is OFF before replacing the product.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. H120-E2-01 In the interest of product improvement, specifications are subject to change without notice.

Digital Controllers
E5□R

New DeviceNet-compatible models offer high-speed and high-precision as general-purpose Digital Controllers with an even broader range of application.

E5□R Series

E5AR

96 × 96 × 95 mm

E5ER

96 × 48 × 95 mm

Contents

Digital Controllers

■ E5□R Selection Guide

Standard type

- **Standard E5AR (96 × 96 mm)**
  - **Basic models**
    1 loop for standard control/
    1 loop for heating and cooling control
    - 4 alarm outputs, 2 event inputs, 2 outputs (control/transfer)
    - 4 alarm outputs, 6 event inputs, RS-485 communications, 2/4 outputs (control/transfer)
  - **2-loop models**
    2 loops for standard control/
    2 loops for heating and cooling control
    1 loop for cascade control
    1 loop for control with remote SP
    1 loop for proportional control
    - 4 alarm outputs, 4 event inputs, RS-485 communications, 2/4 outputs (control/transfer)
  - **4-loop models**
    4 loops for standard control
    2 loops for heating and cooling control
    - 4 alarm outputs, 4 event inputs, RS-485 communications, 4 outputs (control/transfer)
  - **Position-proportional control models**
    1 loop for position-proportional control
    - 4 alarm outputs, 4 event inputs, 2 relay outputs (open, closed)
    - 4 alarm outputs, 4 event inputs, 2 relay outputs (open, closed) RS-485 communications, 1 output (transfer)

- **Standard E5ER (48 × 96 mm)**
  - **Basic models**
    1 loop for standard control/
    1 loop for heating and cooling control
    - 4 alarm outputs, 2 event inputs, 2 outputs (control/transfer)
    - 2/4 alarm outputs, 2/6 event inputs, RS-485 communications, 2/4 outputs (control/transfer)
  - **2-loop models**
    2 loops for standard control/
    1 loop for heating and cooling control
    1 loop for cascade control
    1 loop for control with remote SP
    1 loop for proportional control
    - 4 alarm outputs, 4 event inputs, RS-485 communications, 2 outputs (control/transfer)
  - **Position-proportional control models**
    1 loop for position-proportional control
    - 4 alarm outputs, 4 event inputs, 2 relay outputs (open, closed)
    - 4 alarm outputs, no event input, 2 relay outputs (open, closed) RS-485 communications, 1 output (transfer)

DeviceNet type

DeviceNet-compatible E5AR (96 × 96 mm)

- **Basic models** — 4 alarm outputs, 2 event inputs, DeviceNet communications
  1 loop for standard control/
  1 loop for heating and cooling control
- **2-loop models** — 2 alarm outputs, no event inputs, DeviceNet communications
  2 loops for standard control
  1 loop for heating and cooling control
  2 loops for heating and cooling control
  1 loop for cascade control
  1 loop for control with remote SP
  1 loop for proportional control
- **4-loop models** — 4 alarm outputs, no event inputs, DeviceNet communications
  4 loops for standard control
  2 loops for heating and cooling control
- **Position-proportional control models** — 4 alarm outputs, no event inputs, 2 relay outputs (open, closed) DeviceNet communications
  1 loop for position-proportional control

DeviceNet-compatible E5ER (48 × 96 mm)

- **Basic models** — 2 alarm outputs, 2 event inputs, DeviceNet communications
  1 loop for standard control/
  1 loop for heating and cooling control
- **2-loop models** — 2 alarm outputs, no event inputs, DeviceNet communications
  2 loops for standard control/
  1 loop for heating and cooling control
  1 loop for cascade control
  1 loop for control with remote SP
  1 loop for proportional control
- **Position-proportional control models** — 2 alarm outputs, no event inputs, 2 relay outputs (open, closed) DeviceNet communications
  1 loop for position-proportional control

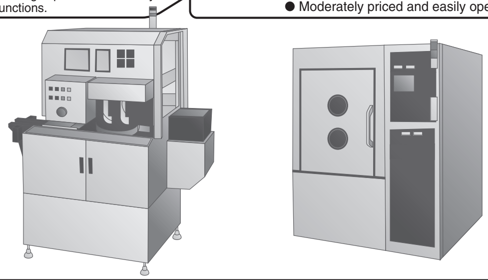
■ Applications

High-speed

Problem: Lack of reasonably-priced controller for devices requiring high-speed response (e.g., ceramic heaters) resulting in using expensive machinery with unnecessary functions.

Solution:
- Improved control performance with high-speed sampling at 50 ms.
- Moderately priced and easily operated.

Applications
- Bonding equipment
- Evaporation equipment
- Coil winding machinery

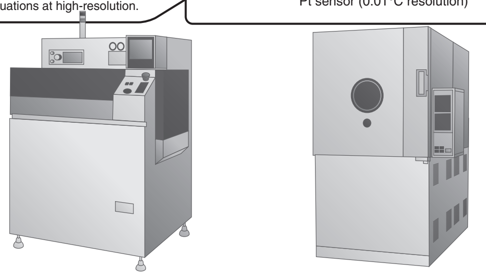


High-resolution

Problem: Need for high-resolution measuring and monitoring of internal temperatures of devices while handling fluctuations at high-resolution.

Solution: Greater input resolution with Pt sensor (0.01°C resolution)

Applications
- Semiconductor production lines (exposure, air-conditioning)
- Environmental testing equipment
- Vacuum heating furnace
- Sterilizing equipment
- Food processing machinery



■ Features

Easily Coordinate Control with PLCs Using Various I/O

• Up to 6 Event Inputs

Externally control bank switching (4/8 banks), RUN/STOP, auto/manual, SP mode, communications write enable/disable, and other operations with event inputs.

• Up to 2 Transfer Outputs

Externally output PVs, SPs, MVs, and ramp SP monitor values for each loop.

• Up to 4 Auxiliary Outputs

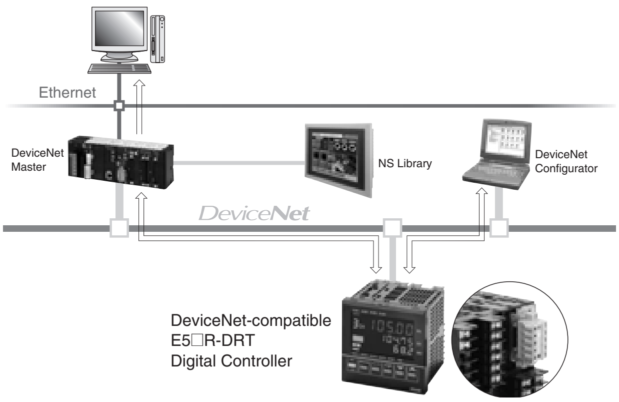
Externally output warnings for 11 alarm modes and input errors.

• RS-485 Serial Communications

Simply share data, such as PVs and SPs, with an OMRON PLC (without requiring special programming). Only settings are required.

• DeviceNet Communications

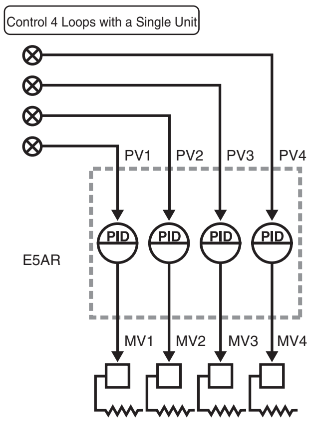
Perform high-speed data communications with the PLC without requiring special programming. Unified management of communications from a DeviceNet Configurator is also possible.

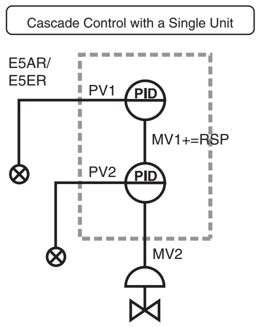


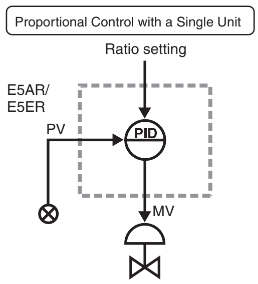
Control Up to 4 Loops with a Single Unit

Models with 1, 2, and 4 analog inputs are available (see note). Various control modes can also be selected in the software settings, including standard control, heating/cooling control, cascade control, position-proportional control, and remote SP control. This allows a single Unit to perform multipoint control (up to 4 loops for the E5AR, and up to 2 loops for the E5ER), cascade control, and proportional control.
Temperature, humidity, and pressure can be controlled simultaneously for up to 4 points from a single Unit, contributing to reduced costs and smaller panels.

Note: Models with 4 analog inputs are 96 x 96 mm (E5AR only).







Digital Controllers
E5AR

E5AR Digital Controllers offer high speed, high precision, and multiple I/O and use a 5-digit, 3-row LCD display for high visual clarity.

- A short sampling period of 50 ms enables use in applications requiring high-speed response.
- PV, SP, and MV data is displayed simultaneously in a 3-row, negative LCD display with a backlight.
- Bar graph to show MV (manipulated variable), valve opening, or deviation.
- Multiloop control, cascade control, and proportional control are possible with a single Controller.
- When using models with communications functions, initial settings can be downloaded and settings can be masked using Support Software (Thermo Tools).
- Equipped with calculation functions as a standard (e.g., square root calculation and broken-line approximation).
- DeviceNet Communications
  Data setting and monitoring can be performed without special programming.

Model Number Structure

■ Model Number Legend

E5AR-□□□□□□□□□-□□□
1 2 3 4 5 6 7 8 9 10

1. Constant values/Program
None: Constant value

2. Control method
Blank: Standard or heating/cooling control
P: Position proportional control

3. Output 1
R: DPST-NO relay outputs
Q: Pulse voltage and pulse voltage/current outputs
C: Current and current outputs

4. Output 2
Blank: None
R: Relay outputs
Q: Pulse voltage and pulse voltage/current outputs
C: Current and current outputs

5. Auxiliary Outputs
Blank: None
4: 4PST-NO relay outputs
T: 2 transistor outputs

6. Optional Function 1
Blank: None
3: RS-485 communications

7. Optional Function 2
Blank: None
D: 4 event inputs

8. Input 1
B: Multi-input and 2 event inputs
F: Multi-input and FB (Potentiometer input)
W: Multi-input and multi-input

9. Input 2
Blank: None
W: Multi-input and multi-input

10. Communications Method
Blank: None
FLK: RS-485 (CompoWay F/MODBUS)
DRT: DeviceNet

Ordering Information

■ Digital Controllers

Standard Controllers

Size	Control type	Control mode	Outputs (control/transfer)	Optional functions: Auxiliary outputs (SUB)	Optional functions: Event inputs	Optional functions: Serial communi-cations	Model
96 × 96 mm	Basic control (1 loop)	Single-loop standard control Single-loop heating and cooling control	2 points: Pulse voltage and Pulse voltage/current	4	2	No	E5AR-Q4B
			2 points: Current and Current				E5AR-C4B
			2 points: Pulse voltage and Pulse voltage/current			RS-485	E5AR-Q43B-FLK (See note 2.)
			2 points: Current and Current				E5AR-C43B-FLK (See note 2.)
			2 points: Pulse voltage and Pulse voltage/current		6		E5AR-Q43DB-FLK (See note 2.)
			2 points: Current and Current				E5AR-C43DB-FLK (See note 2.)
			4 points: Pulse voltage and Pulse voltage/current and Current (2 points)				E5AR-QC43DB-FLK
	2-loop control	2-loop standard control Single-loop heating and cooling control Single-loop cascade control Single-loop control with remote SP Single-loop proportional control	2 points: Pulse voltage and Pulse voltage/current	4	4	RS-485	E5AR-Q43DW-FLK (See note 2.)
			2 points: Current and Current				E5AR-C43DW-FLK (See note 2.)
		2-loop standard control 2-loop heating and cooling control Single-loop cascade control Single-loop control with remote SP Single-loop proportional control	4 points: Pulse voltage (2 points) and Pulse voltage/current (2 points)				E5AR-QQ43DW-FLK
	4-loop control	4-loop standard control 2-loop heating and cooling control	4 points: Current output (4 points)	4	4	RS-485	E5AR-CC43DWW-FLK
			4 points: Pulse voltage (2 points) and Pulse voltage/current (2 points)				E5AR-QQ43DWW-FLK (See note 2.)
	Position-proportional control (1 loop)	Single-loop position-proportional control	Relay output (1 open, 1 close)	4	4	No	E5AR-PR4DF
			Relay output (1 open, 1 close) and 1 current (transfer) output			RS-485	E5AR-PRQ43DF-FLK

Note 1: Specify the power supply specifications when ordering. Model numbers for 100 to 240 VAC are different from those for 24 VAC/VDC.

2: These models are for 100 to 240 VAC only.

DeviceNet-compatible Controllers

Size	Control type	Control mode	Outputs (control/transfer)	Optional functions			Model
				Auxiliary outputs (SUB)	Event inputs	DeviceNet communi-cations	
96 × 96 mm	Basic control (1 loop)	1 loop for standard control Single-loop heating and cooling control	2 points: Pulse voltage and Pulse voltage/current	4	2	Yes	E5AR-Q4B-DRT
			2 points: Current and Current				E5AR-C4B-DRT
			4 points: Pulse voltage and Pulse voltage/current and Current (2 points)				E5AR-QC4B-DRT
	2-loop control	2-loop standard control 2-loop heating and cooling control Single-loop cascade control Single-loop control with remote SP Single-loop proportional control	4 points: Pulse voltage (2 points) and Pulse voltage/current (2 points)	4	None	Yes	E5AR-QQ4W-DRT
	4-loop control	4-loop standard control 2-loop heating and cooling control	4 points: Current (4 points)	4	None	Yes	E5AR-CC4WW-DRT
	Position-proportional control (1 loop)	Single-loop position-proportional control	Relay output (1 open, 1 close)	4	None	Yes	E5AR-PR4F-DRT
			Relay output (1 open, 1 close) and Current (transfer) output (1 point)				E5AR-PRQ4F-DRT

Note: Specify the power supply specifications when ordering. Model numbers for 100 to 240 VAC are different from those for 24 VAC/VDC.

Inspection Results

The Inspection Report can be ordered at the same time as the Digital Controller using the following model number.

Inspection Report (Sold Separately)

Descriptions	Model
Inspection Report for E5AR	E5AR-K

Terminal Cover (Sold Separately)

Descriptions	Model
Terminal Cover for E5AR	E53-COV14

Specifications

■ Ratings

Item	Supply voltage (See note 1.)	100 to 240 VAC, 50/60 Hz	24 VAC, 50/60 Hz; 24 VDC
Operating voltage range		85% to 110% of rated supply voltage	
Power consumption		22 VA max. (with maximum load)	15 VA/10 W max. (with maximum load)
Sensor input (See note 2.)		Thermocouple: K, J, T, E, L, U, N, R, S, B, W Platinum resistance thermometer: Pt100 Current input: 4 to 20 mA DC, 0 to 20 mA DC (including remote SP input) Voltage input: 1 to 5 VDC, 0 to 5 VDC, 0 to 10 VDC (including remote SP input) (Input impedance: 150 Ω for current input, approx. 1 MΩ for voltage input)	
Control output	**Voltage (pulse) output**	12 VDC, 40 mA max. with short-circuit protection circuit (E5AR-QQ□WW-□: 21 mA max.)	
	Current output	0 to 20 mA DC, 4 to 20 mA DC; load: 500 Ω max. (including transfer output) (Resolution: Approx. 54,000 for 0 to 20 mA DC; Approx. 43,000 for 4 to 20 mA DC)	
	Relay output	Position-proportional control type (open, closed) N.O., 250 VAC, 1 A (including inrush current)	
Auxiliary output		Relay Output N.O., 250 VAC, 1 A (resistive load) Transistor Output Maximum load voltage: 30 VDC; Maximum load current: 50 mA; Residual voltage: 1.5 V max.; Leakage current: 0.4 mA max.	
Potentiometer input		100 Ω to 2.5 kΩ	
Event input	**Contact**	Input ON: 1 kΩ max.; OFF: 100 kΩ min.	
	No-contact	Input ON: Residual voltage of 1.5 V max.; OFF: Leakage current of 0.1 mA max.	
		Short-circuit: Approx. 4 mA	
Remote SP input		Refer to the information on sensor input.	
Transfer output		Refer to the information on control output.	
Control method		2-PID or ON/OFF control	
Setting method		Digital setting using front panel keys or setting using serial communications	
Indication method		7-segment digital display and single-lighting indicator Character Height No. 1 display: 12.8 mm; No. 2 display: 7.7 mm; No. 3 display: 7.7 mm	
Other functions		Depends on model.	
Ambient operating temperature		–10 to 55°C (with no icing or condensation) For 3 years of assured use: –10 to 50°C (with no icing or condensation)	
Ambient operating humidity		25% to 85%	
Storage temperature		–25 to 65°C (with no icing or condensation)	

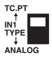
Note 1: The supply voltage (i.e., 100 to 240 VAC or 24 VAC/VDC) depends on the model. Be sure to specify the required type when ordering.

2: The Controller is equipped with multiple sensor input. Temperature input or analog input can be selected with the input type setting switch. There is basic insulation between power supply and input terminals, power supply and output terminals, and input and output terminals.

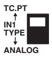
■ Input Ranges

The E5AR has multi-inputs. The default setting is 2 (K-type thermocouple, –200.0 to 1300.0°C or –300.0 to 2300.0°F).

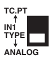
Platinum Resistance Thermometer Input

Input		Pt100	
Range	°C	–200.0 to 850.0	–150.00 to 150.00
	°F	–300.0 to 1500.0	–199.99 to 300.00
Setting		0	1
Minimum setting unit (SP and alarm)		0.1	0.01
Input type setting switch		Set to TC.PT. 	

Thermocouple Input

Input		K		J		T	E	L	U	N	R	S	B	W
Range	°C	–200.0 to 1300.0	–20.0 to 500.0	–100.0 to 850.0	–20.0 to 400.0	–200.0 to 400.0	0.0 to 600.0	–100.0 to 850.0	–200.0 to 400.0	–200.0 to 1300.0	0.0 to 1700.0	0.0 to 1700.0	100.0 to 1800.0	0.0 to 2300.0
	°F	–300.0 to 2300.0	0.0 to 900.0	–100.0 to 1500.0	0.0 to 750.0	–300.0 to 700.0	0.0 to 1100.0	–100.0 to 1500.0	–300.0 to 700.0	–300.0 to 2300.0	0.0 to 3000.0	0.0 to 3000.0	300.0 to 3200.0	0.0 to 4100.0
Setting		2	3	4	5	6	7	8	9	10	11	12	13	14
Minimum setting unit (SP and alarm)		0.1												
Input type setting switch		Set to TC.PT. 												

Current/Voltage Input

Input	Current		Voltage		
	4 to 20 mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V
Range	Depending on the scaling settings, one of the following ranges will be displayed. –19999 to 99999 –1999.9 to 9999.9 –199.99 to 999.99 –19.999 to 99.999 –1.9999 to 9.9999				
Setting	15	16	17	18	19
Input type setting switch	Set to ANALOG. 				

■ Characteristics

Indication accuracy	Thermocouple input with cold junction compensation: (±0.1% of PV or ±1°C, whichever is greater) ±1 digit max. (See note 1.) Thermocouple input without cold junction compensation: (±0.1% FS or ±1°C, whichever is smaller) ±1 digit (See note 2.) Analog input: ±0.1% FS ±1 digit max. Platinum resistance thermometer input: (±0.1% of PV or ±0.5°C, whichever is greater) ±1 digit max. Position-proportional potentiometer input: ±5% FS ±1 digit max.
Control mode	Standard control (heating or cooling control), heating/cooling control, standard control with remote SP (2-input models only), heating/cooling control with remote SP (2-input models only), cascade standard control (2-input models only), cascade heating/cooling control (2-input models only), proportional control (2-input models only), position-proportional control (control-valve control models only)
Control period	0.2 to 99.0 s (in units of 0.1 s) for time-proportioning control output
Proportional band (P)	0.00% to 999.99% FS (in units of 0.01% FS)
Integral time (I)	0.0 to 3,999.9 s (in units of 0.1 s)
Derivative time (D)	0.0 to 3,999.9 s (in units of 0.1 s)
Hysteresis	0.01% to 99.99% FS (in units of 0.01% FS)
Manual reset value	0.0% to 100.0% (in units of 0.1% FS)
Alarm setting range	–19,999 to 99,999 EU (See note 3.) (The decimal point position depends on the input type and the decimal point position setting.)
Input sampling period	50 ms
Insulation resistance	20 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min (between charged terminals of different polarities)
Vibration resistance	10 to 55 Hz, 20 m/s^2 for 10 min each in X, Y, and Z directions
Shock resistance	100 m/s^2, 3 times each in X, Y, and Z directions
Inrush current	100 to 240-VAC models: 50 A max. 24 VAC/VDC models: 30 A max.
Weight	E5AR: Controller only: Approx. 450 g; Mounting bracket: Approx. 60 g; Terminal cover: Approx. 30 g E5ER: Controller only: Approx. 330 g; Mounting bracket: Approx. 60 g; Terminal cover: Approx. 16 g
Degree of protection	Front panel: NEMA4X for indoor use (equivalent to IP66); Rear case: IP20; Terminals: IP00
Memory protection	Non-volatile memory (number of writes: 100,000)
Applicable standards	UL3121-1, CSA C22.2 No. 1010-1 EN61010-1 (IEC61010-1): Pollution degree 2/overvoltage category 2
EMC	EMI: EN61326 Radiated Interference Electromagnetic Field Strength: EN55011 Group 1 Class A Noise Terminal Voltage: EN55011 Group 1 Class A EMS: EN61326 ESD Immunity: EN61000-4-2: 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Electromagnetic Immunity:EN61000-4-3: 10 V/m (amplitude-modulated, 80 MHz to 1 GHz, 1.4 GHz to 2 GHz) (level 3) Burst Noise Immunity: EN61000-4-4: 2 kV power line (level 3) 2 kV output line (relay output) (level 4) 1 kV measurement line, I/O signal line (level 4) 1 kV communications line (level 3) Conducted Disturbance Immunity: EN61000-4-6: 3 V (0.15 to 80 MHz) (level 3) Surge Immunity: EN61000-4-5: 1 kV line to line (power line, output line (relay output)) (level 2) 2 kV line to ground (power line, output line (relay output)) (level 3) Power Frequency Magnetic Field Immunity: EN61000-4-8: 30 A/m (50 Hz) continuous field Voltage Dip/Interrupting Immunity: EN61000-4-11: 0.5 cycle, 100% (rated voltage)

Note 1: K-, T-, or N-type thermocouple at –100°C max.: ±2°C ±1 digit max.
U- or L-type thermocouple: ±2°C ±1 digit max.
B-type thermocouple at 400°C max.: No accuracy specification.
R- or S-type thermocouple at 200°C max.: ±3°C ±1 digit max.
W-type thermocouple: (±0.3% of PV or ±3°C, whichever is greater) ±1 digit max.
2: U- or L-type thermocouple: ±1°C ±1 digit
R- or S-type thermocouple at 200°C max.: ±1.5°C ±1 digit
3: "EU" (Engineering Unit) represents the unit after scaling. If a temperature sensor is used it is either °C or °F.

■ Communications Specifications

RS-485 Serial Communications

Transmission path connection	Multiple points
Communications method	RS-485 (two-wire, half duplex)
Synchronization method	Start-stop synchronization
Baud rate	9,600, 19,200, or 384,000 bps
Transmission code	ASCII (CompoWay/F), RTU Remote Terminal Unit (MODBUS)
Data bit length	7 or 8 bits
Stop bit length	1 or 2 bits
Error detection	Vertical parity (none, even, odd) Block check character (BCC) Start-stop synchronization data format
Flow control	None
Interface	RS-485
Retry function	None

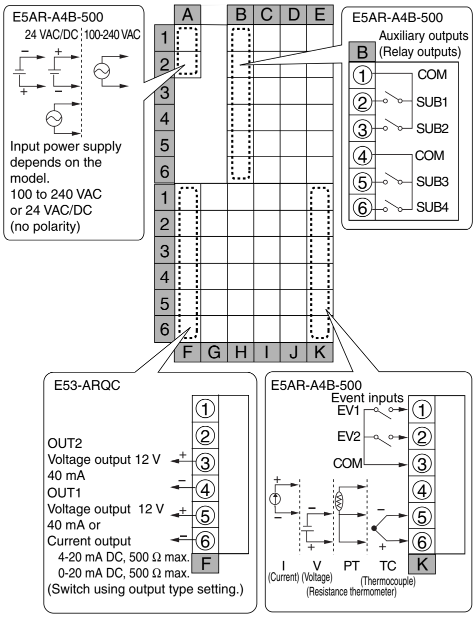
DeviceNet

<table>
<tr><th colspan="2">Item</th><th colspan="4">Specifications</th></tr>
<tr><td colspan="2">Communications protocol</td><td colspan="4">Conforms to DeviceNet</td></tr>
<tr><td rowspan="3">Communications functions</td><td>Remote I/O communications</td><td colspan="4">• Master-slave connections (polling, bit-strobe, COS, or cyclic)
• Conform to DeviceNet specifications.</td></tr>
<tr><td>I/O allocations</td><td colspan="4">• Can allocate any I/O data from the Configurator.
• Can allocate any data, such as parameters specific to the DeviceNet and the Digital Controller variable area.
• Up to 2 blocks for the IN Area, up to a total of 100 words.
• One block for the OUT Area, up to 100 words (first word is always allocated to Output Enable Bits).</td></tr>
<tr><td>Message communications</td><td colspan="4">• Explicit message communications
• CompoWay/F communications commands can be sent (commands are sent in explicit message format).</td></tr>
<tr><td colspan="2">Connection format</td><td colspan="4">Combination of multidrop and T-branch connections (for trunk and drop lines)</td></tr>
<tr><td colspan="2">Baud rate</td><td colspan="4">DeviceNet: 500, 250, or 125 kbps, or automatic detection of master baud rate</td></tr>
<tr><td colspan="2">Communications media</td><td colspan="4">Special 5-wire cable (2 signal lines, 2 power lines, and 1 shield line)</td></tr>
<tr><td colspan="2" rowspan="5">Communications distance</td><td>Baud rate</td><td>Network length</td><td>Drop line length</td><td>Total drop line length</td></tr>
<tr><td>500 kbps</td><td>100 m max. (100 m max.)</td><td>6 m max.</td><td>39 m max.</td></tr>
<tr><td>250 kbps</td><td>250 m max. (100 m max.)</td><td>6 m max.</td><td>78 m max.</td></tr>
<tr><td>125 kbps</td><td>500 m max. (100 m max.)</td><td>6 m max.</td><td>156 m max.</td></tr>
<tr><td colspan="4">The values in parentheses apply when Thin Cables are used.</td></tr>
<tr><td colspan="2">Supply voltage</td><td colspan="4">DeviceNet power supply: 24 VDC</td></tr>
<tr><td colspan="2">Allowable voltage range</td><td colspan="4">DeviceNet power supply: 11 to 25 VDC</td></tr>
<tr><td colspan="2">Current consumption</td><td colspan="4">50 mA max. (24 VDC)</td></tr>
<tr><td colspan="2">Maximum number of nodes that can be connected</td><td colspan="4">64 (includes Configurator when used)</td></tr>
<tr><td colspan="2">Maximum number of slaves that can be connected</td><td colspan="4">63</td></tr>
<tr><td colspan="2">Error control</td><td colspan="4">CRC error detection</td></tr>
<tr><td colspan="2">Power supply</td><td colspan="4">Power supplied from DeviceNet communications connector.</td></tr>
</table>

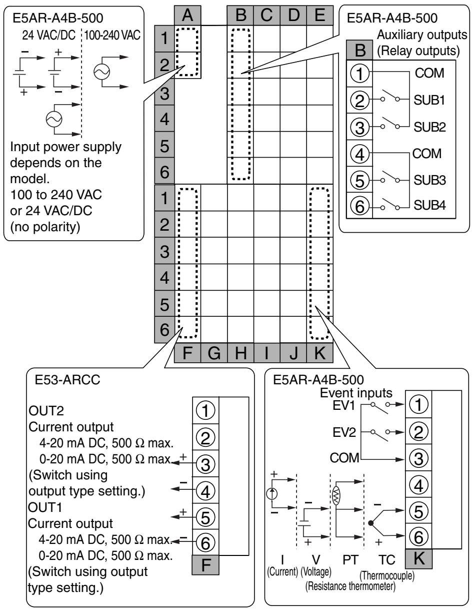
Wiring Terminals

■ E5AR Standard Controller Connections

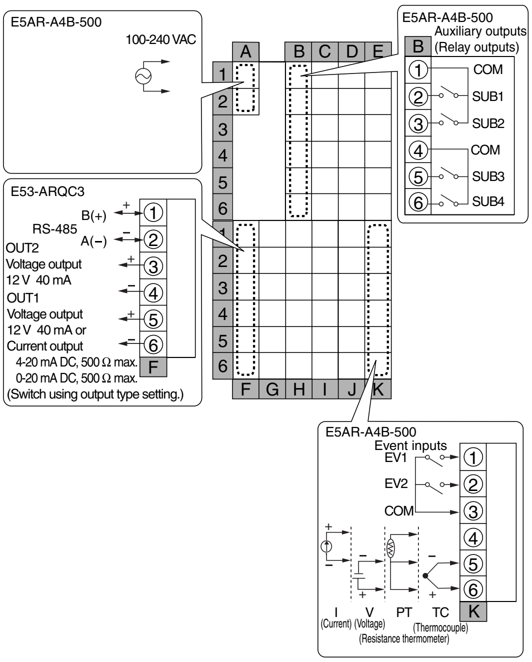
E5AR-Q4B



E5AR-C4B



E5AR-Q43B-FLK



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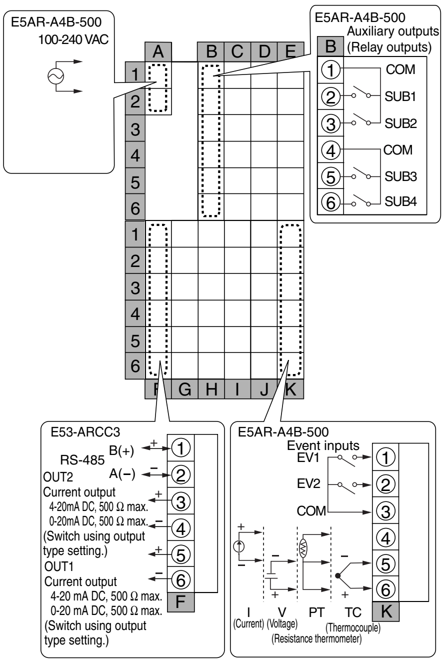
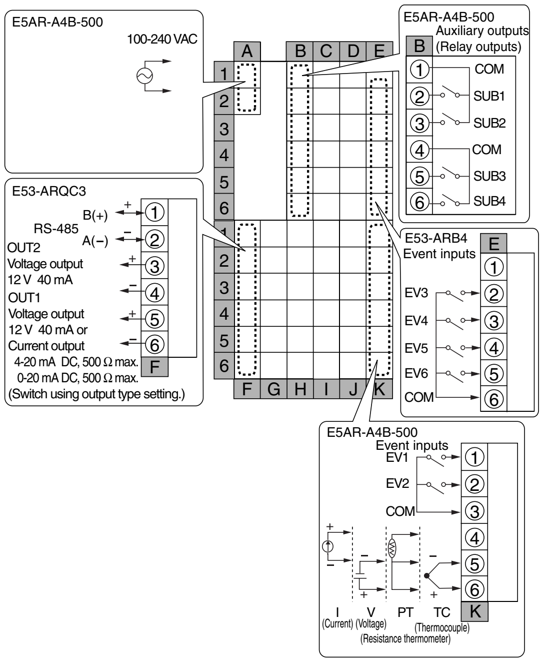
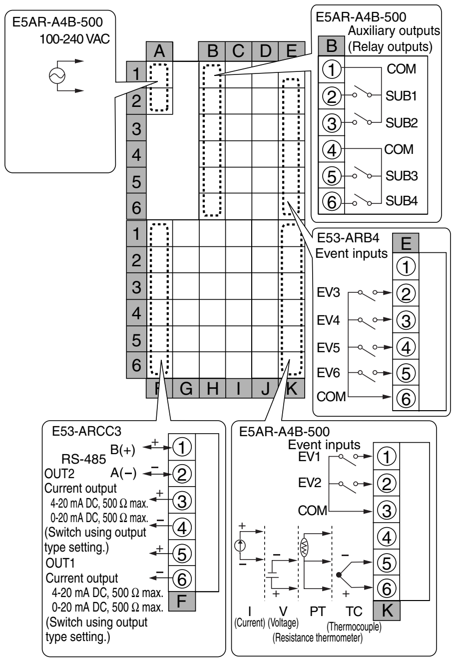


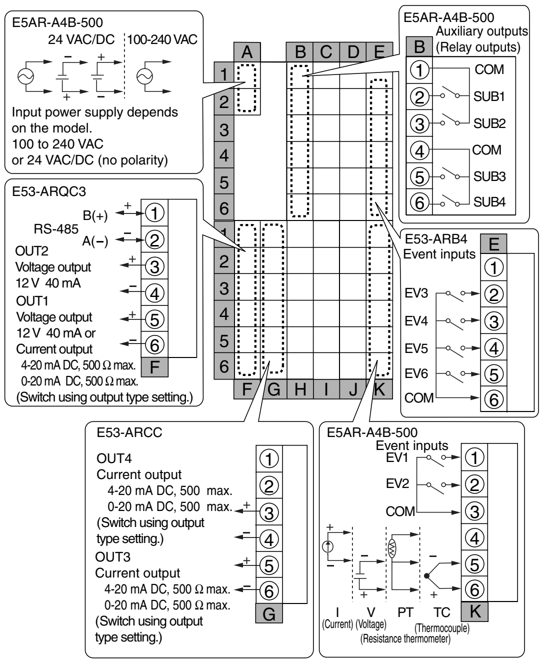
E5AR-Q43DB-FLK



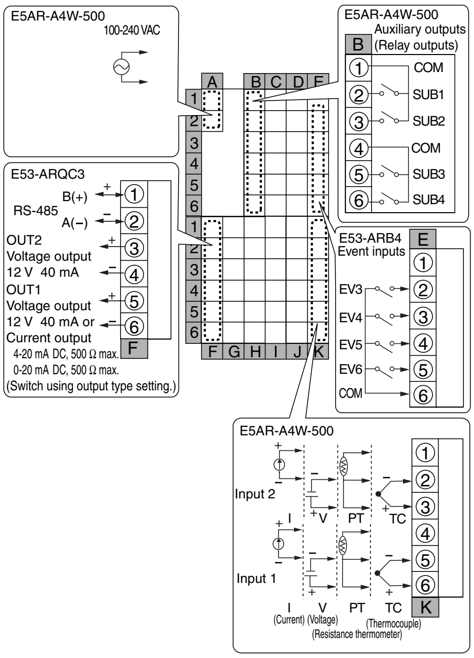
E5AR-C43DB-FLK



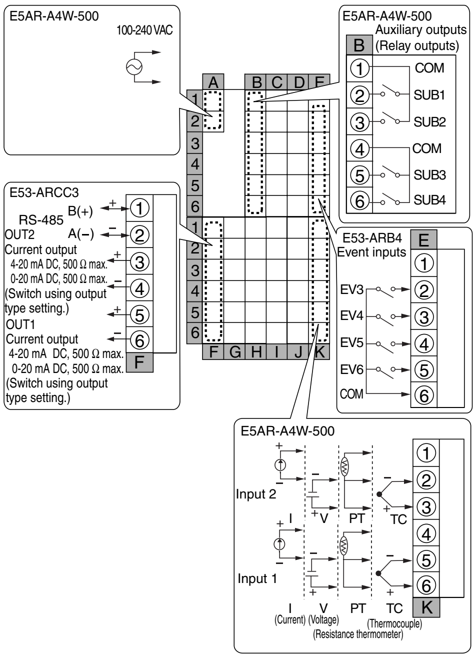
E5AR-QC43DB-FLK



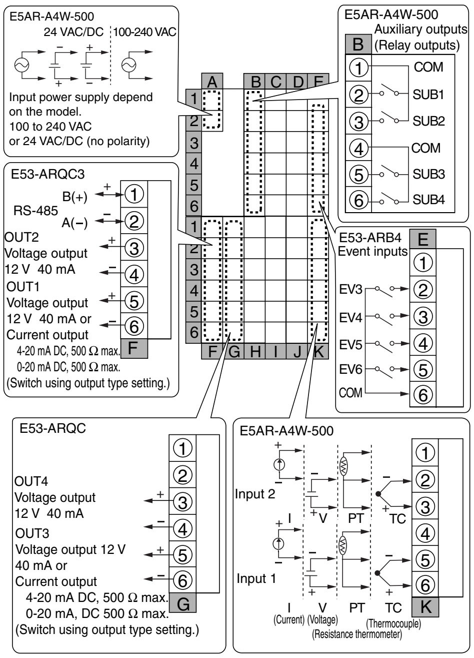
E5AR-Q43DW-FLK (2-loop Control)



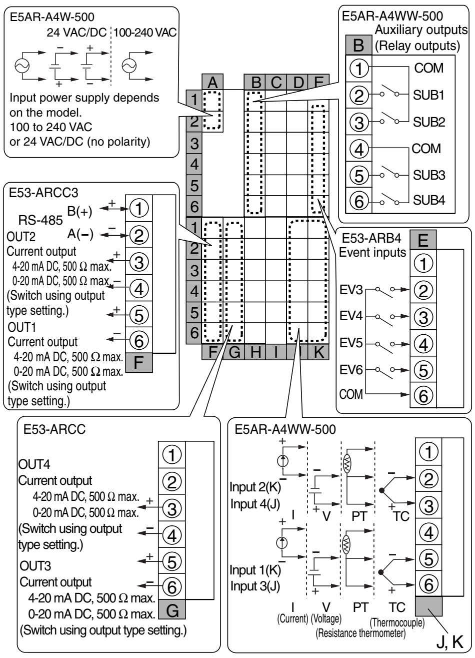
E5AR-C43DW-FLK (2-loop Control)



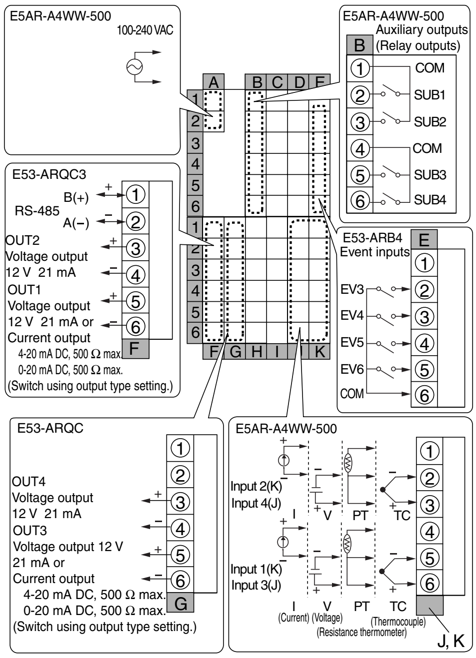
E5AR-QQ43DW-FLK (2-loop Control)



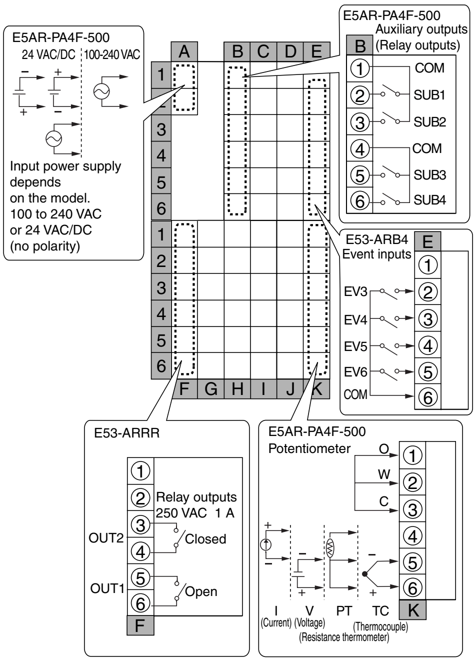
E5AR-CC43DWW-FLK (4-loop Control)



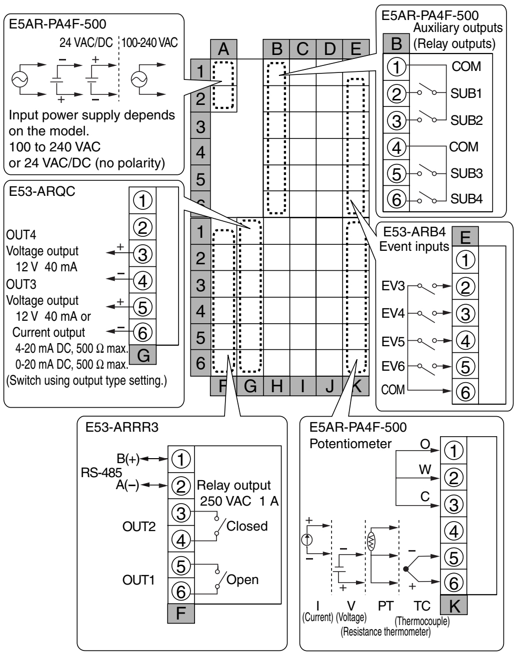
E5AR-QQ43DWW-FLK (4-loop Control)



E5AR-PR4DF

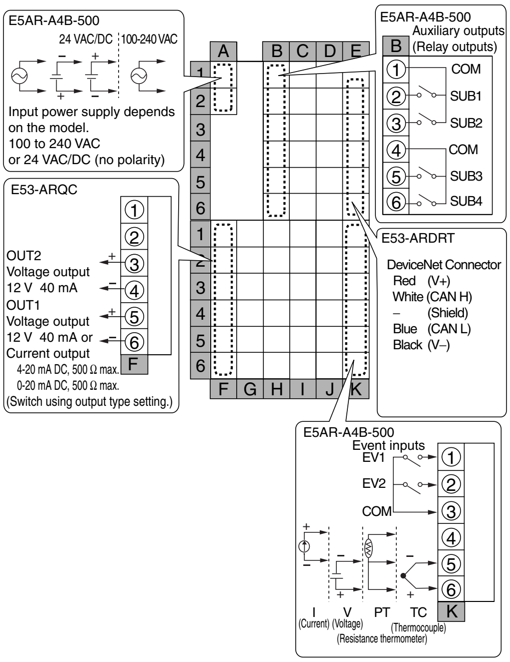


E5AR-PRQ43DF-FLK

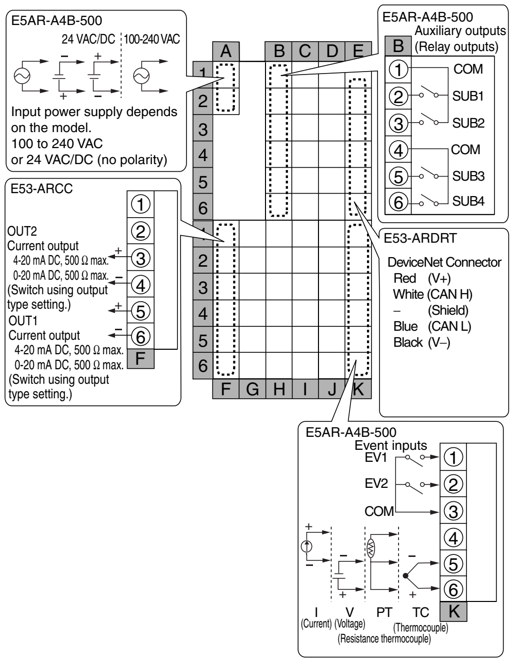


■ E5AR DeviceNet-compatible Controller Connections

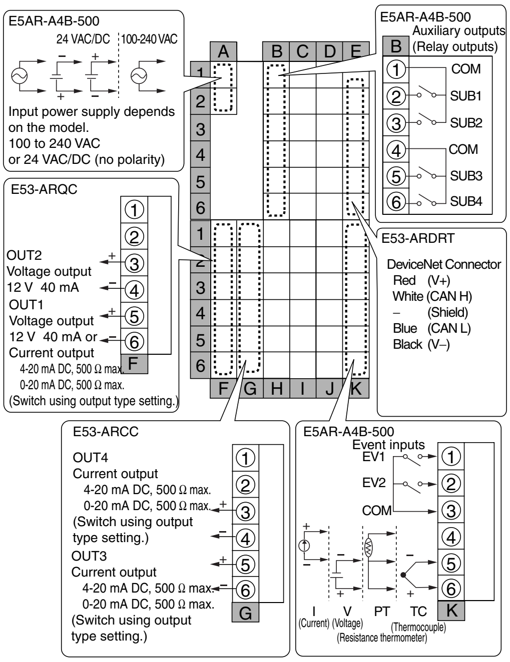
E5AR-Q4B-DRT



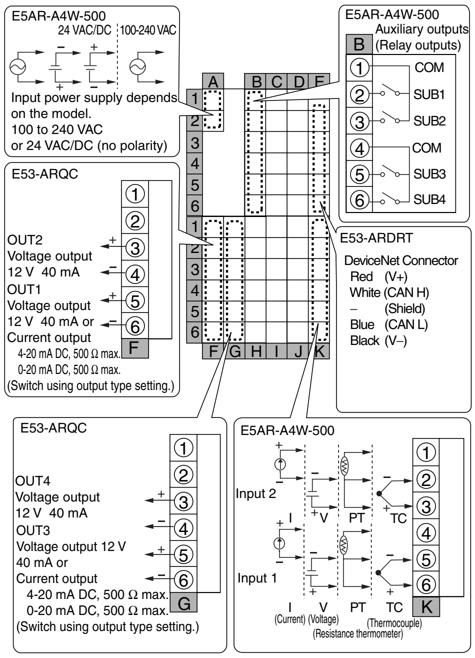
E5AR-C4B-DRT



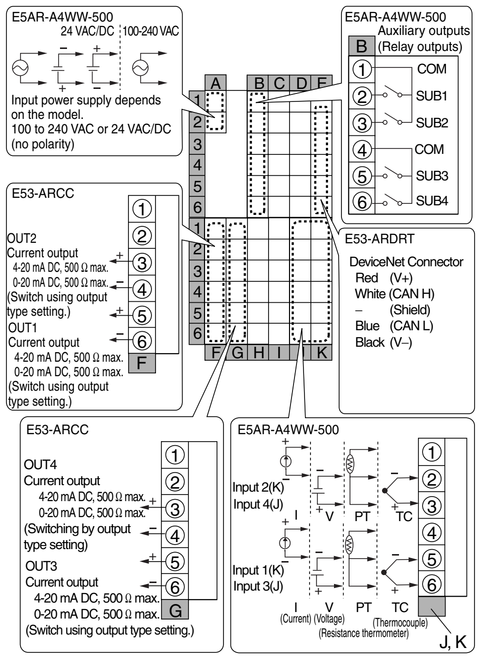
E5AR-QC4B-DRT



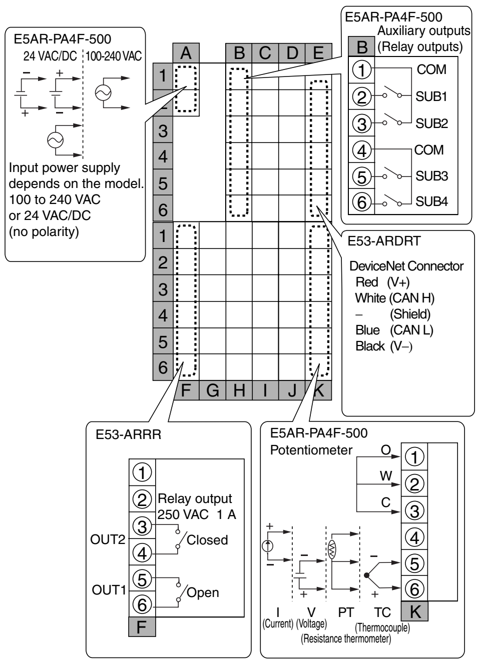
E5AR-QQ4W-DRT (2-loop Control)



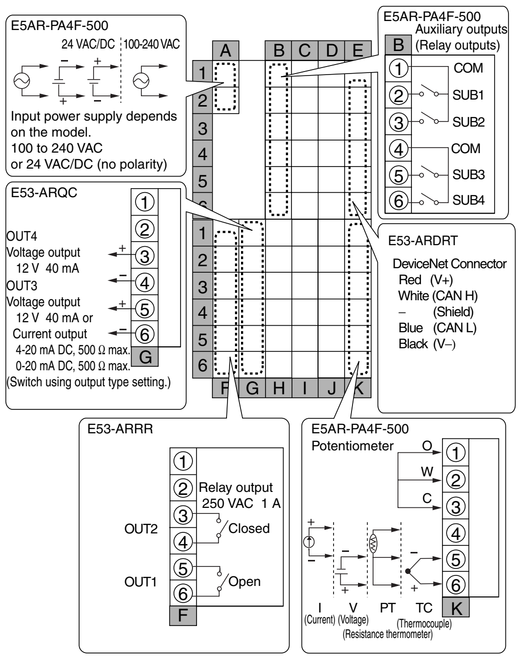
E5AR-CC4WW-DRT (4-loop Control)



E5AR-PR4F-DRT

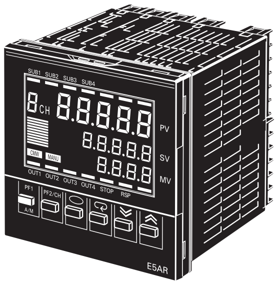
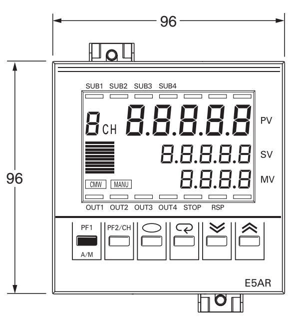


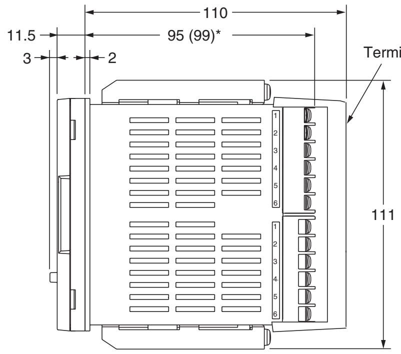
E5AR-PRQ4F-DRT

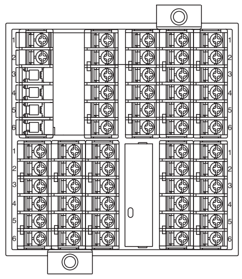


Dimensions

Note: All units are in millimeters unless otherwise indicated.

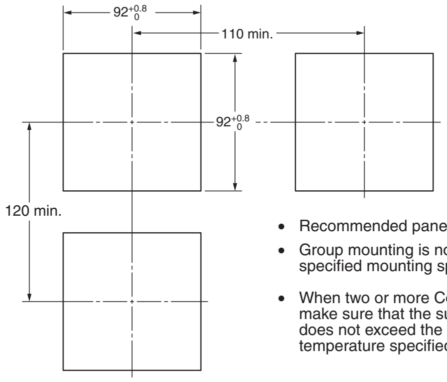




* The value in parentheses is for DeviceNet-compatible Controllers.

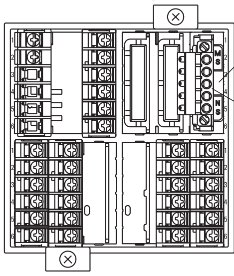
Crimp terminal size: M3

Panel Cutouts



- Recommended panel thickness is 1 to 8 mm.
- Group mounting is not possible. (Maintain the specified mounting space between Controllers.)
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

DeviceNet-compatible Controllers, Rear Panel

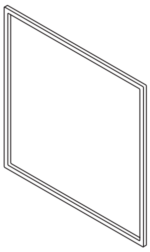


MS/NS indicators
Top: MS
Bottom: NS

DeviceNet communications connector
Used to connect the DeviceNet communications cables.
The DeviceNet communications power is also supplied through this connector.
The connector included with the DeviceNet-compatible Controllers is the FKC 2.5/5-STF-5.08 AU M (PHOENIX CONTACT).

Rubber Packing (Sold Separately)

Y92S-P4 (for E5AR)



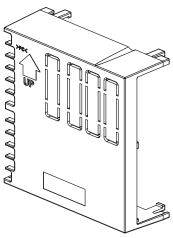
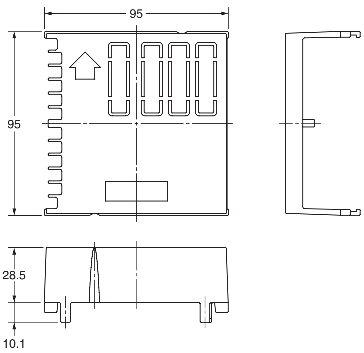
If the rubber packing is lost or damaged, it can be ordered using the following model number: Y92S-P4.

(Depending on the operating environment, deterioration, contraction, or hardening of the rubber packing may occur and so, in order to ensure the level of waterproofing specified in NEMA4, periodic replacement is recommended.)

Note: Rubber packing is provided with the Controller.

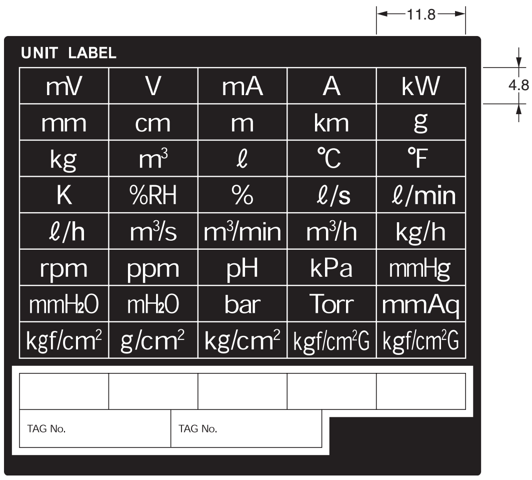
Terminal Cover (Sold Separately)

E53-COV14 (for E5AR)

Unit Label Sheet (Sold Separately)

Y92S-L1



Digital Controllers E5ER

E5ER Digital Controllers offer high speed, high precision, and multiple I/O and use a 5-digit, 3-row LCD display for high visual clarity.

- A short sampling period of 50 ms enables use in applications requiring high-speed response.
- PV, SP, and MV data is displayed simultaneously in a 3-row, negative LCD display with a backlight.
- Multipoint control, cascade control, and proportional control are possible with a single Controller.
- When using models with communications functions, initial settings can be downloaded and settings can be masked using Support Software (Thermo Tools).
- Equipped with calculation functions as a standard (e.g., square root calculation and broken-line approximation).
- DeviceNet Communications
  Data setting and monitoring can be performed without any special programming.

CE cULus

Model Number Structure

■ Model Number Legend

E5ER-□□□□□□□□□-□□□
1 2 3 4 5 6 7 8 9 10

1. Constant values/Program
None: Constant values

2. Control method
Blank: Standard, or heating/cooling control
P: Position-proportional control

3. Output 1
R: DPST-NO relay outputs
Q: Pulse voltage and pulse voltage/current outputs
C: Current and current outputs

4. Output 2
Blank: None
R: Relay
Q: Pulse voltage and pulse voltage/current outputs
C: Current and current outputs

5. Auxiliary outputs
Blank: None
4: 4PST-NO relay outputs
T: 2 transistor outputs

6. Optional function 1
Blank: None
3: RS-485 communications

7. Optional function 2
Blank: None
D: 4 event inputs

8. Input 1
B: Multi-input and 2 event inputs
F: Multi-input and FB (Potentiometer input)
W: Multi-input and multi-input

9. Input 2
Blank: None
W: Multi-input and multi-input

10. Communications Method
Blank: None
FLK: RS-485 (CompoWay F/MODBUS)
DRT: DeviceNet

Ordering Information

■ Digital Controllers

Standard Controllers

Size	Control type	Control mode	Outputs (control/ transfer)	Optional functions			Model
				Auxiliary outputs (SUB)	Event inputs	Serial communications	
48 × 96 mm	Basic control (1 loop)	Single-loop standard control Single-loop heating and cooling control	2 points: Pulse voltage and Pulse voltage/current	4	2	No	E5ER-Q4B
			2 points: Current and Current				E5ER-C4B
			2 points: Pulse voltage and Pulse voltage/current			RS-485	E5ER-Q43B-FLK (See note 2.)
			2 points: Current and Current				E5ER-C43B-FLK (See note 2.)
			2 points: Pulse voltage and Pulse voltage/current	2 (See note 3.)	6		E5ER-QT3DB-FLK (See note 2.)
			2 points: Current and Current				E5EAR-CT3DB-FLK (See note 2.)
			4 points: Pulse voltage and Pulse voltage/current and Current (2 points)	4	2		E5ER-QC43B-FLK
	2-loop control	2-loop standard control Single-loop heating and cooling control Single-loop cascade control Single-loop control with remote SP Single-loop proportional control	2 points: Pulse voltage and Pulse voltage/current	2 (See note 3.)	4	RS-485	E5ER-QT3DW-FLK
			2 points: Current and Current				E5ER-CT3DW-FLK
	Position-proportional control (1 loop)	Single-loop position-proportional control	Relay output (1 open, 1 closed)	2 (See note 3.)	4	No	E5ER-PRTDF
			Relay output (1 open, 1 closed) and Current (transfer) output (1 point)	4	No	RS-485	E5ER-PRQ43F-FLK

Note 1: Specify the power supply specifications when ordering. Model numbers for 100 to 240 VAC are different from those for 24 VAC/VDC.
2: These models are for 100 to 240 VAC only.
3: The auxiliary outputs are transistor outputs.

DeviceNet-compatible Controllers

Size	Control type	Control mode	Outputs (control/ transfer)	Optional functions			Model
				Auxiliary outputs (SUB)	Event inputs	DeviceNet communi-cations	
48 × 96 mm	Basic control (1 loop)	Single-loop standard control Single-loop heating and cooling control	2 points: Pulse voltage Pulse voltage/current	2 (See note 2.)	2	Yes	E5ER-QTB-DRT
			2 points: Current Current				E5ER-CTB-DRT
	2-loop control	2-loop standard control Single-loop heating and cooling control Single-loop cascade control Single-loop standard control with remote SP Single-loop proportional control	2 points: Pulse voltage Pulse voltage/current	2 (See note 2.)	None	Yes	E5ER-QTW-DRT
			2 points: Current Current				E5ER-CTW-DRT
	Position-proportional control (1 loop)	Single-loop position-proportional control	Relay output (1 open, 1 closed)	2 (See note 2.)	None	Yes	E5ER-PRTF-DRT

Note 1: Specify the power supply specifications when ordering. Model numbers for 100 to 240 VAC are different from those for 24 VAC/VDC.
2: The auxiliary outputs are transistor outputs.

Inspection Results

The Inspection Report can be ordered at the same time as the Digital Controller using the following model number.

Inspection Report (Sold Separately)

Descriptions	Model
Inspection Report for E5ER	**E5ER-K**

Terminal Cover (Sold Separately)

Descriptions	Model
Terminal Cover for E5ER	**E53-COV15**

Specifications

■ Ratings

Item	Supply voltage (See note 1.)	100 to 240 VAC, 50/60 Hz	24 VAC, 50/60 Hz; 24 VDC
Operating voltage range		85% to 110% of rated supply voltage	
Power consumption		17 VA max. (with maximum load)	11 VA/7 W max. (with maximum load)
Sensor input (See note 2.)		Thermocouple: K, J, T, E, L, U, N, R, S, B, W Platinum resistance thermometer: Pt100 Current input: 4 to 20 mA DC, 0 to 20 mA DC (including remote SP input) Voltage input: 1 to 5 VDC, 0 to 5 VDC, 0 to 10 VDC (including remote SP input) (Input impedance: 150 Ω for current input, approx. 1 MΩ for voltage input)	
Control output	**Voltage (pulse) output**	12 VDC, 40 mA max. with short-circuit protection circuit (E5AR-QQ□WW-□: 21 mA max.)	
	Current output	0 to 20 mA DC, 4 to 20 mA DC; load: 500 Ω max. (including transfer output) (Resolution: Approx. 54,000 for 0 to 20 mA DC; Approx. 43,000 for 4 to 20 mA DC)	
	Relay output	Position-proportional control type (open, closed) N.O., 250 VAC, 1 A (including inrush current)	
Auxiliary output		Relay Output N.O., 250 VAC, 1 A (resistive load) Transistor Output Maximum load voltage: 30 VDC; Maximum load current: 50 mA; Residual voltage: 1.5 V max.; Leakage current: 0.4 mA max.	
Potentiometer input		100 Ω to 2.5 kΩ	
Event input	**Contact**	Input ON: 1 kΩ max.; OFF: 100 kΩ min.	
	No-contact	Input ON: Residual voltage of 1.5 V max.; OFF: Leakage current of 0.1 mA max.	
		Short-circuit: Approx. 4 mA	
Remote SP input		Refer to the information on sensor input.	
Transfer output		Refer to the information on control output.	
Control method		2-PID or ON/OFF control	
Setting method		Digital setting using front panel keys or setting using serial communications	
Indication method		7-segment digital display and single-lighting indicator Character Height No. 1 display: 9.5 mm; No. 2 display: 7.2 mm; No. 3 display: 7.2 mm	
Other functions		Depends on model.	
Ambient operating temperature		–10 to 55°C (with no icing or condensation) For 3 years of assured use: –10 to 50°C (with no icing or condensation)	
Ambient operating humidity		25% to 85%	
Storage temperature		–25 to 65°C (with no icing or condensation)	

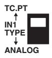
Note 1: The supply voltage (i.e., 100 to 240 VAC or 24 VAC/VDC) depends on the model. Be sure to specify the required type when ordering.

2: The Controller is equipped with multiple sensor input. Temperature input or analog input can be selected with the input type setting switch. There is basic insulation between power supply and input terminals, power supply and output terminals, and input and output terminals.

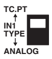
■ Input Ranges

The E5ER has multi-inputs. The default setting is 2 (K-type thermocouple, –200.0 to 1300.0°C or –300.0 to 2300.0°F).

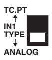
Platinum Resistance Thermometer Input

Input		Pt100	
Range	°C	–200.0 to 850.0	–150.0 to 150.0
	°F	–300.0 to 1500.0	–199.99 to 300.0
Setting		0	1
Minimum setting unit (SP and alarm)		0.1	0.01
Input type setting switch		Set to TC.PT. 	

Thermocouple Input

Input		K		J		T	E	L	U	N	R	S	B	W
Range	°C	–200.0 to 1300.0	–20.0 to 500.0	–100.0 to 850.0	–20.0 to 400.0	–200.0 to 400.0	0.0 to 600.0	–100.0 to 850.0	–200.0 to 400.0	–200.0 to 1300.0	0.0 to 1700.0	0.0 to 1700.0	100.0 to 1800.0	0.0 to 2300.0
	°F	–300.0 to 2300.0	0.0 to 900.0	–100.0 to 1500.0	0.0 to 750.0	–300.0 to 700.0	0.0 to 1100.0	–100.0 to 1500.0	–300.0 to 700.0	–300.0 to 2300.0	0.0 to 3000.0	0.0 to 3000.0	300.0 to 3200.0	0.0 to 4100.0
Setting		2	3	4	5	6	7	8	9	10	11	12	13	14
Minimum setting unit (SP and alarm)		0.1												
Input type setting switch		Set to TC.PT. 												

Current/Voltage Input

Input	Current		Voltage		
Range	4 to 20 mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V
Setting	15	16	17	18	19
Input type setting switch	Set to ANALOG. 				

■ Characteristics

Indication accuracy	Thermocouple input with cold junction compensation: (±0.1% of PV or ±1°C, whichever is greater) ±1 digit max. (See note 1.) Thermocouple input without cold junction compensation: (±0.1% FS or ±1°C, whichever is smaller) ±1 digit (See note 2.) Analog input: ±0.1% FS ±1 digit max. Platinum resistance thermometer input: (±0.1% of PV or ±0.5°C, whichever is greater) ±1 digit max. Position-proportional potentiometer input: ±5% FS ±1 digit max.
Control mode	Standard control (heating or cooling control), heating/cooling control, standard control with remote SP (2-input models only), heating/cooling control with remote SP (2-input models only), cascade standard control (2-input models only), cascade heating/cooling control (2-input models only), proportional control (2-input models only), position-proportional control (control-valve control models only)
Control period	0.2 to 99.0 s (in units of 0.1 s) for time-proportioning control output
Proportional band (P)	0.00% to 999.99% FS (in units of 0.01% FS)
Integral time (I)	0.0 to 3,999.9 s (in units of 0.1 s)
Derivative time (D)	0.0 to 3,999.9 s (in units of 0.1 s)
Hysteresis	0.01% to 99.99% FS (in units of 0.01% FS)
Manual reset value	0.0% to 100.0% (in units of 0.1% FS)
Alarm setting range	–19,999 to 99,999 EU (See note 3.) (The decimal point position depends on the input type and the decimal point position setting.)
Input sampling period	50 ms
Insulation resistance	20 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min (between charged terminals of different polarities)
Vibration resistance	10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions
Shock resistance	100 m/s², 3 times each in X, Y, and Z directions
Inrush current	100 to 240-VAC models: 50 A max. 24 VAC/VDC models: 30 A max.
Weight	E5AR: Controller only: Approx. 450 g; Mounting bracket: Approx. 60 g; Terminal cover: Approx. 30 g E5ER: Controller only: Approx. 330 g; Mounting bracket: Approx. 60 g; Terminal cover: Approx. 16 g
Degree of protection	Front panel: NEMA4X for indoor use (equivalent to IP66); Rear case: IP20; Terminals: IP00
Memory protection	Non-volatile memory (number of writes: 100,000)
Applicable standards	UL3121-1, CSA C22.2 No. 1010-1 EN61010-1 (IEC61010-1): Pollution degree 2/overvoltage category 2
EMC	EMI: EN61326 Radiated Interference Electromagnetic Field Strength: EN55011 Group 1 Class A Noise Terminal Voltage: EN55011 Group 1 Class A EMS: EN61326 ESD Immunity: EN61000-4-2: 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Electromagnetic Immunity:EN61000-4-3: 10 V/m (amplitude-modulated, 80 MHz to 1 GHz, 1.4 GHz to 2 GHz) (level 3) Burst Noise Immunity: EN61000-4-4: 2 kV power line (level 3) 2 kV output line (relay output) (level 4) 1 kV measurement line, I/O signal line (level 4) 1 kV communications line (level 3) Conducted Disturbance Immunity: EN61000-4-6: 3 V (0.15 to 80 MHz) (level 3) Surge Immunity: EN61000-4-5: 1 kV line to line (power line, output line (relay output)) (level 2) 2 kV line to ground (power line, output line (relay output)) (level 3) Power Frequency Magnetic Field Immunity: EN61000-4-8: 30 A/m (50 Hz) continuous field Voltage Dip/Interrupting Immunity: EN61000-4-11: 0.5 cycle, 100% (rated voltage)

Note 1: K-, T-, or N-type thermocouple at –100°C max.: ±2°C ±1 digit max.
U- or L-type thermocouple: ±2°C ±1 digit max.
B-type thermocouple at 400°C max.: No accuracy specification.
R- or S-type thermocouple at 200°C max.: ±3°C ±1 digit max.
W-type thermocouple: (±0.3% of PV or ±3°C, whichever is greater) ±1 digit max.

2: U- or L-type thermocouple: ±1°C ±1 digit
R- or S-type thermocouple at 200°C max.: ±1.5°C ±1 digit

3: "EU" (Engineering Unit) represents the unit after scaling. If a temperature sensor is used it is either °C or °F.

■ Communications Specifications

RS-485 Serial Communications

Transmission path connection	Multiple points
Communications method	RS-485 (two-wire, half duplex)
Synchronization method	Start-stop synchronization
Baud rate	9,600, 19,200, or 384,000 bps
Transmission code	ASCII (CompoWay/F), RTU Remote Terminal Unit (MODBUS)
Data bit length	7 or 8 bits
Stop bit length	1 or 2 bits
Error detection	Vertical parity (none, even, odd) Block check character (BCC) Start-stop synchronization data format
Flow control	None
Interface	RS-485
Retry function	None

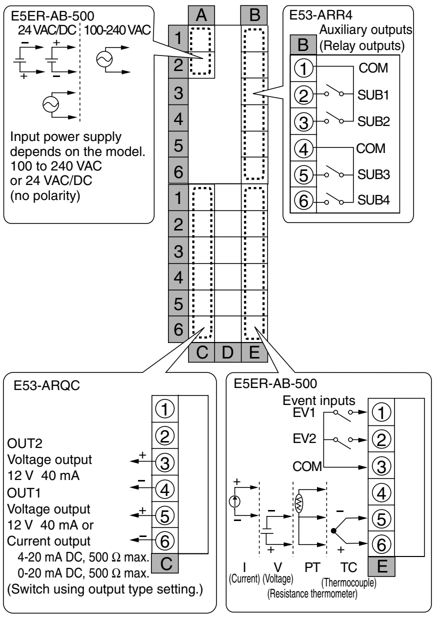
DeviceNet

Item		Specifications			
Communications protocol		Conforms to DeviceNet			
Communications functions	Remote I/O communications	• Master-slave connections (polling, bit-strobe, COS, or cyclic) • Conform to DeviceNet specifications.			
	I/O allocations	• Can allocate any I/O data from the Configurator. • Can allocate any data, such as parameters specific to the Devicenet, and the Digital Controller variable area. • Up to 2 blocks for the IN Area, up to a total of 100 words. • One block for the OUT Area, up to 100 words (first word is always allocated to Output Enable Bits).			
	Message communications	• Explicit message communications • CompoWay/F communications commands can be sent (commands are sent in explicit message format).			
Connection format		Combination of multidrop and T-branch connections (for trunk and drop lines)			
Baud rate		DeviceNet: 500, 250, or 125 kbps, or automatic detection of master baud rate			
Communications media		Special 5-wire cable (2 signal lines, 2 power lines, and 1 shield line)			
Communications distance		Baud rate	Network length	Drop line length	Total drop line length
		500 kbps	100 m max. (100 m max.)	6 m max.	39 m max.
		250 kbps	250 m max. (100 m max.)	6 m max.	78 m max.
		125 kbps	500 m max. (100 m max.)	6 m max.	156 m max.
		The values in parentheses apply when Thin Cables are used.			
Supply voltage		DeviceNet power supply: 24 VDC			
Allowable voltage range		DeviceNet power supply: 11 to 25 VDC			
Current consumption		50 mA max. (24 VDC)			
Maximum number of nodes that can be connected		64 (includes Configurator when used)			
Maximum number of slaves that can be connected		63			
Error control		CRC error detection			
Power supply		Power supplied from DeviceNet communications connector.			

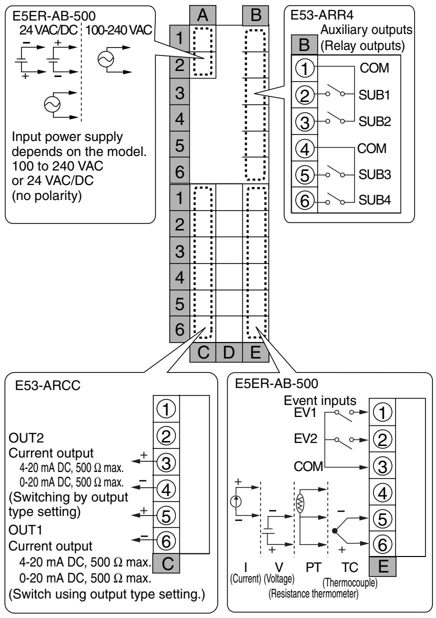
Wiring Terminals

■ E5ER Standard Controller Connections

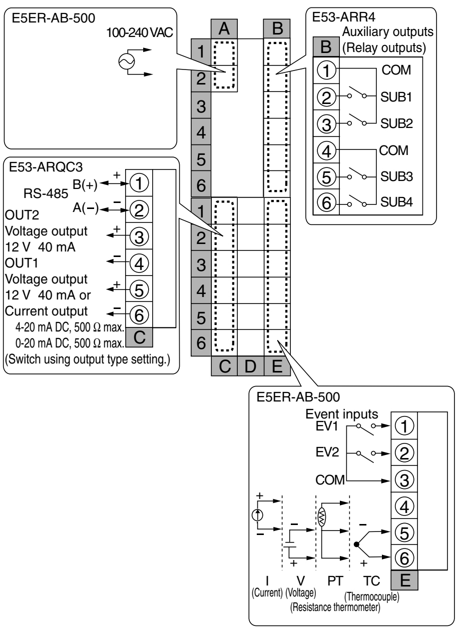
E5ER-Q4B



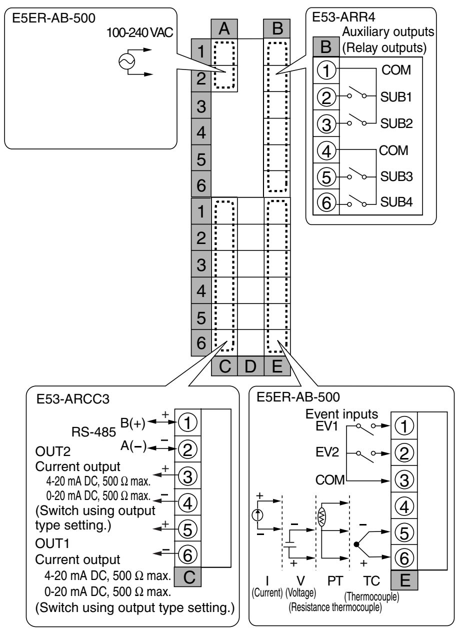
E5ER-C4B



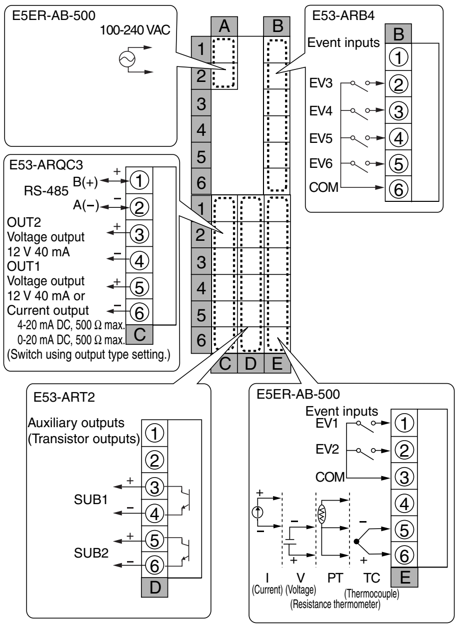
E5ER-Q43B-FLK



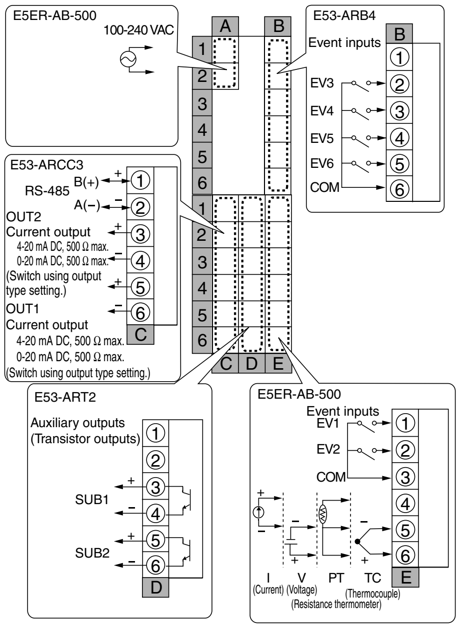
E5ER-C43B-FLK



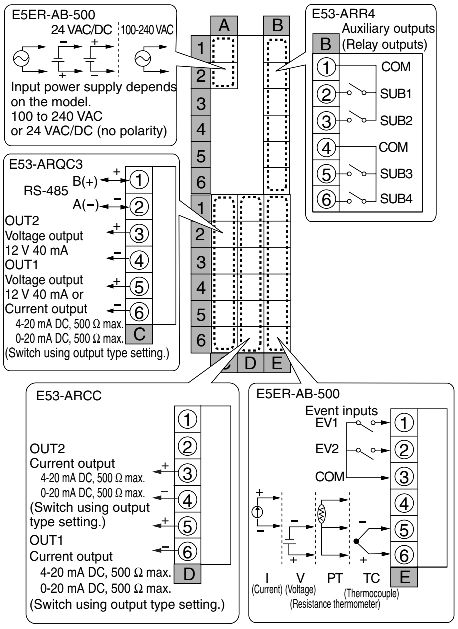
E5ER-QT3DB-FLK



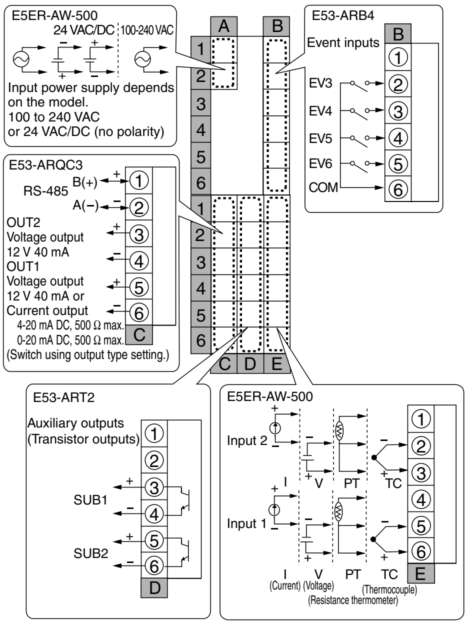
E5ER-CT3DB-FLK



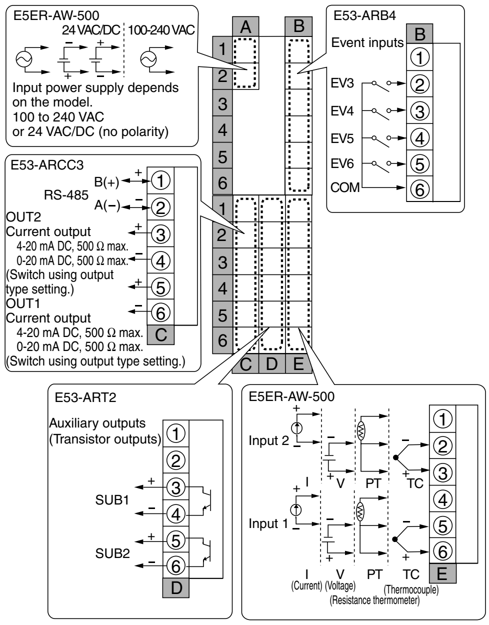
E5ER-QC43B-FLK



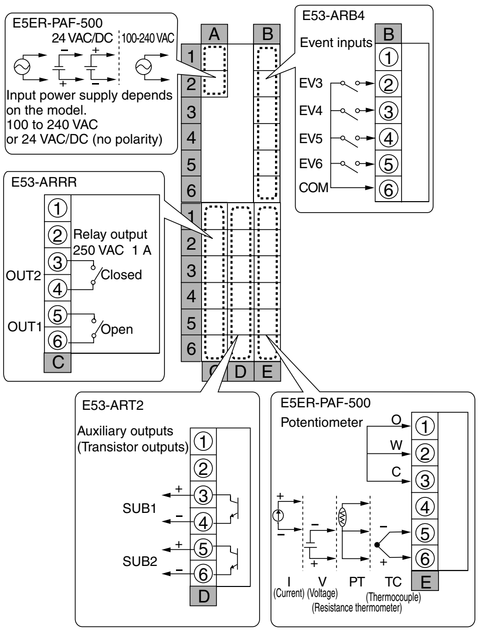
E5ER-QT3DW-FLK (2-loop Control)



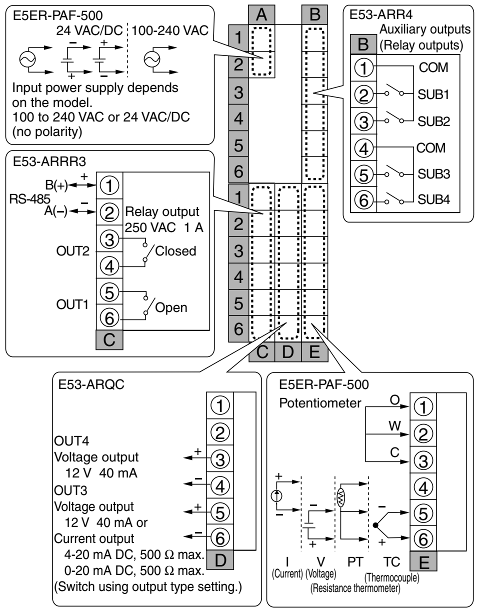
E5ER-CT3DW-FLK (2-loop Control)



E5ER-PRTDF

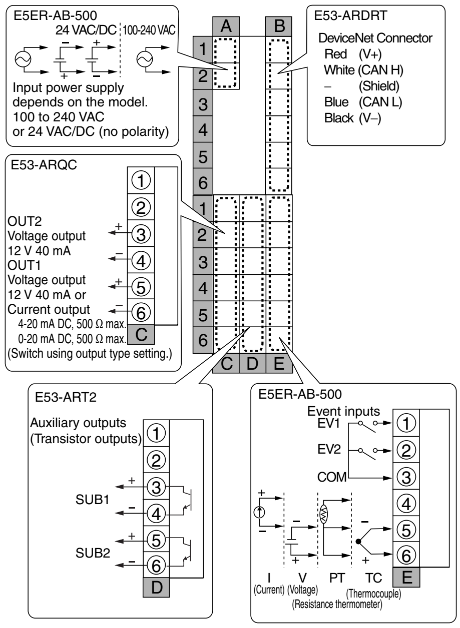


E5ER-PRQ43F-FLK

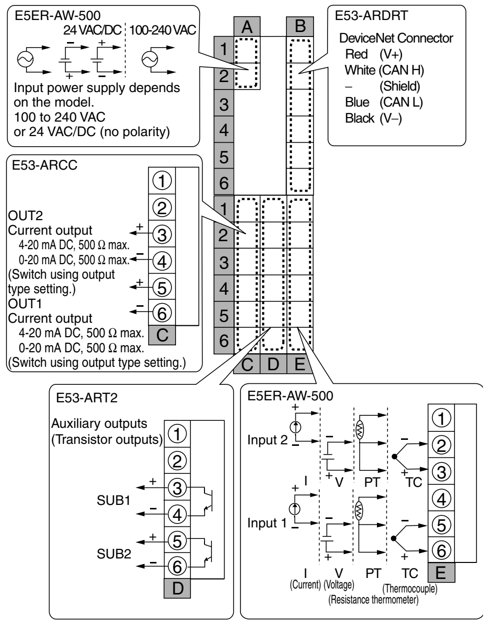


■ E5ER DeviceNet-compatible Controller Connections

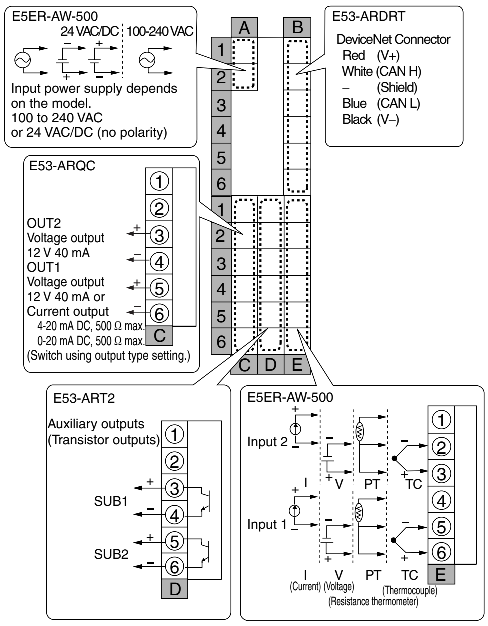
E5ER-QTB-DRT



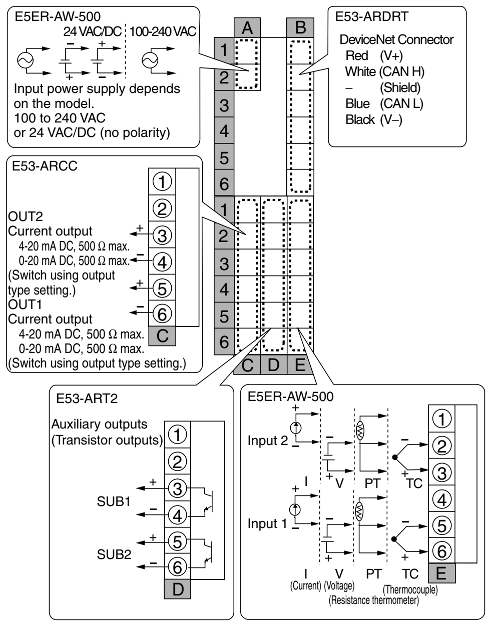
E5ER-CTB-DRT



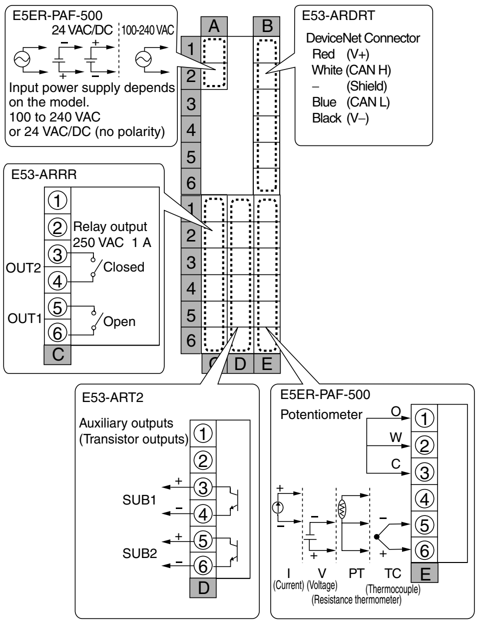
E5ER-QTW-DRT (2-loop Control)



E5ER-CTW-DRT (2-loop Control)

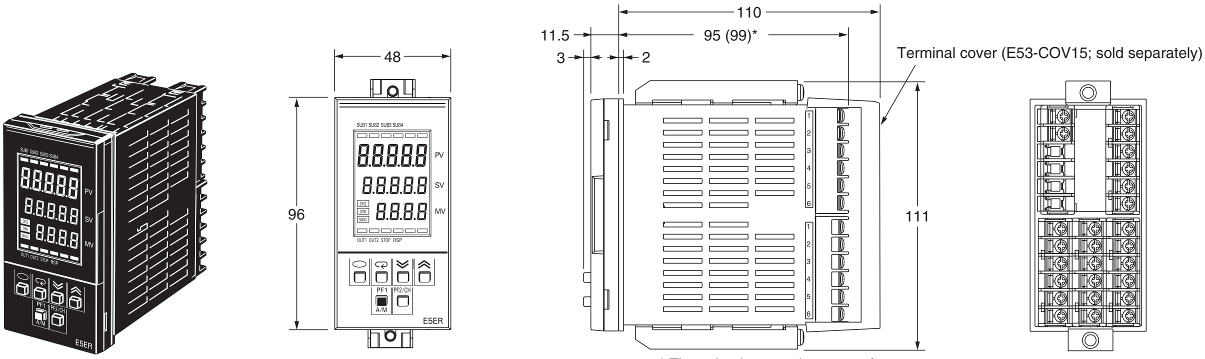


E5ER-PRTF-DRT



Dimensions

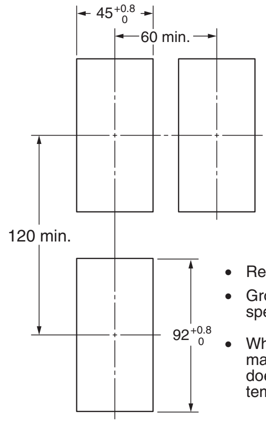
Note: All units are in millimeters unless otherwise indicated.



* The value in parentheses are for DeviceNet-compatible Controllers.

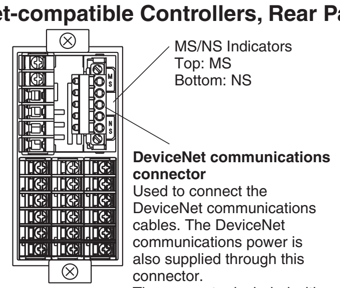
Crimp terminal size: M3

Panel Cutouts



- Recommended panel thickness is 1 to 8 mm.
- Group mounting is not possible. (Maintain the specified mounting space between Controllers.)
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

DeviceNet-compatible Controllers, Rear Panel

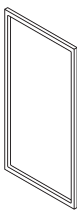


MS/NS Indicators
Top: MS
Bottom: NS

DeviceNet communications connector
Used to connect the DeviceNet communications cables. The DeviceNet communications power is also supplied through this connector.
The connector included with the DeviceNet-compatible Controllers is the FKC 2.5/5-STF-5.08 AU M (PHOENIX CONTACT).

Rubber Packing (Sold Separately)

Y92S-P5 (for E5ER)



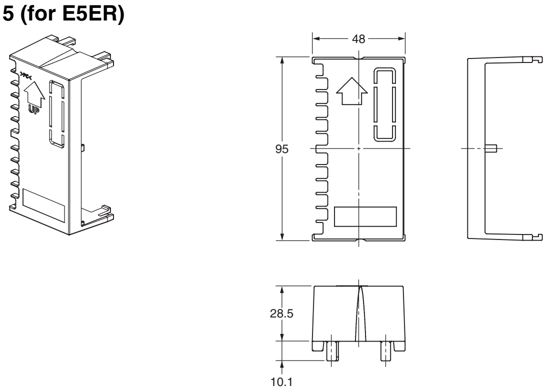
If the rubber packing is lost or damaged, it can be ordered using the following model number: Y92S-P5.

(Depending on the operating environment, deterioration, contraction, or hardening of the rubber packing may occur and so, in order to ensure the level of waterproofing specified in NEMA4, periodic replacement is recommended.)

Note: Rubber packing is provided with the Controller.

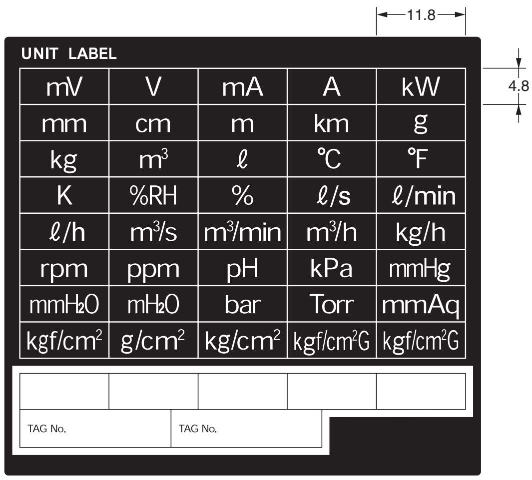
Terminal Cover (Sold Separately)

E53-COV15 (for E5ER)



Unit Label Sheet (Sold Separately)

Y92S-L1



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

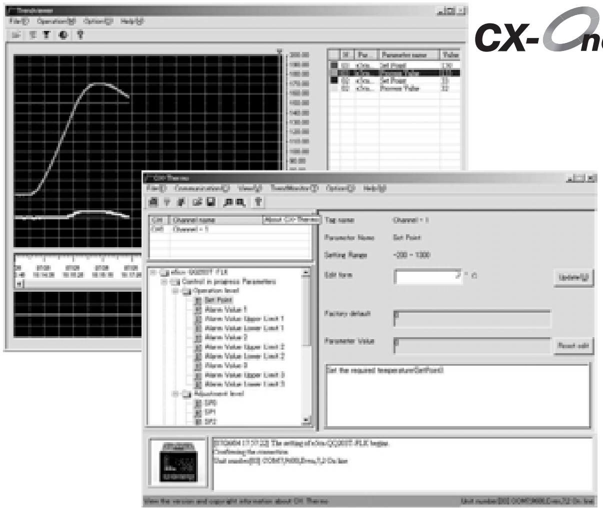
Cat. No. H122-E2-02

In the interest of product improvement, specifications are subject to change without notice.

CX-Thermo Support Software Ver. 3.0
EST2-2C-MV3

Monitoring/Setting Support Software for E5CN-, E5EN-, E5AN, E5ZN-, E5□R, and EJ1-series Temperature Controllers Enabling Faster Parameter Setup, Device Adjustment, and Maintenance

- Enables creating, editing, and batch-downloading parameters from a personal computer, reducing the work required to set parameters.
- Supports Online Monitoring:
  Monitor data for up to 31 Temperature Controllers at the same time. Up to 64 EJ1 Temperature Controllers can be connected. (The Temperature Controllers must be from the same series.)
- Supports parameter masks for hiding unused parameters (E5□N, E5□R and E5ZN).
- Starting CX-Programmer at the same time and using in combination enables sharing of the folders used by CX-Programmer.
- Searches automatically for models by unit number only and is equipped with an autopilot function for connecting to the trend monitor.



CX-One

NEW

Ordering Information

■ List of Models

Name	Model
CX-Thermo Support Software	EST2-2C-MV3

Note: The old models of E5□N Temperature Controller are not supported.

Specifications

Basic functions		Creating, changing, and saving parameters Monitor function Parameter mask (unused parameters are not displayed) function (E5□N, E5□R and E5ZN) Parameter mask settings can be written (personal computer to E5□N) only. Parameter mask settings cannot be read (E5□N to personal computer).
Compatible devices	**Temperature Controllers**	E5□N, EJ1 (Models without communications functions can also be connected if the E58-CIFQ1 Cable is used, although 1:N connections are not possible). E5ZN, E5AR and E5ER (except E5AR and E5ER models for DeviceNet communications)
Personal computer system requirements	**CPU**	300 MHz min.
	OS	Windows 2000 or XP (Japanese or English versions)
	Memory	128 MB min.
	Harddisk	650 MB min. available space
	CD-ROM	One CD-ROM drive
	Monitor	SVGA (800 × 600). Recommended: XGA (1024 × 768), high color (16 bits) min.
	Communications ports	• RS-232C port, COM1 to COM8 • USB port can be used if the E58-CIFQ1 is used (E5□N and EJ1 only). • USB port can be used if the K3SC is used. (Connection to E5□N, E5ZN, or E5□R is supported only for models with communications.)

Note: "E5□N" indicates the upgraded versions of the E5CN, E5AN, and E5EN.

The ThermoMini Parameter Copying Software is provided free-of-charge.

Compatible Temperature Controllers:

- E5CN (new models) only (not supported for EJ1, E5EN, or E5AN)

Functions:

- Uploading all parameters from the E5CN to the personal computer
- Downloading all parameters from the personal computer to the E5CN
- Saving uploaded data to the personal computer and outputting data as CSV files

Note: Changing parameter settings and monitoring is not supported.

Contact your OMRON representative for details.

Note: The product names in this catalog are trademarks or registered trademarks of the respective companies.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. H131-E2-03

In the interest of product improvement, specifications are subject to change without notice.

PROFIBUS-DP Gateway to Host Link / Compoway-F
PRT1-SCU11

Omron's intelligent PROFIBUS gateway

- Supports all Compoway-F-equipped products (temperature controllers, digital panel meters, etc.).
- Can be used in Host Link mode for connecting MCW151-E.
- Enhanced for use with E5AK/E5EK temperature controllers and OYMC Varispeed F7 inverters.
- Cost-effectively integrates existing instruments into a PROFIBUS network.
- Requires no complex protocol conversion writing.
- Has function blocks for drag-and-drop configuration.
- Connects up to 15 instruments to a single PROFIBUS point.

Model Number Structure

PRT1-SCU11

1:	Version
1:	Wired
SCU:	Serial Communication Unit
PRT1:	PROFIBUS Remote Terminal

Specifications

Unit Specifications

Ambient temperatures	Operating temperature: 0 to 55°C Storage temperature: -20 to 75°C
Ambient humidity	10 to 90% (non-condensing)
Conformance to EMC and safety standards	EN61000-6-2: 2001 EN61000-6-4: 2001/CISPR11 EN61131-2: 2003, IDT
Power supply	+24 VDC (+10% / -15%) Current consumption 85 mA (max), 75 mA typical at 24 Vdc
Weight	130 g
Communication Interface	RS-485 based PROFIBUS DP RS-422A / RS-485 RS-232C Peripheral Port supporting connection to CX-Thermo and CX-Drive

PROFIBUS Cable

- Only use shielded twisted pair cable, line type A as specified by EN 50170 vol. 2 (e.g. Belden 3079A).
- The maximum cable length per bus segment (32 stations) depends on the selected communication speed

Baud rate (kbit/s)	Length/segment
9.6, 19.2, 45.45, 93.75	1200
187.5	1000
500	400
1500	200
3000, 6000, 12000	100

PROFIBUS Communication Specifications

Applicable standard	EN 50170 vol. 2 (PROFIBUS-DP)
Type	PROFIBUS-DP Slave
Bus connector	9-pin sub-D female, RS-485
Bus termination	NOT included
Baud rates in kbit/s (auto-detect)	9.6, 19.2, 45.45, 93.75, 187.5, 500, 1500, 3000, 6000, 12000
PROFIBUS address range	01-99
Communication cable	Type A (EN 50170 vol. 2)
Minimum slave interval	0.5 ms
Input data	200 bytes maximum
Output data	200 bytes maximum
Supported DP functions (as responder)	Data_Exchange Chk_Cfg / Set_Prm Slave_Diag Global_Control (SYNC/FREEZE/CLEAR) RD_Inp / RD_Outp / Get_Cfg
GSD file	OC_0780.GSD

RS-422A / RS-485 Protocol Specifications

Compoway-F devices supported	E5AN / E5CN / E5EN / E5GN E5ZN E5ER / E5AR
K-Format devices supported	E5AK / E5EK
Host Link devices supported	R88A-MCW151-E
Memobus devices supported	OYMC Varispeed F7 Inverter
Max. No of devices	15
Connection type	RS-422A (4-wire) RS-485 (2-wire)
Baud rates in kbit/s	9.6, 19.2, 34.8
Slave address range supported	1 ~ 15 (Address and selected PROFIBUS I/O module must match)

Peripheral Port

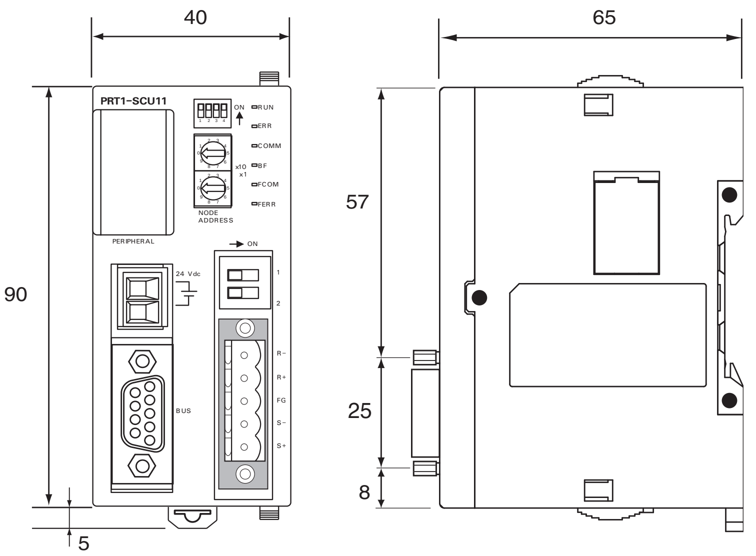
- The Peripheral Port is intended to allow communication between Personal Computer based software (i.e. Thermotools) and temperature controllers.
- Use OMRON's CS1W-CN226 cable to setup the connection.

I/O Configuration Options

Type			Device	Description
Compoway-F	Fixed Comm.	Basic	E5_N / E5ZN / E5_R	1 word I/O per loop
		Extended	E5_N	2 word out / 6 word in
			E5ZN	3 word out / 11 word in
			E5_R	5 word out / 21 word in
	Free Comm.	READ	E5_N / E5ZN / E5_	5 word out / 4 word in
		WRITE		7 word out / 2 word in
		OPERATE		3 word out / 2 word in
K-Format	Fixed Com	Basic	E5AK / E5EK	2 word out / 5 word in
		Extended		4 word out / 5 word in
	Free Comm	Special Operation		3 word out / 3 word in
Host Link			R88A-MCW151-E	5, 10, 15 word I/O
Memob us	Fix		OYMC Varispeed F7 Inverter	3 word out / 3 word in
	Free			3 word out / 3 word in

Note:
- Different protocols can not be intermixed on the same network.
- Total maximum I/O size: 100 words I/O.
- Fixed Communication Blocks are pre-defined I/O blocks designed for the listed devices. Free Communication Blocks require programming in the PROFIBUS master to assemble commands.
- Memobus Fixed I/O modules access pre-defined F7 registers, Free I/O module allows specification of F7 registers.

Dimensions



Units: mm

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. P05-EN-02 In the interest of product improvement, specifications are subject to change without notice.

Power supplies

With the S8VS Micro size IS everything!

Powerful performance in compact design

At just 22.5 mm wide Omron's S8VS Micro series is one of smallest power supplies around, but it delivers more power per cm^3 than almost any similar product in its class!
It provides 100% performance (no derating) right up to its maximum operating temperature. It offers flexible mounting (DIN-rail and horizontal or vertical panel-mounting) for convenient installation. And it is available in 15 W and 30 W models, each of which offers an output voltage choice of 5VDC, 12VDC and 24VDC. A powerful yet cost-effective solution for reducing cabinet space!

Features at a glance:

- Compact size
- No derating
- Easy DIN-rail mounting
- Full range to choose from

What type of network supply is it?

Single-phase

Which type of system is required?

Flexible modular power supply (output, capacity)

Standard power supply

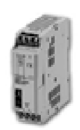
What type is required?

Industrial standard

Preventive maintenance

High power, compact

S8TS



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S8VS without display

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S82K

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S8VS with display

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S8VM

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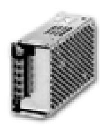
S8PS

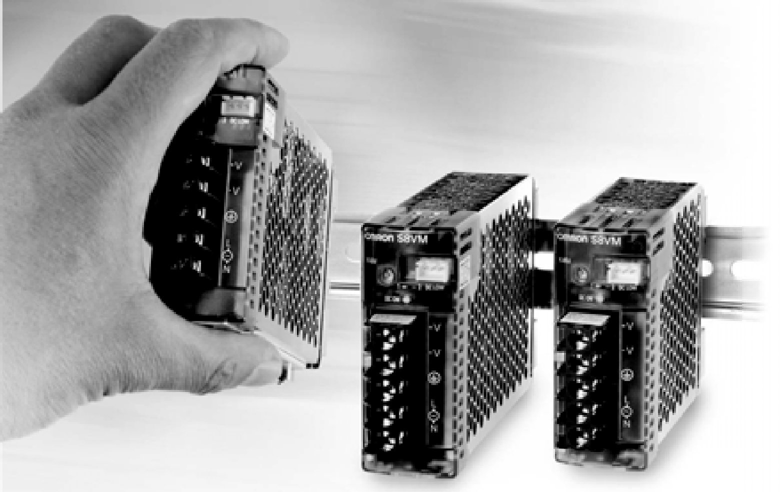


CD

S8VM power supplies

The power supplies that alert you!

This new single-phase industrial switch mode power supply series features an undervoltage alarm that gives a warning in the case of failure. The new S8VM series provide not only a clear indication that a DC output voltage drop has occurred, but also indicates the likely cause – allowing for fast, effective corrective action. The power supplies come in a broad 5 to 24 V voltage range, with output powers between 15 and 150 W. Extensions up to 1500 W will be launched in 2006.



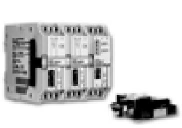
Features at a glance

- Timely, efficient on-site troubleshooting for optimum quality management
- New ultra-compact housing supports cabinet downsizing
- Early-warning system
- Easy installation
- Broad product range of DC output voltages from 5 V up to 24 V and in powers from 15 W to 150 W

Three-phase → 120-960 W → S8PE

DC back-up → S8TS DC battery back-up up to several minutes → S8T-DCBU-01

DC back-up → S8TS buffer block momentary, up to 500 ms → S8T-DCBU-02

S8T-DCBU-01	S8T-DCBU-02	S8PE
		

CD

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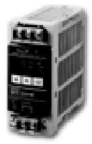
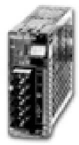
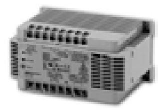
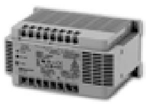
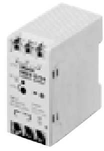
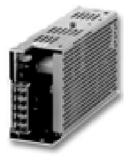
Selection table

	Category	Single phase									
Selection criteria											
	Model	S8VS	S8VM				S8TS			S82K	
	Rated voltage	100 to 240 VAC								100 / 200 VAC or 100 to 240 VAC	
	Voltage	24 V	5 V	12 V	15 V	24 V	5 V	12 V	24 V	5 V	12 V
Power	3 W									■ 0.6 A	■ 0.25 A
	7.5 W									■ 1.5 A	■ 0.6 A
	10 W										
	15 W		■ 3 A	■ 1.3 A	■ 1 A	■ 0.65 A				■ 2.5 A	■ 1.2 A
	25 W						■ 5 A				
	30 W		■ 6 A	■ 2.5 A	■ 2 A	■ 1.3 A		■ 2.5 A		■ 5 A	■ 2.5 A
	50 W		■ 10 A	■ 4.3 A	■ 3.5 A	■ 2.2 A					
	60 W	■ 2.5 A						■ 5 A	■ 2.5 A		
	90 W	■ 3.75 A						■ 7.5 A			
	100 W		■ 20 A	■ 8.5 A	■ 7 A	■ 4.5 A					
	120 W	■ 5 A						■ 10 A	■ 5 A		
	150 W		■ 27 A	■ 12.5 A	■ 10 A	■ 6.5 A					
	180 W	■ 7.5 A							■ 7.5 A		
	240 W	■ 10 A							■ 10 A		
	300 W										
	480 W										
	600 W										
	960 W										
Features	Conforms to EN61000-3-2 A14	■ with PFC	■ with PFC	■ with PFC	■ with PFC	■ with PFC	■ with PFC	■ with PFC	■ with PFC	□	□
	DC back-up						□	□	□		
	Capacitor back-up	□							□		
	Undervoltage alarm	■				■	■	■	■	■	■
	Overvoltage protection	■	■	■	■	■	■	■	■		
	Overload protection	■	■	■	■	■	■	■	■	■	■
	DIN-rail mounting	■	■	■	■	■	■	■	■	■	■
	Screw mounting (with bracket)		■	■	■	■				■	■
	EMI Class B		■	■	■	■	■	■	■	■	■
	UL Class 2	■ only 60 W					■	■	■		
	N+1 redundancy						■	■	■		
	Parallel operation						■	■	■		
	Series operation	■	■	■	■	■	■	■	■		
	Page	B-5	B-32				B-53			B-65	

	Category	Single phase														Three phase
Selection criteria															
	Model	S82K		S82S				S82J				S8PS			S8PE
	Rated voltage	100 / 200 VAC or 100 to 240 VAC		12 - 24 VDC				100 / 200 VAC or 100 to 240 VAC				100 to 240 VAC			400 - 480 VAC or 200 - 230 VAC
	Voltage	15 V	24 V	5 V	12 V	15 v	24 V	5 V	12 V	15 V	24 V	5 V	12 V	24 V	24 V
Power	3 W	■ 0.2 A	■ 0.13 A	■ 0.6 A	■ 0.25 A	■ 0.2 A	■ 0.13 A								
	7.5 W	■ 0.5 A	■ 0.3 A	■ 1.5 A	■ 0.6 A	■ 0.5 A	■ 0.3 A								
	10 W							■ 2 A	■ 1 A	■ 0.7 A	■ 0.5 A				
	15 W		■ 0.6 A												
	25 W							■ 5 A	■ 2.1 A	■ 1.7 A	■ 1.1 A				
	30 W		■ 1.3 A												
	50 W		■ 2.1 A					■ 10 A	■ 4.2 A		■ 2.1 A	■ 10 A	■ 4.2 A	■ 2.1 A	
	60 W														
	90 W		■ 3.75 A												
	100 W		■ 4.2 A					■ 20 A	■ 8.5 A	■ 7 A	■ 4.5 A			■ 4.5 A	
	120 W														■ 5 A
	150 W										■ 6.5 A			■ 6.5 A	
	180 W														
	240 W														■ 10 A
	300 W										■ 14 A			■ 14 A	
	480 W														■ 20 A
	600 W										■ 27 A			■ 27 A	
	960 W														■ 40 A
Features	Conforms to EN61000-3-2 A14	□	□									■ with PFC	■ with PFC	■ with PFC	■
	DC back-up														
	Capacitor back-up		□								□			□	□
	Undervoltage alarm	■	□												
	Overvoltage protection							■ only 100 W			■ only 100 / 300 / 600 W	■	■	■	■ except 40 A
	Overload protection	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	DIN-rail mounting	■	■	■	■	■	■	■	■	■	■ except 300 / 600 W	■	■	■	■ except 40 A
	Screw mounting (with bracket)	■	■					■	■	■	■	■	■	■	■ only 40 A
	EMI Class B	■										■	■	■	
	UL Class 2		■ except dual output					■ except 10 / 25 W	■	■	■ only 50 W				
	N+1 redundancy														
	Parallel operation		■ only 100 W								■ only 300 / 600 W			■ only 300 / 600 W	■
	Series operation		■ only 90 /100 W					■ except 10 / 25 W	■ except 10 / 25 W	■ except 10 / 25 W	■ except 10 / 25 W	■ only 50 W	■ only 50W	■	■
	Page	B-65		CD				CD				CD			B-81

■ Standard □ Available ☐ No / not available

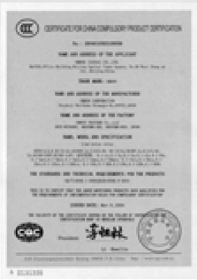
LEADING IN SERVICE

Focussed, progressive, distinctive. Be assured, choose Omron

At Omron we set high standards for ourselves. Our products are known all over the world for their unrivalled quality. But we offer more than just excellent quality. In an environment that places ever greater demands with regard to service, quality and costeffectiveness, other things are important too. Providing a top-quality service is what we do every day, including extra service as standard. This helps to ensure that we can provide tailor-made solutions for applications more effectively and more quickly.

More and more companies are choosing Omron as they seek to work in a partnership that is based on reliability and certainty.

Omron – the reassuring choice.



International standards and approvals

Our products carry all relevant international standards and approvals, including CCC (Chinese Compulsory Certification), which makes exporting your system much easier.

- Reliability, also for your customers
- Maximum flexibility
- Confidence

5-day repair service

More and more people are choosing Omron, as a high degree of reliability is a key feature of its products. You can always rely on Omron. Even if a product unexpectedly malfunctions, our repair team is ready to swing into action.

- Product repaired and returned to you within 5 days, including collection and delivery
- You can track the status of your repair on-line
- Repairs within warranty are completely free-of-charge

For more information please visit the Service & Support section at http://omron-industrial.com

EPLAN for Omron products

The majority of standard Omron products are provided in digital EPLAN format, which means that a few clicks of your mouse are all that is needed to design the right product into your switching panel.

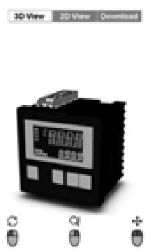
For more information please visit: http://omron-industrial.com/en/eplan/

- Very easy to use
- Always the right product
- Reduced engineering time

Downloadable 2-D and 3-D CAD drawings

Designers of switching panels and machines can download clear 2-D and 3-D CAD drawings for all current products from http://omron-industrial.com/en/2D3D, which can easily be incorporated into your design.

- Large number of formats supported for greater flexibility
- Readily available
- Convenience that saves you time



Switch Mode Power Supply
S8VS

15/30-W Models

Compact, Thin Power Supplies That Mount Just About Anywhere to Contribute to Control Panel Downsizing

- Compact, thin size: 22.5 × 85 × 96.5 mm (W × H × D).
- Three mounting directions (standard, horizontal, facing horizontal).
- Mounting directly onto the panel is possible.
- Safety standards: UL508/60950-1/1604, CSA C22.2 No. 14/60950-1/213, EN50178 (= VDE0160), EN60950-1 (= VDE0805).

60/90/120/180/240-W Models

New Models with Total Run Time Monitor in Addition to Models with Maintenance Forecast Monitor

- Compact size: 40 × 95 mm (W × H) (60-W Models).
- Status displayed on 3-digit, 7-segment display.
- Safety standards: UL508/60950, CSA C22.2 No. 14/60950, EN50178 (= VDE0160), EN60950 (= VDE0805).

Features Common to All Models

- Mount to DIN-rail.
- Lead-free solder.

Model Number Structure

■ Model Number Legend

S8VS- □□□□□□
1 2 3

1. **Power Ratings**
   015: 15 W
   030: 30 W
   060: 60 W
   090: 90 W
   120: 120 W
   180: 180 W
   240: 240 W
2. **Output voltage**
   05: 5 V
   12: 12 V
   24: 24 V
3. **Configuration**

15-W, 30-W Models
None: Standard

60-W Models
None: Standard
A: With maintenance forecast monitor
B: With total run time monitor

90-W, 120-W, 180-W, 240-W Models
None: Standard
A: With maintenance forecast monitor and undervoltage alarm (transistor (sinking))
B: With total run time monitor and undervoltage alarm (transistor (sinking))
AP: With maintenance forecast monitor and undervoltage alarm (transistor (sourcing))
BP: With total run time monitor and undervoltage alarm (transistor (sourcing))

Ordering Information

Power ratings	Input Voltage	Output voltage	Output current	Alarm output	Model number
15 W	100 to 240 VAC	5 V	2.0 A	---	S8VS-01505 (See note 1.)
		12 V	1.2 A		S8VS-01512
		24 V	0.65 A		S8VS-01524
30 W		5 V	4.0 A	---	S8VS-03005 (See note 2.)
		12 V	2.5 A		S8VS-03012
		24 V	1.3 A		S8VS-03024
60 W		24 V	2.5 A	---	S8VS-06024
					S8VS-06024A
					S8VS-06024B
90 W			3.75 A	---	S8VS-09024
				Sinking	S8VS-09024A
				Sourcing	S8VS-09024AP
				Sinking	S8VS-09024B
				Sourcing	S8VS-09024BP
120 W			5 A	---	S8VS-12024
				Sinking	S8VS-12024A
				Sourcing	S8VS-12024AP
				Sinking	S8VS-12024B
				Sourcing	S8VS-12024BP
180 W			7.5 A	---	S8VS-18024
				Sinking	S8VS-18024A
				Sourcing	S8VS-18024AP
				Sinking	S8VS-18024B
				Sourcing	S8VS-18024BP
240 W			10 A	---	S8VS-24024
				Sinking	S8VS-24024A
				Sourcing	S8VS-24024AP
				Sinking	S8VS-24024B
				Sourcing	S8VS-24024BP

Note: 1. The output capacity of the S8VS-01505 is 10 W.
2. The output capacity of the S8VS-03005 is 20 W.

Specifications

■ Ratings/Characteristics

Item		Power ratings / Type	15 W Standard	30 W Standard
Efficiency (typical)		5-V models	72% min. (76% typ.)	70% min. (76% typ.)
		12-V models	74% min. (79% typ.)	76% min. (83% typ.)
		24-V models	77% min. (81% typ.)	80% min. (85% typ.)
Input	Voltage		100 to 240 VAC (85 to 264 VAC)	
	Frequency		50/60 Hz (47 to 450 Hz)	
	Current	100 V input	0.45 A max.	0.9 A max.
		200 V input	0.25 A max.	0.6 A max.
		230 V input	5 V: (0.14 A typ.), 12 V/24 V (0.19 A typ.)	5 V: (0.27 A typ.), 12 V/24 V (0.37 A typ.)
	Power factor		---	
	Harmonic current emissions		Conforms to EN61000-3-2	
	Leakage current	100 V input	0.5 mA max.	
		200 V input	1.0 mA max.	
		230 V input	5 V/12 V/24 V: (0.30 mA typ.)	5 V/12 V/24 V:(0.32 mA typ.)
	Inrush current (See note 1.)	100 V input	25 A max. (20 A typ.) (for a cold start at 25°C)	
		200 V input	50 A max. (40 A typ.) (for a cold start at 25°C)	
		230 V input	5 V/12 V/24 V: (29 A typ.) (See note 6.)	5 V/12 V/24 V: (40 A typ.) (See note 6.)
Output	Voltage adjustment range (See note 2.)		–10% to 15% (with V.ADJ) (guaranteed)	
	Ripple		2.0% (p-p) max. (at rated input/output voltage)	
		f=20MHz measuring	5 V: (0.70%(p-p) typ.), 12 V:(0.48%(p-p) typ.), 24 V:(0.25%(p-p) typ.)	5 V: (0.70%(p-p) typ.), 12 V:(0.52%(p-p) typ.), 24 V:(0.19%(p-p) typ.)
		f=100MHz measuring	5 V: (0.86%(p-p) typ.), 12 V:(0.56%(p-p) typ.), 24 V:(0.32%(p-p) typ.)	5 V: (0.80%(p-p) typ.), 12 V:(0.58%(p-p) typ.), 24 V:(0.21%(p-p) typ.)
	Input variation influence		0.5% max. (at 85 to 264 VAC input, 100% load)	
	Load variation influence (rated input voltage)		2.0% max. (5 V), 1.5% max. (12 V, 24 V), (with rated input, 0 to 100% load)	
	Temperature variation influence		0.05%/°C max.	
	Start up time (See note 1 and 7.)		100 ms max. (at rated input/output voltage)	1,000 ms max. (at rated input/output voltage)
			5 V: (6 ms typ.), 12 V: (12 ms typ.), 24 V: (18 ms typ.)	5 V/12 V/24 V: (240 ms typ.)
	Hold time (See note 1.)		20 ms min. (at rated input/output voltage)	
		at 100% load	5 V: (328 ms typ.), 12V: (251 ms typ.), 24 V: (243 ms typ.)	5 V: (299 ms typ.), 12 V: (217 ms typ.), 24 V: (210 ms typ.)
Additional functions	Overload protection (See note 1.)		105% to 160% of rated load current, voltage drop, automatic reset	105% to 160% of rated load current, voltage drop, intermittent operation, automatic reset
	Overvoltage protection (See note 1.)		Yes (a zener diode clamp) (See note 3.)	Yes (See note 4.)
	Output voltage indication		No	
	Output current indication		No	
	Peak-hold current indication		No	
	Maintenance forecast monitor indication		No	
	Maintenance forecast monitor output		No	
	Total run time monitor indication		No	
	Total run time monitor output		No	
	Undervoltage alarm indication		Yes (color: red)	
	Undervoltage alarm output		No	
	Parallel operation		No	
	Series operation		Models with 24-V output: Possible for up to 2 Power Supplies (with external diode) Models with 5- or 12-V output: Not possible	
Other	Operating ambient temperature		Refer to the derating curve in *Engineering Data*. (with no icing or condensation)	
	Storage temperature		–25 to 65°C	
	Operating ambient humidity		25% to 85% (Storage humidity: 25% to 90%)	
	Dielectric strength		3.0 kVAC for 1 min. (between all inputs and outputs; detection current: 20 mA) 2.0 kVAC for 1 min. (between all inputs and PE terminals; detection current: 20 mA) 1.0 kVAC for 1 min. (between all outputs and PE terminals; detection current: 20 mA)	
	Insulation resistance		100 MΩ min. (between all outputs and all inputs/ PE terminals) at 500 VDC	
	Vibration resistance		10 to 55 Hz, 0.375-mm single amplitude for 2 h each in X, Y, and Z directions	
			10 to 150 Hz, 0.35-mm single amplitude (5 G max.) for 80 min. each in X, Y, and Z directions	
	Shock resistance		150 m/s^2, 3 times each in ±X, ±Y, and ±Z directions	
	Output indicator		Yes (color: green)	
	EMI	Conducted Emissions	Conforms to EN61204-3 EN55011 Class B and based on FCC Class A	
		Radiated Emissions	Conforms to EN61204-3 EN55011 Class B	
	EMS		Conforms to EN61204-3 high severity levels	
	Approved standards		UL: UL508 (Listing, Class 2: Per UL1310), UL60950-1, UL1604 (Class I/Division2) cUL: CSA C22.2 No.14 (Class 2), No.60950-1, No.213 (Class I/Division2) EN/VDE: EN50178 (=VDE0160), EN60950-1 (=VDE0805) SELV (EN60950/EN50178/UL60950-1) According to VDE0106/P100, IP20	
	Weight		160 g max.	180 g max.

Note:
1. Refer to the *Engineering Data* section on page B-21 for details.
2. If the V.ADJ adjuster is turned, the voltage will increase by more than +15% of the voltage adjustment range. When adjusting the output voltage, confirm the actual output voltage from the Power Supply and be sure that the load is not damaged.
3. The overvoltage protection of the S8VS-015□□ uses a zener diode clamp. If the internal feedback circuit is destroyed by any chance, the load may be destroyed by the clamped output voltage (approx. 140% to 190% of the rated output voltage).
4. To reset the protection, turn OFF the power supply for three minutes or longer and then turn the power supply back ON.
5. The typical values indicate the values for an input condition of 230 VAC. All items are measured at a frequency of 50 Hz.
6. The inrush current circuits do not differ for voltage specifications. Therefore, the typical values are the data values for 24-V models.
7. The circuit forms are different, so the start up time is shorter only when using a 15-W power rating.

Specifications

■ Ratings/Characteristics

Item		Power ratings / Type	60 W Standard	60 W Maintenance forecast monitor	60 W Total run time monitor	90 W Standard	90 W Maintenance forecast monitor	90 W Total run time monitor
Efficiency (typical)			78% min. (86% typ.)			80% min. (87% typ.)		
Input	Voltage		100 to 240 VAC (85 to 264 VAC)					
	Frequency		50/60 Hz (47 to 450 Hz)					
	Current	100 V input	1.7 A max.			2.3 A max.		
		200 V input	1.0 A max.			1.4 A max.		
		230 V input	(0.7 A typ.)			(0.9 A typ.)		
	Power factor		---					
	Harmonic current emissions		Conforms to EN61000-3-2					
	Leakage current	100 V input	0.5 mA max.					
		200 V input	1.0 mA max.					
		230 V input	(0.40 mA typ.)			(0.35 mA typ.)		
	Inrush current (See note 1.)	100 V input	25 A max. (for a cold start at 25°C)					
		200 V input	50 A max. (for a cold start at 25°C)					
		230 V input	(47 A typ.)			(38 A typ.)		
Output	Voltage adjustment range (See note 2.)		−10% to 15% (with V.ADJ) (guaranteed)					
	Ripple		2.0% (p-p) max. (at rated input/output voltage)					
		f=20MHz measuring	(0.29% (p-p) typ.)			(0.38% (p-p) typ.)		
		f=100MHz measuring	(0.32% (p-p) typ.)			(0.42% (p-p) typ.)		
	Input variation influence		0.5% max. (at 85 to 264 VAC input, 100% load)					
	Load variation influence (rated input voltage)		1.5% max. (with rated input, 0 to 100% load)					
	Temperature variation influence		0.05%/°C max.					
	Start up time (See note 1.)		1,000 ms max. (at rated input/output voltage)					
			(270 ms typ.)			(260 ms typ.)		
	Hold time (See note 1.)		20 ms min. (at rated input/output voltage)					
		at 100% load	(220 ms typ.)			(190 ms typ.)		
Additional functions	Overload protection (See note 1.)		105% to 160% of rated load current, voltage drop, intermittent, automatic reset					
	Overvoltage protection (See notes 1 and 3.)		Yes					
	Output voltage indication (See note 4.)		No	Yes (selectable) (See note 5.)		No	Yes (selectable) (See note 5.)	
	Output current indication (See note 4.)		No	Yes (selectable) (See note 6.)		No	Yes (selectable) (See note 6.)	
	Peak-hold current indication (See note 4.)		No	Yes (selectable) (See note 7.)		No	Yes (selectable) (See note 7.)	
	Maintenance forecast monitor indication (See note 4.)		No	Yes (selectable)	No	No	Yes (selectable)	No
	Maintenance forecast monitor output		No				Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)	No
	Total run time monitor indication (See note 4.)		No		Yes (selectable)	No		Yes (selectable)
	Total run time monitor output		No					Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)
	Undervoltage alarm indication (See note 4.)		No	Yes (selectable)		No	Yes (selectable)	
	Undervoltage alarm output terminals		No				Yes (open collector output) 30 VDC max., 50 mA max. (See note 8.)	
	Parallel operation		No					
	Series operation		Yes for up to 2 Power Supplies (with external diode)					
Other	Operating ambient temperature		Refer to the derating curve in *Engineering Data*. (with no icing or condensation)					
	Storage temperature		−25 to 65°C					
	Operating ambient humidity		25% to 85% (Storage humidity: 25% to 90%)					
	Dielectric strength		3.0 kVAC for 1 min. (between all inputs and outputs/ alarm outputs; detection current: 20 mA) 2.0 kVAC for 1 min. (between all inputs and PE terminals; detection current: 20 mA) 1.0 kVAC for 1 min. (between all outputs/ alarm outputs and PE terminals; detection current: 20 mA) 500 VAC for 1 min. (between all outputs and alarm outputs; detection current: 20 mA)					
	Insulation resistance		100 MΩ min. (between all outputs/ alarm outputs and all inputs/ PE terminals) at 500 VDC					
	Vibration resistance		10 to 55 Hz, 0.375-mm single amplitude for 2 h each in X, Y, and Z directions					
			10 to 150Hz, 0.35-mm single amplitude (5 G max.) for 80 min each in-X, Y, and Z directions					
	Shock resistance		150 m/s², 3 times each in ±X, ±Y, and ±Z directions					
	Output indicator		Yes (color: green)					
	EMI	Conducted Emissions	Conforms to EN61204-3 EN55011 Class A and based on FCC Class A Conforms to EN61204-3 EN55011 Class B (See note 9.)					
		Radiated Emissions	Conforms to EN61204-3 EN55011 Class A Conforms to EN61204-3 EN55011 Class B (See note 9.)					
	EMS		Conforms to EN61204-3 high severity levels					
	Approved standards		UL: UL508 (Listing, Class 2: Per UL1310), UL60950 cUL: CSA C22.2 No.14 (Class 2), No.60950 EN/VDE: EN50178 (=VDE0160), EN60950 (=VDE0805) SELV (EN60950/EN50178/UL60950-1) According to VDE0106/P100, IP20			UL: UL508 (Listing), UL60950 cUL: CSA C22.2 No.14, No.60950 EN/VDE: EN50178 (=VDE0160), EN60950 (=VDE0805) SELV (EN60950/EN50178/UL60950-1) According to VDE0106/P100, IP20		
	Weight		330 g max.			490 g max.		

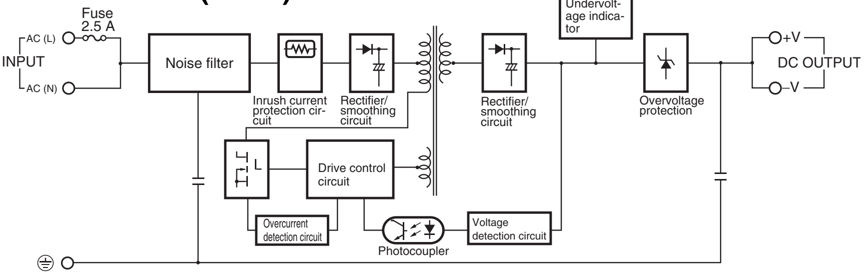
Note:
1. Refer to the *Engineering Data* section on page B-21 for details.
2. If the V.ADJ adjuster is turned, the voltage will increase by more than +15% of the voltage adjustment range (by more than +10% for 240-W models). When adjusting the output voltage, confirm the actual output voltage from the Power Supply and be sure that the load is not damaged.
3. To reset the protection, turn OFF the power supply for three minutes or longer and then turn the power supply back ON.
4. Displayed on 7-segment LED. (character height: 8 mm)
5. Resolution of output voltage indication: 0.1 V, Precision of output voltage indication: ±2% (percentage of output voltage value, ±1 digit)
6. Resolution of output current indication: 0.1 A; Precision of output current indication: ±5% F.S. ±1 digit max. (specified by rated output voltage)
7. Resolution of peak-hold current indication: 0.1 A; Precision of peak-hold current indication: ±5% F.S. ±1 digit max. (specified by rated output voltage); Signal width required for peak-hold current: 20 ms
8. A Type and B Type: Sinking, AP Type and P Type: Sourcing
9. To ensure the emission rating, a ferrite ring core should be used in all cabling (TDK HF60T, HF70RH or equivalent model).
10. The typical values indicate the values for an input condition of 230 VAC. All items are measured at a frequency of 50 Hz.

Item		Power ratings / Type	120 W Standard	120 W Maintenance forecast monitor	120 W Total run time monitor	180 W Standard	180 W Maintenance forecast monitor	180 W Total run time monitor	240 W Standard	240 W Maintenance forecast monitor	240 W Total run time monitor
Efficiency (typical)			80% min. (87% typ.)			80% min. (88% typ.)			80% min. (86% typ.)		
Input	Voltage		100 to 240 VAC (85 to 264 VAC)								
	Frequency		50/60 Hz (47 to 63 Hz)								
	Current	100 V input	1.9 A max.			2.9 A max.			3.8 A max.		
		200 V input	1.1 A max.			1.6 A max.			2.0 A max.		
		230 V input	(0.6 A typ.)			(0.9 A typ.)			(1.2 A typ.)		
	Power factor		0.95 min.								
	Harmonic current emissions		Conforms to EN61000-3-2								
	Leakage current	100 V input	0.5 mA max.								
		200 V input	1.0 mA max.								
		230 V input	(0.43 mA typ.)			(0.45 mA typ.)			(0.45 mA typ.)		
	Inrush current (See note 1.)	100 V input	25 A max. (for a cold start at 25°C)								
		200 V input	50 A max. (for a cold start at 25°C)								
		230 V input	(41 mA typ.)			(34 mA typ.)			(39 mA typ.)		
Output	Voltage adjustment range (See note 2.)		–10% to 15% (with V.ADJ) (guaranteed)						±10% (with V.ADJ) (guaranteed)		
	Ripple		2.0% (p-p) max. (at rated input/output voltage)								
		f=20MHz measuring	(0.66%(p-p) typ.)			(0.45%(p-p) typ.)			(0.13%(p-p) typ.)		
		f=100MHz measuring	(0.67%(p-p) typ.)			(0.52%(p-p) typ.)			(0.21%(p-p) typ.)		
	Input variation influence		0.5% max. (at 85 to 264 VAC input, 100% load)								
	Load variation influence (rated input voltage)		1.5% max. (with rated input, 0 to 100% load)								
	Temperature variation influence		0.05%/°C max.								
	Start up time (See note 1.)		1,000 ms max. (at rated input/output voltage)								
			(380 ms typ.)			(530 ms typ.)			(780 ms typ.)		
	Hold time (See note 1.)		20 ms min. (at rated input/output voltage)								
		at 100% load	(60 ms typ.)			(60 ms typ.)			(30 ms typ.)		
Additional functions	Overload protection (See note 1.)		105% to 160% of rated load current, voltage drop, intermittent, automatic reset							105% to 160% of rated load current, voltage drop, automatic reset	
	Overvoltage protection (See notes 1 and 3.)		Yes								
	Output voltage indication (See note 4.)		No	Yes (selectable) (See note 5.)		No	Yes (selectable) (See note 5.)		No	Yes (selectable) (See note 5.)	
	Output current indication (See note 4.)		No	Yes (selectable) (See note 6.)		No	Yes (selectable) (See note 6.)		No	Yes (selectable) (See note 6.)	
	Peak-hold current indication (See note 4.)		No	Yes (selectable) (See note 7.)		No	Yes (selectable) (See note 7.)		No	Yes (selectable) (See note 7.)	
	Maintenance forecast monitor indication (See note 4.)		No	Yes (selectable)	No	No	Yes (selectable)	No	No	Yes (selectable)	No
	Maintenance forecast monitor output		No	Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)	No	No	Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)	No	No	Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)	No
	Total run time monitor indication (See note 4.)		No		Yes (selectable)	No		Yes (selectable)	No		Yes (selectable)
	Total run time monitor output		No		Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)	No		Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)	No		Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)
	Undervoltage alarm indication (See note 4.)		No	Yes (selectable)		No	Yes (selectable)		No	Yes (selectable)	
	Undervoltage alarm output terminals		No	Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)		No	Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)		No	Yes (open collector output), 30 VDC max., 50 mA max. (See note 8.)	
	Parallel operation		No								
	Series operation		Yes for up to 2 Power Supplies (with external diode)								
Other	Operating ambient temperature		Refer to the derating curve in *Engineering Data.* (with no icing or condensation)								
	Storage temperature		–25 to 65°C								
	Operating ambient humidity		25% to 85% (Storage humidity: 25% to 90%)								
	Dielectric strength		3.0 kVAC for 1 min. (between all inputs and outputs/ alarm outputs; detection current: 20 mA) 2.0 kVAC for 1 min. (between all inputs and PE terminals; detection current: 20 mA) 1.0 kVAC for 1 min. (between all outputs/ alarm outputs and PE terminals; detection current: 20 mA) 500 VAC for 1 min. (between all outputs and alarm outputs; detection current: 20 mA)								
	Insulation resistance		100 MΩ min. (between all outputs/ alarm outputs and all inputs/ PE terminals) at 500 VDC								
	Vibration resistance		10 to 55 Hz, 0.375-mm single amplitude for 2 h each in X, Y, and Z directions								
			10 to 150Hz, 0.35-mm single amplitude (5 G max.) for 80 min each in-X, Y, and Z directions								
	Shock resistance		150 m/s², 3 times each in ±X, ±Y, and ±Z directions								
	Output indicator		Yes (color: green)								
	EMI	Conducted Emissions	Conforms to EN61204-3 EN55011 Class A and based on FCC Class A Conforms to EN61204-3 EN55011 Class B (See note 9.)								
		Radiated Emissions	Conforms to EN61204-3 EN55011 Class A Conforms to EN61204-3 EN55011 Class B (See note 9.)								
	EMS		Conforms to EN61204-3 high severity levels								
	Approved standards		UL: UL508 (Listing), UL60950 cUL: CSA C22.2 No.14, No.60950 EN/VDE: EN50178 (=VDE0160), EN60950 (=VDE0805) SELV (EN60950/UL50178/UL60950-1) According to VDE0106/P100, IP20								
	Weight		550 g max.			850 g max.			1,150 g max.		

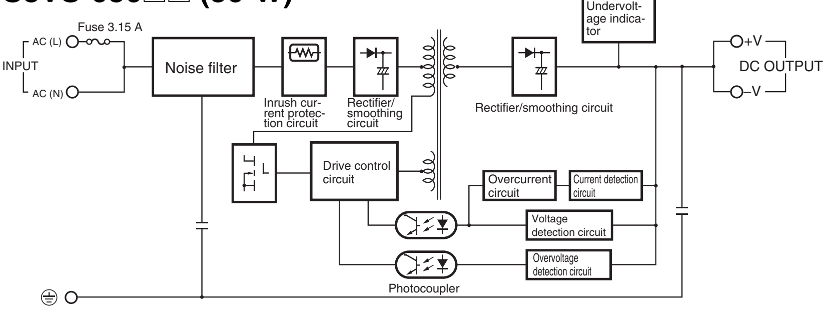
Connections

■ Block Diagrams

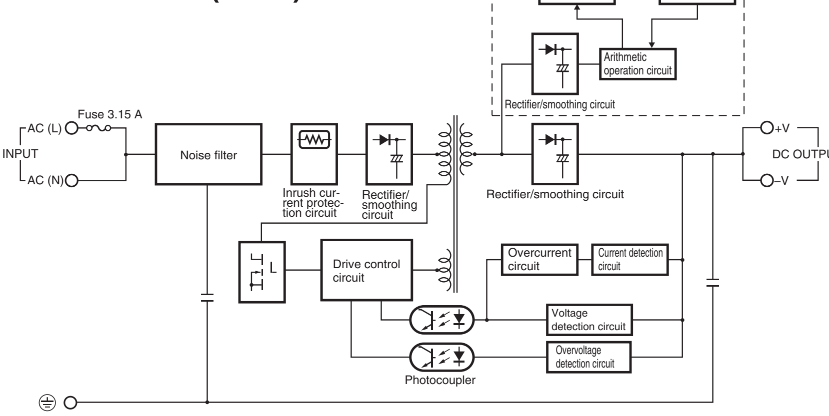
S8VS-015□□ (15-W)



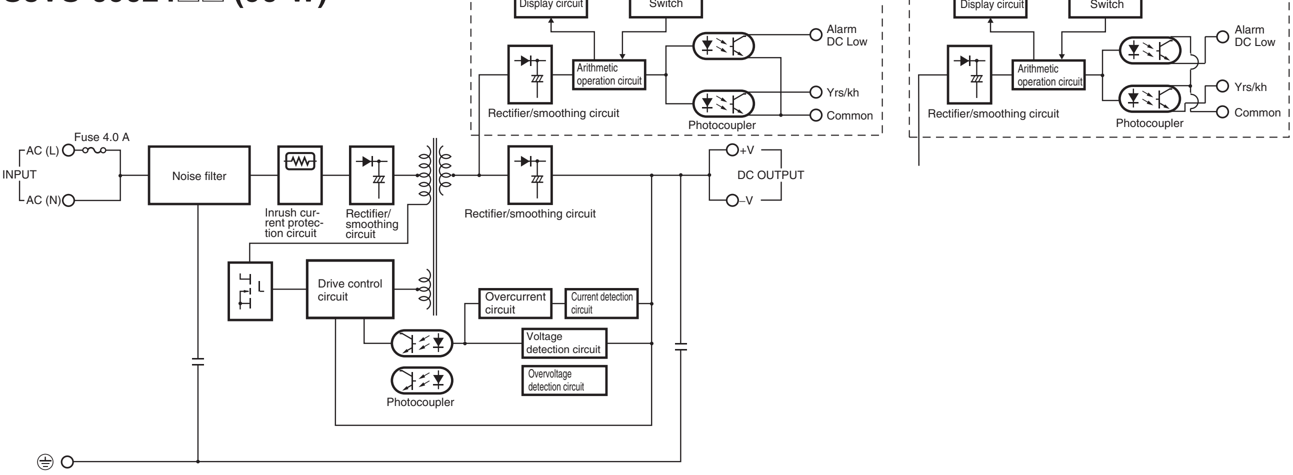
S8VS-030□□ (30-W)



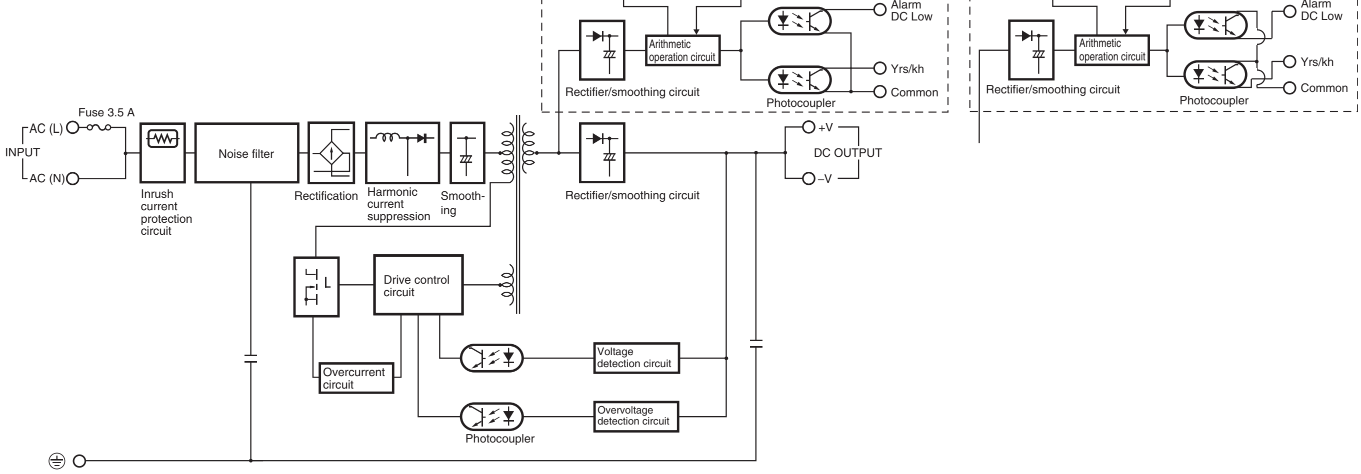
S8VS-06024 (60-W)
S8VS-06024□ (60-W)



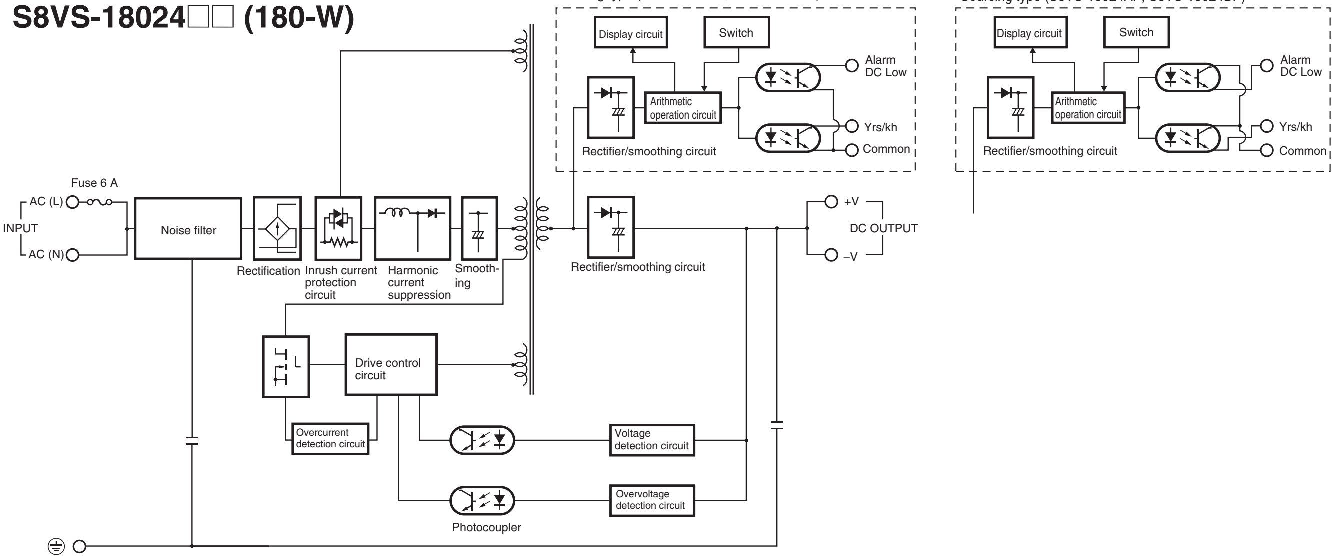
S8VS-09024 (90-W)
S8VS-09024□□ (90-W)



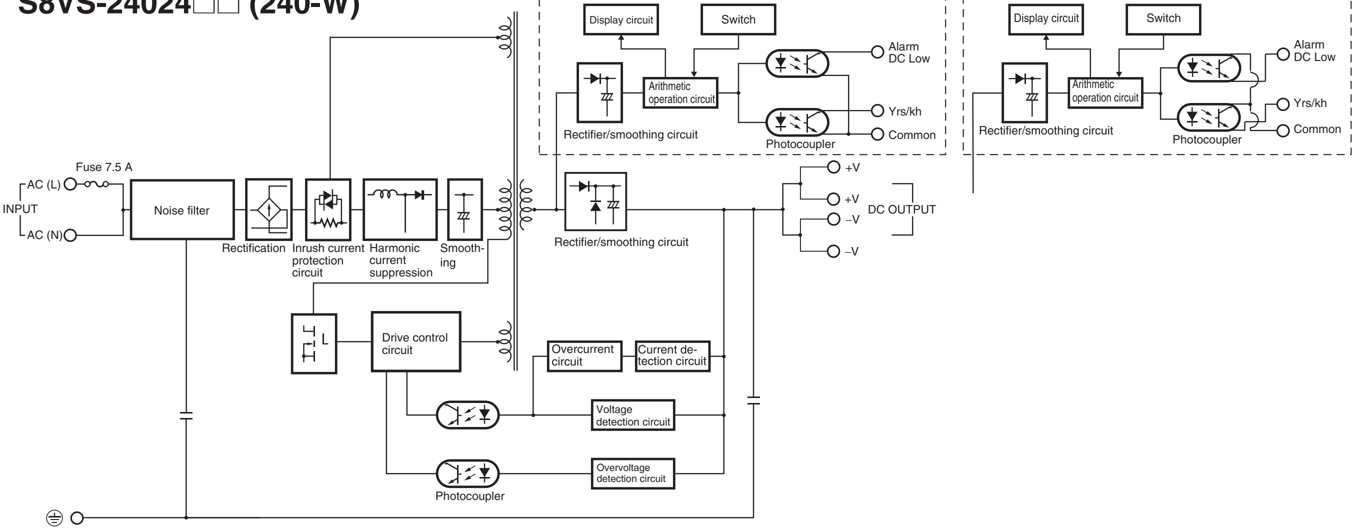
S8VS-12024 (120-W)
S8VS-12024□□ (120-W)



S8VS-18024 (180-W)
S8VS-18024□□ (180-W)



S8VS-24024 (240-W)
S8VS-24024□□ (240-W)

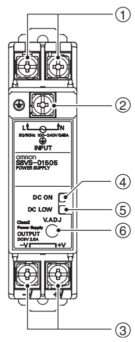


Construction and Nomenclature (15-W, 30-W Models)

■ Nomenclature

15-W, 30-W Models

S8VS-015□□/S8VS-030□□



No.	Name	Function
1	AC Input terminals (L), (N)	Connect the input lines to these terminals. (See note 1.)
2	Protective Earth terminal (PE)	Connect the ground line to this terminal. (See note 2.)
3	DC Output terminals (−V), (+V)	Connect the load lines to these terminals.
4	Output indicator (DC ON: Green)	Lights while a direct current (DC) output is ON.
5	Undervoltage indicator (DC LOW: Red)	Lights when a drop is detected in the output voltage.
6	Output voltage adjuster (V.ADJ)	Use to adjust the voltage.

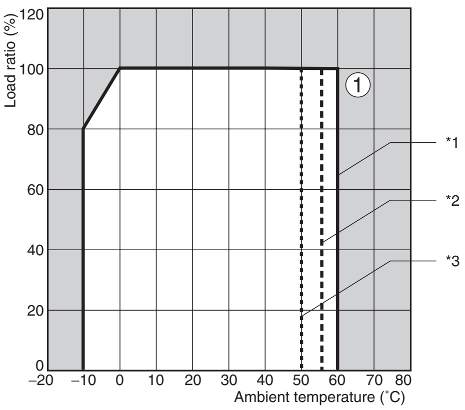
Note: 1. The fuse is located on the (L) side. It is NOT user-replaceable.
2. This is the protective earth terminal specified in the safety standards. Always ground this terminal.

Note: The S8VS-01505 is shown above.

Engineering Data (15-W, 30-W Models)

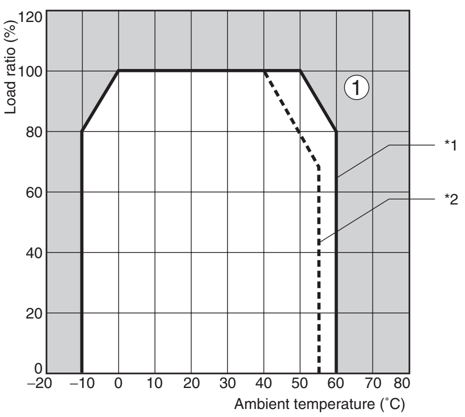
■ Derating Curve

S8VS-015□□



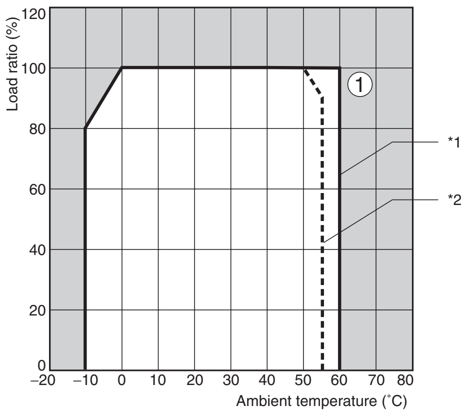
1* Standard mounting
2* Horizontal mounting
3* Mounting facing horizontally

S8VS-03005/S8VS-03012



1* Standard mounting
2* Horizontal mounting/mounting facing horizontally

S8VS-03024

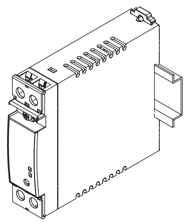


1* Standard mounting
2* Horizontal mounting/mounting facing horizontally

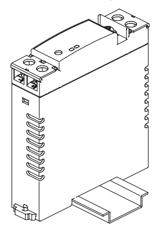
Note: 1. Internal parts may occasionally deteriorate or be damaged. Do not use the Power Supply in areas outside the derating curve (i.e., the area shown by shading ① in the above graph).
2. If there is a derating problem, use forced air-cooling.
3. Provide a space of at least 20 mm when using standard mounting and horizontal mounting. If 20 mm is not available, make sure that the space is at least 10 mm. In this case, reduce the corresponding derating curve by 5°C.
4. When mounting Power Supplies facing horizontally in a vertical stack, provide a space of at least 75 mm in between the Power Supplies. If 75 mm is not available, reduce the corresponding derating curve by 1°C for every 5-mm reduction in space. A space of at least 25 mm, however, must be provided. In this case, reduce the corresponding derating curve by 10°C.

■ Mounting

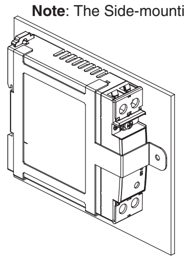
Standard mounting with DIN-rail



Horizontal mounting with DIN-rail

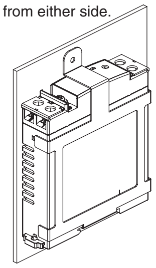


Standard mounting with S82Y-VS30P

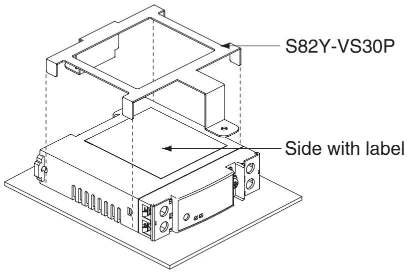


Horizontal mounting with S82Y-VS30P

Note: The Side-mounting Bracket can be mounted from either side.



Mounting facing horizontally with S82Y-VS30P



Note: 1. Improper mounting will interfere with heat dissipation and may occasionally result in deterioration or damage of internal parts. Use the product within the derating curve for the mounting direction that is used. Do not use the Power Supply mounted in any way not shown above.

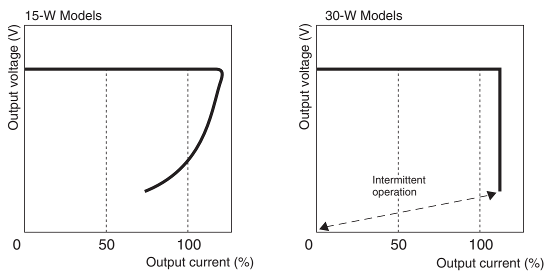
2. Use a mounting bracket (S82Y-VS30P, sold separately) when the Product is mounted facing horizontally.

3. Heat dissipation will be adversely affected. When the Product is mounted facing horizontally, always place the side with the label facing upward.

4. Use PFP-M End Plates on the top and bottom of the Power Supply when mounting facing horizontally on a DIN-rail.

■ Overload Protection

The Power Supply is provided with an overload protection function that protects the power supply from possible damage by overcurrent. When the output current rises above 105% min. of the rated current, the protection function is triggered, decreasing the output voltage. When the output current falls within the rated range, the overload protection function is automatically cleared.



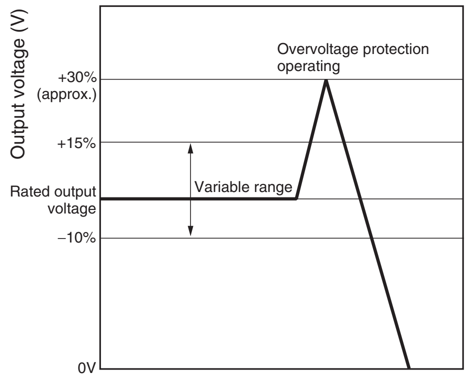
The values shown in the above diagrams are for reference only.

Note: 1. Internal parts may occasionally deteriorate or be damaged if a short-circuited or overcurrent state continues during operation.

2. Internal parts may possibly deteriorate or be damaged if the Power Supply is used for applications with frequent inrush current or overloading at the load end. Do not use the Power Supply for such applications.

■ Overvoltage Protection

Consider the possibility of an overvoltage and design the system so that the load will not be subjected to an excessive voltage even if the feedback circuit in the Power Supply fails. When an excessive voltage that is approximately 130% of the rated voltage or more is output, the output voltage is shut OFF. Reset the Power Supply by turning it OFF for at least three minutes and then turning it back ON again.

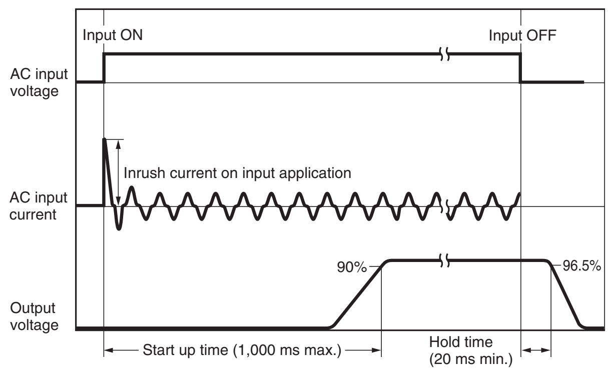


The values shown in the above diagram is for reference only.

Note: 1. Do not turn ON the power again until the cause of the overvoltage has been removed.

2. The overvoltage protection of the S8VS-015□□ uses a zener diode clamp. The output voltage will be clamped at approx. 140% or higher of the rated output voltage (approx. 140% to 190%). <u>If the internal feedback circuit is destroyed by any chance, the load may be destroyed by the clamped output voltage (approx. 140% to 190% of the rated output voltage).</u> The power Supply will not restart if the output is turned OFF by the overvoltage protection operation. If this occurs, replace the Power Supply.

■ Inrush Current, Start Up Time, Output Hold Time



■ Undervoltage Alarm Indication

LED (DC LOW red) lights to warn of output voltage drop.

Detection voltage is set to approx. 80% (75 to 90%) of the rated output voltage.

Note: This function monitors the voltage at the power supply output terminals. To check actual voltage, measure voltage on the load side.

■ Reference Values

Item	Value
Reliability (MTBF)	15 W: 610,800 hrs, 30 W: 656,400 hrs
Life expectancy	10 yrs. min.

Note: Refer to page B-19 for definitions of MTBF and life expectancy.

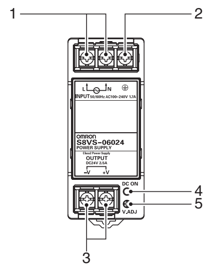
Construction and Nomenclature (60-W, 90-W, 120-W, 180-W, and 240-W Models)

■ Nomenclature

60-W Models

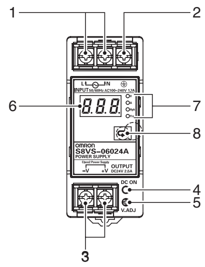
Standard Model

S8VS-06024



Models with Display Monitor

S8VS-06024□

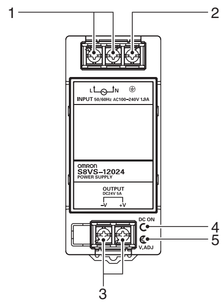


Note: The S8VS-06024A is shown above.

90-W/120-W Models

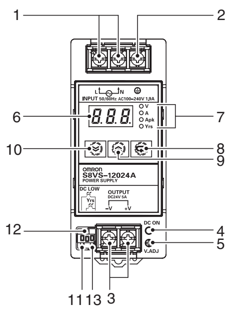
Standard Models

S8VS-09024/S8VS-12024



Models with Display Monitor

S8VS-09024□□/S8VS-12024□□

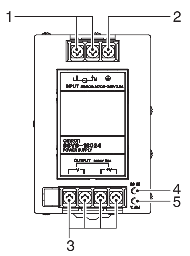


Note: The S8VS-12024A is shown above.

180-W Models

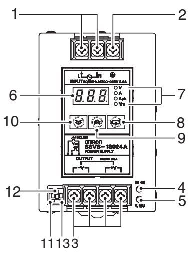
Standard Model

S8VS-18024



Models with Display Monitor

S8VS-18024□□

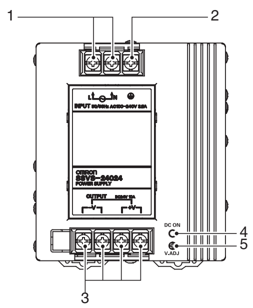


Note: The S8VS-18024A is shown above.

240-W Models

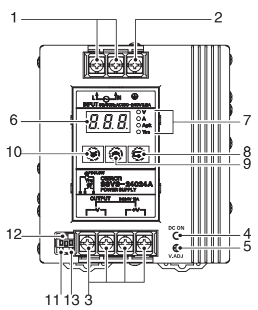
Standard Model

S8VS-24024



Models with Display Monitor

S8VS-24024□□



Note: The S8VS-24024A is shown above.

No.	Name		Function
1	AC Input terminals (L), (N)		Connect the input lines to these terminals. (See note 1.)
2	Protective Earth terminal (PE)		Connect the ground line to this terminal. (See note 2.)
3	DC Output terminals (–V), (+V)		Connect the load lines to these terminals.
4	Output indicator (DC ON: Green)		Lights while a direct current (DC) output is ON.
5	Output voltage adjuster (V.ADJ)		Use to adjust the voltage.
6	Main display (Red) (See note 3.)		Indicates the measurement or set value.
7	Operation indicator (Orange) (See note 3.)	V	Lights up when the output voltage is indicated. Blinks during setup of undervoltage alarm value.
		A	Lights up during indication of output current.
		Apk	Lights up during indication of peak hold current.
		Yrs	Lights up during indication of maintenance forecast monitor. Blinks during setup of maintenance forecast monitor setting. (S8VS-□□□24A□)
		kh	Lights up during indication of total run time monitor. Blinks during setup of total run time monitor. (S8VS-□□□24B□)
8	Mode Key (See note 3.)		Use the Mode Key to change the indicated parameter or reset the peak hold current value.
9	Up Key (See note 4.)		Use the Up Key to change to the setting mode or to increase the set value.
10	Down Key (See note 4.)		Use the Down Key to change to the setting mode or to decrease the set value.
11	Alarm outputs (See notes 4 and 5.)	Undervoltage output terminal (DC Low)	Output when a drop is detected in the output voltage (voltage drop = transistor OFF).
12		Maintenance Forecast output terminal (Yrs) (See note 6.)	Output when the set value for maintenance is reached (transistor OFF).
		Total run time output terminal (kh) (See note 7.)	Output when the set value for total run time is reached (transistor OFF).
13		Common terminal	Common terminal (emitter) for terminals 11 and 12.

Note: 1. The fuse is located on the (L) side. It is NOT user-replaceable.

2. This is the protective earth terminal specified in the safety standards. Always ground this terminal.

3. S8VS-□□□24□□ only.

4. S8VS-□□□24□□ only (excluding S8VS-06024□).

5. Both sinking and sourcing outputs are available.

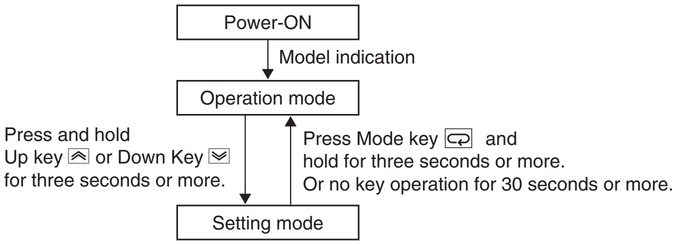
6. S8VS-□□□24A□ only (excluding S8VS-06024A).

7. S8VS-□□□24B□ only (excluding S8VS-06024B).

Engineering Data (S8VS-□□□24□□ Only)

■ Mode Change

S8VS-□□□24A□ Models (with display monitor) can display the output voltage, output current, peak hold current, or maintenance forecast monitor time. S8VS-□□□24B□ Models (with display monitor) can display the output voltage, output current, peak hold current, or total run time.

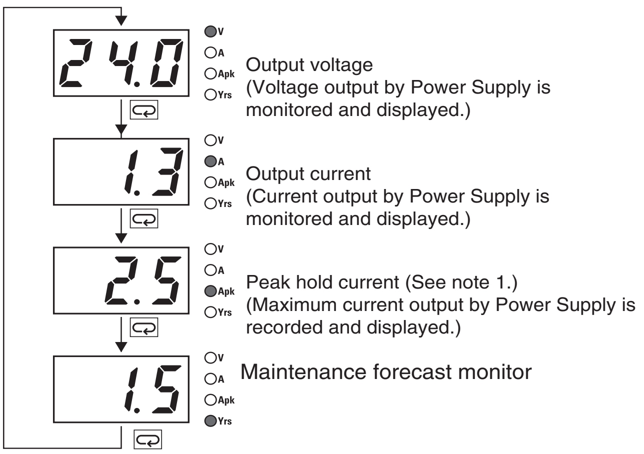


Note: No setting mode is provided for the S8VS-06024□.

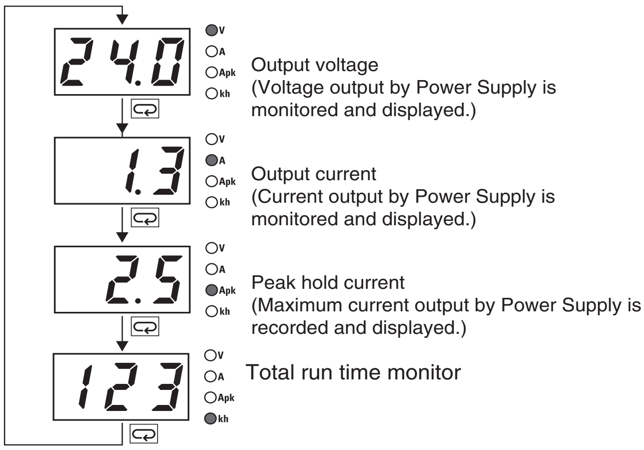
■ Operation Mode

Various states of the Power Supply are indicated.

Models with Maintenance Forecast Monitor (S8VS-□□□24A□)



Models with Total Run Time Monitor (S8VS-□□□24B□)



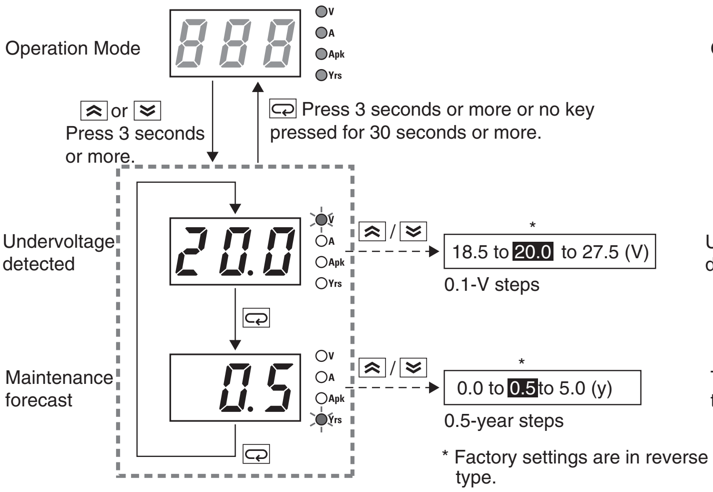
Note: 1. The peak hold current starts measuring the current 3 seconds after the Power Supply is started. Inrush current is thus not measured.

2. For the factory setting, the output voltage will be displayed when the power supply is first turned ON. Thereafter, the output voltage will be indicated in the same display when shutting down.

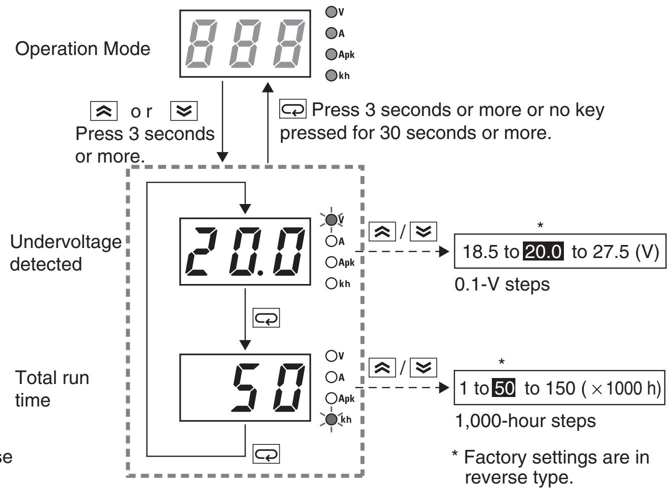
■ Setting Mode (Except for S8VS-06024□)

Set various parameters of the Power Supply.

Models with Maintenance Forecast Monitor (S8VS-□□□24A□)



Models with Total Run Time Monitor (S8VS-□□□24B□)

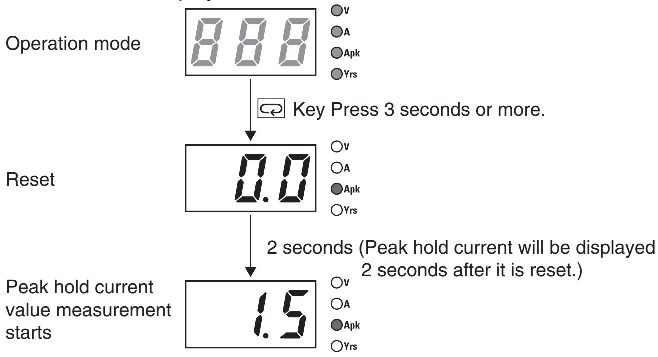


Note: 1. Press and hold the (9) Up Key or (10) Down Key for two seconds or more to increase or decrease the value rapidly.

2. The S8VS-06024□ is not provided with the setting mode and its parameters are fixed at the shipment setting.

Peak Hold Current Reset

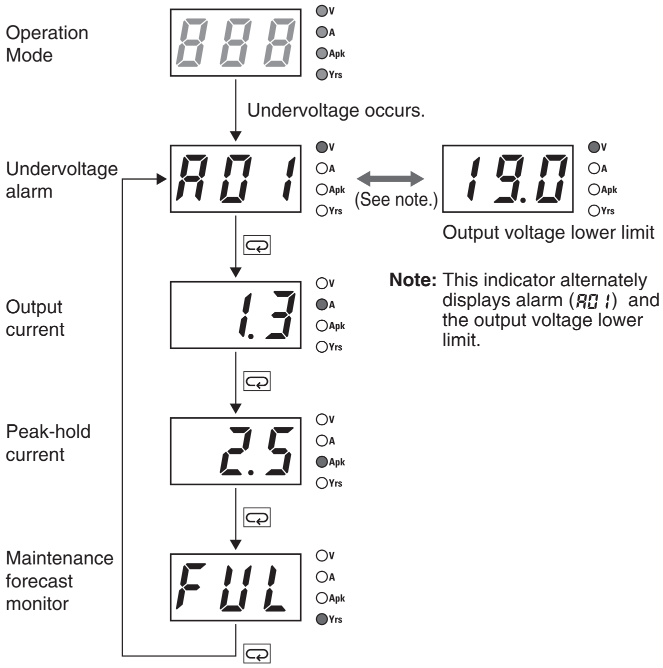
The peak value of the output current (i.e., the peak hold current) can be reset on the display.



Note: The peak hold current value is not reset in the setting mode.

Undervoltage Alarm Indication

This indicator lights when the output voltage is insufficient.

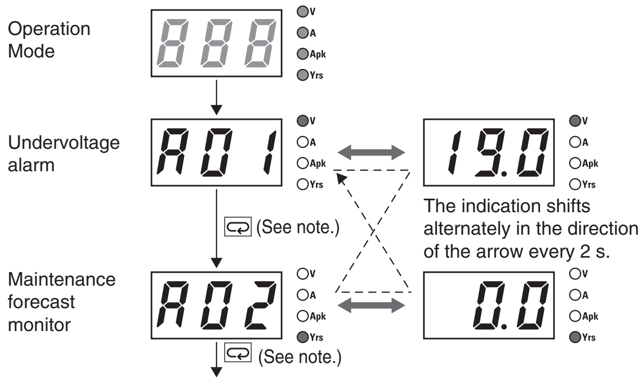


Note: 1. The display changes to the output voltage display when the voltage is restored to the set value or higher.

2. The above displays are for models with a maintenance forecast monitor (S8VS-□□□24A□).

Multiple Alarms

When two or more different alarms occur at the same time



Note: 1. When undervoltage alarm is indicated: Press ⮐ → output load indication When the maintenance forecast monitor or overheat alarm is indicated: Press ⮐ → undervoltage alarm indication

2. The above displays are for models with a maintenance forecast monitor (S8VS-□□□24A□).

■ Self-Diagnostics Function

Numbers in the following table indicate the number used in *Nomenclature* on pages B-12 and B-14.

(6) Main display	Description	Output status	Restoration method	Setting after restoration
- - -	Noise detected in voltage or current	No change	Automatic restoration	No change
Hot	Overheated	(12) Maintenance forecast output terminal (Yrs) turns OFF.	Automatic restoration	No change
E01	Undervoltage alarm set value memory error	(11) Undervoltage output terminal (DC LOW) turns OFF.	Press and hold the (9) Up Key or (10) Down Key for three seconds and check the set value of the corresponding point. The set value must return to the shipment setting	Shipment setting or value set in the setting mode again
E02	Memory error of alarm set value of maintenance forecast monitor or total run time monitor	(12) Maintenance forecast output terminal (Yrs) turns OFF or total run time output terminal (kh) turns OFF.		
E03	Other memory error	(11) Undervoltage output terminal (DC LOW) turns OFF. (12) Maintenance forecast output terminal (Yrs) turns OFF or total run time output terminal (kh) turns OFF.	Turn the AC input OFF then ON again. If the product is not reset, contact the dealer.	No change

Note: 1. External noise is probable as a cause of "- - -", "E01", "E02" and "E03" errors.

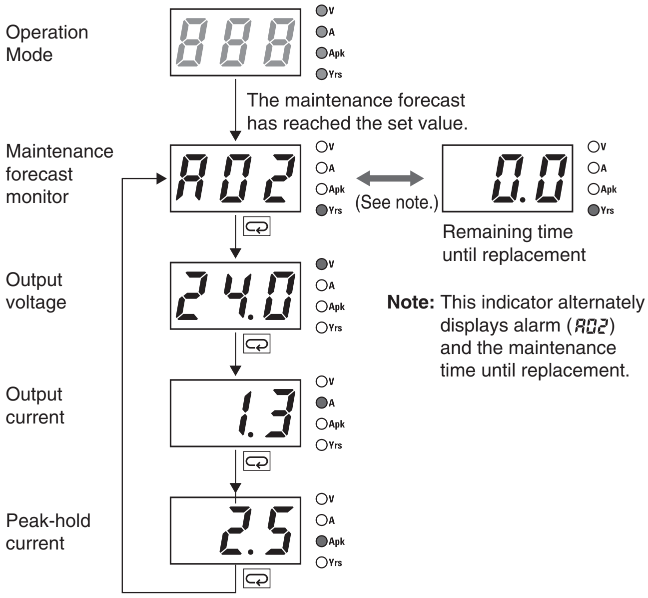
2. Operation out of the derating curve area, ventilation error, and incorrect mounting direction are probable as a cause of "Hot" error.

3. If the "Hot" error state continues for more than three hours, the maintenance forecast monitor function becomes invalid. The Yrs output ((12) Maintenance forecast output terminal (Yrs)) will remain OFF (no continuity between (12) Maintenance forecast output terminal (Yrs) and (13) Alarm output common terminal).
Replace the power supply if this condition occurs even if the output is correct, as internal parts may be deteriorated.

4. The "Hot" error detection function is only for the S8VS-□□□24A□.

■ Maintenance Forecast (S8VS-□□□24A□)

Displays when the maintenance forecast has reached the set value.



■ Indication and Output

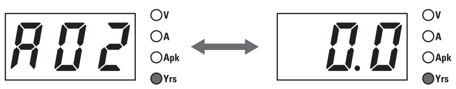
When the product is purchased, "FUL" will be indicated. As electrolytic capacitors deteriorate, indication changes to "HLF". "FUL" will be indicated for the maintenance forecast display for approximately one month after the Power Supply is first turned ON. The accumulated value will then be displayed depending on the ambient conditions thereafter. (However, the "HLF" indication may not appear, depending on the usage environment and the set value for maintenance forecast.)

S8VS-06024A:
After the remaining time to maintenance is reduced to less than two years, indication automatically changes to a value, which decreases from "1.5" to "1.0" to "0.5" to "0.0" (year) as the running hours increase. If the remaining time becomes less than 0.5 year, an alarm (A02) and "0.0" are indicated alternately.

S8VS-09024A□/S8VS-12024A□,
S8VS-18024A□/S8VS-24024A□:
If the maintenance forecast setting L (which can be set arbitrarily from 0.0 to 5.0 years in 0.5-year steps) is set to a value larger than two years, the indication automatically changes to a value (L - 0.5) after the remaining time to maintenance is reduced to the set years, and an alarm (A02) and the remaining time are indicated alternately.

If the setting is less than 2.0 years, the indication changes to a value (1.5) after the remaining time becomes less than two years, and after the remaining time becomes less than the set time, an alarm (A02) and the remaining time (L - 0.5) are indicated alternately.

If the alarm (A02) and a numeric value are indicated alternately, a transistor ((12) maintenance forecast output terminal (Yrs)) will turn OFF to indicate the need for maintenance. (The transistor turns OFF when the maintenance forecast time is reached, i.e., there will be no continuity between (12) maintenance forecast output terminal (Yrs) and (13) alarm output common terminal.)



In the case that the remaining time is reduced to smaller than 0.5 year and an alarm is issued.

Note: 1. The remaining time to maintenance is based on continuous operation, not including the time when the power supply is turned OFF.

2. "FUL" will be indicated until approximately one month of time is accumulated to estimate the speed of deterioration and the output will remain ON (continuity between (12) maintenance forecast output terminal (Yrs) and (13) alarm output common terminal).

3. For details on the display, refer to *Relationship between Indication Value and Outputs of Set Value* under *Maintenance Forecast Monitor Function.*

■ Maintenance Forecast Monitor Function

The Power Supply is equipped with electrolytic capacitors.

The electrolyte inside the electrolytic capacitor penetrates the sealing rubber and evaporates as time passes since it is manufactured, which causes deterioration of characteristics such as decreasing the capacitance, etc.

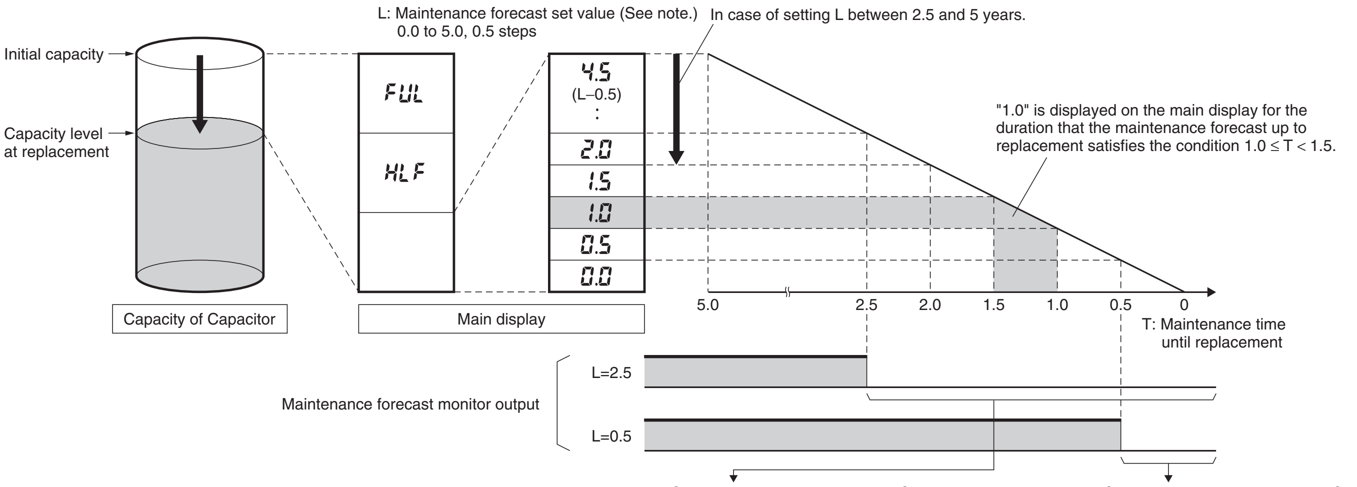
Due to this deterioration of the characteristics of the electrolytic capacitor, the Power Supply decreases its performance as time passes.

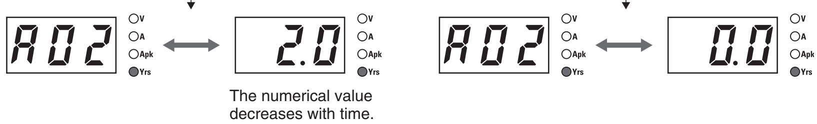
The maintenance forecast monitor function shows an approximate period left for maintenance of the Power Supply due to deterioration of electrolytic capacitors. When the period left for maintenance that the power supply forecasts reaches the set value, an alarm is indicated and an output signal is triggered.

Use this function to know the approximate replacement timing of the Power Supply.

Note: The maintenance forecast monitor function indicates an approximate period left for maintenance, based on deterioration of the electrolytic capacitor. It does not predict failures caused by other reasons.

Relationship between Indicated Values and Output of Set Values





Note: This function can be set only on the S8VS-09024A□, S8VS-12024A□, S8VS-18024A□, and S8VS-24024A□.

■ Principle of Operation

The deterioration speed of the electrolytic capacitor varies considerably according to the ambient temperature. (Generally the speed follows "Rule of Two for every 10°C"; for every 10°C increase in temperature the rate of degradation doubles according to Arrhenius's equation.) The S8VS-□□□24A□ monitors the temperature inside the power supply, and calculates the amount of deterioration according to the running hours and inside temperature. Judging by this amount of deterioration, the power supply will give the alarm indication and output when the period left for maintenance reaches the set value.

Note: 1. Due to degradation of internal electronic parts, replace the power supply approximately 15 years after purchase even if indication and output of maintenance forecast monitor are not issued.

2. The maintenance forecast is accelerated or decelerated according to operating conditions. Periodically check indication.

3. Acceleration or deceleration of the maintenance forecast may cause the output to repeatedly go ON/OFF. Only the S8VS-09024A□, S8VS-12024A□, S8VS-18024A□, and S8VS-24024A□ are equipped with output.

4. The accuracy of the maintenance forecast function may be adversely affected by applications in which the AC input is frequently turned ON/OFF.

■ Reference Values

Reliability (MTBF)	Value		
		Standard types	• With Maintenance Forecast Monitor types • With Total Run Time Monitor types
	60 W:	400,000 hrs,	230,000 hrs,
	90 W:	390,000 hrs,	200,000 hrs,
	120 W:	280,000 hrs,	190,000 hrs,
	180 W:	260,000 hrs,	180,000 hrs,
	240 W:	220,000 hrs,	160,000 hrs,
Definition	MTBF stands for Mean Time Between Failures, which is calculated according to the probability of accidental device failures, and indicates reliability of devices. Therefore, it does not necessarily represent a life of the product.		
Life expectancy	10 yrs. min.		
Definition	The life expectancy indicates average operating hours under the ambient temperature of 40°C and a load rate of 50%. Normally this is determined by the life expectancy of the built-in aluminum electrolytic capacitor.		

Note: The maintenance forecast is the service life (the power supply's internal temperature is monitored at all times) of the internal electrolytic capacitor in actual operating conditions, and varies according to the customer's operating conditions. 15 years is taken as the maximum period of the maintenance forecast.

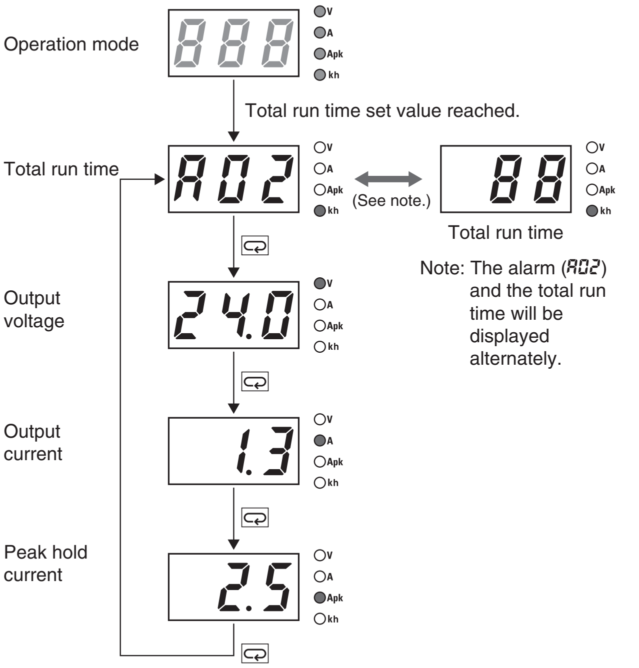
■ Models with Total Run Time Monitor (S8VS-□□□24B□)

S8VS-06024B

The accumulated value of the operating time of the Power Supply is displayed as the total run time. 0 (kh) will be displayed initially after purchase and then the display will advance in 1-kh steps as the operating time accumulates. The S8VS-06024B, however, does not have an alarm function (setting, display, or output).

S8VS-09024B□/S8VS-12024B□/ S8VS-18024B□/S8VS-24024B□

The display will appear when the set value for the total run time has been reached.

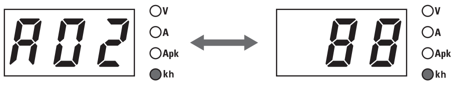


The accumulated value of the operating time of the Power Supply is displayed as the total run time. 0 (kh) will be displayed initially after purchase and then the display will advance in 1-kh steps as the operating time accumulates. When the total run time reaches the preset alarm set value, the alarm (A02) and the total run time will be displayed alternately and a transistor ((12) total run time output terminal (kh)) will output the status externally.

(Alarm set value reached = OFF, i.e., no continuity between (12) total run time output terminal (kh) and (13) alarm output common terminal)

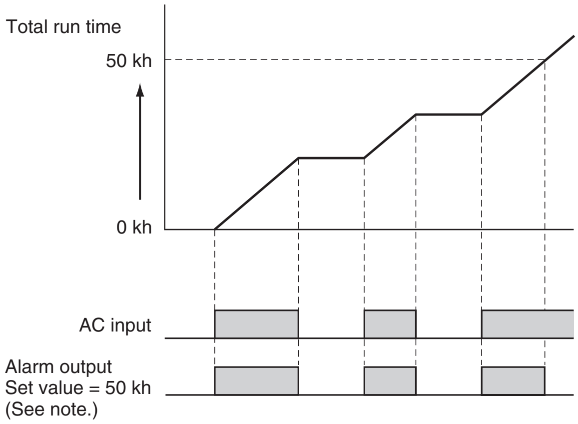
The alarm set value can be changed in the setting mode.

Example: Alarm Displays When a Total Run Time Set Value of 88 kh Is Reached



Note: The total run time cannot be reset. To clear the alarm, change the alarm set value to a value higher than the value displayed for the total run time.

Time Chart



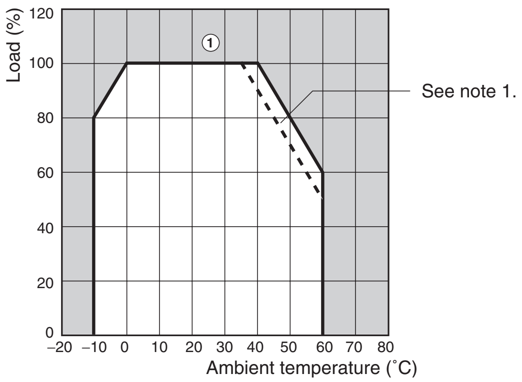
Note: Setting is possible for the following models only: S8VS-09024B□, S8VS-12024B□, S8VS-18024B□, S8VS-24024B□

Note: **1.** The total run time does not include the time that the Power Supply is OFF.

2. The total run time measures the total time that power is being supplied and is not related in any way to deterioration in the electrolytic capacitor built into the Power Supply or to the effects of the ambient temperature.

Engineering Data (60-W, 90-W, 120-W, 180-W, 240-W Models)

■ Derating Curve

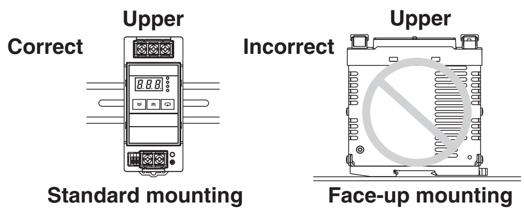


Note: 1. Using side mounting bracket for right-side mounting (excluding 240-W Models).

2. Internal parts may occasionally deteriorate or be damaged. Do not use the Power Supply in areas outside the derating curve (i.e., the area shown by shading ① in the above graph),

3. If there is a derating problem, use forced air-cooling.

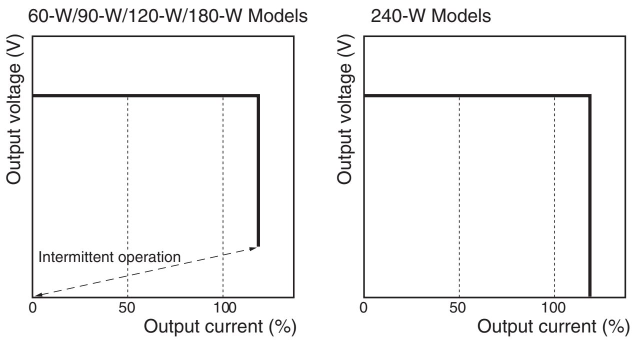
■ Mounting



Note: Improper mounting will interfere with heat dissipation and may occasionally result in deterioration or damage of internal parts. It may also result in failure of the maintenance forecast monitor function. Use the standard mounting method only.

■ Overload Protection

The Power Supply is provided with an overload protection function that protects the power supply from possible damage by overcurrent. When the output current rises above 105% min. of the rated current, the protection function is triggered, decreasing the output voltage. When the output current falls within the rated range, the overload protection function is automatically cleared.



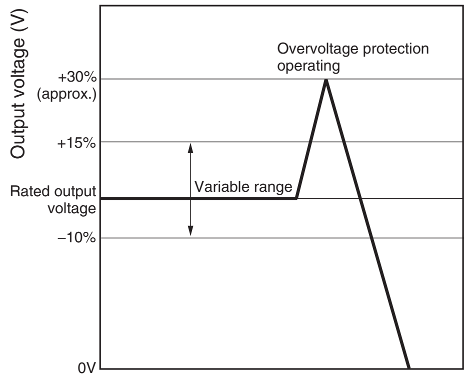
The values shown in the above diagrams are for reference only.

Note: 1. Internal parts may occasionally deteriorate or be damaged if a short-circuited or overcurrent state continues during operation.

2. Internal parts may possibly deteriorate or be damaged if the Power Supply is used for applications with frequent inrush current or overloading at the load end. Do not use the Power Supply for such applications.

■ Overvoltage Protection

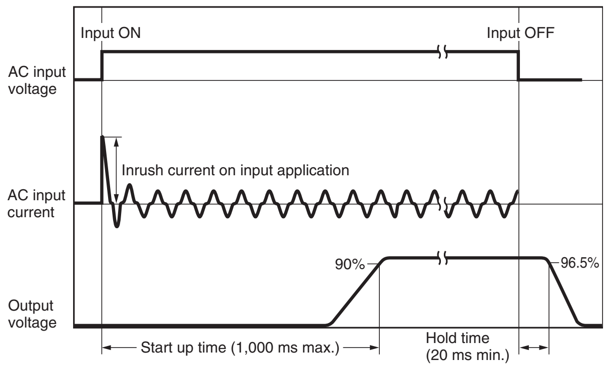
Consider the possibility of an overvoltage and design the system so that the load will not be subjected to an excessive voltage even if the feedback circuit in the Power Supply fails. When an excessive voltage that is approximately 130% of the rated voltage or more is output, the output voltage is shut OFF. Reset the Power Supply by turning it OFF for at least three minutes and then turning it back ON again.



The values shown in the above diagram is for reference only.

Note: Do not turn ON the power again until the cause of the overvoltage has been removed.

■ Inrush Current, Start Up Time, Output Hold Time

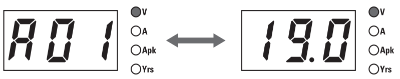


■ Undervoltage Alarm Function (Indication and Output) (S8VS-□□□24□□ Only)

When output voltage drop is detected, an alarm (A01) and lowest output voltage value are indicated alternately. The preset value of detection voltage can be changed in the setting mode.
(From 18.5 to 27.5 V (18.5 to 26.3 V for the S8VS-24024□□), in 0.1-V steps. The value is fixed at 20.0 V for the S8VS-06024□.)

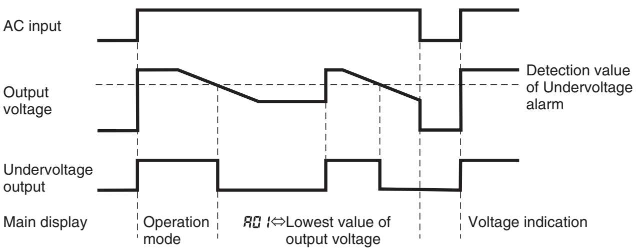
Further, an output ((11) undervoltage output terminal (DC LOW)) to an external device is given from the transistor to notify of the error (excluding S8VS-06024□). (Output voltage drop = OFF, i.e., no continuity between (11) undervoltage output terminal (DC LOW) and (13) alarm output common terminal.)

Example: Outputting an Alarm When the Voltage Output by the S8VS-09024□□ Drops to the Set Value (19.0 V) or Lower



In the case that the output voltage drops below the set value (19.0 V) and an alarm is issued

Note: 1. Operation begins after about three seconds since the AC power is supplied.
2. The alarm is not indicated in the setting mode.
3. Press the ⮐ ((8) Mode Key) after the output voltage is restored, to reset alarm indication.
4. The undervoltage alarm function monitors the output terminal voltage of the Power Supply. To check the voltage accurately, measure the voltage at the load end.

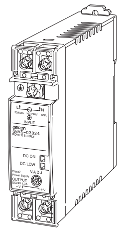


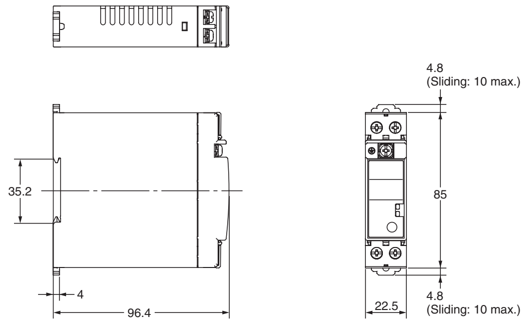
Note: 1. Operation begins after about three seconds since the AC power is supplied.
2. The undervoltage alarm function may also operate when an interruption in AC input is not restored within 20 ms.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

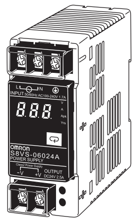
S8VS-015□□ (15-W)
S8VS-030□□ (30-W)

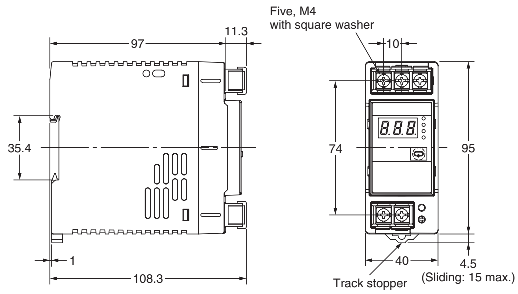




Note: The illustration is the S8VS-03024 Model.

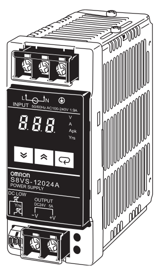
S8VS-06024 (60-W)
S8VS-06024□ (60-W)

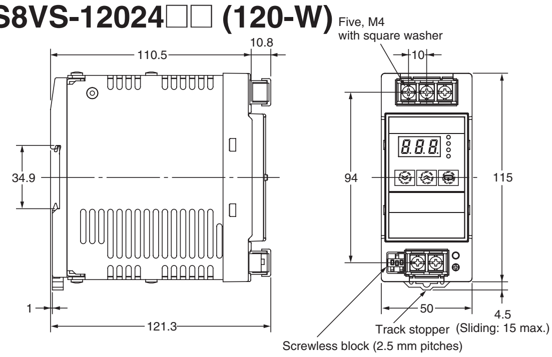




Note: The illustration is the S8VS-06024A Model.

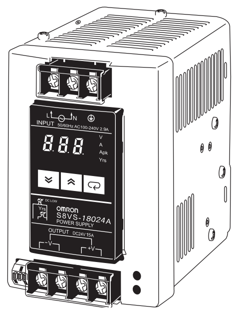
S8VS-09024 (90-W)/S8VS-12024 (120-W)
S8VS-09024□□ (90-W)/S8VS-12024□□ (120-W)

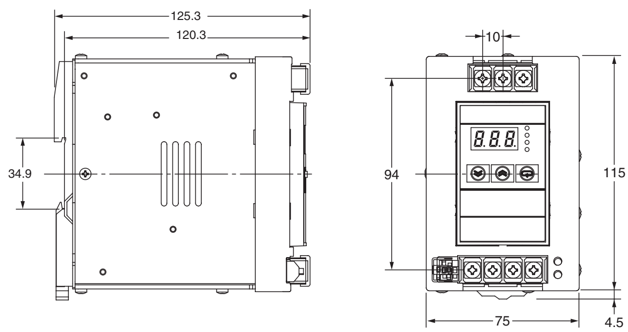




Note: The illustration is the S8VS-12024A Model.

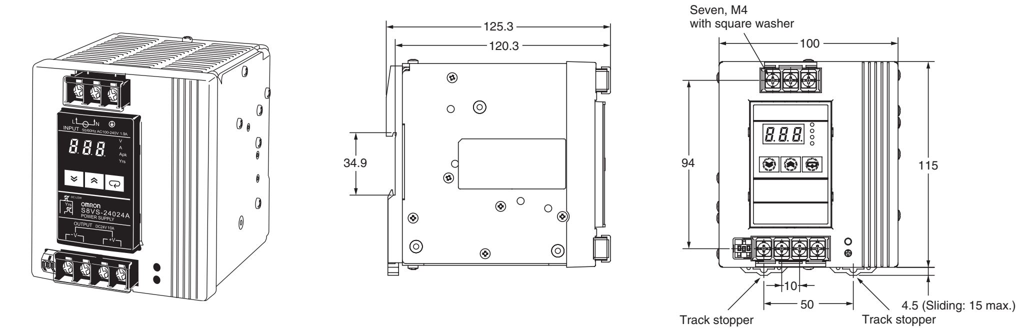
S8VS-18024 (180-W)
S8VS-18024□□ (180-W)





Note: The illustration is the S8VS-18024A Model.

S8VS-24024 (240-W)
S8VS-24024□□ (240-W)



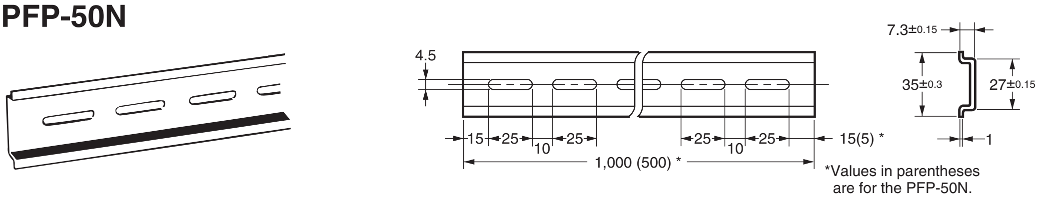
Note: The illustration is the S8VS-24024A Model.

■ DIN-rail (Order Separately)

Note: All units are in millimeters unless otherwise indicated.

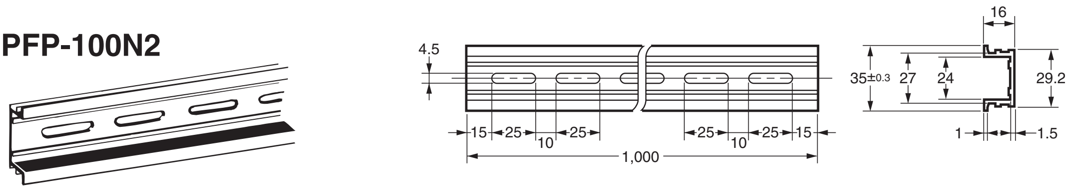
Mounting Rail (Material: Aluminum)

PFP-100N
PFP-50N



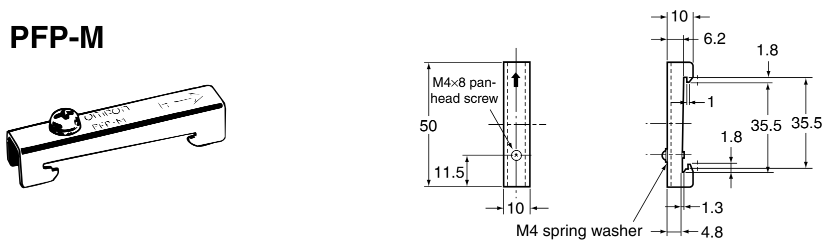
Mounting Rail (Material: Aluminum)

PFP-100N2



End Plate

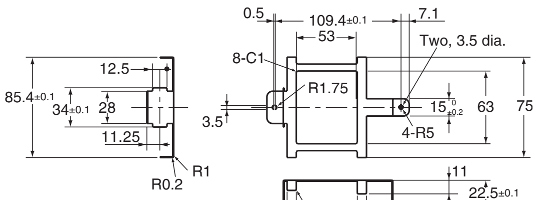
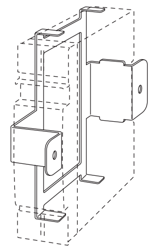
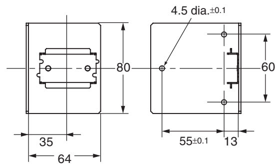
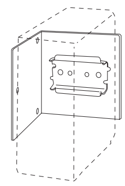
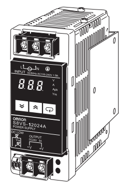
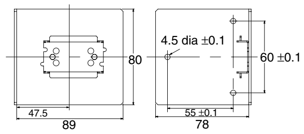
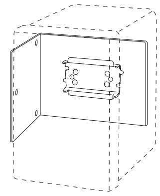
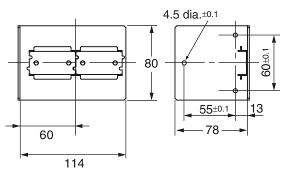
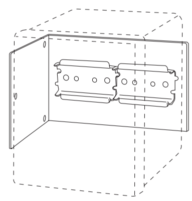
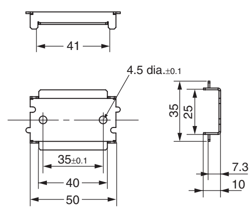
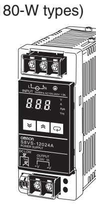
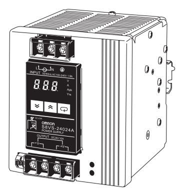
PFP-M



■ Mounting Brackets

Name	Model
Side-mounting Bracket (for 15- and 30-W models)	S82Y-VS30P
Side-mounting Bracket (for 60-, 90-, and 120-W models)	S82Y-VS10S
Side-mounting Bracket (for 180-W models)	S82Y-VS15S
Side-mounting Bracket (for 240-W models)	S82Y-VS20S
Front-mounting Bracket (for 60-, 90-, 120-, 180-, and 240-W models) (See note.)	S82Y-VS10F

Note: Two required to mount a 240-W model.

Type	Model	Dimensions	Appearance
Side-mounting Bracket (For 15-, 30-W models)	S82Y-VS30P	 Note: 1. Direction of the return section: Inside of the bend 2. Height of the return section: 0.1 max. 3. Radius of the inside of the bend: R2 4. Angle of the bend: 90˚±1˚	
Side-mounting Bracket (For 60-, 90-, 120-W models)	S82Y-VS10S	 t = 2.0	Left-side mounting  Right-side mounting 
Side-mounting Bracket (For 180-W models)	S82Y-VS15S	 t = 2.0	Left-side mounting  *Right-side mounting also possible.
Side-mounting Bracket (For 240-W models)	S82Y-VS20S	 t = 2.0	Left-side mounting  *Right-side mounting also possible.
Front-mounting Bracket (For 60-, 90-, 120-, 180-, and 240-W models)	S82Y-VS10F		(For 60-, 90-, 120-, 180-W types)  (For 240-W type)  *Use two S82Y-VS10F brackets for the 240-W type.

Safety Precautions

⚠ CAUTION

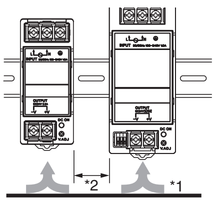
Minor electric shock, fire, or Product failure may occasionally occur. Do not disassemble, modify, or repair the Product or touch the interior of the Product.
Minor burns may occasionally occur. Do not touch the Product while power is being supplied or immediately after power is turned OFF.
Fire may occasionally occur. Tighten terminal screws to the specified torque (15 and 30 W Models: 0.8 to 1.0 N·m 60, 90,120, 180, and 240 W Models: 1.08 N·m).
Minor injury due to electric shock may occasionally occur. Do not touch the terminals while power is being supplied. Always close the terminal cover after wiring.
Minor electric shock, fire, or Product failure may occasionally occur. Do not allow any pieces of metal or conductors or any clippings or cuttings resulting from installation work to enter the Product.

■ Precautions for Safe Use

Mounting

Take adequate measures to ensure proper heat dissipation to increase the long-term reliability of the product. Be sure to allow convection in the atmosphere around devices when mounting. Do not use in locations where the ambient temperature exceeds the range of the derating curve.

When cutting out holes for mounting, make sure that cuttings do not enter the interior of the products.



*1. Convection of air
*2. 20 mm min.
If 20 mm is not available, however, at least 10 mm must be provided.

(15-W and 30-W Models)

Improper mounting will interfere with heat dissipation and may occasionally result in deterioration or damage of internal parts. Use the product within the derating curve for the mounting direction that is used.

Use a mounting bracket when the product is mounted facing horizontally.

Heat dissipation will be adversely affected. When the product is mounted facing horizontally, always place the side with the label facing upward.

Always provide a space of 20 mm even when mounting horizontally or facing horizontally. If a space of 20 mm is not available, at least 10 mm must be provided. When mounting Power Supplies facing horizontally in a vertical stack, provide a space of at least 75 mm in between the Power Supplies. For details, refer to *Derating Curve* on page B-12.

(60-W, 90-W, 120-W, 180-W and 240-W Models)

Improper mounting will interfere with heat dissipation and may occasionally result in deterioration or damage of internal parts. Use the standard mounting method only.

Wiring

Connect the ground completely. A protective earthing terminal stipulated in safety standards is used. Electric shock or malfunction may occur if the ground is not connected completely.

Minor fire may possibly occur. Ensure that input and output terminals are wired correctly.

Do not apply more than 100 N force to the terminal block when tightening it.

Be sure to remove the sheet covering the product for machining before power-ON so that it does not interfere with heat dissipation.

Use the following material for the wires to be connected to the S8VS to prevent smoking or ignition caused by abnormal loads.

Recommended Wire Type

15-W and 30-W Models

Model	Stranded wire	Solid wire
S8VS-03005	AWG18 to 14 (0.9 to 2.0 mm^2)	AWG18 to 16 (0.9 to 1.1 mm^2)
Other models	AWG20 to 14 (0.5 to 2.0 mm^2)	AWG20 to 16 (0.5 to 1.1 mm^2)

60-W, 90-W, 120-W, 180-W and 240-W Models

Model	Recommended wire size	
	For screw terminal	For alarm output terminal
S8VS-06024□	AWG14 to 20 (Cross section 0.517 to 2.081mm^2)	---
S8VS-09024□□ S8VS-12024□□ S8VS-18024□□ S8VS-24024□□	AWG14 to 18 (Cross section 0.823 to 2.081mm^2)	AWG18 to 28 (Cross section 0.081 to 0.823mm^2)

Installation Environment

Do not use the Power Supply in locations subject to shocks or vibrations. In particular, install the Power Supply as far away as possible from contactors or other devices that are a vibration source.

Install the Power Supply well away from any sources of strong, high-frequency noise and surge.

Operating Life

The life of a Power Supply is determined by the life of the electrolytic capacitors used inside. Here, Arrhenius's Law applies, i.e., the life will be cut in half for each rise of 10°C or the life will be doubled for each drop of 10°C. The life of the Power Supply can thus be increased by reducing its internal temperature.

Ambient Operating and Storage Environments

Store the Power Supply at a temperature of –25 to 65°C and a humidity of –25% to 90%.

Do not use the Power Supply in areas outside the derating curve otherwise, internal parts may occasionally deteriorate or be damaged.

Use the Power Supply at a humidity of 25% to 85%.

Do not use the Power Supply in locations subject to direct sunlight.

Do not use locations where liquids, foreign matter, or corrosive gases may enter the interior of products.

S8VS-□□□24A□ Models only

Satisfy the following conditions when storing the Power Supply for long periods of time to maintain its remaining service life function.

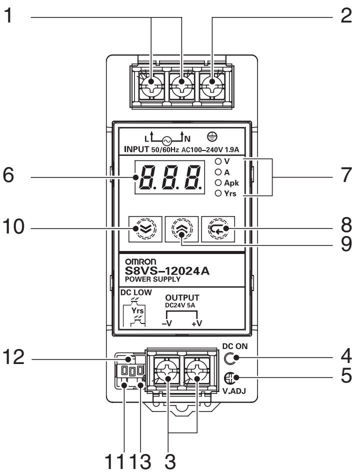
- When storing for more than three months, store within an ambient temperature range of –25 to +30°C and the humidity range of 25% to 70%.

Periodic Check (S8VS-09024□□, S8VS-12024□□, S8VS-18024□□ and S8VS-24024□□ only)

It may take from several years to more than 10 years under general operating conditions for the power supply to output the maintenance forecast monitor alarm (S8VS-□□□24A□). The total run time monitor (S8VS-□□□24B□) may be a similar number of years as the maintenance forecast monitor according to some settings. During operation over an extended period of time, periodically check if the maintenance forecast monitor output ((12)Yrs) or total run time monitor output ((12)kh) is correctly functioning by the following procedure.

1. Select the operation mode.
2. Check that the output ((12)Yrs/kh) is turned ON (with continuity between (12) and (13)).
3. In the operation mode, press and hold the Down Key (10) and the Mode Key (8) simultaneously for at least three seconds. The main display (6) changes to “A02.” An inactive output ((12)Yrs/kh) (no continuity between (12) and (13)) in the “A02” indication indicates the correct function.
4. Release keys to return to the regular state.

Note: DC output stays ON during the periodical check.



Overcurrent Protection

Internal parts may possibly deteriorate or be damaged if a short-circuited or overcurrent state continues during operation.

Internal parts may possibly deteriorate or be damaged if the Power Supply is used for applications with frequent inrush current or overloading at the load end. Do not use the Power Supply for such applications.

Alarm Output (S8VS-09024□□, S8VS-12024□□, S8VS-18024□□, S8VS-24024□□ Only)

When using the alarm output, sufficiently consider the maximum ratings, residual voltage, and leakage current.

Transistor output: Sinking for S8VS-□□□24□ Models
Sourcing for S8VS-□□□24□P Models

30 VDC max., 50 mA max.

ON residually voltage: 2 V max.
OFF leakage current: 0.1 mA max.

Charging the Battery

If a battery is to be connected as the load, mount an overcurrent limiting circuit and an overvoltage protection circuit.

Dielectric Strength Test

If a high voltage is applied between an input and the case (FG), it will pass though the LC of the built-in noise filter and energy will be stored. If the high voltages used for dielectric strength testing are turned ON and OFF with a switch, timer, or similar device, impulse voltage will be generated when the voltage is turned OFF and internal parts may possibly be damaged. To prevent the generation of impulse voltages, reduce the applied voltage slowly with a variable resistor on the test device or turn the voltage ON and OFF at the zero-cross point.

Inrush Current

When two or more Power Supplies are connected to the same input, the total current is the sum of the currents for each Supply. Select fuses and circuit breakers giving sufficient consideration to the fusing or operating characteristics so that fuses will not burn and breakers will not break due to inrush current.

Output Voltage Adjuster (V.ADJ)

The output voltage adjuster (V.ADJ) may possibly be damaged if it is turned with unnecessary force. Do not turn the adjuster with excessive force.

After completing output voltage adjustment, be sure that the output capacity or output current does not exceed the rated output capacity or rated output current.

15-W, 30-W Models

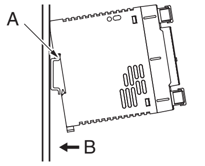
If the output voltage is set to a value less than –10%, the undervoltage alarm function may operate.

60-W, 90-W, 120-W, 180-W, and 240-W Models

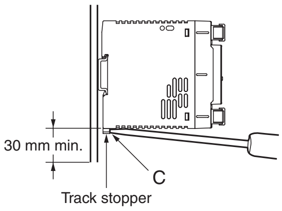
If the output voltage is set to a value less than 20 V (the factory setting), the undervoltage alarm function may operate.

DIN-rail Mounting

To mount the Block on a DIN-rail, hook portion (A) of the Block onto the rail and press the Block in direction (B).



To dismount the Block, pull down portion (C) with a flat-blade screwdriver and pull out the Block.



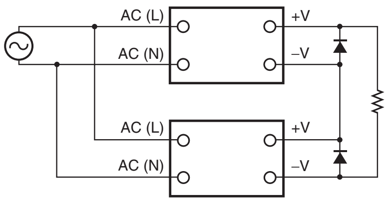
Series Operation

(24-V Model)

Two power supplies can be connected in series.

The (±) voltage output can be accomplished with two power supplies.

Correct



Note: 1. The diode is connected as shown in the figure. If the load is short-circuited, a reverse voltage will be generated inside the Power Supply. If this occurs the Power Supply may possibly deteriorate or be damaged. Always connect a diode as shown in the figure.
Select a diode having the following ratings.

Type	Schottky Barrier diode
Dielectric strength (V_{RRM})	Twice the rated output voltage or above
Forward current (I_F)	Twice the rated output current or above

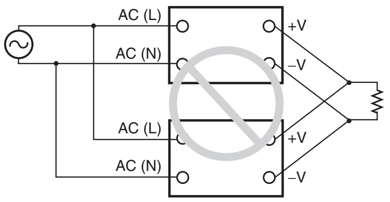
2. Although products having different specifications can be connected in series, the current flowing through the load must not exceed the smaller rated output current.

3. Serial operation is not possible with 5-V and 12-V Models.

Parallel Operation

The product is not designed for parallel operation.

Incorrect



In Case There Is No Output Voltage

The possible cause for no output voltage may be that the overcurrent or overvoltage protection has operated. The internal protection may operate if a large amount of surge voltage such as a lightening surge occurs while turning ON the power supply.

In case there is no output voltage, please check the following points before contacting us:

- Checking overload protected status:
  Check whether the load is in overload status or is short-circuited. Remove wires to load when checking.
- Checking overvoltage or internal protection (except for 15-W Models):
  Turn the power supply OFF once, and leave it OFF for at least 3 minutes. Then turn it ON again to see if this clears the condition.

Harmonic Current Suppression Circuits

(120-W, 180-W and 240-W Models)

A harmonic current suppression circuit is built into the Power Supply. This circuit can create noise when the input is turned ON, but it will last only until the internal circuits stabilize and does not indicate any problem in the product.

Warranty and Application Considerations

Read and Understand this Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability.*

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

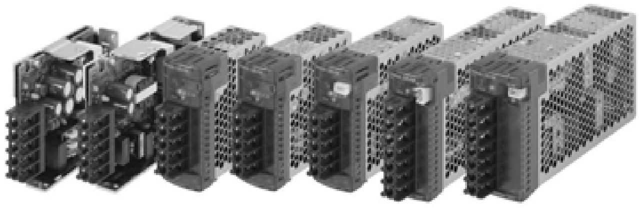
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. T030-E2-02A

Switch Mode Power Supply

S8VM (15/30/50/100/150-W Models)

Power Supply Featuring OMRON's Unique, New Undervoltage Alarm Function with Compact Body Contributing to Machine Downsizing



- New undervoltage alarm function assists in determining causes of errors (S8VM-□□□24A□ only).
- Broad range of possibilities with 5 capacities and 20 models to choose from.
- Lead-free construction complies with RoHS directive.
- Safety standards: UL508/60950-1/1604, CSA C22.2 No. 14/No. 60950-1/No. 213, EN50178, EN60950-1
- New, attentive design prevents screws from falling out of terminal block.
- Finger protection prevents electric shock.
- DIN Rail mounting.

Note: Refer to *Precautions for Safe Use* on page B-49.

Note: 300- to 1,500-W models will be released in 2006.

Model Number Structure

■ Model Number Legend

Note: Not all combinations are possible. Please refer to the list of models in *Ordering Information* on page B-32.

S8VM- □□□□□□□

1 2 3 4

1. **Power Ratings**
   015: 15 W
   030: 30 W
   050: 50 W
   100: 100 W
   150: 150 W
2. **Output voltage**
   05: 5 V
   12: 12 V
   15: 15 V
   24: 24 V
3. **Configuration/function**

None:	Open-frame type	Standard type
C:	Covered type	Standard type
A:	Covered type	Undervoltage alarm type (See note.)

4. **Configuration**

None	Front-mounting type
D	DIN Rail mounting bracket type

Note: The housing and terminal for the undervoltage alarm output are provided with the S8VM-05024A□, S8VM-10024A□ and S8VM-15024A□.

Ordering Information

Configuration	Power ratings	Input voltage	Output voltage	Output current	Front-mounting		DIN Rail mounting bracket	
					Standard type	Undervoltage alarm type	Standard type	Undervoltage alarm type
Open-frame type	15 W	100 to 240 VAC	5 V	3 A	S8VM-01505	---	S8VM-01505D	---
			12 V	1.3 A	S8VM-01512	---	S8VM-01512D	---
			15 V	1 A	S8VM-01515	---	S8VM-01515D	---
			24 V	0.65 A	S8VM-01524	---	S8VM-01524D	---
	30 W		5 V	6 A	S8VM-03005	---	S8VM-03005D	---
			12 V	2.5 A	S8VM-03012	---	S8VM-03012D	---
			15 V	2 A	S8VM-03015	---	S8VM-03015D	---
			24 V	1.3 A	S8VM-03024	---	S8VM-03024D	---
	50 W		5 V	10 A	S8VM-05005	---	S8VM-05005D	---
			12 V	4.3 A	S8VM-05012	---	S8VM-05012D	---
			15 V	3.5 A	S8VM-05015	---	S8VM-05015D	---
			24 V	2.2 A	S8VM-05024	---	S8VM-05024D	---
	100 W		5 V	20 A	S8VM-10005	---	S8VM-10005D	---
			12 V	8.5 A	S8VM-10012	---	S8VM-10012D	---
			15 V	7 A	S8VM-10015	---	S8VM-10015D	---
			24 V	4.5 A	S8VM-10024	---	S8VM-10024D	---
	150 W		5 V	27 A	S8VM-15005 (See note.)	---	S8VM-15005D (See note.)	---
			12 V	12.5 A	S8VM-15012	---	S8VM-15012D	---
			15 V	10 A	S8VM-15015	---	S8VM-15015D	---
			24 V	6.5 A	S8VM-15024	---	S8VM-15024D	---
Covered type	15 W	100 to 240 VAC	5 V	3 A	S8VM-01505C	---	S8VM-01505CD	---
			12 V	1.3 A	S8VM-01512C	---	S8VM-01512CD	---
			15 V	1 A	S8VM-01515C	---	S8VM-01515CD	---
			24 V	0.65 A	S8VM-01524C	S8VM-01524A	S8VM-01524CD	S8VM-01524AD
	30 W		5 V	6 A	S8VM-03005C	---	S8VM-03005CD	---
			12 V	2.5 A	S8VM-03012C	---	S8VM-03012CD	---
			15 V	2 A	S8VM-03015C	---	S8VM-03015CD	---
			24 V	1.3 A	S8VM-03024C	S8VM-03024A	S8VM-03024CD	S8VM-03024AD
	50 W		5 V	10 A	S8VM-05005C	---	S8VM-05005CD	---
			12 V	4.3 A	S8VM-05012C	---	S8VM-05012CD	---
			15 V	3.5 A	S8VM-05015C	---	S8VM-05015CD	---
			24 V	2.2 A	S8VM-05024C	S8VM-05024A	S8VM-05024CD	S8VM-05024AD
	100 W		5 V	20 A	S8VM-10005C	---	S8VM-10005CD	---
			12 V	8.5 A	S8VM-10012C	---	S8VM-10012CD	---
			15 V	7 A	S8VM-10015C	---	S8VM-10015CD	---
			24 V	4.5 A	S8VM-10024C	S8VM-10024A	S8VM-10024CD	S8VM-10024AD
	150 W		5 V	27 A	S8VM-15005C (See note.)	---	S8VM-15005CD (See note.)	---
			12 V	12.5 A	S8VM-15012C	---	S8VM-15012CD	---
			15 V	10 A	S8VM-15015C	---	S8VM-15015CD	---
			24 V	6.5 A	S8VM-15024C	S8VM-15024A	S8VM-15024CD	S8VM-15024AD

Note: The output capacity of the S8VM-15005☐☐ is 135 W.

Specifications

■ Ratings/Characteristics

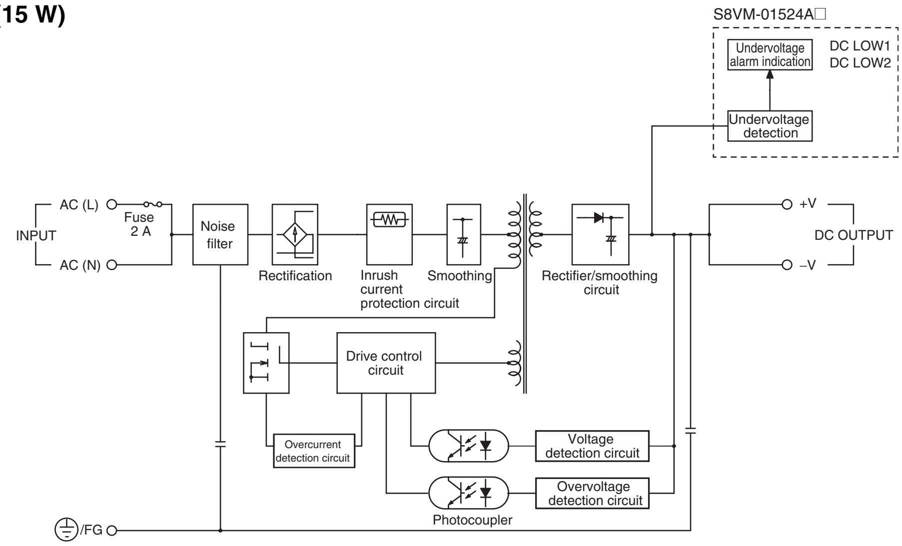
Item		Power ratings	15 W	30 W	50 W	100 W	150 W
Efficiency		5-V models	75% min.	75% min.	80% min.	81% min.	81% min.
		12-V models	78% min.	79% min.	79% min.	81% min.	81% min.
		15-V models	78% min.	79% min.	79% min.	81% min.	81% min.
		24-V models	80% min.	81% min.	80% min.	82% min.	83% min.
Input	Voltage (See note 1.)		100 to 240 VAC (85 to 264 VAC)				
	Frequency (See note 1.)		50/60 Hz (47 to 63Hz)				
	Current	100-V input	0.5 A max.	0.9 A max.	0.8 A max.	1.4 A max.	2.0 A max.
		200-V input	0.25 A max.	0.45 A max.	0.4 A max.	0.7 A max.	1.0 A max.
	Power factor	100-V input	---		0.98 min.		
		200-V input	---		0.94 min.		
	Harmonic current emissions		---		Conforms to EN 61000-3-2		
	Leakage current	100-V input	0.4 mA max. (at rated output)				
		200-V input	0.75 mA max. (at rated output)				
	Inrush current (See note 2.)	100-V input	17.5 A max. (for cold start at 25°C)				
		200-V input	35 A max. (for cold start at 25°C)				
Output	Voltage adjustment range (See note 3.)		–20% to 20% (with V. ADJ) (S8VM-□□□24A□: –10% to 20%)				
	Ripple		3.2% (p-p) max. (5 V), 1.5% (p-p) max. (12 V), 1.2% (p-p) max. (15 V), 1.0% (p-p) max. (24 V), (at rated input/output voltage)		3.2% (p-p) max. (5 V), 1.5% (p-p) max. (12 V), 1.2% (p-p) max. (15 V), 0.75% (p-p) max. (24 V), (at rated input/output voltage)		
	Input variation influence		0.4% max. (at 85 to 264 VAC input, 100%)				
	Load variation influence (rated input voltage)		0.8% max. (with rated input, 0 to 100% load)				
	Temperature variation influence		0.02%/°C max.				
	Start up time (See note 2.)		1,100 ms max. (at rated input/output voltage)		800 ms max. (at rated input/output voltage)		
	Hold time (See note 2.)		20 ms typ. (15 ms min.) (at rated input/output voltage)				
Additional functions	Overload protection (See note 2.)		105% to 160% of rated load current, voltage drop, intermittent, automatic reset		105% to 160% of rated load current, voltage drop (12 V, 15 V, and 24 V), voltage drop, intermittent (5 V), automatic reset		
	Overvoltage protection (See note 2.)		Yes (See note 4.)				
	Undervoltage alarm indication		Yes (color: yellow (DC LOW1), red (DC LOW2)) (S8VM-□□□24A□ only)				
	Undervoltage alarm output		No		Yes (S8VM-□□□24A□ only) (open collector output), 30 VDC max., 50 mA max.), Sinking type (NPN)		
	Series operation		Yes				
	Parallel operation		No				
	Remote sensing function		No			Yes	
Other	Operating ambient temperature		Refer to the derating curve in *Engineering Data* on page B-37. (with no icing or condensation) (See note 2.)				
	Storage temperature		–25 to 65°C				
	Operating ambient humidity		30% to 85% (Storage humidity: 25% to 90%)				
	Dielectric strength		3.0 kVAC for 1 min. (between all inputs and outputs; detection current: 20 mA) 2.0 kVAC for 1 min. (between all inputs and PE/FG terminals; detection current: 20 mA) 500 VAC for 1 min. (between all outputs and PE/FG terminals; detection current: 100 mA) 500 VAC for 1 min. (between all outputs (except the detection output terminals) and detection output terminals; detection current: 20 mA) (S8VM-□□□24A□ only)				
	Insulation resistance		100 MΩ min. (between all outputs and all inputs, PE/FG terminals) at 500 VDC				
	Vibration resistance		10 to 55 Hz, 0.375-mm single amplitude for 2 hours each in X, Y, and Z directions				
	Shock resistance		150m/s², 3 times each in ±X, ±Y, ±Z directions				
	Output indicator		Yes (color: green)				
	EMI	Conducted Emission	Conforms to EN61204-3 EN55011 Class B and based on FCC Class B (See note 5.)				
		Radiated Emission	Conforms to EN61204-3 EN55011 Class B (See note 6.)				
	EMS		Conforms to EN61204-3 High severity levels				
	Approved standards (See note 7.)		UL: UL508 (Listing), UL60950-1, UL1604 (Class I/Division 2) cUL: CSA C22.2 No.14, No.60950-1, No.213 (Class I/Division 2), EN: EN50178, EN60950-1 SELV (EN60950-1) According to VDE0160/P100				
	Weight (See note 8.)		180 g max.	220 g max.	290 g max.	460 g max.	530 g max.

Note:
1. Do not use the Inverter output for the Power Supply. Inverters with an output frequency of 50/60 Hz are available, but the rise in the internal temperature of the Power Supply may result in ignition or burning.
2. Refer to the *Engineering Data* section on page page B-37 to page B-38 for details.
3. If the V. ADJ adjuster is turned, the voltage will increase by more than +20% of the voltage adjustment range.
   When adjusting the output voltage, confirm the actual output voltage from the Power Supply and be sure that the load is not damaged.
4. To reset the protection, turn OFF the Power Supply for three minutes or longer and then turn the Power Supply back ON.
5. Conducted emissions: The noise value is affected by factors such as the wiring method. The product conforms to Class B when the aluminum plate is laid under the product. For 15-W models, insert a clamp filter (ZCAT2436-1330 by TDK) in the output wire to reduce noise.
6. Radiated emissions: The noise value is affected by factors such as the wiring method. The product conforms to Class B when the aluminum plate is laid under the product. For 150-W models, insert a clamp filter (ZCAT2017-0930 by TDK) in the input wire to reduce noise.
7. UL1604 (Class I/Division 2) and CSA C22.2 No. 213 (Class I/Division 2) approval pending.
8. The weight indicated is for front-mounting, open-frame models.

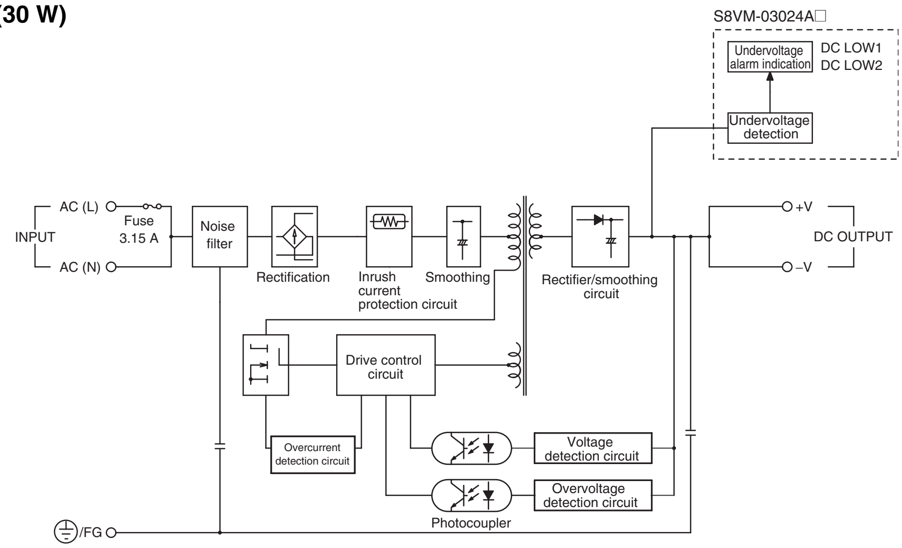
Connections

■ Block Diagrams

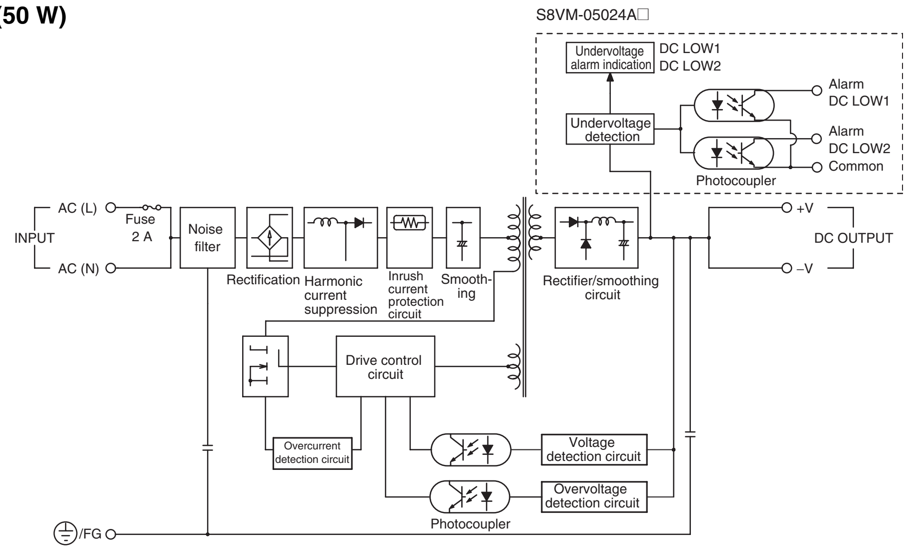
S8VM-015□□□□ (15 W)



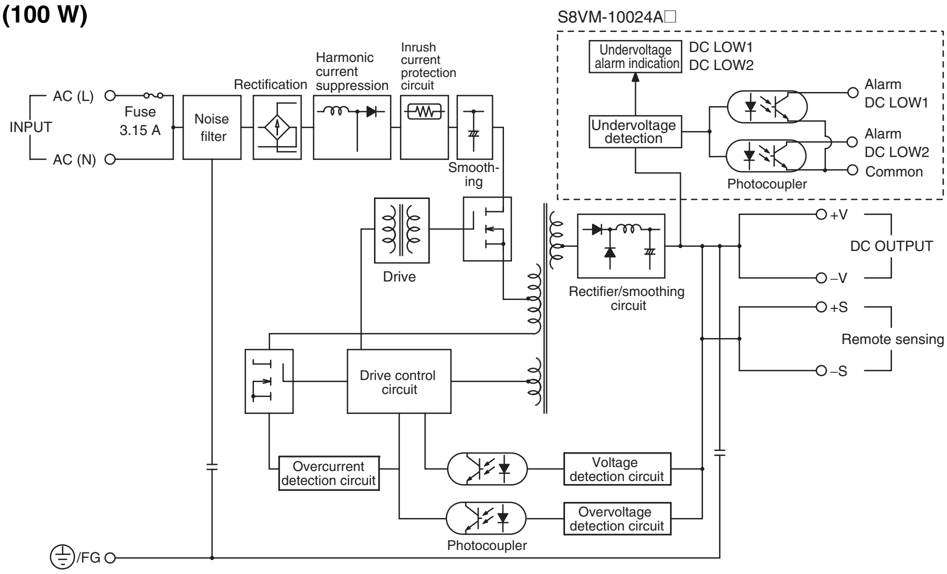
S8VM-030□□□□ (30 W)



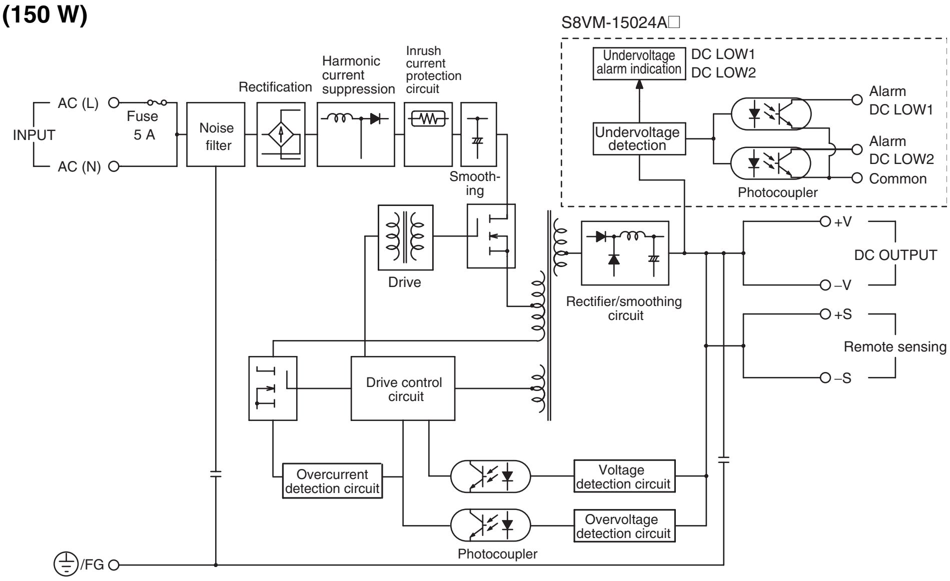
S8VM-050□□□□ (50 W)



S8VM-100□□□□ (100 W)



S8VM-150□□□□ (150 W)

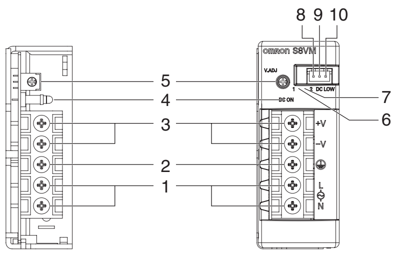


Construction and Nomenclature

■ Nomenclature

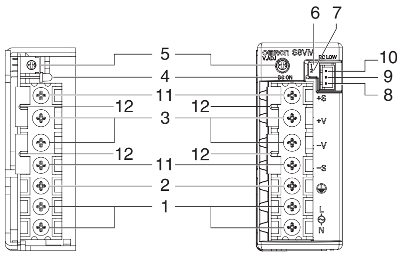
15-W, 30-W, 50-W Models

Open-frame types	Covered types
S8VM-015□□/S8VM-015□□D	S8VM-015□□C□/S8VM-01524A□
S8VM-030□□/S8VM-030□□D	S8VM-030□□C□/S8VM-03024A□
S8VM-050□□/S8VM-050□□D	S8VM-050□□C□/S8VM-05024A□



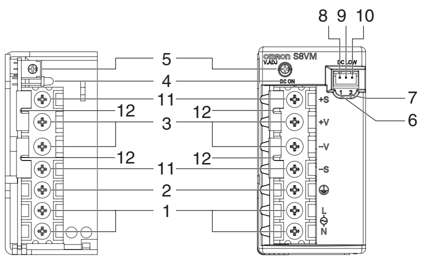
100-W Models

Open-frame types	Covered types
S8VM-100□□/S8VM-100□□D	S8VM-100□□C□/S8VM-10024A□



150-W Models

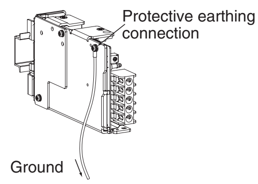
Open-frame types	Covered-types
S8VM-150□□/S8VM-150□□D	S8VM-150□□C□/S8VM-15024A□



No.	Name	Function
1	AC input terminals (L). (N)	Connect the input lines to these terminals. (See note 1.)
2	PE terminal: Protective earthing terminal (S8VM-□□□□□C□/S8VM-□□□□□A□) FG terminal: Frame ground terminal S8VM-□□□□□/S8VM-□□□□□D)	Connect the ground line to this terminal. (See note 2.)
3	DC output terminals (-V). (+V)	Connect the load lines to these terminals.
4	Output indicator (DC ON: Green)	Lights (green) while a direct current (DC) output is ON.
5	Output voltage adjuster (V. ADJ)	Use to adjust the voltage.
6	Undervoltage alarm indicator 1 (DC LOW1: Yellow) (See note 3.)	Lights only when a momentary drop in output voltage is detected. This status is maintained.
7	Undervoltage alarm indicator 2 (DC LOW2: Red) (See note 3.)	Lights only when the output voltage drops to approximately 20 V or lower.
8	Undervoltage alarm output terminal 1: (DC LOW1) (See note 4.)	Outputs only when a momentary drop in output voltage is detected. This status is maintained. (The transistor turns OFF when a voltage drop occurs.)
9	Undervoltage alarm output terminal 2: (DC LOW2) (See note 4.)	Outputs only when the output voltage drops to approximately 20 V or lower. (The transistor turns OFF when a voltage drop occurs.)
10	Common terminal for undervoltage alarm output (See note 4.)	Common terminal (emitter) for terminals 8 and 9
11	Remote sensing terminals (See note 5.)	Correct the voltage drop in the load lines.
12	Short bars (See note 5.)	---

Note: 1. The fuse is located on the (L) side. It is NOT user-replaceable.

2. Protective earthing connection is the panel mounting hole shown in the figure below.
(A protective earthing connection stipulated in safety standards is used. Connect the ground completely (S8VM-□□□□□D only)
Ground terminal: M3 (Depth: 8 mm max.)/Ground wire: AWG 18



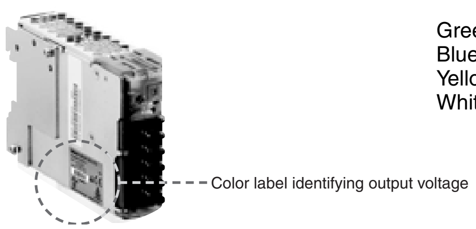
3. S8VM-□□□24A□ only

4. S8VM-05024A□, S8VM-10024A□, S8VM-15024A□ only. Housing and terminals for undervoltage detection output are also provided. For details, refer to *XH Connector Preparation* on page B-50 under *Safety Precautions*.

5. When not using the remote sensing function, leave the short bar in the same state as when shipped.

■ Output Color Label

This color label identifies the output voltage by color.



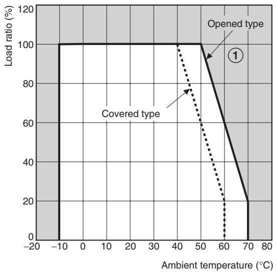
Green: 5 V
Blue: 12 V
Yellow: 15 V
White: 24 V

Engineering Data

■ Derating Curve

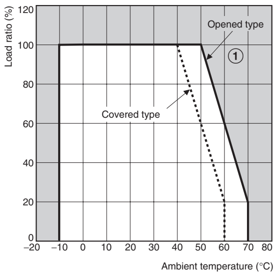
S8VM-15W/30W

Standard mounting/Horizontal mounting/Face-up mounting

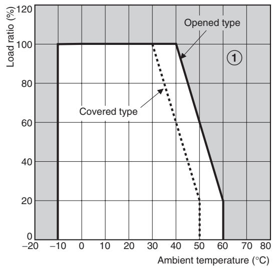


S8VM-50W

Standard mounting/Horizontal mounting

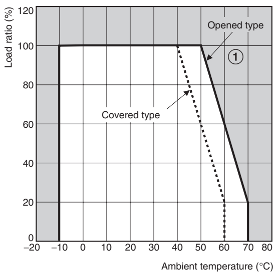


Face-up mounting

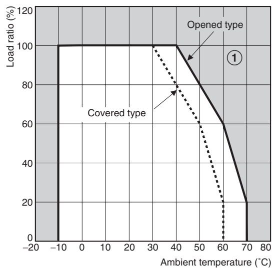


S8VM-100W

Standard mounting

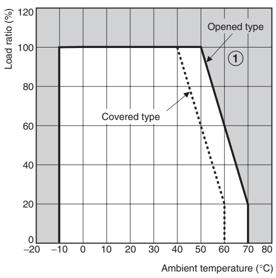


Horizontal mounting/Face-up mounting

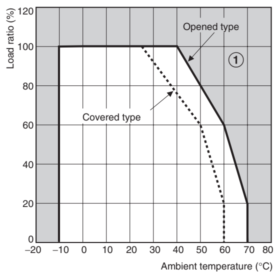


S8VM-150W

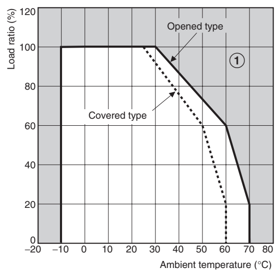
Standard mounting



Horizontal mounting



Face-up mounting



Note: 1. Internal parts may occasionally be deteriorated or damaged. Do not use the Power Supply in areas outside the derating curves (i.e., the area shown by shading 1 in the above graphs)

2. If there is a derating problem, use forced air-cooling.

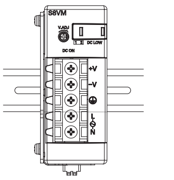
3. When mounting two or more Power Supplies side-by-side, allow at least 20 mm spacing between them. Multiple 100- and 150-W models cannot be used side by side. Be sure to install the Power Supplies as far away from heat-generating sources as possible.

4. When using 150-W models for a long period of time at an input voltage of 90 VAC or lower, reduce the load to 80% or less of the above derating curves.

■ Mounting

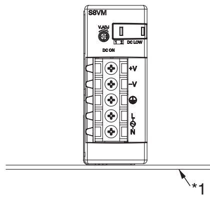
Standard mounting (DIN Rail mounting bracket type)

Correct



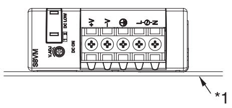
Standard mounting (Front-mounting type)

Correct



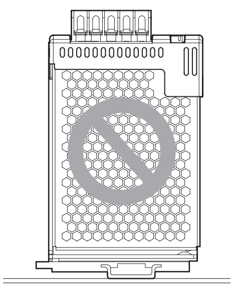
Horizontal mounting (Front-mounting type)

Correct



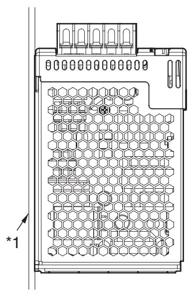
Face-up mounting (DIN Rail mounting bracket type)

Incorrect



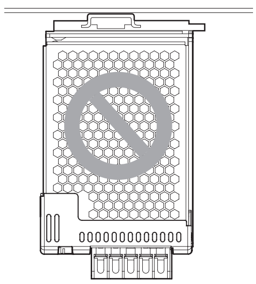
Face-up mounting (Front-mounting type)

Correct



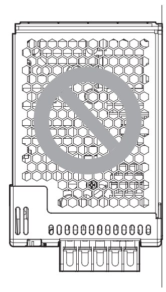
Face-down mounting (DIN Rail mounting bracket type)

Incorrect



Face-down mounting (Front-mounting type)

Incorrect



Note: 1. Improper mounting will interfere with heat dissipation and may occasionally result in deterioration or damage of internal parts.
Use the product within the derating curve for the mounting direction that is used.

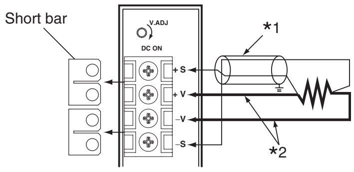
2. Use the metal plate as the mounting panel (*1).

3. Install the Power Supply so that the air flow circulates around the Power Supply, as the Power Supply is designed to radiate heat by means of natural air flow.

4. Mounting screw tightening torque (recommended value: 0.49 N·m)

■ Remote Sensing Function (S8VM-100□□□□/150□□□□ only)

This function compensates a voltage drop on the load lines.
To use this function, connect after removing the two short bars of the remote sensing terminal.



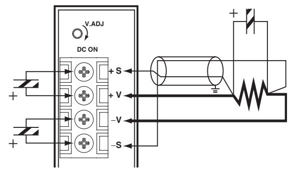
Note: 1. Use a 2-conductor shielded cable as a connection wire (*1).

2. Use as thick a wire as possible since high voltage drops on the load lines (*2) may activate the overvoltage protection function.

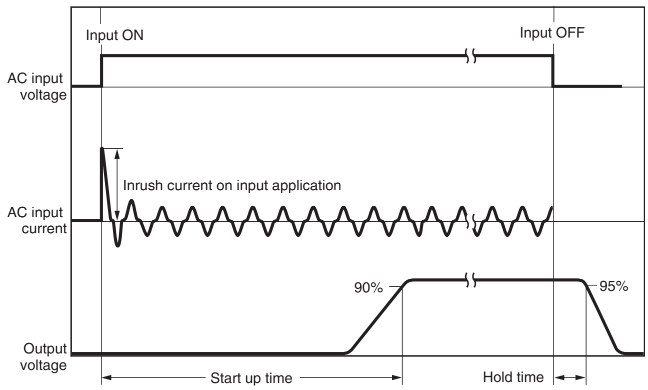
3. Use when the voltage drop is 0.3 V or lower.

4. When the +S and –S terminals are opened with the short bar removed, the overvoltage protection function is activated and the output voltage will be cut off.

5. If the load line is too long, use an electrolytic capacitor in the following 3 locations:
1) Across the load terminals
2) Between the +S terminal and + terminal
3) Between the –S terminal and – terminal
Select the capacity of the connected capacitor from between several tens to several hundreds of μF as a guide, and then determine the capacity when actually connecting the capacitor between terminals as shown below.



■ Inrush Current, Start Up Time, Output Hold Time



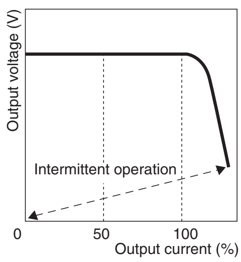
■ Reference Values

Item	Value	Definition
Reliability (MTBF)	135,000 hrs min.	MTBF stands for Mean Time Between Failures, which is calculated according to the probability of accidental device failures, and indicates the reliability of a device. Therefore, it does not necessarily represent the life of the product.
Life expectancy	10 yrs. min.	The life expectancy indicates average operating hours under the ambient temperature of 40°C and a load rate of 50%. Normally this is determined by the life expectancy of the built-in aluminum electrolytic capacitor.

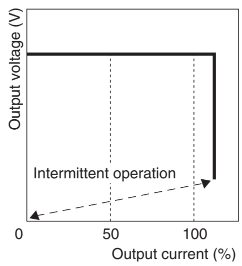
■ Overload Protection

The Power Supply is provided with an overload protection function that protects the Power Supply from possible damage by short-circuit and overcurrent.
When the output current rises above 105% min. of the rated current, the protection function is triggered, automatically decreasing the output voltage. When the output current falls within the rated range, the overload protection function is automatically cleared.

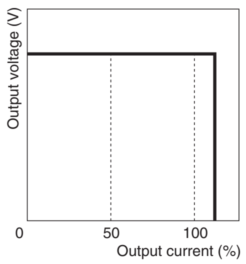
15/30W



50/100/150W (5 V)



50/100/150W (12 V, 15 V, 24 V)



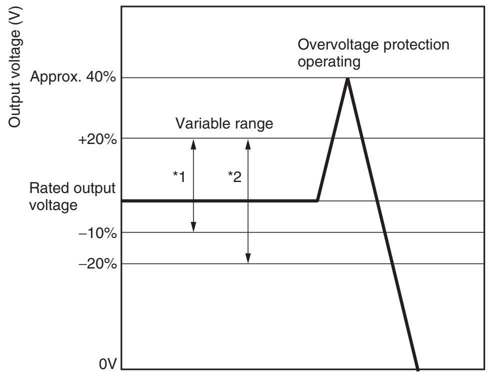
The values shown in the above diagrams are for reference only.

Note: 1. If the Power Supply has been short-circuited or supplied with an overcurrent longer than 30 seconds, the internal parts of the Power Supply may occasionally be deteriorated or damaged. Do not continue to use for longer than 30 seconds in this state.

2. Internal parts may possibly be deteriorated or damaged if the Power Supply is used for applications with frequent inrush current or overloading at the load end. Do not use the Power Supply for such applications.

■ Overvoltage Protection

Consider the possibility of an overvoltage and design the system so that the load will not be subjected to an excessive voltage even if the feedback circuit in the Power Supply fails. When an excessive voltage that is approximately 140% of the rated voltage or more is output, the output voltage is shut OFF, preventing damage to the load due to overvoltage. Reset the Power Supply by turning it OFF for at least three minutes and then turning it back ON again.



The values shown in the above diagram are for reference only.

*1 S8VM-□□□24A□

*2 Except for S8VM-□□□24A□

Note: 1. Do not turn ON the power again until the cause of the overvoltage has been removed.

2. <u>The overvoltage protection function will be activated when the output voltage adjuster (V.ADJ) is set to a value that exceeds +20% of the rated output voltage.</u>

■ Undervoltage Alarm Function (Indication and Output)

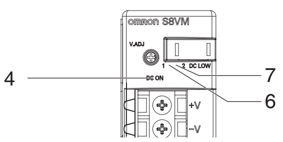
(Only S8VM-□□□24A□)

If an output voltage drop is detected with an S8VM-□□□24A□ with undervoltage alarm function, the DC LOW indicator will light to notify of an output error. The transistor also sends an output externally to notify of the error (except for the S8VM-01524A□ and S8VM-03024A□).

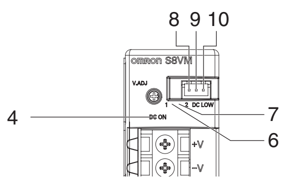
Transistor Output: Open Collector (Sinking type (NPN))
30 VDC max., 50 mA max.

Leakage current when OFF: 0.1 mA or less
Residual voltage when ON: 2 V or less

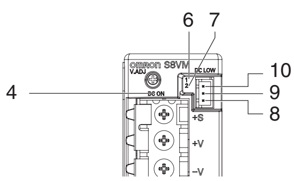
S8VM-01524A□
S8VM-03024A□



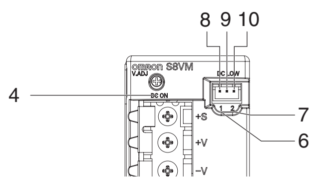
S8VM-05024A□



S8VM-10024A□



S8VM-15024A□



• Undervoltage Alarm Function 1 (DC LOW1)

Only a momentary voltage drop is detected. Detection voltage is automatically adjusted internally by detecting the output voltage (approx. 2.7 V lower than the voltage output at an output voltage of 24.0 V).
During detection, the transistor is OFF (with no continuity across 8 and 10) and the LED (6: Yellow) lights. (The Undervoltage Alarm Function 1 is used as a latch holding function.)

• Undervoltage Alarm Function 2 (DC LOW2)

Detection voltage is set to approx. 20.0 V. (from 18.0 to 21.6 V).
During detection, the transistor is OFF (with no continuity across 9 and 10) and the LED (7: Red) lights.

Note: 1. This function monitors the voltage at the Power Supply output terminals.
To check actual voltage, measure voltage on the load side.

2. Gradual voltage drop is not detected by the Undervoltage Alarm Function 1. (DC LOW1)

3. Once undervoltage is detected by Undervoltage Alarm Function 1 (DC LOW1), the transistor turns OFF and status of the LED (6: Yellow) light is maintained. To reset the function, turn OFF the Power Supply for 60 seconds or longer, and then turn it ON again.

4. If the output voltage remains at 15 V or lower for several seconds when using Undervoltage Alarm Function 1 (DC LOW 1), the output hold status for detection may be reset.

■ Probable Causes of Power Supply Errors and Troubleshooting Using Undervoltage Alarm Function

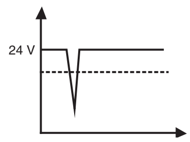
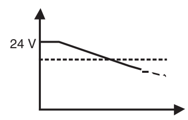
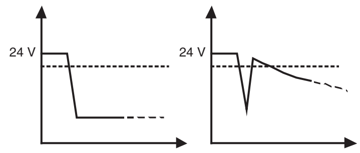
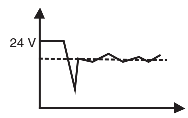
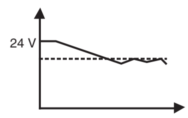
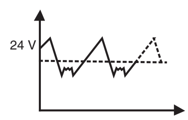
Check the following information if the Undervoltage Alarm Function operates.

Contact your OMRON representative if the Power Supply does not function normally after checking.

The symbols in the table are as follows:

●: Lit, ○: Not lit, ✳: Flashing

Note: Flashing: The output voltage is unstable, causing the LED to repeatedly turn ON and OFF.

	DC ON	DC LOW1		DC LOW2			Output voltage	Power Supply status diagnosis	
	LED ④: Green	LED ⑥: Yellow	Transistor outputs (⑧ to ⑩)	LED ⑦: Red	Transistor outputs (⑨ to ⑩)				
1	●	○	ON	○	ON	→	Normal (approx. 90% min. of rated output voltage)	Normal status	
2	●	●	OFF	○	ON	→	Normal (approx. 90% min. of rated output voltage)	The output voltage has recovered to normal status following a previous sudden voltage drop.	
3	●	○	ON	●	OFF	→	Output drop (approx. 90% max. of rated output voltage)	The output voltage has dropped gradually and remains low.	
4	●	●	OFF	●	OFF	→	Output drop (approx. 90% max. of rated output voltage)	The output voltage remains low following a previous sudden voltage drop.	
5	●	●	OFF	✳	ON ⇕ OFF	→	Output drop (approx. 80% of rated output voltage)	The output voltage remains low and is continuing to fluctuate following a previous sudden voltage drop.	
6	●	○	ON	✳	ON ⇕ OFF	→	Output drop (approx. 80% of rated output voltage)	The output voltage has dropped gradually, remains low, and is continuing to fluctuate.	
7	○	○	OFF	○	OFF	→	No output	No output voltage is being output.	
8	✳	✳	ON ⇕ OFF	✳	ON ⇕ OFF	→	Unstable output	The output voltage is unstable.	

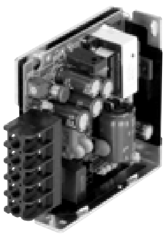
Probable cause of error	Troubleshooting methods	
---	---	1
A momentary power failure has occurred in the input.	Check that the output voltage is normal and no problems have occurred in other devices. No problems will be caused by continuing to use the Power Supply as is. To clear DC LOW1 (LED display and transistor output status), turn OFF the input Power Supply, and wait at least 60 s before turning ON the input Power Supply again.	
A momentary overload has occurred.	The load current has probably exceeded the rated current. Either reduce the connected load or replace the Power Supply with one that has a higher capacity.	2
A momentary output voltage drop has occurred at startup due to the capacity of the capacitor on the load side.	A large inrush current has probably flowed to the load side at startup. Replace the Power Supply with one that has a higher capacity.	
The output voltage has returned to normal voltage following a rapid drop caused by using the output voltage adjuster (V.ADJ).	Turn OFF the input Power Supply, and wait at least 60 s before turning ON the input Power Supply again to clear the indicator status.	
Deterioration due to age (when the Power Supply has been used for several years)	The internal parts of the Power Supply may have deteriorated due to age. Replace the Power Supply. Also replace other Power Supplies that were purchased at the same time.	
Overload (immediately following first use of the Power Supply or when increasing the load)	The load current has probably exceeded the rated current. Check the actual load current and Power Supply capacity. Continued use in overload status may damage the Power Supply.	3
The output voltage dropped to -10% or lower of the rated voltage resulting from using the output voltage adjuster (V.ADJ)	Adjust the output voltage to the rated values using the output voltage adjuster (V.ADJ).	
A sudden overload occurred and the Unit remains in overload status.	An error has probably occurred in the load device. Turn OFF the input voltage, and check whether any errors have occurred in the load device. Continued use in overload status may damage the Power Supply.	4
The output voltage remains low after a rapid voltage drop caused by using the output voltage adjuster (V.ADJ).	Adjust the output voltage to the rated values using the output voltage adjuster (V.ADJ). To clear DC LOW1 (LED display and transistor output status), turn OFF the input Power Supply, and wait at least 60 s before turning ON the input Power Supply again.	
The overload status continues to fluctuate following a sudden overload.	An error has probably occurred in the load device. Turn OFF the input voltage, and check whether any errors have occurred in the load device. Continued use in overload status may damage the Power Supply.	5
Deterioration due to age (after using the Power Supply for several years)	The internal parts of the Power Supply may have deteriorated due to age. Replace the Power Supply. Also replace other Power Supplies that were purchased at the same time.	6
Overload (immediately following first use of the Power Supply or when increasing the load)	The load current has probably exceeded the rated current. Check the actual load current and Power Supply capacity. Continued use in overload status may damage the Power Supply.	
Power Supply interrupted or damaged.	Check whether the Power Supply's input voltage is being applied correctly. If there is no output even though the input voltage is applied correctly, the internal circuit is probably damaged. Return the Product to OMRON.	
Overvoltage protection operation	Turn OFF the input Power Supply, and wait at least 3 min before turning ON the input again. If the same status recurs, the internal circuit is probably damaged. Return the Product to OMRON.	7
The short bar has fallen off, or the +S and -S terminals are open.	Check whether the +S and -S terminals are open. If so, the overvoltage protection function is activated. Therefore, turn OFF the input power supply and wait at least three minutes before turning it ON again. (S8VM-10024A□/15024A□ models only)	
Output short-circuit	Remove the cause of the output short-circuit.	
Intermittent operation due to overload (S8VM-01524A□/03024A□ only)	The load current has probably exceeded the rated current. Check the actual load current and Power Supply capacity. Continued use in overload status may damage the Power Supply.	
The Power Supply fails to start repeatedly due to the capacity of the capacitor on the load side.	A large inrush current has probably flowed to the load side at startup. Replace the Power Supply with one that has a higher capacity.	8
The input turns ON and OFF repeatedly.	Check whether the Power Supply's input voltage is being applied correctly.	
The status repeatedly switches between normal operation and output short-circuit.	An error has probably occurred in the load device. Turn OFF the input voltage, and check whether any errors have occurred in the load device.	

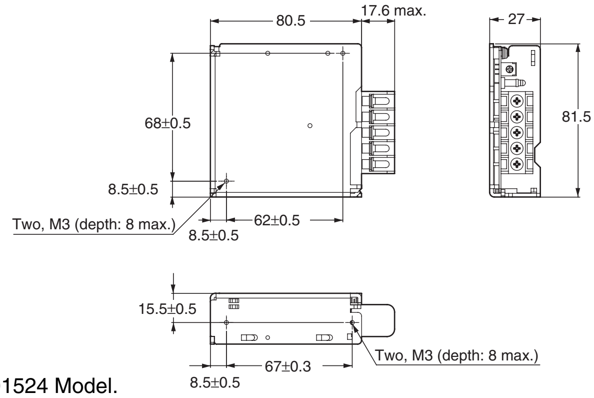
Dimensions

Note: All units are in millimeters unless otherwise indicated.

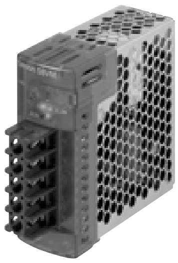
■ Front-mounting Models

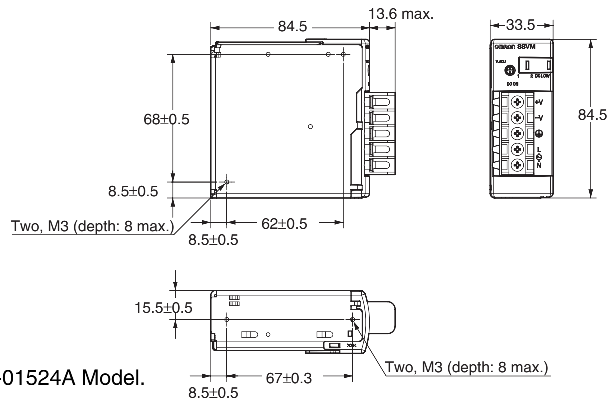
S8VM-015□□
S8VM-015□□C
S8VM-01524A





Note: The image is the S8VM-01524 Model.



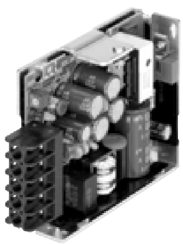


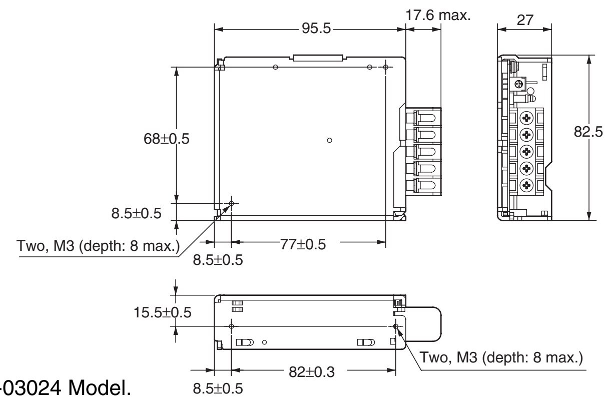
Note: The image is the S8VM-01524A Model.

Mounting Holes

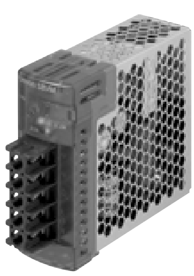
	Surface Screw Mounting
Side Mounting	Two, 4 dia. 68±0.5 62±0.5
Bottom Mounting	Two, 4 dia. 67±0.3

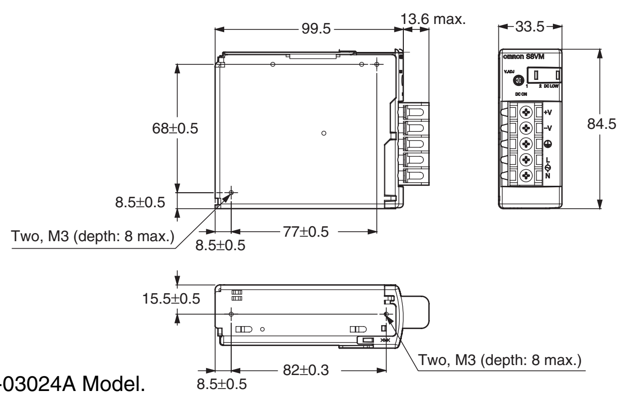
S8VM-030□□
S8VM-030□□C
S8VM-03024A





Note: The image is the S8VM-03024 Model.



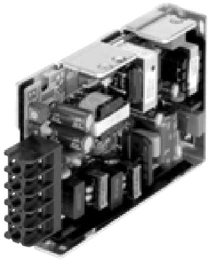


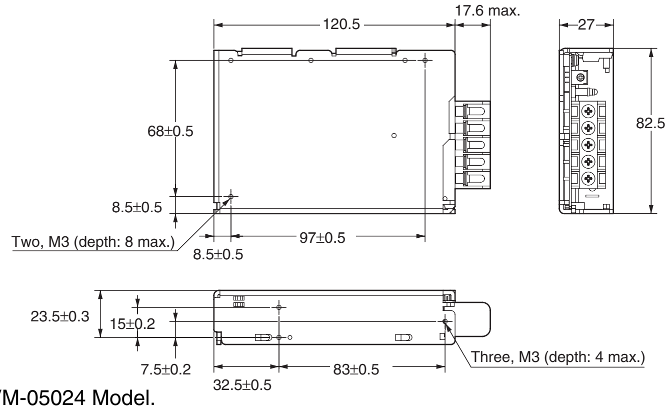
Note: The image is the S8VM-03024A Model.

Mounting Holes

	Surface Screw Mounting
Side Mounting	Two, 4 dia. 68±0.5 77±0.5
Bottom Mounting	Two, 4 dia. 82±0.3

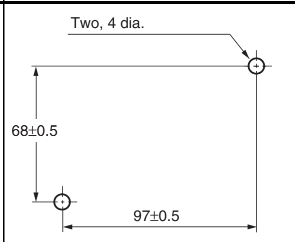
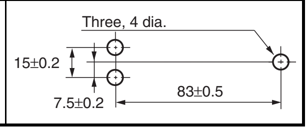
S8VM-050□□
S8VM-050□□C
S8VM-05024A

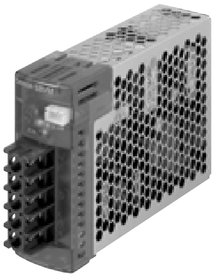


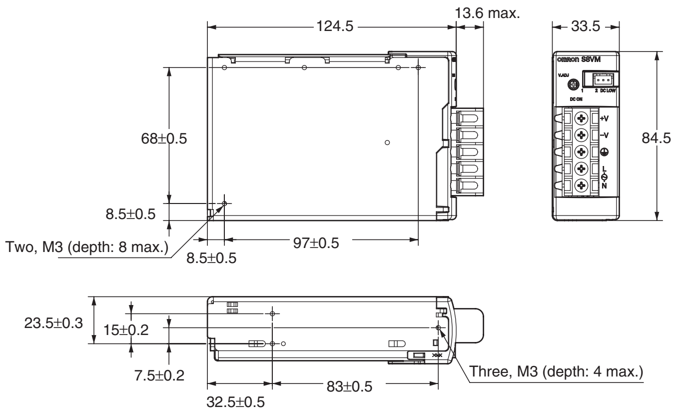


Note: The image is the S8VM-05024 Model.

Mounting Holes

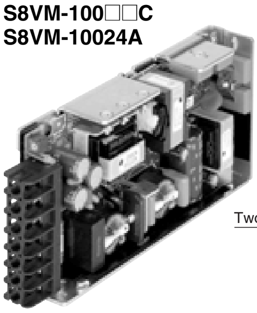
	Surface Screw Mounting
Side Mounting	
Bottom Mounting	

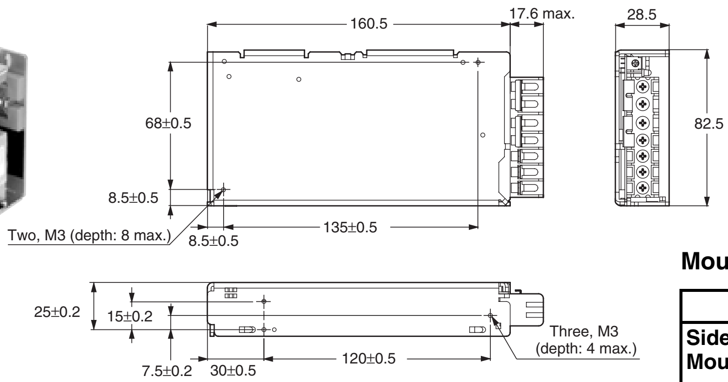




Note: The image is the S8VM-05024A Model.

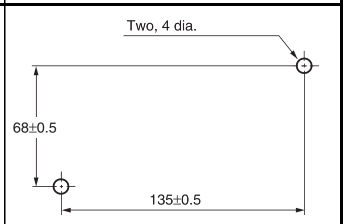
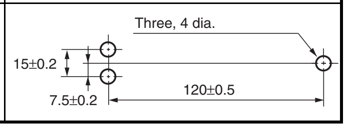
S8VM-100□□
S8VM-100□□C
S8VM-10024A

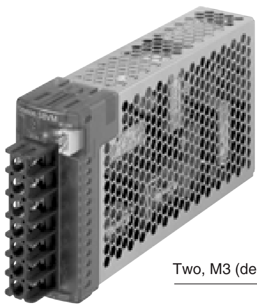


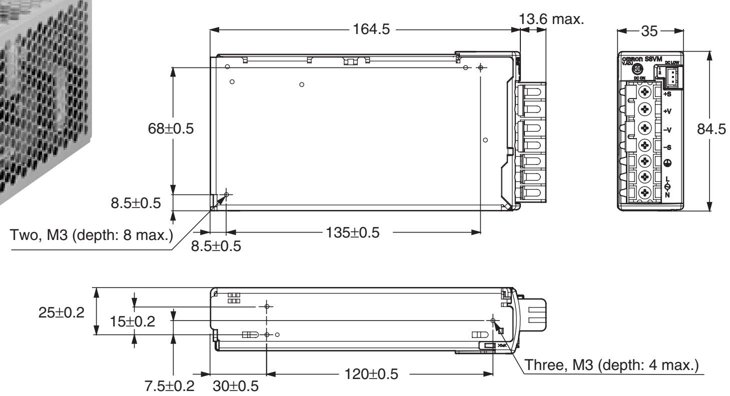


Note: The image is the S8VM-10024 Model.

Mounting Holes

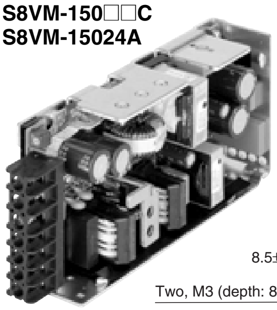
	Surface Screw Mounting
Side Mounting	
Bottom Mounting	

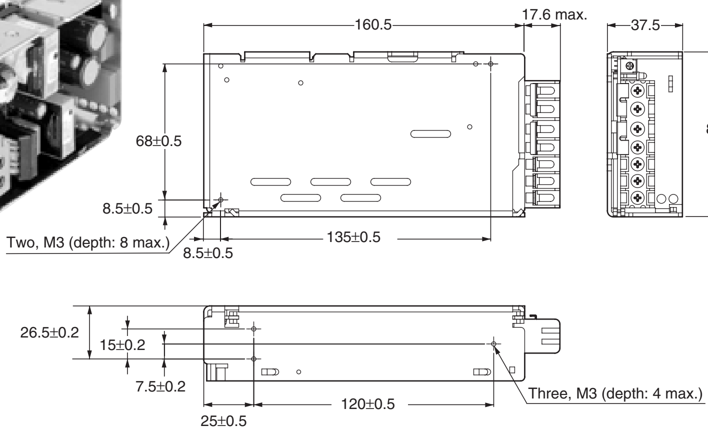




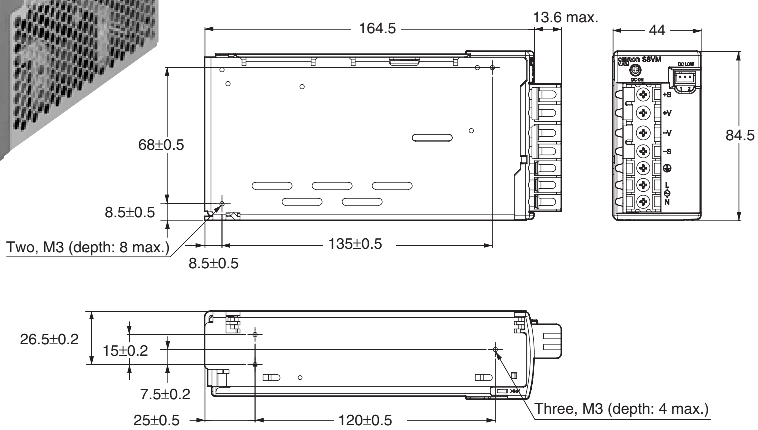
Note: The image is the S8VM-10024A Model.

S8VM-150□□
S8VM-150□□C
S8VM-15024A



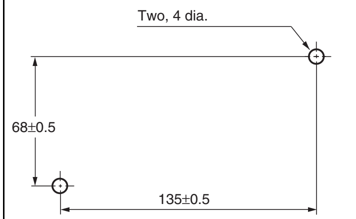
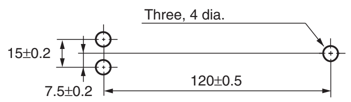


Note: The image is the S8VM-15024 Model.



Note: The image is the S8VM-15024A Model.

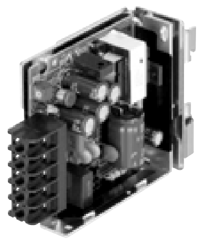
Mounting Holes

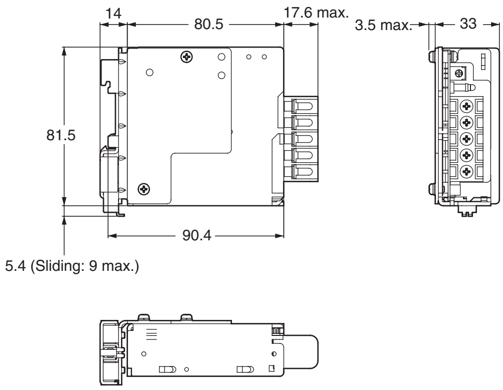
	Surface Screw Mounting
Side Mounting	
Bottom Mounting	

■ DIN Rail Mounting Bracket Models

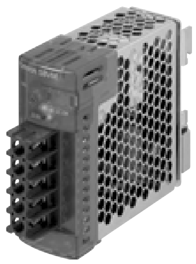
Power supplies

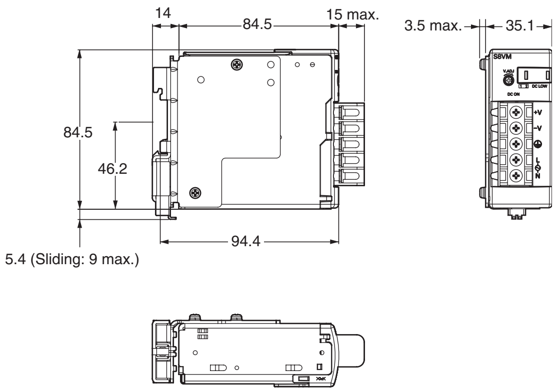
S8VM-015☐☐D
S8VM-015☐☐CD
S8VM-01524AD





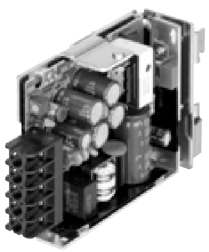
Note: The image is the S8VM-01524D Model.

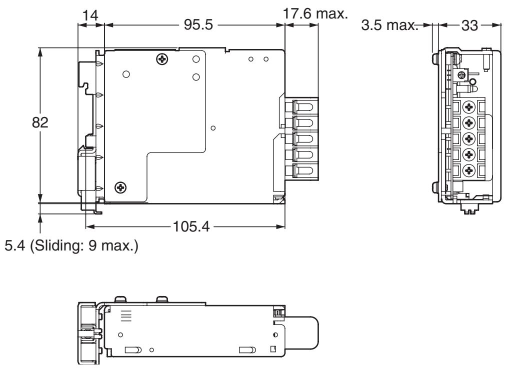




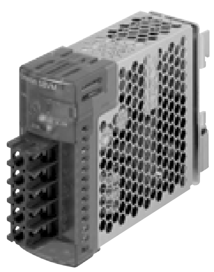
Note: The image is the S8VM-01524AD Model.

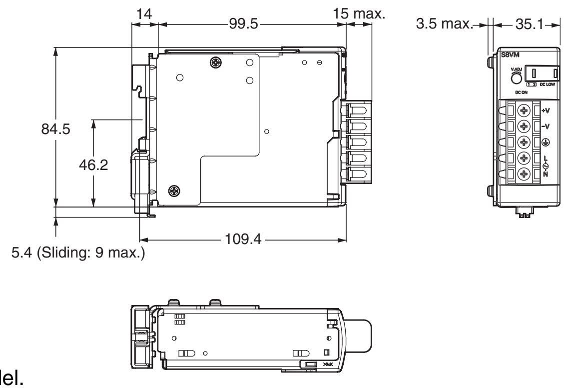
S8VM-030☐☐D
S8VM-030☐☐CD
S8VM-03024AD





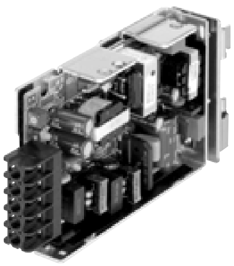
Note: The image is the S8VM-03024D Model.

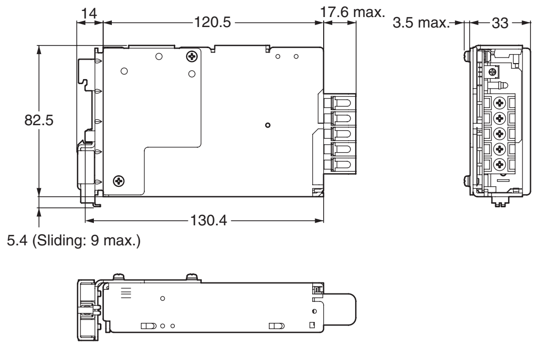




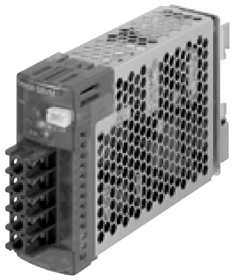
Note: The image is the S8VM-03024AD Model.

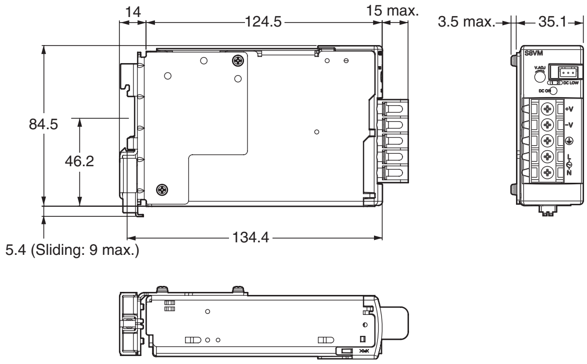
S8VM-050□□D
S8VM-050□□CD
S8VM-05024AD





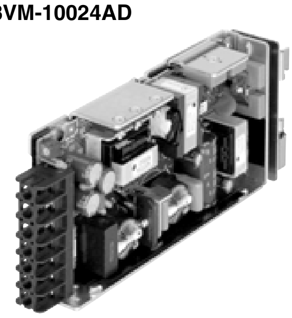
Note: The image is the S8VM-05024D Model.

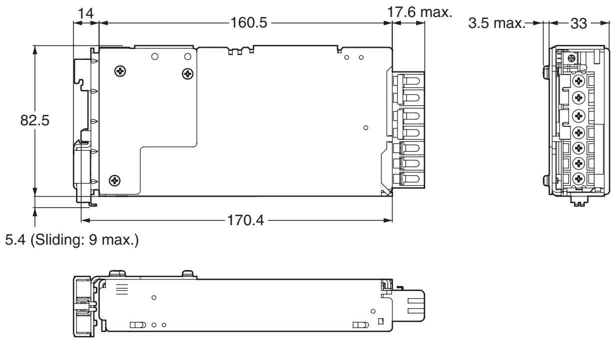




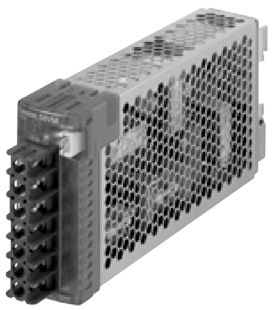
Note: The image is the S8VM-05024AD Model.

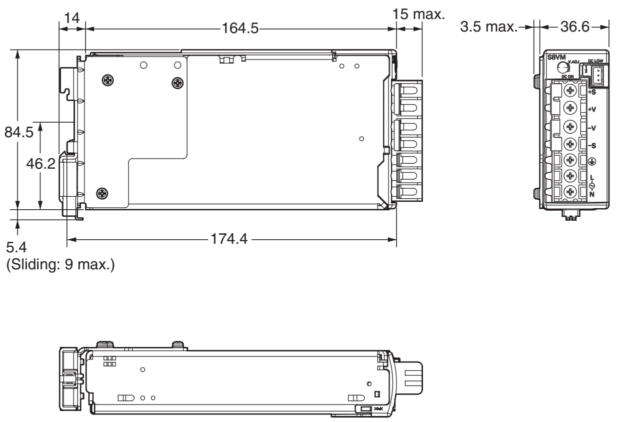
S8VM-100□□D
S8VM-100□□CD
S8VM-10024AD





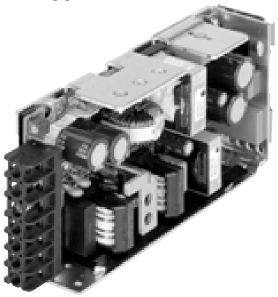
Note: The image is the S8VM-10024D Model.

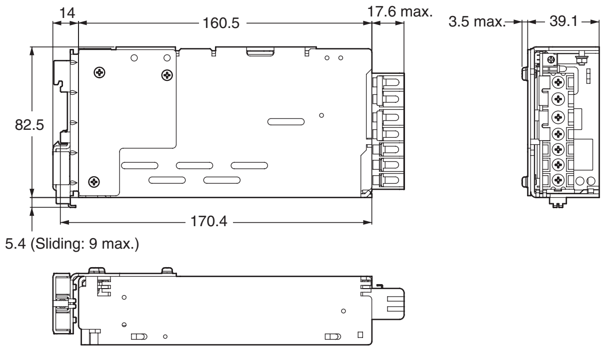




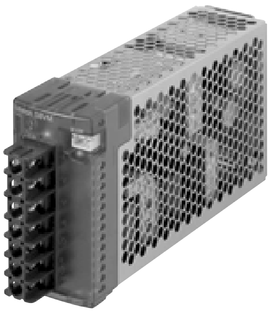
Note: The image is the S8VM-10024AD Model.

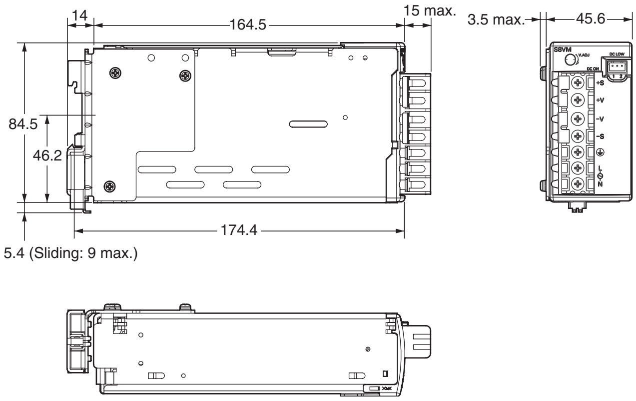
S8VM-150□□D
S8VM-150□□CD
S8VM-15024AD





Note: The image is the S8VM-15024D Model.





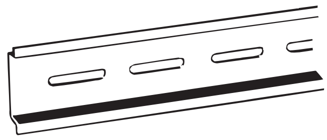
Note: The image is the S8VM-15024AD Model.

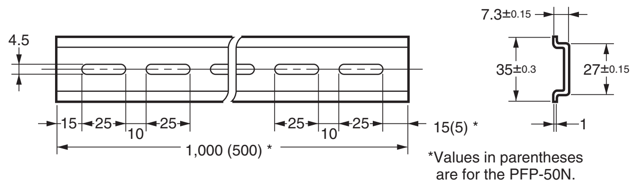
■ DIN Rail (Order Separately)

Note: All units are in millimeters unless otherwise indicated.

Mounting Rail (Material: Aluminum)

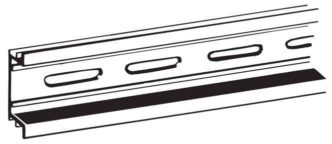
PFP-100N
PFP-50N

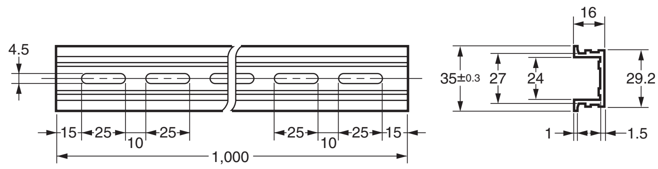




Mounting Rail (Material: Aluminum)

PFP-100N2





Safety Precautions

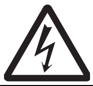
⚠ CAUTION

Minor electric shock, fire, or Product failure may occasionally occur. Do not disassemble, modify, or repair the Product or touch the interior of the Product.

Minor burns may occasionally occur. Do not touch the Product while power is being supplied or immediately after power is turned OFF.

Fire may occasionally occur. Tighten terminal screws to the specified torque of 1.6 N·m.

Minor injury due to electric shock may occasionally occur. Do not touch the terminals while power is being supplied.

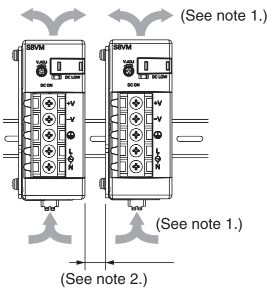


Minor electric shock, fire, or Product failure may occasionally occur. Do not allow any pieces of metal or conductors or any clippings or cuttings resulting from installation work to enter the Product.

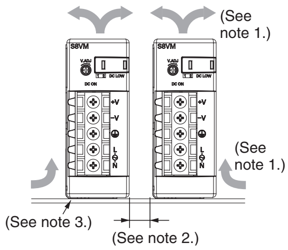
■ Precautions for Safe Use

Mounting

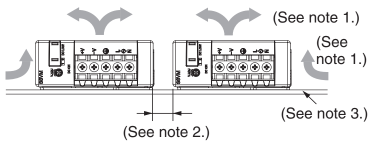
Standard mounting (DIN Rail mounting bracket type)



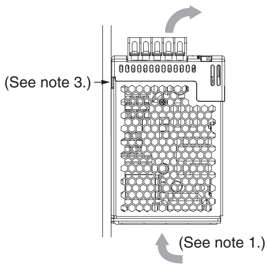
Standard mounting (Front-mounting type)



Horizontal mounting (Front-mounting type)



Face-up mounting (Front-mounting type)



Note: 1. Convection of air
2. 20 mm or more
3. Use a metal plate as the mounting panel.

Take adequate measures to ensure proper heat dissipation to increase the long-term reliability of the Product.
Be sure to allow convection in the atmosphere around devices when mounting. Do not exceed the range of the derating curve.

Use the metal plate as the mounting panel.

When cutting out holes for mounting, make sure that cuttings do not enter the interior of the Product.

Improper mounting will interfere with heat dissipation and may occasionally result in deterioration or damage of internal parts.
Use the Product within the derating curve for the mounting direction that is used.

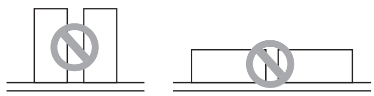
When mounting two or more Power Supplies side-by-side, allow at least 20 mm spacing between them, as shown in the above illustrations.

The internal parts may possibly be damaged if mounting screws are over inserted. Refer to *Dimensions* on page B-42 for maximum depth of insertion inside the Power Supply.

Several Power Supplies cannot be connected. (Only S8VM-100□□□□/150□□□□) Keep the Power Supply as far away from heating elements as possible when installing.

S8VM-100□□□□/S8VM-150□□□□

Incorrect **Incorrect**



Wiring

Connect the ground completely. A protective earthing connection stipulated in safety standards is used. Electric shock or malfunction may occur if the ground is not connected completely.

Minor fire may possibly occur. Ensure that input and output terminals are wired correctly.

Do not apply more than 100 N force to the terminal block when tightening it.

Be sure to remove the sheet covering the Product for machining before power-ON so that it does not interfere with heat dissipation.

Use the following material for the wires to be connected to the S8VM to prevent smoking or ignition caused by abnormal loads.
Over heating or fire can result from inadequately sized wiring materials when problems occur at the load. As a general rule, always select wire sizes suitable for at least 1.6 times the rated current.

Recommended Wire Types

Model		Recommended wire type
S8VM-015□□□□ S8VM-030□□□□ S8VM-050□□□□	(M3.5)	AWG24 to 14 (0.205 to 2.081 mm^2)
S8VM-100□□□□ S8VM-150□□□□	(M3.5)	AWG24 to 14 (0.205 to 2.081 mm^2)
S8VM-100□□□□ S8VM-150□□□□	(M4)	AWG24 to 12 (0.205 to 3.309 mm^2)

Selection of Wires

Select wires for the Power Supply carefully. Refer to this table when selecting the wires.

AWG No.	Cross-sectional area (mm^2)	Configuration (number of conductors/ mm)	Voltage drop per 1 A (mV/ meter)	Recommended maximum current (A)	
				UL1007 (300 V at 80°C)	UL1015 (600 V at 105°C)
30	0.051	7/0.102	358	0.12	---
28	0.081	7/0.127	222	0.15	0.2
26	0.129	7/0.16	140	0.35	0.5
24	0.205	11/0.16	88.9	0.7	1.0
22	0.326	17/0.16	57.5	1.4	2.0
20	0.517	26/0.16	37.6	2.8	4.0
18	0.823	43/0.16	22.8	4.2	6.0
16	1.309	54/0.18	14.9	5.6	8.0
14	2.081	41/0.26	9.5	---	12.0
12	3.309	65/0.26	6.0	---	22.0
10	5.262	104/0.26	3.8	---	35.0

Recommended Maximum Current

The table is applicable to wires with 1 to 4 conductors. Keep the current value to within 80% of the values shown in this table when using wires having 5 or more conductors.

XH Connector Preparation

The following Products are provided with the S8VM-05024A□, S8VM-10024A□ and S8VM-15024A□ for the undervoltage alarm transistor output wiring.

Connector	S8VM-05024A□	S8VM-10024A□	Manu-factured by JST
		S8VM-15024A□	
	S3B-XH-A-1	BH3B-XH-2	
Housing (provided)	XHP-3		
Terminal (provided)	BXH-001T-P0.6 or SXH-001T-P0.6		

Be sure to prepare the connector according to the following instructions to ensure correct wiring. For details, refer to the JST catalog.

- Use a wire size of AWG22 to AWG28.
- The guideline for the length of sheath to be stripped from the wire is 2.1 to 2.6 mm.
- Use either a YC or YRS Crimping Tool (manufactured by JST) to crimp the terminal and wire.
- Be sure to insert the crimped terminal wires into the housing fully until a click is heard. Also, make sure that the wires attached to the housing are securely locked in place.

Installation Environment

Do not use the Power Supply in locations subject to shocks or vibrations. In particular, install the Power Supply as far away as possible from contactors or other devices that are a vibration source.

Install the Power Supply well away from any sources of strong, high-frequency noise and surge.

Operating Life

The life of a Power Supply is determined by the life of the electrolytic capacitors used inside. Here, Arrhenius Law applies, i.e., the life will be halved for each rise of 10°C or the life will be doubled for each drop of 10°C. The life of the Power Supply can thus be increased by reducing its internal temperature.

Ambient Operating and Storage Environments

Store the Power Supply at a temperature of –25 to 65°C and a humidity of 25% to 90%.

The Internal parts may occasionally be deteriorated or damaged. Do not use the Power Supply outside the derating range (i.e., under conditions indicated by the shaded area (   ) in the derating curve diagrams on page B-37.)

Use the Power Supply at a humidity of 30% to 85%.

Do not use the Power Supply in locations subject to direct sunlight.

Do not use the Power Supply in locations where liquids, foreign matter, or corrosive gases may enter the interior of the product.

Overcurrent Protection

If the Power Supply has been short-circuited or supplied with an overcurrent longer than 30 seconds, the internal parts of the Power Supply may occasionally be deteriorated or damaged. Do not continue to use longer than 30 seconds in this state.

Internal parts may possibly be deteriorated or damaged if the Power Supply is used for applications with frequent inrush current or overloading at the load end. Do not use the Power Supply for such applications.

Charging the Battery

If a battery is to be connected as the load, install an overcurrent limiting circuit and an overvoltage protection circuit.

Dielectric Strength Test

If a high voltage is applied between an input and the case (PE/FG), it will pass though the LC of the built-in noise filter and energy will be stored. If the high voltages used for dielectric strength testing are turned ON and OFF with a switch, timer, or similar device, impulse voltage will be generated when the voltage is turned OFF and internal parts may possibly be damaged. To prevent the generation of impulse voltages, reduce the applied voltage slowly with a variable resistor on the test device or turn the voltage ON and OFF at the zero-cross point.

When performing the test, be sure to short-circuit all the output terminals to protect them from damage.

Insulation Test

When performing the test, be sure to short-circuit all the output terminals to protect them from damage.

Inrush Current

When two or more Power Supplies are connected to the same input, inrush current is added to the total current. Select fuses and circuit breakers giving sufficient consideration to the fusing or operating characteristics so that fuses will not burn and breakers will not break due to inrush current.

Output Voltage Adjuster (V.ADJ)

Default Setting: Set at the rated voltage

Adjustable Range: Adjustable with output voltage adjuster (V.ADJ) on the front panel of the Product from –20% to 20% of the rated output voltage (–10% to 20% of the rated voltage for S8VM-□□□24A□)

Turning clockwise increases the output voltage and turning counterclockwise decreases the output voltage.

The output voltage adjuster (V.ADJ) may possibly be damaged if it is turned with unnecessary force. Do not turn the adjuster with excessive force.

After completing output voltage adjustment, be sure that the output capacity or output current does not exceed the rated output capacity or rated output current.

The output voltage may increase beyond the allowable voltage range (up to +20% of the rated voltage) depending on the operation of the output voltage adjuster (V.ADJ). When adjusting the output voltage, check the output voltage of the Power Supply and be sure that the load is not damaged.

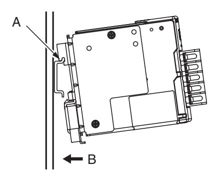
<u>When increasing the output voltage to more than +20% of the rated value using the output voltage adjuster (V. ADJ), the overvoltage protection function may operate.</u>

(S8VM-□□□24A□ Only)

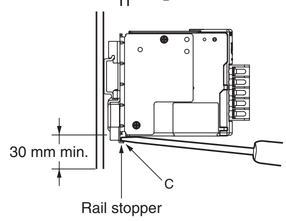
<u>Turn the output voltage adjuster (V.ADJ) slowly. When decreasing the output voltage quickly, or when adjusting the output voltage to less than –10% of the rated value, the undervoltage alarm function may operate.</u>

DIN Rail Mounting

When mounting to a DIN Rail, lower the S8VM onto the Rail until the Rail stopper clicks into place, hook section A over the edge of the Rail and push in the direction of B.



To remove the S8VM from the DIN Rail, insert a screwdriver into section C and pull the S8VM away from the Rail.

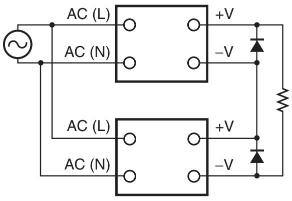


Series Operation

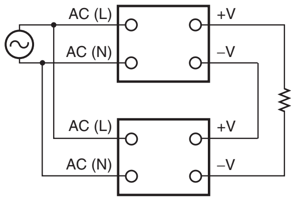
Two Power Supplies can be connected in series.
The (±) voltage output can be accomplished with two Power Supplies.

Series Operation

15W/30W
Correct

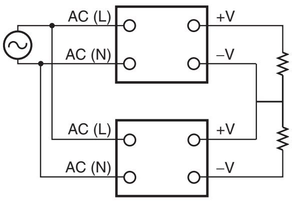


50W/100W/150W
Correct



Output Voltage (±)

Correct



Note: 1. If the load is short-circuited, a reverse voltage may be applied inside the Power Supply unit, and this may possibly cause the deterioration or damage of the Power Supply unit. Connect the diode as shown in the figure. Use the following guidelines to select the diode to be connected.

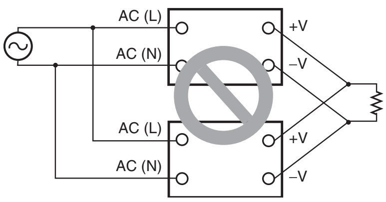
Type	Schottky Barrier diode
Dielectric strength (V_{RRM})	Twice the rated output voltage or above
Forward current (I_F)	Twice the rated output current or above

2. Though Products having different specifications can be connected in series, the current flowing through the load must not exceed the smaller rated output current.

Parallel Operation

The product is not designed for parallel operation.

Incorrect



In Case There Is No Output Voltage

The possible cause for no output voltage may be that the overcurrent protection or overvoltage protection has operated. The internal protection circuit may operate if a large amount of surge voltage such as a lightening surge occurs while turning ON the Power Supply.

If there is no output voltage even after checking the following points please contact us.

Check the Overload Protected Status

Check whether the load is in overload status or is short-circuited. Remove wires load when checking.

Attempt to clear the overvoltage or internal protection function:

Turn the Power Supply OFF once, and leave it OFF for at least 3 minutes. Then turn it ON again to see if this clears the condition.

Check whether the +S terminal or –S terminal is opened with the short bar removed. (S8VM-100□□□□/S8VM-150□□□□ only)

Check if the output voltage has been adjusted to more than +20% of the rated value by output voltage adjuster. (V. ADJ).

Noise when the Input is Turned ON (50/100/150W)

A harmonic current suppression circuit is built into the Power Supply. This circuit can create noise when the input is turned ON, but it will last only until internal operation stabilizes and does not indicate any problem in the Product.

Warranty and Application Considerations

Read and Understand this Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability.*

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. T033-E2-02A

Switch Mode Power Supply

S8TS

Block-type Switch mode Power Supply That Mounts to DIN-rail

- Power supply range of 60 to 240 W available with just one model (24-V models).
- Easy creation of multi-power supply configurations with different output power supplies connected together (24-V, 12-V, and 5-V models).
- Improve power supply system reliability by creating N+1 redundant systems (24-V and 12-V models).
- Approved by UL/CSA standards, EN60950 (IEC 950), and VDE 0160.

Model Number Structure

■ Model Number Legend

S8TS-□□□□□□-□□
1 2 3 4

1. Capacity
060: 60 W
030: 30 W
025: 25 W

2. Output Voltage
24: 24 V
12: 12 V
05: 5 V

3. Structure
None: Screw terminals
F: Connector terminals

4. Bus Line Connectors
None: Basic Block only
E1: S8T-BUS01 and S8T-BUS02 included

Ordering Information

■ Basic Block

Output voltage	Output current	Screw terminal type		Connector terminal type (See note 3.)	
		With Bus Line Connectors (See note 1.)	Without Bus Line Connectors (See note 2.)	With Bus Line Connectors (See note 1.)	Without Bus Line Connectors (See note 2.)
24 V	2.5 A	S8TS-06024-E1	S8TS-06024	S8TS-06024F-E1	S8TS-06024F
12 V	2.5 A	S8TS-03012-E1	S8TS-03012	S8TS-03012F-E1	S8TS-03012F
5 V	5 A	---	S8TS-02505	---	S8TS-02505F

■ Bus Line Connector

Type	Number of Connectors	Model number
AC line + DC line bus (For parallel operation)	1 Connector	S8T-BUS01
	10 Connectors (See note 4.)	S8T-BUS11
AC line bus (For series operation or isolated operation)	1 Connector	S8T-BUS02
	10 Connectors (See note 5.)	S8T-BUS12

Note 1. One S8T-BUS01 Connector and one S8T-BUS02 Connector are included as accessories.
2. Bus Line Connectors are ordered separately if necessary.
3. Attached connectors: 2ESDPLM-05P (for output terminal) and 3ESDPLM-03P (for input terminal) made by DINKLE ENTERPRISE.
4. One package contains 10 S8T-BUS01 Connectors.
5. One package contains 10 S8T-BUS02 Connectors.

Specifications

■ Ratings/Characteristics

24/12-V Models (Basic Block: S8TS-06024□/S8TS-03012□)

Item			Single operation	Parallel operation
Efficiency			24-V models: 75% min.; 12-V models: 70% min. (with rated input, 100% load)	
Input	Voltage		100 to 240 VAC (85 to 264 VAC)	
	Frequency		50/60 Hz (47 to 63 Hz)	
	Current	100 V input	24-V models: 1.0 A max. 12-V models: 0.7 A max.	24-V models: 1.0 A × (No. of Blocks) max. 12-V models: 0.7 A × (No. of Blocks) max.
		200 V input	24-V models: 0.5 A max. 12-V models: 0.4 A max.	24-V models: 0.5 A × (No. of Blocks) max. 12-V models: 0.4 A × (No. of Blocks) max.
	Power factor		24-V models: 0.9 min.; 12-V models: 0.8 min. (with rated input, 100% load) (See note 3.)	
	Leakage current	100 V input	0.35 mA max.	0.35 mA × (No. of Blocks) max.
		240 V input	0.7 mA max.	0.7 mA × (No. of Blocks) max.
	Inrush current (25°C, cold start) (See note 4.)	100 V input	25 A max.	25 A × (No. of Blocks) max.
		200 V input	50 A max.	50 A × (No. of Blocks) max.
Output (See note 3.)	Voltage adjustment range		24-V models: 22 to 28 V 12-V models: 12 V ±10% (with V.ADJ) (See note 1.)	
	Ripple		2% (p-p) max.	
	Input variation influence		0.5% max. (with 85 to 264 VAC input, 100% load)	
	Load variation influence		2% max. (with rated input, 10% to 100% load)	3% max. (with rated input, 10% to 100% load)
	Temperature variation influence		0.05%/°C max. (with rated input and output)	
	Startup time (See note 4.)		1,000 ms max.	
	Hold time (See note 4.)		20 ms min. (with 100/200 VAC, rated input)	
Additional functions	Overcurrent protection (See note 4.)		105% to 125% of rated load current, inverted L drop type, automatic reset	100% to 125% of rated load current inverted L drop type, automatic reset
	Overvoltage protection (See note 4.)		Yes	
	Parallel operation		Yes, 4 Blocks max.	
	N+1 redundant system		Yes, 5 Blocks max.	
	Series operation		Yes	
	Undervoltage indicator (See note 4.)		Yes (color: red)	
	Undervoltage detection output (See note 4.)		Yes (open collector output), 30 VDC max., 50 mA max.	
Other	Ambient operating temperature (See note 4.)		Operating: Refer to the derating curve in *Engineering Data.* Storage: −25 to 65°C (with no icing or condensation)	
	Ambient humidity		Operating: 25% to 85%; Storage: 25% to 90%	
	Dielectric strength		3.0 kVAC, 50/60 Hz for 1 minute (between all inputs and all outputs; detection current: 20 mA)	
			2.0 kVAC, 50/60 Hz for 1 minute (between all inputs and GR terminal; detection current: 20 mA)	
			1.0 kVAC for 1 minute (between all outputs and GR terminal; detection current: 20 mA)	
	Insulation resistance		100 MΩ min. (between all outputs and all inputs, and between all outputs and GR terminal) at 500 VDC	
	Vibration resistance		10 to 55 Hz, 0.375-mm single amplitude for 2 h each in X, Y, and Z directions	
	Shock resistance		150 m/s^2, 3 times each in ±X, ±Y, and ±Z directions	
	Output indicator		Yes (color: green)	
	Electromagnetic interference		Conforms to FCC Class A, EN50081-1	
	EMI		Conforms to EN50081-1/1992	
	Power factor correction		Conforms to EN61000-3-2, EN61000-3-2 A14	
	EMS		Conforms to EN61000-6-2/1999	
	Approved standards		UL: 508 (Listing; Class 2: Per UL1310), 1950, 1604 (Class I, Division 2, Groups A, B, C, D Hazardous Locations)) cUL: CSA C22.2 No.14, No.213 (Class I, Division 2, Groups A, B, C, D Hazardous Locations), No. 950 (Class 2) (See note 2.) EN/VDE: EN50178 (=VDE0160), 60950 (=VDE0806)	
	Weight		450 g max.	450 g × (No. of Blocks) max.

Note 1. Refer to page B-59 for details on adjusting the output voltage for parallel operation. If set to less than −10%, the undervoltage detection function may operate. Ensure that the output capacity and output current after adjustment do not exceed the rated output capacity and rated output current respectively.

2. Class 2 approval does not apply to parallel operation.

3. The output current is specified at power output terminals.

4. Refer to the explanations of functions on page B-56 for details.

5. Be sure to mount End Plates (PFP-M) on both ends of the Power Supply.

5-V Models (Basic Block: S8TS-02505□)

Item			Single operation
Efficiency (typical)			62% min. (with rated input, 100% load)
Input	Voltage		100 to 240 VAC (85 to 264 VAC)
	Frequency		50/60 Hz (47 to 63 Hz)
	Current	100 V input	0.7 A max.
		200 V input	0.4 A max.
	Power factor		0.8 min. (with rated input, 100% load)
	Leakage current	100 V input	0.35 mA max.
		240 V input	0.7 mA max.
	Inrush current (25°C, cold start) (See note 2.)	100 V input	25 A max.
		200 V input	50 A max.
Output (See note 2.)	Voltage adjustment range		5 V ± 10% (with V. ADJ) (See note 1.)
	Ripple		2% (p-p) max.
	Input variation influence		0.5% max. (with 85 to 264 VAC input, 100% load)
	Temperature variation influence		0.05%/°C max. (with rated input and output)
	Load variation influence		1.5% max. (with rated input, 10% to 100% load)
	Startup time (See note 3.)		1,000 ms max.
	Hold time (See note 3.)		20 ms min. (with 100/200 VAC, rated input)
Additional functions	Overcurrent protection (See note 3.)		105% to 125% of rated load current, inverted L drop type, automatic reset
	Overvoltage protection (See note 3.)		Yes
	Parallel operation		No
	N+1 redundant system		No
	Series operation		Yes (with the external diode)
	Undervoltage indicator (See note 3.)		Yes (color: red)
	Undervoltage detection output (See note 3.)		Yes (open collector output), 30 VDC max., 50 mA max.
Other	Ambient operating temperature (See note 3.)		Operating: Refer to the derating curve in *Engineering Data*. Storage: –25 to 65°C (with no icing or condensation)
	Ambient humidity		Operating: 25% to 85%, Storage: 25% to 90%
	Dielectric strength		3.0 kVAC, 50/60 Hz for 1 minute (between all inputs and all outputs; detection current: 20 mA)
			2.0 kVAC, 50/60 Hz for 1 minute (between all inputs and GR terminal; detection current: 20 mA)
			1.0 kVAC for 1 minute (between all outputs and GR terminal; detection current: 20 mA)
	Insulation resistance		100 MΩ min. (between all outputs and all inputs, and between all outputs and GR terminal) at 500 VDC
	Vibration resistance		10 to 55 Hz, 0.375-mm single amplitude for 2 h each in X, Y, and Z directions
	Shock resistance		150 m/s^2, 3 times each in ±X, ±Y, and ±Z directions
	Output indicator		Yes (color: green)
	Electromagnetic interference		Conforms to FCC Class A, EN50081-1
	EMI		Conforms to EN50081-1/1992
	Power factor correction		Conforms to EN61000-3-2, EN61000-3-2A14
	EMS		Conforms to EN61000-6-2/1999
	Approved standards		UL: 508 (Listing), 1950, 1604 (Class I, Division 2, Groups A, B, C, D Hazardous Locations) cUL: CSA C22.2 No.14, No.213 (Class I, Division 2, Groups A, B, C, D Hazardous Locations), No. 950 EN/VDE: EN50178 (=VDE0160), 60950 (=VDE0806)
	Weight		450 g max.

Note 1. If set to less than –10%, the undervoltage detection function may operate. Ensure that the output capacity and output current after adjustment do not exceed the rated output capacity and rated output current respectively.

2. The output current is specified at power output terminals.

3. Refer to the explanations of functions on page B-56 for details.

4. Be sure to mount End Plates (PFP-M) on both ends of the Power Supply.

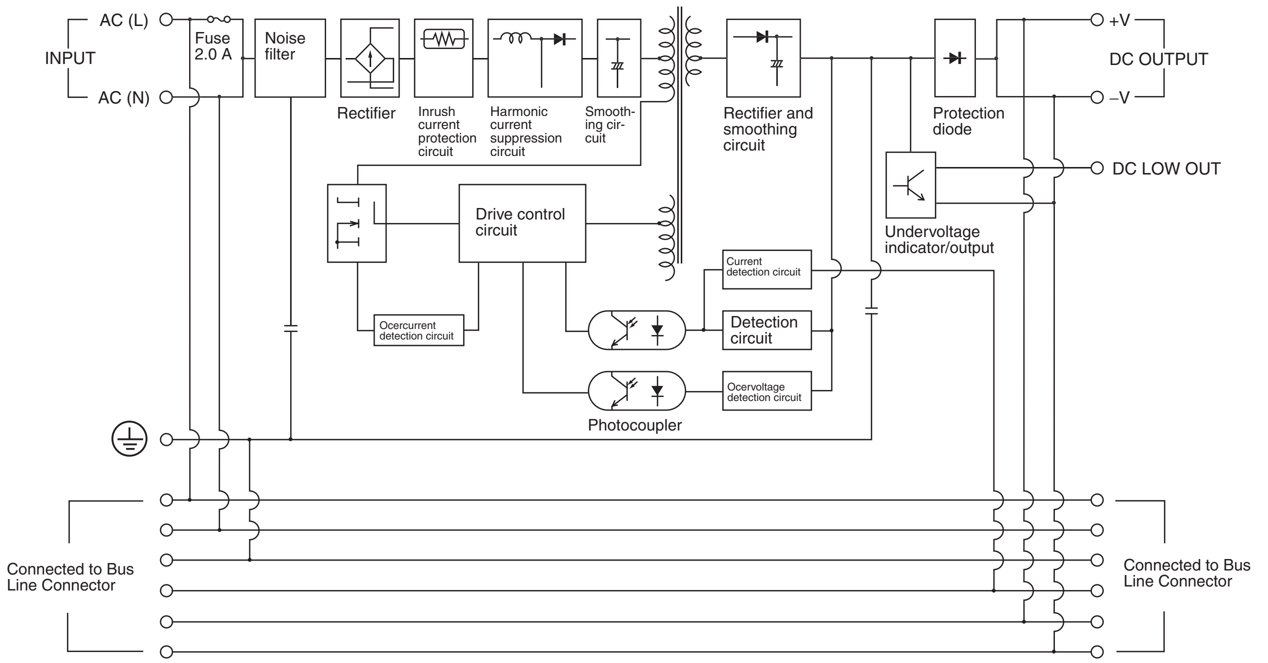
■ Reference Value

Item	Value	Definition
Reliability (MTBF)	250,000 hrs min.	MTBF stands for Mean Time Between Failures, which is calculated according to the probability of accidental device failures, and indicates reliability of devices. Therefore, it does not necessarily represent the life of the product.
Life expectancy	10 yrs min.	The life expectancy indicates average operating hours under the ambient temperature of 40°C and a load rate of 50%. Normally this is determined by the life expectancy of the built-in aluminum electrolytic capacitor.

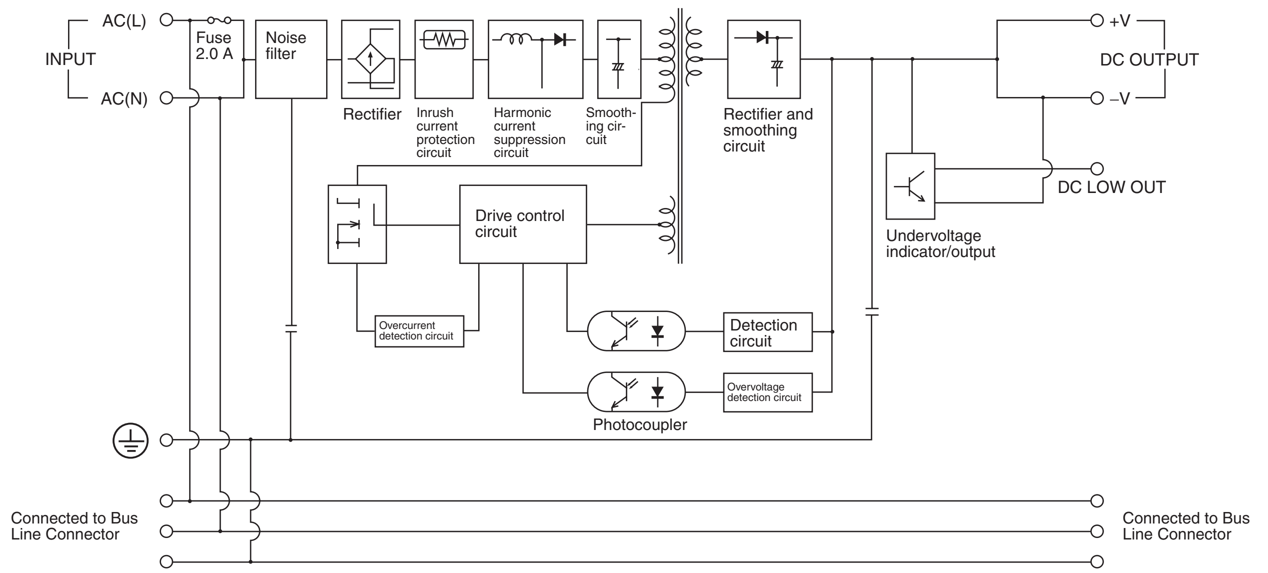
Connections

■ Block Diagrams

S8TS-06024□ and S8TS-03012□

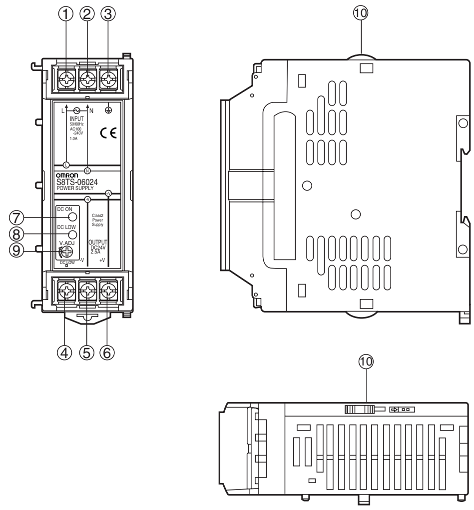


S8TS-02505□

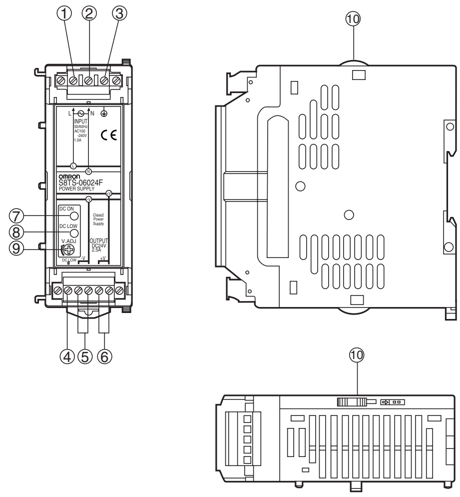


■ Installation

Basic Blocks with Screw Terminals: S8TS-□□□□□



Basic Blocks with Connector Terminals: S8TS-□□□□□F



① **AC Input Terminal (L):** Connect an input line to this terminal.

② **AC Input Terminal (N):** Connect an input line to this terminal.

③ **Ground Terminal (⏚):** Connect a ground line to this terminal.

④ **Undervoltage Detection Output (DC LOW OUT):** Open Collector output

⑤ **DC Output Terminal (–V):** Connect load lines to this terminal.

⑥ **DC Output Terminal (+V):** Connect load lines to this terminal.

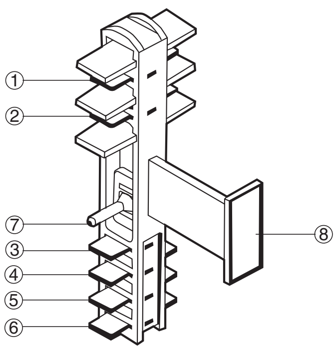
⑦ **Output Indicator (DC ON: Green):** Lights while DC output is ON.

⑧ **Undervoltage Indicator (DC LOW: Red):** Lights when the voltage at the output terminal drops.

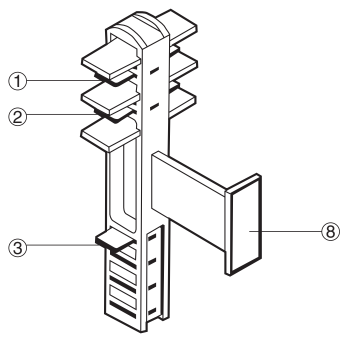
⑨ **Output Voltage Adjuster (V.ADJ):** Use to adjust the voltage.

⑩ **Slider:** Slide to the lock side when connecting. Unlock the slider when disconnecting.

S8T-BUS01 Bus Line Connector (AC Line + DC Line Bus)



S8T-BUS02 Bus Line Connector (AC Line Bus)



① AC Input Terminal (L)

② AC Input Terminal (N)

③ Ground Terminal (⏚)

④ Parallel Operation Signal Terminal

⑤ DC Output Terminal (+V)

⑥ DC Output Terminal (–V)

⑦ Selector

⑧ Projected Indicator Section

Operation

Maximum Number of Blocks That Can Be Linked

Basic Blocks can be linked using Bus Line Connectors.

Increasing Output Capacity

Models	Number of Blocks	N+1 Redundant System
S8TS-06024□	4 Blocks	Yes, 5 Blocks
S8TS-03012□	4 Blocks	Yes, 5 Blocks
S8TS-02505□	No	No

N+1 Redundant Systems

To ensure stable operation when there is a failure in one of the Blocks, use within the derating curve for N+1 redundant systems.

Multi-output Power Supply

Up to 4 Basic Blocks with different output voltage specifications can be linked.

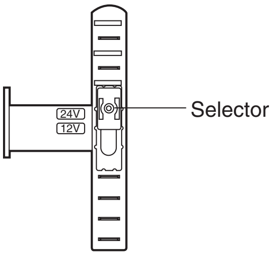
Selecting Bus Line Connectors

Select Bus Line Connectors according to the linking method as follows:

- Using parallel operation:

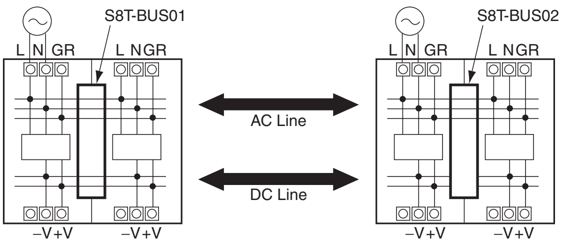
  S8T-BUS01 (DC line connected)

  The S8T-BUS01 Bus Line Connector is equipped with a selector to prevent erroneous connection of Blocks with different output voltage specifications. Slide the selector to the output voltage for parallel operation.



- Not using parallel operation:

  S8T-BUS02 (DC line not connected)



DC line connected (parallel connection)

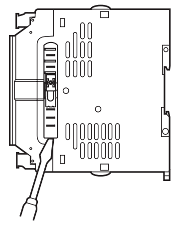
DC line not connected (isolated connection)

Note: Series operation is possible with different specifications, but the current that flows to the load must not exceed the rated output current of any Block.

Mounting and Removing Bus Line Connectors

Pay attention to the following points to maintain electrical characteristics.

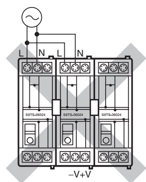
- Do not insert/remove the Connectors more than 20 times.
- Do not touch the Connector terminals.
- To remove the Connectors, insert a flat-bladed screwdriver alternately at both ends.



Wiring Linked Blocks

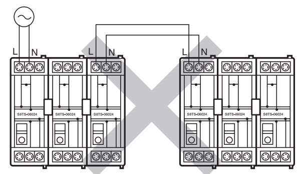
When linking Blocks together, wire input lines to one Block only, otherwise inputs may be shorted internally resulting in damage to the Block.

Do not wire inputs to more than one



Do not cross-wire Blocks or wire between a Block and another device. If the rated current is exceeded, Bus Line Connectors may be damaged.

Do not use cross-wire Blocks.

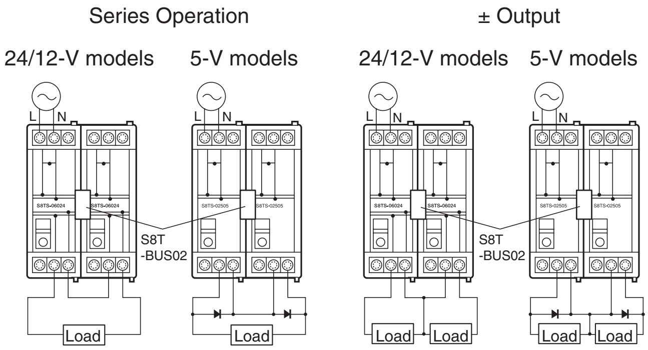


When Basic Blocks are linked together, it is necessary to wire the GR terminal of only one Block, not all the Blocks.

Series Operation and ± Output

Using 2 Basic Blocks enables series operation and the use of ± output. An external diode is not required for S8TS-06024□ and S8TS-03012□ models but is required for S8TS-02505□ models. Use the following as a rough guide for selecting the diode.

Type	Schottky barrier diode
Withstand voltage (V_{RRM})	At least twice the rated output voltage
Current with normal direction (I_F)	At least twice the rated output current



Adjusting Output Voltage for Parallel Operation

The Blocks are factory-set to the rated output voltage. When adjusting voltages, set the same values for Blocks with V.ADJ before linking them together. Adjust the set values within the limits given in the following table.

Model number	Difference between output voltages
S8TS-06024□	0.24 V max.
S8TS-03012□	0.12 V max.

Do not adjust voltages after Blocks are linked together. The output voltage may become unstable.

Inrush Current

The inrush current per Basic Block is 25 A max. at 100 VAC and 50 A max. at 200 VAC. When N Blocks are linked together, the inrush current will be equal to N times that for 1 Basic Block. Be sure to use a fuse with the appropriate fusing characteristics or a breaker with the appropriate tripping characteristics.

Leakage Current

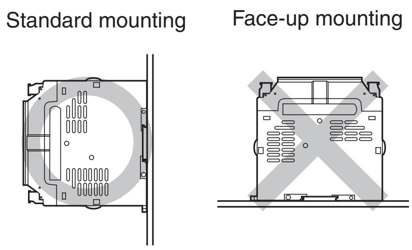
The leakage current per Basic Block is 0.35 mA at 100 VAC and 0.7 mA at 240 VAC. When N Blocks are linked together, the leakage current will be equal to N times that for 1 Basic Block.

Mounting

Mounting Direction

Standard mounting	Yes
Face-up mounting	No
Other mounting methods	No

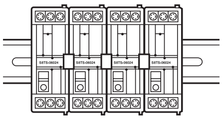
Use standard mounting only. Using any other mounting method will prevent proper hear dissipation and may result in deterioration or damage of internal elements.

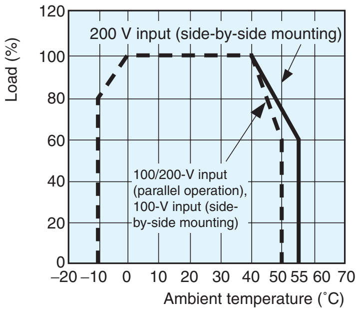


Engineering Data

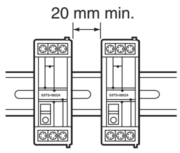
■ Derating Curves

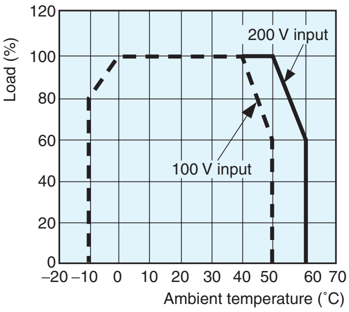
Parallel Operation and Side-by-side Mounting



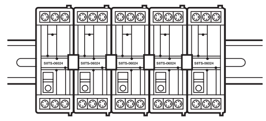


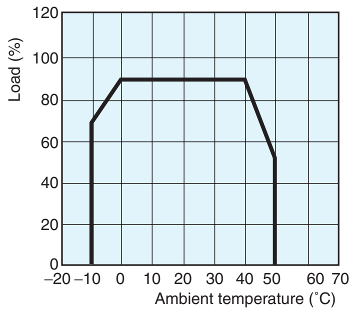
Single Operation with Spaces between Blocks





N+1 Redundant System

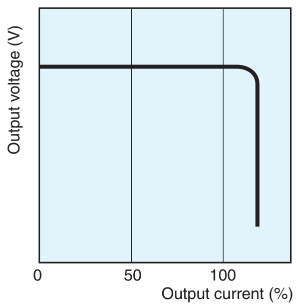




Note: If there is a derating problem, use forced air-cooling.
The ambient temperature is specified for a point 50 mm below the power supply.

■ Overload Protection

The Power Supply is provided with an overload protection function that protects the load and the power supply from possible damage by overcurrent. When the output current rises above 105% min. of the rated current (100% min. of the rated current for parallel operation), the protection function is triggered, decreasing the output voltage. When the output current falls within the rated range, the overload protection function is automatically cleared.

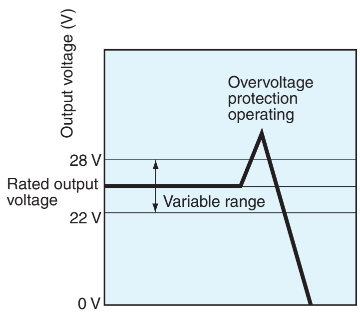


Note: Do not allow the short-circuited or overcurrent state to continue for more than 20 s, otherwise it may damage the element.

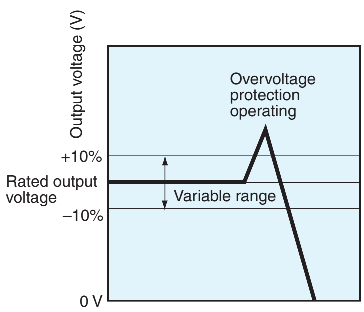
■ Overvoltage Protection

The Power Supply is provided with an overvoltage protection function that protects the load and the Power Supply from possible damage by overvoltage. When an excessive voltage is output, the output voltage is shut OFF. Reset the Power Supply by turning it OFF for at least 1 minute and then turning it back ON again.

24-V Models

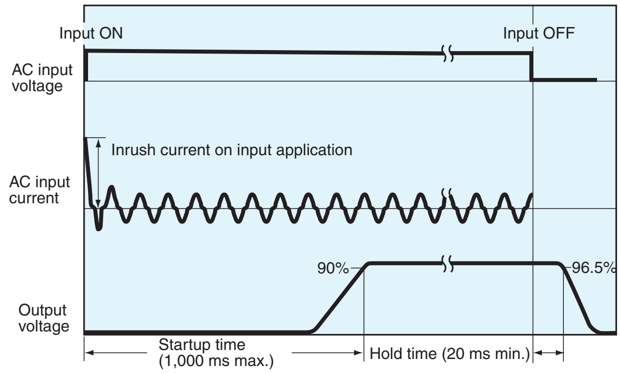


12-V and 5-V Models



Note: Do not turn ON the power again until the cause of the overvoltage has been removed.

■ Inrush Current, Startup Time, Hold Time



■ Undervoltage Indicator and Undervoltage Detection Output

When a drop in the output voltage is detected, the red indicator (DC LOW) lights and transistor (DC LOW: OUT) output turns ON. The detection voltage is set to approximately 80% (75% to 90%) of the rated output voltage.

This function monitors the voltage at the output terminals. For accurate confirmation of the output status, measure the voltage at the output terminal.

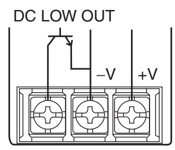
Status of indicator	Voltage status	Output status (See note 1.)
Green: ● DC ON Red: ○ DC LOW	Higher than approx. 80% of the rated output voltage	ON
Green: ● DC ON Red: ● DC LOW (See note 2.)	Less than approx. 80% of the rated output voltage	OFF
Green: ○ DC ON Red: ○ DC LOW	Close to 0 V	OFF

Note 1: Transistor output: Open collector
30 VDC max., 50 mA max.
ON residual voltage: 2 V max.
OFF leakage current: 0.1 mA max.

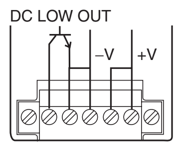
2: The indicators become dimmer as the output voltage approaches 0 V.

Undervoltage Output

Blocks with Screw Terminals



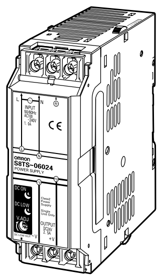
Blocks with Connector Terminals

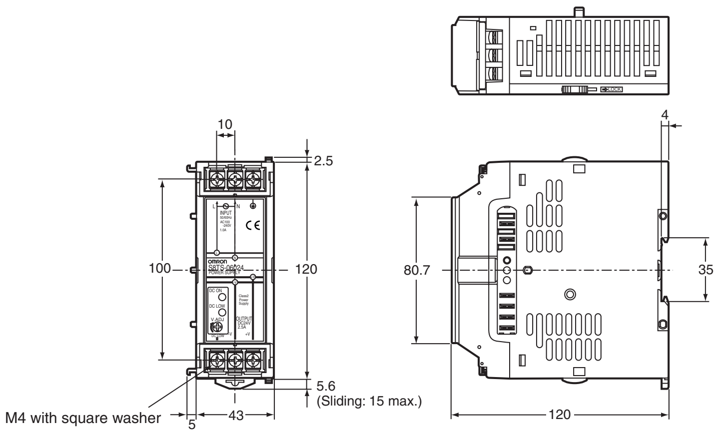


Dimensions

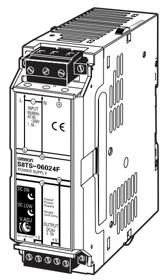
Note: All units are in millimeters unless otherwise indicted.

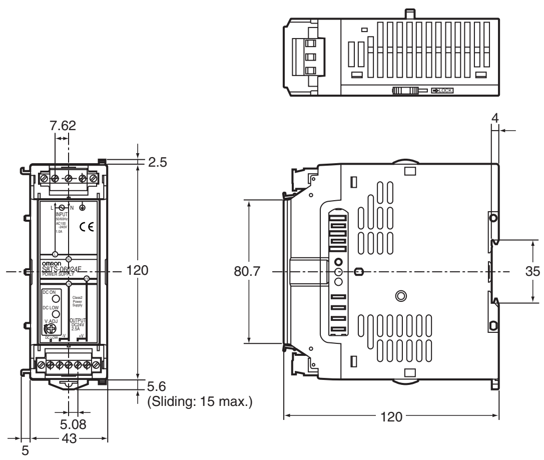
S8TS-□□□□□





S8TS-□□□□□F

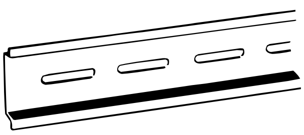


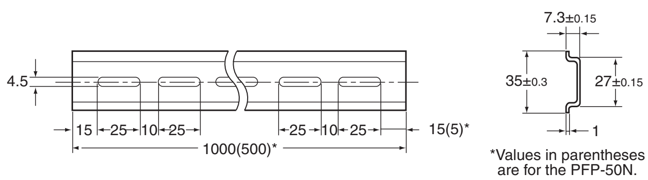


■ Mounting Track (Order Separately)

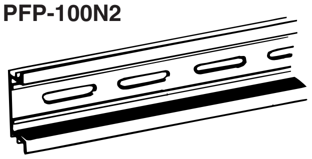
DIN-rail

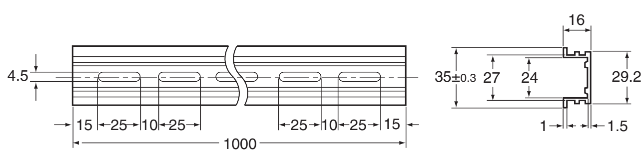
PFP-100N
PFP-50N





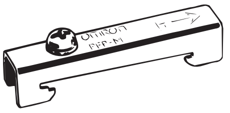
PFP-100N2

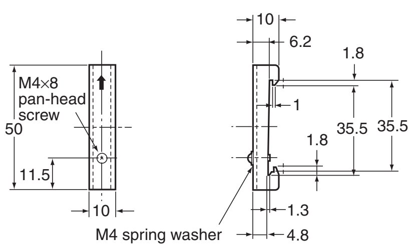




End Plate

PFP-M





Precautions

⚠ WARNING

Do not attempt to take any Block apart or touch the interior of a Block while the power is being supplied. Doing so may result in electric shock.

Do not link or separate any Blocks while the power is being supplied. Doing so may result in electric shock.

Do not remove the connector cover on unused Bus Line Connectors. Doing so may result in electric shock.

Close the terminal covers before use. Not doing so may result in electric shock.

⚠ Caution

When linking Blocks, lock the sliders and track stoppers.

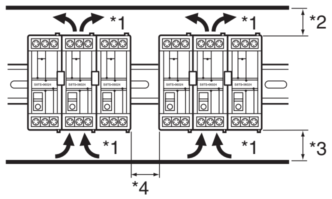
When linking Blocks, wire the input line for 1 Block only. Otherwise, inputs may be shorted internally resulting in damage to the Blocks.

The tightening torque for terminal screws is 1.08 N·m. The tightening torque for connector screws and screw flanges is 0.30 N·m. Loose screws may result in fire.

Do not touch the Power Supply while power is supplied or immediately after power is turned OFF. The Power Supply becomes hot and touching it may result in injury.

Mounting

To improve the long-term reliability of devices, give due consideration to heat dissipation when mounting. With the S8TS, heat is dissipated by natural convection. Mount Blocks in a way that allows convection in the atmosphere around them.



*1. Convection of air

*2. 75 mm min.

*3. 75 mm min.

*4. 10 mm min.

When cutting out holes for mounting, make sure that cuttings do not enter the interior of the products.

Wiring

Be sure to wire I/O terminals correctly. When tightening the terminals, do not exert a force of 100 N or more on terminal blocks or connector terminals.

With Blocks with connector terminals, the current for 1 terminal must not exceed 7.5 A. If a higher current is required, use 2 terminals.

Recommended Wire Size for Single Operation

Model	Recommended wire size
S8TS-06024 S8TS-03012	AWG 14 to 20 (cross-sectional area: 0.517 to 2.081 mm²)
S8TS-02505	AWG 14 to 18 (cross-sectional area: 0.823 to 2.081 mm²)
S8TS-06024F S8TS-03012F	AWG 12 to 20 (cross-sectional area: 0.517 to 3.309 mm²)
S8TS-02505F	AWG 12 to 18 (cross-sectional area: 0.823 to 3.309 mm²)

Recommended Wire Size for Parallel Operation

Model		Recommended wire size
S8TS-06024 S8TS-03012	For 2 Units connected in parallel	AWG 14 to 18 (cross-sectional area: 0.823 to 2.081 mm²)
	For 3 Units connected in parallel	AWG 14 to 16 (cross-sectional area: 1.309 to 2.081 mm²)
	For 4 Units connected in parallel	AWG 14 (cross-sectional area: 2.081 mm²)
S8TS-06024F S8TS-03012F	For 2 Units connected in parallel	AWG 12 to 18 (cross-sectional area: 0.823 to 3.309 mm²)
	For 3 Units connected in parallel	AWG 12 to 16 (cross-sectional area: 1.309 to 3.309 mm²)
	For 4 Units connected in parallel	AWG 12 to 14 (cross-sectional area: 2.081 to 3.309 mm²)

Blocks with Connector Terminals

- When using Blocks with connector terminals, the current for 1 terminal must not exceed 7.5 A. If a higher current is required, use 2 terminals.
- Do not insert/remove AC input connectors or DC output connector more than 20 times.

Installation Environment

Do not use the Power Supply in locations subject to shocks or vibrations. Be sure to mount End Plates (PFP-M) on both ends of the Power Supply. Install the Power Supply well away from any sources of strong, high-frequency noise.

Operating and Storage Environments

Do not use or store the Power Supply in the following locations. Doing so may result in failure, malfunction, or deterioration of performance characteristics.

- Do not use in locations subject to direct sunlight.
- Do not use in locations where the ambient temperature exceeds the range of the derating curve.
- Do not use in locations where the humidity is outside the range 25% to 85%, or locations subject to condensation due to sudden temperature changes.
- Do not store in locations where the ambient temperature is outside the range –25 to 65°C or where the humidity is outside the range 25% to 95%.
- Do not use in locations where liquids, foreign matter, corrosive gases, or flammable gases may enter the interior of products.

Charging Batteries

If a battery is connected as the load, provide an overcurrent control circuit and an overvoltage protective circuit.

Output Voltage Adjuster (V.ADJ)

Do not exert excessive force on the output voltage adjuster (V.ADJ). Doing so may break the adjuster.

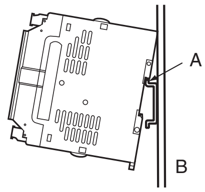
Setting the adjuster to a setting less than 10% may cause the undervoltage detection function to operate.

Bus Line Connectors

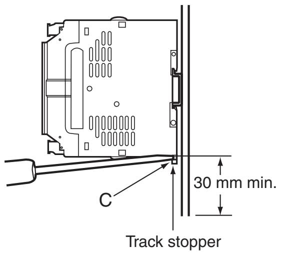
Do not apply sudden shocks (e.g., by dropping) to the Bus Line Connectors. Doing so may result in damage.

DIN-rail Mounting

To mount the Block on a DIN-rail, hook portion (A) of the Block onto the track and press the Block in direction (B).



To dismount the Block, pull down portion (C) with a flat-blade screwdriver and pull out the Block.



No Output Voltage

If there is no output voltage, it is possible that overcurrent protection or overvoltage protection is operating. It is also possible that the latch protection circuit is operating due to the application of a large surge, such as lightning surge. Confirm the 2 points below. If there is still no output voltage, consult your OMRON representative.

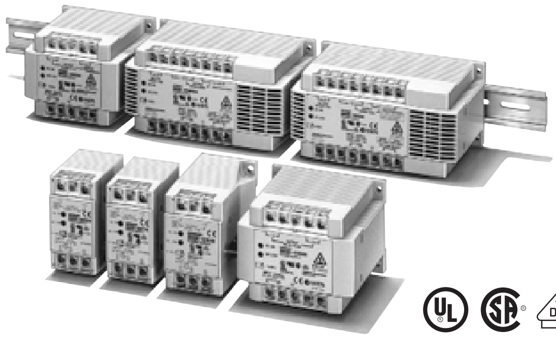
- Checking for Overcurrent Protection:
  Separate the load line and confirm that it is not in an overcurrent state (including short-circuits).
- Checking for Overvoltage Protection or Latch Protection:
  Turn the input power supply OFF, and then turn it ON again after 1 minute or more has elapsed.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

 In the interest of product improvement, specifications are subject to change without notice.

Switch Mode Power Supply
S82K

Ultimate DIN-rail-mounting Power Supply with a Power Range of 3 to 100 W



- EMI: EN 61204-3 class B
- Input: 85 to 264 VAC (except 90-W and 100-W models)
- Safety standards: UL 60950-1/508, cUL: C22.2, cUR: No. 60950-1/14, Class 2 (UL, CSA), EN 60950-1 (=VDE 0805, Teil 1)
- Undervoltage alarm indication available for standard models.

Note: Refer to *"Safety Precautions"* on page B-77.

Model Number Structure

■ Model Number Legend

Note: Not all combinations are possible. Please refer to the list of models in *"Ordering Information"* on page B-65.

S82K - □ □□□ □□

1 2 3

1. Power Factor Correction
None: No
P: Yes

2. Power Ratings
003: 3 W
007: 7.5 W
015: 15 W
030: 30 W
050: 50 W
090: 90 W
100: 100 W

3. Output Voltage
05: +5 VDC
12: +12 VDC
15: +15 VDC
24: +24 VDC
27: ±12 VDC
28: ±15 VDC

Ordering Information

■ List of Models

Note: For details on normal stock models, contact your nearest OMRON representative.

Power ratings	Output voltage	Output current	Function Configuration			Models
			Output	Undervoltage alarm indicator/output	PFC	
3 W	5 V	0.6 A	Single output	Yes	No	S82K-00305
	12 V	0.25 A				S82K-00312
	15 V	0.2 A				S82K-00315
	24 V	0.13 A				S82K-00324
7.5 W	5 V	1.5 A				S82K-00705
	12 V	0.6 A				S82K-00712
	15 V	0.5 A				S82K-00715
	24 V	0.3 A				S82K-00724
	±12 V	0.3 A/0.2 A	Dual output			S82K-00727
	±15 V	0.2 A/0.2 A				S82K-00728
15 W	5 V	2.5 A	Single output			S82K-01505
	12 V	1.2 A				S82K-01512
	24 V	0.6 A				S82K-01524
30 W	5 V	5.0 A				S82K-03005 (See note 1.)
	12 V	2.5 A				S82K-03012
	24 V	1.3 A				S82K-03024
50 W	24 V	2.1 A				S82K-05024
90 W	24 V	3.75 A			No	S82K-09024
					Yes	S82K-P09024
100 W	24 V	4.2 A (See note 2.)			No	S82K-10024
					Yes	S82K-P10024

Note:1. The output capacity of the S82K-03005 is 25 W.
2. The output current during parallel operation is 3.78 A.

Specifications

■ Ratings/Characteristics

Item		Power ratings (See note 1.)	S82K Single output 3 W	S82K Single output 7.5 W	S82K Dual output 7.5 W	S82K Single output 15 W	S82K Single output 30 W
Efficiency (typical)			60% min. (Varies depending on specifications)	64% min. (Varies depending on specifications)		66% min. (Varies depending on specifications)	
Input	Voltage (See note 2.)	AC	100 to 240 VAC (85 to 264 VAC)				
		DC	90 to 350 VDC				Not possible
	Frequency		50/60 Hz (47 to 450 Hz)				
	Current (See note 3.)	100-V input	0.15 A max.	0.25 A max.		0.45 A max.	0.9 A max.
		200-V input				0.25 A max.	0.6 A max.
	Power Factor		---				
	Harmonic current emissions		---				
	Leakage current (See note 3.)	100-V input	0.5 mA max.				
		200-V input	1 mA max.				
	Inrush current (See note 3.)	100-V input	15 A max. (for cold start at 25°C)				25 A max. (for cold start at 25°C)
		200-V input	30 A max. (for cold start at 25°C)				50 A max. (for cold start at 25°C)
	Noise filter		Yes				
Output (See note 4.)	Voltage Adjustment Range		±10% (with V. ADJ) (See note 5.)		Not possible (See note 6.)	±10% (with V. ADJ) (–10% to 15% for S82K-03012/-03024) (See note 5.)	
	Ripple (See note 3.)		2% (p-p) max.				
	Input variation influence		0.5% max. (at 85 to 264 VAC input, 100% load)				
	Load variation influence (rated input voltage)		1.5% max. (0 to 100% load)		+V: 1.5% max. –V: 3% max. (0 to 100% load)	1.5% max. (0 to 100% load)	
	Temperature variation influence (See note 3.)		0.05%/°C max.				
	Start up time		100 ms max. (up to 90% of output voltage at rated input and output)				
	Hold time (See note 3.)		20 ms min.				
Additional functions	Overload protection (See note 7.)		105% to 160% of rated load current (105% to 250% of rated load current for dual output models), gradual current/voltage drop, automatic reset (See note 8.)				105% to 160% of rated load current, gradual current increase, voltage drop intermittent operation, automatic reset
	Overvoltage protection		No				
	Undervoltage alarm indication		Yes (color: red)				
	Undervoltage alarm output		No				
	Parallel operation		No				
Other	Operating ambient temperature		Refer to the derating curve in Engineering Data. (with no icing or condensation)				
	Storage temperature		–25 to 65°C (with no icing or condensation)				
	Operating ambient humidity		25°C to 85% (Storage humidity: 25% to 90%)				
	Dielectric strength		3.0 kVAC for 1 min. (between all inputs and all outputs) 2.0 kVAC for 1 min. (between all inputs and PE terminals) 1.0 kVAC for 1 min. (between all outputs and PE terminals)				
		Detection current	10 mA			20 mA	
	Insulation resistance		100 MΩ min. (between all outputs and all inputs, PE terminals) at 500 VDC				
	Vibration resistance		10 to 55 Hz, 0.375-mm single amplitude for 2 h each in X, Y, and Z directions				
	Shock resistance		300 m/s^2, 3 times each in ±X, ±Y, ±Z directions				
	Output indicator		Yes (color: green)				
	EMI	Conducted Emissions	Conforms to EN61204-3 EN55011 Class B and based on FCC Class B				
		Radiated Emissions	Conforms to EN61204-3 EN55011 Class B				
	EMS		Conforms to EN61204-3 High severity levels				
	Approved standards		UL: UL508 (Listing), 60950-1 Class 2 (excluding Dual output models) CSA: cUL: C22.2 No.14, cUR: No. 60950-1 Class 2 (excluding Dual output models) EN/VDE: EN50178 (VDE=0160), EN60950-1 (=VDE0805 Teil 1) Based on VE0106/P100				
	Weight		150 g max.			260 g max.	380 g max.

Note:1. When a load is connected that has a built-in DC-DC converter, the overload protection may operate at startup and the power supply may not start. Refer to the *Overload Protection* section on page B-72 for details.

2. Use with DC voltage input is beyond the conditions of approval or conformance to applicable safety standards. (DC input possible with 15 W max. Use the 7.5-W single-output models under the load of 90% max. if the voltage range is between 90 and 110 VDC. Do not use the Inverter output for the Power supply. Inverters with an output frequency of 50/60 Hz are available, but the rise in the internal temperature of the Power Supply may result in ignition or burning.

3. Defined with a 100% load and the rated input voltage (100 or 200 VAC.)

4. The output specification is defined at the power supply output terminals.

5. If the V. ADJ adjuster is turned, the voltage will increase by more than +10% of the voltage adjustment range. (+15% for S82K-03012/-03024) When adjusting the output voltage, confirm the actual output voltage from the Power Supply and be sure that the load is not damaged.

6. The settings for the output voltage must be within the following range:
+V: ±1% of the rated value
–V: ±5% of the rated value

7. Refer to the *Overload Protection* section on page B-72 for details.

8. When using the 7.5-W single-output models within the input voltage range between 90 and 110 VDC, the protection function will operate at a current of 95% to 160% of the rated load current.

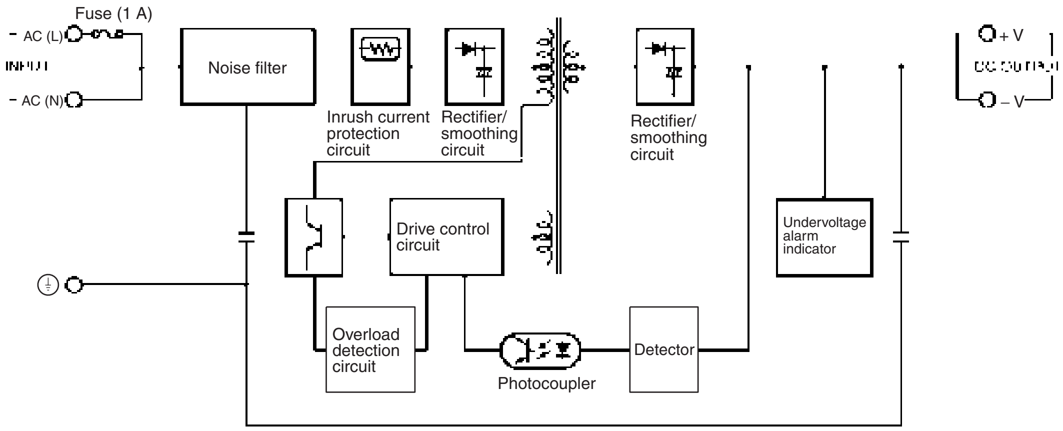
Item		Power ratings (See note 1.)	S82K 50 W	S82K 90 W	S82K 100 W	S82K-P 90 W	S82K-P 100 W
			Single output				
Efficiency (typical)			80% min. (Varies depending on specifications)				
Input	Voltage (See note 2.)	AC	100 to 240 VAC (85 to 264 VAC)	100 V (85 to 132 VAC)/200 V (170 to 264 VAC) Selectable			
		DC	Not possible				
	Frequency		50/60 Hz (47 to 450 Hz)			50/60 Hz (47 to 63 Hz)	
	Current (See note 3.)	100-V input	1.3 A max.	2.5 A max.			
		200-V input	0.8 A max.	1.5 A max.			
	Power Factor		---			0.7 min. (at 200 VAC input, at rated output), 100 V: unlimited	
	Harmonic current emissions		---			Conforms to EN6100-3-2 (200-V only)	
	Leakage current (See note 3.)	100-V input	0.5 mA max.				
		200-V input	1 mA max.				
	Inrush current (See note 3.)	100-V input	25 A max. (for cold start at 25°C)				
		200-V input	50 A max. (for cold start at 25°C)				
	Noise filter		Yes				
Output (See note 4.)	Voltage Adjustment Range		±10% (with V. ADJ) (–10% to 15% for S82K-05024) (See Note 5.)			±10% (with V. ADJ) (See note 5.)	
	Ripple (See note 3.)		2% (p-p) max.				
	Input variation influence		0.5% max. (at 85 to 264 VAC input, 100% load)	0.5% max. (at 85 to 132 VAC input /170 to 264 VAC input, 100% load)			
	Load variation influence (rated input voltage)		1.5% max. (0 to 100% load)				
	Temperature variation influence (See note 3.)		0.05%/°C max.				
	Start up time		100 ms max. (up to 90% of output voltage at rated input and output)	200 ms max.			
	Hold time (See note 3.)		20 ms min.				
Additional functions	Overload protection (See note 6.)		105% to 160% of rated load current, gradual current increase, voltage drop intermittent operation, automatic reset	105% to 160% of rated load current, inverted L drop, automatic reset (See note 7.)			
	Overvoltage protection		No				
	Undervoltage alarm indication		Yes (color: red)				
	Undervoltage alarm output		No	Yes			
	Parallel operation		No		Yes (up to 2 units.)	No	Yes (up to 2 units.) (See note 8.)
Other	Operating ambient temperature		Refer to the derating curve in Engineering Data. (with no icing or condensation)				
	Storage temperature		–25 to 65°C (with no icing or condensation)				
	Operating ambient humidity		25°C to 85% (Storage humidity: 25% to 90%)				
	Dielectric strength		3.0 kVAC for 1 min. (between all inputs and all outputs) 2.0 kVAC for 1 min. (between all inputs and PE terminals) 1.0 kVAC for 1 min. (between all outputs and PE terminals)				
		Detection current	20 mA				
	Insulation resistance		100 MΩ min. (between all outputs and all inputs, PE terminals) at 500 VDC				
	Vibration resistance		10 to 55 Hz, 0.375-mm single amplitude for 2 h each in X, Y, and Z directions				
	Shock resistance		300 m/s^2, 3 times each in ±X, ±Y, ±Z directions			150 m/s^2, 3 times each in ±X, ±Y, ±Z directions	
	Output indicator		Yes (color: green)				
	EMI	Conducted Emissions	Conforms to EN61204-3 EN55011 Class B and based on FCC Class B	Conforms to EN61204-3 EN55011 Class B and based on FCC Class A			
		Radiated Emissions	Conforms to EN61204-3 EN55011 Class B				
	EMS		Conforms to EN61204-3 High severity levels				
	Approved standards		UL: UL508 (Listing), 60950-1 Class 2 (excluding Dual output models) (See note 9.) CSA: cUL: C22.2 No.14, cUR: No. 60950-1 Class 2 (excluding Dual output models) (See note 9.) EN/VDE: EN50178 (VDE=0160), EN60950-1 (=VDE0805 Teil 1) Based on VE0106/P100			UL: UL508 (Listing), Class 2 (per UL 1310) 60950-1 (See note 9.) CSA: cUL: C22.2 No.14, cUR: No. 60950-1 Class 2 (See note 9.) EN/VDE: EN50178 (VDE=0160), EN60950-1 (=VDE0805 Teil 1) According to VDE0106/P100"	
	Weight		400 g max.	600 g max.		1000g max.	

Note:
1. When a load is connected that has a built-in DC-DC converter, the overload protection may operate at startup and the power supply may not start. Refer to the *Overload Protection* section on page B-72 for details.
2. Use with DC voltage input is beyond the conditions of approval or conformance to applicable safety standards. (DC input possible with 15 W max. Use the 7.5-W single-output models under the load of 90% max. if the voltage range is between 90 and 110 VDC.
   Do not use the Inverter output for the Power supply. Inverters with an output frequency of 50/60 Hz are available, but the rise in the internal temperature of the Power Supply may result in ignition or burning.
3. Defined with a 100% load and the rated input voltage (100 or 200 VAC.)
4. The output specification is defined at the power supply output terminals.
5. If the V. ADJ adjuster is turned, the voltage will increase by more than +10% of the voltage adjustment range. (+15% for S82K-03012/-03024)
   When adjusting the output voltage, confirm the actual output voltage from the Power Supply and be sure that the load is not damaged.
6. Refer to the *Overload Protection* section on page B-72 for details.
7. When using the 90-W model at an ambient temperature of 25×C or less, the overload protection function will operate at currents from 101% to 111% of the rated output current. When using the 90-W model at an ambient temperature exceeding 25×C, the overload protection function will operate at currents from 92% to 111% of the rated output current.
8. Parallel operation is set with the Parallel/Single Operation Selector Switch.
9. To meet Class-2 requirements with the 100-W, either a fuse or circuit breaker that is UL listed or CSA certified, and rated at 4.2 A max. should be wired in series with the load to be connected to the Power Supply. Only then can the Power Supply output be considered as meeting Class 2.

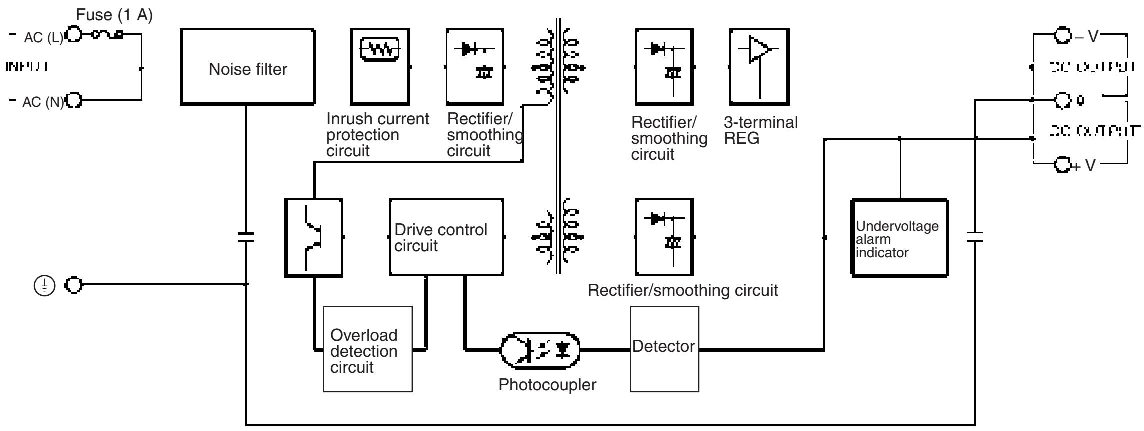
Connections

■ Block Diagrams

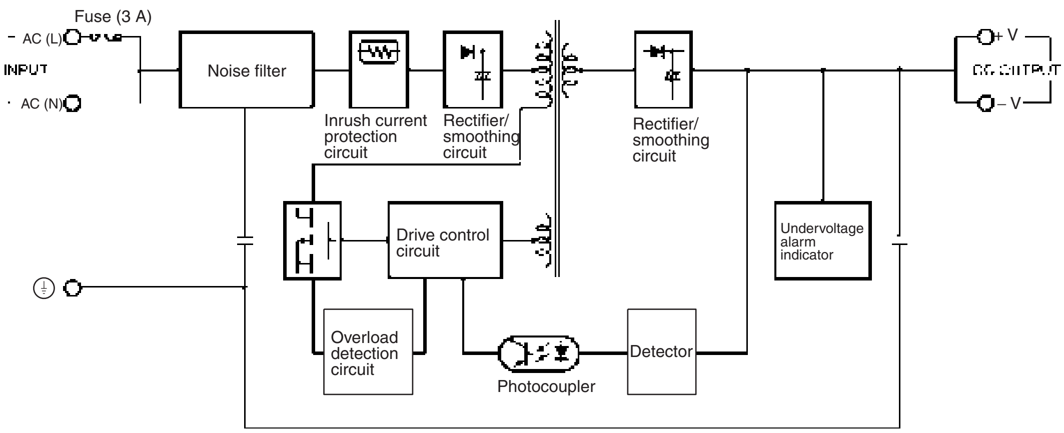
S82K-003□□ (3 W)
S82K-007□□ (7.5 W, Single Output)



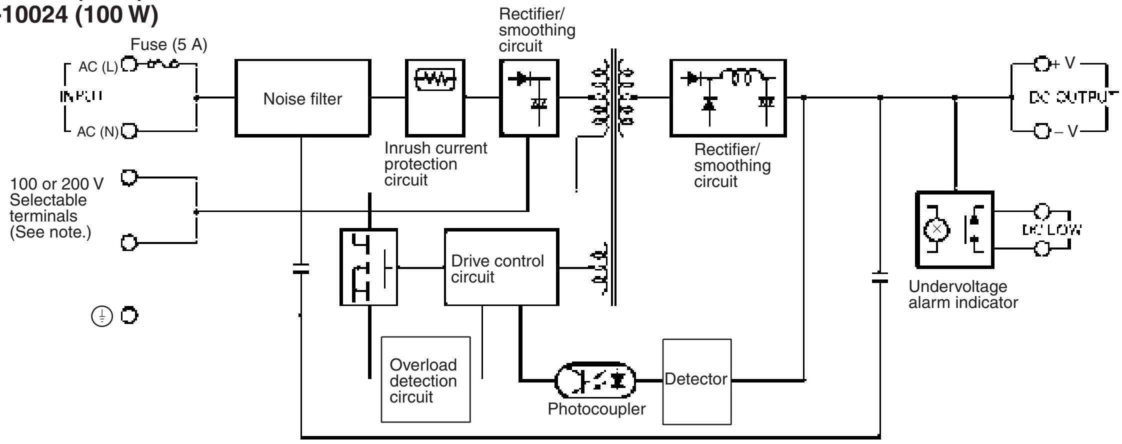
S82K-007□□ (7.5 W, Dual Outputs)



S82K-015□□ (15 W)
S82K-030□□ (30 W)
S82K-05024 (50 W)

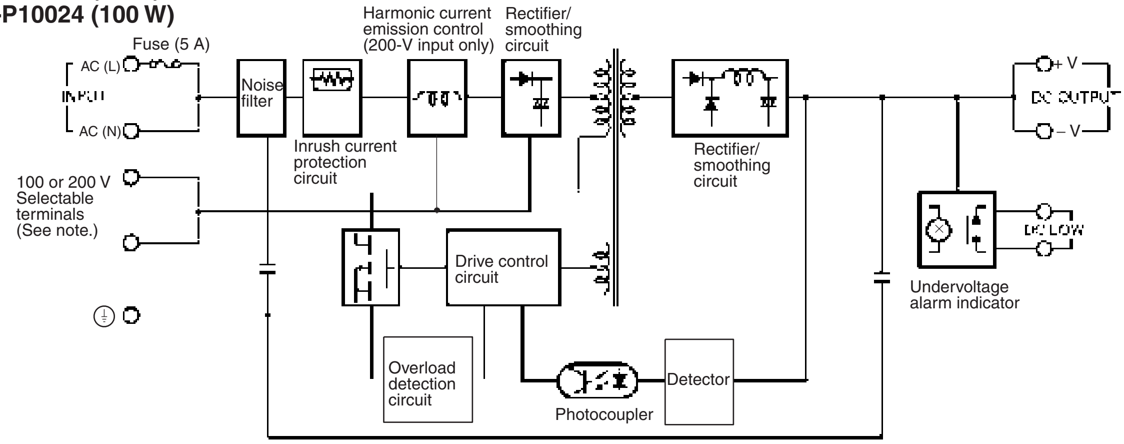


S82K-09024 (90 W)
S82K-10024 (100 W)



Note: Use the short bar to short-circuit terminals 7 and 8 to select 100 to 120 VAC and remove the short bar to select 200 to 240 VAC.

S82K-P09024 (90 W)
S82K-P10024 (100 W)

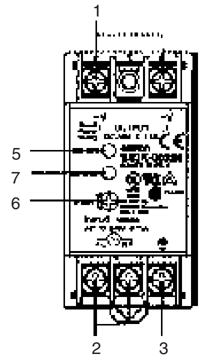


Note: Use the short bar to short-circuit terminals 7 and 8 to select 100 to 120 VAC and remove the short bar to select 200 to 240 VAC.

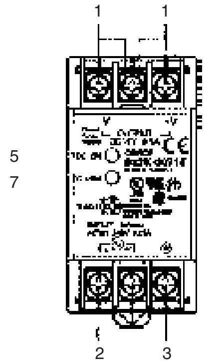
Construction and Nomenclature

■ Nomenclature

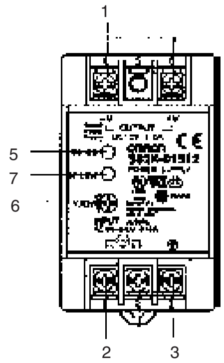
S82K-003□□/S82K-007□□ (Single Output)



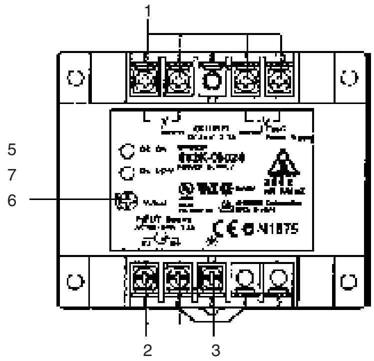
S82K-007□□ (Dual outputs)



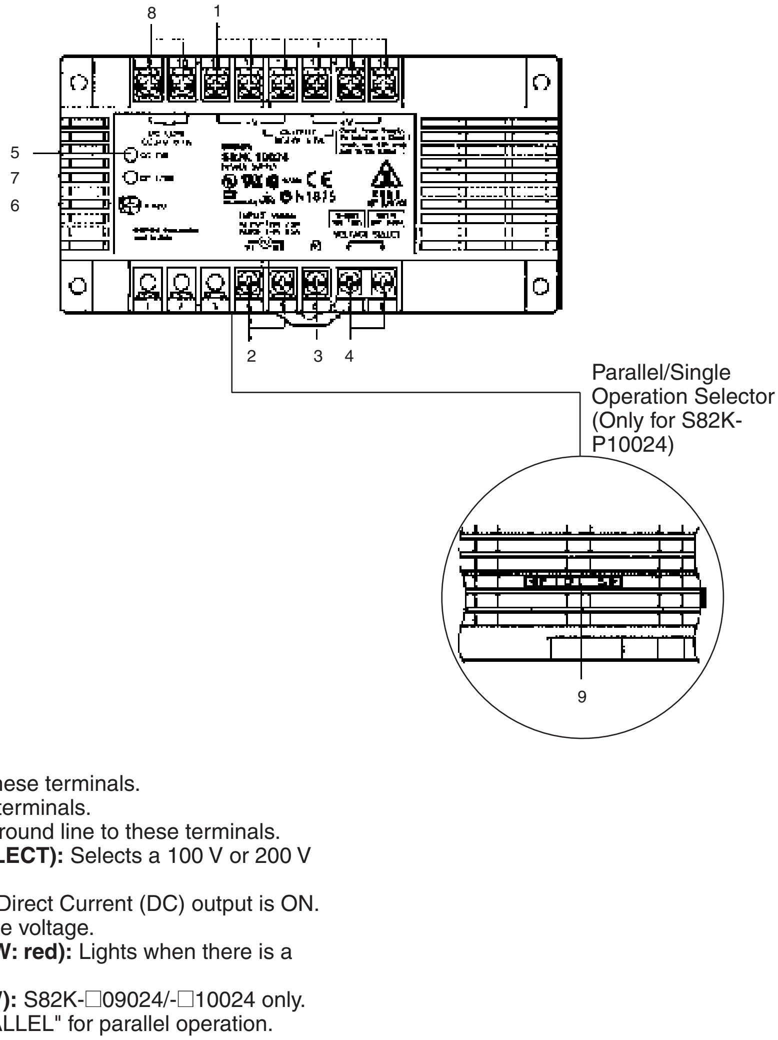
S82K-015□□



S82K-030□□/S82K-05024



S82K-□09024/S82K-□10024



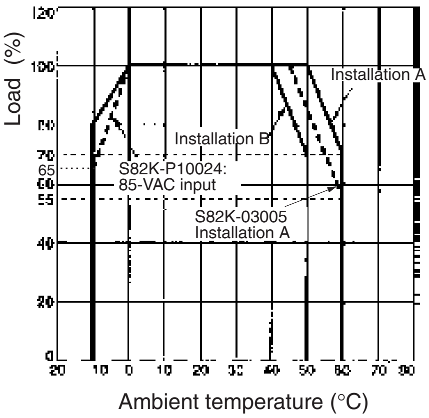
1. **DC Output Terminals:** Connect the load lines to these terminals.
2. **Input Terminals:** Connect the input lines to these terminals.
3. **Protective Earthing Terminals (PE):** Connect a ground line to these terminals.
4. **Input Voltage Selector Terminals (VOLTAGE SELECT):** Selects a 100 V or 200 V input voltage.
5. **Output Indicator (DC ON: green):** Lights while a Direct Current (DC) output is ON.
6. **Output Voltage Adjuster(V.ADJ):** Use to adjust the voltage.
7. **Undervoltage Alarm Indicator Terminal (DC LOW: red):** Lights when there is a drop in the output voltage.
8. **Undervoltage Alarm Output Terminals (DC LOW):** S82K-□09024/-□10024 only.
9. **Parallel/Single Operation Selector:** Set to "PARALLEL" for parallel operation.

Engineering Data

■ Derating Curve (A: Standard mounting, B: Face-up mounting)

3-/7.5-/15-/30-/50-/100-W Models

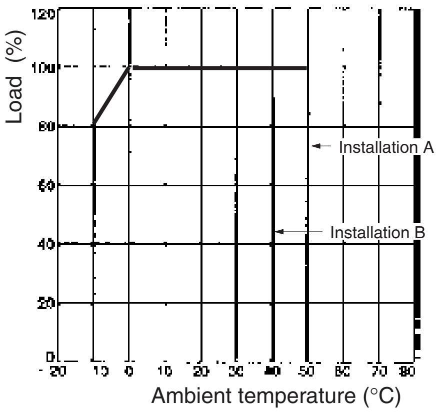
Single-Unit Operation



Note: When using the 7.5-W single-output models within the input voltage range between 90 and 110 VDC, the load rate will become 90% or less.

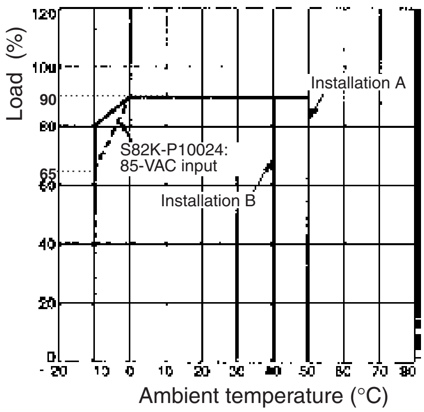
100-W Models without PFC (S82K-10024)

Parallel-Unit Operation



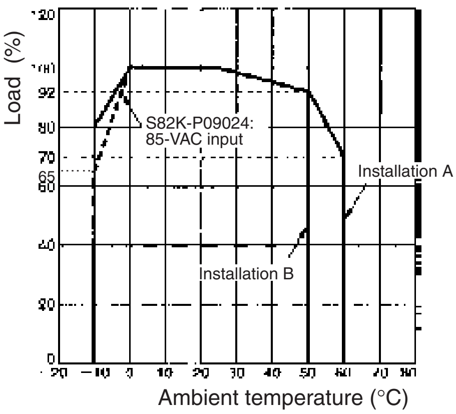
100-W Models with PFC (S82K-P10024)

Parallel-Unit Operation



90-W Models

Single-Unit Operation



Note: 1. Note that the derating curve may vary depending on the installation conditions.

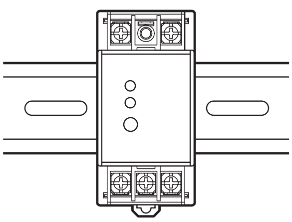
2. Multiple units cannot be installed in a configuration where they are lined up vertically.

3. Use the 7.5-W single-output models under the load of 90% max. if the voltage range is between 90 and 110 VDC.

4. The cold-start time will be longer when using S82K-P09024 or S82K-P10024 with 85-VAC input.

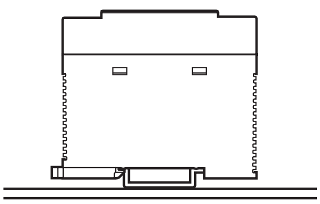
■ Mounting

Top



(A) Standard mounting

Top



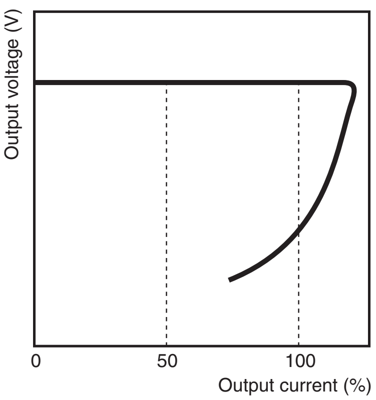
(B) Face-up mounting

Note: Installations other than (A) and (B) are not possible.

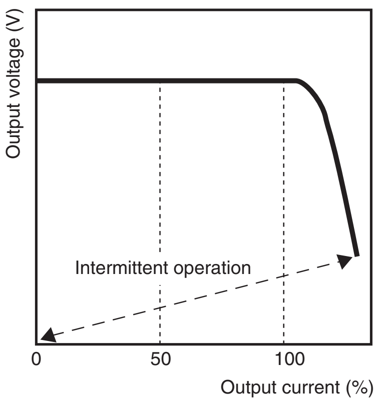
■ Overload Protection

The Power Supply is provided with an overload protection function that protects the Power Supply from possible damage by overcurrent. When the output current rises above 105% min. of the rated current, the protection function is triggered, automatically decreasing the output voltage. When the output current falls within the rated range, the overload protection function is automatically cleared.

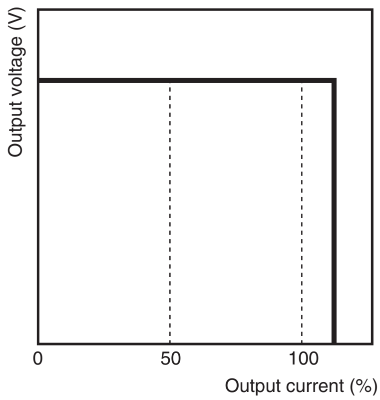
3-/7.5/15 W Models



30-/50 W Models



90-/100 W Models



Note: 1. When connecting a load that has a built-in DC-DC converter, the overcurrent protection function may operate during start-up, thus preventing the Power Supply from starting.

2. Internal parts may occasionally deteriorate or be damaged if a short-circuited or other overcurrent state continues during operation.

3. When using the 7.5-W single-output models within the input voltage range between 90 and 110 VDC, the overload protection function will operate at currents from 95% to 160% of the rated output current.

4. When using the 90-W model at an ambient temperature of 25°C or less, the overload protection function will operate at currents from 101% to 111% of the rated output current. When using the 90-W model at an ambient temperature exceeding 25°C, the overload protection function will operate at currents from 92% to 111% of the rated output current.

5. When using the 100-W model with PFC in parallel operation, operation is limited to a load ratio of 90% to 100% of the rated output current at 4.2 A.

When Using ± Output Models

The +V output detects the total output power (+V output and –V output) to trigger the short-circuit protection against overcurrent. This protection varies depending on the –V output state. The –V output independently triggers the short-circuit protection.

■ Undervoltage Alarm Indicator and Output Function

If the output voltage at the output terminal drops to 75% to 90% of the rated voltage, the red indicator of the S82K (DC LOW indicator) will be lit. In the case of the S82K-□09024/□10024, a voltage drop alarm will be output via the relay available in the models (DC LOW output).

Note: This function detects the voltage at the output terminal of the Power Supply. To check the precise output voltage, measure the voltage at the terminal of the load.

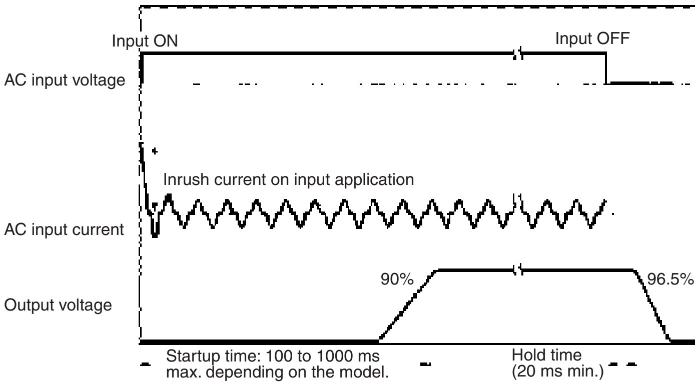
Indicator	Voltage	Operation of □09024/□10024's output (DC LOW output) (See note 2.)
Green: ● DC ON Red: ○ DC LOW	If the voltage at the output terminal is more than 82% of the rated voltage and operation is normal, the green indicator will be lit and the red indicator will not be lit.	
Green: ● DC ON Red: ● DC LOW (See note 1.)	If the voltage at the output terminal drops to below 82% of the rated voltage, the red indicator will be lit. (See note 3.)	
Green: ○ DC ON Red: ○ DC LOW	If the voltage at the output terminal approaches 0 V, both the green and red indicators will not be lit.	

Note: 1. The more the voltage at the output terminal drops, the darker both the green and red indicators will be.

2. The relay contacts have a capacity of 0.1 A at 24 VDC.

3. The red indicator will actually first light at a voltage between 75% and 90% of the rated voltage.

■ Inrush Current, Startup Time, Hold Time



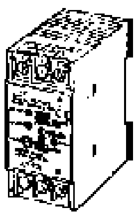
■ Reference Value

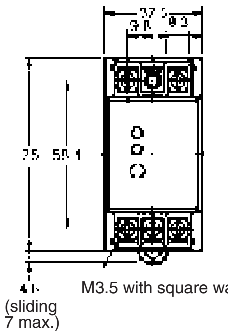
Item	Value	Definition
Reliability (MTBF)	135,000 hrs min.	MTBF stands for Mean Time Between Failures, which is calculated according to the probability of accidental device failures, and indicates reliability of devices. Therefore, it does not necessarily represent a life of the product.
Life expectancy	8 yrs. min.	The life expectancy indicates average operating hours under the ambient temperature of 40°C and a load rate of 50%. Normally this is determined by the life expectancy of the built-in aluminum electrolytic capacitor.

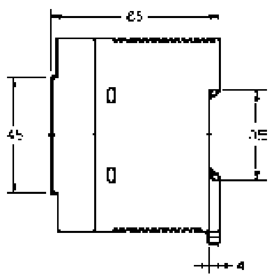
Dimensions

Note: All units are in millimeters unless otherwise indicated.

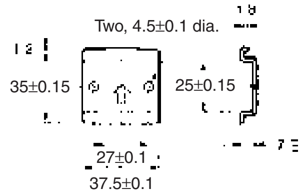
S82K-003□□ (3 W)
S82K-007□□ (7.5 W)



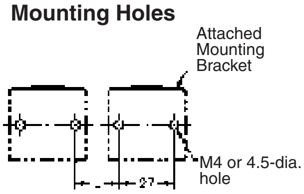




Mounting Brackets (Included)
(Supplied with the Switching Power Supply)
Used when not mounting the Power Supply directly on the DIN-rail.

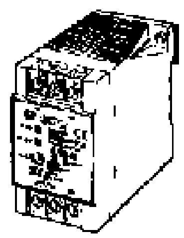


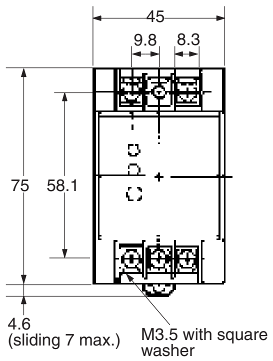
Mounting Holes

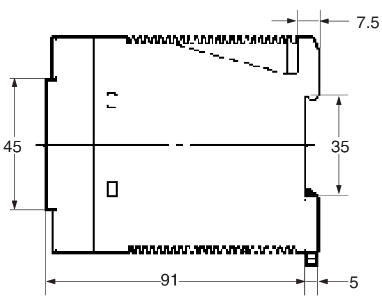


Note: If more than one Power Supply is installed in a row, keep a distance of 20 mm min. (L = 20 mm min.) between each adjacent Power Supply.

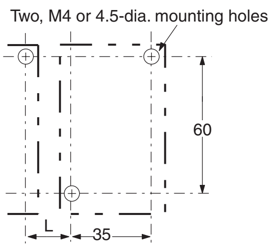
S82K-015□□ (15 W)





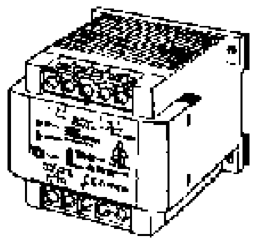


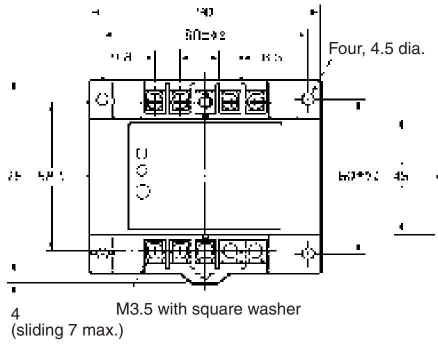
Mounting Holes

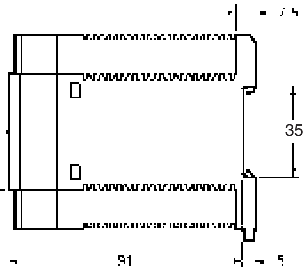


Note: If more than one Power Supply is installed in a row, keep a distance of 20 mm min. (L = 20 mm min.) between each adjacent Power Supply.

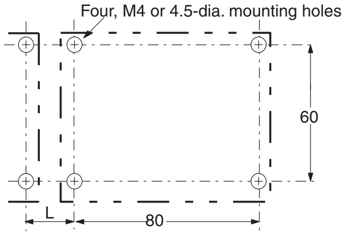
S82K-030□□ (30 W)
S82K-05024 (50 W)





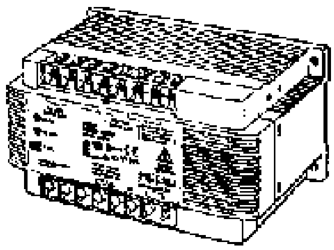


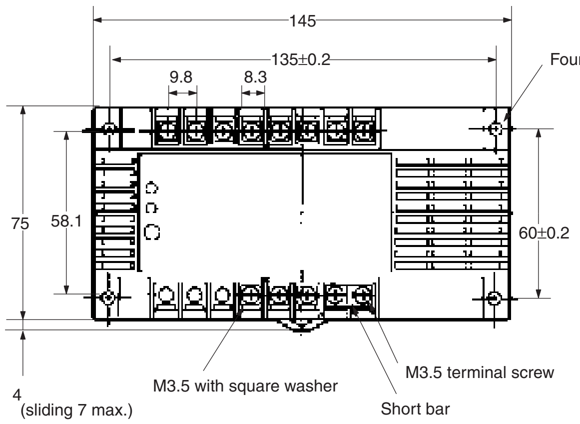
Mounting Holes

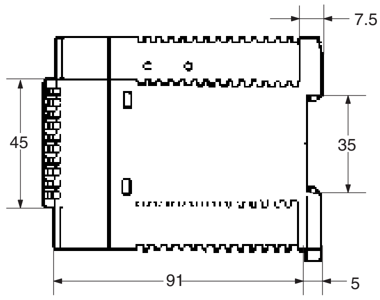


Note: If more than one Power Supply is installed in a row, keep a distance of 20 mm min. (L = 20 mm min.) between each adjacent Power Supply.

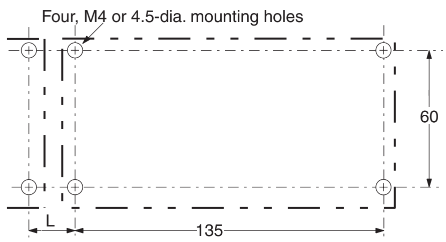
S82K-□09024 (90 W)
S82K-□10024 (100 W)







Mounting Holes

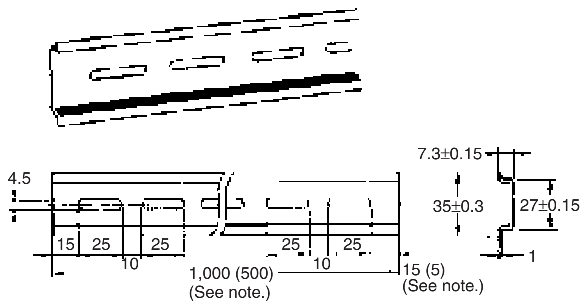


Note: If more than one Power Supply is installed in a row, keep a distance of 20 mm min. (L = 20 mm min.) between each adjacent Power Supply.

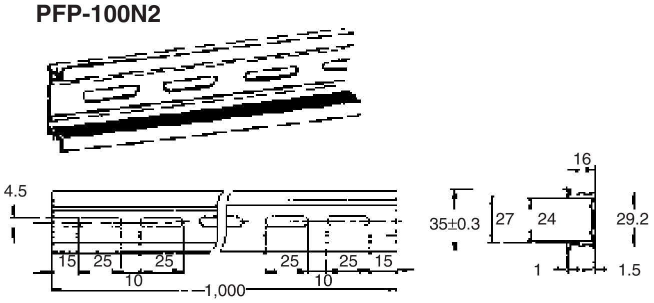
■ Accessories

DIN-rail (Order Separately)

PFP-100N/PFP-50N



PFP-100N2

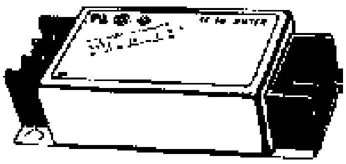


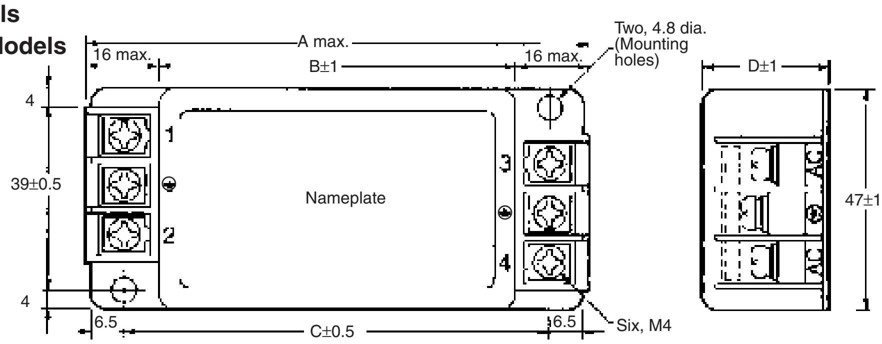
Note: The values shown in parentheses are for the PFP-50N.

Noise Filter (Order Separately)

S82Y-JF3-N for 3- to 50-W Models

S82Y-JF6-N for 90- and 100-W Models





Safety Precautions

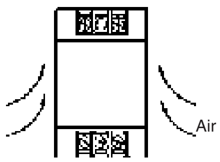
⚠ CAUTION
Minor electric shock, fire, or Product failure may occasionally occur. Do not disassemble, modify, or repair the Product or touch the interior of the Product.
Minor burns may occasionally occur. Do not touch the Product while power is being supplied or immediately after power is turned OFF.
Fire may occasionally occur. Tighten terminal screws to the specified torque of 0.98 N·m.
Minor injury due to electric shock may occasionally occur. Do not touch the terminals while power is being supplied. Always close the terminal cover after wiring.
Minor electric shock, fire, or Product failure may occasionally occur. Do not allow any pieces of metal or conductors or any clippings or cuttings resulting from installation work to enter the Product.

■ Precautions for Safe Use

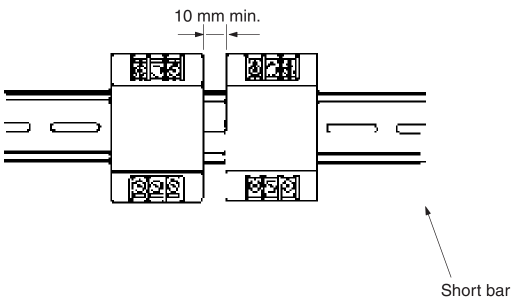
Mounting

Take adequate measures to ensure proper heat dissipation to increase the long-term reliability of the product.

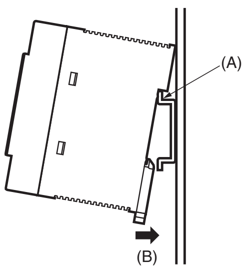
The Power Supply is designed to radiate heat by means of natural air-flow. Therefore, mount the Power Supply so that air flow takes place around the Power Supply.



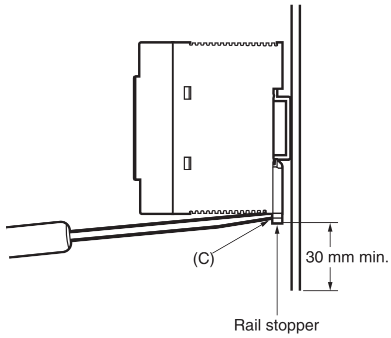
When mounting two or more Power Supplies side-by-side, allow at least 10 mm spacing between them, as shown in the following illustration.
Forced air-cooling is recommended.



To mount the Power Supply on a DIN-rail, hook portion (A) of the Power Supply to the rail and press the Power Supply toward direction (B).



To dismount the Power Supply, pull down portion (C) with a flat-blade screwdriver and pull out the Power Supply.



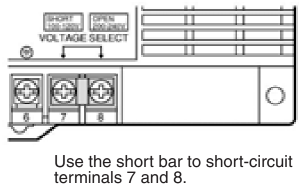
When tightening the terminals, do not tighten the terminal block to a torque greater than 75 N.

Selection of 100 or 200 VAC Input Voltage (S82K-□09024/-□10024)

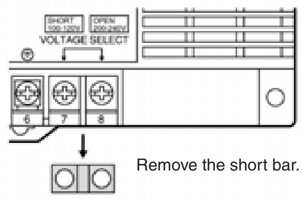
Select a 100 V or 200 V input by shorting or opening the Input Voltage Selector Terminals, as shown in the following diagram.

(The default setting is 200 V.)

100 V Input



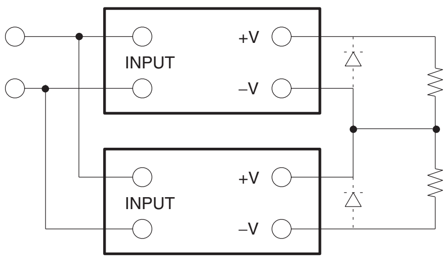
200 V Input



Generating Output Voltage (±)

An output of ± can be generated by using two Power Supplies as shown below, because the Power Supply produces a floating output.

Correct



When connecting the Power Supplies in series with an operation amplifier, connect diodes to the output terminals as shown by the dotted lines in the figure. No diodes are required with S82K 90-W/100-W models.

Charging the Battery

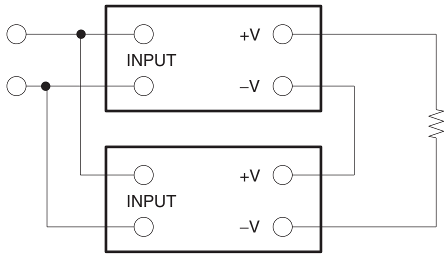
If a battery is to be connected as the load, install an overcurrent limiting circuit and an overvoltage protection circuit.

Series Operation

S82K 90-W/100-W models can be operated in series.
It must be noted that the + output of the 7.5-W dual output model cannot be connected in series to its – output.

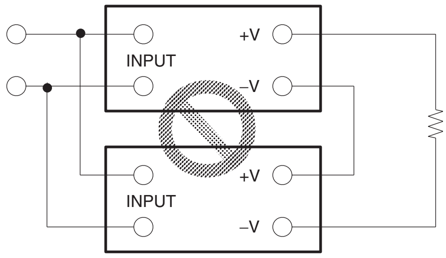
Correct

90-, 100-W Models



Incorrect

3-, 7.5-, 15-, 30-, 50-W Models

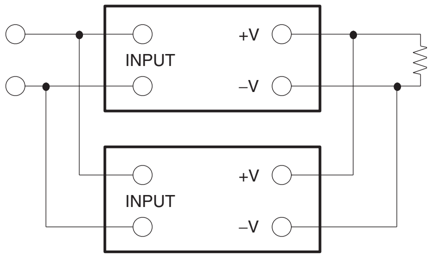


Parallel Operation

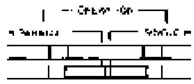
S82K 100-W models can be operated in parallel.
Perform parallel operation with power supplies satisfying the same specifications.

Correct

100-W Models

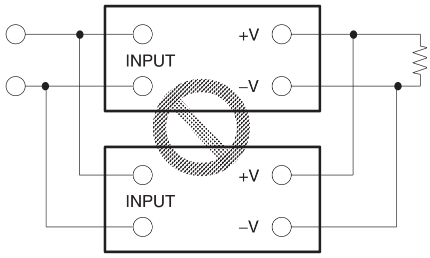


Note: When operating the S82K-P10024 in parallel operation, set the switch to "PARALLEL. In this case, the rated current per S82K-P10024 is 3.78 A.



Incorrect

3-, 7.5-, 15-, 30-, 50- and 90-W Models



Parallel Operation Precautions

The length and thickness of each wire connected to the load must be the same so that there is no difference in voltage drop value between the load and the output terminals of each Power Supply.

Adjust the output voltage of each Power Supply so that there will be no difference in output voltage between each Power Supply.

Wiring

Do not apply more than 75-N force to the terminal block when tightening it.

Ensure that input and output terminals are wired correctly.

Minimum Output Current (S82K-00727/S82K-00728)

The minimum output current of the S82K-00727 and S82K-00728 is restricted by the output voltage and control method.

Note: All the outputs of the S82K-00727 and S82K-00728 are controlled by the +V output. If the +V output current falls to 10% or less of the rated output, the –V output voltage may drop.

Warranty and Application Considerations

Read and Understand this Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability.*

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. T035-E2-01

Three-phase Input Switch Mode
S8PE

DIN-rail mounting, 3-phase input Switch mode Power Supply with a range of 5A to 40A output current

- 3 phase 400/480 or 200/230 VAC input
- 5, 10, 20 and 40A; 24 VDC output
- Higher stability, lower ripple and noise level
- Compact and attractive design, easily mounted to DIN-rail (for 5, 10 and 20A types)
- Natural ventilation, no fan for less maintenance
- UL60950 (CSA22.2-60950), UL508 listing (CSA22.2-14) in addition to the CE mark
- Conform to EN61000-3-2
- All types can be used for parallel & serial operation

Ordering Information

■ S8PE

Input voltage	Power rating	Output voltage	Output current	With Front mounting Bracket	With DIN-rail mounting Bracket
400/480 VAC 3-phase	120 W	24 V	5 A	–	S8PE-F12024CD
	240 W	24 V	10 A	–	S8PE-F24024CD
	480 W	24 V	20 A	S8PE-F48024C	S8PE-F48024CD
	960 W	24 V	40 A	S8PE-F96024C	–
200/230 VAC 3-phase	120 W	24 V	5 A	–	S8PE-J12024CD
	240 W	24 V	10 A	–	S8PE-J24024CD
	480 W	24 V	20 A	–	S8PE-J48024CD
	960 W	24 V	40 A	S8PE-J96024C	–

■ Model Number Legend

S8PE - □ □□□ □□ □□
1 2 3 4

1. Input Voltage

F: 400-480 VAC 3-phase
J: 200-230 VAC 3-phase

2. Power Rating

120: 120 W
240: 240 W
480: 480 W
960: 960 W

3. Output Voltage

24: 24 V

4. Configuration

C: Covered type with Front-mounting bracket
CD: Covered type with DIN-rail mounting bracket

Specifications

Item	Nominal Input Voltage	F: 400...480 VAC				J: 200...230 VAC			
	Nominal Output Current	**5 A**	**10 A**	**20 A**	**40 A**	**5 A**	**10 A**	**20 A**	**40 A**
Efficiency (typical)	(Vin = 400 VAC, Pmax) (Vin = 480 VAC, Pmax) (Vin = 230 VAC, Pmax)	85% 84% –	88% 88% –	87% 87% –	90% 90% –	– – 86%	– – 88%	– – 89%	– – 91%
Input	Voltage range	340...576 VAC				180..264 VAC			
	Frequency	50/60 Hz							
	Current (max.) (Vin = Range min., Pmax)	0.5 A	1.0 A	1.5 A	2.5 A	1.0 A	2.0 A	3.0 A	5.0 A
	Power factor (typical) (Vin = 400 VAC, Pmax) (Vin = 480 VAC, Pmax) (Vin = 230 VAC, Pmax)	0.58 0.52 –	0.64 0.59 –	0.89 0.84 –	0.89 0.84 –	– – 0.55	– – 0.55	– – 0.9	– – 0.89
	Leakage current (max.) (Vin = 400 VAC, Pmax) (Vin = 480 VAC, Pmax) (Vin = 230 VAC, Pmax)	0.4 mA 0.5 mA –	0.9 mA 1.1 mA –	1.3 mA 1.6 mA –	0.7 mA 0.9 mA –	– – 0.3 mA	– – 0.4 mA	– – 0.7 mA	– – 1.4 mA
	Inrush current (max.) (Pmax) (Note 1)	30 A	30 A	40 A	50 A	35 A	35 A	75 A	75 A
Output	Voltage adjustment range	22.5..26.4 VDC min.							
	Tolerance adjustment accuracy	± 0.5%							
	Ripple & noise (Pmax.)	200 mV max.							
	Load variation influence	± 2% max.							
	Input variation influence	± 0.5% max.							
	Temperature variation influence	± 0.01%/°C							
	Startup time (max.)	1.7 s	1.5 s	1.0 s	0.1 s	0.9 s	1.0 s	1.3 s	0.1 s
	Hold time (min.) (Vin = 200 VAC, Pmax) (Vin = 400 VAC, Pmax) (Vin = 480 VAC, Pmax) (Vin = 230 VAC, Pmax)	– 21 ms 25 ms –	– 17 ms 26 ms –	– 11 ms 24 ms –	– 14 ms 26 ms –	10 ms – – 20 ms	4 ms – – 10 ms	4 ms – – 8 ms	5 ms – – 13 ms
	Protection	- Short circuit protection with automatic reset - Over load protection - Over voltage protection (Note 4)							
	Parallel operation	Yes (for two units)							
	Serial operation	Yes (for two units)							
	Indicator	Yes (Green LED)							
Others	Heat radiation	Natural air cooling							
	Ambient temperature (Note 2)	-10..60 °C (de-rating: 2%/°C for 50..60 °C)							
	Storage temperature	-25..85 °C							
	Ambient humidity	25..85%							
	Dielectric strength	500 VAC 50/60 Hz (Output - P.E.) Comply to EN60950 F: 2.5 kVAC 50/60 Hz (Input - P.E.) J: 1.5 kVAC 50/60 Hz (Input - P.E.)							
	Insulation resistance	500 M Ω min. at 500 VDC: P.E. - Output							
	EMC	EN55022 class A, EN55011 class A, EN50081-2 EN61000-6-2, EN61000-3-2 class A							
	Approved standards	IEC60950, EN60950, UL60950, CSA22.2-60950 UL508 (Listing), CSA22.2-14, EN50178, EN60204-1							
	Life expectancy (Note 3)	10 years (typical)							
	Weight	750 g	1.0 kg	2.65 kg	4.75 kg	750 g	1.0 kg	2.65 kg	4.75 kg

Note 1. Measured at 25 °C, and cold start condition. (F: Vin = 480 VAC, J: Vin = 230 VAC, duration < 500 µs)

2. For UL and CSA, -105 to 50 °C (de-rating: 2%/°C for 40-50 °C only for 40 A model).

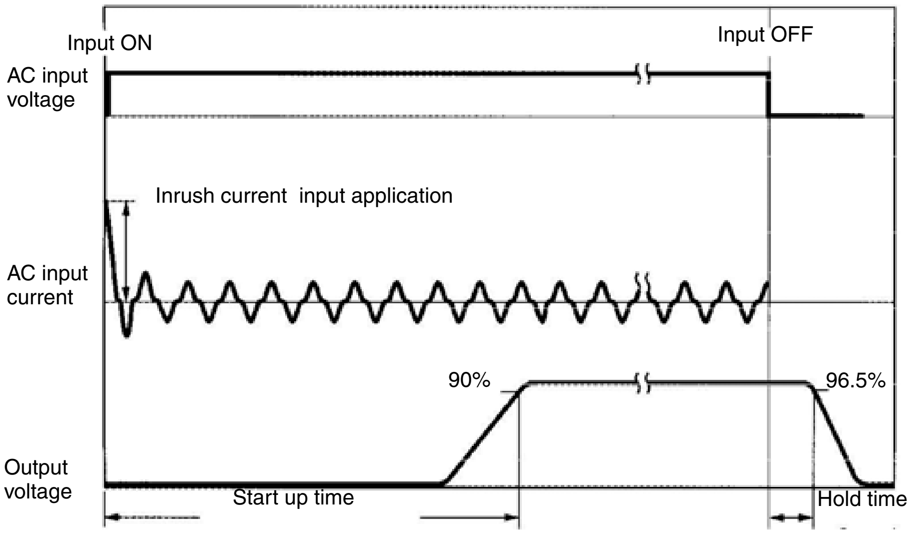
3. Under the ambient temperature of 40 °C, and a load rate of 50%.

4. Over voltage protection is provided for 5A, 10A and 20A models.

For 40A model, no overvoltage protection is provided.

Engineering Data

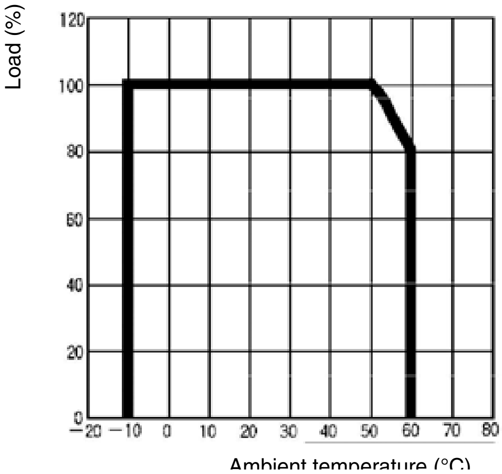
■ Definition of Inrush Current, Start up Time and Hold Time



■ Overload Protction

The Power supply is provided with an overload protec tion function that protect the load and the power sup ply from possible damage by over current. When the output current rises above between 105 to 130% of the rated current, the protection function is triggered, decreasing the output voltage. When output current falls within the rated range, the overload protection function is automatically cleared.

■ De-rating Curve



For UL and CSA the maximum temperature is 50% (with derating of 2%/°C from 40 °C to 50 °C, only for 40 A model)

■ Overvoltage Protction

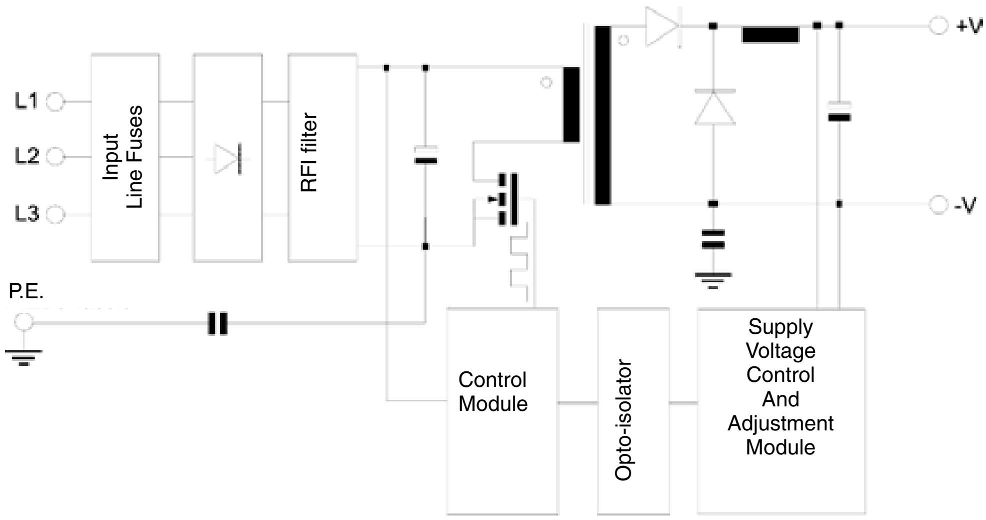
(except for 40 A model)

If output voltage exceed the rated voltage more than 20% (50% at maximum) by some reason, then the output voltage will be turned OFF automatically for safety. To restart the S8PE, turn OFF the input voltage, wait for about one minute, then apply the input power again.

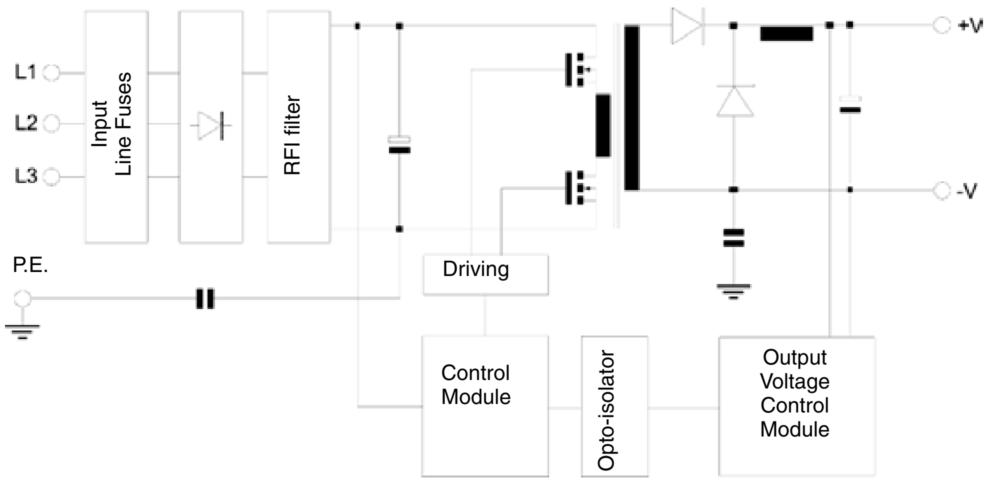
Operation

■ Block Diagram

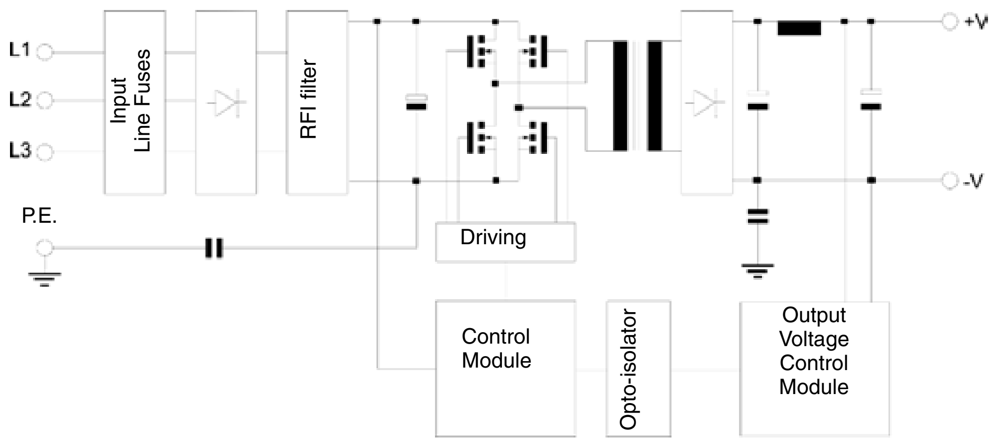
S8PE-F12024CD/J12024CD (5 A)
S8PE-F24024CD/J24024CD (10 A)



S8PE-F48024C (20 A)
S8PE-F48024CD/J48024CD (20 A)



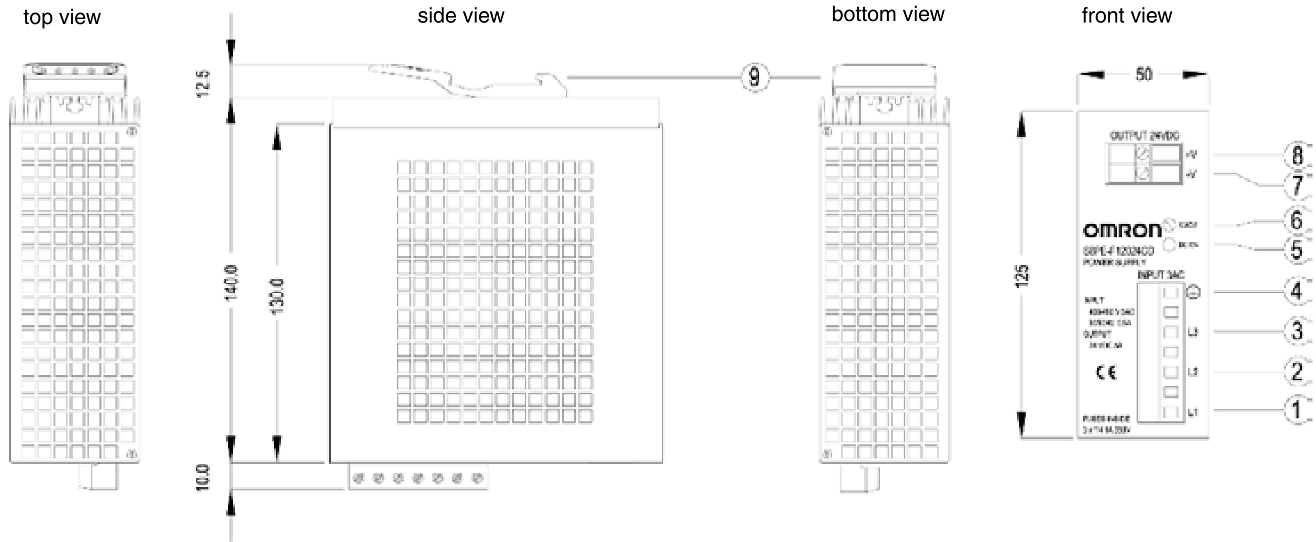
S8PE-F96024C/J96024C (40 A)



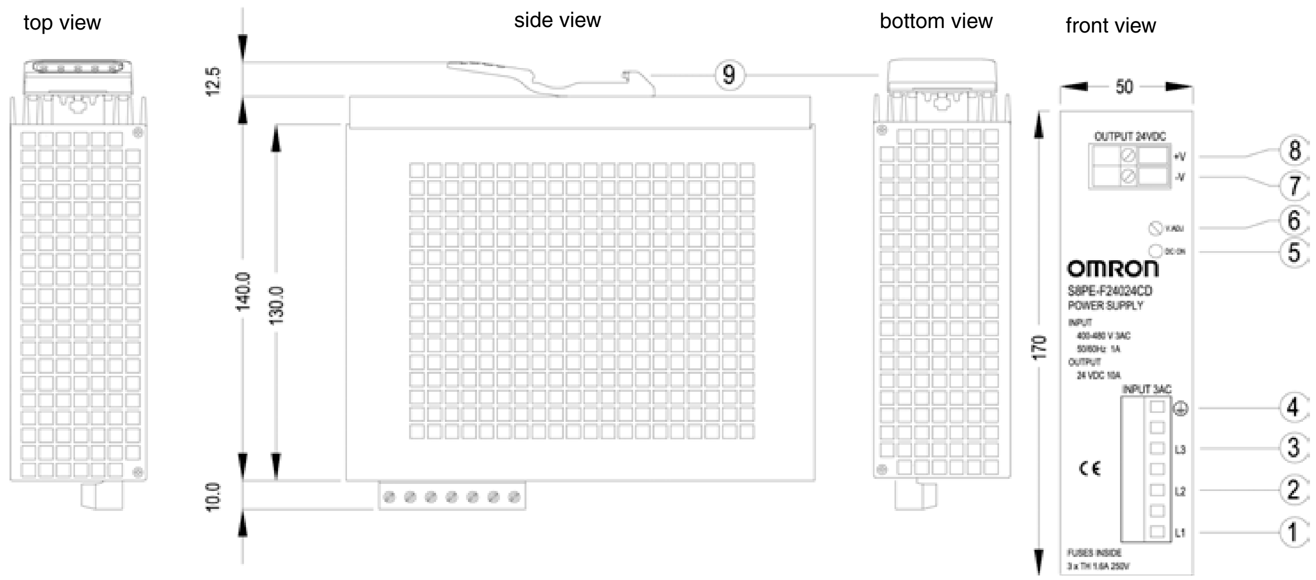
Dimensions and Installation

Note: All dimensions shown are in millimeters.

S8PE-F12024CD/J12024CD (5 A)

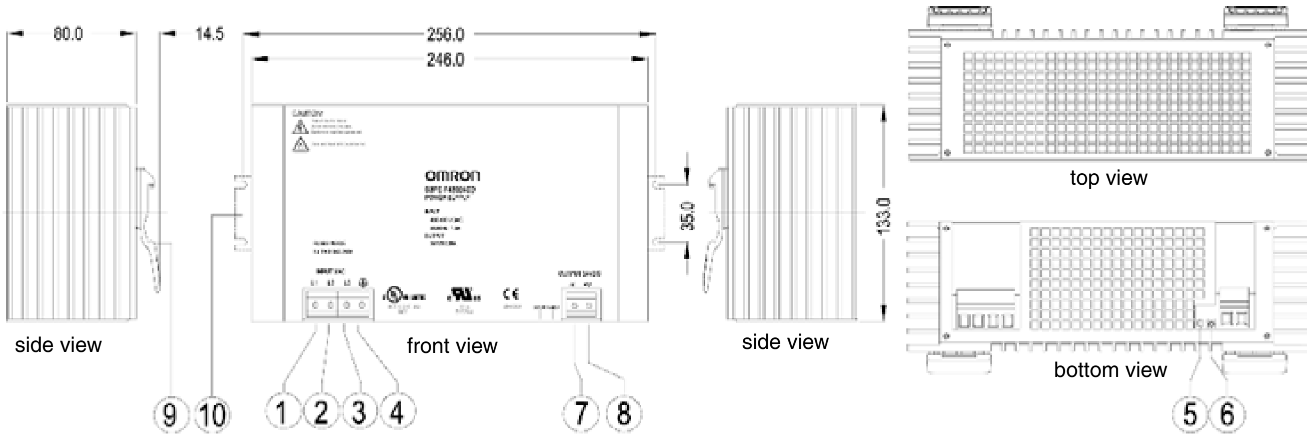


S8PE-F24024CD/J24024CD (10 A)

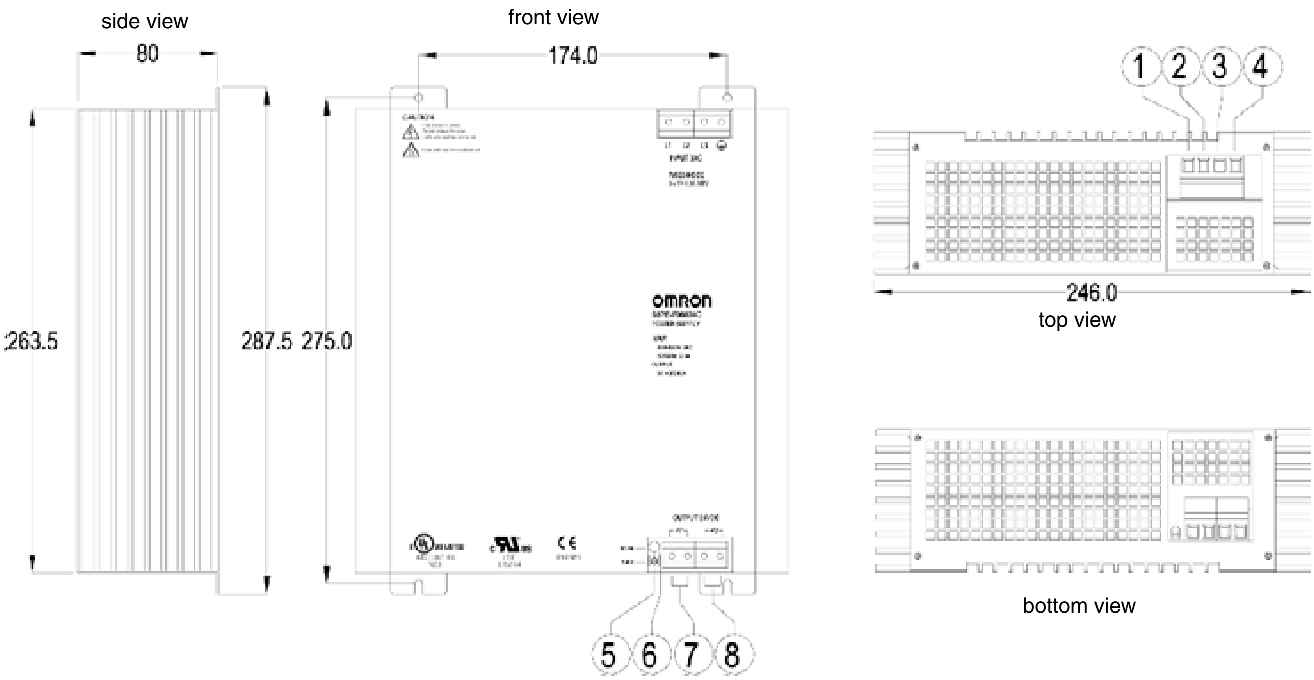


①	AC INPUT L1	⑥	Output Voltage adjustment trimmer V.ADJ
②	AC INPUT L2	⑦	DC OUTPUT -V
③	AC INPUT L3	⑧	DC OUTPUT +V
④	Protective Earth (P.E.)	⑨	35 mm DIN-rail attachment
⑤	DC OUTPUT indicator		

S8PE-F48024C (20 A)
S8PE-F48024CD/J48024CD (20 A)



S8PE-F96024C/J96024C (40 A)



①	AC INPUT L1	⑥	Output Voltage adjustment trimmer V.ADJ
✍	AC INPUT L2	⑦	DC OUTPUT -V
③	AC INPUT L3	⑧	DC OUTPUT +V
④	Protective Earth (P.E.)	⑨	35 mm DIN-rail attachment for S8PE-F48024CD/J48024CD type only
⑤	DC OUTPUT indicator	⑩	Fixing bracket for S8PE-F48024C type only

Notice

Three phase input operation when one phase is missing

The S8PE will in most cases continue to operate even after the loss of one phase of the supply. The perfor mance specifications are of course not guaranteed under these conditions. As the loss of one phase puts additional stress on some components, the life span of the unit could be shortened. It is prudent therefore to regularly check for signs of the following possible conditions.

1. Input terminals wiring open/loose.
2. Incorrect / no voltage on one or more phases of the supply.
3. Abrupt or periodical loss of input voltage.

Three phase input switch off

In order to switch off the Power Supply completely: all 3 phases need to be switched off.

Mounting

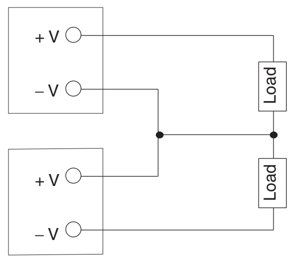
To improve and maintain the reliability of the Power Supply over a long period, adequate consideration must be taken to heat radiation.

The S8PE is designed to radiate heat by natural air cooling, therefore, mount the S8PE so that enough air flow takes place around the power supply.

If installing S8PEs closely, keep the minimum dis tance of 10 cm at 50 °C ambient, 5 cm at 20 °C am bient.

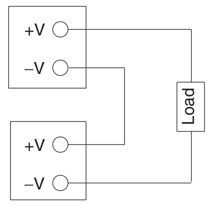
Generating (±) Output Voltage

An output of ± can be generated as shown below, since the S8PE has a floating output.



Serial Operation

As shown below, the output voltage from each S8PE can be added. Types must be the same.



Parallel Operation

Safety Precautions

■ Safety Signal words

This document uses the following signal words to mark safety precautions for the S8PE. These precautions pro vide important information for the safe application of the product. You must be sure to follow the instructions pro vided with safety signal words.

⚠ WARNING	Indicates information that, if ignored, could possibly result in loss of life or seriously injury.
⚠ Caution	Indicates information that, if ignored, could result in relatively serious or minor injury, damage to the product, or faulty operation.

⚠ WARNING

Be sure to connect the grounding line Not doing so may result in electric shock.

⚠ Caution

Do not attempt to disassemble the Power Supply or touch its internal parts while power is being supplied. Doing so may result in electric shock.

⚠ Caution

Do not touch the S8PE while the power is being supplied or immediately after the power is turned OFF. Otherwise hot Switching Power Supply.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. M02E-EN-01

Timers

With over 70 years experience in timers, Omron knows exactly how to satisfy every timer function need. Our range includes motor timers, electronic timers, standard and digital timers, all available in a wide variety of housing and mounting methods to suit any customer requirement.

- An extensive range of motor timers, electronic timers and digital timers
- A wide range of timer function modes
- Conformance with all safety standards
- A wide range of housing varieties to suit every application
- Timer range from 0.001 seconds to 9999 hours
- Relay outputs, contact and transistor outputs

Which type of timer is needed?

Motor timer

Analogue

Which mounting method is required?

DIN-rail

Plug / front

Which size is required?

17.5 mm

22.5 mm

H2C

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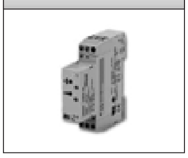
H3DS



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H3DE

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H3YN

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H3CR

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H5CX series – designed to your specifications

The H5CX series is a complete range of digital timers offering multiple time ranges and covering basically all timing functions, including real twin-timer function, memory function, an intuitive way of programming, and a two-colour, back-lit negative transmissive LCD display.

Every model features a crystal-clear display for excellent visibility in all lighting conditions, dust- and water-proof front casing (IP66) that guarantees top performance under adverse conditions, and extensive functionality in its class.

In addition, each unit in this series has the same “look and feel” with its uniform display design, the same front-panel rocker-keys for easy set-up and operation, and the same intuitive way of programming.

Digital

Which size is required?

48 x 24 mm

48 x 48 mm

H8GN

CD

H5CX

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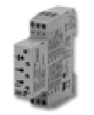
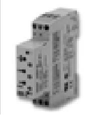
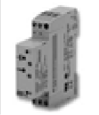
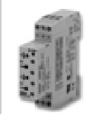
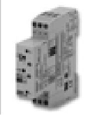
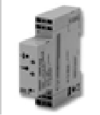
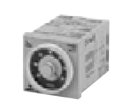
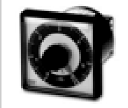
Table of contents

Selection Table

Category		Analogue solid state timer										
Selection criteria												
	Model	H3DS-M	H3DS-S	H3DS-A	H3DS-F	H3DS-G	H3DS-X	H3DE-M	H3DE-S	H3DE-F	H3DE-G	H3DE-H
	Mounting	DIN-rail										
	Size	17.5 mm						22.5 mm				
	Type	Multi-functional			Twin timer	Star delta	Two-wired	Multi-functional		Twin timer	Star delta	Power OFF delay
Contact configuration	Time limit	■	■	■	■	■	■	■	■	■	■	■
	Instantaneous							■	■			
	Programmable contacts							■	■			
	14 pins											
	11 pins											
	8 pins											
	Screw terminals	■	■	■	■	■	■	■	■	■	■	■
	Screw-less clamp terminals	□	□	□	□	□	□					
	Screw-less clamp sockets											
Inputs	Voltage input	□	□	□				□	□			
Outputs	Transistor											
	Relay	■	■	■	■	■		■	■	■	■	■
	SCR						■					
	Relay output type: SPDT	■	■	■	■			□	■	■	■ (2X)	■
	Relay output type: SPST-NO					■ (2X)						
	Relay output type: DPDT							□	■			
	Relay output type: 4PDT											
Features	Time range: Total time range	0.1 s to 120 h	1 s to 120 h	2 s to 120 h	0.1 s to 120 h	1 s to 120 h	0.1 s to 120 h	0.1 s to 120 h	0.1 s to 120 h	0.1 s to 120 h	1 s to 120 h	0.1 s to 120 h
	Time range: Number of sub ranges	7	7	7	6	2	7	8	8	8	2	2 (model dependent)
	Supply voltage	24 to 230 VAC or 24 to 48 VDC	24 to 230 VAC or 24 to 48 VDC	24 to 230 VAC or 24 to 48 VDC	24 to 230 VAC or 24 to 48 VDC	24 to 230 VAC or 24 to 48 VDC	24 to 230 VAC or 24 to 48 VDC	24 to 230 VAC or 12 VDC	24 to 230 VAC / DC or 12 VDC	24 to 230 VAC / DC	24 to 230 VAC / DC	100 to 120 VAC, 200 to 230 VAC, 24 VAC / DC, 48 VAC / DC
	Number of operating modes	8	4	1	2	1	1	8	4	1	1	1
Functions	ON-delay	■	■				■	■	■			
	Flicker OFF start	■			■			■		■		
	Flicker ON start	■	■		■			■	■	■		
	Signal ON / OFF-delay	■						■				
	Signal OFF-delay	■						■				■
	Interval (signal or power start)	■	■					■	■			
	One-shot output (ON-delay)	■	■					■	■			
	ON-delay (fixed)			■							■	
	Independent ON / OFF time											
	Star-delta					■						
Re-marks	Transistor						■					
	Page	C-5						C-39				

Analogue solid state timer					Digital timer		Motor timer		
									
H3YN	H3CR-A	H3CR-F	H3CR-G	H3CR-H	H5CX	H8GN	H2A	H2C	H3AM
Socket/on panel									
21.5 mm	1/16 DIN					1/32 DIN	40 x 50 mm	1/16 DIN	1/4 DIN
Miniature	Multi-functional	Twin timer	Star delta	Power OFF-delay	Multi-functional	Preset counter / timer	Miniature high per-formance motor timer	Motor timer	
■	■	■	■	■	■	■	■	■	■
	■		■	■			□	■	■
					■	■			■
■									
	□	□	□	□	□			□	
■	□	□	□	□	□		■	□	
					□	■		□	■
□									
	□								■
	□				□				
■	□	■	■	■	□	■	■	■	■
	□			□	□	■	■	■	
			■ (2X)				□		
□	□	■		□					■
□									
0.1 s to 10 h (model dependent)	0.05 s to 300 h, 0.1 s to 600 h (model dependent)	0.05 s to 30 h or 1.2 s to 300 h (model dependent)	0.5 s to 120 s	0.05 s to 12 s, 1.2 s to 12 min	0.001 s to 9999 h (configurable)	0.000 s to 9999 h (configurable)	0.2 s to 24 h (frequency dependent)	0.2 s to 30 h	0.5 s to 12 h
2	9	14	4	4	10	9	13	15	15
24, 100 to 120, 200 to 230 VAC, 12, 23, 48, 100 to 110, 125 VDC	100 to 240 VAC, 100 to 125 VDC, 24 to 48 VAC, 12 to 48 VDC	100 to 240 VAC, 12 VDC, 24 VAC / DC, 48 to 125 VDC	100 to 120 VAC, 200 to 240 VAC	100 to 120 VAC, 200 to 240 VAC, 24 VAC / DC, 48 VDC, 100 to 125 VDC	100 to 240 VAC, 24 VAC, 12 to 24 VDC	24 VDC	100, 110, 200, 220 VAC (50Hz), 100 / 110, 200 / 220 VAC (60 Hz)	24, 48, 100, 110, 115, 120, 200, 220, 240 VAC	100 to 240 VAC
4	6 (model dependent)		2	1	12	6	1	2	2
■	□				■	■	■	■	■
■	□	■			■	■			
■	□	■			■				
	□			■	■				
	□				■	■		■	■
■	□				■	■			
	□				■				
					■				
					■	■			
			■						
	□				■				
C-69	C-81				C-125	CD	CD	C-157	CD

■ Standard □ Available No / not available

Timers

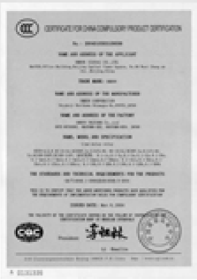
LEADING IN SERVICE

Focussed, progressive, distinctive. Be assured, choose Omron

At Omron we set high standards for ourselves. Our products are known all over the world for their unrivalled quality. But we offer more than just excellent quality. In an environment that places ever greater demands with regard to service, quality and costeffectiveness, other things are important too. Providing a top-quality service is what we do every day, including extra service as standard. This helps to ensure that we can provide tailor-made solutions for applications more effectively and more quickly.

More and more companies are choosing Omron as they seek to work in a partnership that is based on reliability and certainty.

Omron – the reassuring choice.



International standards and approvals

Our products carry all relevant international standards and approvals, including CCC (Chinese Compulsory Certification), which makes exporting your system much easier.

- Reliability, also for your customers
- Maximum flexibility
- Confidence

5-day repair service

More and more people are choosing Omron, as a high degree of reliability is a key feature of its products. You can always rely on Omron. Even if a product unexpectedly malfunctions, our repair team is ready to swing into action.

- Product repaired and returned to you within 5 days, including collection and delivery
- You can track the status of your repair on-line
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For more information please visit the Service & Support section at http://omron-industrial.com

EPLAN for Omron products

The majority of standard Omron products are provided in digital EPLAN format, which means that a few clicks of your mouse are all that is needed to design the right product into your switching panel.

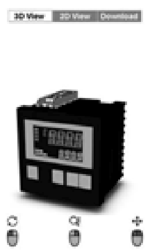
For more information please visit: http://omron-industrial.com/en/eplan/

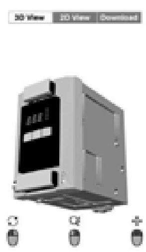
- Very easy to use
- Always the right product
- Reduced engineering time

Downloadable 2-D and 3-D CAD drawings

Designers of switching panels and machines can download clear 2-D and 3-D CAD drawings for all current products from http://omron-industrial.com/en/2D3D, which can easily be incorporated into your design.

- Large number of formats supported for greater flexibility
- Readily available
- Convenience that saves you time





Solid-state Timer

H3DS

DIN-rail Mounted, Standard 17.5-mm Width Timer Range

- A wide AC/DC power supply range (24 to 230 VAC/ 24 to 48 VDC) reduces the number of timer models kept in stock. (24 to 230 VAC/VDC with H3DS-XL☐)
- Smart Dial/Selector-locking Mechanism: Prevents the dials and selectors on the Timer's front panel from being inadvertently operated or being operated without authorization. The lock can only be unlocked and locked with an optional pen-type Lock Key.
- Screw-Less Clamp type available. (H3DS-☐LC)
- Sticker provided for easy timer identification and management.
- Terminal clamp left open when delivered (screw terminal type).
- Finger protection terminal block to meet VDE0106/P100.
- Enables easy sequence checks through instantaneous outputs for a zero set value at any time range.
- Incorporates environment-friendly, cadmium-free contacts.
- Conforms to EN61812-1 and IEC60664-1 4 kV/2 for Low Voltage, and EMC Directives.

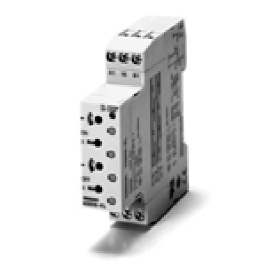
■ Broad Line-up of H3DS Series

H3DS

H3DS-M/S/A

Standard Timer
H3DS-M (eight multi-modes)
H3DS-S (four multi-modes)
H3DS-A (single mode)

H3DS-F

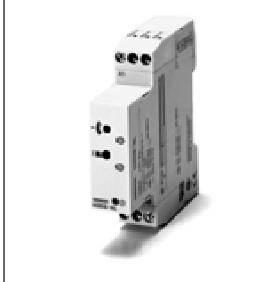


Twin Timer
H3DS-F

H3DS-G

Star-delta Timer
H3DS-G

H3DS-X



Two-wired Timer
H3DS-X

Contents

Solid-state Timer

Solid-state Multi-functional Timer

H3DS-M/-S/-A

- Eight operating modes (H3DS-M) and four operating modes (H3DS-S) cover a wide range of applications.
- A wide time setting range of 0.10 s to 120 h.
- Two LEDs indicate power and relay status respectively.

Model Number Structure

Model Number Legend

H3DS -□ L □
1 2 3

1. M: Multi-function type
   S: Standard type
   A: Single-function type
2. L: Smart lock mechanism
3. None: Screw terminal type
   C: Screw-Less Clamp type

Ordering Information

List of Models

Supply voltage	Control output	Input type	Operating mode (see note)	Model	
				Screw terminal type	Screw-Less Clamp type
24 to 230 VAC (50/60Hz)/ 24 to 48 VDC	Contact output: SPDT (time-limit output SP-DT)	Voltage input	Eight multi-modes: A, B, B2, C, D, E, G, J	H3DS-ML	H3DS-MLC
		No-input available	Four multi-modes: A, B2, E, J	H3DS-SL	H3DS-SLC
			Single mode: A	H3DS-AL	H3DS-ALC

Note: The operating modes are as follows:
A: ON-delay
B: Flicker OFF start
B2: Flicker ON start
C: Signal ON/OFF-delay
D: SIgnal OFF-delay
E: Interval
G: Signal ON/OFF-delay
J: One shot

Accessories (Order Separately)

Lock Key		Y92S-38
Mounting DIN-rail	50 cm (l) x 7.3 mm (t)	PFP-50N
	1 m (l) x 7.3 mm (t)	PFP-100N
	1 m (l) x 16 mm (t)	PFP-100N2
End Plate		PFP-M
Spacer		PEP-S

Specifications

■ General

Item	H3DS-ML□	H3DS-SL□	H3DS-AL□
Operating mode	A: ON-delay (Signal or Power) B: Flicker OFF start (Signal or Power) B2: Flicker ON start (Signal or Power) C: Signal ON/OFF-delay D: Signal OFF-delay E: Interval (Signal or Power) G: Signal ON/OFF-delay J: One-shot (Signal or Power)	A: ON-delay B2: Flicker ON start E: Interval J: One-shot	A: ON-delay (fixed)
Input type	Voltage input	---	
Output type	Relay: SPDT		
External connections	Screw terminal, Screw-Less Clamp		
Terminal block	Screw terminal type: Clamps two 2.5-mm^2 max. bar terminals without sleeves. Screw-Less Clamp type: Clamps two 1.5-mm^2 max. bar terminals without sleeves.		
Terminal screw tightening torque	0.98 N·m max.		
Mounting method	DIN-rail mounting (see note)		
Attachment	Nameplate label		
Approved standards	UL508, CSA C22.2 No.14 Conforms to EN61812-1, IEC60664-1 4 kV/2, VDE0106/P100 Output category according to IEC60947-5-1 (AC-13; 250 V 5 A/AC-14; 250 V 1 A/AC-15; 250 V 1 A/DC-13; 30 V 0.1 A/DC-14; 30 V 0.05 A)		

Note: Can be mounted to 35-mm DIN-rail with a plate thickness of 1 to 2.5 mm.

■ Time Ranges

Time scale display	Time range
0.1 s	0.1 to 1.2 s
1 s	1 to 12 s
0.1 m	0.1 to 1.2 min
1 m	1 to 12 min
0.1 h	0.1 to 1.2 h
1 h	1 to 12 h
10 h	10 to 120 h

Note: When the time setting dial is set to “0” for any time scale, the output will operate instantaneously.

■ Ratings

Rated supply voltage (see notes 1 and 2)	24 to 230 VAC (50/60 Hz)/24 to 48 VDC
Operating voltage range	85% to 110% of rated supply voltage
Power reset	Minimum power-off time: 0.1 s
Reset voltage	2.4 VAC/DC max.
Power consumption (see note 3)	AC: 32 VA max./3.0 W max. (typical: 30 VA/2.7 W) at 230 VAC 14 VA max./2.2 W max. (typical: 13 VA/2.1 W) at 100 to 120 VAC DC: 0.7 W max. (typical: 0.6 W) at 24 VDC 1.4 W max. (typical: 1.3 W) at 48 VDC
Voltage input	Max. permissible capacitance between inputs lines (terminals B1 and A2): 2,000 pF Load connectable in parallel with inputs (terminals B1 and A1). H-level: 20.4 to 253 VAC/20.4 to 52.8 VDC L-level: 0 to 2.4 VAC/DC
Control output	Contact output: 5 A at 250 VAC with resistive load (cosϕ = 1) 5 A at 30 VDC with resistive load (cosϕ = 1)
Ambient temperature	Operating: –10°C to 55°C (with no icing) Storage: –25°C to 65°C (with no icing)
Ambient humidity	Operating: 35% to 85%

Note: 1. DC ripple rate: 20% max.

2. Since an inrush current of 0.5 A will occur when using the power supply voltage at 24 VDC, pay careful attention when turning on or off the power supply to the Timer with a solid-state output such as a sensor.

3. The power consumption is for mode A after the Timer counts the time-up time and for the AC input at 50 Hz. The power consumption of the H3DS-ML includes the input circuit with the B1 and A1 terminals short-circuited.

■ Characteristics

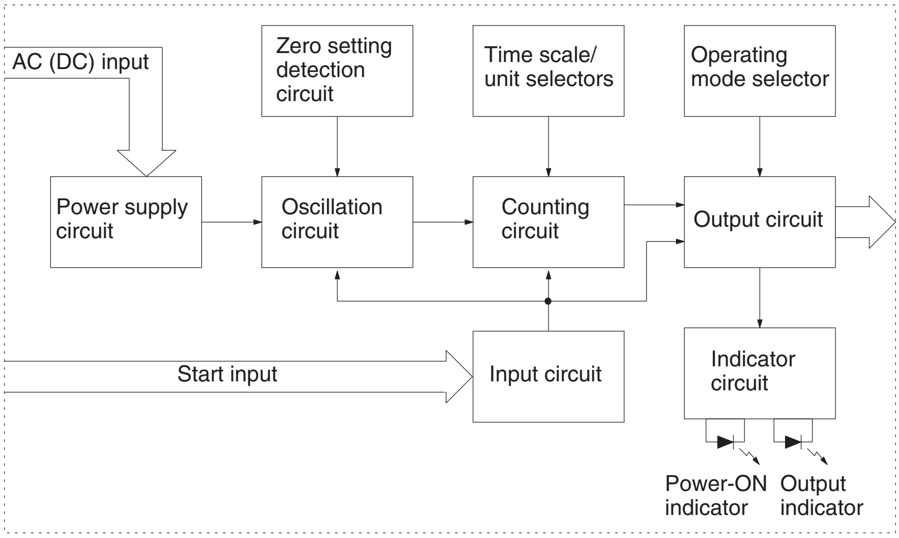
Accuracy of operating time	±1% max. of FS (±1% ±10 ms max. at 1.2-s range)
Setting error	±10% ±50 ms max. of FS
Signal input time	50 ms min.
Influence of voltage	±0.7% max. of FS (±0.7% ±10 ms max. at 1.2-s range)
Influence of temperature	±5% max. of FS (±5%±10 ms max. at 1.2-s range)
Insulation resistance	100 MΩ min. at 500 VDC
Dielectric strength	Between current-carrying metal parts and exposed non-current-carrying metal parts: 2,000 VAC for 1 min. Between control output terminals and operating circuit: 2,000 VAC for 1 min. Between contacts not located next to each other: 1,000 VAC for 1 min.
Vibration resistance	Malfunction: 0.5-mm single amplitude at 10 to 55 Hz Destruction: 0.75-mm single amplitude at 10 to 55 Hz
Shock resistance	Malfunction: 100 m/s^2 3 times each in 6 directions Destruction: 1,000 m/s^2 3 times each in 6 directions
Impulse withstand voltage	3 kV (between power terminals) 4.5 kV (between current-carrying metal parts and exposed non-current-carrying metal parts)
Noise immunity	Square-wave noise generated by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise) ±1.5 kV
Static immunity	Malfunction: 4 kV Destruction: 8 kV
Life expectancy	Mechanical: 10 million operations min. (under no load at 1,800 operations/h) Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 360 operations/h) (see note)
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class B Emission AC Mains: EN55011 Group 1 class B Harmonic Current: EN61000-3-2 Voltage Fluctuation and Flickering: EN61000-3-3 (EMS) EN61812-1 Immunity ESD: EN61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: EN61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power port and output port (level 3) 1 kV control port with capacitive clamp (level 3) Immunity Surge: EN61000-4-5: 2 kV common mode (level 3) 1 kV differential mode (level 3)
Case color	Light gray (5Y7/1)
Degree of protection	IP30 (Terminal block: IP20)
Weight	Approx. 70 g

Note: For reference:
A maximum current of 0.15 A can be switched at 125 VDC (cosφ=1).
A maximum current of 0.1 A can be switched if L/R is 7 ms.
In both cases, a life of 100,000 operations can be expected.
The minimum applicable load is 10 mA at 5 VDC (failure level: P).

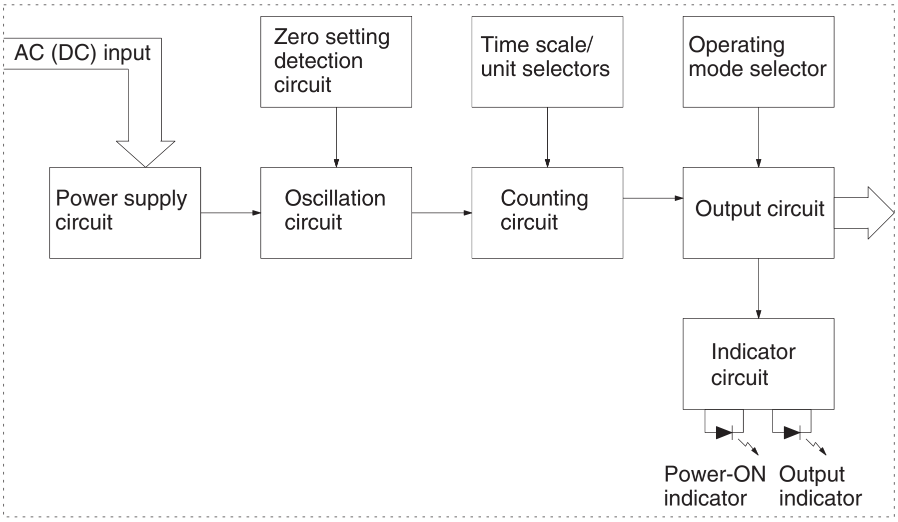
Connections

■ Block Diagram

H3DS-ML□



H3DS-SL□/-AL□

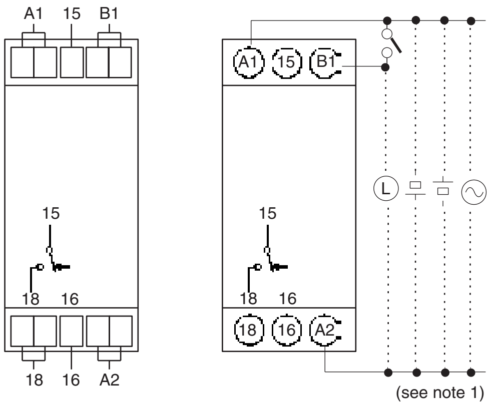


■ I/O Functions

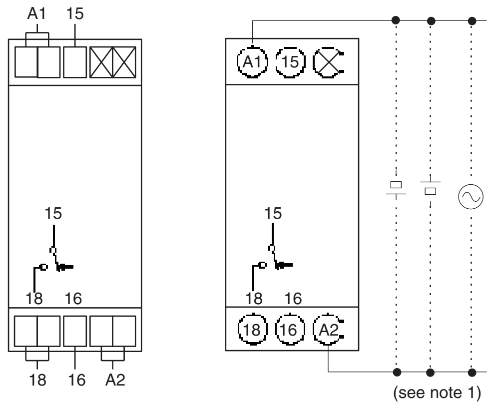
Item		H3DS-ML□	H3DS-SL□/-AL□
Input	**Start**	Starts operation.	No input is available.
Output	**Control output**	Outputs are turned ON according to designated output mode when preset value is reached.	Outputs are turned ON according to designated output mode when preset value is reached.

Terminal Arrangement

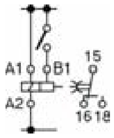
H3DS-MLC **H3DS-ML**



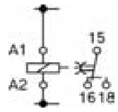
H3DS-SLC/-ALC **H3DS-SL/-AL**



(DIN notation)



(DIN notation)



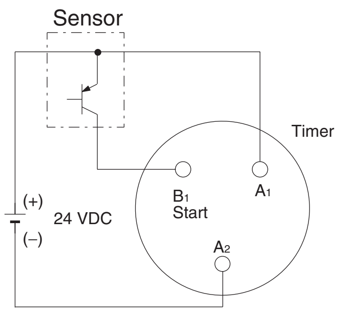
Note: 1. DC supply voltage does not require the designation of polarity.

2. The contact symbol for the H3DS is indicated with because it offers multiple operating modes and is different from the delayed contact for conventional timers.

Input Connections

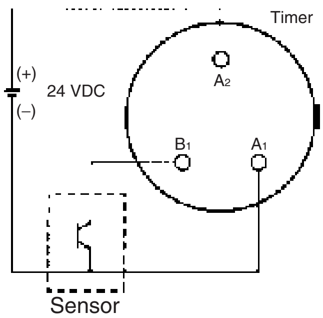
The inputs of the H3DS-ML□ are voltage (voltage imposition or open) inputs.

No-contact Input
(Connection to PNP output sensor.)



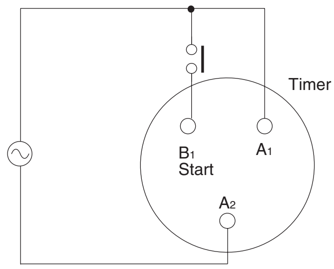
Operates with PNP transistor ON

No-contact Input
(Connection to NPN output sensor.)



Operates with NPN transistor ON

Contact Input



Operates with relay ON

Voltage Input Signal Levels

No-contact input	1. Transistor ON Residual voltage: 1 V max. (Voltage between terminals B_1 and A_2 must be more than the rated "H-level" voltage (20.4 VDC min.).)
	2. Transistor OFF Leakage current: 0.01 mA max. (Voltage between terminals B_1 and A_2 must be less than the rated "L-level" voltage (2.4 VDC max.).)
Contact input	Use contacts that can adequately switch 0.1 mA at each voltage to be imposed. (When the contacts are ON or OFF, voltage between terminals B_1 and A_2 must be within the following ranges: When contacts are ON: 20.4 to 253 VAC/20.4 to 52.8 VDC When contacts are OFF: 0 to 2.4 VAC/DC

Operation

■ Basic Operation

Setting of Selector

The selectors can be turned clockwise and counterclockwise to select the desired time scale, or operating mode.

Each selector has a snap mechanism that secures the selector at a given position. Set the selector at a position at which it is secured. Do not set it midway between two securing positions or a malfunction could result from improper setting.

Selection of Operating Mode (except for H3DS-AL)

The H3DS-ML/-SL can be set to any one of the operating modes A to J. Turn the operating mode selector with a screwdriver until the desired operating mode appears in the operating mode display window.

H3DS-ML (8 modes): A, B, B2, C, D, E, G, J
(In order of appearance)
H3DS-SL (4 modes): A, E, B2, J, E, E, J, J
(In order of appearance)

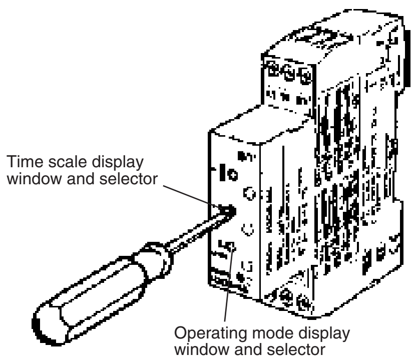
Note: Letters that appear more than once indicate exactly the same operating mode.

Selection of Time Scale

The time scale is selected by turning the time scale selector. The time scales will appear in the following order in the time scale display window on the left of the selector:

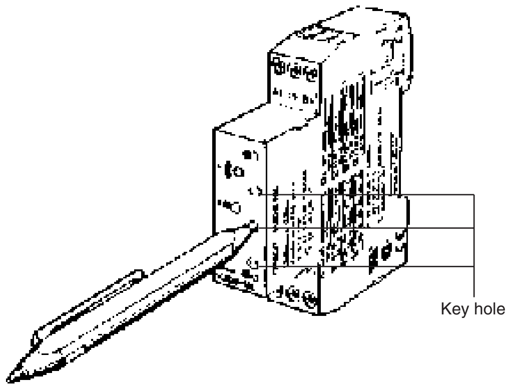
1 s, 0.1 s, 1 h, 0.1 h, 10 h, 1 h, 1 m, 0.1 m.

Note: The time scale "1h" appears twice. Both instances indicate exactly the same time scale.



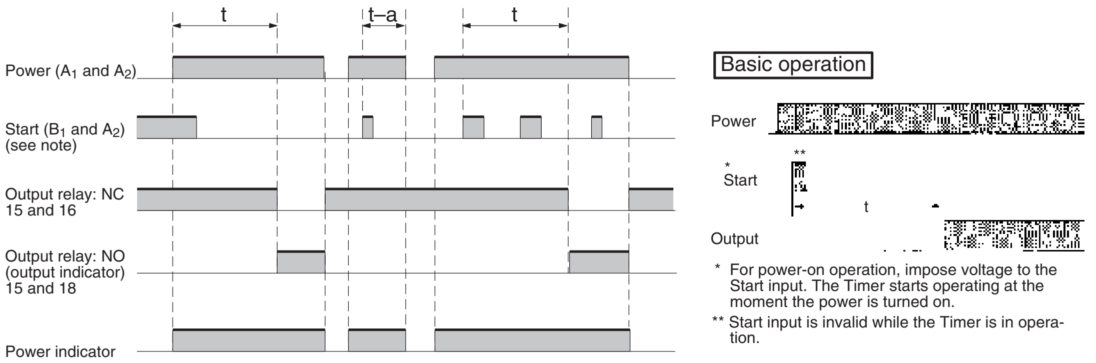
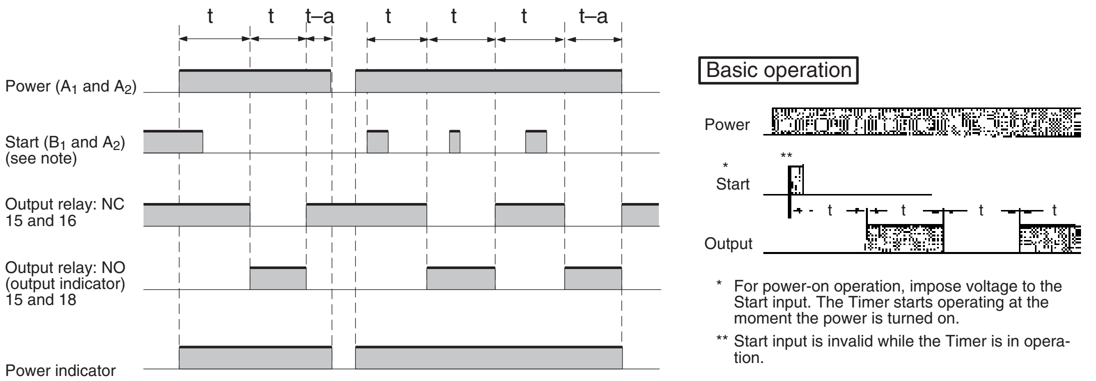
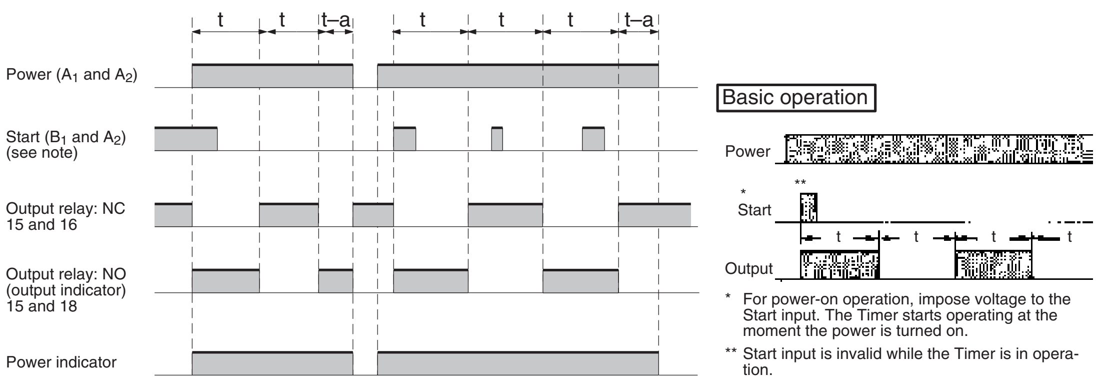
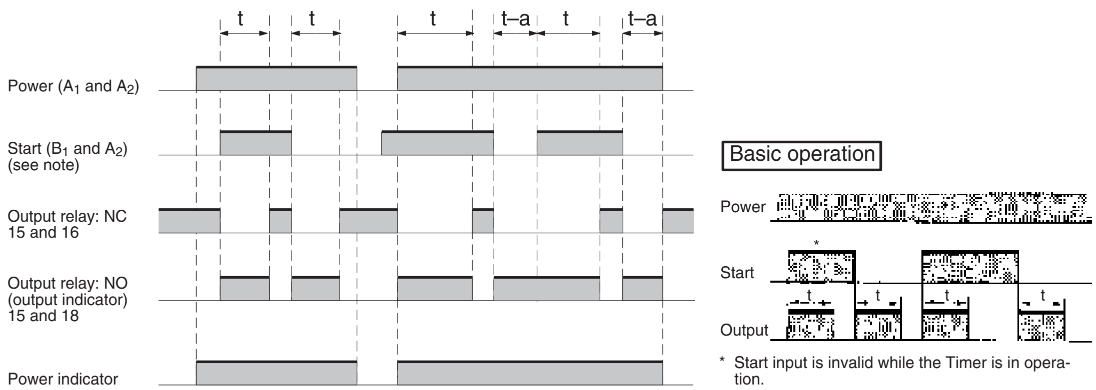
Locking/Unlocking of Selectors and Time Setting Dial

The time setting dial, time scale selector, and operating mode selector can be locked using the Y92S-38 Lock Key, a special pen type tool that is sold separately. To lock the dial or selectors, insert the Lock Key in the keyhole to the lower right of the dial or selector and turn it clockwise until the dial or selector is completely covered with the red cover. To unlock, turn the Lock Key in the opposite direction.

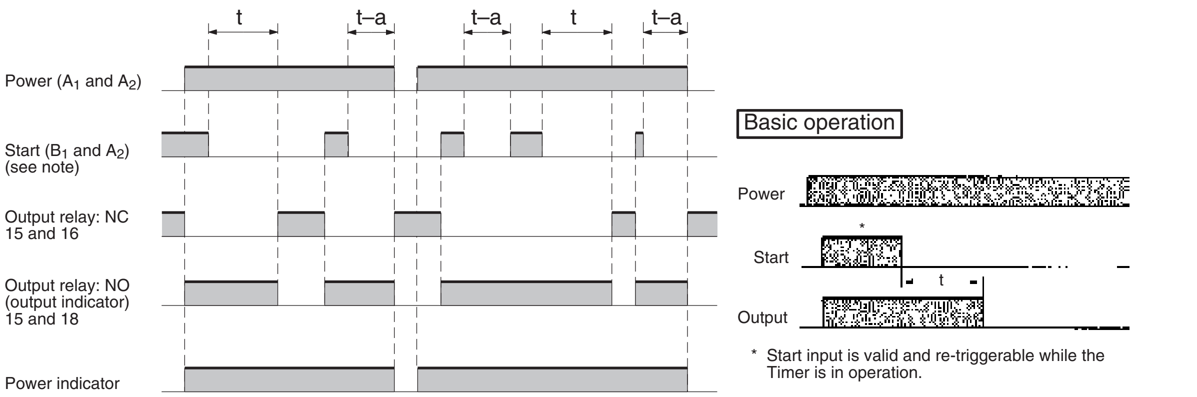
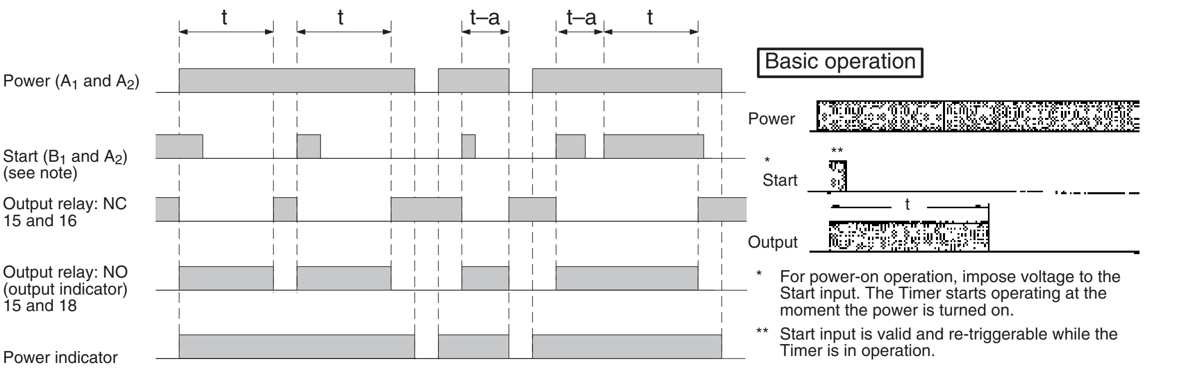
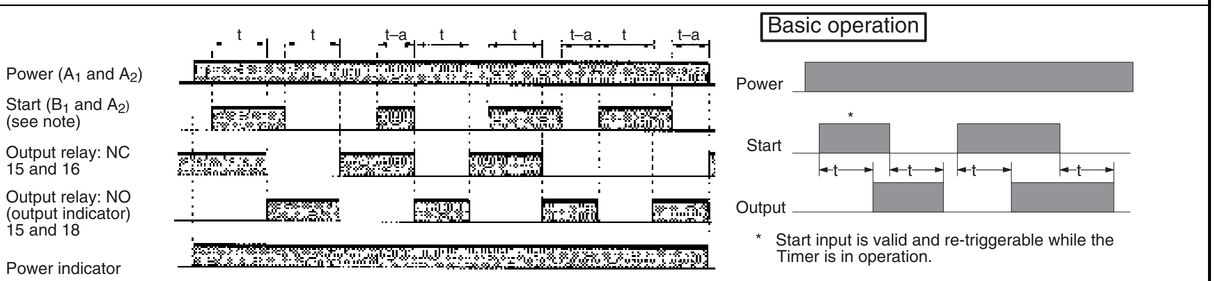
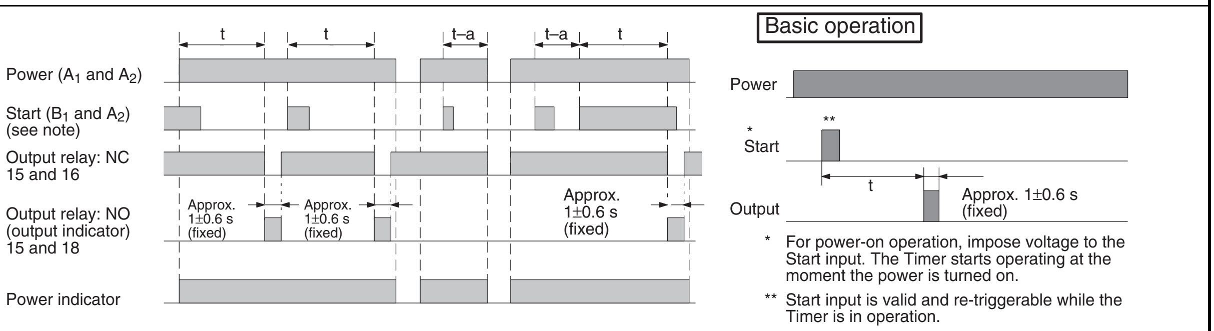


■ Timing Chart

Note: 1. The minimum power reset time is 0.1 s and the minimum signal input time is 0.05 s.
2. The letter "t" in the timing charts stands for the set time and "t–a" means that the period is less than the time set.
3. There is no start input for H3DS-SL□/-AL□ models. Operation starts at power-on.

Operating mode	Timing chart
A: ON-delay	
B: Flicker OFF start	
B2: Flicker ON start	
C: Signal ON/OFF-delay	

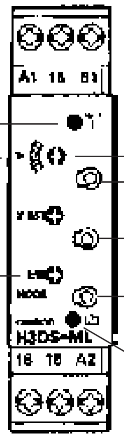
Note: The start input of the H3DS-ML□ model is activated by applying a voltage to B1 and A2 terminals.
The voltage can be applied by turning on the contact between B1 and A1 (Refer to *Terminal Arrangement*).

Operating mode	Timing chart
D: Signal OFF-delay	
E: Interval	
G: Signal ON/OFF-delay	
J: One-shot output (ON delay)	

Note: The start input of the H3DS-ML□ model is activated by applying a voltage to B1 and A2 terminals.
The voltage can be applied by turning on the contact between B1 and A1 (Refer to *Terminal Arrangement*).

Nomenclature

H3DS-ML□/-SL□

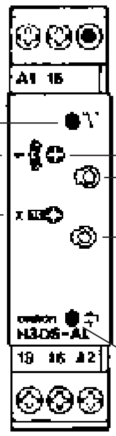


(Front View)

H3DS-MLC/-SLC

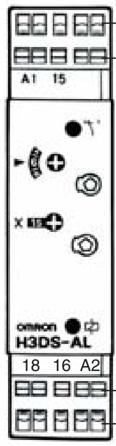
(Front View)

H3DS-AL□

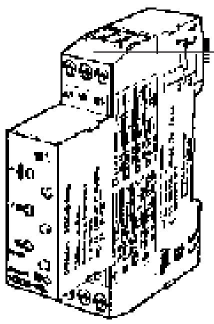


(Front View)

H3DS-ALC



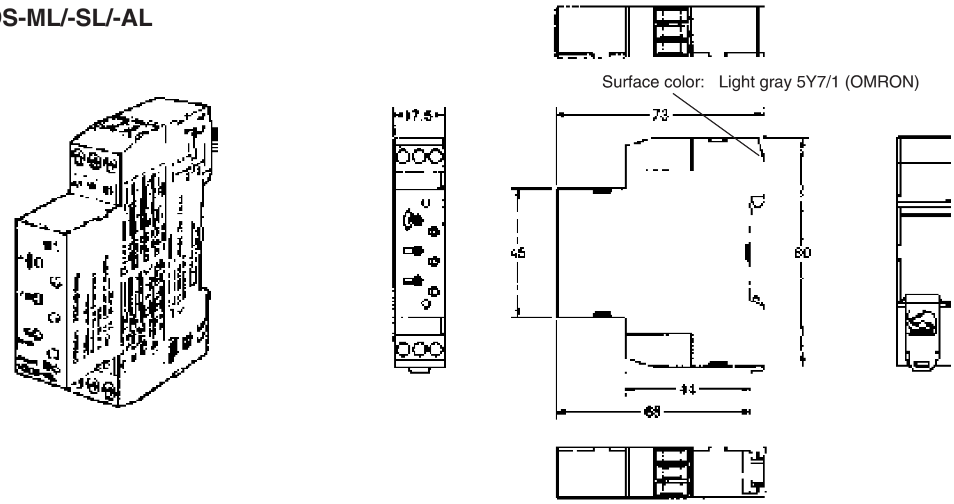
(Front View)



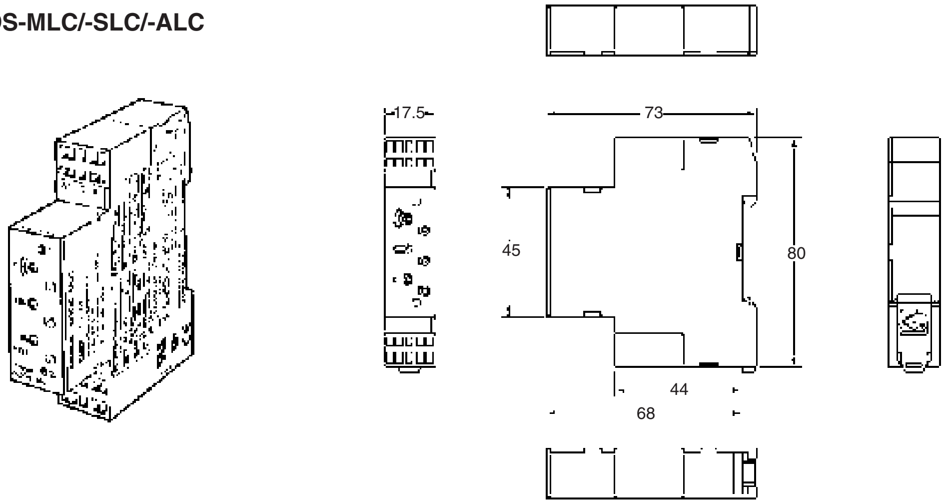
Dimensions

Note: All units are in millimeters unless otherwise indicated.

H3DS-ML/-SL/-AL



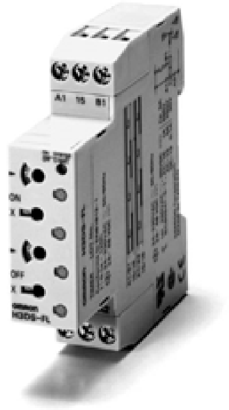
H3DS-MLC/-SLC/-ALC



Solid-state Twin Timer

H3DS-F

- Operates in flicker-OFF or flicker-ON start mode with one Unit.
- Independent ON- and OFF-time settings. Combinations of long ON- or OFF-time and short OFF- or ON-time setting are possible.
- Long time range from 0.1 s to 12 h for both ON and OFF time settings.



Model Number Structure

Model Number Legend

H3DS -F L □
1 2 3

1. F: Twin timers
2. L: Smart lock mechanism
3. None: Screw terminal type
   C: Screw-Less Clamp type

Ordering Information

List of Models

Operating mode	Supply voltage	Model	
		Screw terminal type	Screw-Less Clamp type
Flicker-OFF/Flicker-ON start	24 to 230 VAC (50/60 Hz)/24 to 48 VDC	H3DS-FL	H3DS-FLC

Accessories (Order Separately)

Lock Key		Y92S-38
Mounting DIN-rail	50 cm (l) x 7.3 mm (t)	PFP-50N
	1 m (l) x 7.3 mm (t)	PFP-100N
	1 m (l) x 16 mm (t)	PFP-100N2
End Plate		PFP-M
Spacer		PEP-S

Specifications

■ General

Item	H3DS-F
Operating mode	Flicker-OFF/Flicker-ON start
Output type	Relay: SPDT
External connections	Screw terminal, Screw-Less Clamp
Terminal block	Screw terminal type: Clamps two 2.5-mm^2 max. bar terminals without sleeves. Screw-Less Clamp type: Clamps two 1.5-mm^2 max. bar terminals without sleeves.
Terminal screw tightening torque	0.98 N·m max.
Mounting method	DIN-rail mounting (see note)
Attachment	Nameplate label
Approved standards	UL508, CSA C22.2 No.14 Conforms to EN61812-1, IEC60664-1 4 kV/2, VDE0106/P 100 Output category according to IEC60947-5-1 (AC-13; 250 V 5A/AC-15; 250 V 1 A/DC-13; 30 V 0.1 A)

Note: Can be mounted to 35-mm DIN-rail with a plate thickness of 1 to 2.5 mm.

■ Time Ranges

Time scale display	Time range
0.1 s	0.1 to 1.2 s
1 s	1 to 12 s
0.1 m	0.1 to 1.2 min
1 m	1 to 12 min
0.1 h	0.1 to 1.2 h
1 h	1 to 12 h

Note: When the time setting dial is set to “0” for any time scale, the output will operate instantaneously.

■ Ratings

Rated supply voltage (See note.)	24 to 230 VAC (50/60 Hz)/24 to 48 VDC
Operating voltage range	85% to 110% of rated supply voltage
Power reset	Minimum power-off time: 0.1 s
Reset voltage	2.4 VAC/DC max.
Power consumption	AC: 33 VA max./2.2 W max. (typical: 31 VA/2.0 W) at 230 VAC 11 VA max./1.9 W max. (typical: 9.7 VA/1.7 W) at 100 to 120 VAC DC: 0.7 W max. (typical: 0.6 W) at 24 VDC 1.4 W max. (typical: 1.2 W) at 48 VDC
Voltage input	Max. permissible capacitance between inputs lines (terminals B1 and A2): 2,000 pF Load connectable in parallel with inputs (terminals B1 and A1). H-level: 20.4 to 253 VAC/20.4 to 52.8 VDC L-level: 0 to 2.4 VAC/DC
Control output	Contact output: 5 A at 250 VAC with resistive load (cosϕ = 1) 5 A at 30 VDC with resistive load (cosϕ = 1)
Ambient temperature	Operating: –10°C to 55°C (with no icing) Storage: –25°C to 65°C (with no icing)
Ambient humidity	Operating: 35% to 85%

Note: DC ripple rate: 20% max.

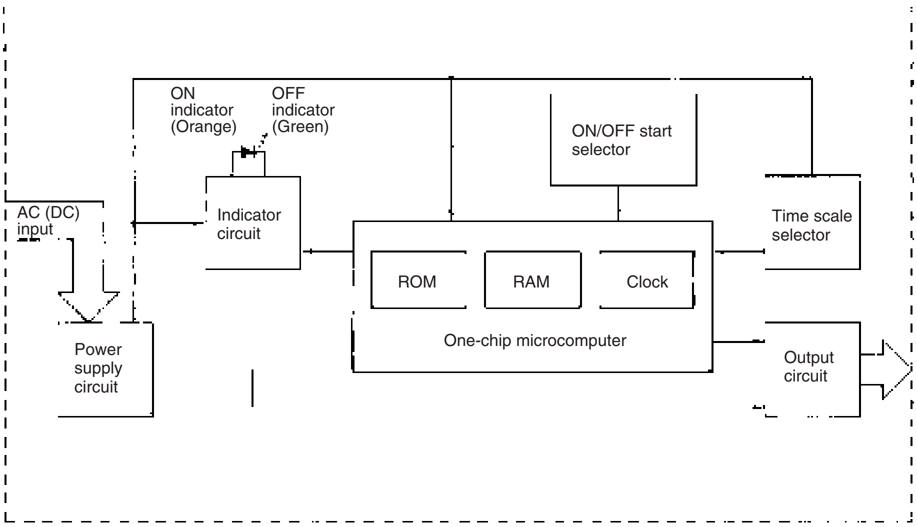
Characteristics

Accuracy of operating time	±1% max. of FS (±1% ±10 ms max. at 1.2-s range)
Setting error	±10% ± 50 ms max. of FS
Influence of voltage	±0.5% max. of FS (±0.5% ±10 ms max. at 1.2-s range)
Influence of temperature	±5% max. of FS (±5% ± 10 ms max. at 1.2-s range)
Insulation resistance	100 MΩ min. at 500 VDC
Dielectric strength	Between current-carrying metal parts and exposed non-current-carrying metal parts: 2,000 VAC (50/60 Hz) for 1 min. Between control output terminals and operating circuit: 2,000 VAC (50/60 Hz) for 1 min. Between contacts not located next to each other: 1,000 VAC (50/60 Hz) for 1 min.
Impulse withstand voltage	3 kV (between power supply terminals) 4.5 kV (between current-carrying metal parts and exposed non-current-carrying metal parts)
Noise immunity	Square-wave noise generated by noise simulator (pulse width: 100 ns/1 µs, 1-ns rise) ±1.5 kV
Static immunity	Malfunction: 4 kV Destruction: 8 kV
Vibration resistance	Malfunction: 0.5-mm single amplitude at 10 to 55 Hz Destruction: 0.75-mm single amplitude at 10 to 55 Hz
Shock resistance	Malfunction: 200 m/s^2, 3 times each in 6 directions Destruction: 300 m/s^2, 3 times each in 6 directions
Life expectancy	Mechanical: 10 million operations min. (under no load at 1,800 operations/h) Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 360 operations/h) (see note)
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class B Emission AC Mains: EN55011 Group 1 class B Harmonic Current: EN61000-3-2 Voltage Fluctuation and Flickering: EN61000-3-3 (EMS) EN61812-1 Immunity ESD: EN61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: EN61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power port and output port (level 3) 1 kV control port with capacitive clamp (level 3) Immunity Surge: EN61000-4-5: 2 kV common mode (level 3) 1 kV differential mode (level 3)
Case color	Light gray (5Y7/1)
Degree of protection	IP30 (IP20 for terminal block)
Weight	Approx. 70 g

Note: For reference:
A maximum current of 0.15 A can be switched at 125 VDC (cosϕ=1).
A maximum current of 0.1 A can be switched if L/R is 7 ms.
In both cases, a life of 100,000 operations can be expected.
The minimum applicable load is 10 mA at 5 VDC (failure level: P).

Connections

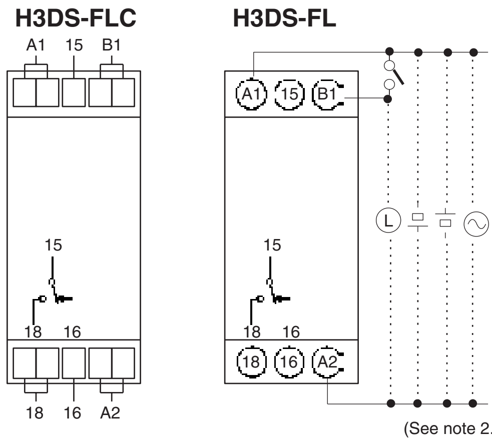
■ Block Diagram



■ I/O Function

Inputs		Flicker-ON start operation begins when inputs are turned ON.
Outputs	**Control output**	Outputs are turned ON/OFF according to the time set by the ON-and OFF-time setting dial.

■ Terminal Arrangement



Note: 1. If voltage is applied to terminal B1, or if terminals A1 and B1 are shorted, the operating mode is switched to flicker-ON start mode. If these terminals are disconnected, the mode switches to flicker-OFF start mode.

2. DC supply voltage does not require the designation of polarity.

Operation

■ Basic Operation

Setting of Selector

The selectors can be turned clockwise and counterclockwise to select the desired time scale, or operating mode.

Each selector has a snap mechanism that secures the selector at a given position. Set the selector at a position at which it is secured. Do not set it midway between two securing positions or a malfunction could result from improper setting.

Settings for ON/OFF Start

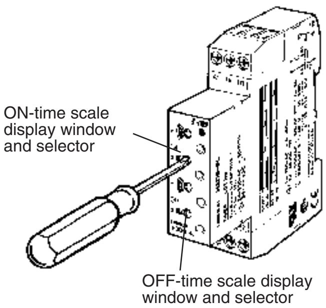
If voltage is applied to terminal B1, or if terminals A1 and B1 are shorted, the operating mode is switched to flicker-ON start mode. If these terminals are disconnected, the mode switches to flicker-OFF start mode. The operating mode will not change if the state of the applied voltage changes during timer operation.

Selection of Time Scale

The time scale is selected by turning the ON-time scale selector and OFF-time scale selector. The time scales will appear in the following order in each time scale display window on the left of the selector:

0.1 s, 1 h, 0.1 h, 1 m, 1 s, 0.1 h, 0.1 m, 1 s.

Note: The time scales "1 s" and "0.1 h" appear twice. Both instances indicate exactly the same time scale.

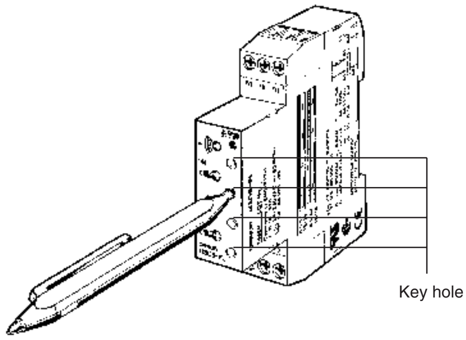


Time Setting

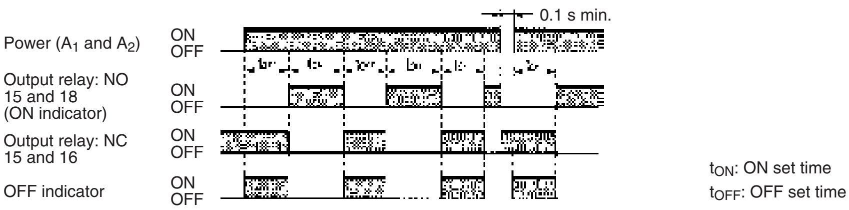
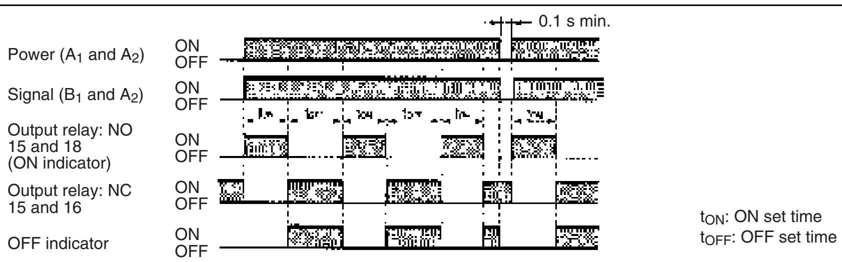
Use the ON/OFF-time setting dials to set the ON/OFF time.

Locking/Unlocking of Selectors and Time Setting Dial

The ON/OFF-time setting dials and time scale selectors can be locked using the Y92S-38 Lock Key, a special pen type tool that is sold separately. To lock the dials or selectors, insert the Lock Key in the keyhole to the lower right of the dial or selector and turn it clockwise until the dial or selector is completely covered with the red cover. To unlock, turn the Lock Key in the opposite direction.



■ Timing Charts

Operating mode	Timing chart
Flicker-OFF start (See note 1.)	
Flicker-ON start (See note 1.)	

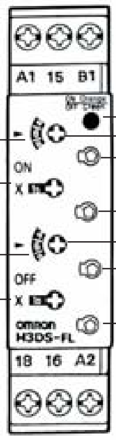
Note: 1. If voltage is applied to terminal B1, or if terminals A1 and B1 are shorted, the operating mode is switched to flicker-ON start mode. If these terminals are disconnected, the mode switches to flicker-OFF start mode.

2. The reset time requires a minimum of 0.1 s.

3. When power is supplied in flicker-ON start mode, the OFF indicator lights momentarily. This, however, has no effect on the performance of the Timer.

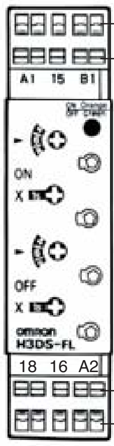
Nomenclature

H3DS-FL□

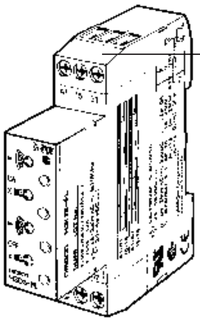


(Front View)

H3DS-FLC

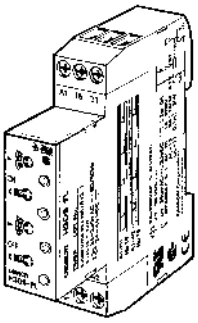


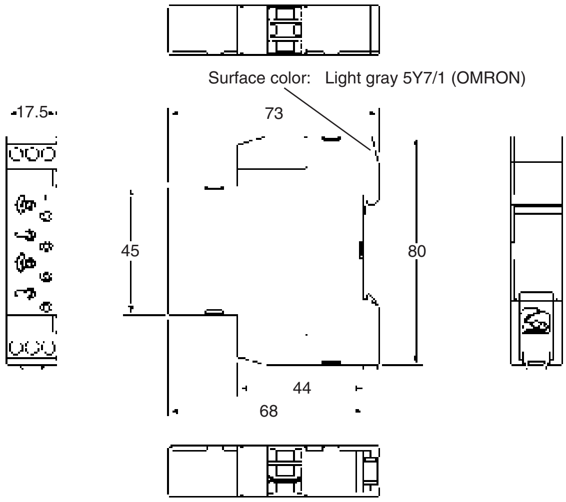
(Front View)



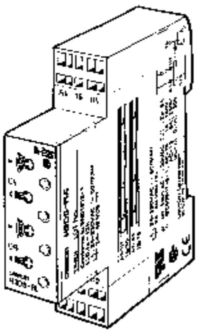
Dimensions

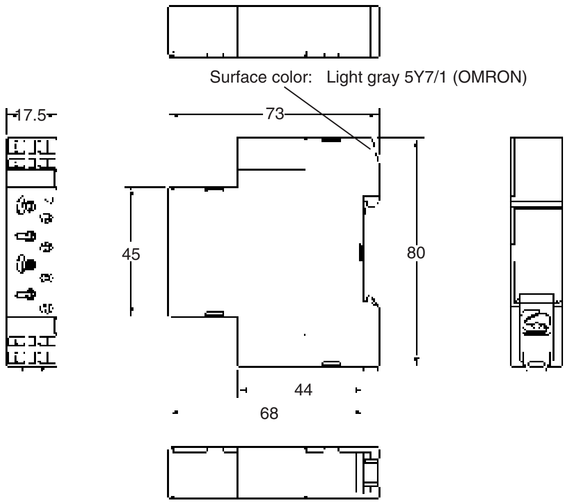
H3DS-FL





H3DS-FLC

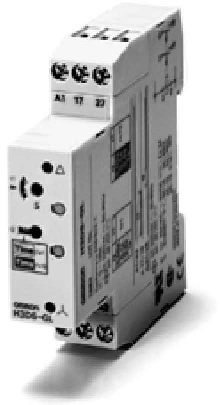




Solid-state Star-delta Timer

H3DS-G

- A wide star-time range (up to 120 seconds) and star-delta transfer time range (up to 1 second)



Model Number Structure

■ Model Number Legend

H3DS -G L □
1 2 3

1. G: Star-delta timer
2. L: Smart lock mechanism
3. None: Screw terminal type
   C: Screw-Less Clamp type

Ordering Information

■ List of Models

Operating mode	Supply voltage	Model	
		Screw terminal type	Screw-Less Clamp type
Star-delta operation	24 to 230 VAC (50/60 Hz)/24 to 48 VDC	H3DS-GL	H3DS-GLC

■ Accessories (Order Separately)

Lock Key		Y92S-38
Mounting DIN-rail	50 cm (l) x 7.3 mm (t)	PFP-50N
	1 m (l) x 7.3 mm (t)	PFP-100N
	1 m (l) x 16 mm (t)	PFP-100N2
End Plate		PFP-M
Spacer		PEP-S

Specifications

■ General

Item	H3DS-G
Operating mode	Star-delta operation
Operating/Reset method	Time-limit operation/Self-reset
External connections	Screw terminal, Screw-Less Clamp
Terminal block	Screw terminal type: Clamps two 2.5-mm^2 max. bar terminals without sleeves. Screw-Less Clamp type: Clamps two 1.5-mm^2 max. bar terminals without sleeves.
Terminal screw tightening torque	0.98 N·m max.
Output type	(Star operation circuit) Relay: SPST-NO (Delta operation circuit) Relay: SPST-NO
Mounting method	DIN-rail mounting (see note)
Attachment	Nameplate label
Approved standards	UL508, CSA C22.2 No.14 Conforms to EN61812-1, IEC60664-1 4 kV/2, VDE0106/P100 Output category according to IEC60947-5-1 (AC-13; 250 V 5A/AC-15; 250 V 1 A/DC-13; 30 V 0.1 A)

Note: Can be mounted to 35-mm DIN-rail with a plate thickness of 1 to 2.5 mm.

■ Time Ranges

Time scale	Star operation time ranges
x 1	1 to 12 s
x 10	10 to 120 s

Star-delta transfer time	Programmable at 0.05 s, 0.1 s, 0.5 s, or 1 s

■ Ratings

Rated supply voltage (see note)	24 to 230 VAC (50/60 Hz)/24 to 48 VDC
Operating voltage range	85% to 110% of rated supply voltage
Power reset	Minimum power-off time: 0.5 s
Reset voltage	2.4 VAC/DC max.
Power consumption	AC: 21 VA max./1.7 W max. (typical: 20 VA/1.6 W) at 230 VAC 11 VA max./2.0 W max. (typical: 8.6 VA/1.5 W) at 100 to 120 VAC DC: 1.3 W max. (typical: 1.2 W) at 24 VDC 0.7 W max. (typical: 0.6 W) at 48 VDC
Control output	Contact output: 5 A at 250 VAC with resistive load (cosϕ = 1) 5 A at 30 VDC with resistive load (cosϕ = 1)
Ambient temperature	Operating: –10°C to 55°C (with no icing) Storage: –25°C to 65°C (with no icing)
Ambient humidity	Operating: 35% to 85%

Note: DC ripple rate: 20% max.

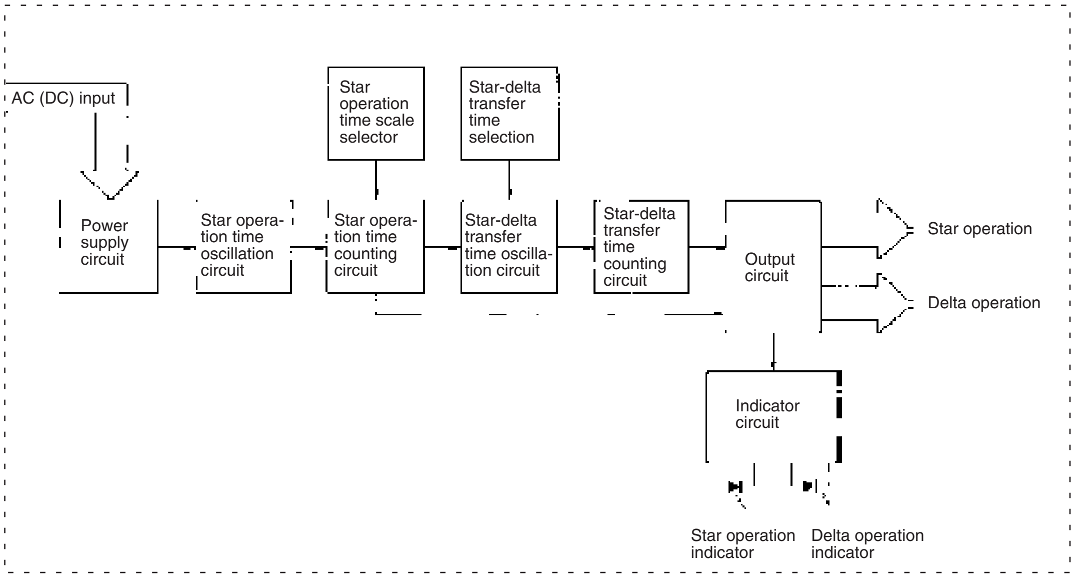
Characteristics

Accuracy of operating time	±1% max. of FS
Setting error	±10% ± 50 ms max. of FS
Total tolerance of transfer time	± (25% FS + 5 ms) max.
Influence of voltage	±0.5% max. of FS
Influence of temperature	±5% max. of FS
Insulation resistance	100 MΩ min. at 500 VDC
Dielectric strength	Between current-carrying metal parts and exposed non-current-carrying metal parts: 2,000 VAC (50/60 Hz) for 1 min. Between control output terminals and operating circuit: 2,000 VAC (50/60 Hz) for 1 min. Between contacts not located next to each other: 1,000 VAC (50/60 Hz) for 1 min.
Impulse withstand voltage	3 kV (between power supply terminals) 4.5 kV (between current-carrying metal parts and exposed non-current-carrying metal parts)
Noise immunity	Square-wave noise generated by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise) ±1.5 kV
Static immunity	Malfunction: 4 kV Destruction: 8 kV
Vibration resistance	Malfunction: 0.5-mm single amplitude at 10 to 55 Hz Destruction: 0.75-mm single amplitude at 10 to 55 Hz
Shock resistance	Malfunction: 200 m/s^2, 3 times each in 6 directions Destruction: 300 m/s^2, 3 times each in 6 directions
Life expectancy	Mechanical: 10 million operations min. (under no load at 1,800 operations/h) Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 360 operations/h) (see note)
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class B Emission AC Mains: EN55011 Group 1 class B Harmonic Current: EN61000-3-2 Voltage Fluctuation and Flickering: EN61000-3-3 (EMS) EN61812-1 Immunity ESD: EN61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: EN61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power port and output port (level 3) 1 kV control port with capacitive clamp (level 3) Immunity Surge: EN61000-4-5: 2 kV common mode (level 3) 1 kV differential mode (level 3)
Case color	Light gray (5Y7/1)
Degree of protection	IP30 (IP20 for terminal block)
Weight	Approx. 70 g

Note: For reference:
A maximum current of 0.15 A can be switched at 125 VDC (cosϕ=1).
A maximum current of 0.1 A can be switched if L/R is 7 ms.
In both cases, a life of 100,000 operations can be expected.
The minimum applicable load is 10 mA at 5 VDC (failure level: P).

Connections

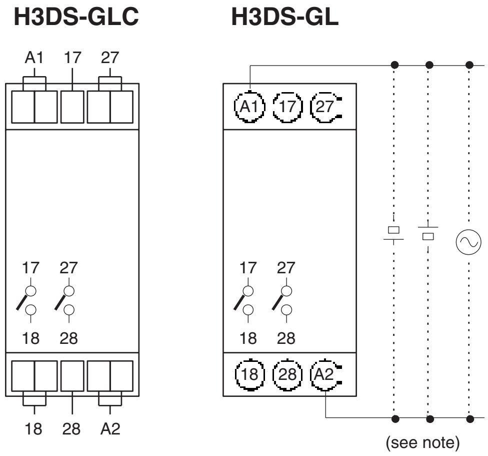
■ Block Diagram



■ I/O Functions

Inputs		---
Outputs	**Control output**	Star output is turned OFF when the dial set value is reached and delta output is ON after the preset transfer time elapses

■ Terminal Arrangement



Note: DC supply voltage does not require the designation of polarity.

Operation

■ Basic Operation

Setting of Selector

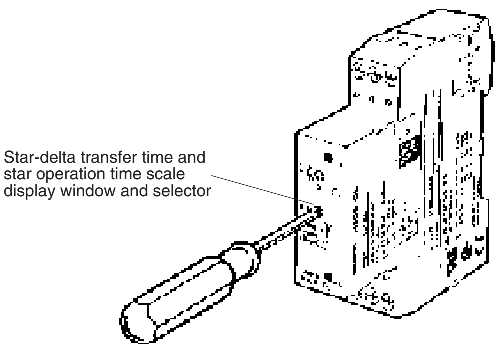
The selectors can be turned clockwise and counterclockwise to select the desired time scale, or operating mode.

Each selector has a snap mechanism that secures the selector at a given position. Set the selector at a position at which it is secured. Do not set it midway between two securing positions or a malfunction could result from improper setting.

Selection of Time Unit and Time Scale

The star-delta transfer time and star operation time scale are set with the same selector. The star-delta transfer time can be set to 0.05, 0.1, 0.5, or 1. The star operation time scale can be set to a multiplication factor of 1 or 10. If the star-delta transfer time is displayed in the display window in white letters, this means that the star operation time scale is "x10". Refer to the example below.

Star-delta transfer time	Star operation time scale
0.05 s	x1
0.1 s	
0.5 s	
1 s	
0.05 s	x10
0.1 s	
0.5 s	
1 s	

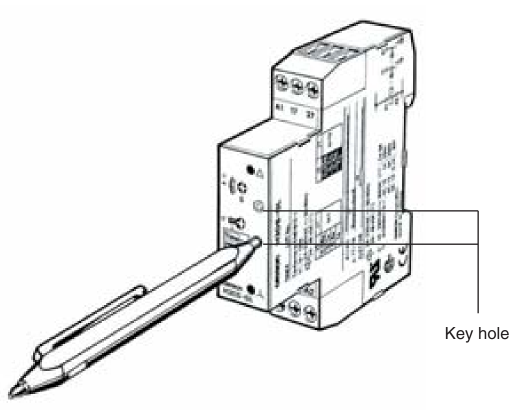


Time Setting

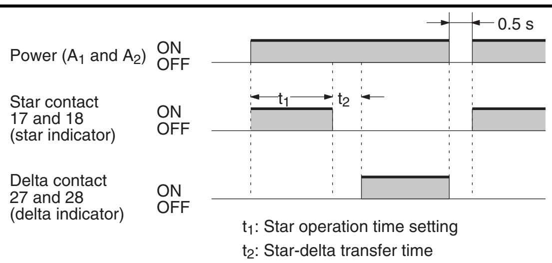
The star operation time of the Timer is set with the time setting dial.

Locking/Unlocking of Selectors and Time Setting Dial

The time setting dial and time scale selector can be locked using the Y92S-38 Lock Key, a special pen type tool that is sold separately. To lock the dial or selectors, insert the Lock Key in the keyhole to the lower right of the dial or selector and turn it clockwise until the dial or selector is completely covered with the red cover. To unlock, turn the Lock Key in the opposite direction.



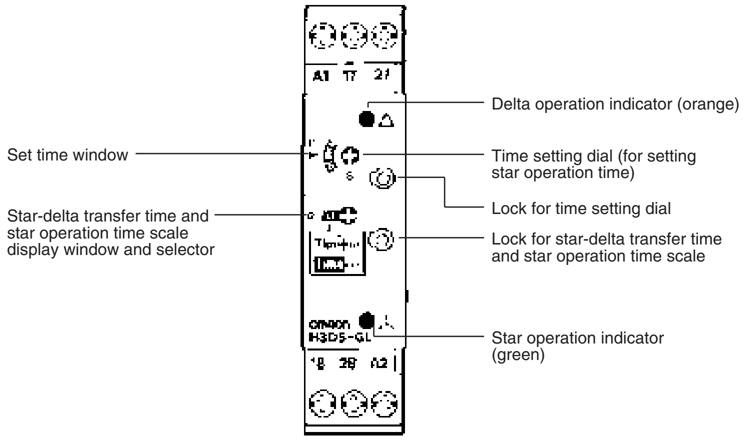
■ Timing Charts



Note: The reset time requires a maximum of 0.5 s.

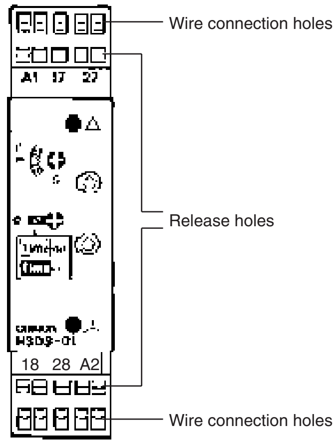
Nomenclature

H3DS-GL□

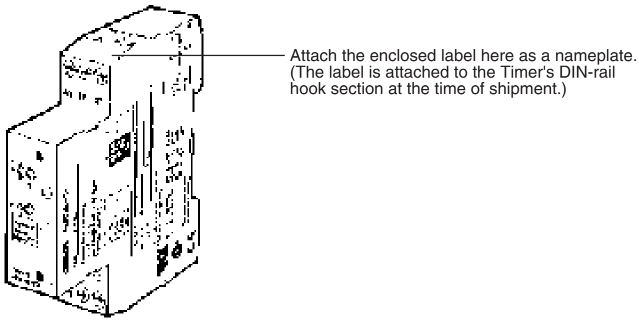


(Front View)

H3DS-GLC

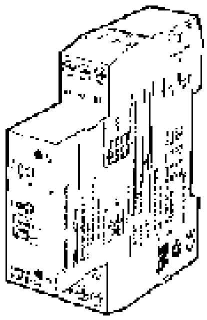


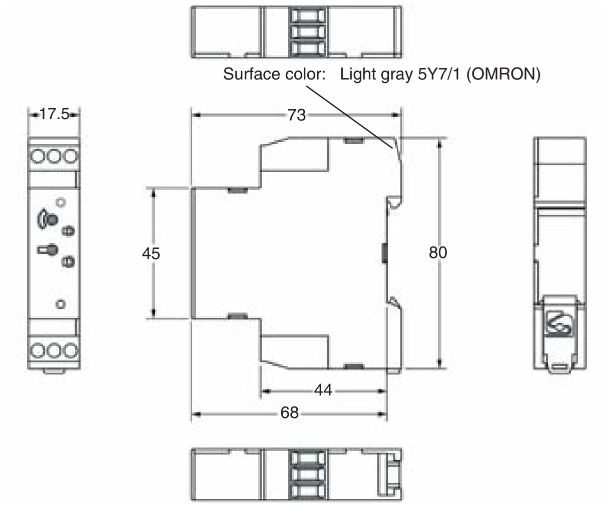
(Front View)



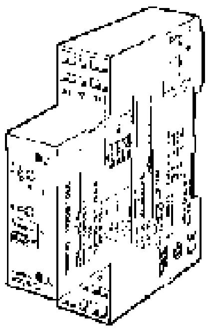
Dimensions

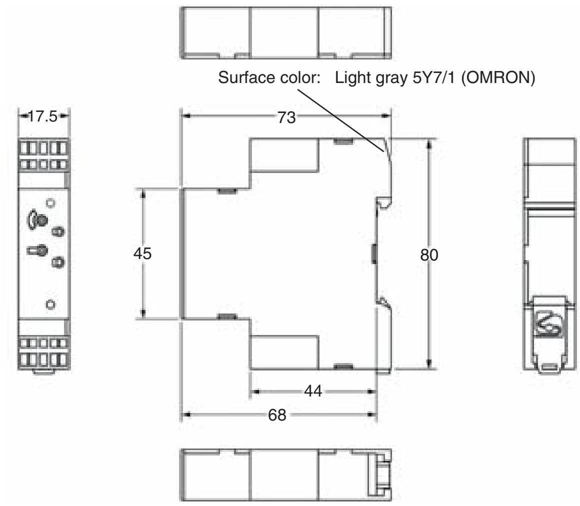
H3DS-GL





H3DS-GLC

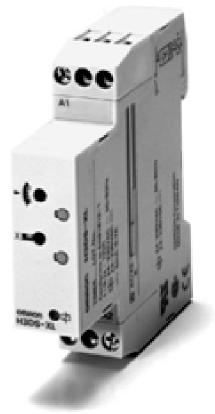




Solid-state Two-wired Timer

H3DS-X

• Covers wide range of supply voltage (24 to 230 VAC/VDC).



Model Number Structure

■ Model Number Legend

H3DS -X L□
1 2 3

1. X: Two-wired timer
2. L: Smart lock mechanism
3. None: Screw terminal type
   C: Screw-Less Clamp type

Ordering Information

■ List of Models

Supply voltage	Input type	Operating mode	Model	
			Screw terminal type	Screw-Less Clamp type
24 to 230 VAC/VDC (50/60 Hz)	No-input available	ON-delay	H3DS-XL	H3DS-XLC

■ Accessories (Order Separately)

Lock Key		Y92S-38
Mounting DIN-rail	50 cm (l) x 7.3 mm (t)	PFP-50N
	1 m (l) x 7.3 mm (t)	PFP-100N
	1 m (l) x 16 mm (t)	PFP-100N2
End Plate		PFP-M
Spacer		PEP-S

Specifications

■ General

Item	H3DS-X
Operating mode	ON-delay
Operating/Reset method	Time-limit operation/self-resetting
Output type	SCR output
External connections	Screw terminal, Screw-Less Clamp
Terminal block	Screw terminal type: Clamps two 2.5-mm^2 max. bar terminals without sleeves. Screw-Less Clamp type: Clamps two 1.5-mm^2 max. bar terminals without sleeves.
Terminal screw tightening torque	0.98 N·m max.
Mounting method	DIN-rail mounting (see note)
Attachment	Nameplate label
Approved standards	UL508, CSA C22.2 No.14 Conforms to EN61812-1, IEC60664-1 4 kV/2, VDE0106/P100

Note: Can be mounted to 35-mm DIN-rail with a plate thickness of 1 to 2.5 mm.

■ Time Ranges

Time scale display	Time range
0.1 s	0.1 to 1.2 s
1 s	1 to 12 s
0.1 m	0.1 to 1.2 min
1 m	1 to 12 min
0.1 h	0.1 to 1.2 h
1 h	1 to 12 h
10 h	10 to 120 h

Note: When the time setting dial is set to "0" for any time scale, the output will operate instantaneously.

■ Ratings

Rated supply voltage (see note)	24 to 230 VAC/VDC (50/60 Hz)
Operating voltage range	85% to 110% of rated supply voltage
Power reset	Minimum power-off time: 0.1 s
Reset voltage	1.0 VAC/VDC max.
Reset current	5 mA max.
Power consumption	5 mA max.
Control output	SCR output:5 mA to 0.7 A
Ambient temperature	Operating: –10°C to 55°C (with no icing) Storage: –25°C to 65°C (with no icing)
Ambient humidity	Operating: 35% to 85%

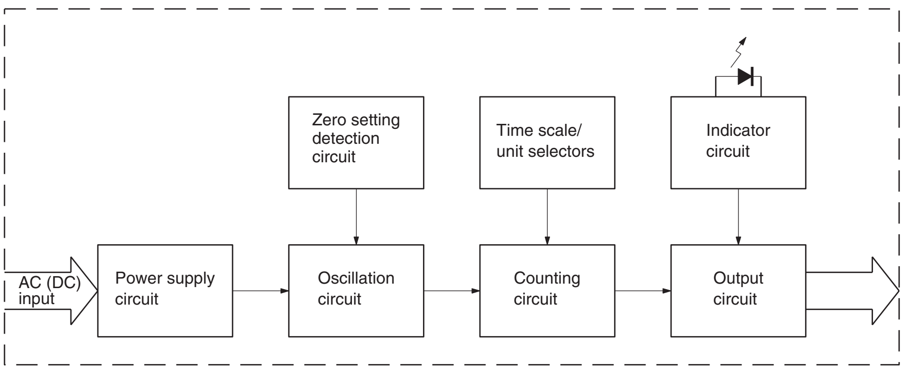
Note: The ripple in DC power supply must be 5% max.

Characteristics

Accuracy of operating time	±1% max. of FS (±1% ±10 ms max. at 1.2-s range)
Setting error	±10% ± 50 ms max. of FS
Reset time	0.1 s max.
Influence of voltage	±0.5% max. of FS (±0.5%±10 ms max. at 1.2-s range)
Influence of temperature	±5% max. of FS (±5%±10 ms max. at 1.2-s range)
Insulation resistance	100 MΩ min. at 500 VDC
Dielectric strength	Between current-carrying metal parts and exposed non-current-carrying metal parts: 2,000 VAC for 1 min
Impulse withstand voltage	3 kV (between power supply terminals) 4.5 kV (between current-carrying metal parts and exposed non-current-carrying metal parts)
Noise immunity	Square-wave noise generated by noise simulator (pulse width: 100 ns/1 µs, 1-ns rise) ±1.5 kV (between power supply terminals)
Static immunity	Malfunction: 4 kV Destruction: 8 kV
Vibration resistance	Malfunction: 0.5-mm single amplitude at 10 to 55 Hz Destruction: 0.75-mm single amplitude at 10 to 55 Hz
Shock resistance	Malfunction: 200 m/s^2, 3 times each in 6 directions Destruction: 300 m/s^2, 3 times each in 6 directions
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class B Emission AC Mains: EN55011 Group 1 class B Harmonic Current: EN61000-3-2 Voltage Fluctuation and Flickering: EN61000-3-3 (EMS) EN61812-1 Immunity ESD: EN61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: EN61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power port and output port (level 3) 1 kV control port with capacitive clamp (level 3) Immunity Surge: EN61000-4-5: 2 kV common mode (level 3) 1 kV differential mode (level 3)
Case color	Light gray (5Y7/1)
Degree of protection	IP30 (IP20 for terminal block)
Weight	Approx. 70 g

Connections

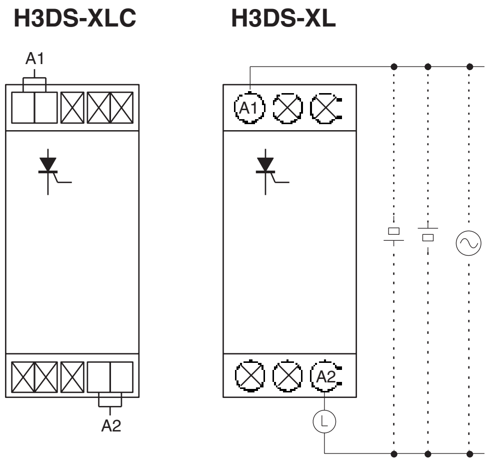
Block Diagram



I/O Functions

Inputs		---
Outputs	**Control output**	Outputs are turned ON when the preset value is reached.

■ Terminal Arrangement



Note: DC supply voltage does not require the designation of polarity.

Operation

■ Basic Operation

Setting of Selector

The selectors can be turned clockwise and counterclockwise to select the desired time scale, or operating mode.

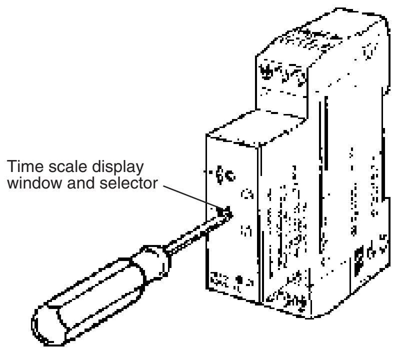
Each selector has a snap mechanism that secures the selector at a given position. Set the selector at a position at which it is secured. Do not set it midway between two securing positions or a malfunction could result from improper setting.

Selection of Time Scale

The time scale is selected by turning the time scale selector. The time scales will appear in the following order in the time scale display window on the left of the selector:

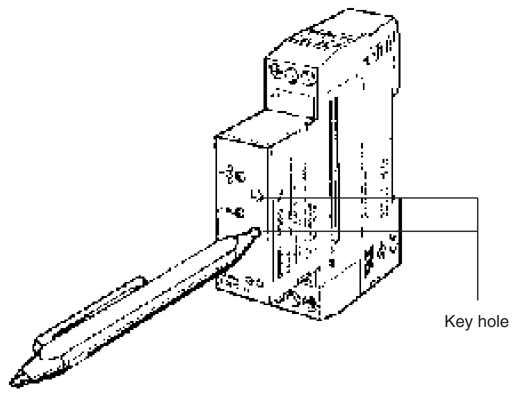
1 s, 0.1 s, 1 h, 0.1 h, 10 h, 1 h, 1 m, 0.1 m.

Note: The time scale “1h” appears twice. Both instances indicate exactly the same time scale.

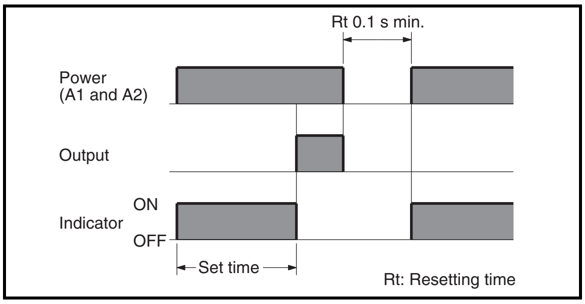


Locking/Unlocking of Selectors and Time Setting Dial

The time setting dial and time scale selector can be locked using the Y92S-38 Lock Key, a special pen type tool that is sold separately. To lock the dial or selectors, insert the Lock Key in the keyhole to the lower right of the dial or selector and turn it clockwise until the dial or selector is completely covered with the red cover. To unlock, turn the Lock Key in the opposite direction.

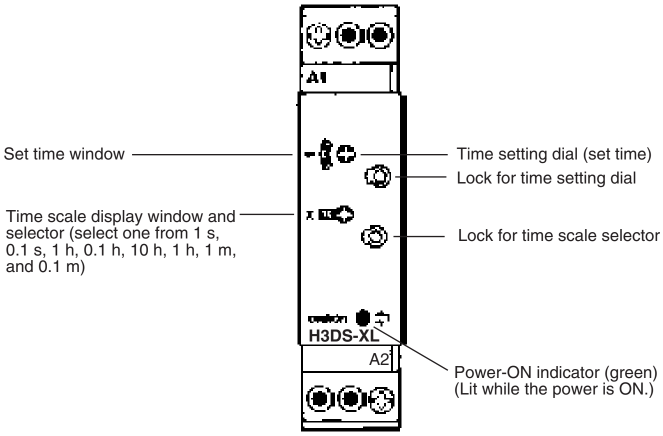


■ Timing Charts



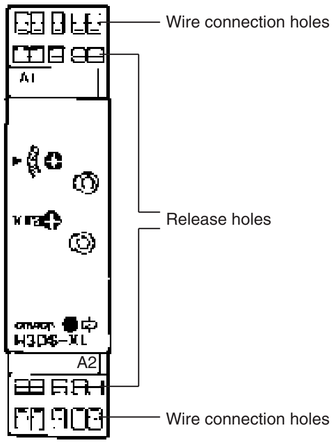
Nomenclature

H3DS-XL□

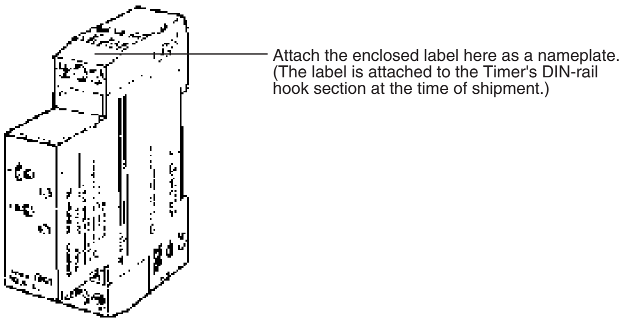


(Front View)

H3DS-XLC

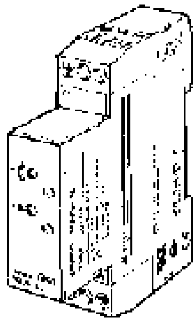


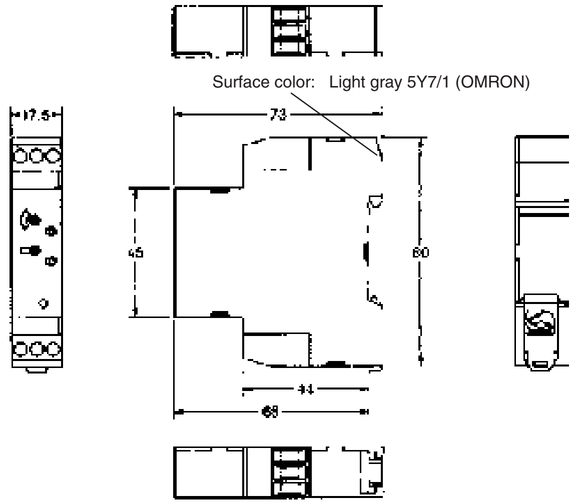
(Front View)



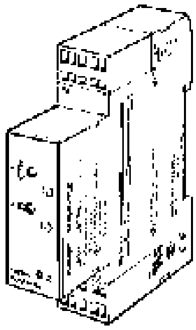
Dimensions

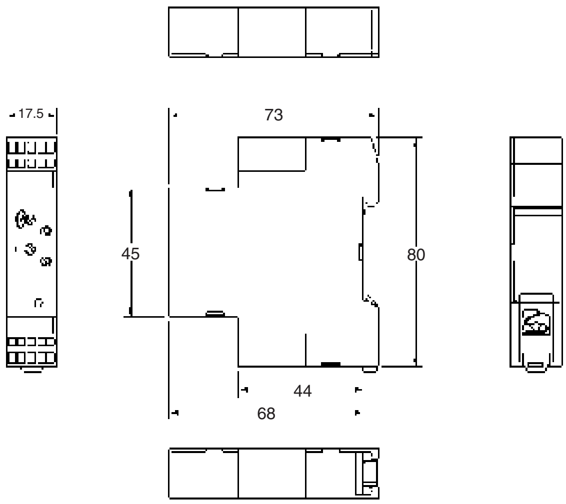
H3DS-XL





H3DS-XLC





ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

Solid-state Timer
H3DE

DIN-rail Mounted, Standard 22.5-mm Width Timer Range

- A wide AC/DC power supply range (24 to 230 VAC/DC) reduces the number of timer models kept in stock. (except for H3DE-H)
- 12-VDC model available for a specific application. (H3DE-M2)
- Nameplate provided for easy timer identification and management.
- Terminal clamp left open when delivered.
- Finger protection terminal block to meet VDE0106/P100.
- Enables easy sequence checks through instantaneous outputs for a zero set value at any time range.
- Incorporates environment-friendly, cadmium-free contacts. (except for H3DE-H)
- High immunity to inverter noise.
- Approved by UL and CSA.
- Conforms to EN61812-1 and IEC60664-1 4 kV/2 for Low Voltage, and EMC Directives.

■ Broad Line-up of H3DE Series

H3DE

H3DE-M/S

Standard Timer
H3DE-M
H3DE-S

H3DE-F

Twin Timer
H3DE-F

H3DE-G

Star-delta Timer
H3DE-G

H3DE-H

Power OFF-delay Timer
H3DE-H

Contents

Solid-state Multi-functional Timer

H3DE-M/-S

- Eight operating modes (H3DE-M) and four operating modes (H3DE-S) cover a wide range of applications.
- Programmable contact enables the building of a self-holding relay circuit (-□2 models).
- A wide time setting range of 0.10 s to 120 h.

Model Number Structure

■ Model Number Legend

H3DE -□ □
1 2

1. M: Multi-function type
   S: Standard type
2. 2: DPDT
   1: SPDT

Ordering Information

■ List of Models

Supply voltage	Control output	Model	
		Multi-function type	Standard type
12 VDC	Contact output: DPDT (time-limit output SPDT and switchable SPDT (time-limit ←→ instantaneous))	H3DE-M2 (see note)	---
24 to 230 VAC/DC	Contact output: DPDT (time-limit output SPDT and switchable SPDT (time-limit ←→ instantaneous))	H3DE-M2 (see note)	H3DE-S2
	Contact output: SPDT (time-limit output SPDT)	H3DE-M1	H3DE-S1

Note: Specify both the model number and supply voltage when ordering H3DE-M2.
Example: H3DE-M2 24 to 230 VAC/DC
Supply voltage

■ Accessories (Order Separately)

Mounting DIN-rail	50 cm (l) x 7.3 mm (t)	PFP-50N
	1 m (l) x 7.3 mm (t)	PFP-100N
	1 m (l) x 16 mm (t)	PFP-100N2
End Plate	PFP-M	
Spacer	PFP-S	

Specifications

■ General

Item	H3DE-M2	H3DE-M1	H3DE-S2	H3DE-S1
Operating mode	A: ON-delay (Signal or Power) B: Flicker OFF start (Signal or Power) B2: Flicker ON start (Signal or Power) C: Signal ON/OFF-delay D: Signal OFF-delay E: Interval (Signal or Power) G: Signal ON/OFF-delay J: One-shot (Signal or Power)		A: ON-delay B2: Flicker ON start E: Interval J: One-shot	
Terminal block	Clamps two 2.5 mm^2 max. bar terminals without sleeves.			
Terminal screw tightening torque	0.98 N·m max. {approx. 10 kgf·cm max.}			
Input type	Voltage input		---	
Output type	Relay: DPDT	Relay: SPDT	Relay: DPDT	Relay: SPDT
Mounting method	DIN-rail mounting (see note)			
Attachment	Nameplate			
Approved standards	UL508, CSA 22.2 No.14 Conforms to EN61812-1, IEC60664-1 4 kV/2, VDE0106/P100 Output category according to IEC60947-5-1 (AC-13; 250 V 5A/AC-15; 250 V 3 A/DC-13; 30 V 0.1 A)			

Note: Can be mounted to 35-mm DIN-rail with a plate thickness of 1 to 2.5 mm.

■ Time Ranges

Time scale display	Time unit display			
	sec	min	hrs	10 h
x 0.1	0.1 to 1.2 s	0.1 to 1.2 min	0.1 to 1.2 h	1 to 12 h
x 1	1 to 12 s	1 to 12 min	1 to 12 h	10 to 120 h

Note: When the main dial is set to "0" for all settings, the output will operate instantaneously.

■ Ratings

Rated supply voltage (see notes 1 and 2)		24 to 230 VAC/DC (50/60 Hz) 12 VDC (H3DE-M2 model only)
Operating voltage range		85% to 110% of rated supply voltage
Power reset		Minimum power-off time: 0.1 s
Reset voltage		2.4 VAC/DC max.
Power consumption (see note 3)	**H3DE-M1**	AC: approx. 4.3 VA (2.2 W) at 230 VAC DC: approx. 0.7 W at 24 VDC
	H3DE-M2	AC: approx. 4.8 VA (2.4 W) at 230 VAC DC: approx. 1.0 W at 24 VDC
	H3DE-S1	AC: approx. 2.7 VA (1.6 W) at 230 VAC DC: approx. 0.7 W at 24 VDC
	H3DE-S2	AC: approx. 3.2 VA (1.9 W) at 230 VAC DC: approx. 1.0 W at 24 VDC
Voltage input		Max. permissible capacitance between input lines (terminals B1 and A2): 2000 pF Load connectable in parallel with inputs (terminals B1 and A2) H-level: 20.4 to 253 VAC/DC L-level: 0 to 2.4 VAC/DC
Control output		Contact output: 5 A at 250 VAC with resistive load (cosφ = 1) 5 A at 30 VDC with resistive load (cosφ = 1)
Ambient temperature		Operating: –10°C to 55°C (with no icing) Storage: –25°C to 65°C (with no icing)
Ambient humidity		Operating: 35% to 85%

Note: 1. DC ripple rate: 20% max.

2. Since an inrush current of 0.25 A will occur when using the power supply voltage at 24 VDC, pay careful attention when turning on or off the power supply to the Timer with a solid-state output such as a sensor.

3. The power consumption is for mode A after the Timer counts the time-up time and for the AC input at 50 Hz. The power consumption of the H3DE-M□ includes the input circuit with the B1 and A1 terminals short-circuited.

■ Characteristics

Accuracy of operating time	±1% max. of FS (±1% ±10 ms max. at 1.2-s range) (see note 1)
Setting error	±10% ±50 ms max. of FS (see note 1)
Signal input time	50 ms min. (see note 1)
Influence of voltage	±0.5% max. of FS (±0.5% ±10 ms max. at 1.2-s range)
Influence of temperature	±2% max. of FS (±2%±10 ms max. at 1.2-s range)
Insulation resistance	100 MΩ min. at 500 VDC
Dielectric strength	Between current-carrying metal parts and exposed non-current-carrying metal parts: 2,000 VAC for 1 min. Between control output terminals and operating circuit: 2,000 VAC for 1 min. Between contacts of different polarities: 2,000 VAC for 1 min. Between contacts not located next to each other: 1,000 VAC for 1 min.
Vibration resistance	Malfunction: 0.5-mm single amplitude at 10 to 55 Hz Destruction: 0.75-mm single amplitude at 10 to 55 Hz
Shock resistance	Malfunction: 100 m/s^2 Destruction: 1,000 m/s^2
Contact material	AGNi+gold plating (Use the G6RN-1 at 12 VDC.)
Impulse withstand voltage	3 kV (between power terminals) 4.5 kV (between current-carrying metal parts and exposed non-current-carrying metal parts)
Noise immunity	Square-wave noise generated by noise simulator (pulse width: 100 ns/1 µs, 1-ns rise) ±1.5 kV
Static immunity	Malfunction: 4 kV Destruction: 8 kV
Life expectancy	Mechanical: 10 million operations min. (under no load at 1,800 operations/h) Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 360 operations/h) (see note 2)
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class B Emission AC Mains: EN55011 Group 1 class B Harmonic Current: EN61000-3-2 Voltage Fluctuation and Flickering: EN61000-3-3 (EMS) EN61812-1 Immunity ESD: EN61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: EN61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power port and output port (level 3) 1 kV control port with capacitive clamp (level 3) Immunity Surge: EN61000-4-5: 2 kV common mode (level 3) 1 kV differential mode (level 3)
Degree of protection	IP30 (Terminal block: IP20)
Weight	120 g

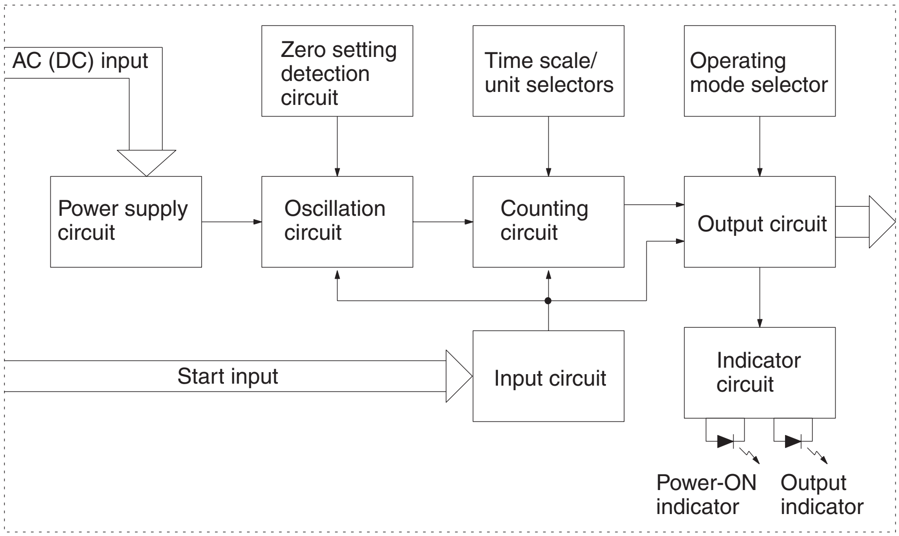
Note: 1. With the H3DE-M□, if the voltage exceeds 26.4 VAC/DC, the following hold at signal OFF for C, D, and G modes:
Accuracy of operating time: ±1% ±50 ms max. at 1.2-s range
Setting error: ±10% +100/–50 ms max.
Signal input time: 100 ms min.

2. For reference: A maximum current of 0.15 A can be switched at 125 VDC (cosϕ=1).
A maximum current of 0.1 A can be switched if L/R is 7 ms.
In both cases, a life of 100,000 operations can be expected.
The minimum applicable load is 10 mA at 5 VDC (failure level: P).

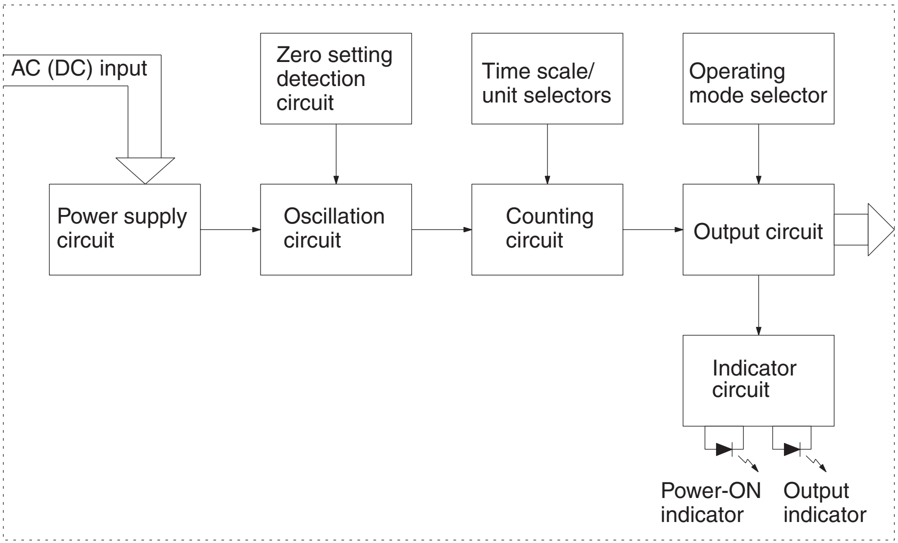
Connections

■ Block Diagram

H3DE-M1/-M2



H3DE-S1/-S2



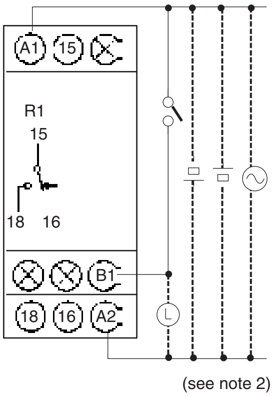
■ I/O Functions

Item		H3DE-M1/-M2	H3DE-S1/-S2
Input	**Start**	Starts operation.	No input is available.
Output	**Control output**	Outputs are turned ON according to designated output mode when preset value is reached. (See note.)	Outputs are turned ON according to designated output mode when preset value is reached. (see note.)

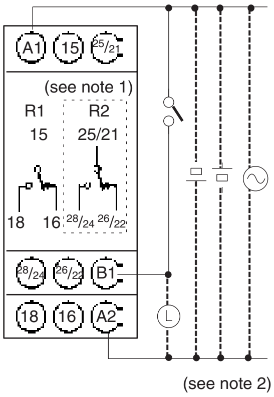
Note: When the output type selector switch on the bottom of the Timer is set to the instantaneous side, the relay R2 (terminal numbers 21/25, 22/26, and 24/28) becomes an instantaneous contact and turns ON/OFF in synchronization with the changes in the power supply.

Terminal Arrangement

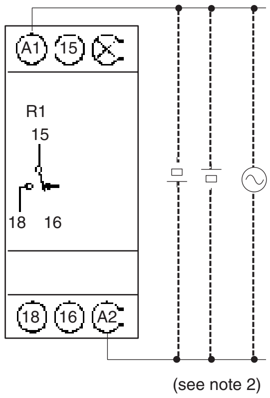
H3DE-M1



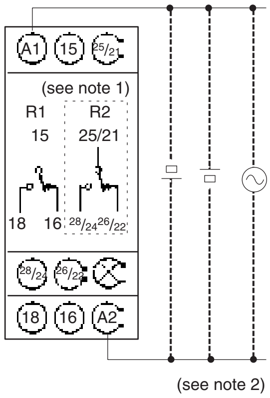
H3DE-M2



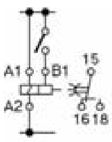
H3DE-S1



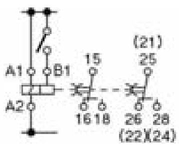
H3DE-S2



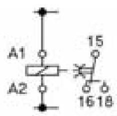
(DIN notation)



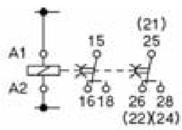
(DIN notation)



(DIN notation)



(DIN notation)



Note: 1. The relay R2 can be set to either instantaneous or time-limit contact using the switch located on the bottom of the Timer.

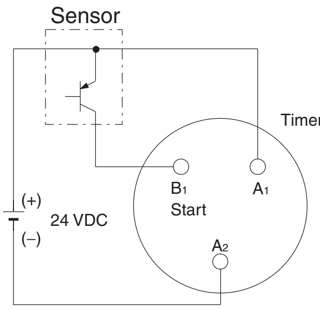
2. DC supply voltage does not require the designation of polarity.

3. The contact symbol for the H3DE is indicated with  because it offers multiple operating modes and is different from the delayed contact for conventional timers.

Input Connections

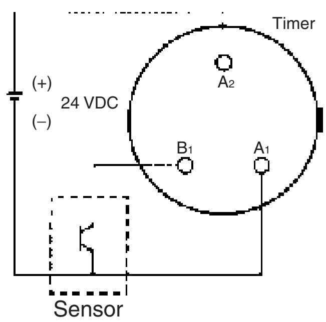
The inputs of the H3DE-M1/-M2 are voltage (voltage imposition or open) inputs.

No-contact Input
(Connection to PNP output sensor.)



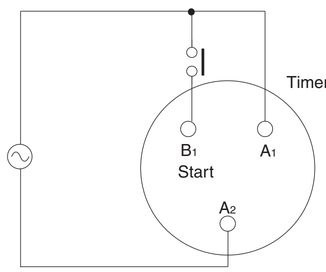
Operates with PNP transistor ON

No-contact Input
(Connection to NPN output sensor.)



Operates with NPN transistor ON

Contact Input



Operates with relay ON

Voltage Input Signal Levels

No-contact input	1. Transistor ON Residual voltage: 1 V max. (Voltage between terminals B_1 and A_2 must be more than the rated "H-level" voltage (20.4 VDC min.).)
	2. Transistor OFF Leakage current: 0.01 mA max. (Voltage between terminals B_1 and A_2 must be less than the rated "L-level" voltage (2.4 VDC max.).)
Contact input	Use contacts that can adequately switch 0.1 mA at each voltage to be imposed. (When the contacts are ON or OFF, voltage between terminals B_1 and A_2 must be within the following ranges: When contacts are ON: 20.4 to 253 VAC/DC When contacts are OFF: 0 to 2.4 VAC/DC

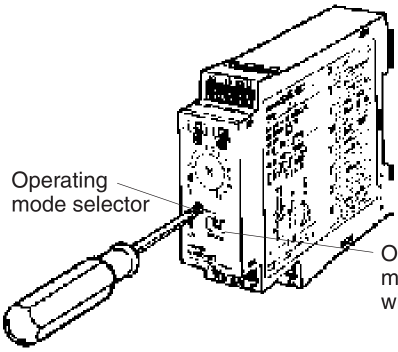
Operation

■ Basic Operation

Setting of Selector

The selectors can be turned clockwise and counterclockwise to select the desired time unit, time scale, or operating mode.

Each selector has a snap mechanism that secures the selector at a given position. Set the selector at a position at which it is secured. Do not set it midway between two securing positions or a malfunction could result from improper setting.

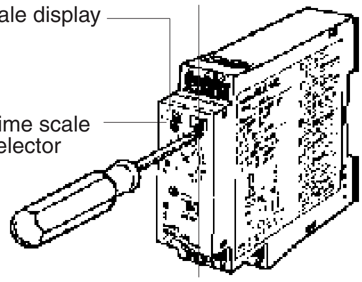


Selection of Operating Mode

The H3DE-M/-S can be set to any one of the operating modes A to J. Turn the operating mode selector with a screwdriver until the desired operating mode (A, B, C, B2, D, E, J, or G for the H3DE-M and A, E, J, or B2 for the H3DE-S) appears in the operating mode display window located below the selector.

Selection of Time Unit and Time Scale

The desired time unit (s, m, h, or 10h) can be displayed in the time unit display window above the time setting dial by turning the time unit selector located at the upper right corner of the front panel. Time scale (0.1 or 1) is selected with the time scale selector at the upper left corner of the front panel, it appears in the time scale display window above the selector.

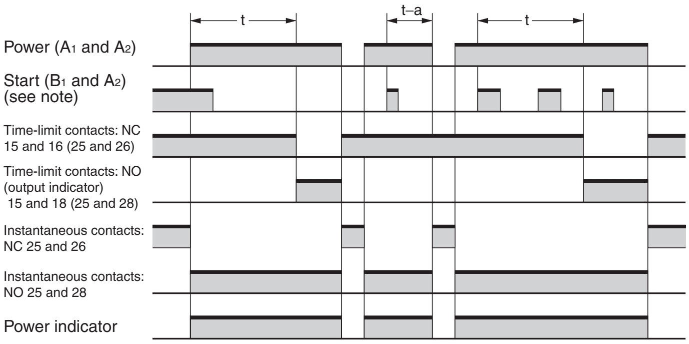


■ Timing Chart

Note: 1. The minimum power reset time is 0.1 s and the minimum signal input time is 0.05 s.
2. The letter "t" in the timing charts stands for the set time and "t–a" means that the period is less than the time set.
3. There is no start input with H3DE-S☐ models. Operation starts when the power is turned ON.
4. There is no instantaneous output with H3DE-M1/-S1 models.

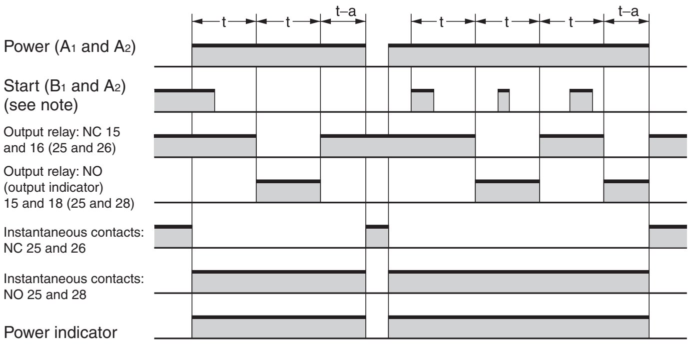
Operating mode / **Timing chart**

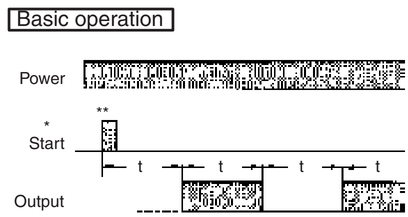
A: ON-delay



* For power-on operation, impose voltage to the Start input. The Timer starts operating at the moment the power is turned on.
** Start input is invalid while the Timer is in operation.

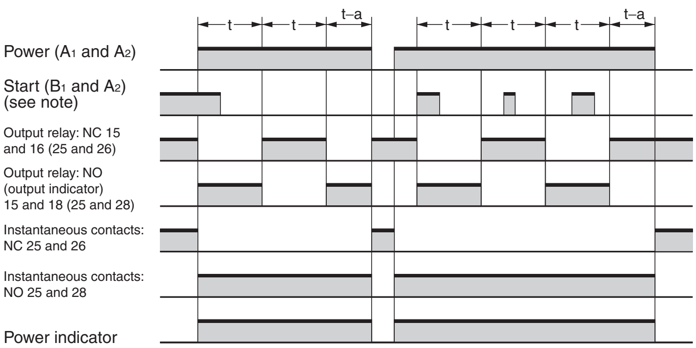
B: Flicker OFF start

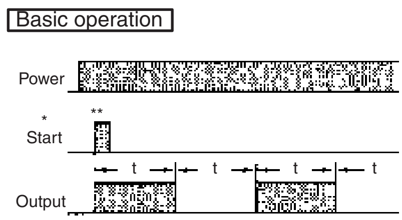




* For power-on operation, impose voltage to the Start input. The Timer starts operating at the moment the power is turned on.
** Start input is invalid while the Timer is in operation.

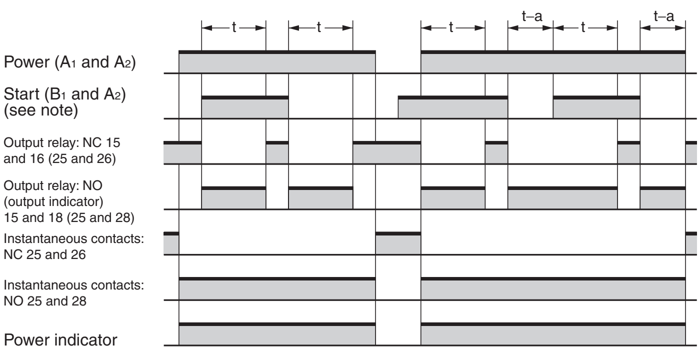
B2: Flicker ON start

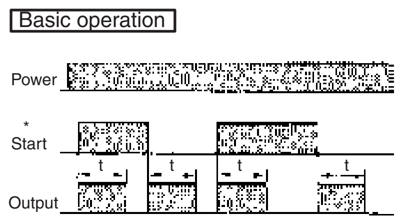




* For power-on operation, impose voltage to the Start input. The Timer starts operating at the moment the power is turned on.
** Start input is invalid while the Timer is in operation.

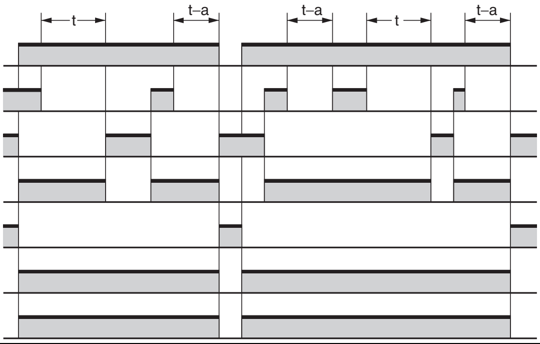
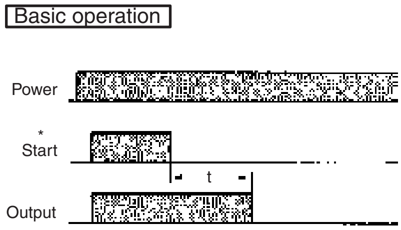
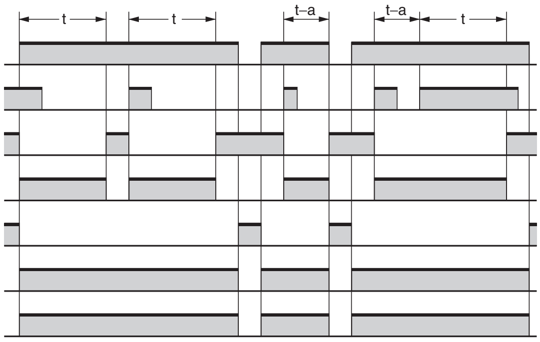
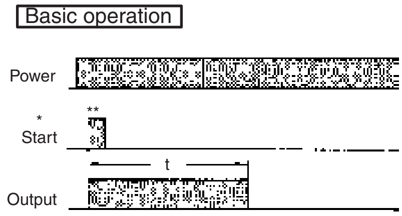
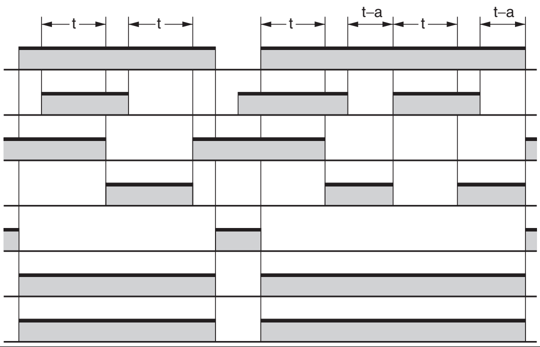
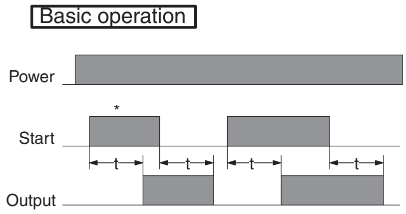
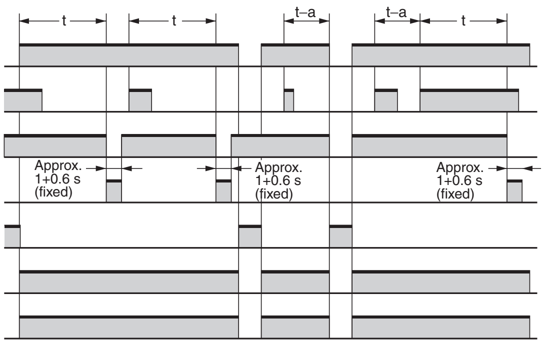
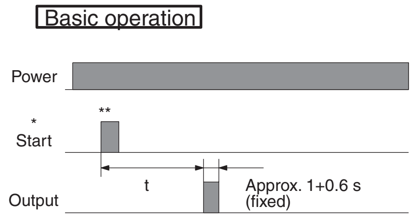
C: Signal ON/ OFF-delay





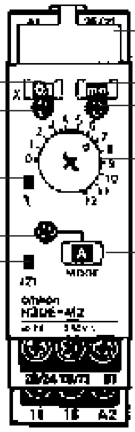
* Start input is valid and re-triggerable while the Timer is in operation.

Note: The start input of the H3DE-M1 or H3DE-M2 model is activated by applying a voltage to B1 and A2 terminals.
The voltage can be applied by turning on the contact between B1 and A1 (Refer to *Terminal Arrangement*)

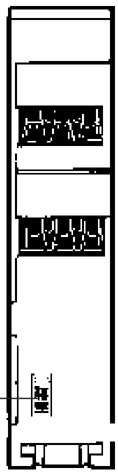
Operating mode	Timing chart
D: Signal OFF-delay	  * Start input is valid and re-triggerable while the Timer is in operation.
E: Interval	  * For power-on operation, impose voltage to the Start input. The Timer starts operating at the moment the power is turned on. ** Start input is valid and re-triggerable while the Timer is in operation.
G: Signal ON/ OFF-delay	  * Start input is valid and re-triggerable while the Timer is in operation.
J: One-shot output (ON delay)	  * For power-on operation, impose voltage to the Start input. The Timer starts operating at the moment the power is turned on. ** Start input is valid and re-triggerable while the Timer is in operation.

Note: The start input of the H3DE-M1 or H3DE-M2 model is activated by applying a voltage to B1 and A2 terminals. The voltage can be applied by turning on the contact between B1 and A1 (Refer to *Terminal Arrangement*).

Nomenclature

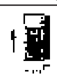
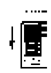


(Front View)



(Bottom View)

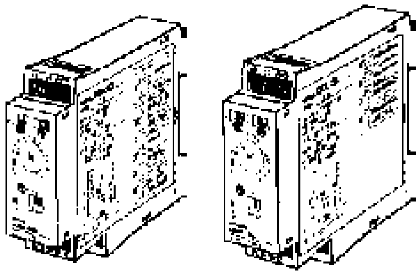
Output Type Selector Switch Settings

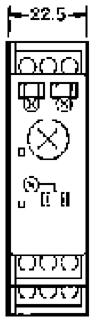
Setting	Output type
	Time-limit output (terminal numbers 25, 26 and 28) (default setting)
	Instantaneous output (terminal numbers 21, 22 and 24)

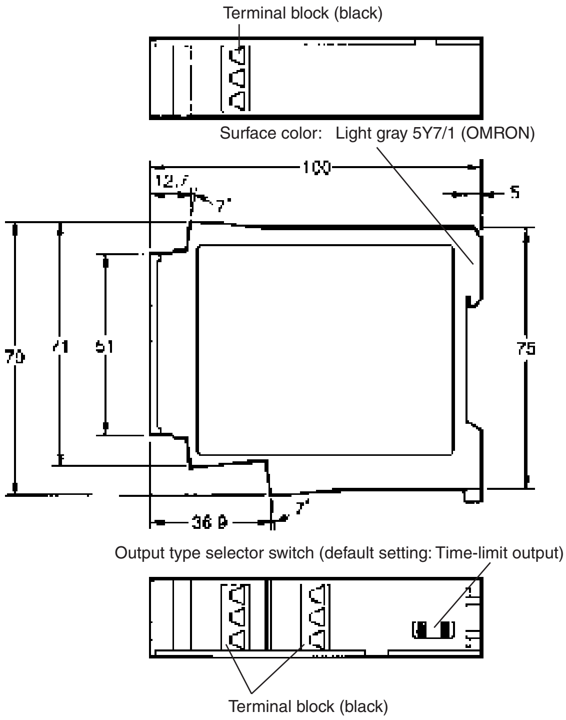
Dimensions

Note: All units are in millimeters unless otherwise indicated.

H3DE-M/-S







Solid-state Twin Timer
H3DE-F

- Operates in flicker-OFF or flicker-ON start mode with one Unit.
- Independent ON- and OFF-time settings.
  Combinations of long ON- or OFF-time and short OFF- or ON-time setting are possible.
- Long time range from 0.1 s to 12 h for both ON and OFF time settings.

Model Number Structure

■ Model Number Legend

H3DE -□
1

1. F: Twin timers

Ordering Information

■ List of Models

Operating mode	Supply voltage	Model
Flicker-OFF/Flicker-ON start	24 to 230 VAC/VDC	H3DE-F

■ Accessories (Order Separately)

Mounting DIN-rail	50 cm (l) x 7.3 mm (t)	PFP-50N
	1 m (l) x 7.3 mm (t)	PFP-100N
	1 m (l) x 16 mm (t)	PFP-100N2
End Plate	PFP-M	
Spacer	PFP-S	

Specifications

■ General

Item	H3DE-F
Operating mode	Flicker-OFF/Flicker-ON start
Operating/Reset method	Time-limit operation/Time-limit reset or self-reset
Terminal block	Clamps two 2.5 mm^2 max. bar terminals without sleeves
Terminal screw tightening torque	0.98 N·m max. {approx. 10 kgf·cm max.}
Output type	Relay: SPDT
Mounting method	DIN-rail mounting (see note)
Attachment	Nameplate
Approved standards	UL508, CSA 22.2 No.14 Conforms to EN61812-1, IEC60664-1 4 kV/2, VDE0106/P 100 Output category according to IEC60947-5-1 (AC-13; 250 V 5A/AC-15; 250 V 3 A/DC-13; 30 V 0.1 A)

Note: Can be mounted to 35-mm DIN-rail with a plate thickness of 1 to 2.5 mm.

■ Time Ranges

Time scale display (see note 1)	Time unit display			
	sec	10 s	min	hrs
x 0.1	0.1 to 1.2 s	1 to 12 s	0.1 to 1.2 min	0.1 to 1.2 h
x 1	1 to 12 s	10 to 120 s	1 to 12 min	1 to 12 h

Note: 1. Time scale display is applied commonly for ON and OFF time.
2. When the main dial is set to “0” for all settings, the output will operate instantaneously.

■ Ratings

Rated supply voltage (see note)	24 to 230 VAC/VDC (50/60 Hz)
Operating voltage range	85% to 110% of rated supply voltage
Power reset	Minimum power-off time: 0.1 s
Reset voltage	2.4 VAC/DC max.
Power consumption	AC: Approx. 3.1 VA (1.8 W) at 230 VAC DC: Approx. 0.8 W at 24 VDC
Control output	Contact output: 5 A at 250 VAC with resistive load (cosϕ = 1) 5 A at 30 VDC with resistive load (cosϕ = 1)
Ambient temperature	Operating: –10°C to 55°C (with no icing) Storage: –25°C to 65°C (with no icing)
Ambient humidity	Operating: 35% to 85%

Note: DC ripple rate: 20% max.

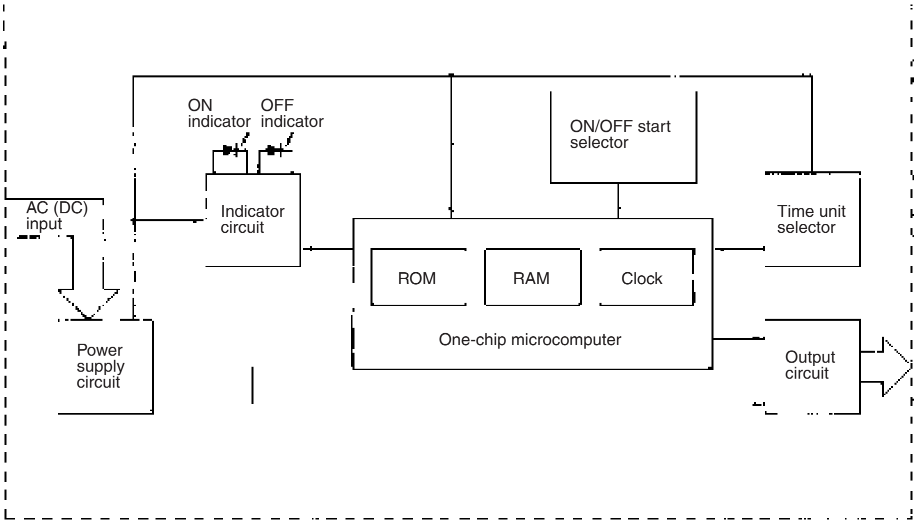
Characteristics

Accuracy of operating time	±1% max. of FS (±1% ±10 ms max. at 1.2-s range)
Setting error	±10% ± 0.05 s max. of FS
Influence of voltage	±0.5% max. of FS (±0.5% ±10 ms max. at 1.2-s range)
Influence of temperature	±2% max. of FS (±2% ± 10 ms max. at 1.2-s range)
Insulation resistance	100 MΩ min. at 500 VDC
Dielectric strength	Between current-carrying metal parts and exposed non-current-carrying metal parts: 2,000 VAC (50/60 Hz) for 1 min. Between control output terminals and operating circuit: 2,000 VAC (50/60 Hz) for 1 min. Between contacts not located next to each other: 1,000 VAC (50/60 Hz) for 1 min.
Impulse withstand voltage	3 kV (between power supply terminals) 4.5 kV (between current-carrying metal parts and exposed non-current-carrying metal parts)
Noise immunity	Square-wave noise generated by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise) ±1.5 kV
Static immunity	Malfunction: 4 kV Destruction: 8 kV
Vibration resistance	Malfunction: 0.5-mm single amplitude at 10 to 55 Hz Destruction: 0.75-mm single amplitude at 10 to 55 Hz
Shock resistance	Malfunction: 100 m/s² Destruction: 1,000 m/s²
Life expectancy	Mechanical: 10 million operations min. (under no load at 1,800 operations/h) Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 360 operations/h)
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class B Emission AC Mains: EN55011 Group 1 class B Harmonic Current: EN61000-3-2 Voltage Fluctuation and Flickering: EN61000-3-3 (EMS) EN61812-1 Immunity ESD: EN61000-4-2: 6 kV contact discharge (level 3); 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: EN61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power port and output port (level 3); 1 kV control port with capacitive clamp (level 3) Immunity Surge: EN61000-4-5: 2 kV common mode (level 3); 1 kV differential mode (level 3)
Degree of protection	IP30 (IP20 for terminal block)
Weight	Approx. 110 g

Note: For reference:
A maximum current of 0.15 A can be switched at 125 VDC (cosϕ=1).
A maximum current of 0.1 A can be switched if L/R is 7 ms.
In both cases, a life of 100,000 operations can be expected.
The minimum applicable load is 10 mA at 5 VDC (failure level: P).

Connections

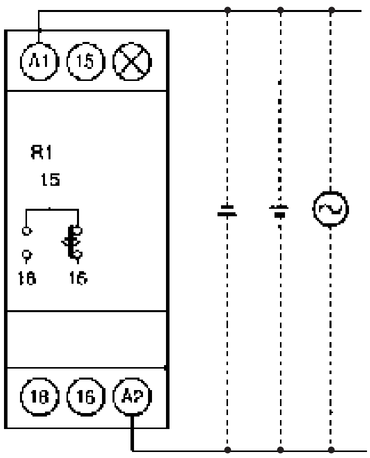
■ Block Diagram



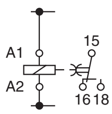
■ I/O Function

Inputs		---
Outputs	**Control output**	Outputs are turned ON/OFF according to the time set by the ON-and OFF-time setting dial.

■ Terminal Arrangement



(DIN notation)



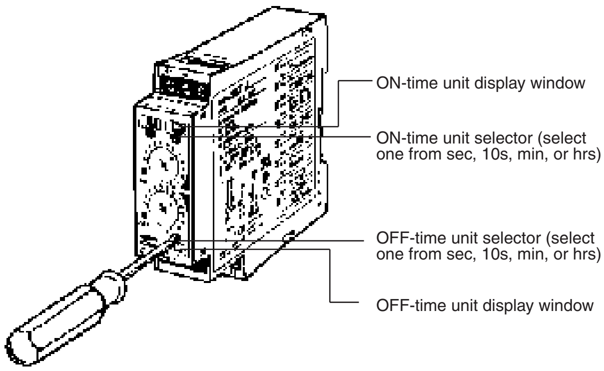
Note: DC supply voltage does not require the designation of polarity.

Operation

■ Basic Operation

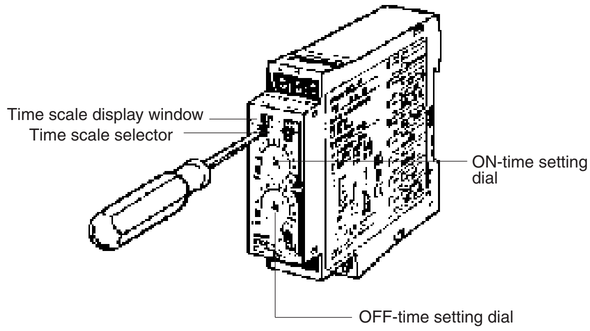
Time Unit Selection

The time unit display window for output ON is located on the upper-right side of the front panel above the corresponding time unit selector.
The time unit display window for output OFF is located on the lower-right side of the front panel below the corresponding time unit selector.
According to the setting of each time unit selector, “sec” for seconds, “10s” for 10 seconds, “min” for minutes, or “hrs” for hours will appear in the corresponding time unit display window.



Time Scale Selection

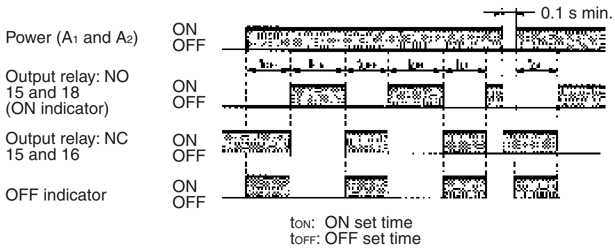
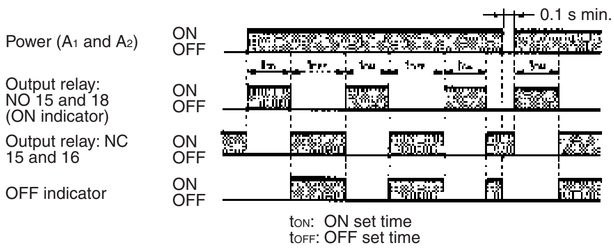
The time scale selector on the upper-left side of the front panel can be set to 0.1 or 1 as a magnification coefficient.



Time Setting

Use the ON/OFF-time setting dial to set the ON/OFF time.

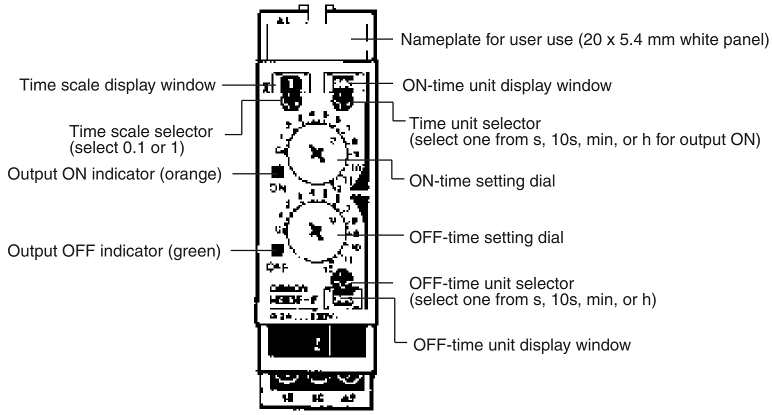
■ Timing Charts

Operating mode	Timing chart
Flicker-OFF start	
Flicker-ON start	

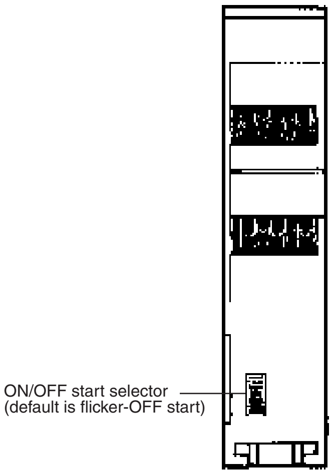
Note: 1. The reset time requires a minimum of 0.1 s.

2. When power is supplied in flicker-ON start mode, the OFF indicator lights momentarily. This, however, has no effect on the performance of the Timer.

Nomenclature

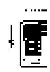


(Front View)



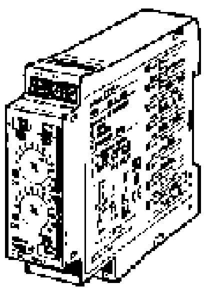
(Bottom View)

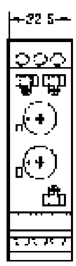
ON/OFF Start Selector Switch Settings

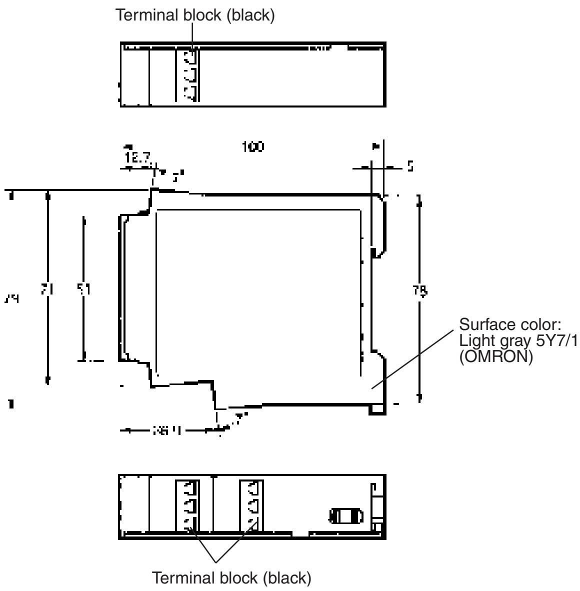
Setting	Operating mode
	Flicker-ON start
	Flicker-OFF start

Dimensions

H3DE-F







Solid-state Star-delta Timer

H3DE-G

- A wide star-time range (up to 120 seconds) and star-delta transfer time range (up to 0.5 seconds)

Model Number Structure

■ Model Number Legend

H3DE -□
1

1. G: Star-delta timer

Ordering Information

■ List of Models

Supply voltage	Model
24 to 230 VAC/VDC	H3DE-G

■ Accessories (Order Separately)

Mounting DIN-rail	50 cm (l) x 7.3 mm (t)	PFP-50N
	1 m (l) x 7.3 mm (t)	PFP-100N
	1 m (l) x 16 mm (t)	PFP-100N2
End Plate	PFP-M	
Spacer	PFP-S	

Specifications

■ General

Item	H3DE-G
Operating mode	Star-delta operation
Operating/Reset method	Time-limit operation/Self-reset
Terminal block	Clamps two 2.5 mm^2 max. bar terminals without sleeves
Terminal screw tightening torque	0.98 N·m max. {approx. 10 kgf·cm max.}
Output type	(Star operation circuit) Relay: SPDT (Delta operation circuit) Relay: SPDT
Mounting method	DIN-rail mounting (see note)
Attachment	Nameplate
Approved standards	UL508, CSA 22.2 No.14 Conforms to EN61812-1, IEC60664-1 4 kV/2, VDE0106/P100 Output category according to IEC60947-5-1 (AC-13; 250 V 5A/AC-15; 250 V 3 A/DC-13; 30 V 0.1 A)

Note: Can be mounted to 35-mm DIN-rail with a plate thickness of 1 to 2.5 mm.

■ Time Ranges

Time scale display	Star operation time ranges
x 1	1 to 12 s
x 10	10 to 120 s

Star-delta transfer time	Programmable at 0.05 s, 0.1 s, 0.25 s or 0.5 s

■ Ratings

Rated supply voltage (see note)	24 to 230 VAC/VDC (50/60 Hz)
Operating voltage range	85% to 110% of rated supply voltage
Power reset	Minimum power-off time: 0.5 s
Reset voltage	24 VAC/DC max.
Power consumption	AC: Approx. 3 VA (1.8 W) at 230 VAC DC: Approx. 0.8 W at 24 VDC
Control output	Contact output: 5 A at 250 VAC with resistive load ($\cos\phi = 1$) 5 A at 30 VDC with resistive load ($\cos\phi = 1$)
Ambient temperature	Operating: –10°C to 55°C (with no icing) Storage: –25°C to 65°C (with no icing)
Ambient humidity	Operating: 35% to 85%

Note: DC ripple rate: 20% max.

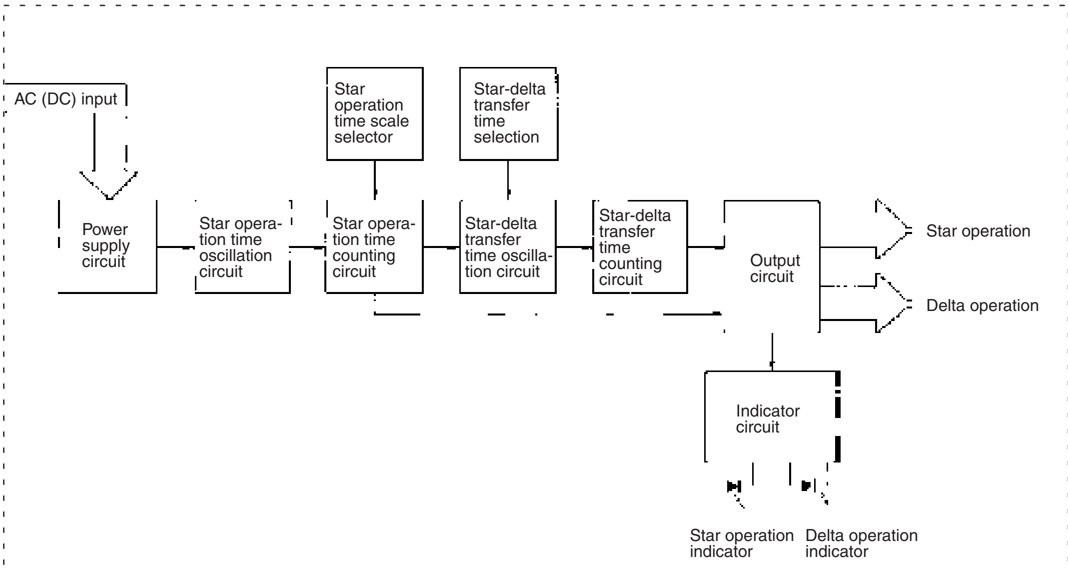
Characteristics

Accuracy of operating time	±1% max. of FS
Setting error	±10% ± 0.05 s max. of FS
Total tolerance of transfer time	± (25% FS + 5 ms) max.
Influence of voltage	±0.5% max. of FS
Influence of temperature	±2% max. of FS
Insulation resistance	100 MΩ min. at 500 VDC
Dielectric strength	Between current-carrying metal parts and exposed non-current-carrying metal parts: 2,000 VAC (50/60 Hz) for 1 min. Between control output terminals and operating circuit: 2,000 VAC (50/60 Hz) for 1 min. Between contacts not located next to each other: 1,000 VAC (50/60 Hz) for 1 min.
Impulse withstand voltage	3 kV (between power supply terminals) 4.5 kV (between current-carrying metal parts and exposed non-current-carrying metal parts)
Noise immunity	Square-wave noise generated by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise) ±1.5 kV
Static immunity	Malfunction: 4 kV Destruction: 8 kV
Vibration resistance	Malfunction: 0.5-mm single amplitude at 10 to 55 Hz Destruction: 0.75-mm single amplitude at 10 to 55 Hz
Shock resistance	Malfunction: 100 m/s^2 Destruction: 1,000 m/s^2
Life expectancy	Mechanical: 10 million operations min. (under no load at 1,800 operations/h) Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 360 operations/h)
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class B Emission AC Mains: EN55011 Group 1 class B Harmonic Current: EN61000-3-2 Voltage Fluctuation and Flickering: EN61000-3-3 (EMS) EN61812-1 Immunity ESD: EN61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: EN61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power port and output port (level 3) 1 kV control port with capacitive clamp (level 3) Immunity Surge: EN61000-4-5: 2 kV common mode (level 3) 1 kV differential mode (level 3)
Degree of protection	IP30 (IP20 for terminal block)
Weight	Approx. 120 g

Note: For reference:
A maximum current of 0.15 A can be switched at 125 VDC (cosϕ=1).
A maximum current of 0.1 A can be switched if L/R is 7 ms.
In both cases, a life of 100,000 operations can be expected.
The minimum applicable load is 10 mA at 5 VDC (failure level: P).

Connections

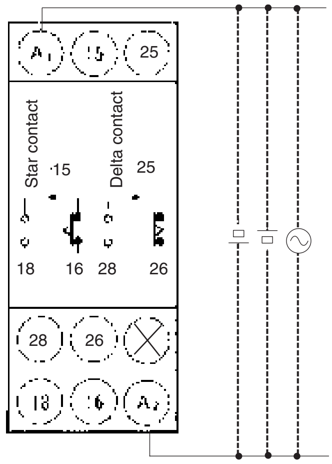
■ Block Diagram



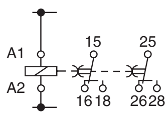
■ I/O Functions

Inputs		---
Outputs	**Control output**	Star output is turned OFF when the dial set value is reached and delta output is ON after the preset transfer time elapses

■ Terminal Arrangement



(DIN notation)



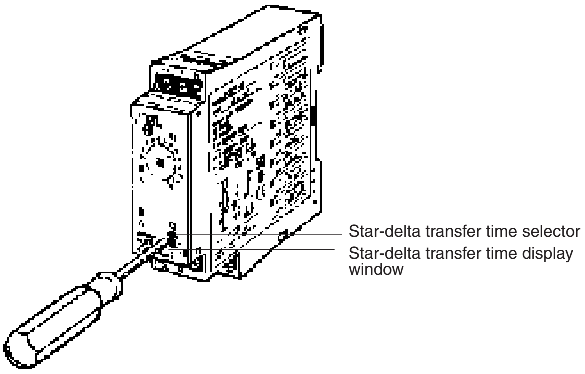
Note: DC supply voltage does not require the designation of polarity.

Operation

Basic Operation

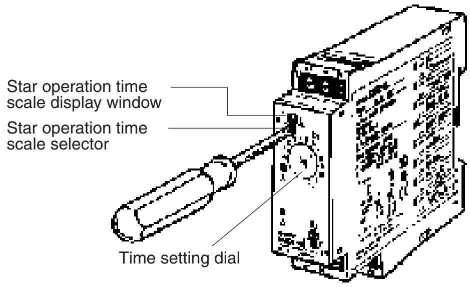
Time Unit Setting

The star-delta transfer time is set to 0.05, 0.1, 0.25 or 0.5 with the star-delta transfer time selector on the lower-right side of the front panel and the set value appears in the star-delta transfer time display window below the selector.



Time Scale Selection

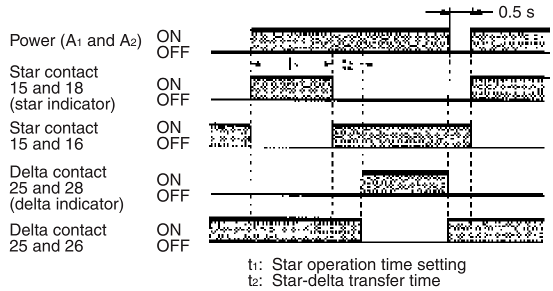
The star operation time scale selector on the upper-left side of the front panel can be set to 1 or 10 as a magnification.



Time Setting

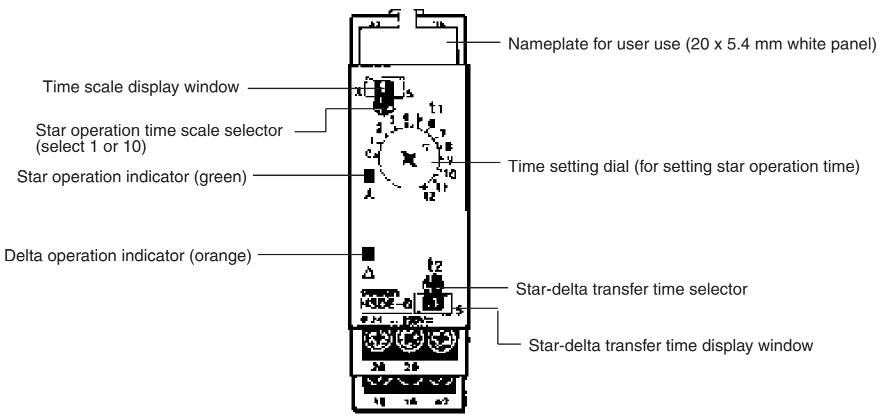
The operation time of the Timer is set with the time setting dial.

Timing Charts



Note: The reset time requires a maximum of 0.5 s.

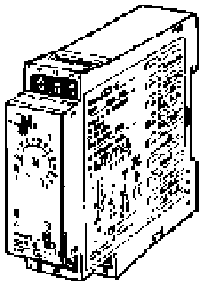
Nomenclature

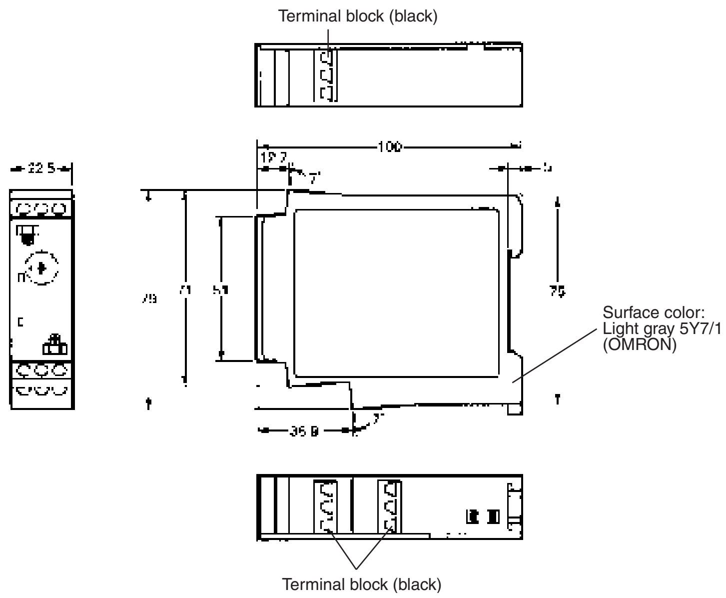


(Front View)

Dimensions

H3DE-G





Solid-state Power OFF-delay Timer

H3DE-H

- Two delay-time models available.
  0.1 to 12 seconds (S Series)
  1 to 120 seconds (L Series)
- Covers wide range of supply voltage.

Model Number Structure

Model Number Legend

H3DE -☐
1

1. H: Power OFF-delay timer

Ordering Information

List of Models

Supply voltage	Model	
	S Series (time range: 0.1 to 12 s)	L Series (time range: 1 to 120 s)
100 to 120 VAC	H3DE-H	H3DE-H
200 to 230 VAC		
24 VAC/VDC		
48 VAC/VDC		

Note: Specify both the model number and supply voltage when ordering.
Example: H3DE-H 24 VAC/DC S
Time span code
Supply voltage

Accessories (Order Separately)

Mounting DIN-rail	50 cm (l) x 7.3 mm (t)	PFP-50N
	1 m (l) x 7.3 mm (t)	PFP-100N
	1 m (l) x 16 mm (t)	PFP-100N2
End Plate	PFP-M	
Spacer	PFP-S	

Specifications

■ General

Item	H3DE-H
Operating mode	Power OFF-delay
Operating/Reset method	Instantaneous operation/Time-limit reset
Terminal block	Clamps Two 2.5 mm^2 max. bar terminals without sleeves
Terminal screw tightening torque	0.98 N·m max. {approx. 10 kgf·cm max.}
Output type	Relay: SPDT
Mounting method	DIN-rail mounting (see note)
Attachment	Nameplate
Approved standards	UL508, CSA 22.2 No.14 Conforms to EN61812-1, IEC60664-1 4 kV/2, VDE0106/P100 Output category according to IEC60947-5-1 (AC-13; 250 V 5A/AC-15; 250 V 3 A/DC-13; 30 V 0.1 A)

Note: Can be mounted to 35-mm DIN-rail with a plate thickness of 1 to 2.5 mm.

■ Time Ranges

Time scale display		Time ranges	Min. power ON time
S series	x 0.1 s	0.1 to 1.2 s	0.1 s minimum
	x 1 s	1 to 12 s	
L series	x 1 s	1 to 12 s	0.3 s minimum
	x 10 s	10 to 120 s	

Note: The Timer will not operate if the specified power-on time is not kept. Be sure to supply power for at least the period specified.

■ Ratings

Rated supply voltage (see note)		100 to 120 VAC (50/60 Hz) 200 to 230 VAC (50/60 Hz) 24 VAC/VDC (50/60 Hz) 48 VAC/VDC (50/60 Hz)
Operating voltage range		85% to 110% of rated supply voltage
Power consumption	**24 VAC/VDC Type**	AC: Approx. 0.3 VA (0.2 W) at 24 VAC DC: Approx. 0.2 W at 24 VDC
	48 VAC/VDC Type	AC: Approx. 0.5 VA (0.5 W) at 48 VAC DC: Approx. 0.5 W at 48 VDC
	100 to 120 VAC Type	AC: Approx. 0.8 VA (0.7 W) at 120 VAC
	200 to 230 VAC Type	AC: Approx. 1.6 VA (1.0 W) at 230 VAC
Control output		Contact output: 5 A at 250 VAC with resistive load (cosϕ = 1) 5 A at 30 VDC with resistive load (cosϕ = 1)
Ambient temperature		Operating: –10°C to 55°C (with no icing) Storage: –25°C to 65°C (with no icing)
Ambient humidity		Operating: 35% to 85%

Note: The ripple in DC power supply must be 20% max. A single-phase, full-wave rectifying power supply can be connected if the ripple output of the power supply is a maximum of 20% of the whole output.

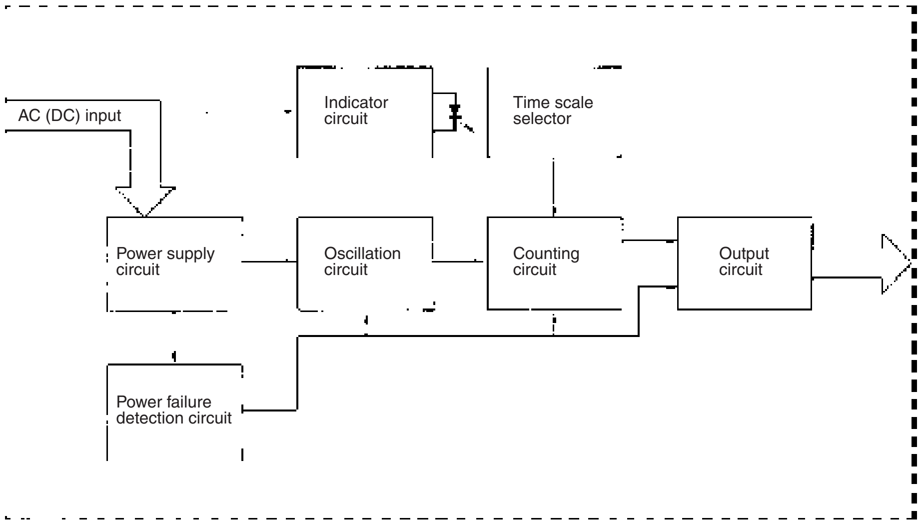
■ Characteristics

Accuracy of operating time	±1% max. of FS (±1% ±10 ms max. at 1.2-s range)
Setting error	±10% ± 0.05 s max. of FS
Influence of voltage	±0.5% max. of FS (±0.5% ±10 ms max. at 1.2-s range)
Influence of temperature	±2% max. of FS (±2% ± 10 ms max. at 1.2-s range)
Insulation resistance	100 MΩ min. at 500 VDC
Dielectric strength	Between current-carrying metal parts and exposed non-current-carrying metal parts: 2,000 VAC (50/60 Hz) for 1 min. Between control output terminals and operating circuit: 2,000 VAC (50/60 Hz) for 1 min. Between contacts not located next to each other: 1,000 VAC (50/60 Hz) for 1 min.
Impulse withstand voltage	3 kV (or 1 kV for 24/48 VAC/VDC models) (between power supply terminals) 4.5 kV (or 1.5 kV for 24/48 VAC/VDC models) (between current-carrying metal parts and exposed non-current-carrying metal parts)
Noise immunity	Square-wave noise generated by noise simulator (pulse width: 100 ns/1 µs, 1-ns rise) ±1.5 kV (between power supply terminals)
Static immunity	Malfunction: 4 kV Destruction: 8 kV
Vibration resistance	Malfunction: 0.5-mm single amplitude at 10 to 55 Hz Destruction: 0.75-mm single amplitude at 10 to 55 Hz
Shock resistance	Malfunction: 100 m/s^2 Destruction: 1,000 m/s^2
Life expectancy	Mechanical: 10 million operations min. (under no load at 1,200 operations/h) Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 1,200 operations/h)
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A Harmonic Current: EN61000-3-2 Voltage Fluctuation and Flickering: EN61000-3-3 (EMS) EN61812-1 Immunity ESD: EN61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: EN61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power port and output port (level 3) 1 kV control port with capacitive clamp (level 3) Immunity Surge: EN61000-4-5: 2 kV common mode (level 3) 1 kV differential mode (level 3)
Degree of protection	IP30 (IP20 for terminal block)
Weight	Approx. 120 g

Note: For reference:
A maximum current of 0.15 A can be switched at 125 VDC (cosϕ=1).
A maximum current of 0.1 A can be switched if L/R is 7 ms.
In both cases, a life of 100,000 operations can be expected.
The minimum applicable load is 100 mA at 5 VDC (failure level: P).

Connections

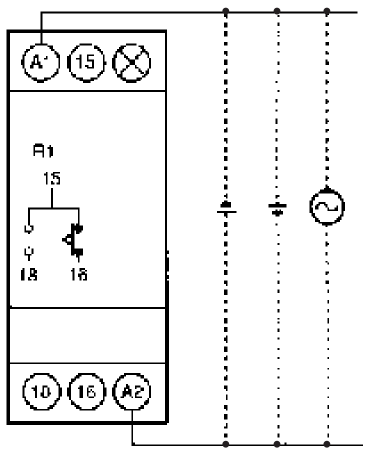
■ Block Diagram



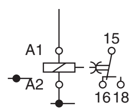
■ I/O Functions

Inputs		---
Outputs	Control output	The Timer operates instantaneously when the Timer is turned ON. The Timer is in counting operation after the Timer is turned OFF and the output of the Timer is turned OFF when the preset time elapses.

■ Terminal Arrangement



(DIN notation)



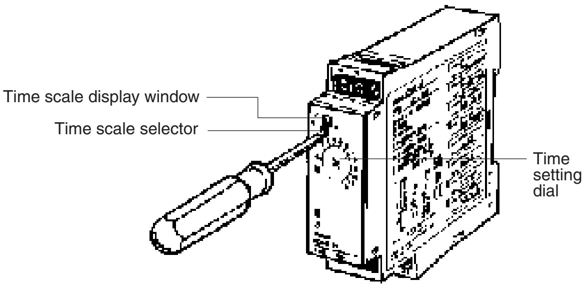
Note: DC supply voltage does not require the designation of polarity.

Operation

■ Basic Operation

Time Scale Selection

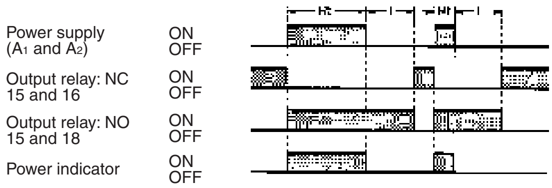
The time scale selector on the upper left-hand side of the front panel of the S Series can be set to 0.1 or 1 and that of the L Series can be set to 1 or 10 as magnification coefficients.



Time Setting

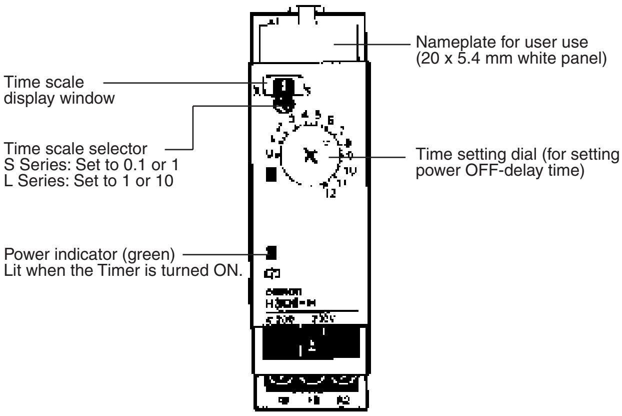
The operating time of the Timer is set with the time setting dial.

■ Timing Charts



t: Set time
Rt: Minimum power-on time (S-series: 0.1 s min.; L-series: 0.3 s min.)
(The output may never turn ON if this time or more is not ensured.)

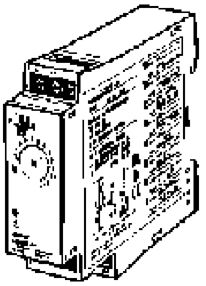
Nomenclature

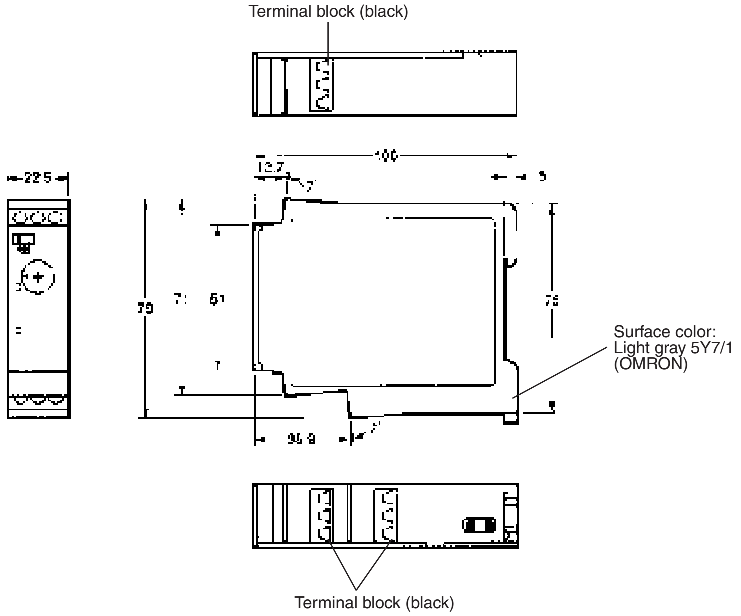


(Front View)

Dimensions

H3DE-H





ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. L092-E2-05 In the interest of product improvement, specifications are subject to change without notice.

Timers

Solid-state Timer
H3YN

Miniature Timer with Multiple Time Ranges and Multiple Operating Modes

- Minimizes stock.
- Pin configuration compatible with MY Power Relay.
- Standard multiple operating modes and multiple time ranges.
- Conforms to EN61812-1 and IEC60664-1 for Low Voltage, and EMC Directives.

Model Number Structure

■ Model Number Legend

H3YN-□□-□
1 2 3

1. **Output**
   2: DPDT
   4: 4PDT
2. **Time Range**
   None:Short-time range (0.1 s to 10 min)
   1: Long-time range (0.1 min to 10 hrs)
3. **Contact Type**
   None:Single contact
   Z: Twin contacts

Ordering Information

■ List of Models

Supply voltage	Time-limit contact	Short-time range model (0.1 s to 10 min)	Long-time range model (0.1 min to 10 h)
24, 100 to 120, 200 to 230 VAC; 12, 24, 48, 100 to 110, 125 VDC	DPDT	H3YN-2	H3YN-21
	4PDT	H3YN-4	H3YN-41
24 VDC	4PDT (Twin contacts)	H3YN-4-Z	H3YN-41-Z

Note: Specify both the model number and supply voltage when ordering.
Example: H3YN-2 24 VAC
Supply voltage

■ Accessories (Order Separately)

Connecting Socket

Timer	DIN-rail mounting/Front Connecting Socket	Back Connecting Socket		
		Solder terminal	Wire-wrap terminal	PC terminal
H3YN-2/-21	PYF08A, PYF08A-N, PYF08A-E	PY08	PY08QN(2)	PY08-02
H3YN-4/-41 H3YN-4-Z/-41-Z	PYF14A, PYF14A-N, PYF14A-E	PY14	PY14QN(2)	PY14-02

Hold-down Clips

Model	Applicable Socket
Y92H-3	PYF08A, PYF08A-N, PYF08A-E PYF14A, PYF14A-N, PYF14A-E
Y92H-4	PY08, PY08QN(2), PY08-02 PY14, PY14QN(2), PY14-02

Specifications

■ Ratings

Item	H3YN-2/-4/-4-Z	H3YN-21/-41/-41-Z
Time ranges	0.1 s to 10 min (1 s, 10 s, 1 min, or 10 min max. selectable)	0.1 min to 10 h (1 min, 10 min, 1 h, or 10 h max. selectable)
Rated supply voltage	24, 100 to 120, 200 to 230 VAC (50/60 Hz) 12, 24, 48, 100 to 110, 125 VDC (see note 1)	
Pin type	Plug-in	
Operating mode	ON-delay, interval, flicker OFF start, or flicker ON start (selectable with DIP switch)	
Operating voltage range	85% to 110% of rated supply voltage (12 VDC: 90% to 110% of rated supply voltage) (see note 2)	
Reset voltage	10% min. of rated supply voltage (see note 3)	
Power consumption	100 to 120 VAC: Relay ON: approx. 1.8 VA (1.6 W) at 120 VAC, 60 Hz Relay OFF: approx. 1 VA (0.6 W) at 120 VAC, 60 Hz 200 to 230 VAC: Relay ON: approx. 2.2 VA (1.8 W) at 230 VAC, 60 Hz Relay OFF: approx. 1.5 VA (1.1 W) at 230 VAC, 60 Hz 24 VAC: Relay ON: approx. 1.8 VA (1.4 W) at 24 VAC, 60 Hz Relay OFF: approx. 0.3 VA (0.2 W) at 24 VAC, 60 Hz 12 VDC: Relay ON: approx. 1.1 W at 12 VDC Relay OFF: approx. 0.1 W at 12 VDC 24 VDC: Relay ON: approx. 1.1 W at 24 VDC Relay OFF: approx. 0.1 W at 24 VDC 48 VDC: Relay ON: approx. 1.2 W at 48 VDC Relay OFF: approx. 0.3 W at 48 VDC 100 to 110 VDC: Relay ON: approx. 1.6 W at 110 VDC Relay OFF: approx. 0.4 W at 110 VDC 125 VDC: Relay ON: approx. 1.6 W at 125 VDC Relay OFF: approx. 0.4 W at 125 VDC	
Control outputs	DPDT: 5 A at 250 VAC, resistive load ($\cos\phi = 1$) 4PDT: 3 A at 250 VAC, resistive load ($\cos\phi = 1$)	

Note: 1. Single-phase, full-wave-rectified power supplies can be used.

2. When using the H3YN continuously in any place where the ambient temperature is in a range of 45°C to 50°C, supply 90% to 110% of the rated supply voltages (supply 95% to 110% with 12 VDC type).

3. Set the reset voltage as follows to ensure proper resetting.
100 to 120 VAC: 10 VAC max.
200 to 230 VAC: 20 VAC max.
100 to 110 VDC: 10 VDC max.

Characteristics

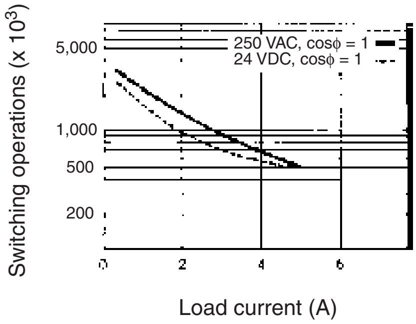
Item	H3YN-2/-21/-4/-41
Accuracy of operating time	±1% FS max. (1 s range: ±1%±10 ms max.)
Setting error	±10%±50 ms FS max.
Reset time	Min. power-opening time: 0.1 s max. (including halfway reset)
Influence of voltage	±2% FS max.
Influence of temperature	±2% FS max.
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min (between current-carrying terminals and exposed non-current-carrying metal parts) (see note 1) 2,000 VAC, 50/60 Hz for 1 min (between operating power circuit and control output) 2,000 VAC, 50/60 Hz for 1 min (between different pole contacts; 2-pole model) 1,500 VAC, 50/60 Hz for 1 min (between different pole contacts; 4-pole model) 1,000 VAC, 50/60 Hz for 1 min (between non-continuous contacts)
Vibration resistance	Destruction: 10 to 55 Hz, 0.75-mm single amplitude for 1 h each in 3 directions Malfunction: 10 to 55 Hz, 0.5-mm single amplitude for 10 min each in 3 directions
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 100 m/s^2
Ambient temperature	Operating: –10°C to 50°C (with no icing) Storage: –25°C to 65°C (with no icing)
Ambient humidity	Operating: 35% to 85%
Life expectancy	Mechanical: 10,000,000 operations min. (under no load at 1,800 operations/h) Electrical: DPDT: 500,000 operations min. (5 A at 250 VAC, resistive load at 1,800 operations/h) 4PDT: 200,000 operations min. (H3YN-4-Z/-41-Z: 100,000 operations min.) (3 A at 250 VAC, resistive load at 1,800 operations/h) (see note 2)
Impulse withstand voltage	Between power terminals: 3 kV for 100 to 120 VAC, 200 to 230 VAC, 100 to 110 VDC, 125 VDC 1 kV for 12 VDC, 24 VDC, 48 VDC, 24 VAC Between exposed non-current-carrying metal parts: 4.5 kV for 100 to 120 VAC, 200 to 230 VAC, 100 to 110 VDC, 125 VDC 1.5 kV for 12 VDC, 24 VDC, 48 VDC, 24 VAC
Noise immunity	±1.5 kV, square-wave noise by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise)
Static immunity	Destruction: 8 kV Malfunction: 4 kV
Degree of protection	IP40
Weight	Approx. 50 g
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A (EMS) EN61812-1 Immunity ESD: EN61000-4-2: 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: EN61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power-line (level 3) 2 kV I/O signal-line (level 4) Immunity Surge: EN61000-4-5: 2 kV line to ground (level 3) 1 kV line to line (level 3)
Approved standards	UL508, CSA C22.2 No. 14, Lloyds Conforms to EN61812-1 and IEC60664-1. (2.5 kV/2 for H3YN-2/-21, 2.5 kV/1 for H3YN-4/-41, H3YN-4-Z/-41-Z) Output category according to EN60947-5-1.

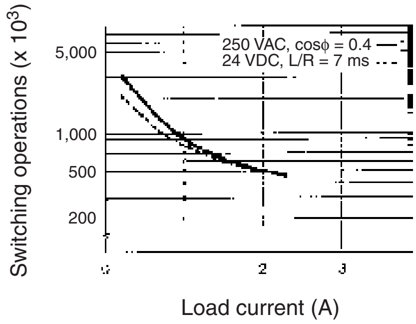
Note: **1.** Terminal screw sections are excluded.

2. Refer to the *Life-test Curve*.

■ Life-test Curve (Reference Value)

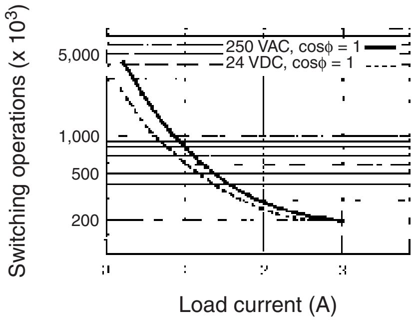
H3YN-2/-21

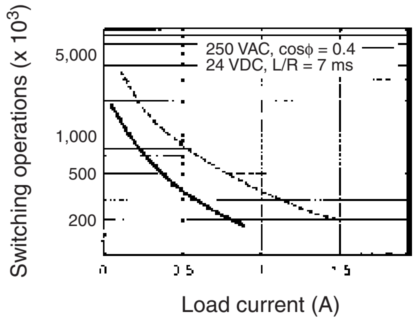




Reference: A maximum current of 0.6 A can be switched at 125 VDC (cosϕ = 1). Maximum current of 0.2 A can be switched if L/R is 7 ms. In both cases, a life of 100,000 operations can be expected.
The minimum applicable load is 1 mA at 5 VDC (P reference value).

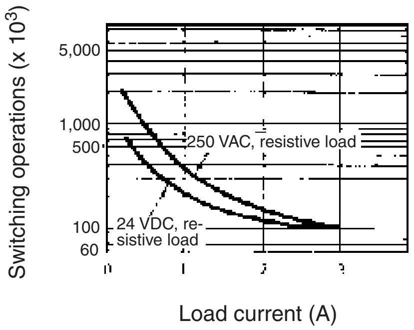
H3YN-4/-41





Reference: A maximum current of 0.5 A can be switched at 125 VDC (cosϕ = 1). Maximum current of 0.2 A can be switched if L/R is 7 ms. In both cases, a life of 100,000 operations can be expected.
The minimum applicable load is 1 mA at 1 VDC (P reference value).

H3YN-4-Z/-41-Z



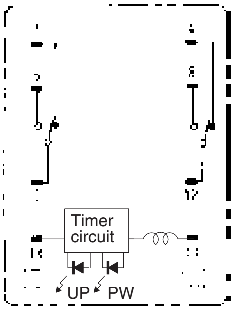
Reference: A maximum current of 0.5 A can be switched at 125 VDC (cosϕ = 1). Maximum current of 0.2 A can be switched if L/R is 7 ms. In both cases, a life of 100,000 operations can be expected.
The minimum applicable load is 0.1 mA at 1 VDC (P reference value).

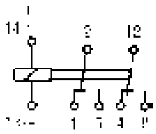
Connections

■ Connection

H3YN-2/-21

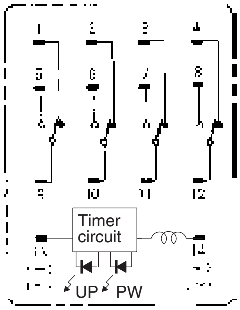
DIN Indication

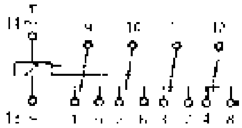




H3YN-4/-41
H3YN-4-Z/-41-Z

DIN Indication



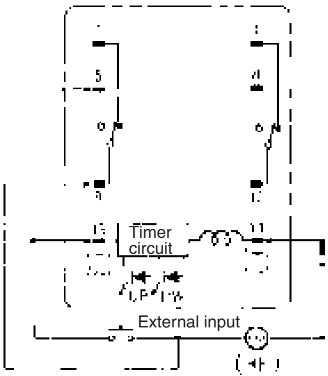


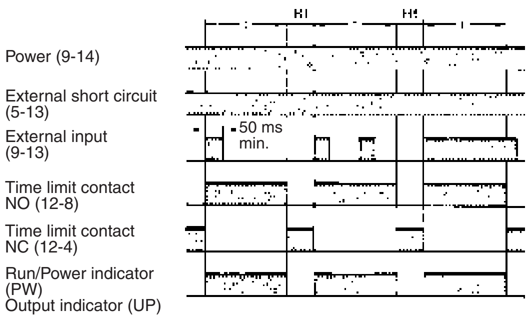
Pulse Operation

A pulse output for a certain period can be obtained with a random external input signal.

Use the H3YN in interval mode as shown in the following timing charts.

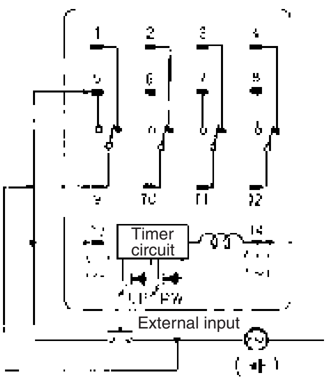
H3YN-2/-21

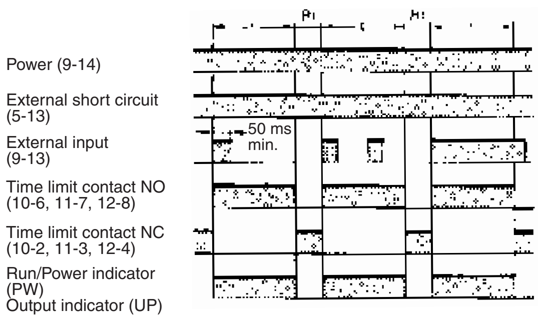




Note: t: Set time
Rt: Reset time

H3YN-4/-41
H3YN-4-Z/-41-Z





Note: t: Set time
Rt: Reset time

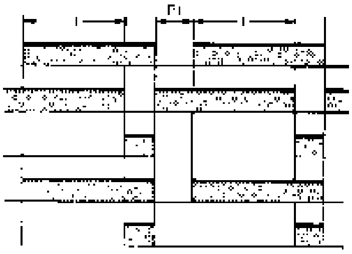
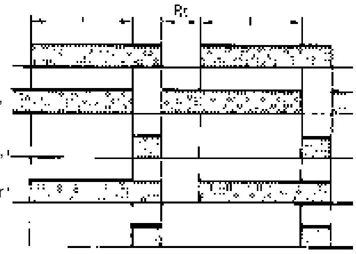
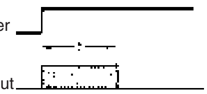
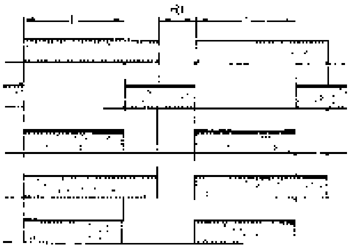
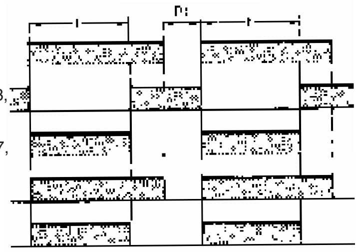
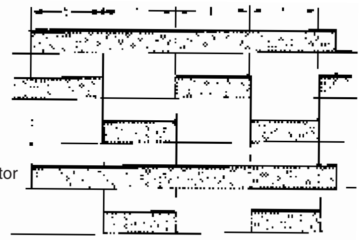
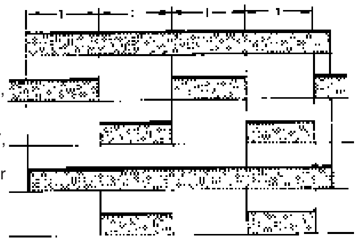
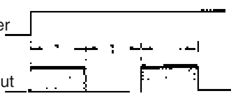
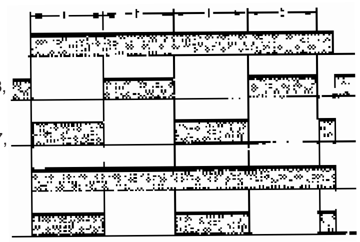
⚠ Caution

Be careful when connecting wires.

Mode	Terminals
Pulse operation	Power supply between 9 and 14 Short-circuit between 5 and 13 Input signal between 9 and 13
Operating mode; interval and all other modes	Power supply between 13 and 14

Operation

■ Timing Chart

Operating mode	Timing chart	
	H3YN-2/-21	H3YN-4/-41
ON-delay Power Output 	Power (13-14) Time limit contact NC (9-1, 12-4) Time limit contact NO (9-5, 12-8) Run/Power indicator (PW) Output indicator (UP) 	Power (13-14) Time limit contact NC (9-1, 10-2, 11-3, 12-4) Time limit contact NO (9-5, 10-6, 11-7, 12-8) Run/Power indicator (PW) Output indicator (UP) 
Interval Power Output 	Power (13-14) Time limit contact NC (9-1, 12-4) Time limit contact NO (9-5, 12-8) Run/Power indicator (PW) Output indicator (UP) 	Power (13-14) Time limit contact NC (9-1, 10-2, 11-3, 12-4) Time limit contact NO (9-5, 10-6, 11-7, 12-8) Run/Power indicator (PW) Output indicator (UP) 
Flicker OFF-start Power Output 	Power (13-14) Time limit contact NC (9-1, 12-4) Time limit contact NO (9-5, 12-8) Run/Power indicator (PW) Output indicator (UP) 	Power (13-14) Time limit contact NC (9-1, 10-2, 11-3, 12-4) Time limit contact NO (9-5, 10-6, 11-7, 12-8) Run/Power indicator (PW) Output indicator (UP) 
Flicker ON-start Power Output 	Power (13-14) Time limit contact NC (9-1, 12-4) Time limit contact NO (9-5, 12-8) Run/Power indicator (PW) Output indicator (UP) 	Power (13-14) Time limit contact NC (9-1, 10-2, 11-3, 12-4) Time limit contact NO (9-5, 10-6, 11-7, 12-8) Run/Power indicator (PW) Output indicator (UP) 

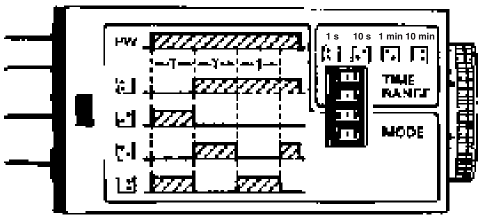
Note: t: Set time
Rt: Reset time

■ DIP Switch Settings

The 1-s range and ON-delay mode for H3YN-2/-4/-4-Z, the 1-min range and ON-delay mode for H3YN-21/-41/-41-Z are factory-set before shipping.

Time Ranges

Model	Time range	Time setting range	Setting	Factory-set
H3YN-2, H3YN-4 H3YN-4-Z	1 s	0.1 to 1 s		Yes
	10 s	1 to 10 s		No
	1 min	0.1 to 1 min		No
	10 min	1 to 10 min		No
H3YN-21, H3YN-41 H3YN-41-Z	1 min	0.1 to 1 min		Yes
	10 min	1 to 10 min		No
	1 h	0.1 to 1 h		No
	10 h	1 to 10 h		No



Note: The top two DIP switch pins are used to select the time ranges.

Operating Modes

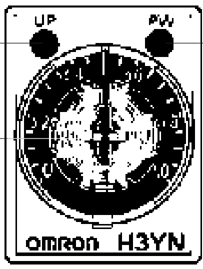
Operating mode	Setting	Factory-set
ON-delay		Yes
Interval		No
Flicker OFF-start		No
Flicker ON-start		No

Note: The bottom two DIP switch pins are used to select the operating mode.

Nomenclature

Output Indicator (Orange)
(Lit: Output ON)

Main Dial
Set the desired time according to time range selectable by DIP switch.



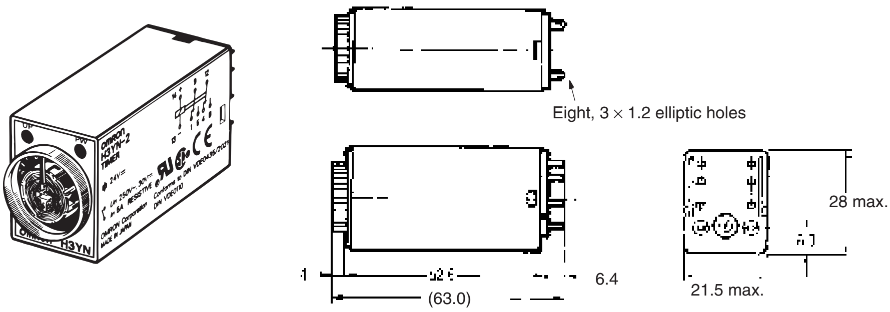
Run/Power Indicator (Green)
(Lit: Power ON)

Dimensions

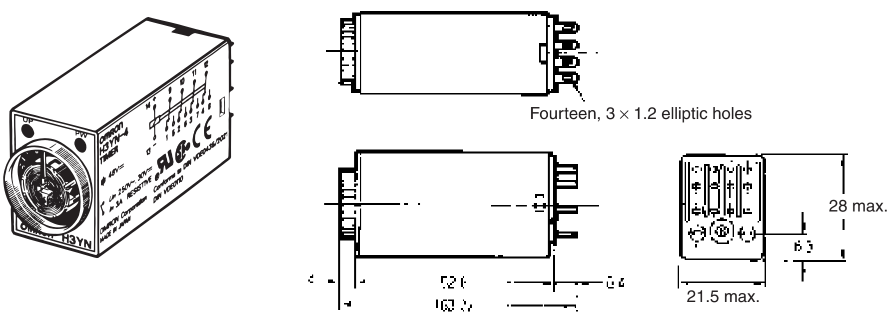
Note: All units are in millimeters unless otherwise indicated.

■ Timers

H3YN-2/-21 Front Mounting

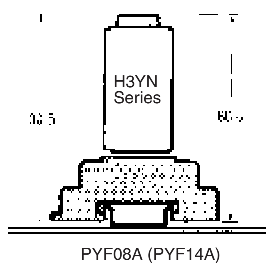


H3YN-4/-41 Front Mounting
H3YN-4-Z/-41-Z

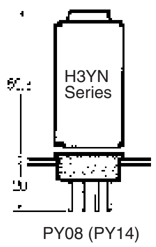


Mounting Height

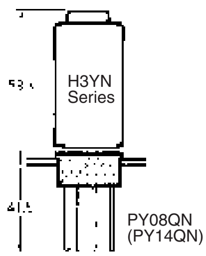
PYF08A/PYF08A-N/PYF08A-E (PYF14A/PYF14A-N/PYF14A-E (see note))



PY08 (PY14 (see note))



PY08QN (PY14QN (see note))



Note: Models in parentheses are Connecting Sockets to the H3YN-4/-41 or H3YN-4-Z/-41-Z.

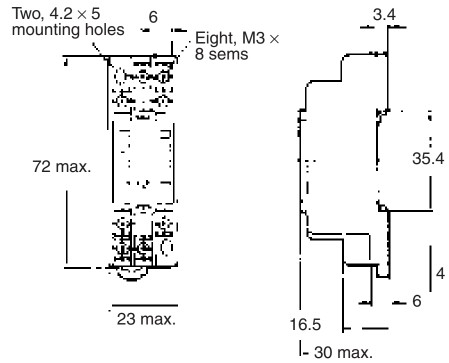
■ Accessories (Order Separately)

Connecting Sockets

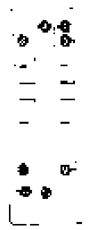
Use the PYF☐A, PY☐, PY☐-02, or PY☐QN(2) to mount the H3YN. When ordering any one of these Sockets, replace "☐" with "08" or "14."

Track Mounting/Front Connecting Sockets

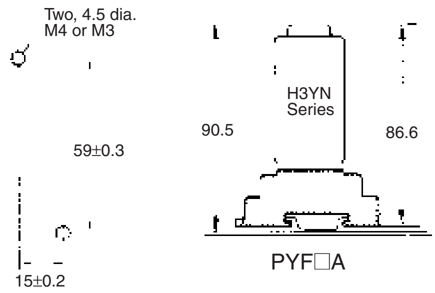
PYF08A



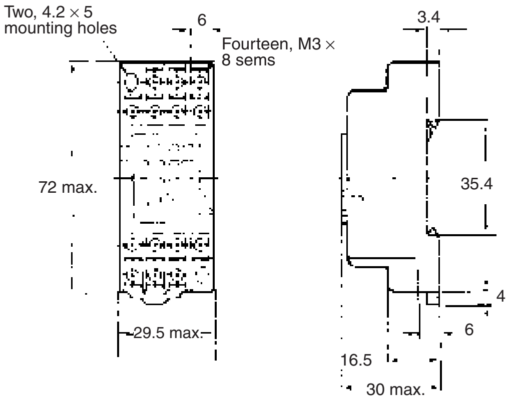
Terminal Arrangement (Top View)



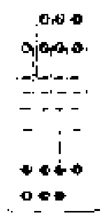
Mounting Holes



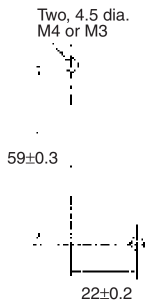
PYF-14A



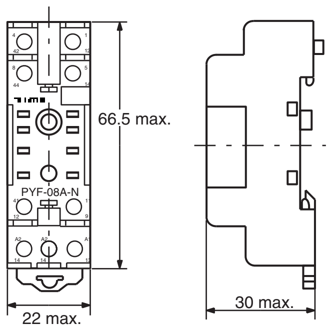
Terminal Arrangement (Top View)



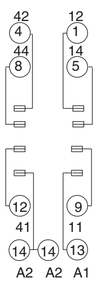
Mounting Holes



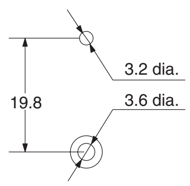
PYF-08A-N



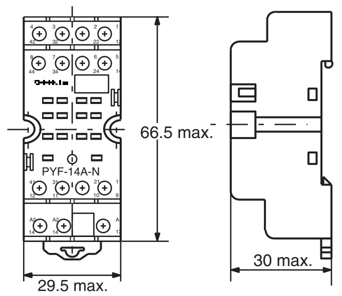
Terminal Arrangement



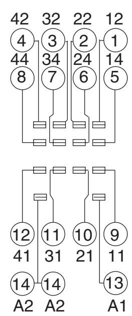
Mounting Holes (for Surface Mounting)



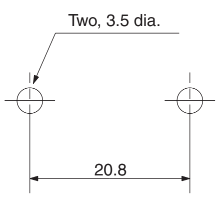
PYF-14A-N



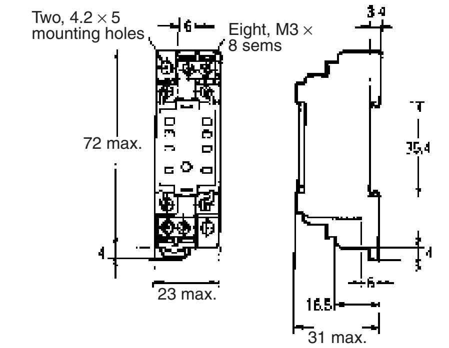
Terminal Arrangement



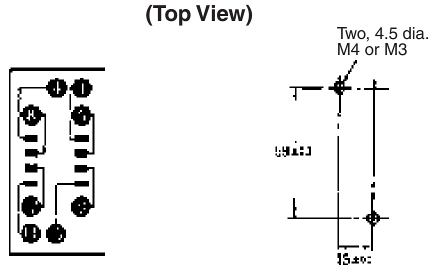
Mounting Holes (for Surface Mounting)



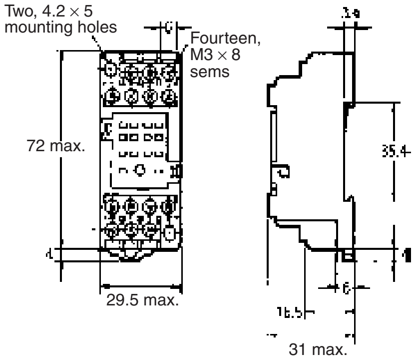
PYF08A-E



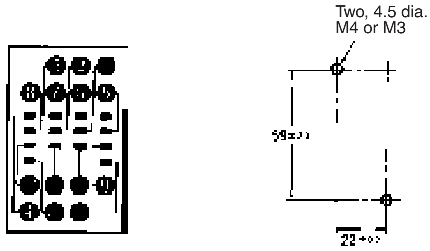
(Top View)



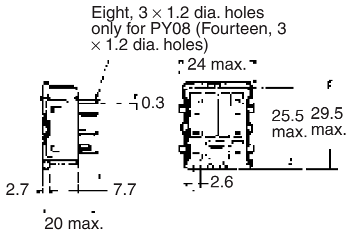
PYF14A-E



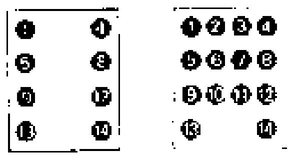
(Top View)



Back Connecting Sockets
PY08, PY14

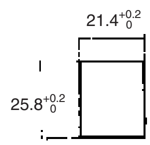


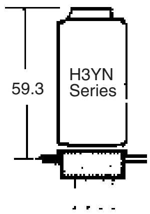
Terminal Arrangement (Bottom View)



PY08 PY14

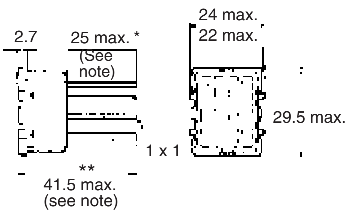
Panel Cutout



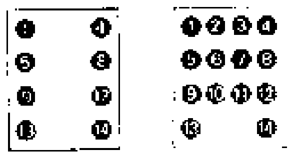


PY□, PY□-02,
PY□QN(2)

PY08QN, PY14QN
PY08QN(2), PY14QN(2)



Terminal Arrangement (Bottom View)

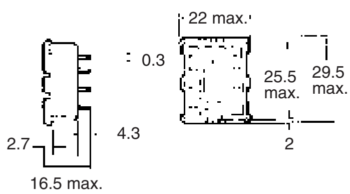


PY08QN
PY08QN(2)

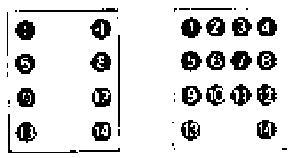
PY14QN
PY14QN(2)

Note: With PY□QN(2)(-3), dimension * should read 20 max. and dimension ** 36.5 max.

PY08-02, PY14-02



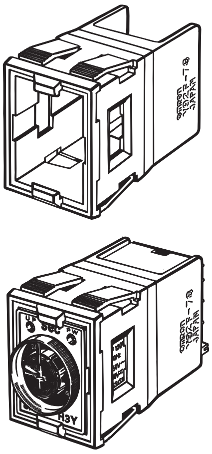
Terminal Arrangement (Bottom View)

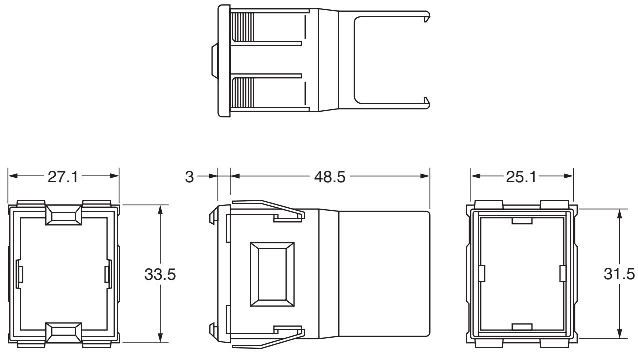


PY08□-02 PY14□-02

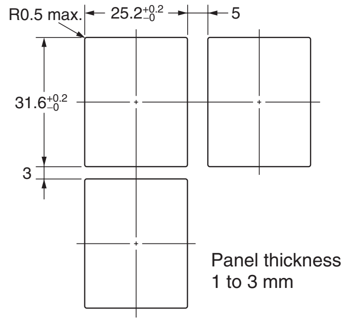
Flush Mounting Adapter

Y92F-78





Panel Cutout

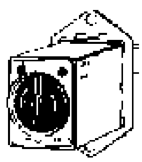


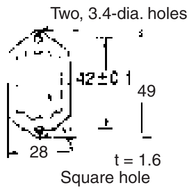
Note: **1.** Push the H3Y in until the Adaptor (Y92F-78) hooks engage with its rear panel.
2. Do not round the corners of the cutout on the rear panel surface, otherwise the Adaptor (Y92F-78) tabs may not engage properly.

Socket Mounting Plates

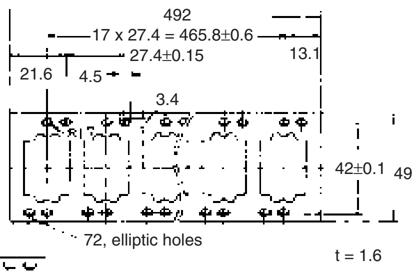
The PYP-1 is a Socket Mounting Plate for a single Socket and the PYP-18 is a Socket Mounting Plate for 18 Sockets. The PYP-18 can be cut appropriately according to the number of Sockets to be used.

PYP-1





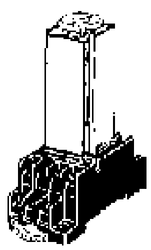
PYP-18



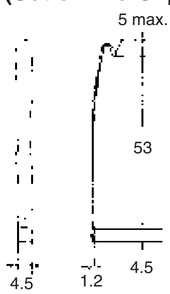
Hold-down Clips

The Hold-down Clip makes it possible to mount the H3YN securely and prevent the H3YN from falling out due to vibration or shock.

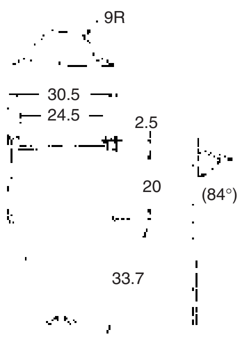
Y92H-3
Y92H-4



Y92H-3 for PYF□A Socket (Set of Two Clips)



Y92H-4 for PY□ Socket

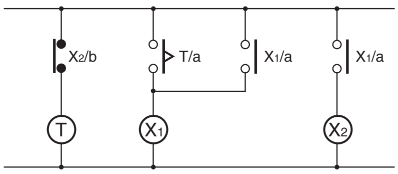


Precautions

■ Correct Use

The operating voltage will increase when using the H3YN continuously in any place where the ambient temperature is in a range of 45°C to 50°C. Supply 90% to 110% of the rated voltages (at 12 VDC: 95% to 110%).

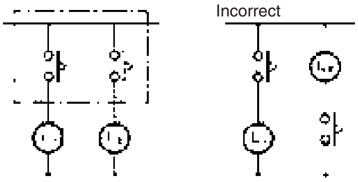
Do not leave the H3YN in time-up condition for a long period of time (for example, more than one month in any place where the ambient temperature is high), otherwise the internal parts (aluminum electrolytic capacitor) may become damaged. Therefore, the use of the H3YN with a relay as shown in the following circuit diagram is recommended to extend the service life of the H3YN.



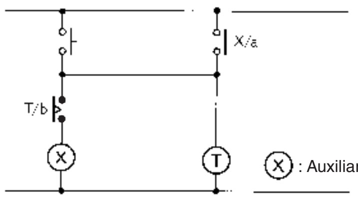
X: Auxiliary relay such as MY Relay

The H3YN must be disconnected from the Socket when setting the DIP switch, otherwise the user may touch a terminal imposed with a high voltage and get an electric shock.

Do not connect the H3YN as shown in the following circuit diagram on the right hand side, otherwise the H3YN's internal contacts different from each other in polarity may become short-circuited.



Use the following safety circuit when building a self-holding or self-resetting circuit with the H3YN and an auxiliary relay, such as an MY Relay, in combination.



X: Auxiliary relay such as MY Relay

In the case of the above circuit, the H3YN will be in pulse operation. Therefore, if the circuit shown on page C-73 is used, no auxiliary relay will be required.

Do not set to the minimum setting in the flicker modes, otherwise the contact may become damaged.

Be careful not to apply any voltage to the terminal screws on the back of the Timer. Mount the product so that the screws will not come in contact with the panel or metal parts.

Do not use the H3YN in places where there is excessive dust, corrosive gas, or direct sunlight.

Do not mount more than one H3YN closely together, otherwise the internal parts may become damaged. Make sure that there is a space of 5 mm or more between any H3YN models next to each other to allow heat radiation.

The internal parts may become damaged if a supply voltage other than the rated ones is imposed on the H3YN.

In order to conform to UL and CSA requirements when using the H3YN-4/-41 or H3YN-4-Z/-41-Z, connect the Unit so that output contacts (contacts of different poles) have the same electric potential.

In cases such as PLC input where the load is extremely small for the control output of a timer containing a power relay (using other than gold-plated contacts), reliability can be increased by using contacts of the same poles (e.g., the H3Y-2) in parallel.

■ Precautions for EN61812-1 Conformance

The H3YN as a built-in timer conforms to EN61812-1 provided that the following conditions are satisfied.

Handling

Do not touch the DIP switch while power is supplied to the H3YN.

Before dismounting the H3YN from the Socket, make sure that no voltage is imposed on any terminal of the H3YN.

The applicable Socket is the PYF□A.

Only basic insulation is ensured between the Y92H-3 Hold-down Clips and H3YN internal circuits.

Do not allow the Y92H-3 Hold-down Clips to contact other parts.

The insulation test voltage between different pole contacts for the 4-pole model is the impulse voltage of 2.95 kV.

Wiring

The power supply for the H3YN must be protected with equipment such as a breaker approved by VDE.

Basic insulation is ensured between the H3YN's operating circuit and control output.

Basic insulation: Overvoltage category II, pollution degree 1 (H3YN-4/-41, H3YN-4-Z/-41-Z), pollution degree 2 (H3YN-2/-21) (with a clearance of 1.5 mm and a creepage distance of 2.5 mm at 240 VAC)

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. L089-E2-03

Solid-state Timer
H3CR

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments. Refer to *Warranty and Application Considerations* (CD), and *Safety Precautions* (pages C-103, C-124, *Common to H3CR* on CD).

DIN 48 x 48-mm Multifunctional Timer Series

- Conforms to EN61812-1 and IEC60664-1 4 kV/2 for Low Voltage, and EMC Directives.
- Approved by UL and CSA.
- Lloyds/NK approvals.
- Six-language instruction manual provided.

■ Broad Line-up of H3CR Series

H3CR

H3CR-A

H3CR-F

H3CR-G

H3CR-H

Multifunctional Timer

Model	Type
H3CR-A, H3CR-AS, H3CR-AP	11-pin model
H3CR-A8, H3CR-A8S	8-pin model
H3CR-A8E	8-pin with instantaneous contact output model

Twin Timer

Model	Type
H3CR-F, H3CR-FN, H3CR-F-300, H3CR-FN-300	11-pin model
H3CR-F8, H3CR-F8N, H3CR-F8-300, H3CR-F8N-300	8-pin model

Star-delta Timer

Model	Type
H3CR-G8L, H3CR-G8EL	8-pin model

Power OFF-delay Timer

Model	Type
H3CR-HRL	11-pin model
H3CR-H8L, H3CR-H8RL	8-pin model

Note: H3CR-AS, H3CR-A8S: Transistor output models

Contents

Solid-state Timer

Solid-state Multi-functional Timer

H3CR-A

DIN 48 x 48-mm State-of-the-art Multifunctional Timer

- A wider power supply range reduces the number of timer models kept in stock.
- A wide range of applications through six or four operating modes.
- Reduced power consumption. (Except for H3CR-A8E)
- Enables easy sequence checks through instantaneous outputs for a zero set value at any time range.
- Length, when panel-mounted with a Socket, of 80 mm or less.
- Time Setting Rings enable consistent settings and limit the setting range.
- Panel Covers enable various panel designs.
- PNP input models available.
- Rich variety of inputs: Start, reset, and gate functions (11-pin models and -AP models)

Model Number Structure

■ Model Number Legend

Note: This model number legend includes combinations that are not available. Before ordering, please check the *List of Models* on page C-84 for availability.

H3CR-A□ □ □ - □ □
1 2 3 4 5

1. **Number of Pins**
   None: 11-pin models
   8: 8-pin models
2. **Input Type for 11-pin Models**
   None: No-voltage input (NPN type)
   P: Voltage input (PNP type)
3. **Output**
   None: Relay output (DPDT)
   S: Transistor output (NPN/PNP universal use)
   E: Relay output (SPDT) with instantaneous relay output (SPDT)
4. **Suffix**
   300: Dual mode models (signal ON/OFF-delay and one-shot)
   301: Double time scale (range) models (0.1 s to 600 h)
5. **Supply Voltage**
   100-240AC/100-125DC: 100 to 240 VAC/100 to 125 VDC
   24-48AC/12-48DC: 24 to 48 VAC/12 to 48 VDC
   24-48AC/DC: 24 to 48 VAC/VDC (Only for H3CR-A8E)

Ordering Information

■ List of Models

Note: 1. Specify both the model number and supply voltage when ordering.
Example: H3CR-A 100-240AC/100-125DC
Supply voltage

2. The operating modes are as follows
A: ON-delay
B: Flicker OFF start
B2: Flicker ON start
C: Signal ON/OFF-delay
D: Signal OFF-delay
E: Interval
G: Signal ON/OFF-delay
J: One-shot

11-pin Models

Output	Supply voltage	Input type	Time range	Operating mode (See note 2)	Model (See note 1.)
Contact	100 to 240 VAC (50/60 Hz)/ 100 to 125 VDC	No-voltage input	0.05 s to 300 h	Six multi-modes: A, B, B2, C, D, E	H3CR-A
	24 to 48 VAC (50/60 Hz)/ 12 to 48 VDC				
	100 to 240 VAC (50/60 Hz)/ 100 to 125 VDC			Dual-modes: G, J	H3CR-A-300
	24 to 48 VAC (50/60 Hz)/ 12 to 48 VDC				
	100 to 240 VAC (50/60 Hz)/ 100 to 125 VDC	Voltage input		Six multi-modes: A, B, B2, C, D, E	H3CR-AP
	24 to 48 VAC (50/60 Hz)/ 12 to 48 VDC				
	100 to 240 VAC (50/60 Hz)/ 100 to 125 VDC	No-voltage input	0.1 s to 600 h		H3CR-A-301
	24 to 48 VAC (50/60 Hz)/ 12 to 48 VDC				
Transistor (Photocoupler)	24 to 48 VAC (50/60 Hz)/ 12 to 48 VDC		0.05 s to 300 h		H3CR-AS

8-pin Models

Output	Supply voltage	Input type	Time range	Operating mode (See note 2)	Model (See note 1.)
Contact	100 to 240 VAC (50/60 Hz)/ 100 to 125 VDC	No-input available	0.05 s to 300 h	Four multi-modes: A, B2, E, J (Power supply start)	H3CR-A8
	24 to 48 VAC (50/60 Hz)/ 12 to 48 VDC				
	100 to 240 VAC (50/60 Hz)/ 100 to 125 VDC		0.1 s to 600 h		H3CR-A8-301
	24 to 48 VAC (50/60 Hz)/ 12 to 48 VDC				
Transistor (Photocoupler)	24 to 48 VAC (50/60 Hz)/ 12 to 48 VDC		0.05 s to 300 h		H3CR-A8S
Time-limit contact and instantaneous contact	100 to 240 VAC (50/60 Hz)/ 100 to 125 VDC				H3CR-A8E
	24 to 48 VAC/VDC (50/60 Hz)				

Accessories (Order Separately)

Name/specifications		Models
Flush Mounting Adapter		Y92F-30
		Y92F-73
		Y92F-74
Mounting DIN-rail	**50 cm (ℓ) x 7.3 mm (t)**	PFP-50N
	1 m (ℓ) x 7.3 mm (t)	PFP-100N
	1 m (ℓ) x 16 mm (t)	PFP-100N2
End Plate		PFP-M
Spacer		PFP-S
Protective Cover		Y92A-48B
DIN-rail Mounting/ Front Connecting Socket	**8-pin**	P2CF-08
	8-pin, finger safe type	P2CF-08-E
	11-pin	P2CF-11
	11-pin, finger safe type	P2CF-11-E
Back Connecting Socket	**8-pin**	P3G-08
	8-pin, finger safe type	P3G-08 with Y92A-48G (See note 1)
	11-pin	P3GA-11
	11-pin, finger safe type	P3GA-11 with Y92A-48G (See note 1)
Time Setting Ring	**Setting a specific time**	Y92S-27
	Limiting the setting range	Y92S-28
Panel Cover (See note 2)	**Light gray (5Y7/1)**	Y92P-48GL
	Black (N1.5)	Y92P-48GB
	Medium gray (5Y5/1)	Y92P-48GM
Hold-down Clip (See note 3)	**For PL08 and PL11 Sockets**	Y92H-7
	For PF085A Socket	Y92H-8

Note: 1. Y92A-48G is a finger safe terminal cover which is attached to the P3G-08 or P3GA-11 Socket.
2. The Time Setting Ring and Panel Cover are sold together.
3. Hold-down Clips are sold in sets of two.

Specifications

General

Item	H3CR-A/-AS	H3CR-AP	H3CR-A8/-A8S	H3CR-A8E
Operating mode	A: ON-delay B: Flicker OFF start B2: Flicker ON start C: Signal ON/OFF-delay D: Signal OFF-delay E: Interval G: Signal ON/OFF-delay (Only for H3CR-A-300) J: One-shot (Only for H3CR-A-300)		A: ON-delay (power supply start) B2: Flicker ON start (power supply start) E: Interval (power supply start) J: One-shot (power supply start)	
Pin type	11-pin		8-pin	
Input type	No-voltage input	Voltage input	---	
Time-limit output type	H3CR-A/-A8/-AP: Relay output (DPDT) H3CR-AS/-A8S: Transistor output (NPN/PNP universal)*			Relay output (SPDT)
Instantaneous output type	---			Relay output (SPDT)
Mounting method	DIN-rail mounting, surface mounting, and flush mounting			
Approved standards	UL508, CSA C22.2 No.14, NK, Lloyds Conforms to EN61812-1 and IEC60664-1 (VDE0110) 4kV/2. Output category according to EN60947-5-1 for Timers with Contact Outputs. Output category according to EN60947-5-2 for Timers with Transistor Outputs.			

*The internal circuits are optically isolated from the output. This enables universal application as NPN or PNP transistor.

■ Time Ranges

Note: When the time setting knob is turned below "0" until the point where the time setting knob stops, the output will operate instantaneously at all time range settings.

Standard (0.05-s to 300-h) Models

Time unit		s (sec)	min (min)	h (hrs)	x10 h (10 h)
Full scale setting	1.2	0.05 to 1.2	0.12 to 1.2		1.2 to 12
	3	0.3 to 3			3 to 30
	12	1.2 to 12			12 to 120
	30	3 to 30			30 to 300

Double (0.1-s to 600-h) Models

Time unit		s (sec)	min (min)	h (hrs)	x10 h (10 h)
Full scale setting	2.4	0.1 to 2.4	0.24 to 2.4		2.4 to 24
	6	0.6 to 6			6 to 60
	24	2.4 to 24			24 to 240
	60	6 to 60			60 to 600

■ Ratings

Rated supply voltage (See note 1)	100 to 240 VAC (50/60 Hz)/100 to 125 VDC, 24 to 48 VAC (50/60 Hz)/12 to 48 VDC (24 to 48 VAC/VDC for H3CR-A8E) (See note 2)
Operating voltage range	85% to 110% of rated supply voltage (90% to 110% at 12 VDC)
Power reset	Minimum power-opening time: 0.1 s
Input	No-voltage Input ON impedance: 1 kΩ max. ON residual voltage: 1 V max. OFF impedance: 100 kΩ min. Voltage Input Max. permissible capacitance between inputs lines (terminals 6 and 7): 1,200 pF Load connectable in parallel with inputs (terminals 6 and 7). • 100 to 240 VAC/100 to 125 VDC High (logic) level: 85 to 264 VAC/85 to 137.5 VDC Low (logic) level: 0 to 10 VAC/0 to 10 VDC • 24 to 48 VAC/12 to 48 VDC High (logic) level: 20.4 to 52.8 VAC/10.8 to 52.8 VDC Low (logic) level: 0 to 2.4 VAC/0 to 1.2 VDC
Power consumption	H3CR-A/-A8 • 100 to 240 VAC/100 to 125 VDC (When at 240 VAC, 60 Hz) Relay ON: approx. 2.0 VA (1.6 W) Relay OFF: approx. 1.3 VA (1.1 W) • 24 to 48 VAC/12 to 48 VDC (When at 24 VDC) Relay ON: approx. 0.8 W Relay OFF: approx. 0.2 W H3CR-AP (See note 3) • 100 to 240 VAC/100 to 125 VDC (When at 240 VAC, 60 Hz) Relay ON: approx. 2.5 VA (2.2 W) Relay OFF: approx. 1.8 VA (1.7 W) • 24 to 48 VAC/12 to 48 VDC (When at 24 VDC) Relay ON: approx. 0.9 W Relay OFF: approx. 0.3 W H3CR-A8E • 100 to 240 VAC/100 to 125 VDC (When at 240 VAC, 60 Hz) Relay ON/OFF: approx. 2 VA (0.9 W) • 24 to 48 VAC/VDC (When at 24 VDC) Relay ON/OFF: approx. 0.9 W H3CR-AS/-A8S • 24 to 48 VAC/12 to 48 VDC (When at 24 VDC) Output ON: 0.3 W Output OFF: 0.2 W
Control outputs	Time limit contacts: 5 A at 250 VAC/30 VDC, 0.15 A at 125 VDC, resistive load (cosϕ = 1) Transistor output: Open collector (NPN/PNP), 100 mA max. at 30 VDC max., residual voltage: 2 V max. Instantaneous contact: 5 A at 250 VAC/30 VDC, 0.15 A at 125 VDC, resistive load (cosϕ = 1)

Note: **1.** DC ripple rate: 20% max. if the power supply incorporates a single-phase, full-wave rectifier.

2. Each 24-to-48-VAC/12-to-48-VDC model causes an inrush current of approximately 0.85 A. Pay careful attention when attempting to turn ON power to such a model with non-contact output from a device such as a sensor.

3. The values are for when the terminals 2 and 7 and terminals 10 and 6 are short-circuited, and include the consumption current of the input circuit.

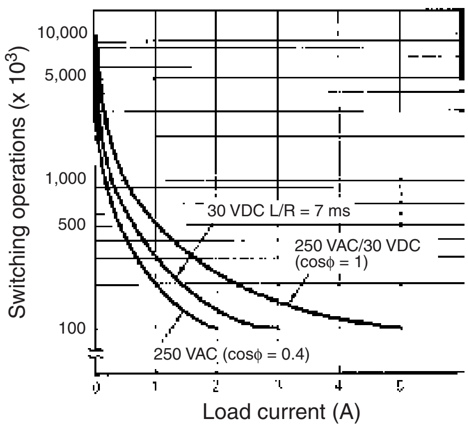
■ Characteristics

Accuracy of operating time	±0.2% FS max. (±0.2%±10 ms max. in a range of 1.2 s)
Setting error	±5% FS ±50 ms (See note 1)
Reset time	Min. power-opening time: 0.1 s max. Min. pulse width: 0.05 s (H3CR-A/-AS)
Reset voltage	10% max. of rated supply voltage
Influence of voltage	±0.2% FS max. (±0.2%±10 ms max. in a range of 1.2 s)
Influence of temperature	±1% FS max. (±1%±10 ms max. in a range of 1.2 s)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC (1,000 VAC for H3CR-A□S), 50/60 Hz for 1 min (between current-carrying metal parts and exposed non-current-carrying metal parts) 2,000 VAC (1,000 VAC for H3CR-A□S), 50/60 Hz for 1 min (between control output terminals and operating circuit) 2,000 VAC, 50/60 Hz for 1 min (between contacts of different polarities) 1,000 VAC, 50/60 Hz for 1 min (between contacts not located next to each other) 2,000 VAC, 50/60 Hz for 1 min (between input and control output terminals and operation circuit) for H3CR-AP
Impulse withstand voltage	3 kV (between power terminals) for 100 to 240 VAC/100 to 125 VDC, 1 kV for 24 to 48 VAC/12 to 48 VDC 4.5 kV (between current-carrying terminal and exposed non-current-carrying metal parts) for 100 to 240 VAC/100 to 125 VDC, 1.5 kV for 24 to 48 VAC/12 to 48 VDC and 24 to 48 VAC/VDC
Noise immunity	±1.5 kV (between power terminals) and ±600 V (between no-voltage input terminals), square-wave noise by noise simulator (pulse width: 100 ns/1 µs, 1-ns rise)
Static immunity	Malfunction: 8 kV Destruction: 15 kV
Vibration resistance	Destruction: 10 to 55 Hz with 0.75-mm single amplitude each in 3 directions for 2 hours each Malfunction: 10 to 55 Hz with 0.5-mm single amplitude each in 3 directions for 10 minutes each
Shock resistance	Destruction: 1,000 m/s^2 3 times each in 6 directions Malfunction: 100 m/s^2 3 times each in 6 directions
Ambient temperature	Operating: -10°C to 55°C (with no icing) Storage: -25°C to 65°C (with no icing)
Ambient humidity	Operating: 35% to 85%
Life expectancy	Mechanical: 20,000,000 operations min. (under no load at 1,800 operations/h) Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 1,800 operations/h) (See note 2)
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A (EMS) EN61812-1 Immunity ESD: IEC61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: IEC61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity RF-interference from Pulse-modulated Radio Waves: IEC61000-4-3: 10 V/m (900±5 MHz) (level 3) Immunity Conducted Disturbance: IEC61000-4-6: 10 V (0.15 to 80 MHz) (level 3) Immunity Burst: IEC61000-4-4: 2 kV power-line (level 3) 2 kV I/O signal-line (level 4) Immunity Surge: IEC61000-4-5: 1 kV line to line (level 3) 2 kV line to ground (level 3)
Case color	Light gray (Munsell 5Y7/1)
Degree of protection	IP40 (panel surface)
Weight	Approx. 90 g

Note: 1. The value is ±5% FS +100 ms to –0 ms max. when the C, D, or G mode signal of the H3CR-AP is OFF.

2. Refer to the *“Life-test Curve” on page C-88*.

■ Life-test Curve

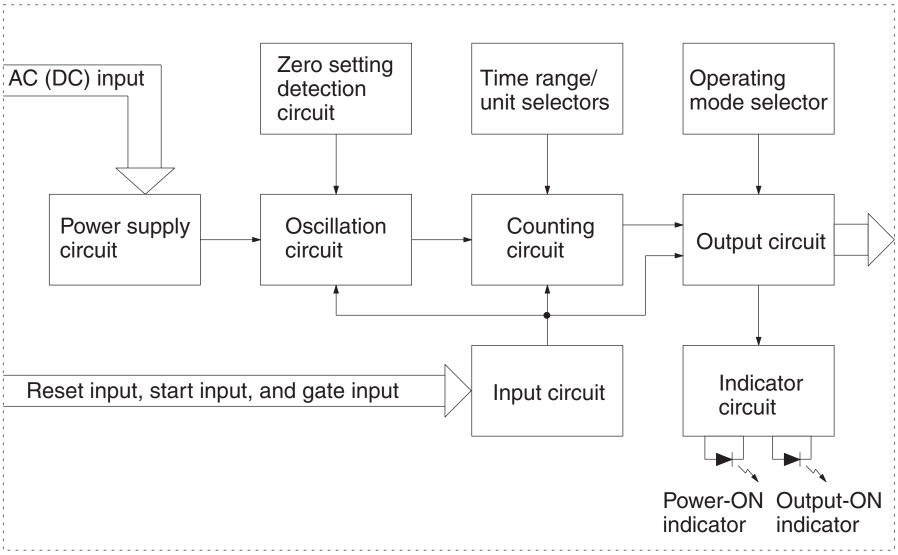


Reference: A maximum current of 0.15 A can be switched at 125 VDC (cosφ = 1) and a maximum current of 0.1 A can be switched if L/R is 7 ms. In both cases, a life of 100,000 operations can be expected.
The minimum applicable load is 10 mA (100 mA for H3CR-A8E) at 5 VDC (failure level: P).

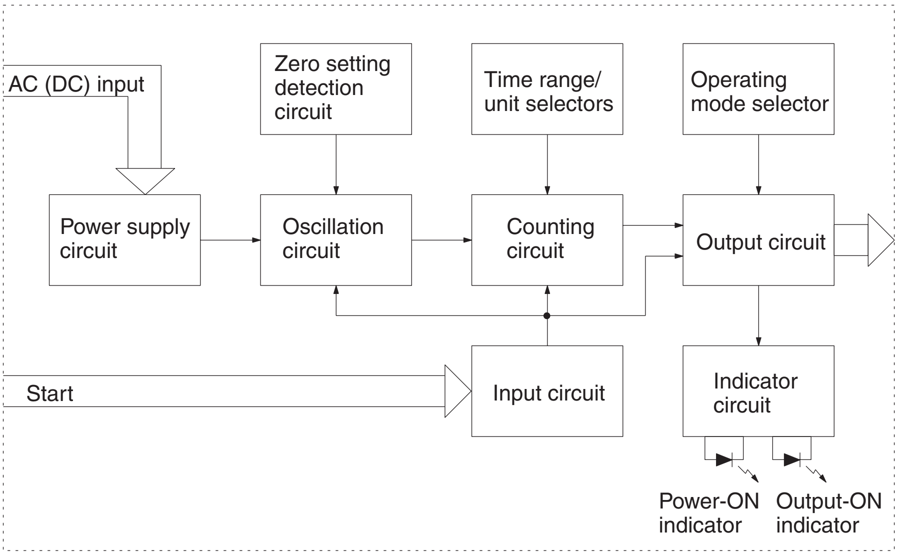
Connections

■ Block Diagrams

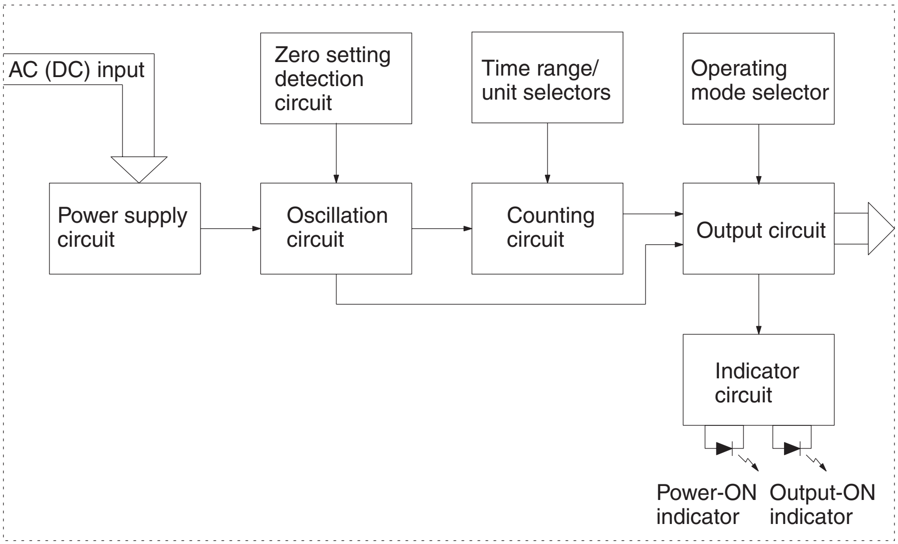
H3CR-A/AS



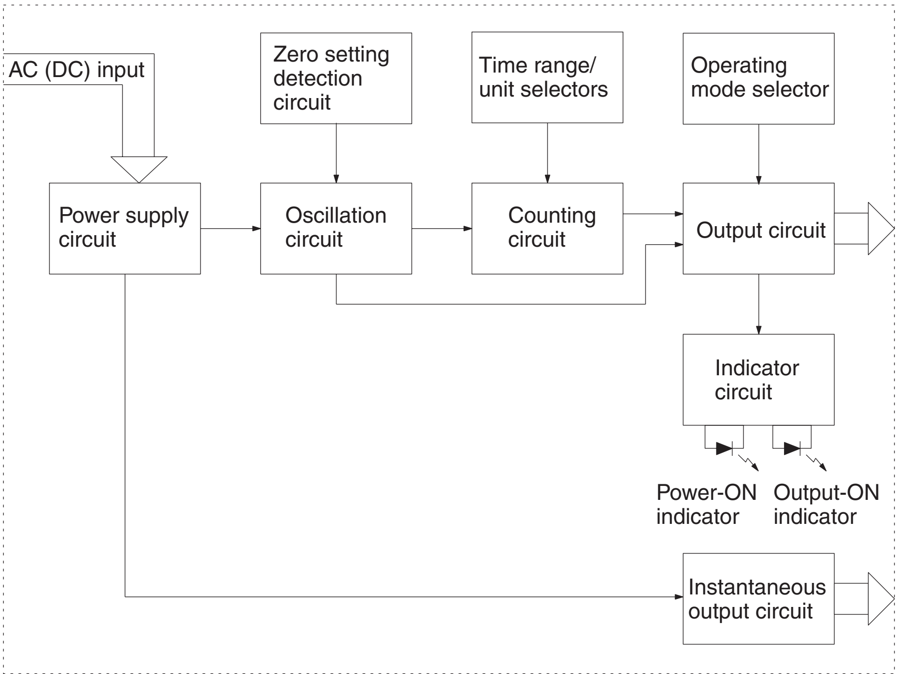
H3CR-AP



H3CR-A8/A8S



H3CR-A8E



■ I/O Functions

Inputs (for -A/ -AS models)	**Start**	Starts time-measurement.
	Reset	Interrupts time-measurement and resets time-measurement value. No time-measurement is made and control output is OFF while the reset input is ON.
	Gate	Prohibits time-measurement.
Outputs	**Control output**	Outputs are turned ON according to designated output mode when preset value is reached.

Note: H3CR-AP incorporates start input only.

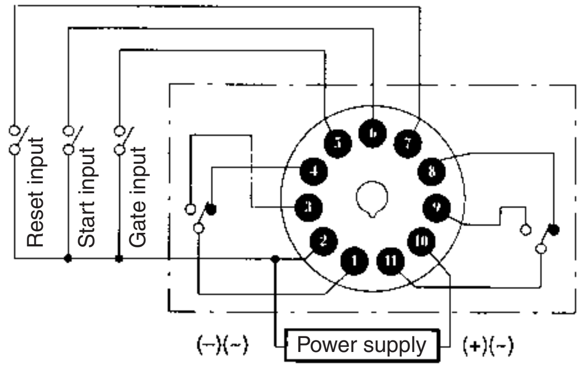
■ Terminal Arrangement

Note: The delayed contact of conventional Timers was indicated as

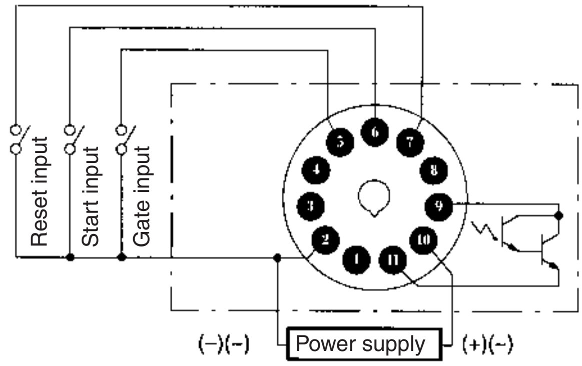
The contact symbol of the H3CR-A is indicated as because its operating mode is six multi-modes (four multi-modes for the H3CR-A8).

11-pin Models

H3CR-A/-A-300/-A-301 (Contact Output)

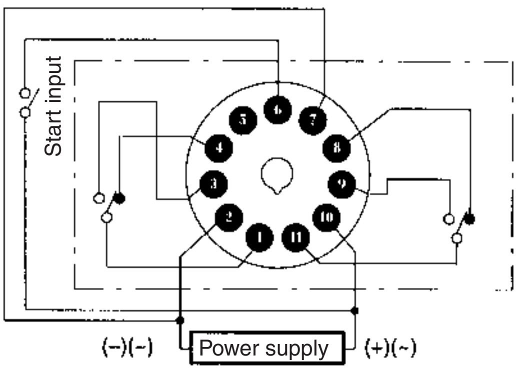


H3CR-AS (Transistor Output)



Note: Terminals 1, 3, 4, and 8 are empty. Terminals 2, 5, 6, 7, and 10 are the same as for the H3CR-A.

H3CR-AP (Contact Output)

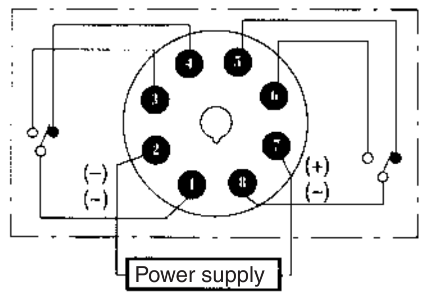


Note: 1. Terminal 5 is empty.

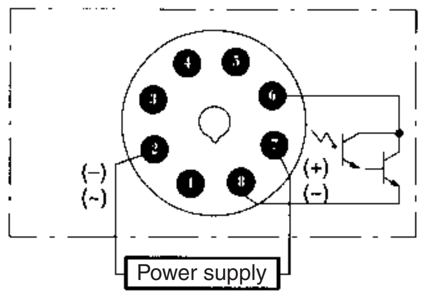
2. Separate power supplies can be used for the Timer and inputs.

8-pin Models

H3CR-A8/-A8-301 (Contact Output)

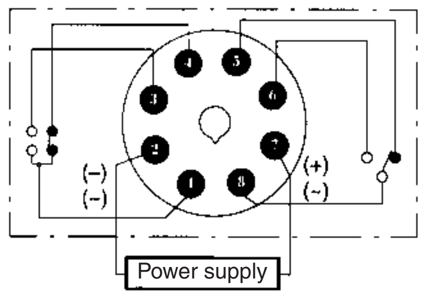


H3CR-A8S (Transistor Output)



Note: Terminals 1, 3, 4, and 5 are empty. Terminals 2 and 7 are the same as for the H3CR-A8.

H3CR-A8E (Contact Output)



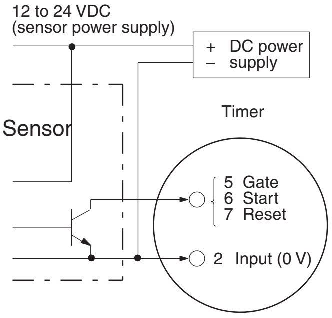
■ Input Connections

H3CR-A/-AS

The inputs of the H3CR-A/-AS are no-voltage (short-circuit or open) inputs.

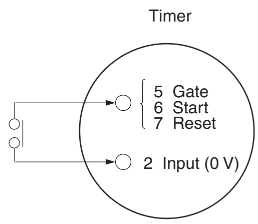
No-voltage Inputs

No-contact Input
(Connection to NPN open collector output sensor.)



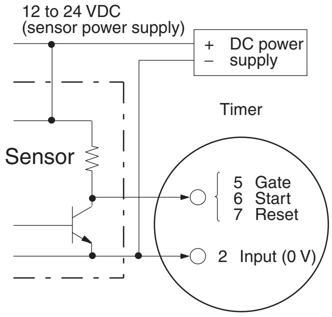
Operates with transistor ON

Contact Input



Operates with relay ON

No-contact Input
(Connection to a voltage output sensor.)



Operates with transistor ON

No-voltage Input Signal Levels

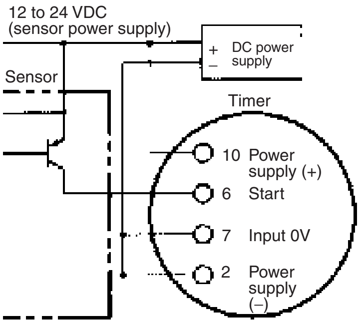
No-contact input	1. Short-circuit level Transistor ON Residual voltage: 1 V max. Impedance when ON: 1 kΩ max.
	2. Open level Transistor OFF Impedance when OFF: 100 kΩ min.
Contact input	Use contacts which can adequately switch 0.1 mA at 5 V

H3CR-AP

The start input of the H3CR-AP is voltage input. (Voltage imposition or open)

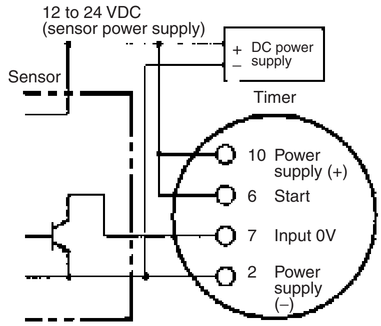
Voltage Inputs

No-contact Input
(Connection to PNP open collector output sensor)



Operates with PNP transistor ON

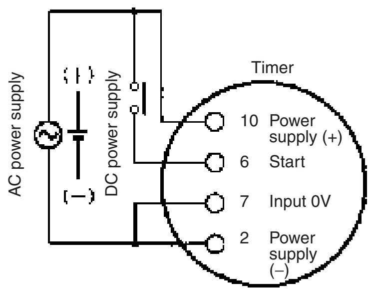
No-contact Input
(Connection to NPN open collector output sensor)



Operates with NPN transistor ON

Note: The input circuit is isolated from the power supply circuit. Thus, an NPN transistor can be connected.

Contact Input



Operates with relay ON

Note: Refer to the signal levels in the following table and be aware of the minimum applicable load of the relay.

Voltage Input Signal Levels

No-contact input	1. Transistor ON Residual voltage: 1 V max. The voltage between terminals 6 and 7 must be 10.8 VDC min.
	2. Transistor OFF Leakage current: 0.01 mA max. The voltage between terminals 6 and 7 must be 1.2 VDC max.
Contact input	Use contacts that can adequately switch 0.1 mA at each operating voltage. The voltage between terminals 6 and 7 with contacts ON or OFF must satisfy the specified value. Contacts ON 100-to-240-VAC and 100-to-125-VDC models: 85 to 264 VAC or 85 to 137.5 VDC 24-to-48-VAC and 12-to-48-VDC models: 20.4 to 52.8 VAC or 10.8 to 52.8 VDC Contacts OFF 100-to-240-VAC and 100-to-125-VDC models: 0 to 10 VAC or 0 to 10 VDC 24-to-48-VAC and 12-to-48-VDC models: 0 to 2.4 VAC or 0 to 1.2 VDC

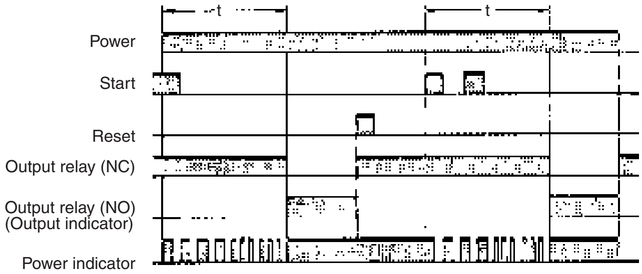
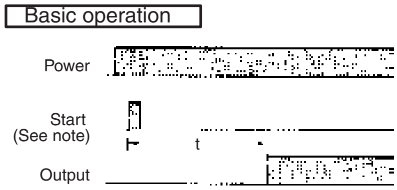
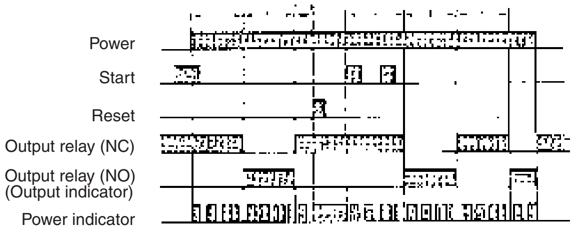
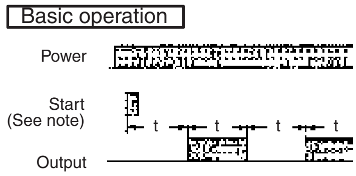
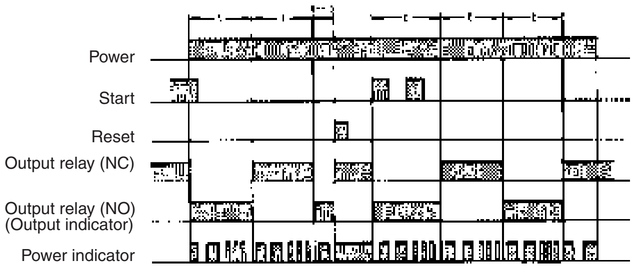
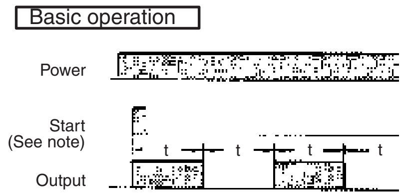
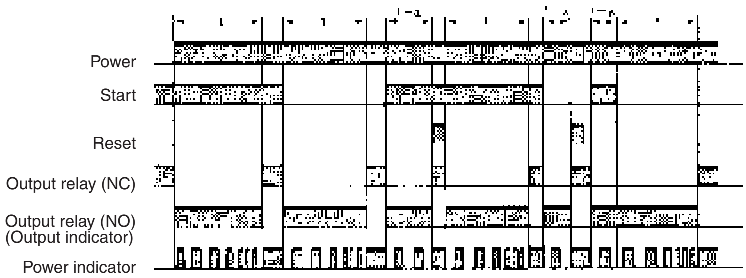
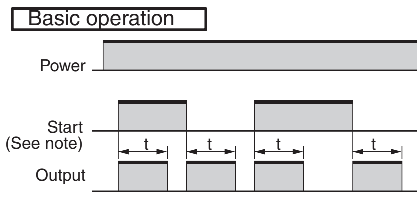
Operation

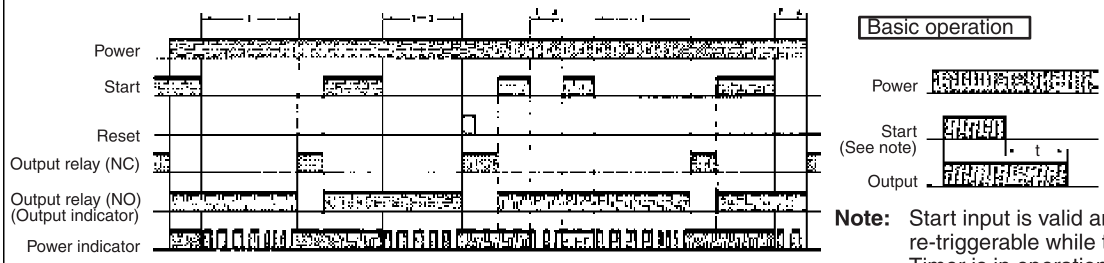
■ Timing Chart

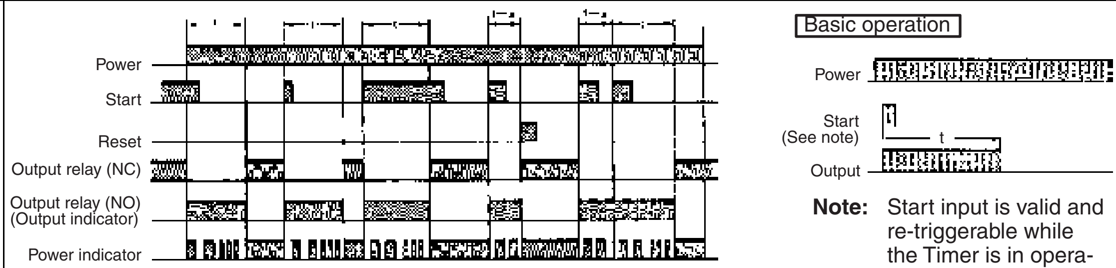
Note: 1. The minimum power-opening time ("Rt") is 0.1 s.
2. The minimum input pulse width (for start, reset) is 0.05 s.
3. The letter "t" in the timing charts stands for the set time and "t–a" means that the period is less than the time set.
4. Power supply start in mode J is also possible for H3CR-A8/-A8E/-A8S/-A8-301 models.

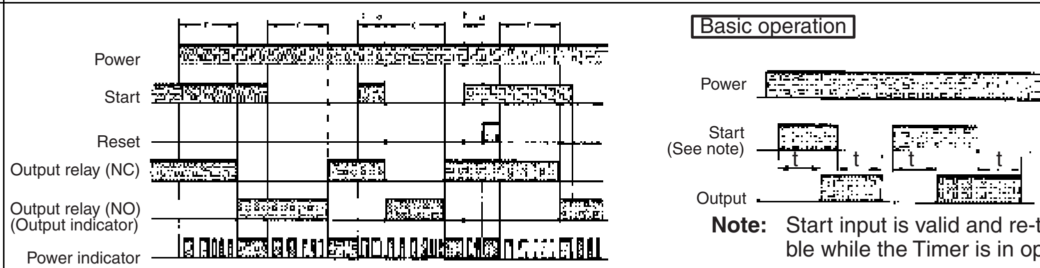
H3CR-A/-AS/-AP*

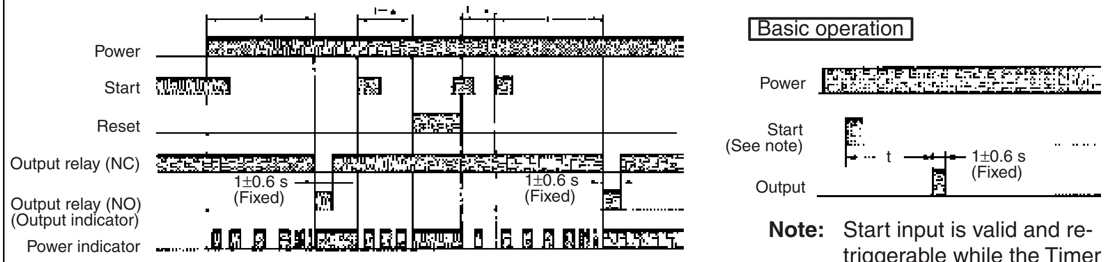
*H3CR-AP model incorporates start input only.

Operating mode	Timing chart
A: ON-delay	  **Note:** Start input is invalid while the Timer is in operation.
B: Flicker OFF start	  **Note:** Start input is invalid while the Timer is in operation.
B2: Flicker ON start	  **Note:** Start input is invalid while the Timer is in operation.
C: Signal ON/ OFF- delay	  **Note:** Start input is valid and re-triggerable while the Timer is in operation.

<table>
<tr><th>Operating mode</th><th>Timing chart</th></tr>
<tr><td>D:
Signal OFF-delay</td><td>


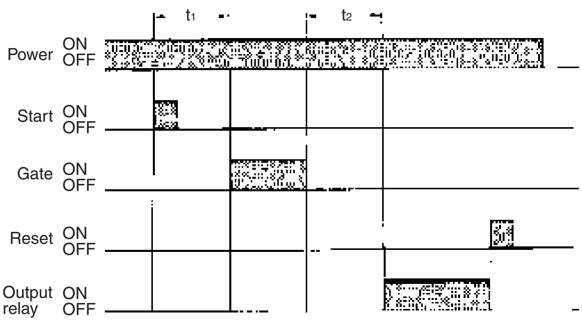
Note: Start input is valid and re-triggerable while the Timer is in operation.</td></tr>
<tr><td>E:
Interval</td><td>


Note: Start input is valid and re-triggerable while the Timer is in operation.</td></tr>
<tr><td>G:
Signal ON/ OFF-delay</td><td>


Note: Start input is valid and re-triggerable while the Timer is in operation.</td></tr>
<tr><td>J:
One-shot output</td><td>


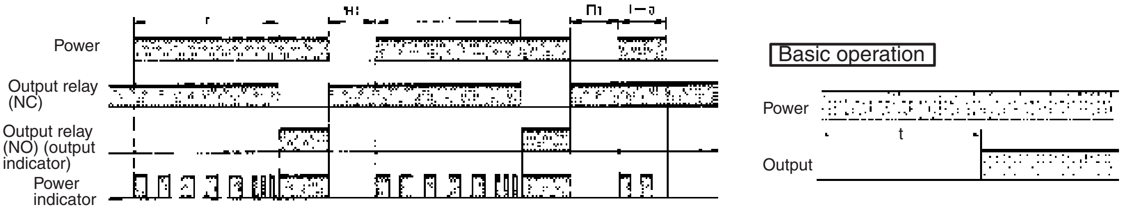
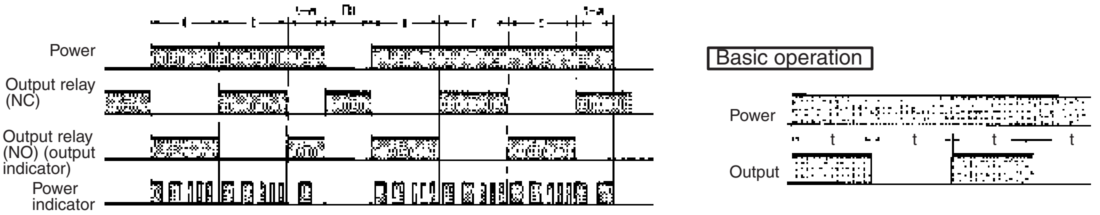
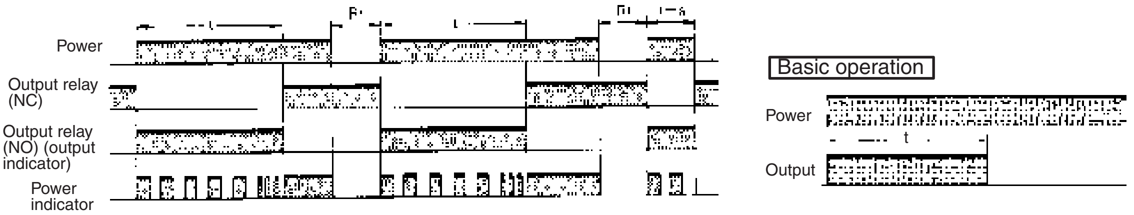
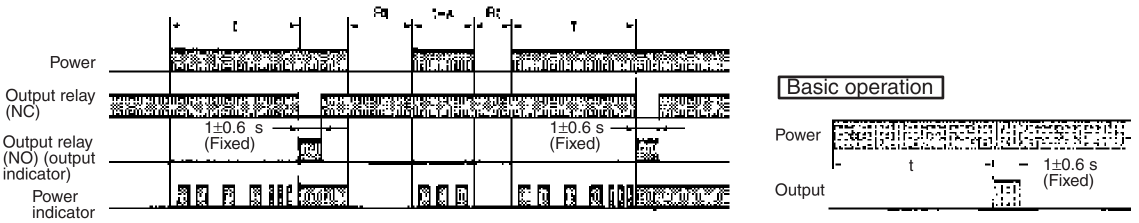
Note: Start input is valid and re-triggerable while the Timer is in operation.</td></tr>
</table>

Gate Signal Input



Note:
1. This timing chart indicates the gate input in operating mode A (ON-delay operation).
2. The set time is the sum of t_1 and t_2.
3. H3CR-AP model incorporates start input only.

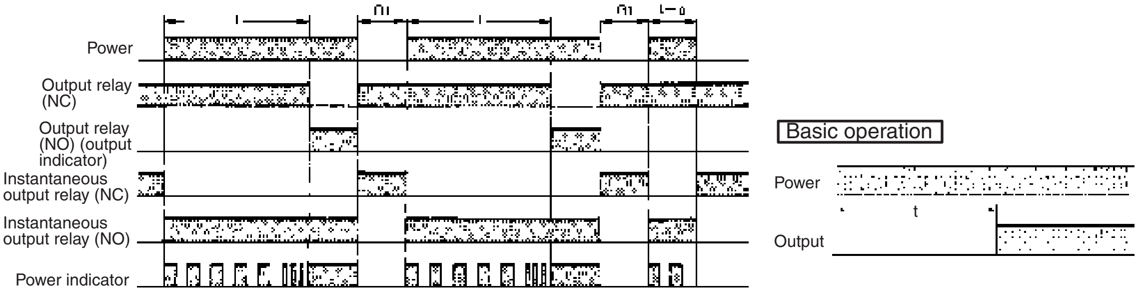
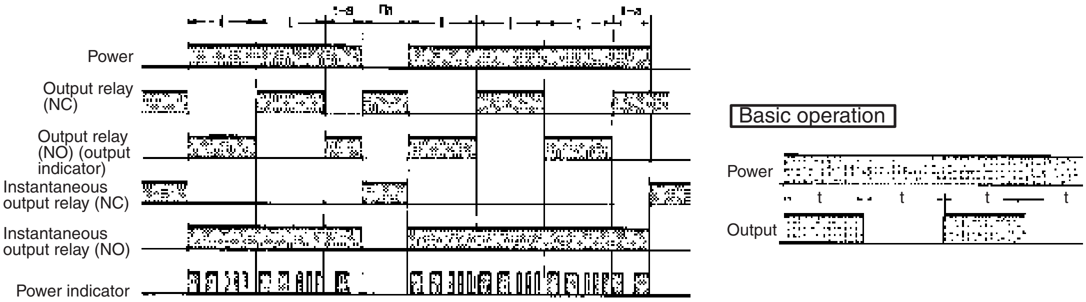
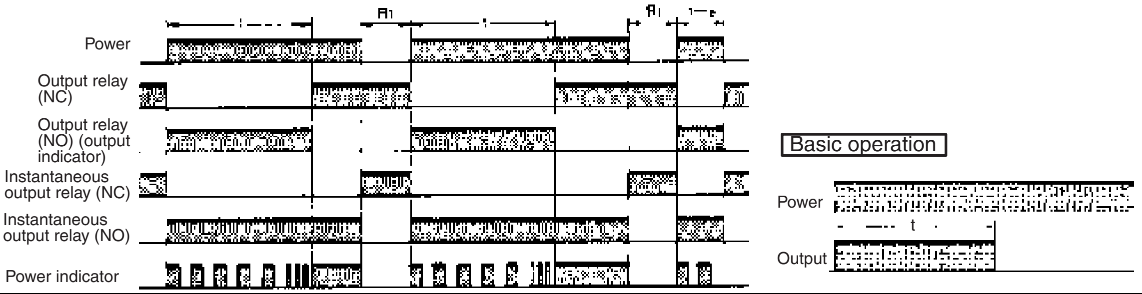
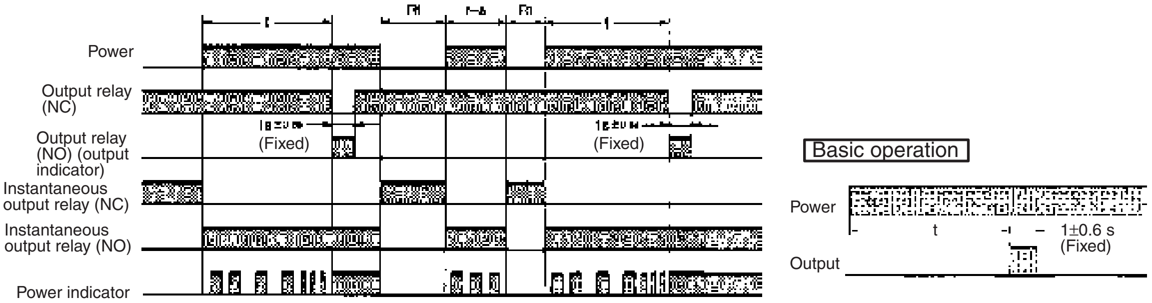
H3CR-A8/-A8S

Operating mode	Timing chart
A: ON-delay	
B_2: Flicker ON start	
E: Interval	
J: One-shot output	

Note: 1. The minimum power-opening time (“Rt”) is 0.1 s.

2. The letter “t” in the timing charts stands for the set time and “t–a” means that the period is less than the time set.

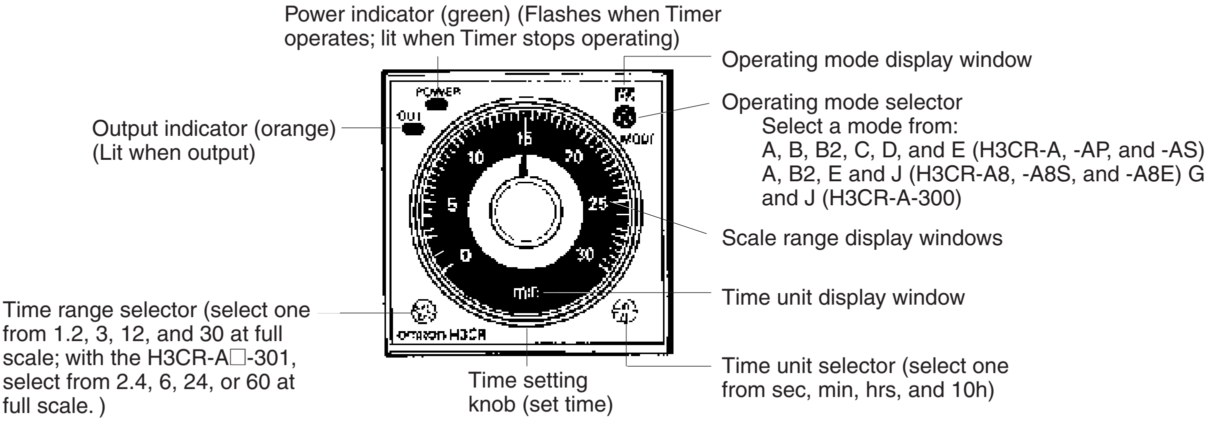
H3CR-A8E

Operating mode	Timing chart
A: ON-delay	
B_2: Flicker ON start	
E: Interval	
J: One-shot output	

Note: 1. The minimum power-opening time (“Rt”) is 0.1 s.

2. The letter “t” in the timing charts stands for the set time and “t–a” means that the period is less than the time set.

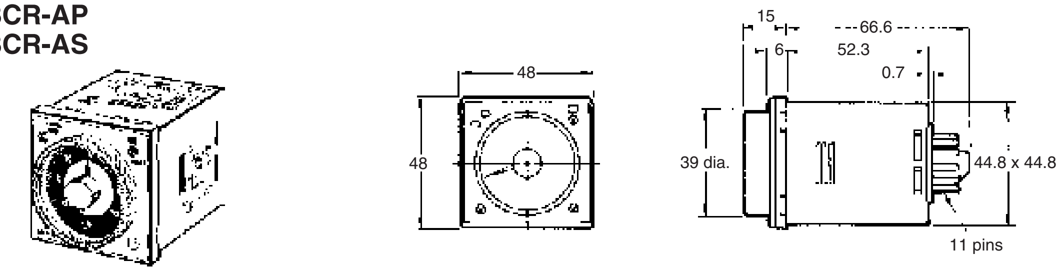
Nomenclature



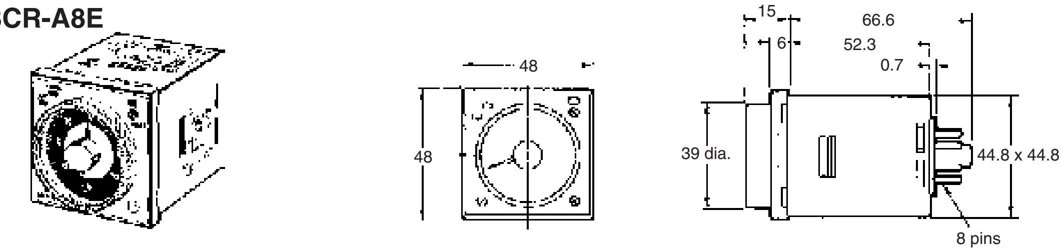
Dimensions

Note: All units are in millimeters unless otherwise indicated.

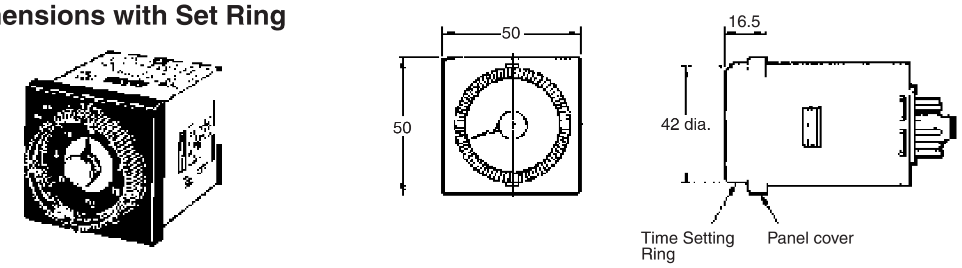
H3CR-A
H3CR-AP
H3CR-AS



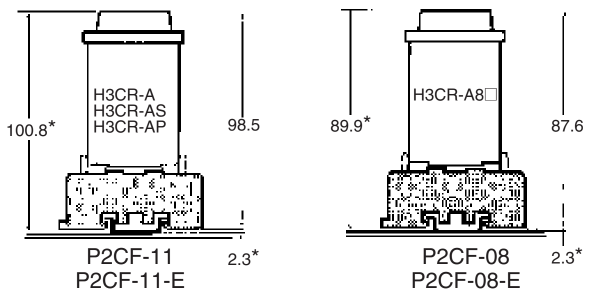
H3CR-A8
H3CR-A8S
H3CR-A8E



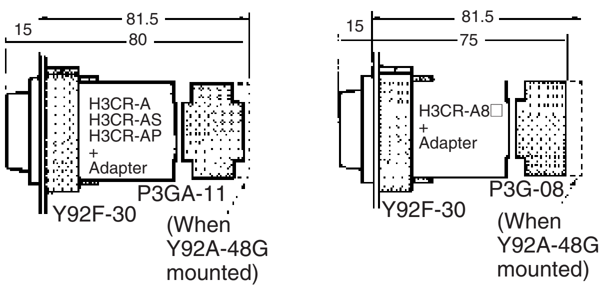
Dimensions with Set Ring



Dimensions with Front Connecting Socket P2CF-08-□/P2CF-11-□



Dimensions with Back Connecting Socket P3G-08/P3GA-11



*These dimensions vary with the kind of DIN-rail (reference value).

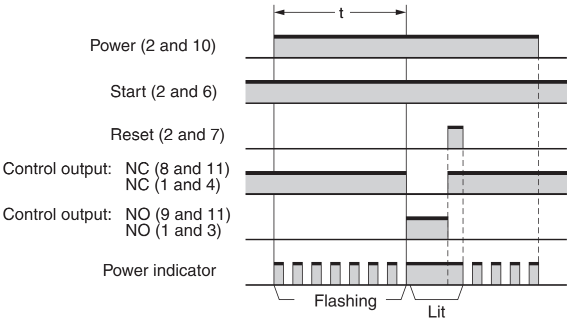
Application Examples (H3CR-A)

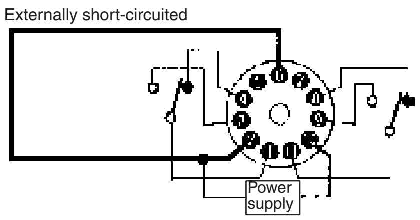
A Mode: ON-delay

ON-delay operation (A mode) is a basic mode.

1. Power-ON Start/Power-OFF Reset

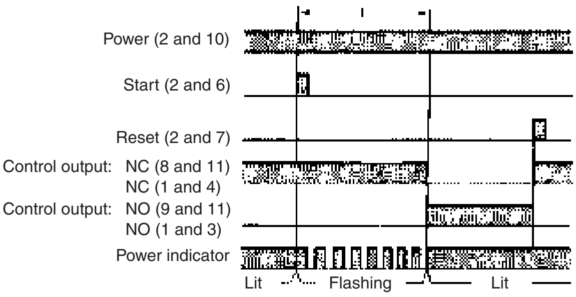
The Power-ON start/Power-OFF reset operation is a standard operating method.

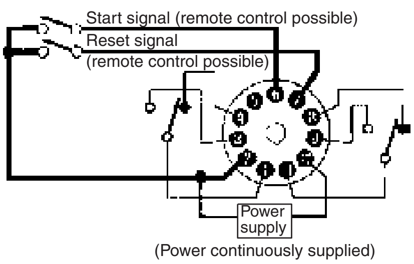




2. Signal Start/Signal Reset

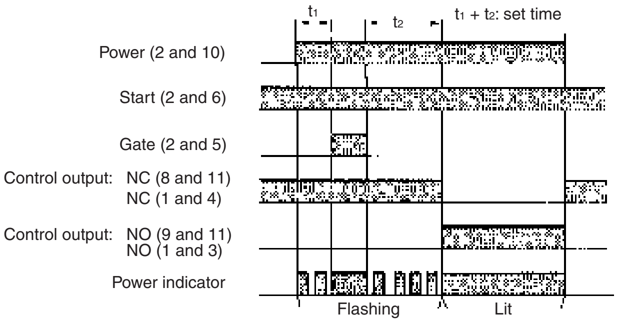
The Signal start/Signal reset operation is useful for remote control of the Timer.



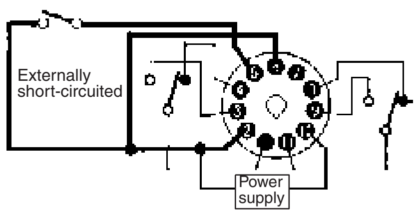


3. Control of Integrated Time with Gate Signal

With a gate signal, the Power-ON start operation and Signal start operation can be controlled (the operation can be interrupted).



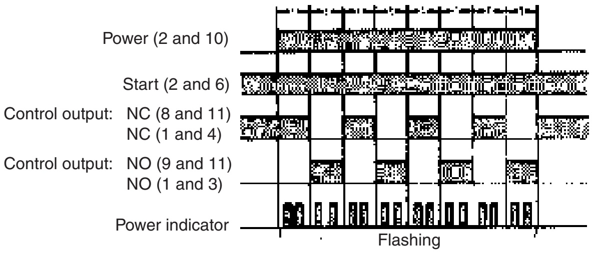
Gate signal (The operation is interrupted with the gate signal if the Timer detects an abnormal signal.)

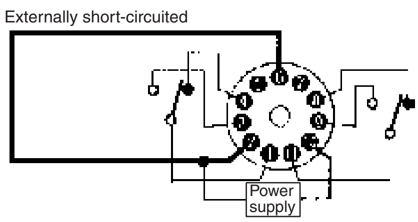


B/B2 Mode: Flicker

The flicker operation in the B and B2 modes can be effectively applied to lamp or buzzer (ON and OFF) alarms or the monitoring of an intermittent operation with a display.

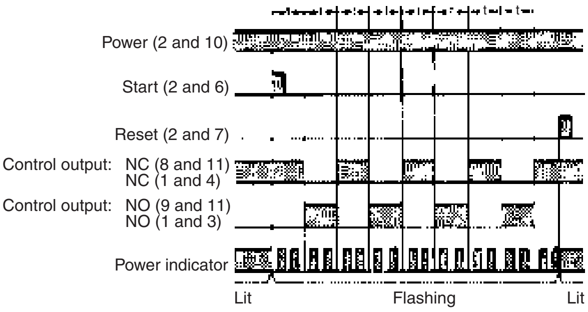
1. Power-ON Start/Power-OFF Reset (in B Mode)

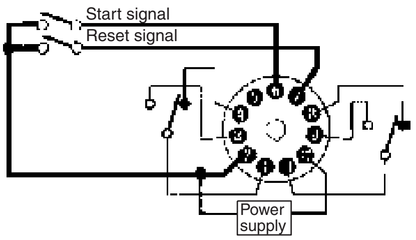




2. Signal Start/Signal Reset (in B Mode)

If there is an abnormal signal, flashing starts. When the abnormal condition is restored, a reset signal stops the display flashing.





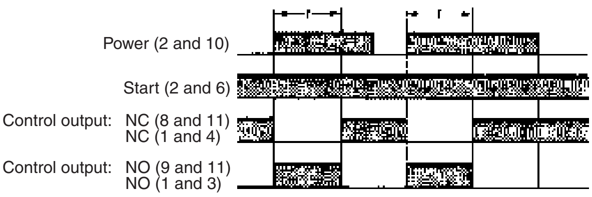
(Power continuously supplied)

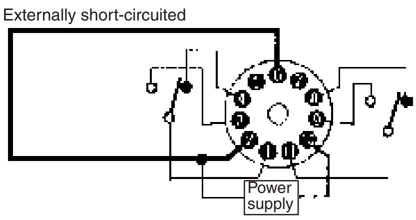
C Mode: Signal ON/OFF-delay

The Signal ON-/OFF-delay operation (C mode) is useful for the control of distribution of products on a production line into boxes by the specified number or time.

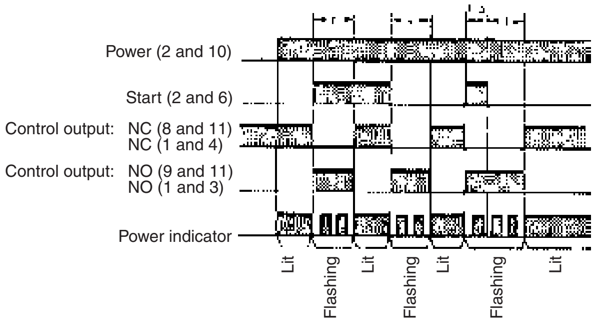
1. Power-ON Start/Instantaneous Operation/ Time-limit Reset

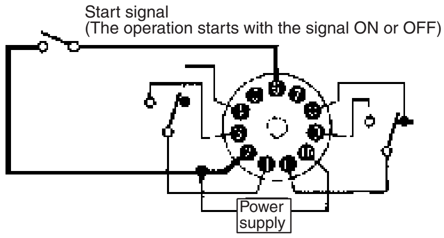
A set of these functions is useful for the operation of a machine for a specified period when power is ON.





2. Signal-ON-OFF Start/Instantaneous Operation/Time-limit Reset



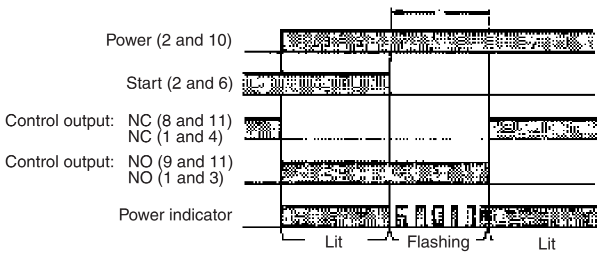


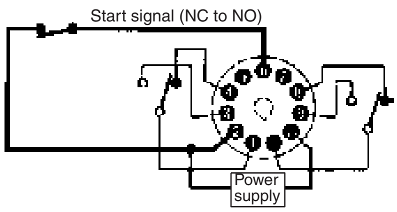
(Power continuously supplied)

D Mode: Signal OFF-delay

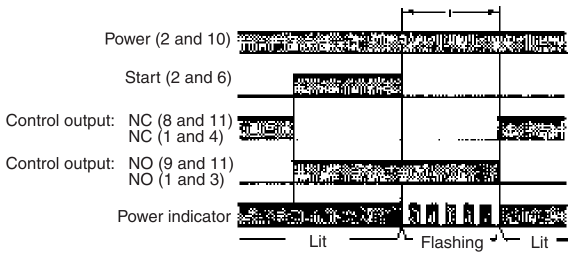
Signal OFF-delay operation (D mode) can be effectively used to keep a load operating for a certain period. For example, this function enables the cooling fan for a lamp or heater to operate for a certain period after the lamp or heater is switched OFF.

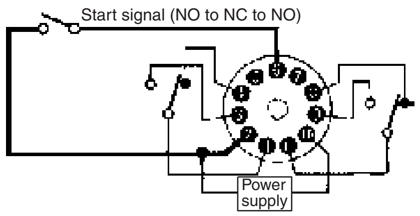
1. Power-ON Start/Instantaneous Operation/ Time-limit Reset





2. Signal Start/Instantaneous Operation/ Time-limit Reset



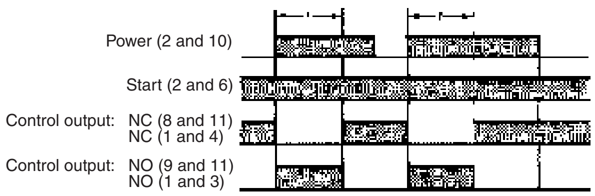


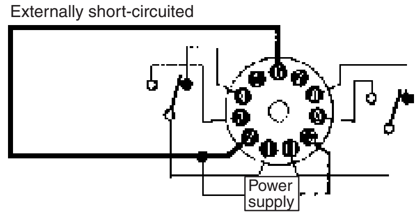
(Power continuously supplied)

E Mode: Interval

1. Power-ON Start/Instantaneous Operation/ Time-limit Reset

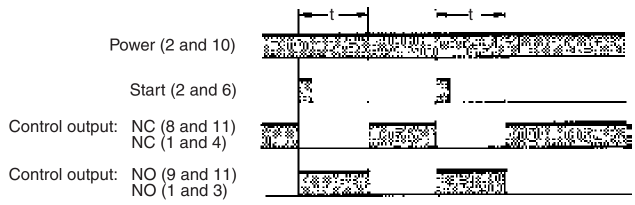
This function is useful for the operation of a machine for a specified period after power is ON.

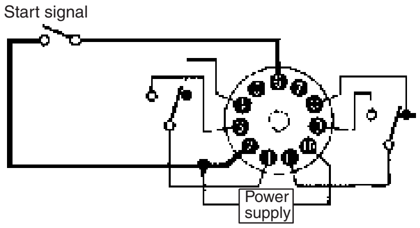




2. Signal Start/Instantaneous Operation/ Time-limit Reset

This function is useful for the repetitive control such as the filling of liquid for a specified period after each Signal start input.





(Power continuously supplied)

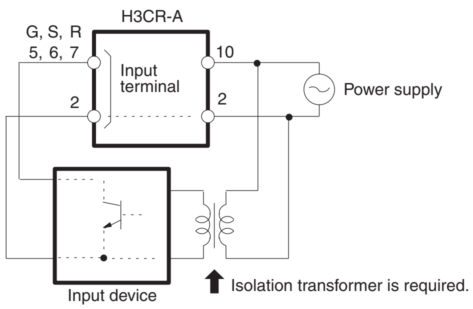
Safety Precautions (H3CR-A)

Note: The undermentioned is common for all H3CR-A models.

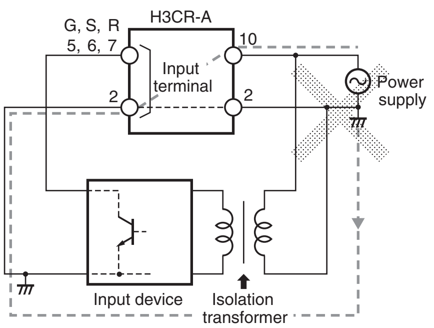
■ Power Supplies

For the power supply of an input device of the H3CR-A□/-A□S/-AP, use an isolating transformer with the primary and secondary windings mutually isolated and the secondary winding not grounded.

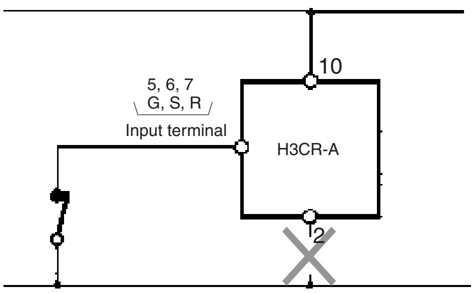
Correct



Incorrect



The H3CR-A□/-A□S/AP's power supply terminal 2 is a common terminal for input signals to the Timer. Do not disconnect the wires on terminal 2, otherwise the internal circuitry of the Timer will be damaged.



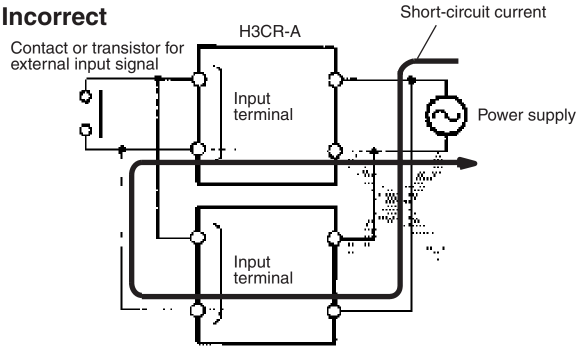
Make sure that the voltage is applied within the specified range, otherwise the internal elements of the Timer may be damaged.

■ Input/Output

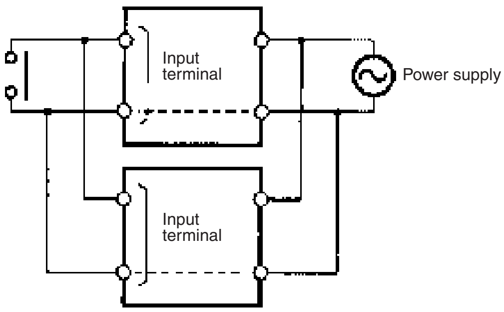
Relationship between Input and Power Supply Circuits (except for H3CR-A8E)

The H3CR-A (except for H3CR-A8E) uses transformerless power supply. When connecting a relay or transistor as an external signal input device, pay attention to the following points to prevent short-circuiting due to a sneak current to the transformerless power supply. If a relay or transistor is connected to two or more Timers, the input terminals of those Timers must be wired properly so that they will not differ in phase, otherwise the terminals will be short-circuited to one another.

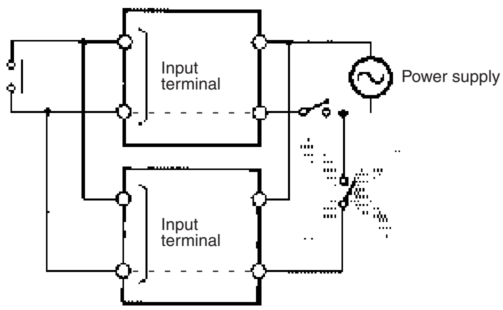
Incorrect



Correct



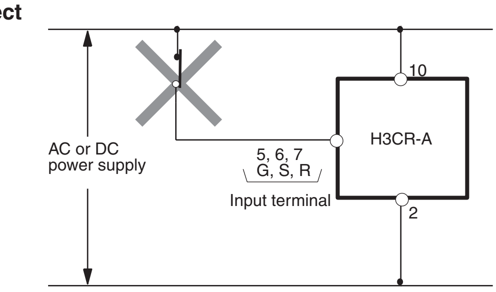
It is impossible to provide two independent power switches as shown below regardless of whether or not the Timers are different in phase.



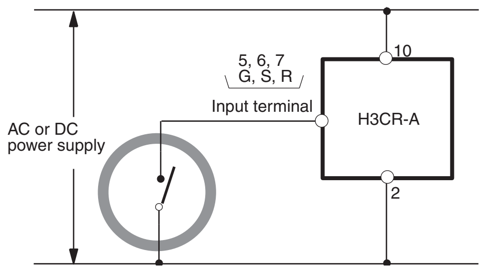
Relationship between Input and Power Supply Circuits (H3CR-A□/-A□S)

An appropriate input is applied to the input signal terminals of the H3CR-A□/-A□S when one of the input terminals is short-circuited with the common terminal (terminal 2) for the input signals. Never use terminal 10 as the common terminal for this purpose, otherwise the internal circuit of the Timer will be damaged.

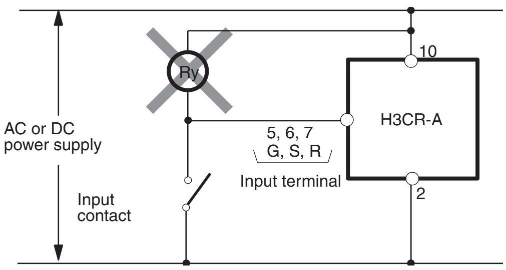
Incorrect



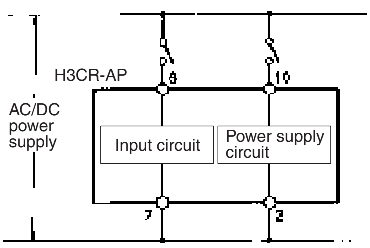
Correct



Do not connect a relay or any other load between input terminals, otherwise the internal circuit of the Timer will be damaged due to the high-tension voltage applied to the input terminals.



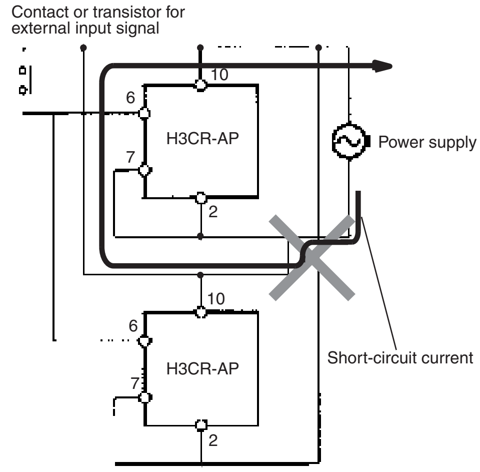
Relationship between Input and Power Supply Circuits (H3CR-AP)



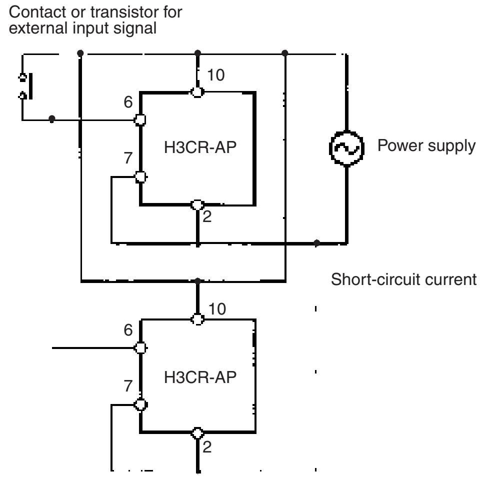
Since the input circuit and the power supply circuit are configured independently, the input circuit can be turned ON or OFF irrespective of the ON/OFF state of the power supply.
It must be noted that a voltage equivalent to the power supply voltage is applied to the input circuit.

If a relay or transistor is connected to two or more Timers, the input terminals of those Timers must be wired properly so that they will not be different in phase or the terminals will be short-circuited to one another (refer to the figures below).

Incorrect



Correct



Common to All H3CR-A Models

With the H3CR-AP, input wires must be as short as possible. If the floating capacity of wires exceeds 1,200 pF (approx. 10 m for cables with 120 pF/m), the operation will be affected. Pay particular attention when using shielded cables.

The H3CR-A□S transistor output is isolated from the internal circuitry by a photocoupler. Therefore, either NPN or PNP output is possible.

Solid-state Twin Timer

H3CR-F

DIN 48 x 48-mm Twin Timers

- Wide power supply ranges of 100 to 240 VAC and 48 to 125 VDC respectively.
- ON- and OFF-times can be set independently and so combinations of long ON- or OFF-time and short OFF- or ON-time settings are possible.
- Fourteen time ranges from 0.05 s to 30 h or from 1.2 s to 300 h depending on the model to be used.
- Models with a flicker ON start or flicker OFF start are available.
- Easy sequence checks through instantaneous outputs for a zero set value at any time range.
- Length, when panel-mounted with a Socket, of 80 mm or less.
- 11-pin and 8-pin models are available.

Model Number Structure

■ Model Number Legend

H3CR - F □ □ - □ □
1 2 3 4 5

1. Classification
F: Twin timers

2. Configuration
None: 11-pin socket
8: 8-pin socket

3. Twin Timer Mode
None: Flicker OFF start
N: Flicker ON start

4. Time Range
None: 0.05 s to 30 h models
300: 1.2 s to 300 h models

5. Supply Voltage
100-240AC: 100 to 240 VAC
24AC/DC: 24 VAC/VDC
12DC: 12 VDC
48-125DC: 48 to 125 VDC

Ordering Information

■ List of Models

Operating modes	Supply voltage	0.05 s to 30 h models		1.2 s to 300 h models	
		11-pin models	8-pin models	11-pin models	8-pin models
Flicker OFF start	100 to 240 VAC	H3CR-F 100-240AC	H3CR-F8 100-240AC	H3CR-F-300 100-240AC	H3CR-F8-300 100-240AC
	24 VAC/DC	H3CR-F 24AC/DC	H3CR-F8 24AC/DC	H3CR-F-300 24AC/DC	H3CR-F8-300 24AC/DC
	12 VDC	H3CR-F 12DC	H3CR-F8 12DC	H3CR-F-300 12DC	H3CR-F8-300 12DC
	48 to 125 VDC	H3CR-F 48-125DC	H3CR-F8 48-125DC	H3CR-F-300 48-125DC	H3CR-F8-300 48-125DC
Flicker ON start	100 to 240 VAC	H3CR-FN 100-240AC	H3CR-F8N 100-240AC	H3CR-FN-300 100-240AC	H3CR-F8N-300 100-240AC
	24 VAC/DC	H3CR-FN 24AC/DC	H3CR-F8N 24AC/DC	H3CR-FN-300 24AC/DC	H3CR-F8N-300 24AC/DC
	12 VDC	H3CR-FN 12DC	H3CR-F8N 12DC	H3CR-FN-300 12DC	H3CR-F8N-300 12DC
	48 to 125 VDC	H3CR-FN 48-125DC	H3CR-F8N 48-125DC	H3CR-FN-300 48-125DC	H3CR-F8N-300 48-125DC

■ Accessories (Order Separately)

Name/specifications		Models
Flush Mounting Adapter		Y92F-30
		Y92F-73
		Y92F-74
Mounting DIN-rail	**50 cm (ℓ) x 7.3 mm (t)**	PFP-50N
	1 m (ℓ) x 7.3 mm (t)	PFP-100N
	1 m (ℓ) x 16 mm (t)	PFP-100N2
End Plate		PFP-M
Spacer		PFP-S
Protective Cover		Y92A-48B
DIN-rail Mounting/ Front Connecting Socket	**8-pin**	P2CF-08
	8-pin, finger safe type	P2CF-08-E
	11-pin	P2CF-11
	11-pin, finger safe type	P2CF-11-E
Back Connecting Socket	**8-pin**	P3G-08
	8-pin, finger safe type	P3G-08 with Y92A-48G (See note 1)
	11-pin	P3GA-11
	11-pin, finger safe type	P3GA-11 with Y92A-48G (See note 1)
Hold-down Clip (See note 2)	**For PL08 and PL11 Sockets**	Y92H-7
	For PF085A Socket	Y92H-8

Note: 1. Y92A-48G is a finger safe terminal cover which is attached to the P3G-08 or P3GA-11 Socket.
2. Hold-down Clips are sold in sets of two.

Specifications

■ General

Item	H3CR-F	H3CR-F8	H3CR-FN	H3CR-F8N
Operating mode	Flicker OFF start		Flicker ON start	
Pin type	11-pin	8-pin	11-pin	8-pin
Operating/Reset method	Time-limit operation/Time-limit reset or self-reset			
Output type	Relay output (DPDT)			
Mounting method	DIN-rail mounting, surface mounting, and flush mounting			
Approved standards	UL508, CSA C22.2 No.14, NK, Lloyds Conforms to EN61812-1 and IEC60664-1 (VDE0110) 4kV/2. Output category according to EN60947-5-1.			

■ Time Ranges

0.05 s to 30 h Models

Time unit		s (sec)	x10 s (10 s)	min (min)	h (hrs)
Setting	1.2	0.05 to 1.2	1.2 to 12	0.12 to 1.2	
	3	0.3 to 3	3 to 30	0.3 to 3	
	12	1.2 to 12	12 to 120	1.2 to 12	
	30	3 to 30	30 to 300	3 to 30	

Note: Instantaneous output is available at any time range. To obtain instantaneous output, set to below 0.

1.2 s to 300 h Models

Time unit		x10 s (10 s)	x10 min (10 min)	h (hrs)	x10 h (10 h)
Setting	1.2	1.2 to 12	1.2 to 12	0.12 to 1.2	1.2 to 12
	3	3 to 30	3 to 30	0.3 to 3	3 to 30
	12	12 to 120	12 to 120	1.2 to 12	12 to 120
	30	30 to 300	30 to 300	3 to 30	30 to 300

Note: Instantaneous output is available at any time range. To obtain instantaneous output, set to below 0.

Ratings

Rated supply voltage (See note)	100 to 240 VAC (50/60 Hz),12 VDC, 24 VAC/DC (50/60 Hz), 48 to 125 VDC
Operating voltage range	85% to 110% of rated supply voltage; 90% to 110% with 12-VDC models
Power reset	Minimum power-opening time: 0.1 s
Power consumption	100 to 240 VAC: approx. 10 VA (2.1 W) at 240 VAC 24 VAC/VDC: approx. 2 VA (1.7 W) at 24 VAC approx. 1 W at 24 VDC 48 to 125 VDC: approx. 1.5 W at 125 VDC 12 VDC: approx. 1 W at 12 VDC
Control outputs	Contact output: 5 A at 250 VAC/30 VDC, resistive load (cosϕ = 1)

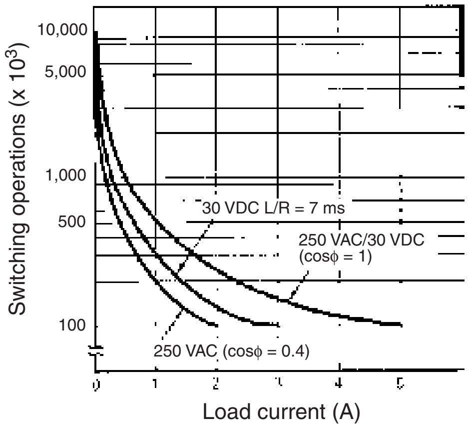
Note: A power supply with a ripple of 20% max. (single-phase power supply with full-wave rectification) can be used with each DC Model.

Characteristics

Accuracy of operating time	±0.2% FS max. (±0.2% FS ±10 ms max. in ranges of 1.2 and 3 s)
Setting error	±5% FS ±50 ms max.
Reset time	0.1 s max.
Reset voltage	10% max. of rated voltage
Influence of voltage	±0.2% FS max. (±0.2% FS ±10 ms max. in ranges of 1.2 and 3 s)
Influence of temperature	±1% FS max. (±1% FS ±10 ms max. in ranges of 1.2 and 3s)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min (between current-carrying metal parts and exposed non-current-carrying metal parts) 2,000 VAC, 50/60 Hz for 1 min (between control output terminals and operating circuit) 2,000 VAC, 50/60 Hz for 1 min (between contacts of different polarities) 1,000 VAC, 50/60 Hz for 1 min (between contacts not located next to each other)
Impulse withstand voltage	3 kV (between power terminals) for 100 to 240 VAC, 48 to 125 VDC 1 kV for 12 VDC, 24 VAC/DC 4.5 kV (between current-carrying terminal and exposed non-current-carrying metal parts) for 100 to 240 VAC, 48 to 125 VDC 1.5 kV for 12 VDC, 24 VAC/DC
Noise immunity	±1.5 kV (between power terminals), square-wave noise by noise simulator (pulse width: 100 ns/1 µs, 1-ns rise) ±400 V for 12 VDC
Static immunity	Malfunction: 8 kV Destruction: 15 kV
Vibration resistance	Destruction: 10 to 55 Hz with 0.75-mm single amplitude for 2 hrs each in three directions Malfunction: 10 to 55 Hz with 0.5-mm single amplitude for 10 min each in three directions
Shock resistance	Destruction: 980 m/s^2 three times each in six directions Malfunction: 98 m/s^2 three times each in six directions
Ambient temperature	Operating: −10°C to 55°C (with no icing) Storage: −25°C to 65°C (with no icing)
Ambient humidity	Operating: 35% to 85%
Life expectancy	Mechanical: 20 million operations min. (under no load at 1,800 operations/h) Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 1,800 operations/h) (See note)
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A (EMS) EN61812-1 Immunity ESD: IEC61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: IEC61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity RF-interference from Pulse-modulated Radio Waves: IEC61000-4-3: 10 V/m (900±5 MHz) (level 3) Immunity Conducted Disturbance: IEC61000-4-6: 10 V (0.15 to 80 MHz) (level 3) Immunity Burst: IEC61000-4-4: 2 kV power-line (level 3) 2 kV I/O signal-line (level 4) Immunity Surge: IEC61000-4-5: 1 kV line to line (level 3) 2 kV line to ground (level 3)
Case color	Light Gray (Munsell 5Y7/1)
Degree of protection	IP40 (panel surface)
Weight	Approx. 100 g

Note: Refer to the *"Life-test Curve" on page C-108.*

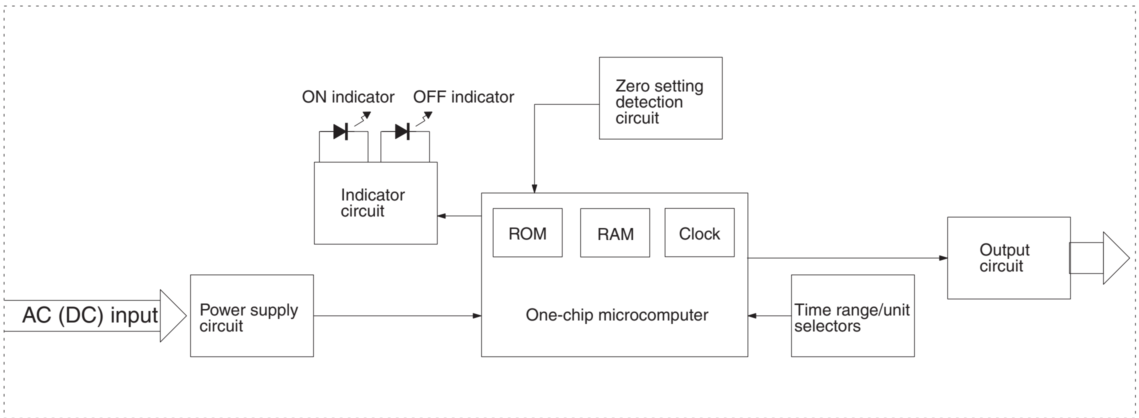
■ Life-test Curve



Reference: A maximum current of 0.15 A can be switched at 125 VDC (cosϕ = 1) and a maximum current of 0.1 A can be switched if L/R is 7 ms. In both cases, a life of 100,000 operations can be expected.
The minimum applicable load is 10 mA at 5 VDC (failure level: P).

Connections

■ Block Diagrams

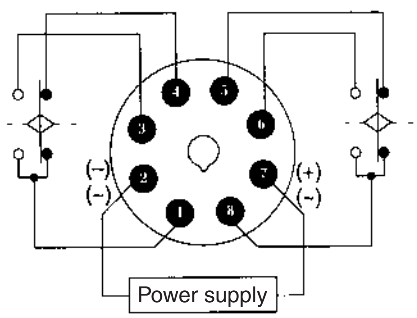


■ I/O Functions

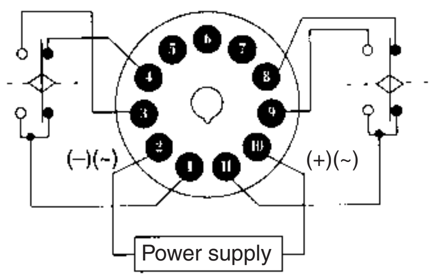
Inputs		---
Outputs	**Control output**	Outputs are turned ON/OFF according to the time set by the ON- and OFF-time setting knob.

■ Terminal Arrangement

H3CR-F8
H3CR-F8
NH3CR-F8-300
H3CR-F8N-300



H3CR-F
H3CR-FN
H3CR-F-300
H3CR-FN-300

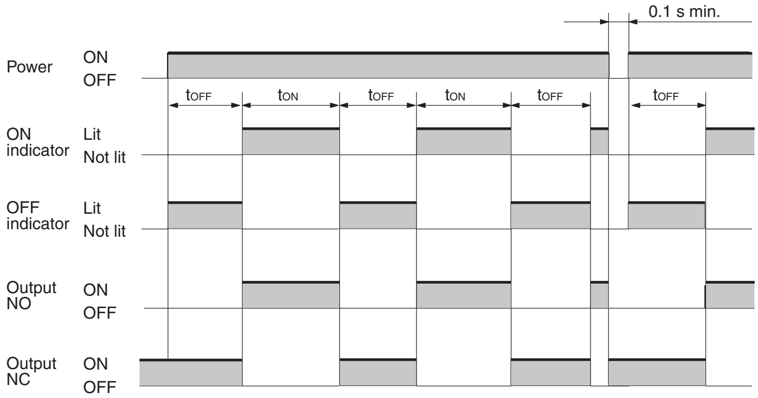
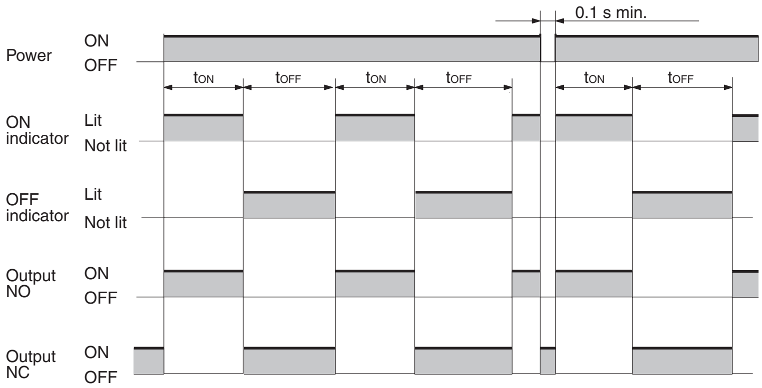


Note: Leave terminals 5, 6, and 7 open.
Do not use them as relay terminals.

Operation

■ Timing Chart

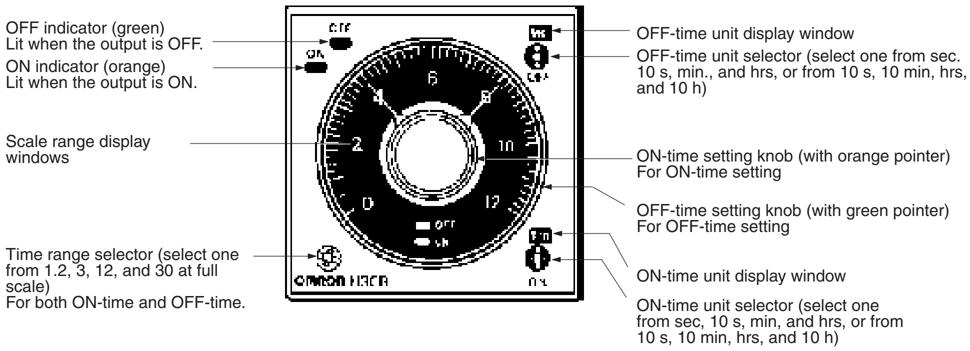
t_{ON}: ON set time
t_{OFF}: OFF set time

Operating mode	Timing chart
Flicker OFF start	
Flicker ON start	

Note: 1. The reset time requires a minimum of 0.1 s.

2. When power is supplied in flicker ON start mode, the OFF indicator lights momentarily. This, however, has no effect on the performance of the Timer.

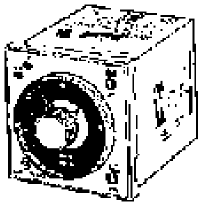
Nomenclature

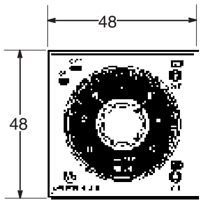


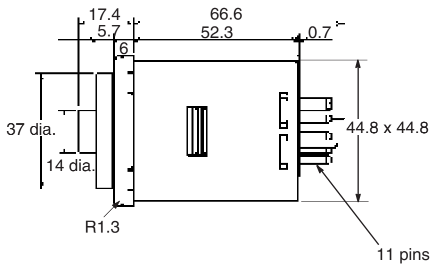
Dimensions

Note: All units are in millimeters unless otherwise indicated.

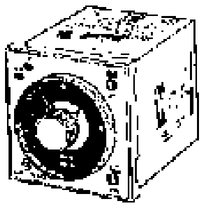
H3CR-F
H3CR-FN
H3CR-F-300
H3CR-FN-300

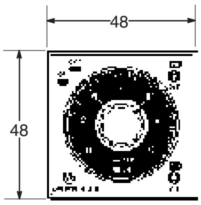


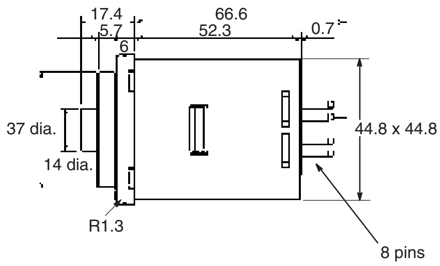




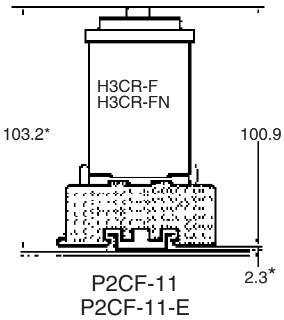
H3CR-F8
H3CR-F8N
H3CR-F8-300
H3CR-F8N-300

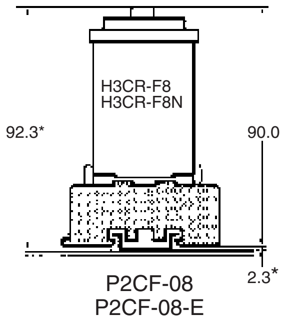




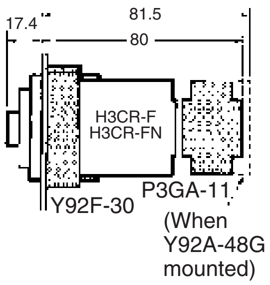


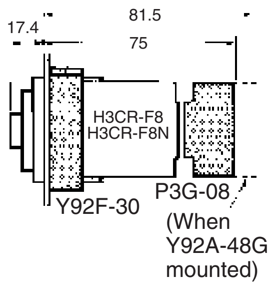
Dimensions with Front Connecting Socket
P2CF-08-□/P2CF-11-□





Dimensions with Back Connecting Socket
P3G-08/P3GA-11





*These dimensions vary with the kind of DIN-rail (reference value).

Solid-state Star-delta Timer

H3CR-G

DIN 48 x 48-mm Star-delta Timer

- A wide star-time range (up to 120 seconds) and star-delta transfer time range (up to 0.5 seconds).

Model Number Structure

■ Model Number Legend

H3CR - G 8 □ L □
1 2 3 4 5

1. Classification
G: Star-delta timer

2. Configuration
8: 8-pin socket

3. Outputs
None: Star-delta operation contact
E: Star-delta operation contact and instantaneous contact

4. Dimensions
L: Long-body model

5. Supply Voltage
100-120AC: 100 to 120 VAC
200-240AC: 200 to 240 VAC

Ordering Information

■ List of Models

Outputs	Supply voltage	8-pin models
Time-limit contact	100 to 120 VAC	H3CR-G8L 100-120AC
	200 to 240 VAC	H3CR-G8L 200-240AC
Time-limit contact and instantaneous contact	100 to 120 VAC	H3CR-G8EL 100-120AC
	200 to 240 VAC	H3CR-G8EL 200-240AC

■ Accessories (Order Separately)

Name/specifications		Models
Flush Mounting Adapter		Y92F-30
		Y92F-70
		Y92F-71
Mounting DIN-rail	**50 cm (ℓ) x 7.3 mm (t)**	PFP-50N
	1 m (ℓ) x 7.3 mm (t)	PFP-100N
	1 m (ℓ) x 16 mm (t)	PFP-100N2
End Plate		PFP-M
Spacer		PFP-S
Protective Cover		Y92A-48B

Name/specifications		Models
DIN-rail Mounting/ Front Connecting Socket	**8-pin**	P2CF-08
	8-pin, finger safe type	P2CF-08-E
Back Connecting Socket	**8-pin**	P3G-08
	8-pin, finger safe type	P3G-08 with Y92A-48G (See note 1)
Time Setting Ring	**Setting a specific time**	Y92S-27
	Limiting the setting range	Y92S-28
Panel Cover (See note 2)	**Light gray (5Y7/1)**	Y92P-48GL
	Black (N1.5)	Y92P-48GB
	Medium gray (5Y5/1)	Y92P-48GM
Hold-down Clip (See note 3)	**For PL08 and PL11 Sockets**	Y92H-1
	For PF085A Socket	Y92H-2

Note: 1. Y92A-48G is a finger safe terminal cover which is attached to the P3G-08 Socket.
2. The Time Setting Ring and Panel Cover are sold together.
3. Hold-down Clips are sold in sets of two.

Specifications

■ General

Item	H3CR-G8L	H3CR-G8EL
Functions	Star-delta timer	Star-delta timer with instantaneous output
Pin type	8-pin	
Operating/Reset method	Time-limit operation/Self-reset	
Output type	Time-limit: SPST-NO (star operation circuit) SPST-NO (delta operation circuit)	Time-limit: SPST-NO (star operation circuit) SPST-NO (delta operation circuit) Instantaneous: SPST-NO
Mounting method	DIN-rail mounting, surface mounting, and flush mounting	
Approved standards	UL508, CSA C22.2 No.14, NK, Lloyds Conforms to EN61812-1 and IEC60664-1 (VDE0110) 4kV/2. Output category according to EN60947-5-1.	

■ Time Ranges

Time unit		Star operation time ranges
Full scale setting	**6**	0.5 to 6 s
	12	1 to 12 s
	60	5 to 60 s
	120	10 to 120 s

Star-delta transfer time	Programmable at 0.05 s, 0.1 s, 0.25 s or 0.5 s

Ratings

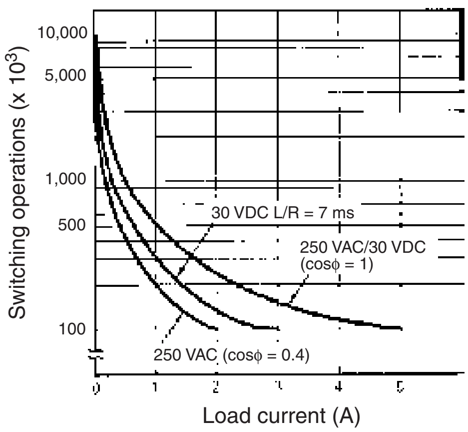
Rated supply voltage	100 to 120 VAC (50/60 Hz), 200 to 240 VAC (50/60 Hz)
Operating voltage range	85% to 110% of rated supply voltage
Power reset	Minimum power-opening time: 0.5 s
Power consumption	100 to 120 VAC: approx. 6 VA (2.6 W) at 120 VAC 200 to 240 VAC: approx. 12 VA (3.0 W) at 240 VAC
Control outputs	Contact output: 5 A at 250 VAC/30 VDC, resistive load (cosϕ = 1)

Characteristics

Accuracy of operating time	±0.2% FS max.
Setting error	±5% FS ±50 ms max.
Accuracy of Star-delta transfer time	±25% FS + 5 ms max.
Reset voltage	10% max. of rated voltage
Influence of voltage	±0.2% FS max.
Influence of temperature	±1% FS max.
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min (between current-carrying metal parts and exposed non-current-carrying metal parts) 2,000 VAC, 50/60 Hz for 1 min (between control output terminals and operating circuit) 2,000 VAC, 50/60 Hz for 1 min (between contacts of different polarities) 1,000 VAC, 50/60 Hz for 1 min (between contacts not located next to each other)
Impulse withstand voltage	3 kV (between power terminals) 4.5 kV (between current-carrying terminal and exposed non-current-carrying metal parts)
Noise immunity	±1.5 kV (between power terminals), square-wave noise by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise)
Static immunity	Malfunction: 8 kV Destruction: 15 kV
Vibration resistance	Destruction: 10 to 55 Hz with 0.75-mm single amplitude for 2 hrs each in three directions Malfunction: 10 to 55 Hz with 0.5-mm single amplitude for 10 min each in three directions
Shock resistance	Destruction: 980 m/s^2 three times each in six directions Malfunction: 294 m/s^2 three times each in six directions
Ambient temperature	Operating: –10°C to 55°C (with no icing) Storage: –25°C to 65°C (with no icing)
Ambient humidity	Operating: 35% to 85%
Life expectancy	Mechanical: 20 million operations min. (under no load at 1,800 operations/h) Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 1,800 operations/h) (See note)
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A (EMS) EN61812-1 Immunity ESD: IEC61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: IEC61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity RF-interference from Pulse-modulated Radio Waves: IEC61000-4-3: 10 V/m (900±5 MHz) (level 3) Immunity Conducted Disturbance: IEC61000-4-6: 10 V (0.15 to 80 MHz) (level 3) Immunity Burst: IEC61000-4-4: 2 kV power-line (level 3) 2 kV I/O signal-line (level 4) Immunity Surge: IEC61000-4-5: 1 kV line to line (level 3) 2 kV line to ground (level 3)
Case color	Light Gray (Munsell 5Y7/1)
Degree of protection	IP40 (panel surface)
Weight	H3CR-G8L: approx. 110 g; H3CR-G8EL: approx. 130 g

Note: Refer to the *"Life-test Curve" on page C-114.*

■ Life-test Curve

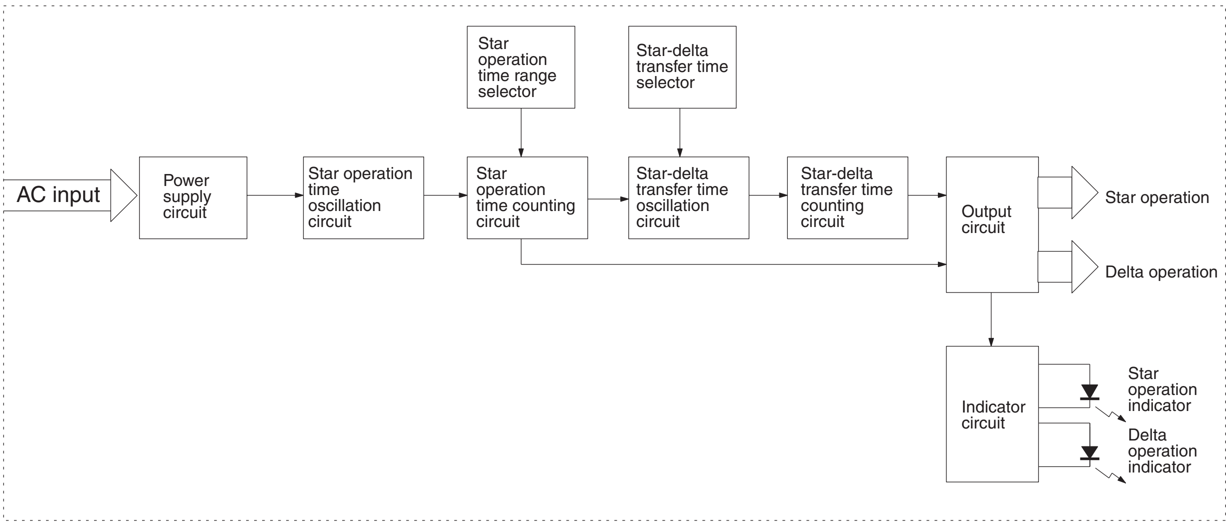


Reference: A maximum current of 0.15 A can be switched at 125 VDC (cosϕ = 1) and a maximum current of 0.1 A can be switched if L/R is 7 ms. In both cases, a life of 100,000 operations can be expected.
The minimum applicable load is 10 mA at 5 VDC (failure level: P).

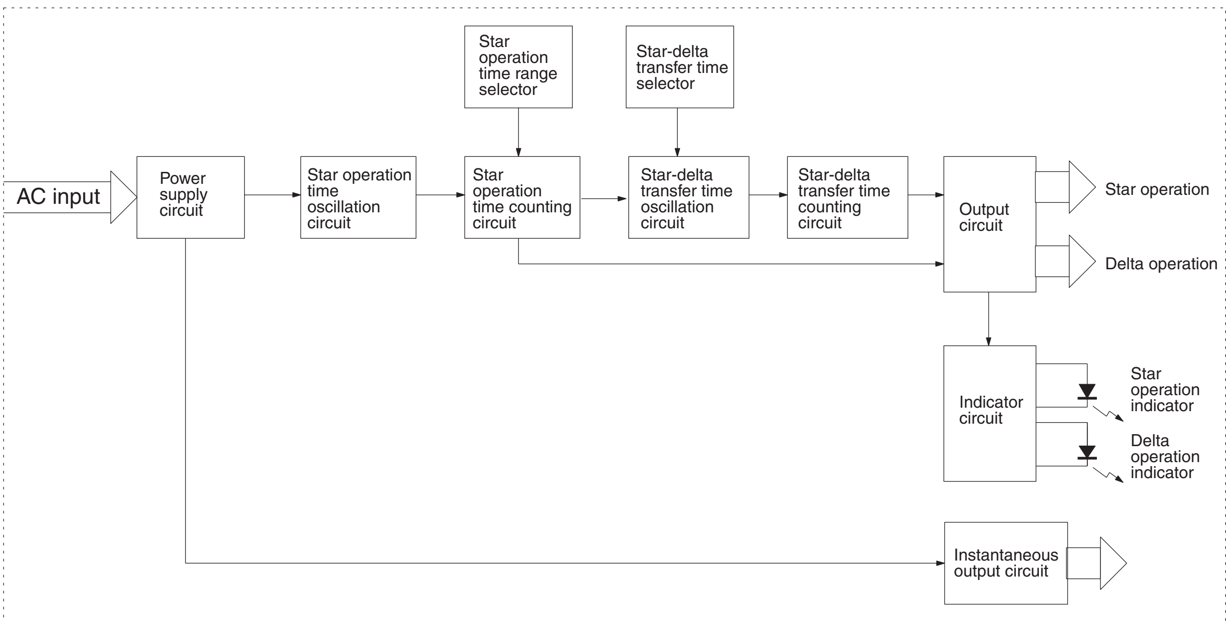
Connections

■ Block Diagrams

H3CR-G8L



H3CR-G8EL

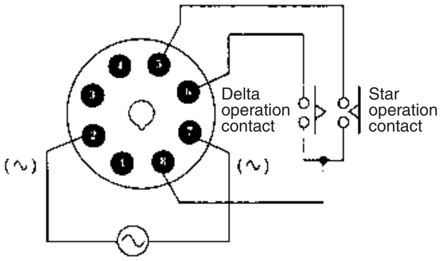


I/O Functions

Inputs		---
Outputs	Control output	If the time reaches the value set with the time setting knob, the star operation output will be turned OFF and there will be delta operation output after the set star-delta transfer time has elapsed.

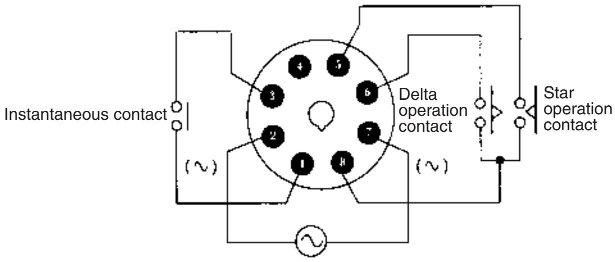
Terminal Arrangement

H3CR-G8L



Note: Leave terminals 1, 3, and 4 open. Do not use them as relay terminals.

H3CR-G8EL

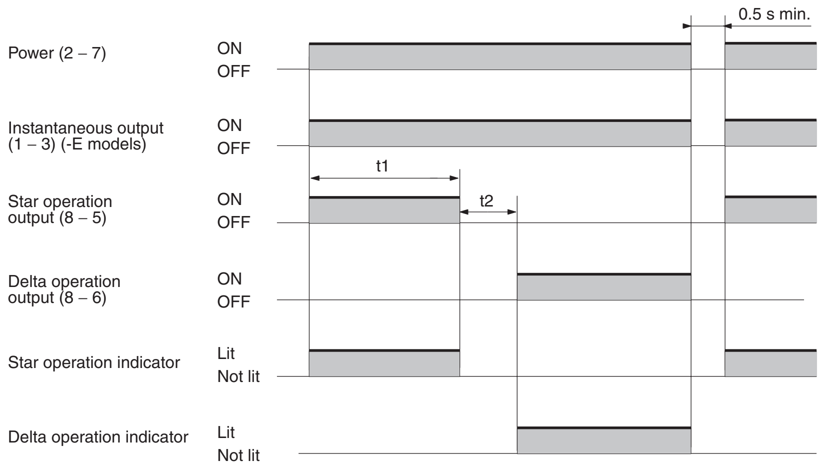


Note: Leave terminal 4 open. Do not use them as relay terminals.

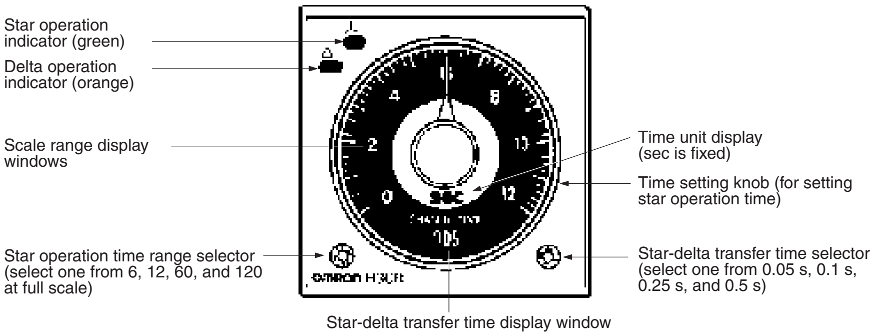
Operation

Timing Chart

t1: Star operation time setting
t2: Star-delta transfer time

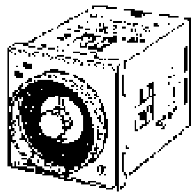
Model	Timing chart
H3CR-G8L/-G8EL	

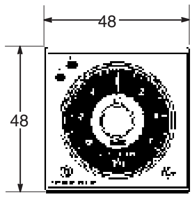
Nomenclature

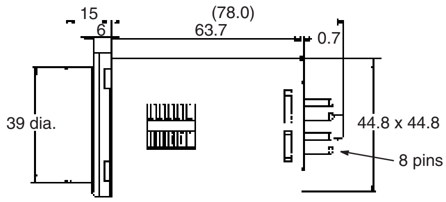


Dimensions

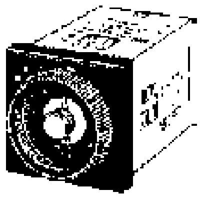
Note: All units are in millimeters unless otherwise indicated.

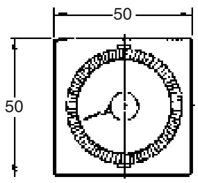


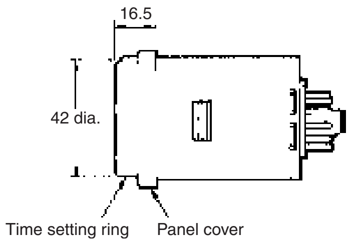




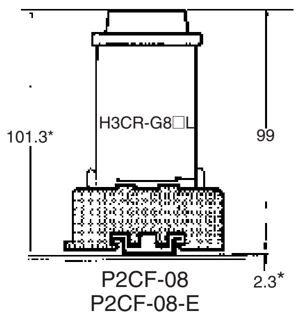
Dimensions with Set Ring



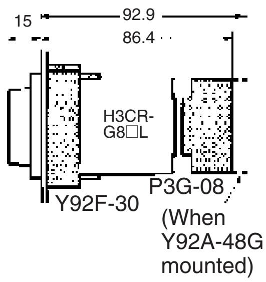




Dimensions with Front Connecting Socket P2CF-08-□



Dimensions with Back Connecting Socket P3G-08



*These dimensions vary with the kind of DIN-rail (reference value).

Solid-state Power OFF-delay Timer

H3CR-H

DIN 48 x 48-mm Power OFF-delay Timer

- Long power OFF-delay times;
  S-series: up to 12 seconds,
  M-series: up to 12 minutes.
- Models with forced-reset input are available.
- 11-pin and 8-pin models are available.

Model Number Structure

■ Model Number Legend

Note: This model number legend includes combinations that are not available. Before ordering, please check the *List of Models* below for availability.

H3CR - H □ □ L □ □
1 2 3 4 5 6

1. Classification
H: Power OFF-delay timer

2. Configuration
None: 11-pin socket
8: 8-pin socket

3. Input
None: Without reset input
R: With reset input

4. Dimensions
L: Long-body model

5. Supply Voltage
100-120AC: 100 to 120 VAC
200-240AC: 200 to 240 VAC
48DC: 48 VDC
100-125DC: 100 to 125 VDC

6. Time Range
S: 0.05 to 12 s
M: 0.05 to 12 min

■ List of Models

Input	Output	Supply voltage	S-series		M-series	
			11-pin models	8-pin models	11-pin models	8-pin models
Without reset input	DPDT	100 to 120 VAC	---	H3CR-H8L 100-120AC S	---	H3CR-H8L 100-120AC M
		200 to 240 VAC		H3CR-H8L 200-240AC S		H3CR-H8L 200-240AC M
		24 VAC/DC		H3CR-H8L 24AC/DC S		H3CR-H8L 24AC/DC M
		48 VDC		H3CR-H8L 48DC S		H3CR-H8L 48DC M
		100 to 125 VDC		H3CR-H8L 100-125DC S		H3CR-H8L 100-125DC M
With reset input		100 to 120 VAC	H3CR-HRL 100-120AC S	---	H3CR-HRL 100-120AC M	---
		200 to 240 VAC	H3CR-HRL 200-240AC S		H3CR-HRL 200-240AC M	
		24 VAC/DC	H3CR-HRL 24AC/DC S		H3CR-HRL 24AC/DC M	
		48 VDC	H3CR-HRL 48DC S		H3CR-HRL 48DC M	
		100 to 125 VDC	H3CR-HRL 100-125DC S		H3CR-HRL 100-125DC M	
	SPDT	100 to 120 VAC	---	H3CR-H8RL 100-120AC S	---	H3CR-H8RL 100-120AC M
		200 to 240 VAC		H3CR-H8RL 200-240AC S		H3CR-H8RL 200-240AC M
		24 VAC/DC		H3CR-H8RL 24AC/DC S		H3CR-H8RL 24AC/DC M
		48 VDC		H3CR-H8RL 48DC S		H3CR-H8RL 48DC M
		100 to 125 VDC		H3CR-H8RL 100-125DC S		H3CR-H8RL 100-125DC M

■ Accessories (Order Separately)

Name/specifications		Models
Flush Mounting Adapter		Y92F-30
		Y92F-70
		Y92F-71
Mounting DIN-rail	**50 cm (ℓ) x 7.3 mm (t)**	PFP-50N
	1 m (ℓ) x 7.3 mm (t)	PFP-100N
	1 m (ℓ) x 16 mm (t)	PFP-100N2
End Plate		PFP-M
Spacer		PFP-S
Protective Cover		Y92A-48B
DIN-rail Mounting/ Front Connecting Socket	**8-pin**	P2CF-08
	8-pin, finger safe type	P2CF-08-E
	11-pin	P2CF-11
	11-pin, finger safe type	P2CF-11-E
Back Connecting Socket	**8-pin**	P3G-08
	8-pin, finger safe type	P3G-08 with Y92A-48G (See note 1)
	11-pin	P3GA-11
	11-pin, finger safe type	P3GA-11 with Y92A-48G (See note 1)
Hold-down Clip (See note 2)	**For PL08 and PL11 Sockets**	Y92H-1
	For PF085A Socket	Y92H-2

Note: 1. Y92A-48G is a finger safe terminal cover which is attached to the P3G-08 or P3GA-11 Socket.
2. Hold-down Clips are sold in sets of two.

Specifications

■ General

Item	H3CR-H8L	H3CR-H8RL	H3CR-HRL
Operating/Reset method	Instantaneous operation/Time-limit reset	Instantaneous operation/Time-limit reset/Forced reset	
Pin type	8-pin		11-pin
Input type	---	No-voltage	
Output type	Relay output (DPDT)	Relay output (SPDT)	Relay output (DPDT)
Mounting method	DIN-rail mounting, surface mounting, and flush mounting		
Approved standards	UL508, CSA C22.2 No.14, NK, Lloyds Conforms to EN61812-1 and IEC60664-1 (VDE0110) 4kV/2. Output category according to EN60947-5-1.		

■ Time Ranges

Time unit		S-series	M-series
		s (sec)	**min (min)**
Setting	**0.6**	0.05 to 0.6	
	1.2	0.12 to 1.2	
	6	0.6 to 6	
	12	1.2 to 12	
Min. power ON time		0.1 s min.	2 s min.
Time-up operation repeat period		3 s min.	
Forced-reset repeat period		3 s min.	

Note: 1. If the above minimum power ON time is not secured, the H3CR may not operate. Be sure to secure the above minimum power ON time.
2. Do not use the Timer with a repeat period of less than 3 s. Doing so may result in abnormal heating or burning. Refer to *Safety Precautions (H3CR-H)* on page C-124 for details.

Ratings

Rated supply voltage (See note 1)	100 to 120 VAC (50/60 Hz), 200 to 240 VAC (50/60 Hz), 24 VAC/VDC (50/60 Hz), 48 VDC, 100 to 125 VDC
Operating voltage range	85% to 110% of rated supply voltage
No-voltage input (See note 2)	ON-impedance: 1 kΩ max. ON residual voltage: 1 V max. OFF impedance: 500 kΩ min.
Power consumption	100 to 120 VAC: approx. 0.23 VA (0.22 W) at 120 VAC 200 to 240 VAC: approx. 0.35 VA (0.3 W) at 240 VAC 24 VAC/DC: approx. 0.17 VA (0.15 W) at 24 VAC approx. 0.1 W at 24 VDC 48 VDC: approx. 0.18 W at 48 VDC 100 to 125 VDC: approx. 0.5 W at 125 VDC
Control outputs	Contact output: 5 A at 250 VAC/30 VDC, resistive load (cosϕ = 1)

Note: 1. A power supply with a ripple of 20% max. (single-phase power supply with full-wave rectification) can be used with each DC Model.

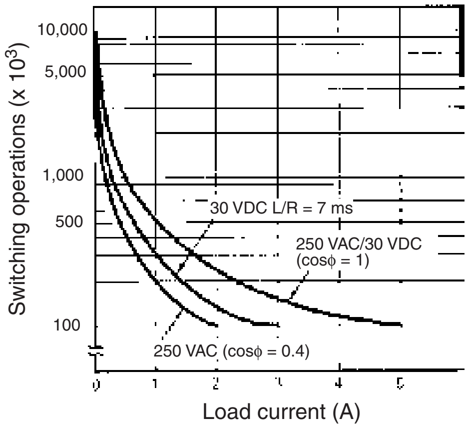
2. For contact input, use contacts which can adequately switch 1 mA at 5 V.

Characteristics

Accuracy of operating time	±0.2% FS max. (±0.2% FS ±10 ms max. in ranges of 0.6 and 1.2 s)
Setting error	±5% FS ±50 ms max.
Operation start voltage	30% max. of rated voltage
Influence of voltage	±0.2% FS max. (±0.2% FS ±10 ms max. in ranges of 0.6 and 1.2 s)
Influence of temperature	±1% FS max. (±1% FS ±10 ms max. in ranges of 0.6 and 1.2 s)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min (between current-carrying metal parts and exposed non-current-carrying metal parts) 2,000 VAC, 50/60 Hz for 1 min (between control output terminals and operating circuit) 2,000 VAC, 50/60 Hz for 1 min (between contacts of different polarities) 1,000 VAC, 50/60 Hz for 1 min (between contacts not located next to each other)
Impulse withstand voltage	3 kV (between power terminals) for 100 to 120 VAC, 200 to 240 VAC, 100 to 125 VDC; 1 kV for 24 VAC/DC, 48 VDC 4.5 kV (between current-carrying terminal and exposed non-current-carrying metal parts) for 100 to 120 VAC, 200 to 240 VAC, 100 to 125 VDC; 1.5 kV for 24 VAC/DC, 48 VDC
Noise immunity	±1.5 kV (between power terminals) and ±600 V (between input terminals), square-wave noise by noise simulator (pulse width: 100 ns/1 µs, 1-ns rise); ±1 kV (between power terminals) for 48 VDC
Static immunity	Malfunction: 8 kV Destruction: 15 kV
Vibration resistance	Destruction: 10 to 55 Hz with 0.75-mm single amplitude for 2 hrs each in three directions Malfunction: 10 to 55 Hz with 0.5-mm single amplitude for 10 min each in three directions
Shock resistance	Destruction: 980 m/s^2 three times each in six directions Malfunction: 98 m/s^2 three times each in six directions
Ambient temperature	Operating: –10°C to 55°C (with no icing) Storage: –25°C to 65°C (with no icing)
Ambient humidity	Operating: 35% to 85%
Life expectancy	Mechanical: 10 million operations min. (under no load at 1,200 operations/h) Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 1,200 operations/h) (See note)
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A (EMS) EN61812-1 Immunity ESD: IEC61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: IEC61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity RF-interference from Pulse-modulated Radio Waves: IEC61000-4-3: 10 V/m (900±5 MHz) (level 3) Immunity Conducted Disturbance: IEC61000-4-6: 10 V (0.15 to 80 MHz) (level 3) Immunity Burst: IEC61000-4-4: 2 kV power-line (level 3) 2 kV I/O signal-line (level 4) Immunity Surge: IEC61000-4-5: 1 kV line to line (level 3) 2 kV line to ground (level 3)
Case color	Light Gray (Munsell 5Y7/1)
Degree of protection	IP40 (panel surface)
Weight	Approx. 120 g

Note: Refer to the *Life-test Curve* on page C-120.

■ Life-test Curve

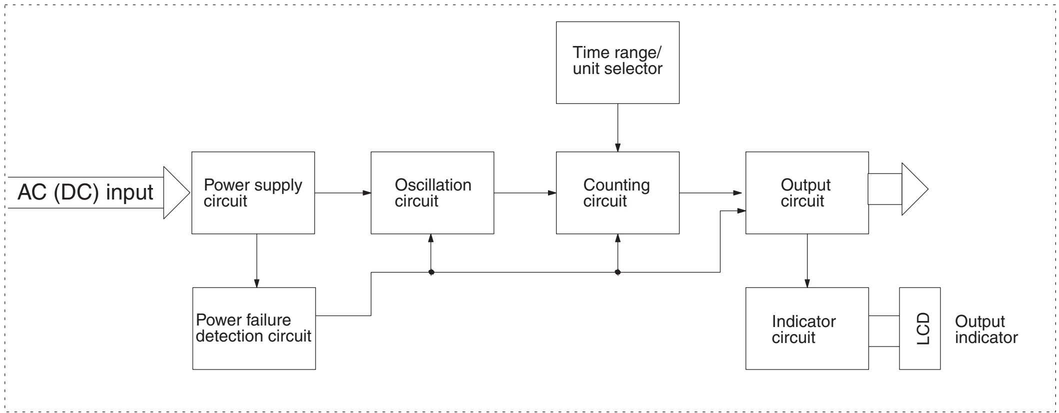


Reference: A maximum current of 0.15 A can be switched at 125 VDC (cosϕ = 1) and a maximum current of 0.1 A can be switched if L/R is 7 ms. In both cases, a life of 100,000 operations can be expected.
The minimum applicable load is 10 mA at 5 VDC for H3CR-H8L/-HRL and 100 mA at 5 VDC for H3CR-H8RL (failure level: P).

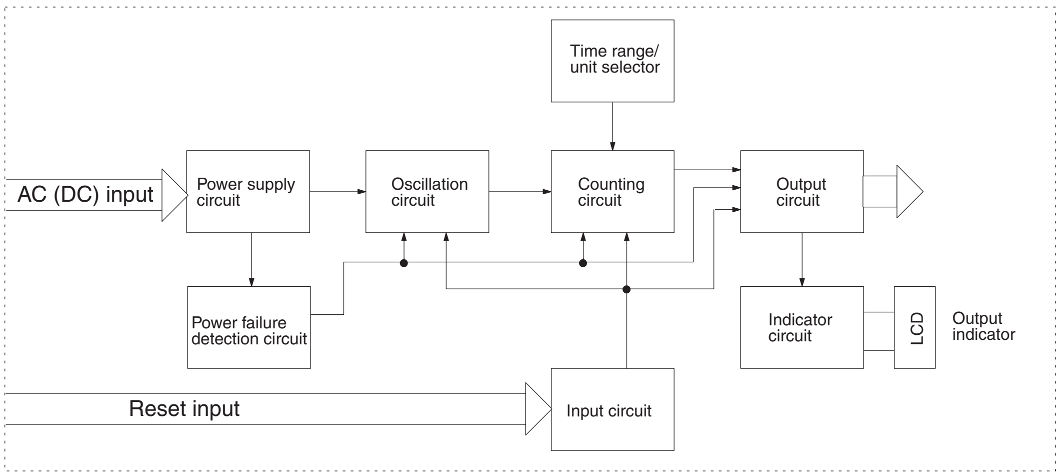
Connections

■ Block Diagrams

Without Reset Input (H3CR-H8L)



With Reset Input (H3CR-H8RL/-HRL)



■ I/O Functions

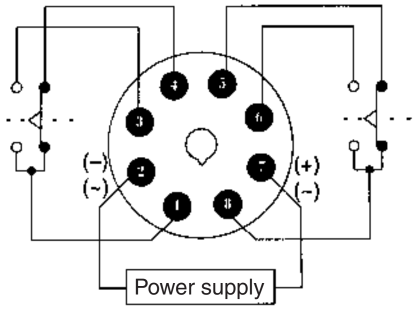
Inputs	**Reset**	Turns off the control output and resets the elapsed time.
Outputs	**Control output**	Operates instantaneously when the power is turned on and time-limit resets when the set time is up after the power is turned off.

■ Terminal Arrangement

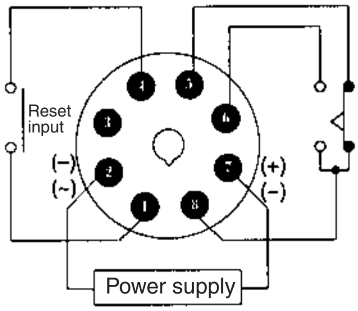
Note: DC models, including 24 VAC/DC models, have polarity.

8-pin Models

Without Reset Input (H3CR-H8L)



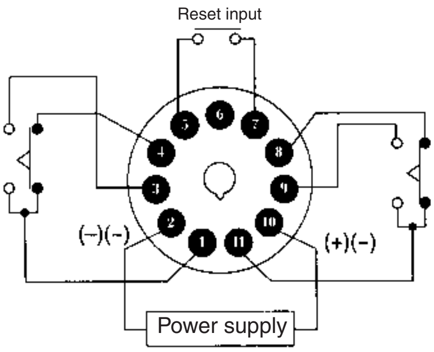
With Reset Input (H3CR-H8RL)



Note: Leave terminal 3 open. Do not use them as relay terminals.

11-pin Model

With Reset Input (H3CR-HRL)

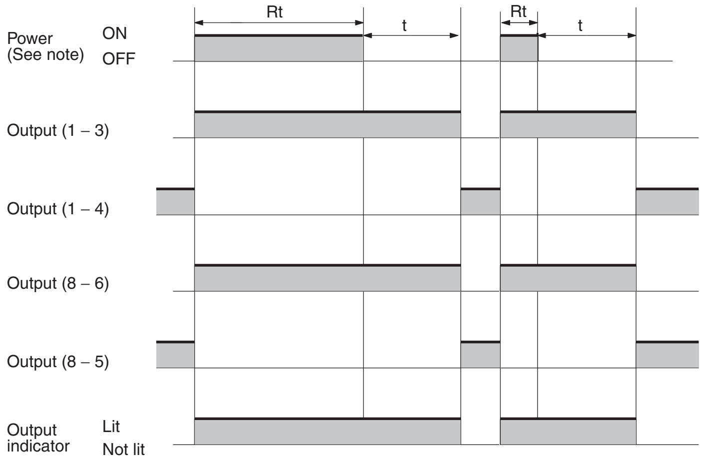
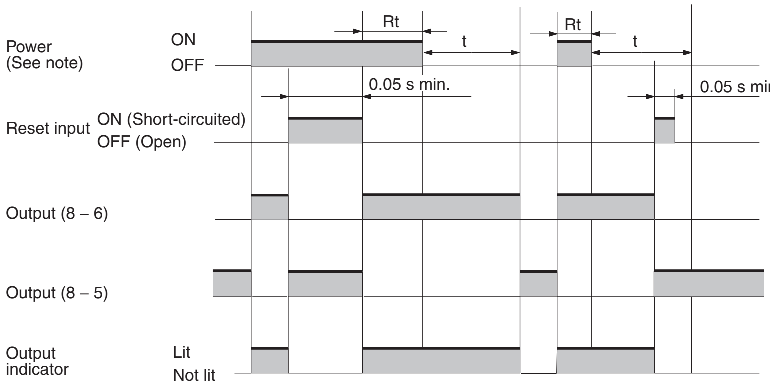
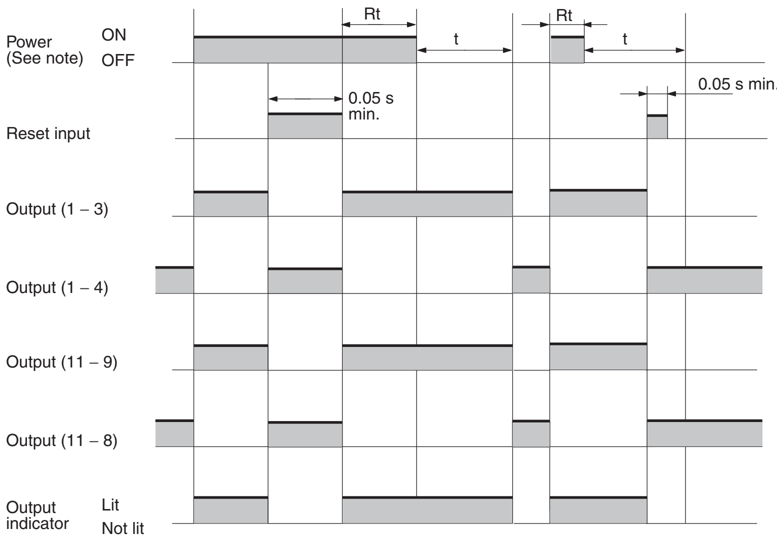


Note: Leave terminal 6 open. Do not use them as relay terminals.

Operation

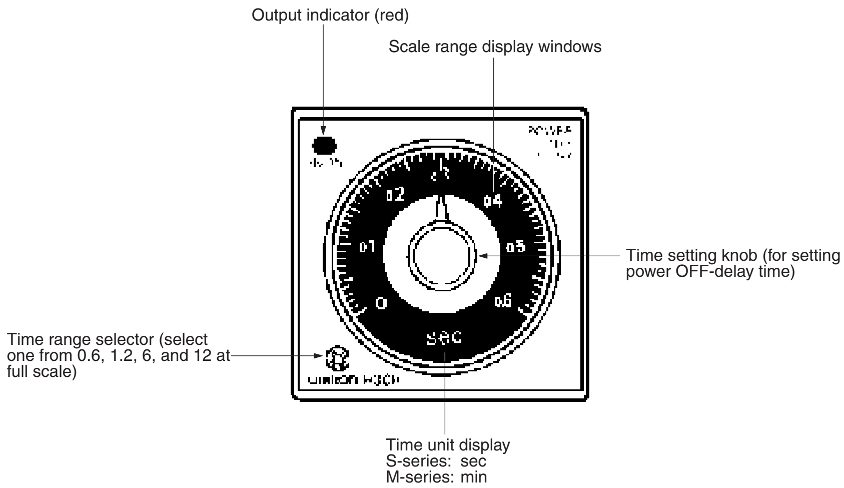
■ Timing Chart

t: Set time
Rt: Minimum power ON time (S-series: 0.1 s min.; M-series: 2 s min.)
If the power ON time is less than this value, the Timer may not operate (i.e., output may not turn ON).

<table>
<tr><th>Model</th><th>Timing chart</th></tr>
<tr><td>H3CR-H8L</td><td>
</td></tr>
<tr><td>H3CR-H8RL</td><td>
</td></tr>
<tr><td>H3CR-HRL</td><td>
</td></tr>
</table>

Note: If the power is turned ON until the set time is up, the timer will be retriggered.

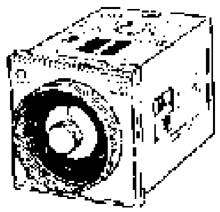
Nomenclature

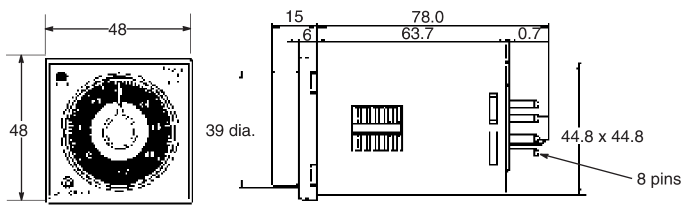


Dimensions

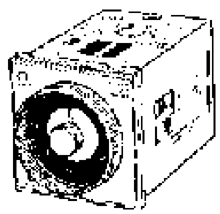
Note: All units are in millimeters unless otherwise indicated.

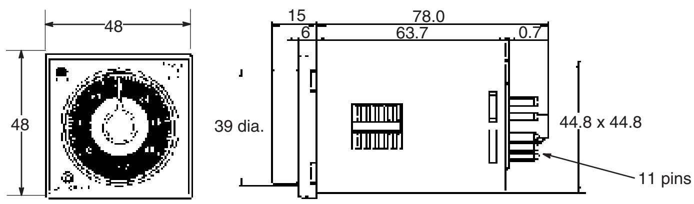
H3CR-H8L
H3CR-H8RL



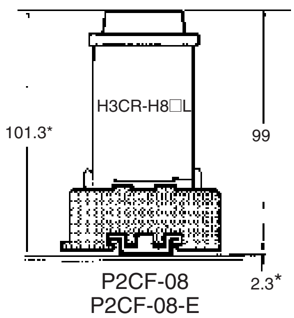


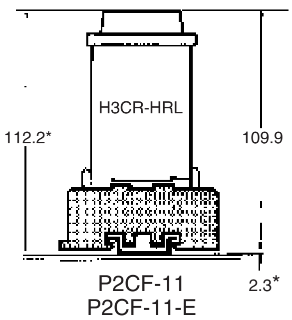
H3CR-HRL



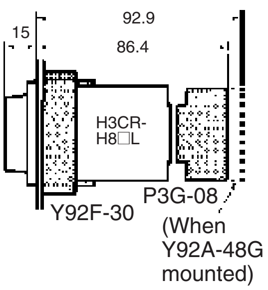


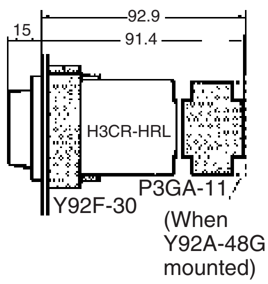
Dimensions with Front Connecting Socket P2CF-08-□/P2CF-11-□





Dimensions with Back Connecting Socket P3G-08/P3GA-11





*These dimensions vary with the kind of DIN-rail (reference value).

Safety Precautions (H3CR-H)

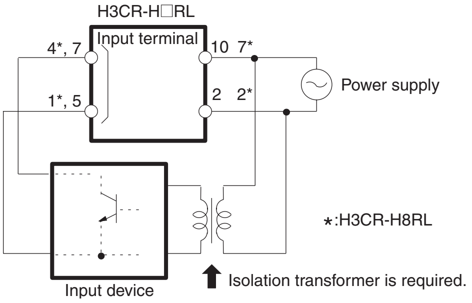
Note: The undermentioned is common for all H3CR-H models.

■ Power Supplies

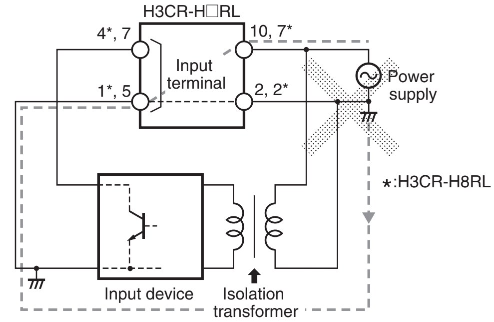
The H3CR-H has a large inrush current; provide sufficient power supply capacity. If the power supply capacity is too small, there may be delays in turning ON the output.

With the H3CR-H□RL, for the power supply of an input device, use an isolating transformer, of which the primary and secondary windings are mutually isolated and the secondary winding is not grounded.

Correct



Incorrect

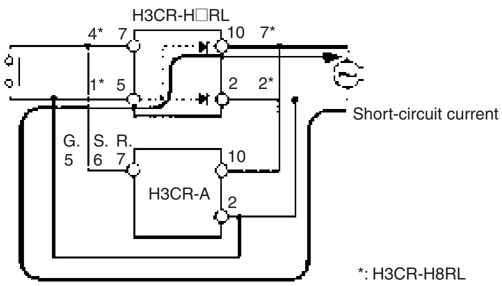


■ Input/Output (H3CR-H□RL)

An appropriate input is applied to the input signal terminal of the Timer when the input terminal for the input signal is short-circuited. Do not attempt to connect any input terminal to any terminal other than the input terminal or to apply voltage across other than the specified input terminals or the internal circuits of the Timer may be damaged.

The H3CR-H□RL uses transformerless power supply. When connecting a relay or transistor as an external signal input device, pay attention to the following points to prevent short-circuiting due to a sneak current to the transformerless power supply.

If input is made simultaneously from one input contact or a transistor to the H3CR-H and a Timer whose common input terminals are used as power terminals, such as the H3CR-A, a short-circuit current will be generated. Either input through isolated contacts, or isolate the power supply for one of the Timers.

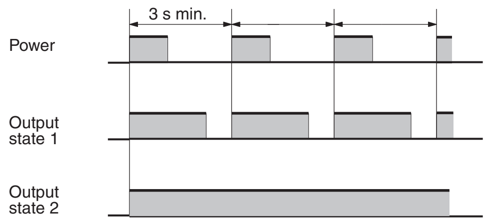


■ Wiring

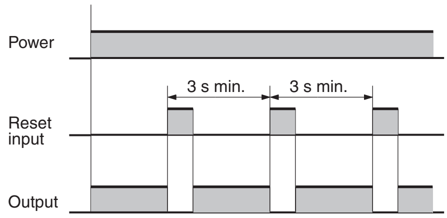
The H3CR-H has a high impedance circuit. Therefore, the H3CR-H may not be reset if the H3CR-H is influenced by inductive voltage. In order to eliminate any influence of inductive voltage, the wires connected to the H3CR-H must be as short as possible and should not be installed alongside power lines. If the H3CR-H is influenced by inductive voltage that is 30% or more of the rated voltage, connect a CR filter with a capacitance of approximately 0.1 µF and a resistance of approximately 120 Ω or a bleeder resistor between the power supply terminals. If there is any residual voltage due to current leakage, connect a bleeder resistor between the power supply terminals.

■ Operation

An interval of 3 s minimum is required to turn on the H3CR-H after the H3CR-H is turned off. If the H3CR-H is turned on and off repeatedly with an interval of shorter than 3 s, abnormal heating or burning may occur in internal elements.



After the forced reset function of the H3CR-H is activated, an interval of 3 s minimum is required to activate the forced reset function again. If the forced reset function is activated repeatedly with an interval of shorter than 3 s, the internal parts of the H3CR-H may deteriorate and the H3CR-H may malfunction.



If it is required that the output be turned on repeatedly with an interval of shorter than 3 s, consider use of the H3CR-A in mode D (signal OFF-delay).

■ Others

If the H3CR-H is dropped or experiences some other kind of shock, because a latching relay is used for output, contacts may be reversed or go into a neutral state. If the H3CR-H is dropped, reconfirm correct operation.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. L084-E2-06

Multifunction Digital Timer
H5CX

- Highly visible display with backlit negative transmissive LCD.
- Programmable PV color to visually alert when output status changes (screw terminal block models).
- Intuitive setting enabled using DIP switch (H5CX-A/-A11 models) and ergonomic up/down digit keys.
- Twin timer in one body to meet a broader range of cyclic control application requirements as well as ON/OFF duty adjustable flicker mode.
- PNP/NPN switchable DC-voltage input (H5CX-A/-A11 models).
- Finger-safe terminals (screw terminal block models).
- Meet a variety of mounting requirements: Screw terminal block models, and pin-style terminal models.
- NEMA4/IP66 compliance.
- Six-language instruction manual.

Contents

Model Number Structure

■ Model Number Legend:

H5CX-□□□□□
1 2 3 4 5

1. **Type classifier**
   A: Standard type
   L: Economy type
2. **External connection**
   None: Screw terminals
   8: 8-pin socket
   11: 11-pin socket
3. **Output type**
   None: Contact output
   S: Transistor output
4. **Supply voltage**
   None: 100 to 240 VAC 50/60 Hz
   D: 12 to 24 VDC/24 VAC 50/60 Hz
5. **Case color**
   None: Black
   G: Light gray (Munsell 5Y7/1): Produced upon request.

Ordering Information

■ List of Models

Output type	Supply voltage	Models		
		Standard type		Economy type
		Screw terminals	11-pin socket	8-pin socket
Contact output	100 to 240 VAC	H5CX-A	H5CX-A11	H5CX-L8
	12 to 24 VDC/24 VAC	H5CX-AD	H5CX-A11D	H5CX-L8D
Transistor output	100 to 240 VAC	H5CX-AS	H5CX-A11S	H5CX-L8S
	12 to 24 VDC/24 VAC	H5CX-ASD	H5CX-A11SD	H5CX-L8SD

Note: The power supply and input circuits for the H5CX-A11/A11S have basic insulation. Other models are not insulated.

■ Accessories (Order Separately)

Name		Models
Flush Mounting Adapter (See note 1.)		Y92F-30
Waterproof Packing (See note 1.)		Y92S-29
DIN-rail Mounting/ Front Connecting Socket	8-pin	P2CF-08
	8-pin, finger-safe type	P2CF-08-E
	11-pin	P2CF-11
	11-pin, finger-safe type	P2CF-11-E
Back Connecting Socket	8-pin	P3G-08
	8-pin, finger-safe type	P3G-08 with Y92A-48G (See note 2.)
	11-pin	P3GA-11
	11-pin, finger-safe type	P3GA-11 with Y92A-48G (See note 2.)
Hard Cover		Y92A-48
Soft Cover		Y92A-48F1
Mounting DIN-rail	50 cm (l) × 7.3 mm (t)	PFP-50N
	1 m (l) × 7.3 mm (t)	PFP-100N
	1 m (l) × 16 mm (t)	PFP-100N2
End Plate		PFP-M
Spacer		PFP-S

Note 1. Supplied with H5CX-A□ models (except for H5CX-A11□ and H5CX-L8□ models).
2. Y92A-48G is a finger-safe terminal cover attached to the P3G-08 or P3GA-11 Socket.

Specifications

■ Ratings

Item	H5CX-A□	H5CX-A11□	H5CX-L8□
Classification	Digital timer		
Rated supply voltage	100 to 240 VAC (50/60 Hz), 24 VAC (50/60 Hz)/12 to 24 VDC (permissible ripple: 20% (p-p) max.)		
Operating voltage range	85% to 110% rated supply voltage (12 to 24 VDC: 90% to 110%)		
Power consumption	Approx. 6.2 VA at 264 VAC Approx. 5.1 VA at 26.4 VAC Approx. 2.4 W at 12 VDC		
Mounting method	Flush mounting	Flush mounting, surface mounting, DIN-rail mounting	
External connections	Screw terminals	11-pin socket	8-pin socket
Terminal screw tightening torque	0.5 N·m max.	---	
Display	7-segment, negative transmissive LCD; Present value: 11.5-mm-high characters, red or green (programmable) Set value: 6-mm-high characters, green	7-segment, negative transmissive LCD Present value: 11.5-mm-high characters, red Set value: 6-mm-high characters, green	
Digits	4 digits		
Time ranges	9.999 s (0.001-s unit), 99.99 s (0.01-s unit), 999.9 s (0.1-s unit), 9999 s (1-s unit), 99 min 59 s (1-s unit) 999.9 min (0.1-min unit), 9999 min (1-min unit), 99 h 59 min (1-min unit), 999.9 h (0.1-h unit), 9999 h (1-h unit)		
Timer mode	Elapsed time (Up), remaining time (Down) (selectable)		
Input signals	Start, gate, reset		Start, reset
Input method	No-voltage input/voltage input (switchable) No-voltage Input ON impedance: 1 kΩ max. (Leakage current: 5 to 20 mA when 0 Ω) ON residual voltage: 3 V max. OFF impedance: 100 kΩ min. Voltage Input High (logic) level: 4.5 to 30 VDC Low (logic) level: 0 to 2 VDC (Input resistance: approx. 4.7 kΩ)		No-voltage Input ON impedance: 1 kΩ max. (Leakage current: 5 to 20 mA when 0 Ω) ON residual voltage: 3 V max. OFF impedance: 100 kΩ min.
Start, reset, gate	Minimum input signal width: 1 or 20 ms (selectable, same for all input)		
Power reset	Minimum power-opening time: 0.5 s (except for A-3, b-1, and F mode)		
Reset system	Power resets (except for A-3, b-1, and F modes), external and manual reset		
Sensor waiting time	250 ms max. (Control output is turned OFF and no input is accepted during sensor waiting time.)		
Output modes	A, A-1, A-2, A-3, b, b-1, d, E, F, Z, ton or toff		
One-shot output time	0.01 to 99.99 s		
Control output	SPDT contact output: 5 A at 250 VAC/30 VDC, resistive load (cosϕ=1) Minimum applied load: 10 mA at 5 VDC (failure level: P, reference value) Transistor output: NPN open collector, 100 mA at 30 VDC max. residual voltage: 1.5 VDC max. (Approx. 1 V)		
	Output category according to EN60947-5-1 for Timers with Contact Outputs (AC-15; 250 V 3 A/AC-13; 250 V 5 A/ DC-13; 30 V 0.5 A) Output category according to EN60947-5-2 for Timers with Transistor Outputs (DC-13; 30 V 100 mA) NEMA B300 Pilot Duty, 1/4 HP 5-A resistive load at 120 VAC, 1/3 HP 5-A resistive load at 240 VAC		
Key protection	Yes		
Memory backup	EEPROM (overwrites: 100,000 times min.) that can store data for 10 years min.		
Ambient temperature	Operating: –10 to 55°C (–10 to 50°C if timers are mounted side by side) (with no icing or condensation) Storage: –25 to 65°C (with no icing or condensation)		
Ambient humidity	25% to 85%		
Case color	Black (N1.5)		
Attachments	Waterproof packing, flush mounting adapter, label for DIP switch settings	Label for DIP switch settings	None

■ Characteristics

Item	H5CX-A□/-A11□/-L8□
Accuracy of operating time and setting error (including temperature and voltage influences) (See note 1.)	Power-ON start: ±0.01% ±50 ms max. Rated against set value Signal start: ±0.005 ±30 ms max. Rated against set value Signal start for transistor output model: ±0.005% ±3 ms max. (See note 2.) If the set value is within the sensor waiting time at startup the control output of the H5CX will not turn ON until the sensor waiting time passes.
Insulation resistance	100 MΩ min. (at 500 VDC) between current-carrying terminal and exposed non-current-carrying metal parts, and between non-continuous contacts
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between current-carrying terminals and non-current-carrying metal parts 1,000 VAC (for H5CX-□SD), 50/60 Hz for 1 min between control output, power supply, and input circuit (2,000 VAC for models other than H5CX-□SD) 1,000 VAC, 50/60 Hz for 1 min between non-continuous contacts
Impulse withstand voltage	3 kV (between power terminals) for 100 to 240 VAC, 1 kV for 24 VAC/12 to 24 VDC 4.5 kV (between current-carrying terminal and exposed non-current-carrying metal parts) for 100 to 240 VAC 1.5 kV for 24 VAC/12 to 24 VDC
Noise immunity	±1.5 kV (between power terminals) and ±600 V (between input terminals), square-wave noise by noise simulator (pulse width: 100 ns/1 ms, 1-ns rise)
Static immunity	Destruction: 15 kV Malfunction: 8 kV
Vibration resistance	Destruction: 10 to 55 Hz with 0.75-mm single amplitude each in three directions, four cycles each (8 min per cycle) Malfunction: 10 to 55 Hz with 0.35-mm single amplitude each in three directions, four cycles each (8 min per cycle)
Shock resistance	Destruction: 294 m/s^2 each in three directions Malfunction: 98 m/s^2 each in three directions
Life expectancy	Mechanical: 10,000,000 operations min. Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load) See *Life-test Curve* on page C-129.
Approved safety standards (See note 3.)	UL508/Recognition (H5CX-L8□: Listing only with OMRON's P2CF-08□ or P3G-08 socket), CSA C22.2 No. 14, conforms to EN61010-1 (Pollution degree 2/overvoltage category II) Conforms to VDE0106/P100 (finger protection).
EMC	(EMI) EN61326 Emission Enclosure: EN55011 Group 1 class A Emission AC mains: EN55011 Group 1 class A (EMS) EN61326 Immunity ESD: EN61000-4-2: 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Immunity RF-interference: EN61000-4-3: 10 V/m (Amplitude-modulated, 80 MHz to 1 GHz) (level 3); 10 V/m (Pulse-modulated, 900 MHz ±5 MHz) (level 3) Immunity Conducted Disturbance: EN61000-4-6: 10 V (0.15 to 80 MHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power-line (level 3); 1 kV I/O signal-line (level 4) Immunity Surge: EN61000-4-5: 1 kV line to lines (power and output lines) (level 3); 2 kV line to ground (power and output lines) (level 3) Immunity Voltage Dip/Interruption EN61000-4-11: 0.5 cycle, 100% (rated voltage)
Degree of protection	Panel surface: IP66 and NEMA Type 4 (indoors) (See note 4.)
Weight	H5CX-A□: Approx. 135 g, H5CX-A11□/-L8□: Approx. 105 g

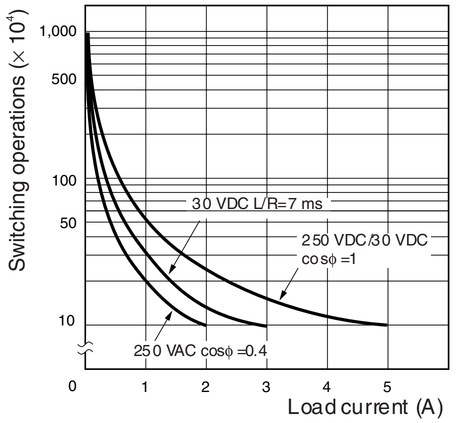
Note 1. The values are based on the set value.

2. The value is applied for a minimum pulse width of 1 ms.

3. To meet UL listing requirements with the H5CX-L8□, an OMRON P2CF-08-□ or P3G-08 Socket must be mounted on the Timer.

4. A waterproof packing is necessary to ensure IP66 waterproofing between the H5CX and installation panel.

■ Life-test Curve (Reference Values)



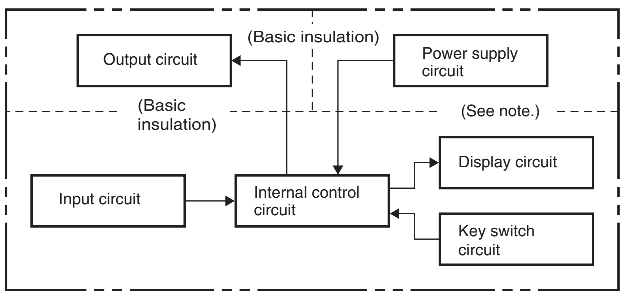
Reference: A maximum current of 0.15 A can be switched at 125 VDC (cosφ=1) and a maximum current of 0.1 A can be switched if L/R is 7 ms. In both cases, a life of 100,000 operations can be expected. The minimum applicable load is 10 mA at 5 VDC (failure level: P).

■ Inrush Current (Reference Values)

Voltage	Applied voltage	Inrush current (peak value)	Time
100 to 240 VAC	264 VAC	5.3 A	0.4 ms
24 VAC/ 12 to 24 VDC	26.4 VAC	6.4 A	1.4 ms
	26.4 VDC	4.4 A	1.7 ms

Connections

■ Block Diagram



Note: Power circuit is not insulated from the input circuit, except for H5CX-A11/-A11S, which have basic insulation.

■ I/O Functions

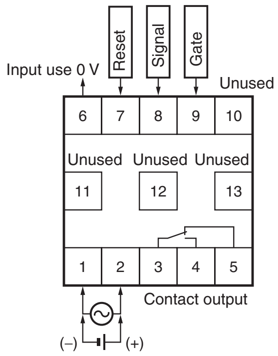
Inputs	**Start signal**	Stops timing in A-2 and A-3 (power ON delay) modes. Starts timing in other modes.
	Reset	Resets present value. (In elapsed time mode, the present value returns to 0; in remaining time mode, the present value returns to the set value.) Count inputs are not accepted and control output turns OFF while reset input is ON. Reset indicator is lit while reset input is ON.
	Gate	Inhibits timer operation.
Outputs	**Control output (OUT)**	Outputs take place according to designated operating mode when timer reaches corresponding set value.

■ Terminal Arrangement

Confirm that the power supply meets specifications before use.

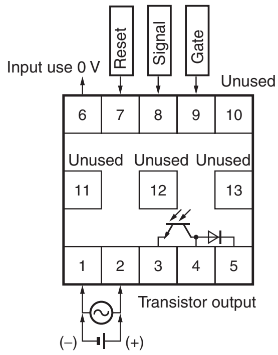
Recommended 24VDC power supply; eg. OMRON S8VS

H5CX-A/-AD



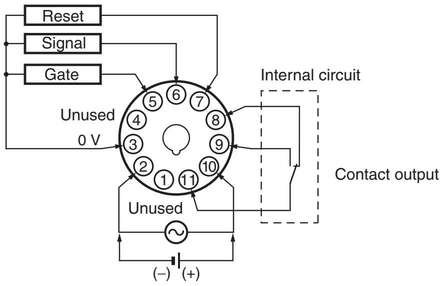
The power supply and input circuit are not insulated.
Terminals 1 and 6 of the H5CX-AD are connected internally.

H5CX-AS/-ASD



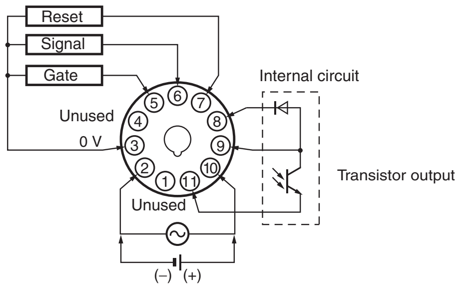
The power supply and input circuit are not insulated.
Terminals 1 and 6 of the H5CX-ASD are connected internally.

H5CX-A11/-A11D



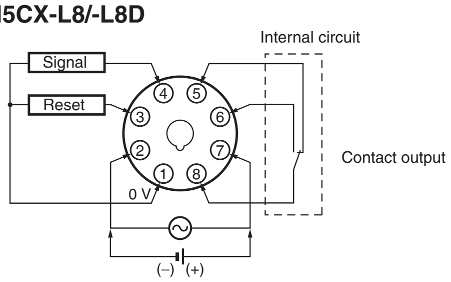
The power supply and input circuit of the H5CX-A11 have basic insulation.
The power supply and input circuit of the H5CX-A11D are not insulated.
Terminals 2 and 3 of the H5CX-A11D are connected internally.

H5CX-A11S/-A11SD



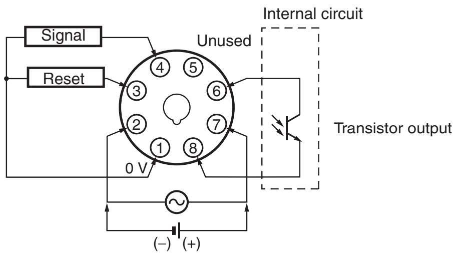
The power supply and input circuit of the H5CX-A11S have basic insulation.
The power supply and input circuit of the H5CX-A11SD are not insulated.
Terminals 2 and 3 of the H5CX-A11SD are connected internally.

H5CX-L8/-L8D



The power supply and input circuit are not insulated.
Terminals 1 and 2 of the H5CX-L8D are connected internally.

H5CX-L8S/-L8SD

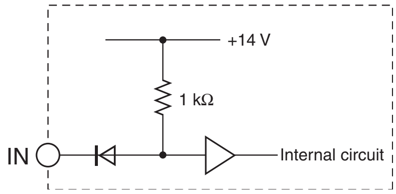


The power supply and input circuit are not insulated.
Terminals 1 and 2 of the H5CX-L8SD are connected internally.

Note: Do not connect unused terminals as relay terminals.

■ Input Circuits

Start, Reset, and Gate Input



■ Input Connections

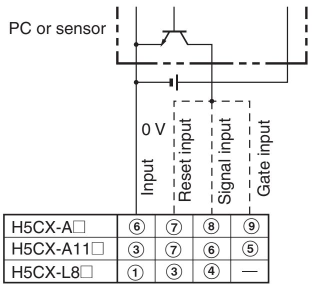
The inputs of the H5CX-A□/-A11□ are no-voltage (short-circuit or open) inputs or voltage inputs.

The input of the H5CX-L8□ is no-voltage input only.

No-voltage Inputs (NPN Inputs)

Open Collector

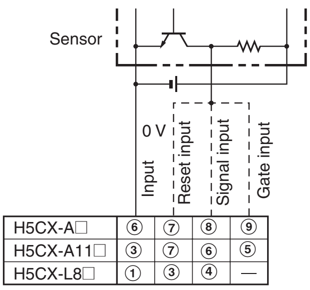
(Connection to NPN open collector output sensor)



Operate with transistor ON

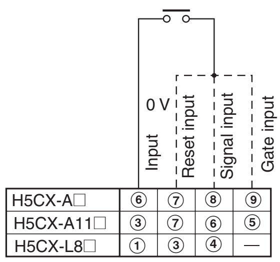
Voltage Output

(Connection to a voltage output sensor)



Operate with transistor ON

Contact Input

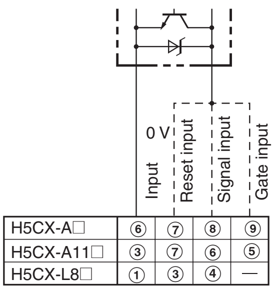


Operate with relay ON

No-voltage Input Signal Levels

No-contact input	Short-circuit level Transistor ON Residual voltage: 3 V max. Impedance when ON: 1 kΩ max. (the leakage current is 5 to 20 mA when the impedance is 0 Ω)
	Open level Transistor OFF Impedance when OFF: 100 kΩ min.
Contact input	Use contact which can adequately switch 5 mA at 10 V Maximum applicable voltage: 30 VDC max.

DC Two-wire Sensor



Operate with transistor ON

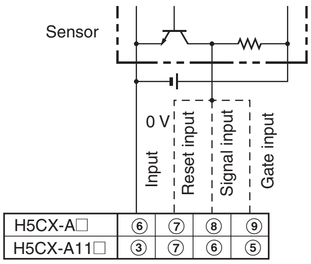
Applicable Two-wire Sensor

Leakage current: 1.5 mA max.
Switching capacity: 5 mA min.
Residual voltage: 3 VDC max.
Operating voltage: 10 VDC

Voltage Inputs (PNP Inputs)

No-contact Input (NPN Transistor)

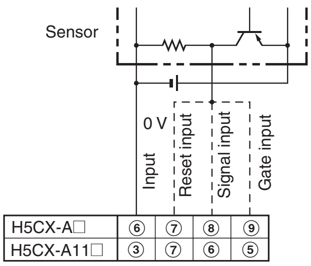
(Connection to NPN open collector output sensor)



Operate with transistor OFF

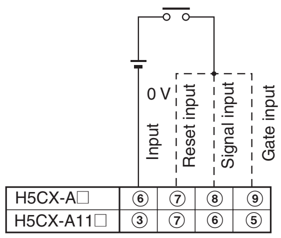
No-contact Input (PNP Transistor)

(Connection to PNP open collector output sensor)



Operate with transistor ON

Contact Input



Operate with relay ON

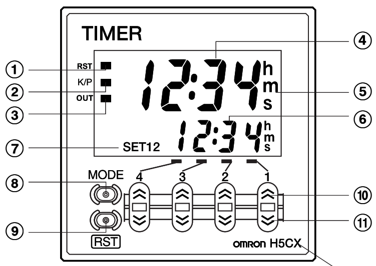
Voltage Input Signal Levels

High level (Input ON):	4.5 to 30 VDC
Low level (Input OFF):	0 to 2 VDC
Maximum applicable voltage:	30 VDC max.
Input resistance:	Approx. 4.7 kΩ

Note: Power circuit is not insulated from the input circuit, except for H5CX-A11/-A11S, which have basic insulation. For wiring, refer to *Precautions.*

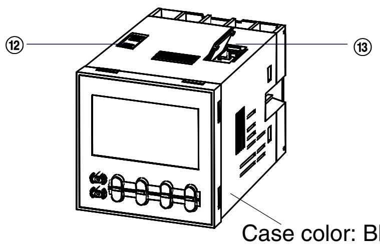
Nomenclature

Indicator
① Reset Indicator (orange)
② Key Protection Indicator (orange)
③ Control Output Indicator (orange)
④ Present Value (red or green (programmable) for H5CX-A models, red for H5CX-A11 /-L models) Character height: 11.5 mm
⑤ Time Unit Display (Color is same as present value.): (If the time range is 0 min, 0 h, 0.0 h, or 0 h 0 min, this display flashes to indicate timing operation.)
⑥ Set Value (green) Character height: 6 mm
⑦ Set Value 1, 2 Display



Front color: Black

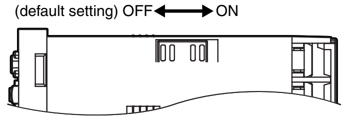
Front View



Case color: Black

Operation Key
⑧ Mode Key (Changes modes and setting items)
⑨ Reset Key (Resets present value and output)
⑩ Up Keys 1 to 4
⑪ Down Keys 1 to 4

Switches
⑫ Key-protect Switch



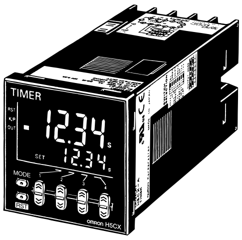
⑬ DIP Switch

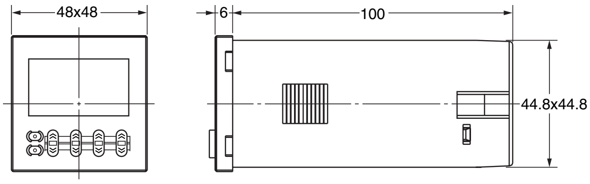
Dimensions

Note: All units are in millimeters unless otherwise indicated.

■ Timer (without Flush Mounting Adapter)

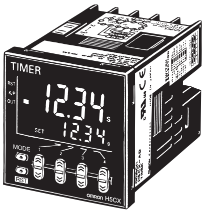
H5CX-A/-AS (Flush Mounting)

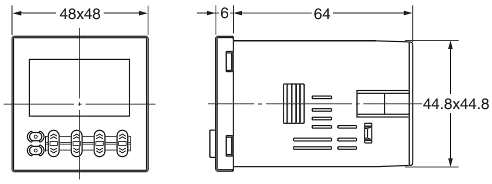




Note: M3.5 terminal screw (effective length: 6 mm)

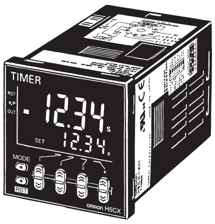
H5CX-AD/-ASD (Flush Mounting)

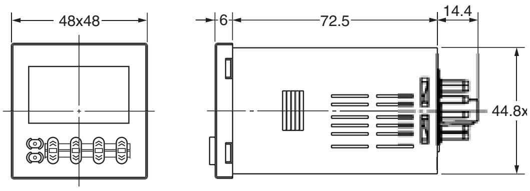




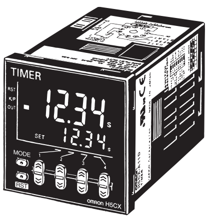
Note: M3.5 terminal screw (effective length: 6 mm)

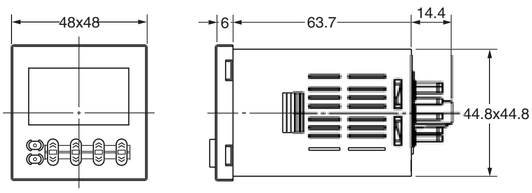
H5CX-A11/-A11S (Flush Mounting/Surface Mounting)



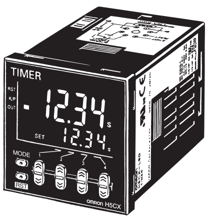


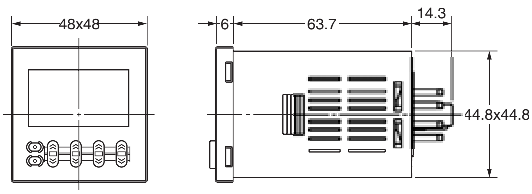
H5CX-A11D/-A11SD (Flush Mounting/Surface Mounting)





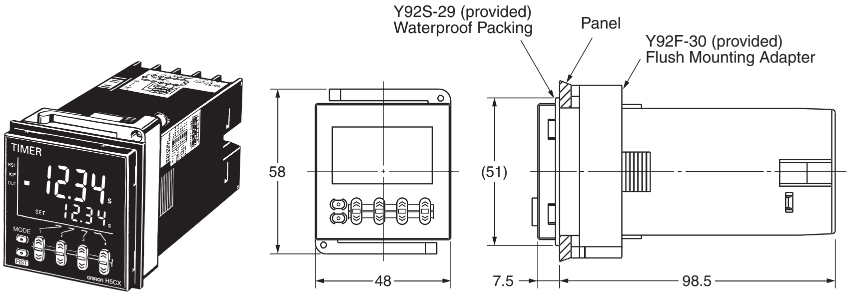
H5CX-L8□ (Flush Mounting/Surface Mounting)



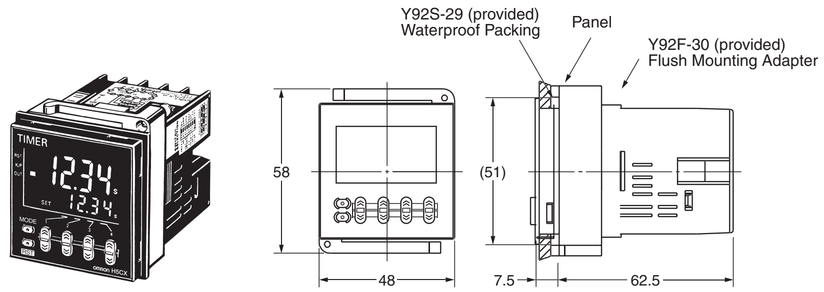


■ Dimensions with Flush Mounting Adapter

H5CX-A/-AS (Provided with Adapter and Waterproof Packing)

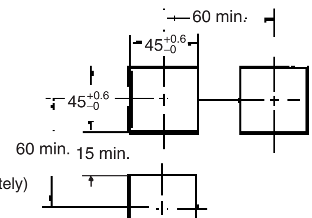


H5CX-AD/-ASD (Provided with Adapter and Waterproof Packing)



Panel Cutouts

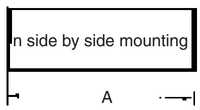
Panel cutouts areas shown below.
(according to DIN43700).



Note 1. The mounting panel thickness should be 1 to 5 mm.

2. To allow easier operability, it is recommended that Adapters are mounted so that the gap between sides with hooks is at least 15 mm.

3. It is possible to mount timers side by side, but only in the direction without the hooks.

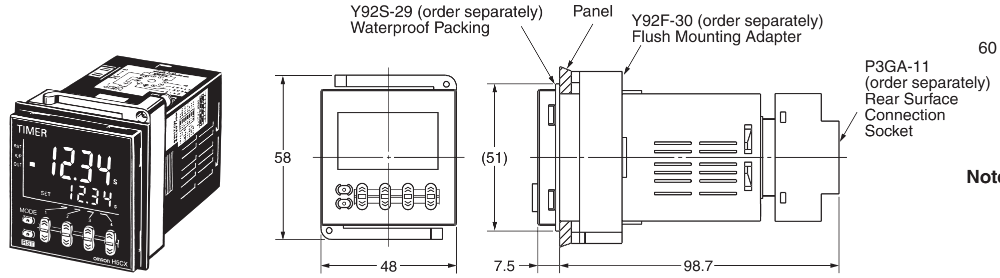


$A = (48n - 2.5)^{+1}_{0}$

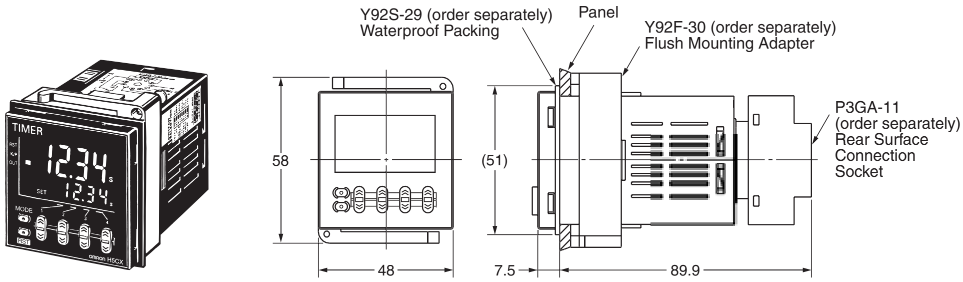
With Y92A-48F1 attached.
$A = \{48n-2.5 + (n-1) \times 4\}^{+1}_{0}$

With Y92A-48 attached.
$A = (51n-5.5)^{+1}_{0}$

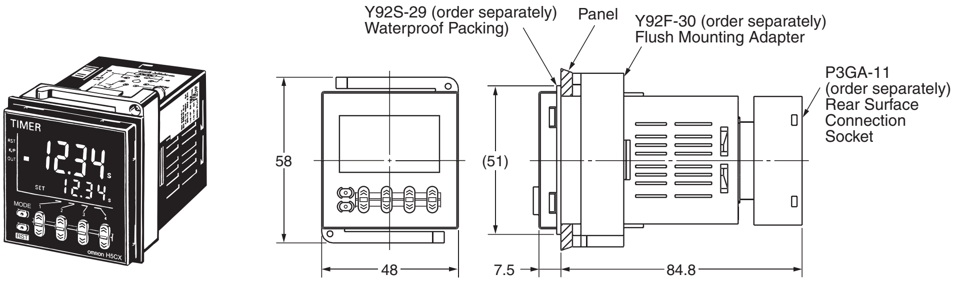
H5CX-A11/-A11S (Adapter and Waterproof Packing Ordered Separately)



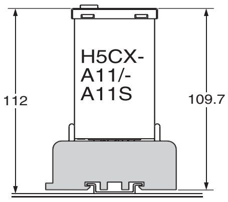
H5CX-A11D/-A11SD (Adapter and Waterproof Packing Ordered Separately)



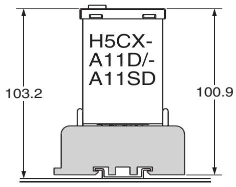
H5CX-L8□ (Adapter and Waterproof Packing Ordered Separately)



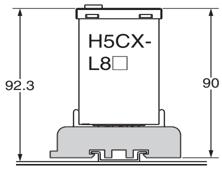
Dimensions with Front Connecting Socket



P2CF-11



P2CF-11



P2CF-08

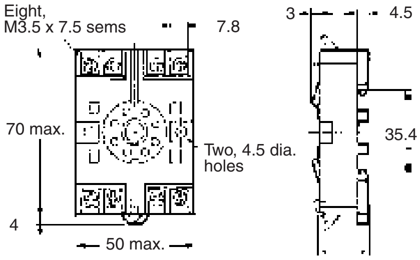
Note: These dimensions vary with the kind of DIN-rail (reference value).

Accessories (Order Separately)

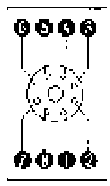
Note: All units are in millimeters unless otherwise indicated.

Track Mounting/Front Connecting Socket

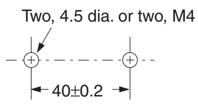
P2CF-08



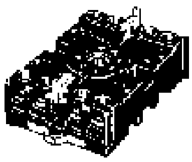
Terminal Arrangement/ Internal Connections (Top View)

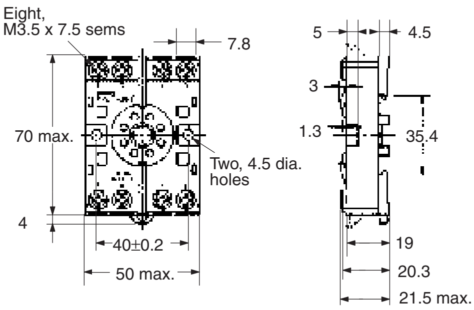


Surface Mounting Holes



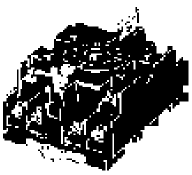
P2CF-08-E (Finger Safe Terminal Type) Conforming to VDE0106/P100

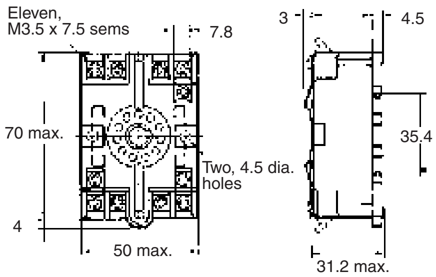




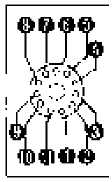
Track Mounting/Front Connecting Socket

P2CF-11

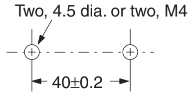




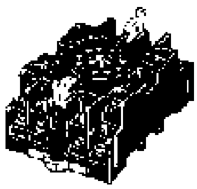
Terminal Arrangement/ Internal Connections (Top View)

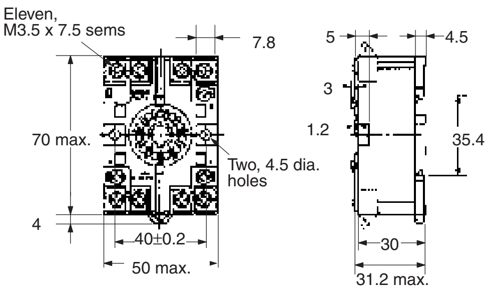


Surface Mounting Holes



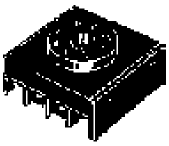
P2CF-11-E (Finger Safe Terminal Type) Conforming to VDE0106/P100

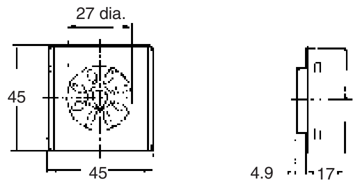




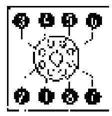
Back Connecting Socket

P3G-08

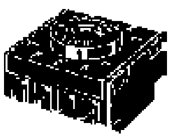


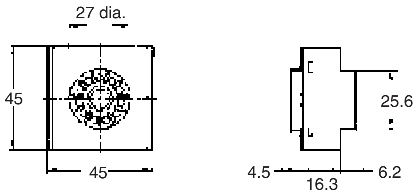


Terminal Arrangement/ Internal Connections (Bottom View)

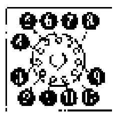


P3GA-11



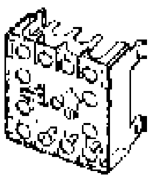


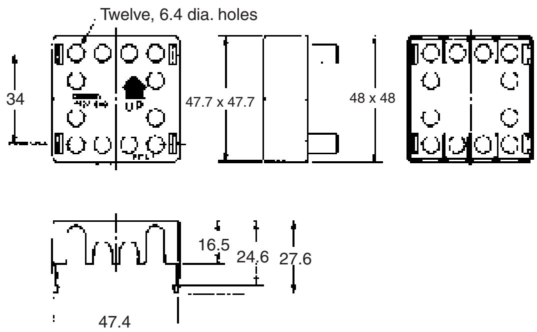
Terminal Arrangement/ Internal Connections (Bottom View)



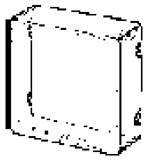
Finger Safe Terminal Cover Conforming to VDE0106/P100

Y92A-48G (Attachment for P3G-08/P3GA-11 Socket)

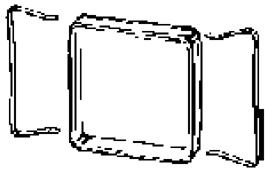




Hard Cover
Y92A-48

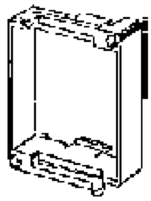


Soft Cover
Y92A-48F1



Flush Mounting Adapter
(provided with H5CX-A□ models)

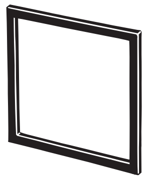
Y92F-30



Note: Order the Flush Mounting Adapter separately if it is lost or damaged.

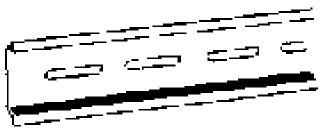
Waterproof Packing
(provided with H5CX-A□ models)

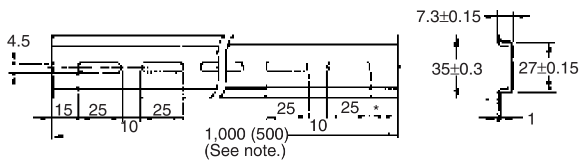
Y92S-29



Note: Order the Waterproof Packing separately if it is lost or damaged. Depending on the operating environment, the Waterproof Packing may deteriorate, contract, or harden and so regular replacement is recommended to ensure NEMA4 compliance.

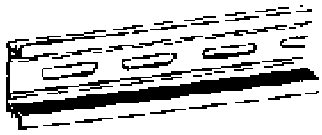
Mounting DIN-rail
PFP-100N, PFP-50N

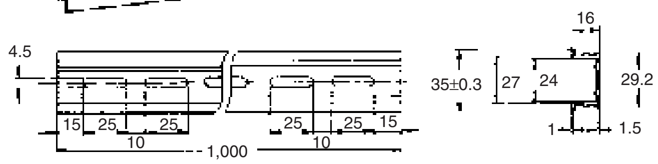




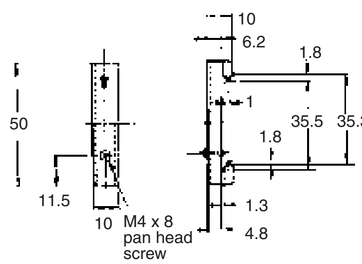
Note: The values shown in parentheses are for the PFP-50N.

PFP-100N2

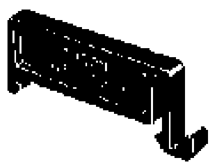


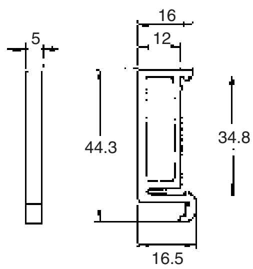


End Plate
PFP-M



Spacer
PFP-S





Precautions

⚠ Caution

Do not use the product in locations subject to flammable or explosive gases. Doing so may result in explosion.

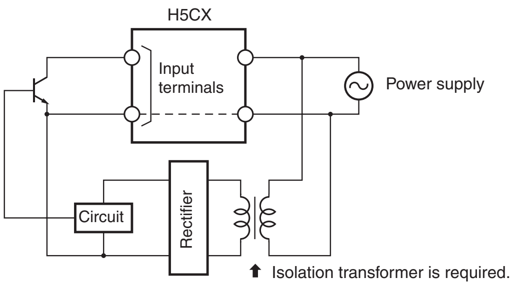
The service life of the output relays depends on the switching capacity and switching conditions. Consider the actual application conditions and use the product within the rated load and electrical service life. Using the product beyond its service life may result in contact deposition or burning.

Do not disassemble, repair, or modify the product. Doing so may result in electric shock, fire, or malfunction.

Do not allow metal objects or conductive wires to enter the product. Doing so may result in electric shock, fire, or malfunction.

■ Power Supplies

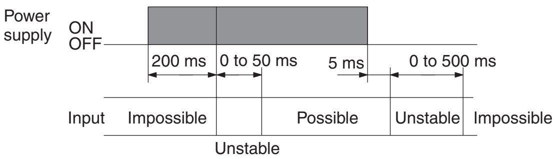
For the power supply of an input device of the H5CX (except for H5CX-A11□), use an isolating transformer with the primary and secondary windings mutually isolated and the secondary winding not grounded.



Make sure that the voltage is applied within the specified range, otherwise the internal elements of the Timer may be damaged.

Do not touch the input terminals while power is supplied. The H5CX (except for H5CX-A11/-A11S) has a transformerless power supply and so touching the input terminals with power supplied may result in electric shock.

When turning the power ON and OFF, input signal reception is possible, unstable, or impossible as shown in the diagram below.



Turn the power ON and OFF using a relay with a rated capacity of 10 A minimum to prevent contact deterioration due to inrush current caused by turning the power ON and OFF.

Apply the power supply voltage through a relay or switch in such a way that the voltage reaches a fixed value immediately, otherwise they may not be reset or a timer error may result.

Be sure that the capacity of the power supply is large enough, otherwise the Timer may not start due to inrush current (approx. 10 A) that may flow for an instant when the Timer is turned on.

Make sure that the fluctuation of the supply voltage is within the permissible range.

■ Timer Control with Power Start

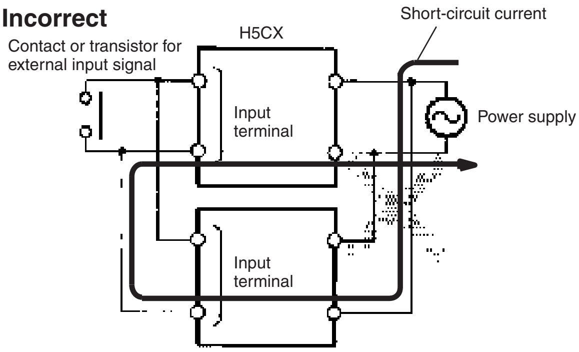
To allow for the startup time of peripheral devices (sensors, etc.), the H5CX starts timing operation between 200 ms to 250 ms after power is turned ON. For this reason, in operations where timing starts from power ON, the time display will actually start from 250 ms. If the set value is 249 ms or less, the time until output turns ON will be a fixed value between 200 and 250. (Normal operation is possible for set value of 250 ms or more.) In applications where a set value of 249 ms or less is required, use start timing with signal input.

When the H5CX is used with power start in F mode (i.e., accumulative operation with output on hold), there will be a timer error (approximately 100 ms each time the H5CX is turned ON) due to the characteristics of the internal circuitry. Use the H5CX with signal start if timer accuracy is required.

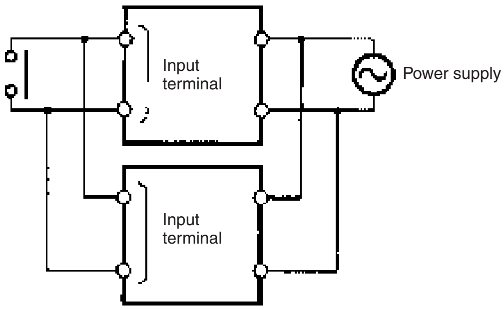
■ Input/Output

The H5CX (except for H5CX-A11/-A11S) uses a transformerless power supply. When connecting a relay or transistor as an external signal input device, pay attention to the following points to prevent short-circuiting due to a sneak current to the transformerless power supply. If a relay or transistor is connected to two or more Timers, the input terminals of those Timers must be wired properly so that they will not differ in phase, otherwise the terminals will be short-circuited to one another.

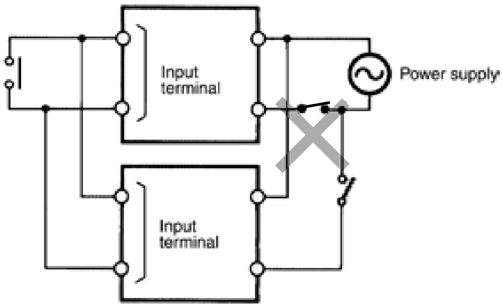
Incorrect



Correct



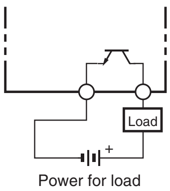
It is impossible to provide two independent power switches as shown below regardless of whether or not the Timers are different in phase.



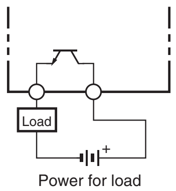
■ Transistor Output

The transistor output of the H5CX is insulated from the internal circuitry by a photocoupler, so the transistor output can be used as both NPN and PNP output.

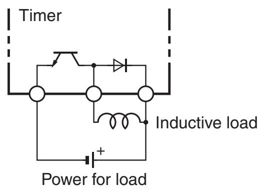
NPN Output



PNP Output



The diode connected to the collector of the output transistor is used to absorb inverted voltage that is generated when an inductive load is connected to the H5CX.



■ Changing the Set Values

When changing the set value during a timing operation, the output will turn ON if the set value is changed as follows because of the use of a constant read-in system:

Elapsed time mode: Present value ≥ set value

Remaining time mode: Elapsed time ≥ set value (The present value is set to 0.)

Note: When in the remaining time mode, the amount the set value is changed is added to or subtracted from the present value.

■ Operation with a Set Value of 0

Operation with a set value of 0 will vary with the output mode. Refer to the *Timing Charts*.

■ DIP Switch Setting

Ensure that the power is turned OFF before changing DIP switch settings. Changing DIP switch settings with the power turned ON may result in electric shock due to contact with terminals subject to high voltages.

■ Power Failure Backup

All data is stored in the EEPROM when there is a power failure. The EEPROM can be overwritten more than 100,000 times.

Operating mode	Overwriting timing
A-3, F mode	When power is turned OFF.
Other mode	When settings are changed.

■ Response Delay Time When Resetting (Transistor Output)

The following table shows the delay from when the reset signal is input until the output is turned OFF.

(Reference value)

Minimum reset signal width	Output delay time
1 ms	0.8 to 1.2 ms
20 ms	15 to 25 ms

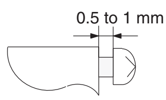
■ Wiring

Be sure to wire the Timer with the correct polarity.

■ Mounting

Tighten the two mounting screws on the Adapter. Tighten them alternately, a little at a time, so as to keep them at an equal tightness.

The H5CX's panel surface is water-resistive (conforming to NEMA 4 and IP66). In order to prevent the internal circuit from water penetration through the space between the timer and operating panel, attach a waterproof packing between the timer and installation panel and secure the waterproof packing with the Y92F-30 flush-mounting adapter.



It is recommended that the space between the screw head and the adapter should be 0.5 to 1 mm.

■ Self-diagnostic Function

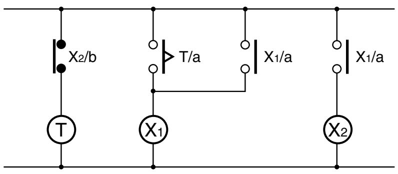
The following displays will appear if an error occurs.

Main display	Sub-display	Error	Output status	Correction method	Set value after reset
E1	Not lit	CPU	OFF	Either press the reset key or reset the power supply.	No change
E2	Not lit	Memory error (RAM)	OFF	Reset the power supply.	No change
E2	SUM	Memory error (EEP) (See note)	OFF	Reset to the factory settings using the reset key.	0

Note: This includes times when the life of the EEPROM has expired.

■ Operating Environment

- Use the product within the ratings specified for submerging in water, and exposure to oil.
- Do not use the product in locations subject to vibrations or shocks. Using the product in such locations over a long period may result in damage due to stress.
- Do not use the product in locations subject to dust, corrosive gases, or direct sunlight.
- Separate the input signal devices, input signal cables, and the product from the source of noise or high-tension cables producing noise.
- Separate the product from the source of static electricity when using the product in an environment where a large amount of static electricity is produced (e.g., forming compounds, powders, or fluid materials being transported by pipe).
- Organic solvents (such as paint thinner), as well as very acidic or basic solutions might damage the outer casing of the Timer.
- Use the product within the ratings specified for temperature and humidity.
- Do not use the product in locations where condensation may occur due to high humidity or where temperature changes are severe.
- Store at the specified temperature. If the H5CX has been stored at a temperature of less than –10°C, allow the H5CX to stand at room temperature for at least 3 hours before use.
- Leaving the H5CX with outputs ON at a high temperature for a long time may hasten the degradation of internal parts (such as electrolytic capacitors). Therefore, use the product in combination with relays and avoid leaving the product as long as more than 1 month with the output turned ON.



Ⓧ Auxiliary relay
(e.g., MY Relay)

■ Insulation

There is no insulation between power supply and input terminals (except for H5CX-A11/-A11S).

Basic insulation between power supply and output terminals, and between input terminals and output terminals.

Input and output terminals are connected to devices without exposed charged parts.

Input and output terminals are connected to devices with basic insulation that is suitable for the maximum operating voltage.

Operating Procedures

■ Setting Procedure Guide

Settings for Timer Operation

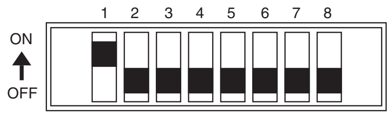
Use the following settings for all models except the H5CX-L8□.
Refer to page C-143 for the H5CX-L8□.

When Using Basic Functions Only

Basic Functions

- Time range (0.001 s to 999.9 h, except 9999 h and 9999min)
- Output mode (A, A-2, E, F)
- Timer mode (UP/DOWN)
- Input signal width (20 ms/1 ms)

The settings can be performed easily with the DIP switch.
➨For details on the setting methods, refer to page C-142.



When Using Other Time Ranges (9999 h, 9999 min) and Output Modes (A-1, A-3, b, b-1, d, and Z)

All the functions can be set with the operation keys.
➨For details on the setting methods, refer to page C-143.

When Using More Detailed Setting Items (Output Time, NPN/PNP Input Mode, Display Color, Key Protect Level)

Setting for items other than the basic functions can be performed with the operation keys.
➨For details on the setting methods, refer to page C-143.

Note: At the time of delivery, the H5CX is set for timer operation.

Settings for Twin Timer Operation

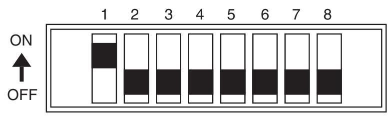
Use the following settings for all models except the H5CX-L8□.
Refer to page C-150 for the H5CX-L8□.

When Using Basic Functions Only

Basic Functions

- Time range (0.01 s to 99 min 59 s)
- ON/OFF start mode (flicker OFF start/flicker ON start)
- Timer mode (UP/DOWN)
- Input signal width (20 ms/1 ms)

The settings can be performed easily with the DIP switch.
➨For details on the setting methods, refer to page C-149.



When Using Other Time Ranges (999.9 min, 9999 min, 99 h 59 min, 999.9 h, 9999 h, 9.999 s)

All the functions can be set with the operation keys.
➨For details on the setting methods, refer to page C-150.

When Using More Detailed Setting Items (NPN/PNP Input Mode, Display Color, Key Protect Level)

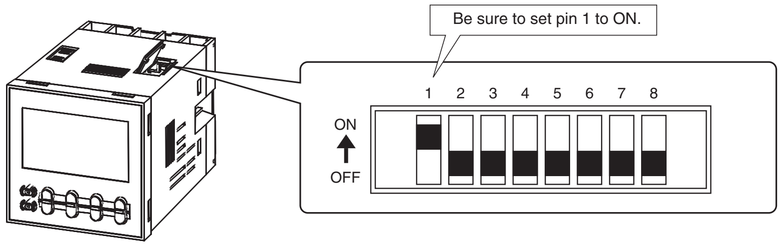
Setting for items other than the basic functions can be performed with the operation keys.
➨For details on the setting methods, refer to page C-150.

Note: At the time of delivery, the H5CX is set for timer operation.

■ Operating Procedures (Timer Function)

Settings for Basic Functions

Settings for basic functions can be performed with just the DIP switch.



	Item	OFF	ON
1	DIP switch settings enable/ disable	Disabled	Enabled
2	Time range	Refer to the table on the right.	
3			
4			
5	Output mode	Refer to the table on the right.	
6			
7	Timer mode	Elapsed time (UP)	Remaining time (DOWN)
8	Input signal width	20 ms	1 ms

Note: All the pins are factory-set to OFF.

Pin 2	Pin 3	Pin 4	Time range
ON	ON	ON	0.001 s to 9.999 s
OFF	OFF	OFF	0.01 s to 99.99 s
ON	OFF	OFF	0.1 s to 999.9 s
OFF	ON	OFF	1 s to 9999 s
ON	ON	OFF	0 min 01 s to 99 min 59 s
OFF	OFF	ON	0.1 min to 999.9 min
ON	OFF	ON	0 h 01 min to 99 h 59 min
OFF	ON	ON	0.1 h to 999.9 h

Pin 5	Pin 6	Output mode
OFF	OFF	A mode (signal ON delay (I): power reset operation)
ON	OFF	A-2 mode: (power ON delay (I): power reset operation)
OFF	ON	E mode (interval: power reset operation)
ON	ON	F mode (accumulative: power hold operation)

Easy Confirmation of Switch Settings Using Indicators

The ON/OFF status of the DIP switch pins can be confirmed using the front display. For details, refer to page 153.

Note 1. Be sure to set pin 1 of the DIP switch to ON. If it is set to OFF, the DIP switch settings will not be enabled.

2. Changes to DIP switch settings are enabled when the power is turned ON. (Perform DIP switch settings while the power is OFF.)

3. There is no DIP switch on the H5CX-L8□. For details on the setting methods, refer to page C-143.

4. When using time ranges or output modes that cannot be set with the DIP switch, all of the settings have to be made using the operation keys. For details on the setting methods, refer to page C-143.

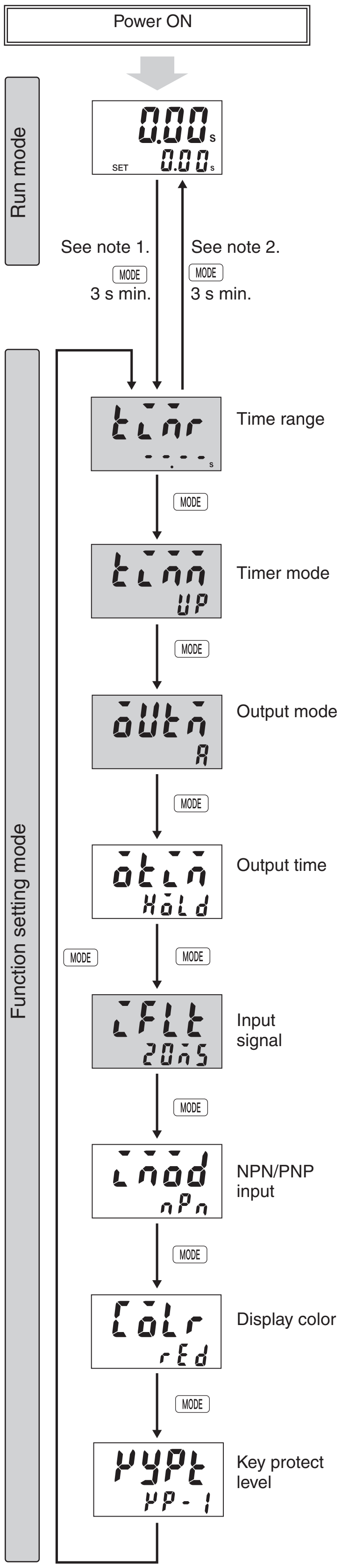
Detailed Settings

After making DIP switch settings for basic functions, detailed settings (see note) can be added using the operation keys.
For details, refer to page C-143.

Note: Output time, NPN/PNP input mode, display color, key protect level.

Settings for Advanced Functions

Settings that cannot be performed with the DIP switch are performed with the operation keys.



For details on operations in run mode, refer to page C-145.

Note 1. If the mode is switched to the function setting mode during operation, operation will continue.

2. Changes made to settings in function setting mode areenabled for the first time when the mode is changed to run mode. Also, when settings are changed, the timer is reset (time initialized and output turned OFF).

The characters displayed in reverse video are the default settings.

When performing settings with operation keys only, set pin1 of the DIP switch to OFF (factory setting). If pin 1 of the DIP switch is set to ON, the setting items indicated in ■ will not be displayed.

Set the time range using the ⌃⌄ keys.

--.--s ↔ ---.-s ↔ ----s ↔ ...... ↔ ----h ↔ -.---s

For details, refer to *Time Range List* below.

Set the timer mode using the ⌃⌄ keys.

UP ↔ doWn
(Elapsed time) (Remaining time)

Set the output mode using the ⌃⌄ keys.

A ↔ A-1 ↔ A-2 ↔ A-3 ↔ b ↔ b-1 ↔ d ↔ E ↔ F ↔ Z
(A) (A-1) (A-2) (A-3) (b) (b-1) (d) (E) (F) (Z)

Set each digit for the output time using the corresponding ⌃⌄ keys.

0 ↔ 1 ↔ 2 ↔ 3 ↔ 4 ↔ 5 ↔ 6 ↔ 7 ↔ 8 ↔ 9

HoLd/0.01～99.99 : Output hold/0.01 to 99.99 s

(If the output time is set to 0.00, HoLd is displayed.)
Displayed for modes A, A-1, A-2, A-3, b, and b-1 only.

Set the input signal width using the ⌃⌄ keys.

20mS ↔ 1mS
(20 ms) (1 ms)

Set the NPN/PNP input mode using the ⌃⌄ keys.

nPn ↔ PnP
(NPN input) (PNP input)

Only displayed for H5CX-A□ and H5CX-A11□ models.

Set the display color using the ⌃⌄ keys.

rEd ↔ Grn ↔ r-G ↔ G-r
(Red) (Green) Red-green Green-red

Displayed for terminal-block models (H5CX-A□) only.

Set the key protect level using the ⌃⌄ keys.

KP-1 ↔ KP-2 ↔ KP-3 ↔ KP-4 ↔ KP-5
(KP-1) (KP-2) (KP-3) (KP-4) (KP-5)

Time Range List

Display	Set Value
--.-- s	0.01 s to 99.99 s (default setting)
---.- s	0.1 s to 999.9 s
---- s	1 s to 9999 s
--:-- m s	0 min 01 s to 99 min 59 s
---.- m	0.1 min to 999.9 min
---- m	1 min to 9999 min
--:-- h m	0 h 01 min to 99 h 59 min
---.- h	0.1 h to 999.9 h
---- h	1 h to 9999 h
-.--- s	0.001 s to 9.999 s

Explanation of Functions

Time Range (timr) (Setting possible using DIP switch.)

Set the range to be timed in the range 0.000 s to 9,999 h. Settings of type ---- h (9,999 h) and ---- min (9,999 min) cannot, however, be made with the DIP switch. Use the operation keys if these settings are required.

Timer Mode (timm) (Setting possible using DIP switch.)

Set either the elapsed time (UP) or remaining time (DOWN) mode.

Output Mode (outm) (Setting possible using DIP switch.)

Set the output mode. The possible settings are A, A-1, A-2, A-3, b, b-1, d, E, F, and Z. Only output modes A, A-2, E, and F can be set using the DIP switch. Use the operation keys if a different setting is required. (For details on output mode operation, refer to “Timing Charts” on page C-146.)

Output Time (otim)

When using one-shot output, set the output time for one-shot output (0.01 to 99.99 s). One-shot output can be used only if the selected output mode is A, A-1, A-2, b, or b-1. If the output time is set to 0.00, hold is displayed, and the output is held.

Input Signal Width (iflt) (Setting possible using DIP switch.)

Set the minimum signal input width (20 ms or 1 ms) for signal, reset, and gate inputs. The same setting is used for all external inputs (signal, reset, and gate inputs). If contacts are used for the input signal, set the input signal width to 20 ms. Processing to eliminate chattering is performed for this setting.

NPN/PNP Input Mode (imod)

Select either NPN input (no-voltage input) or PNP input (voltage input) as the input format. The same setting is used for all external inputs. For details on input connections, refer to “Input Connections” on page C-131.

Display Color (colr)

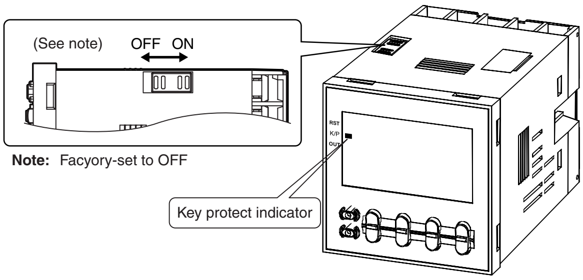
Set the color used for the present value.

	Output OFF	Output ON
red	Red (fixed)	
grn	Green (fixed)	
r-g	Red	Green
g-r	Green	Red

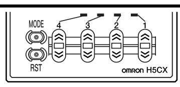
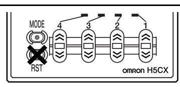
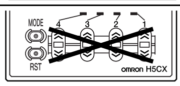
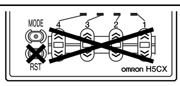
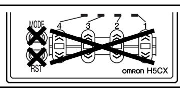
Key Protect Level (kypt)

Set the key protect level.

When the key-protect switch is set to ON, it is possible to prevent setting errors by prohibiting the use of certain operation keys by specifying the key protect level (KP-1 to KP-5). The key protect indicator is lit while the key-protect switch is set to ON.



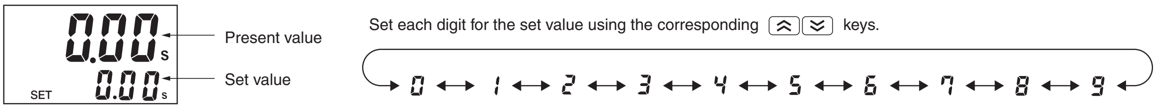
Note: Facyory-set to OFF

Level	Meaning	Details			
		Changing mode (See note.)	Switching display during operation	Reset key	Up/down key
KP-1 (default setting)		No	Yes	Yes	Yes
KP-2		No	Yes	No	Yes
KP-3		No	Yes	Yes	No
KP-4		No	Yes	No	No
KP-5		No	No	No	No

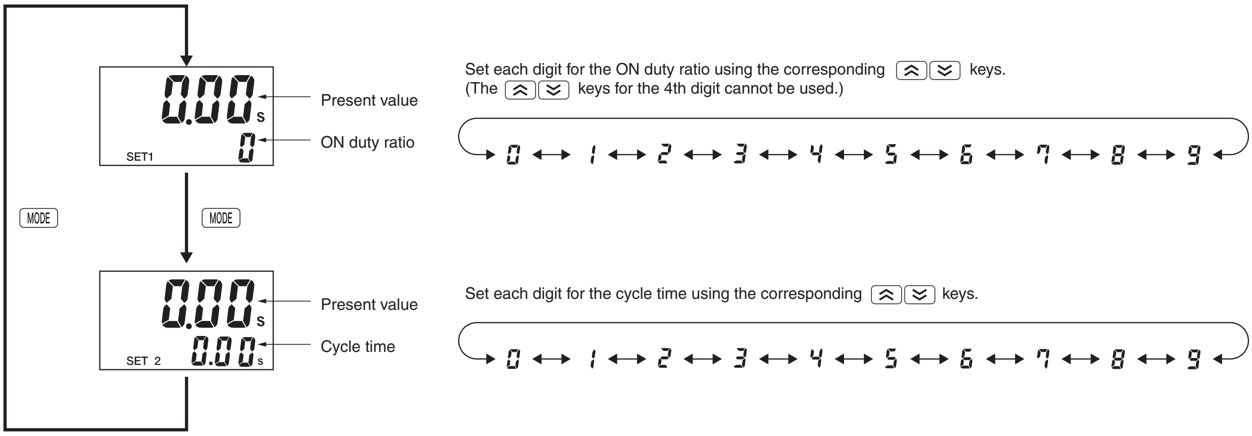
Note: Changing mode to timer/twin timer selection mode (MODE + ⩓1 1 s min.) or function setting mode (MODE 3 s min.).

Operation in Run Mode

When Output Mode Is Not Z



When Output Mode Z Is Selected



Present Value and Set Value

These items are displayed when the power is turned ON. The present value is displayed in the main display and the set value is displayed in the sub-display. The values displayed will be determined by the settings made for the time range and the timer mode in function setting mode.

Present Value and ON Duty Ratio (Output Mode = Z)

The present value is displayed in the main display and the ON duty ratio is displayed in the sub-display. “SET1” lights at the same time.

Set the ON duty ratio used in ON/OFF-duty adjustable flicker mode (Z) as a percentage.

If a cycle time is set, cyclic control can be performed in ON/OFF-duty adjustable flicker mode simply by changing the ON duty ratio.

$$\text{ON time} = \text{Cycle time} \times \frac{\text{ON duty ratio (\%)}}{100}$$

The output accuracy will vary with the time range, even if the ON duty ratio setting is the same. Therefore, if fine output time adjustment is required, it is recommended that the time range for the cycle time is set as small as possible.

Examples:

1. If the cycle time is 20 s, the ON duty ratio is 31%, and the time range is 1 s to 9999 s, the ON time is given by the following:

   $20\text{ (s)} \times \frac{31\text{ (\%)}}{100} = 6.2\text{ (s)} \rightarrow$ Rounded off to the nearest integer

   (because of the time range setting) → ON time = 6 s
2. If the cycle time is 20.00 s, the ON duty ratio is 31%, and the time range is 0.01 s to 99.99 s, the ON time is given by the following:

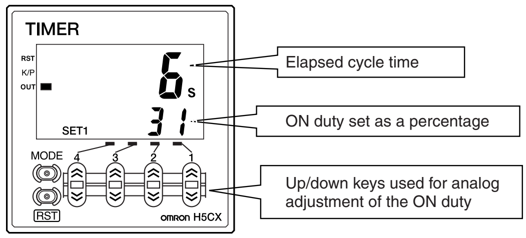
   $20.00\text{ (s)} \times \frac{31\text{ (\%)}}{100} = 6.200\text{ (s)} \rightarrow$ Rounded off to 2 decimal places

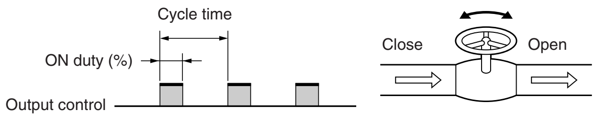
   (because of the time range setting) → ON time = 6.20 s

Present Value and Cycle Time (Output Mode = Z)

The present value is displayed in the main display and the cycle time is displayed in the sub-display. “SET2” lights at the same time.

Set the cycle time used in ON/OFF-duty adjustable flicker mode (Z).



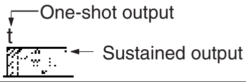


Opening/closing valve	Fully closed↔Fully open
ON duty	0%↔100%

Timing Charts

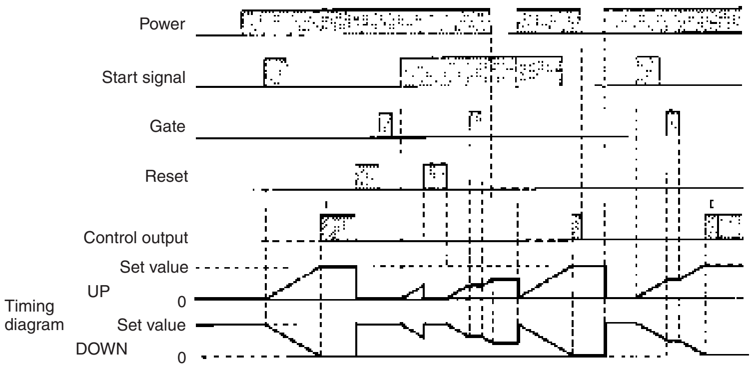
Timer Operation

The gate input is not included in the H5CX-L8☐ models.



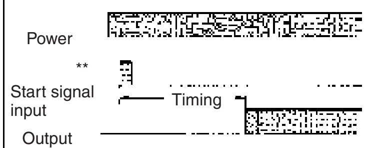
Either one-shot output or sustained output can be selected.

Output mode A: Signal ON delay 1 (Timer resets when power comes ON.)



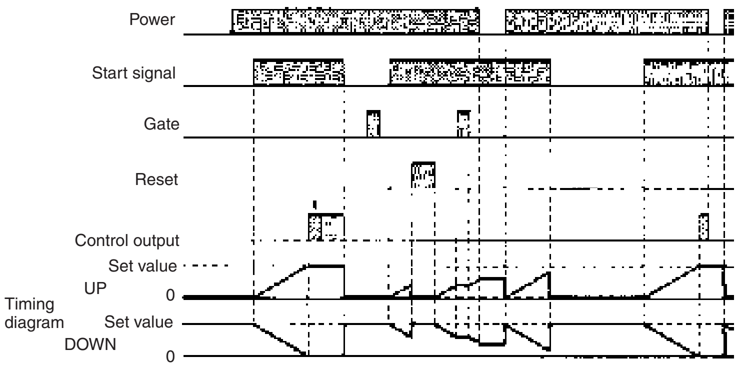
Timing starts when the start signal goes ON.
While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.
The control output is controlled using a sustained or one-shot time period.

Basic Operation



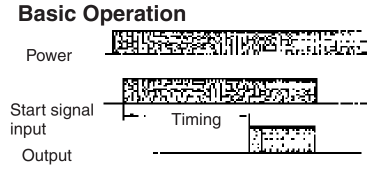
* Output is instantaneous when setting is 0.
** Start signal input is disabled during timing.

Output mode A-1: Signal ON delay 2 (Timer resets when power comes ON.)



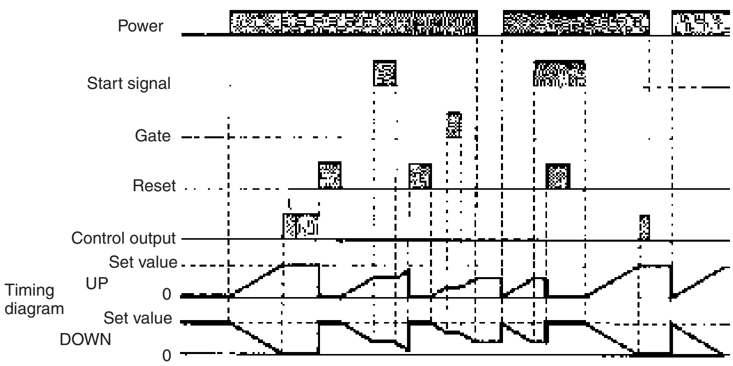
Timing starts when the start signal goes ON, and is reset when the start signal goes OFF.
While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.
The control output is controlled using a sustained or one-shot time period.

Basic Operation



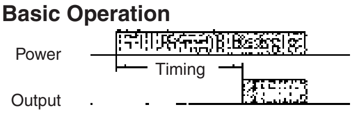
*Output is instantaneous when setting is 0.

Output mode A-2: Power ON delay 1 (Timer resets when power comes ON.)



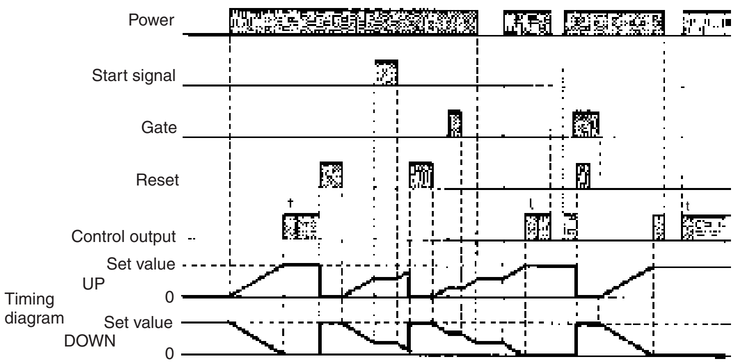
Timing starts when the reset input goes OFF.
The start signal disables the timing function (i.e., same function as the gate input).
The control output is controlled using a sustained or one-shot time period.

Basic Operation



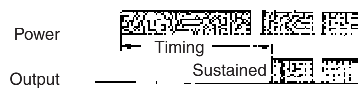
*Output is instantaneous when setting is 0.

Output mode A-3: Power ON delay 2 (Timer does not reset when power comes ON.)



Timing starts when the reset input goes OFF.
The start signal disables the timing function (i.e., same function as the gate input).
The control output is controlled using a sustained or one-shot time period.

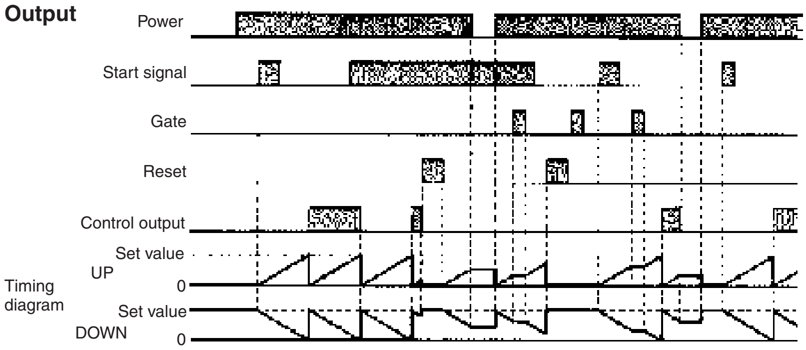
Basic Operation



*Output is instantaneous when setting is 0.

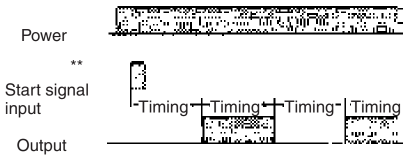
Output mode b: Repeat cycle 1 (Timer resets when power comes ON.)

Sustained Output



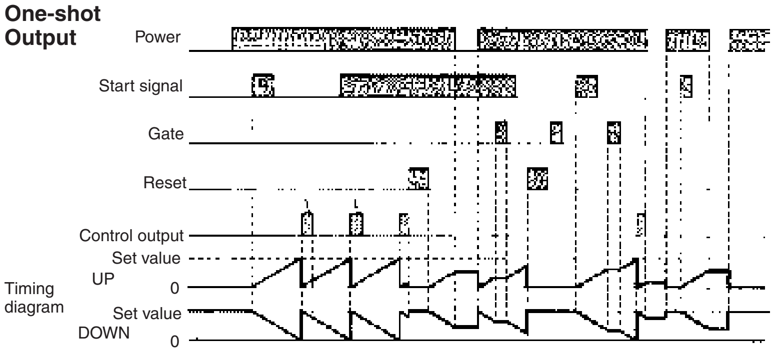
Timing starts when the start signal goes ON.
The status of the control output is reversed when time is up (OFF at start).
While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.

Basic Operation



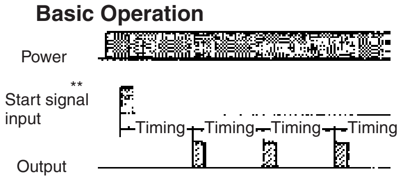
* Normal output operation will not be possible if the set time is too short.
Set the value to at least 100 ms (contact output type).
** Start signal input is disabled during timing.

One-shot Output



Timing starts when the start signal goes ON.
The control output is turned ON when time is up.
While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.

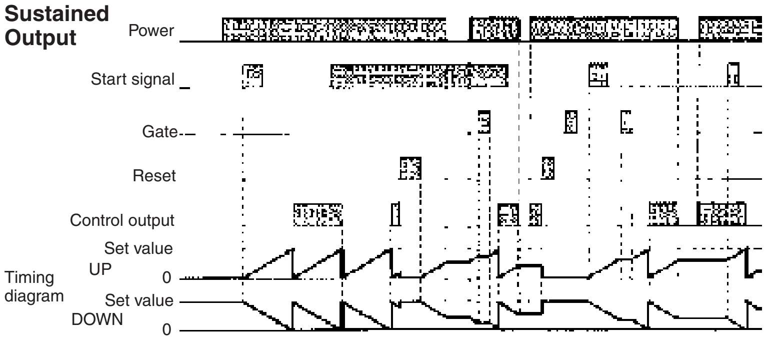
Basic Operation



* Normal output operation will not be possible if the set time is too short.
Set the value to at least 100 ms (contact output type).
** Start signal input is disabled during timing.

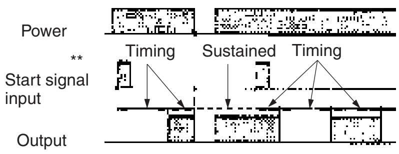
Output mode b-1: Repeat cycle 2 (Timer does not reset when power comes ON.)

Sustained Output



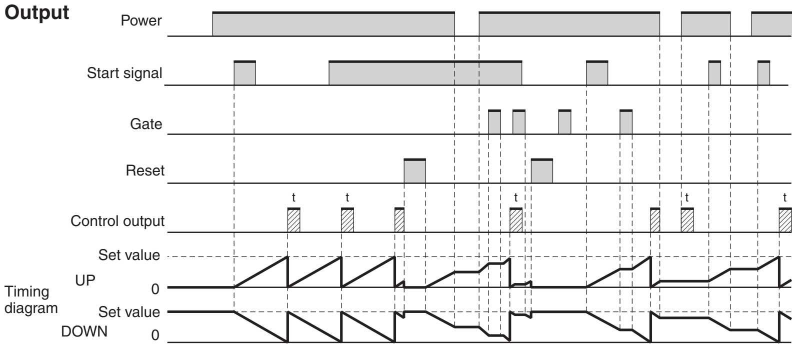
Timing starts when the start signal goes ON.
The status of the control output is reversed when time is up (OFF at start).
While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.

Basic Operation



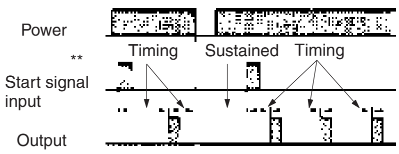
* Normal output operation will not be possible if the set time is too short.
Set the value to at least 100 ms (contact output type).
** Start signal input is disabled during timing.

One-shot Output



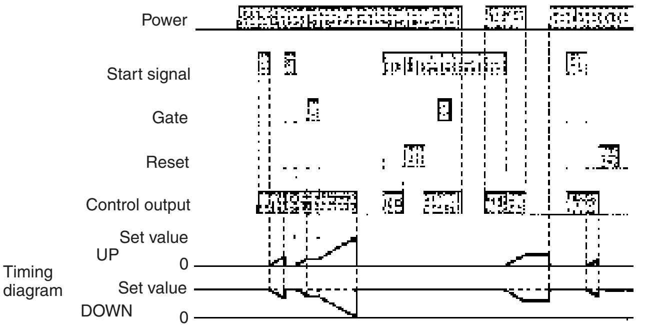
Timing starts when the start signal goes ON.
The control output comes ON when time is up.
While the start signal is ON, the timer starts when power comes ON or when the reset input goes OFF.

Basic Operation



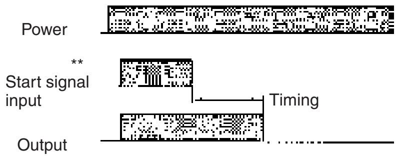
* Normal output operation will not be possible if the set time is too short.
Set the value to at least 100 ms (contact output type).
** Start signal input is disabled during timing.

Output mode d: Signal OFF delay (Timer resets when power comes ON.)



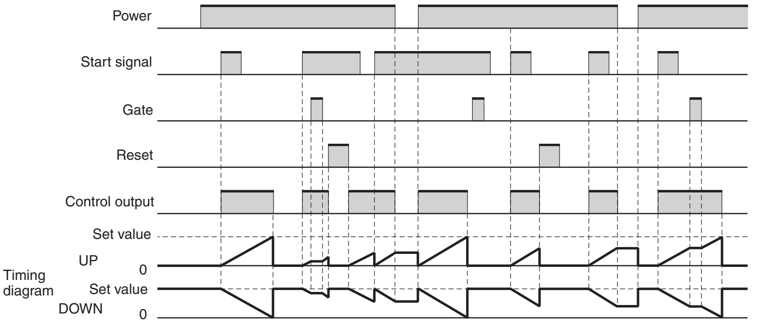
The control output is ON when the start signal is ON (except when the power is OFF or the reset is ON).
The timer is reset when the time is up.

Basic Operation



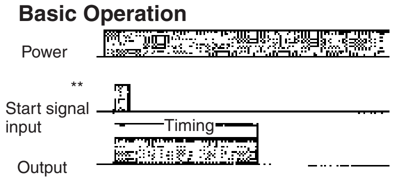
* Output functions only during start signal input when setting is 0.
** Start signal input is enabled during timing.

Output mode E: Interval (Timer resets when power comes ON.)



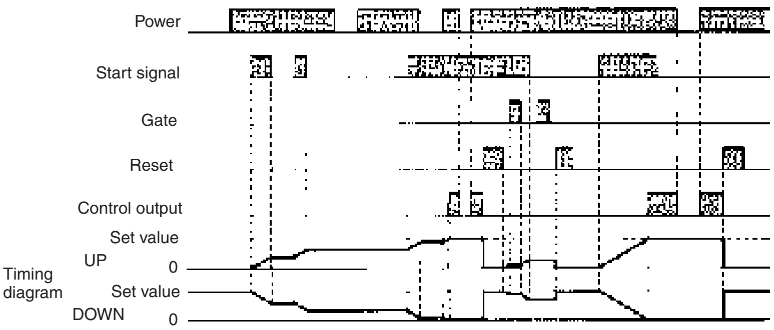
Timing starts when the start signal comes ON.
The control output is reset when time is up.
While the start signal is ON, the timer starts when power comes ON or when the reset input goes OFF.

Basic Operation



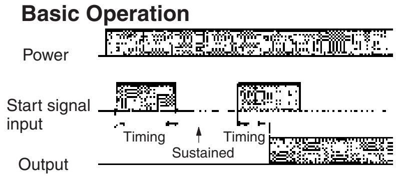
* Output is disabled when the setting is 0.
** Start signal input is enabled during timing.

Output mode F: Cumulative (Timer does not reset when power comes ON.)



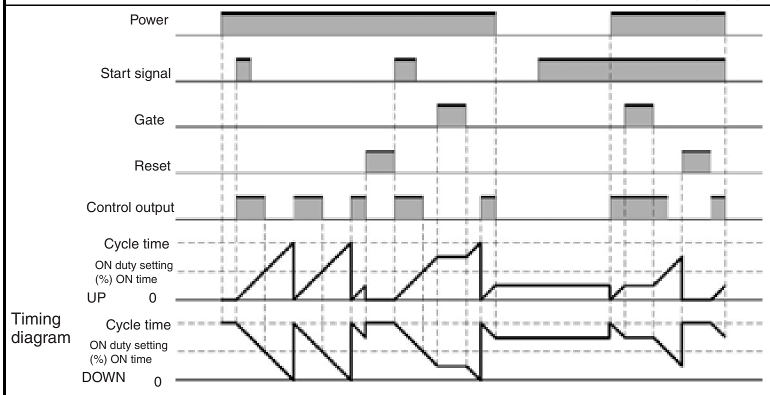
Start signal enables timing (timing is stopped when the start signal is OFF or when the power is OFF).
A sustained control output is used.

Basic Operation



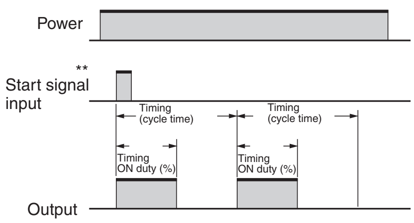
*Output is instantaneous when setting is 0.

Z mode: ON/OFF-duty adjustable flicker



Timing starts when the start signal goes ON.
The status of the control output is reversed when time is up (ON at start).
While the start signal is ON, the timer starts when power comes ON or when the reset input goes OFF.

Basic Operation



* Normal output operation will not be possible if the set time is too short.
Set the value to at least 100 ms (contact output type).
** Start signal input is disabled during timing.

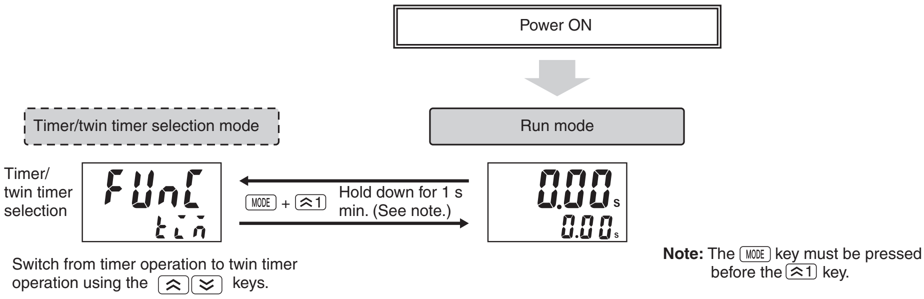
Z Mode

Output quantity can be adjusted by changing the cycle time set in the adjustment level to 1 and by changing the ON duty (%) set value.
The set value shows the ON duty (%) and can be set to a value between 0 and 100 (%). When the cycle time is 0, the output will always be OFF. When the cycle time is not 0 and when ON duty has been set to 0 (%), the output will always be OFF. When ON duty has been set to 100 (%), the output will always be ON.

■ Operating Procedures (Twin Timer Function)

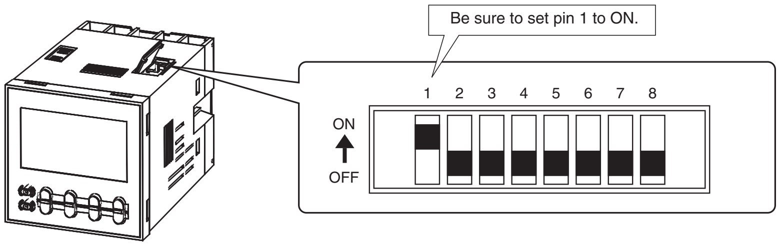
Switching from Timer to Twin Timer

The H5CX is factory-set for timer operation. To switch to twin timer operation, use the procedure given below. For details, refer to page C-154.



Settings for Basic Functions

Settings for basic functions can be performed with just the DIP switch.



	Item	OFF	ON
1	DIP switch settings enable/ disable	Disabled	Enabled
2	OFF time range	Refer to the table on the right.	
3			
4	ON time range	Refer to the table on the right.	
5			
6	ON/OFF start mode	Flicker OFF start	Flicker ON start
7	Timer mode	UP	DOWN
8	Input signal width	20 ms	1 ms

Note: All the pins are factory-set to OFF.

Pin 2	Pin 3	OFF time range
OFF	OFF	0.01 s to 99.99 s
ON	OFF	0.1 s to 999.9 s
OFF	ON	1 s to 9999 s
ON	ON	0 min 01 s to 99 min 59 s

Pin 4	Pin 5	ON time range
OFF	OFF	0.01 s to 99.99 s
ON	OFF	0.1 s to 999.9 s
OFF	ON	1 s to 9999 s
ON	ON	0 min 01 s to 99 min 59 s

Easy Confirmation of Switch Settings Using Indicators
The ON/OFF status of the DIP switch pins can be confirmed using the front display. For details, refer to page C-153.

Note 1. Be sure to set pin 1 of the DIP switch to ON. If it is set to OFF, the DIP switch settings will not be enabled.
2. Changes to DIP switch settings are enabled when the power is turned ON. (Perform DIP switch settings while the power is OFF.)
3. There is no DIP switch on the H5CX-L8□. For details on the setting methods, refer to page C-150.
4. When using time ranges that cannot be set with the DIP switch, all of the settings have to be made using the operation keys. For details on the setting methods, refer to page C-150.

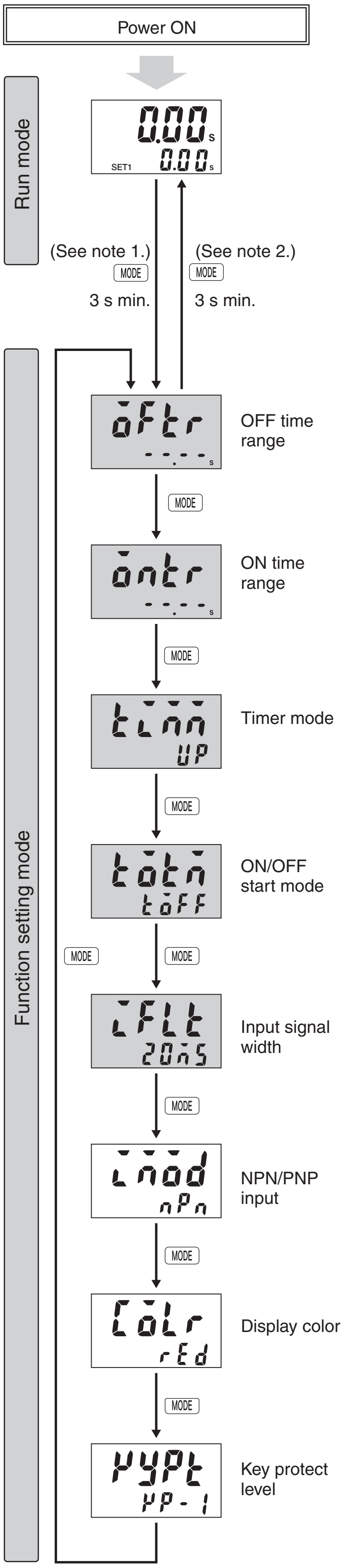
Detailed Settings

After making DIP switch settings for basic functions, detailed settings (see note) can be added using the operation keys. For details, refer to page C-150.

Note: NPN/PNP input mode, display color, key protect level.

Settings for Advanced Functions

Settings that cannot be performed with the DIP switch are performed with the operation keys.



For details on operations in run mode, refer to page C-152.

Note 1. If the mode is switched to the function setting mode dur-ing operation, operation will continue.

2. Changes made to settings in function setting mode are enabled for the first time when the mode is changed to run mode. Also, when settings are changed, the timer is reset (time initialized and output turned OFF).

The characters displayed in reverse video are the initial values.

When performing settings with operation keys only, set pin1 of the DIP switch to OFF (factory setting). If pin 1 of the DIP switch is set to ON, the setting items indicated by ■ will not be displayed.

OFF time range

Set the OFF time range using the ⌃⌄ keys.

--.-- s ↔ ---.- s ↔ ---- s ↔ ...... ↔ ---- h ↔ -.--- s

⇒ For details, refer to *Time Range List* below.

ON time range

Set the ON timer range using the ⌃⌄ keys.

--.-- s ↔ ---.- s ↔ ---- s ↔ ...... ↔ ---- h ↔ -.--- s

⇒ For details, refer to *Time Range List* below.

Timer mode

Set the timer mode using the ⌃⌄ keys.

UP ↔ doWn
(Elapsed time) (Remaining time)

ON/OFF start mode

Set the twin timer output mode using the ⌃⌄ keys.

toFF ↔ ton
(Flicker OFF start) (Flicker ON start)

Input signal width

Set the input signal width using the ⌃⌄ keys.

20mS ↔ 1mS
(20 ms) (1 ms)

NPN/PNP input

Set the NPN/PNP input mode using the ⌃⌄ keys.

nPn ↔ PnP
(NPN input) (PNP input)

Only displayed for H5CX-A□ and H5CX-A11□ models.

Display color

Set the display color using the ⌃⌄ keys.

rEd ↔ Grn ↔ r-G ↔ G-r
(Red) (Green) (Red-green) (Green-red)

Displayed for terminal-block models (H5CX-A□) only.

Key protect level

Set the key protect level using the ⌃⌄ keys.

KP-1 ↔ KP-2 ↔ KP-3 ↔ KP-4 ↔ KP-5
(KP-1) (KP-2) (KP-3) (KP-4) (KP-5)

Time Range List

Display	Set Value
--.-- s	0.01 s to 99.99 s (default setting)
---.- s	0.1 s to 999.9 s
---- s	1 s to 9999 s
--:-- m s	0 min 01 s to 99 min 59 s
---.- m	0.1 min to 999.9 min
---- m	1 min to 9999 min
--:-- h m	0 h 01 min to 99 h 59 min
---.- h	0.1 h to 999.9 h
---- h	1 h to 9999 h
-.--- s	0.001 s to 9.999 s

Explanation of Functions

OFF Time Range (oFtr) (Setting possible using DIP switch.)

Set the time range for the OFF time in the range 0.000 s to 9,999 h. Only settings of type --.-- s (99.99 s), ---.- s (999.9 s), ---- s (9,999 s), and -- min -- s (99 min 59 s), however, can be made with the DIP switch. Use the operation keys if another type of setting is required.

ON Time Range (ontr) (Setting possible using DIP switch.)

Set the time range for the ON time in the range 0.001 s to 9,999 h. Only settings of type --.-- s (99.99 s), ---.- s (999.9 s), ---- s (9,999 s), and -- min -- s (99 min 59 s), however, can be made with the DIP switch. Use the operation keys if another type of setting is required.

Timer Mode (timm) (Setting possible using DIP switch.)

Set either UP (incremental) or DOWN (decremental) timer mode. In UP mode, the elapsed time is displayed, and in DOWN mode, the remaining time is displayed.

ON/OFF Start Mode (totm) (Setting possible using DIP switch.)

Set the output mode. Set either flicker OFF start or flicker ON start. (For details on output mode operation, refer to “Timing Charts” on page C-152.)

Input Signal Width (iflt) (Setting possible using DIP switch.)

Set the minimum signal input width (20 ms or 1 ms) for signal, reset, and gate inputs. The same setting is used for all external inputs (signal, reset, and gate inputs). If contacts are used for the input signal, set the input signal width to 20 ms. Processing to eliminate chattering is performed for this setting.

NPN/PNP Input Mode (imod)

Select either NPN input (no-voltage input) or PNP input (voltage input) as the input format. The same setting is used for all external inputs. For details on input connections, refer to “Input Connections” on page C-131.

Display Color (colr)

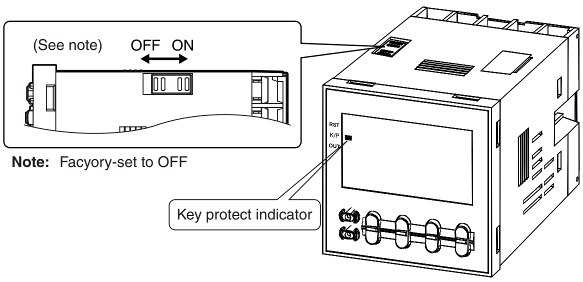
Set the color used for the present value.

	Output OFF	Output ON
red	Red (fixed)	
grn	Green (fixed)	
r-g	Red	Green
g-r	Green	Red

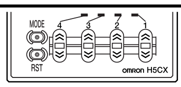
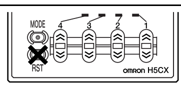
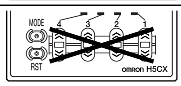
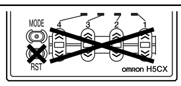
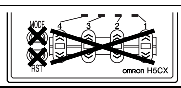
Key Protect Level (kypt)

Set the key protect level.

When the key-protect switch is set to ON, it is possible to prevent setting errors by prohibiting the use of certain operation keys by specifying the key protect level (KP-1 to KP-5). The key protect indicator is lit while the key-protect switch is set to ON.

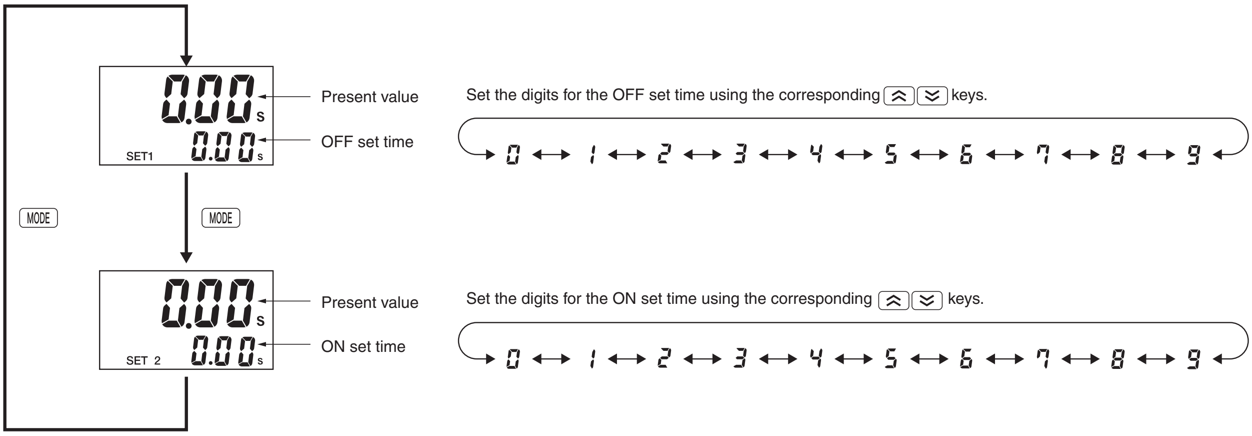


Note: Facyory-set to OFF

Level	Meaning	Details			
		Changing mode (See note.)	Switching display during operation	Reset key	Up/down key
KP-1 (default setting)		No	Yes	Yes	Yes
KP-2		No	Yes	No	Yes
KP-3		No	Yes	Yes	No
KP-4		No	Yes	No	No
KP-5		No	No	No	No

Note: Changing mode to timer/twin timer selection mode (MODE + ⩓1 1 s min.) or function setting mode (MODE 3 s min.).

Operation in Run Mode



Present Value and OFF Set Time

The present value is displayed in the main display and the OFF set time is displayed in the sub-display. “SET1” lights at the same time.

Present Value and ON Set Time

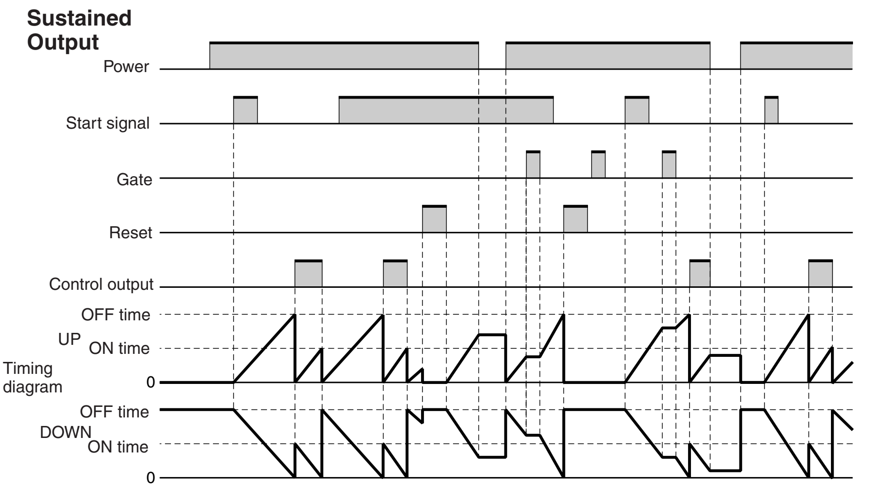
The present value is displayed in the main display and the ON set time is displayed in the sub-display. “SET2” lights at the same time.

Timing Charts

Twin Timer Operation

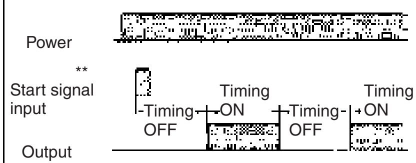
The gate input is not included in the H5CX-L8☐ models.

Output mode toff: Flicker OFF start



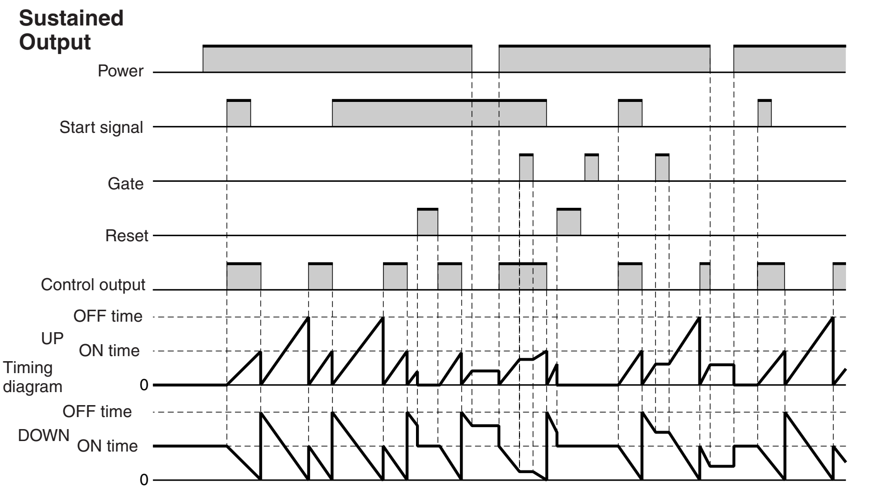
Timing starts when the start signal goes ON.
The status of the control output is reversed when time is up (OFF at start).
While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.

Basic Operation



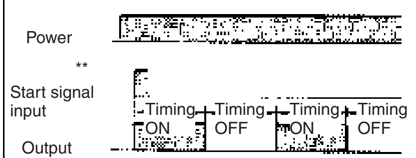
* Normal output operation will not be possible if the ON/OFF set time is too short .Set the value to at least 100 ms (contact output type).
** Start signal input is disabled during timing.

Output mode ton: Flicker ON start



Timing starts when the start signal goes ON.
The status of the control output is reversed when time is up (ON at start).
While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.

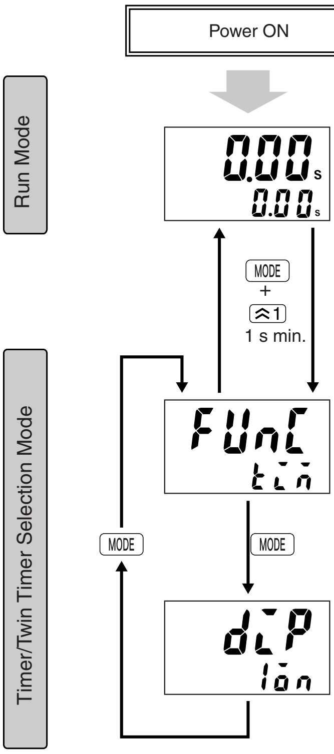
Basic Operation



* Normal output operation will not be possible if the ON/OFF set time is too short. Set the value to at least 100 ms (contact output type).
** Start signal input is disabled during timing.

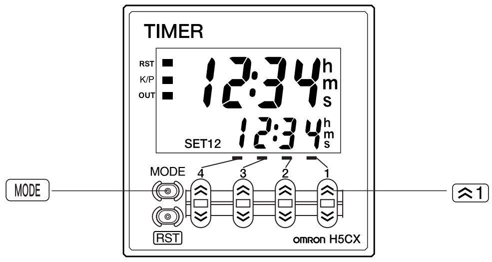
■ Operation in Timer/Twin Timer Selection Mode

Select whether the H5CX is used as a timer or a twin timer in timer/twin timer selection mode. The H5CX is also equipped with a DIP switch monitor function, a convenient function that enables the settings of the DIP switch pins to be confirmed using the front display.



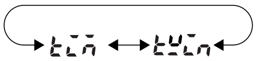
Timer/Twin timer selection

DIP switch monitor



To change the mode to timer/twin timer selection mode, hold down the [⩓1] key for 1 s min. with the [MODE] key held down.
The [MODE] key must be pressed before the [⩓1] key.
If the [⩓1] key is pressed first, the mode will not change.

Select either timer operation or twin timer operation using the [⩓][⩔] keys.



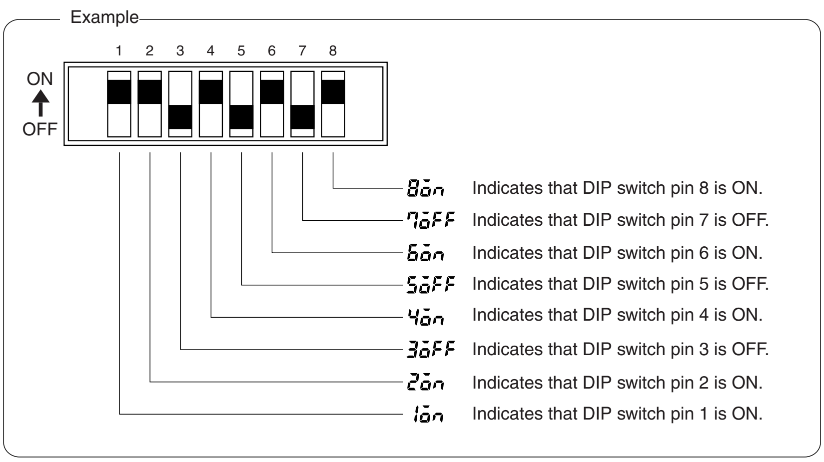
(Timer) (Twin timer)

Note: The H5CX is factory-set for timer operation.

Confirm the status of DIP switch pins 1 to 8 using the [⩓][⩔] keys.

Note 1. This display is not supported with H5CX-L8□.

2. This display is only possible when DIP switch pin 1 (DIP switch settings enable/disable) is set to ON (enable).



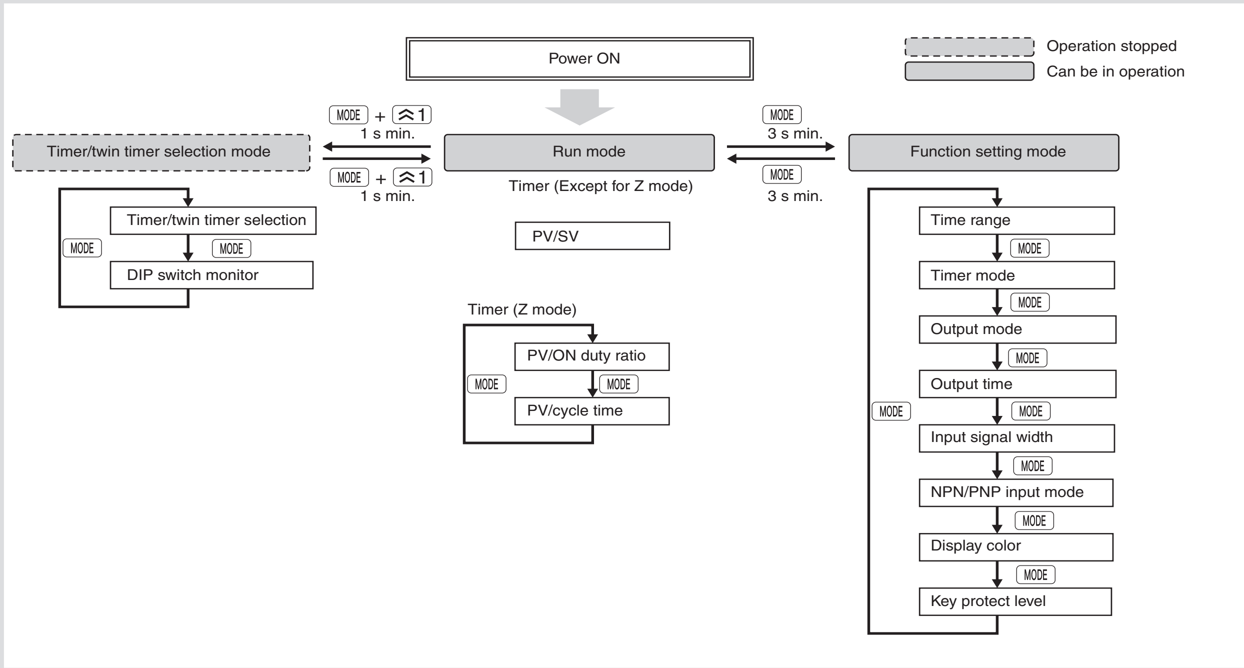
Note 1. When the mode is changed to timer/twin timer selection mode, the present value is reset and output turns OFF. Timing operation is not performed in timer/twin timer selection mode.

2. Setting changes made in timer/twin timer selection mode are enabled when the mode is changed to run mode. If settings are changed, the HC5X is automatically reset (present value initialized, output turned OFF).

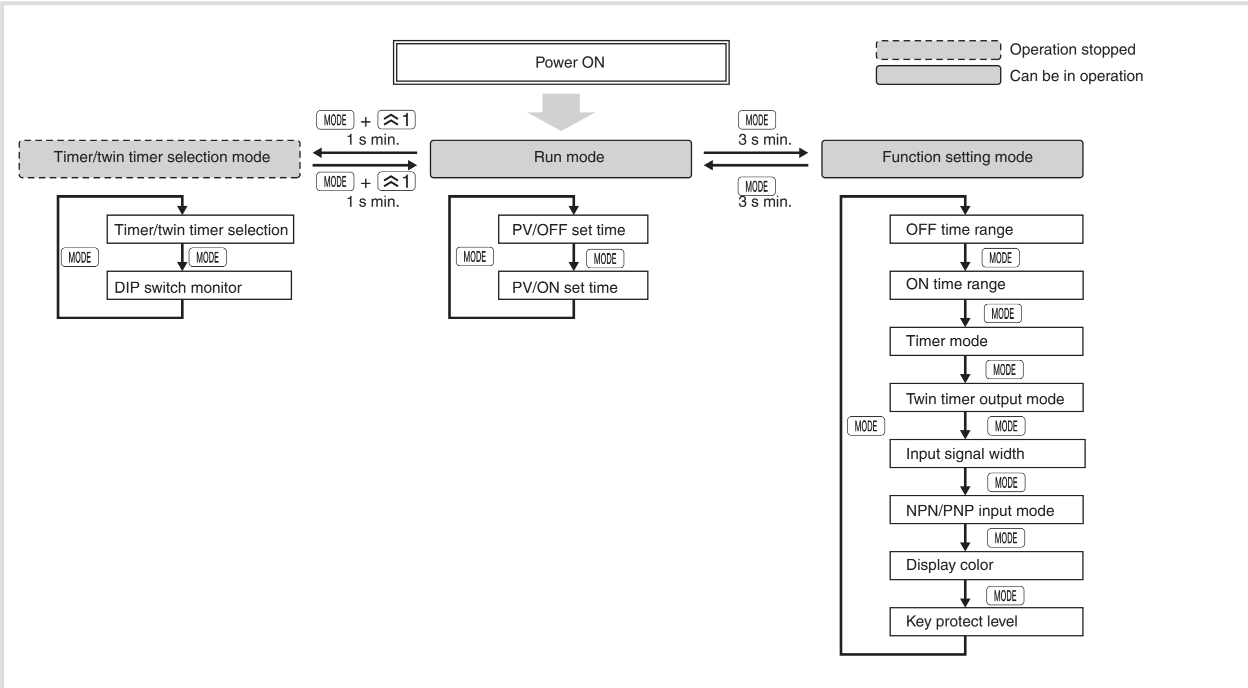
Additional Information

■ Using the Operation Keys

Timer Operation



Twin Timer Operation



Note 1. All setting changes are performed using the ⋀ and ⋁ keys.

2. The above flowcharts outline the procedure for all models. For details on specific models, refer to page C-143 (timer operation) or page C-150 (twin timer operation).

List of Settings

Fill in your set values in the set value column of the following tables and utilize the tables for quick reference.

Timer/Twin Timer Selection Mode

Parameter name	Parameter	Setting range	Default value	Unit	Set value
Timer/Twin Timer selection	FUnC	tim/twin	tim	---	
DIP switch monitor	dIP	on/oFF	oFF	---	

Settings for Timer Operation

Run Mode when Output Mode Is Not Z

Parameter name		Parameter	Setting range	Default value	Unit	Set value
Present value, set value	Set value	---	0.00 to 99.99 (Time range: --,--s)	0.00	s	
		---	0.0 to 999.9 (Time range: ---,-s)	0.0	s	
		---	0 to 9999 (Time range: ----s)	0	s	
		---	0:00 to 99:59 (Time range: --min--s)	0:00	min; s	
		---	0.0 to 999.9 (Time range: ---,-min)	0.0	min	
		---	0 to 9999 (Time range: ----min)	0	min	
		---	0:00 to 99:59 (Time range: --h--min)	0:00	h; min	
		---	0.0 to 999.9 (Time range: ---,-h)	0.0	h	
		---	0 to 9999 (Time range: ----h)	0	h	
		---	0.000 to 9.999 (Time range: -,---s)	0.000	s	
	Present value	---	Same as set value	Same as left	Same as left	

Run Mode when Output Mode = Z

Parameter name		Parameter	Setting range	Default value	Unit	Set value
Present value, ON duty ratio	Cycle time	---	0.00 to 99.99 (Time range: --,--s)	0.00	s	
		---	0.0 to 999.9 (Time range: ---,-s)	0.0	s	
		---	0 to 9999 (Time range: ----s)	0	s	
		---	0:00 to 99:59 (Time range: --min--s)	0:00	min; s	
		---	0.0 to 999.9 (Time range: ---,-min)	0.0	min	
		---	0 to 9999 (Time range: ----min)	0	min	
		---	0:00 to 99:59 (Time range: --h--min)	0:00	h; min	
		---	0.0 to 999.9 (Time range: ---,-h)	0.0	h	
		---	0 to 9999 (Time range: ----h)	0	h	
		---	0.000 to 9.999 (Time range: -,---s)	0.000	s	
	ON duty ratio	---	0 to 100	0	%	
Present value, cycle time	Present value	---	Same as cycle time above	Same as left	Same as left	
	Present value	---	Same as cycle time above	Same as left	Same as left	

Function Setting Mode

Parameter name	Parameter	Setting range	Default value	Unit	Set value
Time range	timr	--.--s/---.-s/----s/--min--s/---.-min/----min/--h--min/---.-h/----h/-.---s	--.--s	---	
Timer mode	timm	UP/doWn	UP	---	
Output mode	oUtm	A/A-1/A-2/A-3/b/b-1/d/E/F/Z	A	---	
Output time	otim	HoLd/0.01 to 99.99	HoLd	s	
Input signal width	iFLt	20mS/1mS	20mS	---	
NPN/PNP input mode	imod	nPn/PnP	nPn	---	
Display color	CoLr	rEd/orG/r-o/o-r	rEd	---	
Key protect level	KYPt	KP-1/KP-2/KP-3/KP-4/KP-5	KP-1	---	

Settings for Twin Timer Operation

Run Mode

Parameter name		Parameter	Setting range	Default value	Unit	Set value
Present value, OFF set time	OFF set time	---	0.00 to 99.99 (Time range: --,--s)	0.00	s	
		---	0.0 to 999.9 (Time range: ---,-s)	0.0	s	
		---	0 to 9999 (Time range: ----s)	0	s	
		---	0:00 to 99:59 (Time range: --min--s)	0:00	min; s	
		---	0.0 to 999.9 (Time range: ---,-min)	0.0	min	
		---	0 to 9999 (Time range: ----min)	0	min	
		---	0:00 to 99:59 (Time range: --h--min)	0:00	h; min	
		---	0.0 to 999.9 (Time range: ---,-h)	0.0	h	
		---	0 to 9999 (Time range: ----h)	0	h	
		---	0.000 to 9.999 (Time range: -,---s)	0.000	s	
	Present value	---	Same as OFF set time above	Same as left	Same as left	
Present value, ON set time	ON set time	---	Same as OFF set time above	Same as left	Same as left	
	Present value	---	Same as OFF set time above	Same as left	Same as left	

Function Setting Mode

Parameter name	Parameter	Setting range	Default value	Unit	Set value
OFF time range	oFtr	--.--s/---.-s/----s/--min--s/---.-min/----min/ --h--min/---.-h/----h/-.---s	--.--s	---	
ON time range	ontr	--.--s/---.-s/----s/--min--s/---.-min/----min/ --h--min/---.-h/----h/-.---s	--.--s	---	
Timer mode	tmm	UP/doWn	UP	---	
ON/OFF start mode	tOtm	tOFF/tOn	tOFF	---	
Input signal width	iFLt	20mS/1mS	20mS	---	
NPN/PNP input mode	imod	nPn/PnP	nPn	---	
Display color	COLr	rEd/Grn/r-G/G-r	rEd	---	
Key protect level	KYPt	KP-1/KP-2/KP-3/KP-4/KP-5	KP-1	---	

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. L101-E2-04 In the interest of product improvement, specifications are subject to change without notice.

Motor Timer
H2C

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments. Refer to *Warranty and Application Considerations* (page C-167), and *Safety Precautions* (page C-165).

DIN-sized (48 x 48, 45 x 75 mm) Motor Timer with Variable Time Ranges

- Five time ranges are selectable per timer unit.
- Easy-to-monitor neon lamp for timing operation indication (for 110, 120, 220, 240 VAC types only).
- Easy-to-set large transparent knob and easy-to-read single pattern scale facilitate time setting.
- Equipped with timing operation indicator and moving pointer.
- Conforms to EN61812-1 and IEC60664-1 4 kV/1 for Low Voltage, and EMC Directives (except for H2C-F□).

Model Number Structure

■ Model Number Legend

H2C-□ □
1 2

1. External Connection/Attachment
None: 11-pin socket
S: 11-pin socket/time setting ring
8: 8-pin socket
F: Front screw

2. Operation/Resetting System
None: Time-limit operation/self-resetting
R: Time-limit operation/electric resetting

Ordering Information

■ List of Models

Operation/resetting system	Internal connection	Terminal	Time-limit contact	Instantaneous contact	Attachment	Model
Time-limit operation/ self-resetting	Parallel motor and clutch connection	8-pin socket	SPDT	SPDT	---	H2C-8
	Separate motor and clutch connection	11-pin socket				H2C
					Y92A-Y1 Time Setting Ring	H2C-S
		Front screw			---	H2C-F
Time-limit operation/ electric resetting		8-pin socket	SPDT	---	---	H2C-8R
		11-pin socket		SPDT		H2C-R
					Y92A-Y1 Time Setting Ring	H2C-SR
		Front screw			---	H2C-FR

Note: Specify both the supply voltage and time range code (A, B, or C) in addition to the model number when ordering.
Example: H2C-S 24 VAC B
Time range code
Supply voltage

■ Accessories (Order Separately)

Name/specifications		Models
Flush Mounting Adapter		Y92F-30
Time Setting Ring (See note 1.)		Y92A-Y1
Mounting DIN-rail	50 cm (l) × 7.3 mm (t)	PFP-50N
	1 m (l) × 7.3 mm (t)	PFP-100N
	1 m (l) × 16 mm (t)	PFP-100N2
End Plate		PFP-M
Spacer		PFP-S
Protective Cover		Y92A-48B
DIN-rail Mounting/Front Connecting Socket	8-pin	P2CF-08
	8-pin, finger safe type	P2CF-08-E
	11-pin	P2CF-11
	11-pin, finger safe type	P2CF-11-E
Back Connecting Socket	8-pin, screw terminal	P3G-08
	8-pin, finger safe type	P3G-08 with Y92A-48G (See note 2.)
	11-pin	P3GA-11
	11-pin, finger safe type	P3GA-11 with Y92A-48G (See note 2.)
Hold-down Clip (See note 3.)	For PL08 and PL11 Sockets	Y92H-1
	For PF085A Socket	Y92H-2

Note: 1. Supplied with H2C-S/-SR models.

2. Y92A-48G is a finger safe terminal cover which is attached to the P3G-08 or P3GA-11 Socket.

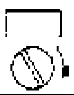
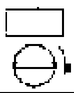
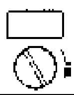
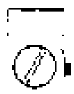
3. Hold-down Clips are sold in sets of two.

Specifications

■ Time Ranges

Five time ranges are available for each timer by turning the time range selector every 60 degrees.

Note: Rated time is displayed on the window.

Time range code	Position of time range selector				
					
A	1.25 to 30 s	7.5 s to 3 min	1.25 to 30 min	7.5 min to 3 h	1.25 to 30 h
B	0.2 to 6 s	2 to 60 s	0.2 to 6 min	2 to 60 min	0.2 to 6 h
C	0.5 to 12 s	5 to 120 s	0.5 to 12 min	5 to 120 min	0.5 to 12 h

■ Ratings

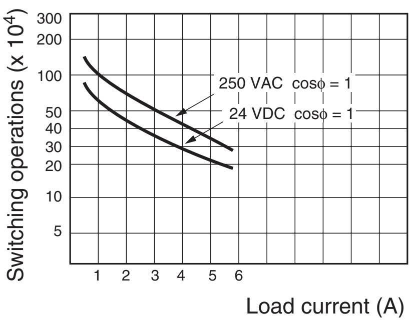
Item	H2C
Rated supply voltage (motor and clutch)	24, 48, 100, 110, 115, 120, 200, 220, or 240 VAC (50/60 Hz) (see note)
Operating voltage range	85% to 110% of rated supply voltage
Power consumption	4.2 VA max. (3.96 W max.)
Reset voltage	10% max. of rated supply voltage
Reset time	Minimum power-opening time: 0.5 s Minimum pulse width: 0.5 s
Control outputs	6 A at 250 VAC, resistive load ($\cos\phi = 1$)
Mounting method	Flush mounting (except for H2C-F/-FR models), surface mounting, DIN-rail mounting

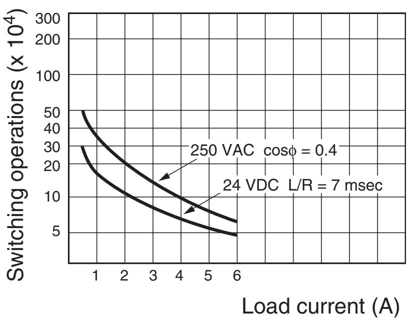
Note: The front panel of the timer is color coded to identify the following supply voltage classifications:
100 to 120 V: Blue
200 to 240 V: Red
Other classes: Black

■ Characteristics

Accuracy of operating time	±0.5% FS max. (±1% max. at 0.2 to 6 s for the time range code B or at 0.5 to 12 s for the time range code C)
Setting error	±2% FS max.
Reset time	0.5 s max.
Influence of voltage	±1% FS max.
Influence of temperature	±2% FS max.
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min (between current-carrying and non-current-carrying parts) 2,000 VAC, 50/60 Hz for 1 min (between contact and control circuit and between contacts of different polarities) 1,000 VAC, 50/60 Hz for 1 min (between non-continuous contacts)
Vibration resistance	Destruction: 10 to 55 Hz with 0.375-mm single amplitude for 1 h each in three directions Malfunction: 10 to 55 Hz with 0.25-mm single amplitude for 10 min each in three directions
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 150 m/s^2
Ambient temperature	Operating: –10°C to 50°C Storage: –25°C to 65°C
Ambient humidity	Operating: 45% to 85%
Life expectancy	Mechanical: 10,000,000 operations min. (under no load at 1,800 operations/h) Electrical: 500,000 operations min. (3 A at 250 VAC, resistive load at 1,800 operations/h) See *Life-test Curve* for other details.
Motor life expectancy	20,000 h
Approved standards	UL917, CSA C22.2 No.14. Conforms to EN61812-1 and IEC60664-1 4 kV/1 (except for H2C-F□ models). Output category according to EN60947-5-1 (except for H2C-F□ models).
EMC (except for H2C-F□ models)	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A (EMS) EN61812-1 Immunity ESD: IEC61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: IEC61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity Burst: IEC61000-4-4: 2 kV power-line (level 3) 2 kV I/O signal-line (level 4) Immunity Surge: IEC61000-4-5: 1 kV line to line (level 3) 2 kV line to ground (level 3)
Case color	Light gray (Munsell 5Y7/1)
Degree of protection	IP40 (panel surface)
Weight	H2C series: approx. 180 g H2C-F series: approx. 270 g

■ Life-test Curve



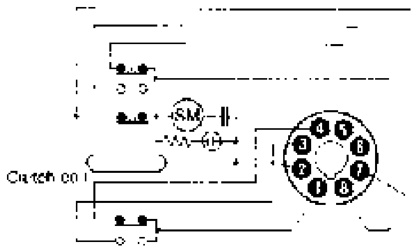


Connections

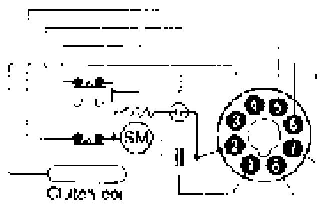
■ Terminal Arrangement

Note: The connections diagrams are for when the clutch is in the excited, reset state.

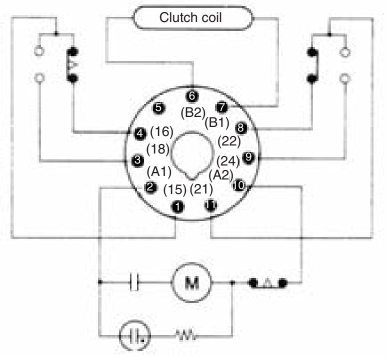
H2C-8

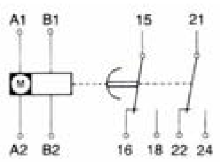


H2C-8R



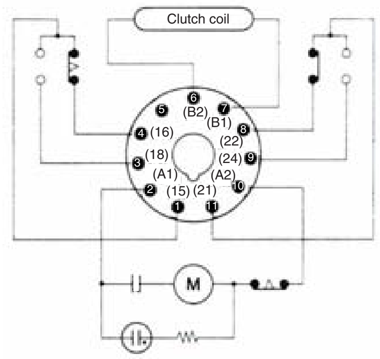
H2C(-F)/H2C-S

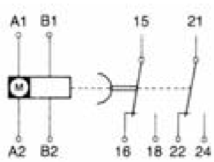




(DIN 46 199-5)

H2C-(F)R/H2C-SR



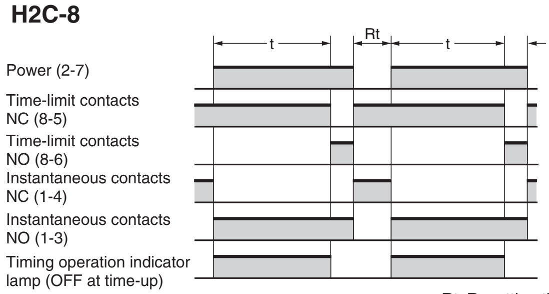


(DIN 46 199-5)

Operation

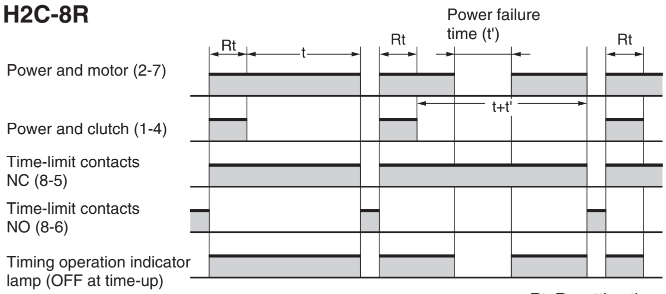
■ Timing Chart

H2C-8



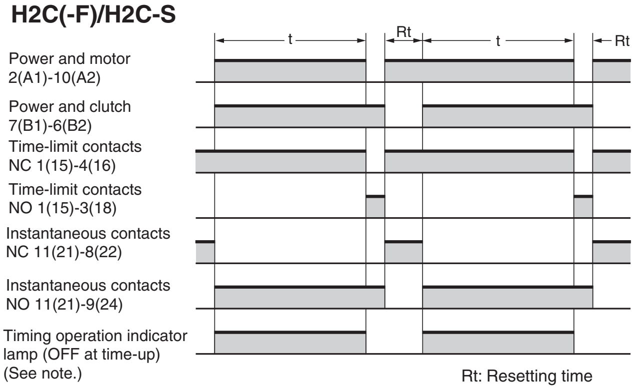
Rt: Resetting time

H2C-8R



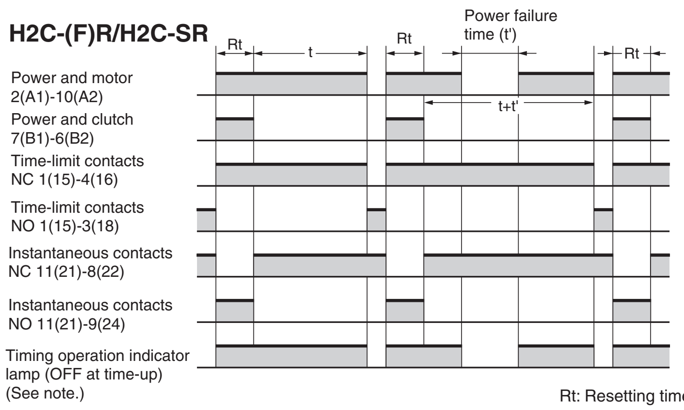
Rt: Resetting time

H2C(-F)/H2C-S



Rt: Resetting time

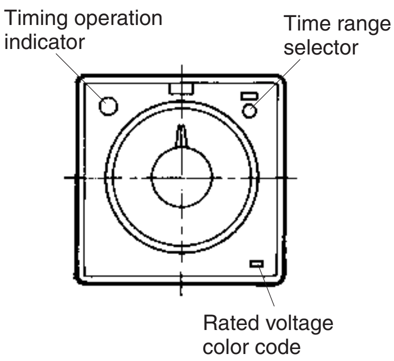
H2C-(F)R/H2C-SR



Rt: Resetting time

Note: For the types rated at 24 and 48 VAC, the timing operation indicator is not equipped.

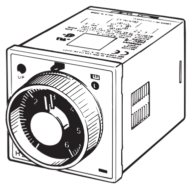
Nomenclature

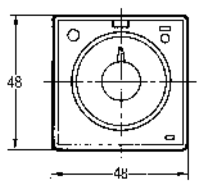


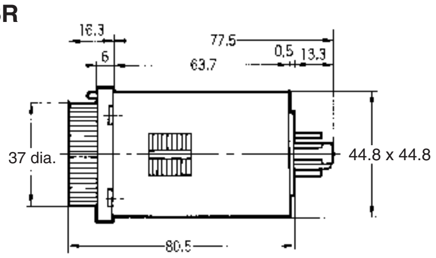
Dimensions

Note: All units are in millimeters unless otherwise indicated.

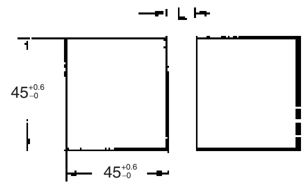
H2C/H2C-S/H2C-R/H2C-SR/H2C-8/H2C-8R





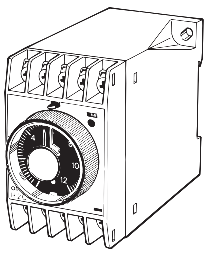


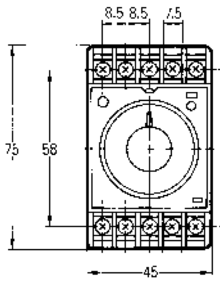
For Flush Mounting

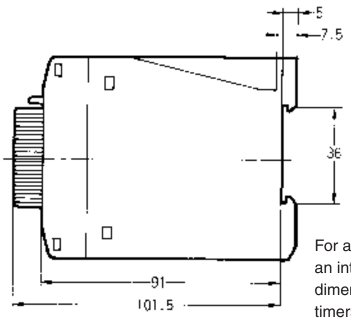


For a load current of 3 A max., dimension L becomes 3 mm min. with an interval of 0 mm between timers. For a load current of 6 A max., dimension L becomes 8 mm min. with an interval of 5 mm between timers. When using in locations with high ambient temperatures, ensure that there is an interval of at least 5 mm between timers.

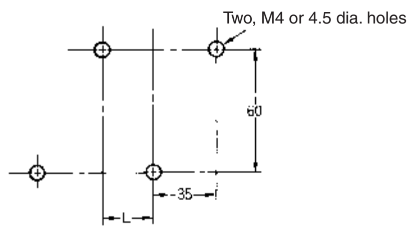
H2C-F/H2C-FR





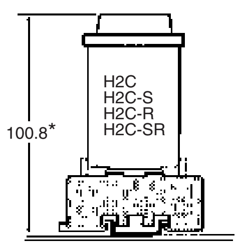


Mounting Holes

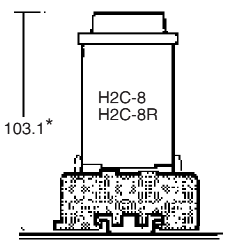


For a load current of 1 A max., dimension L becomes 10 mm min. with an interval of 0 mm between timers. For a load current of 3 A max., dimension L becomes 15 mm min. with an interval of 5 mm between timers. For a load current of 6 A max., dimension L becomes 20 mm min. with an interval of 10 mm between timers.

Dimensions with Front Connecting Socket P2CF-08-□/P2CF-11-□

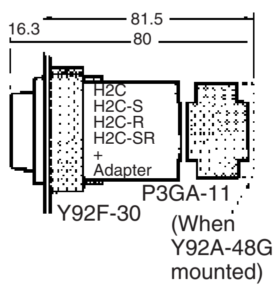


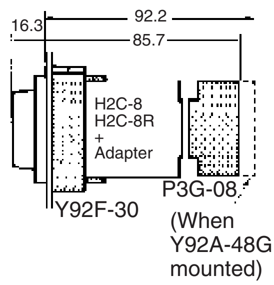
P2CF-11
P2CF-11-E



P2CF-08
P2CF-08-E

Dimensions with Back Connecting Socket P3G-08/P3GA-11



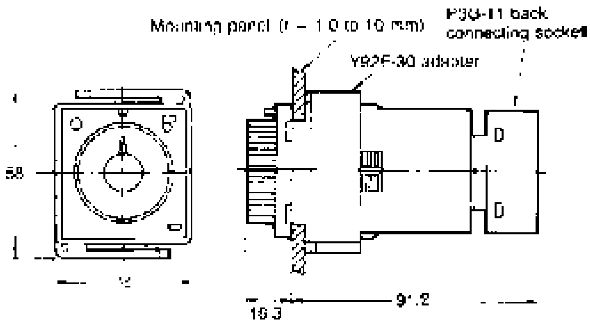


*These dimensions vary with the kind of DIN-rail (reference value).

■ Accessories (Order Separately)

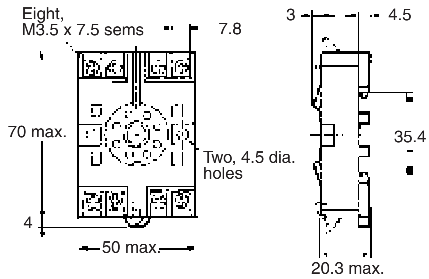
Adapter for Flush Mounting

Y92F-30

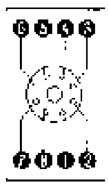


DIN-rail Mounting/Front Connecting Socket

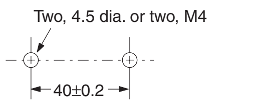
P2CF-08



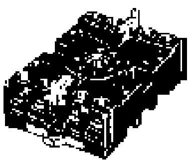
Terminal Arrangement/ Internal Connections (Top View)

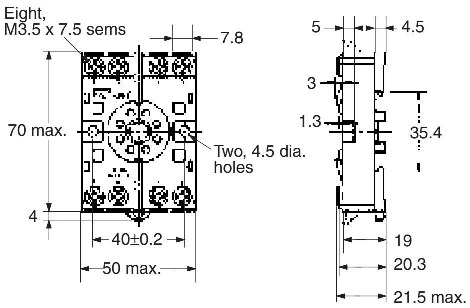


Surface Mounting Holes



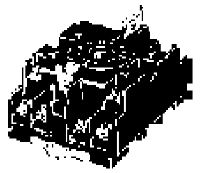
P2CF-08-E (Finger Safe Terminal Type) Conforming to VDE0106/P100

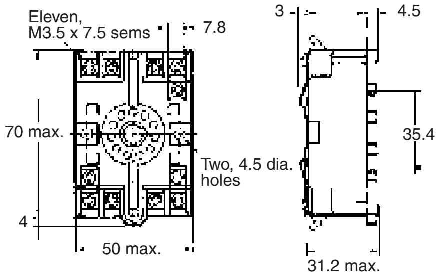




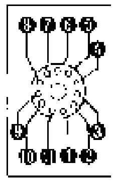
DIN-rail Mounting/Front Connecting Socket

P2CF-11

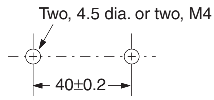




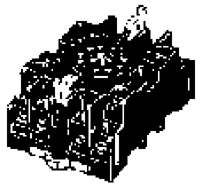
Terminal Arrangement/ Internal Connections (Top View)

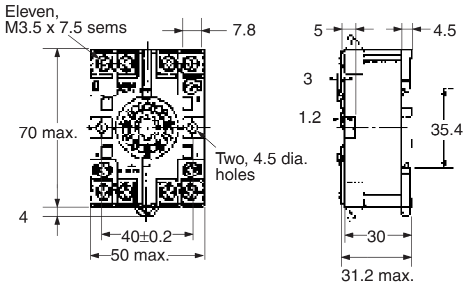


Surface Mounting Holes



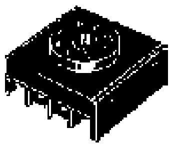
P2CF-11-E (Finger Safe Terminal Type) Conforming to VDE0106/P100

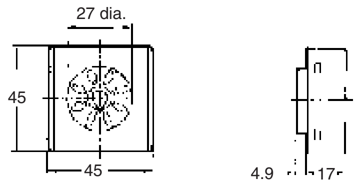




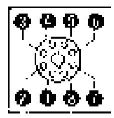
Back Connecting Socket

P3G-08

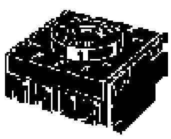


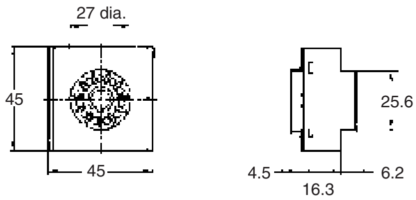


Terminal Arrangement/ Internal Connections (Bottom View)

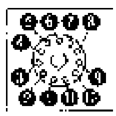


P3GA-11





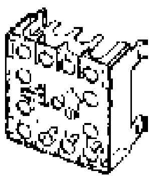
Terminal Arrangement/ Internal Connections (Bottom View)

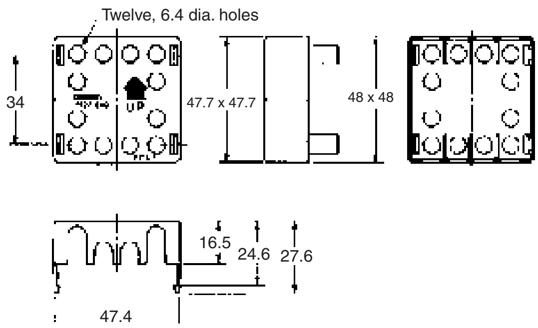


Finger Safe Terminal Cover

Conforming to VDE0106/P100

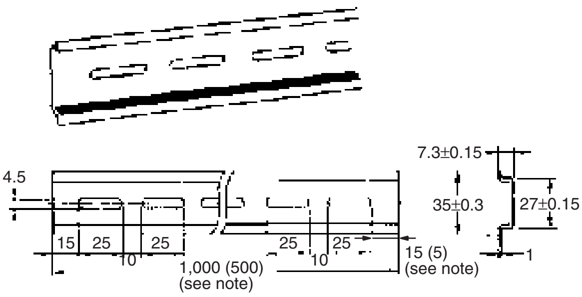
Y92A-48G
(Attachment for P3G-08/ P3GA-11 Socket)



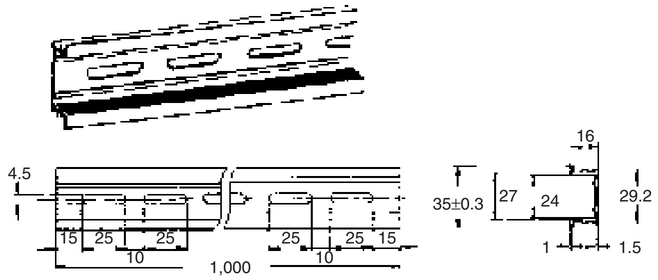


Mounting DIN-rail

PFP-100N, PFP-50N



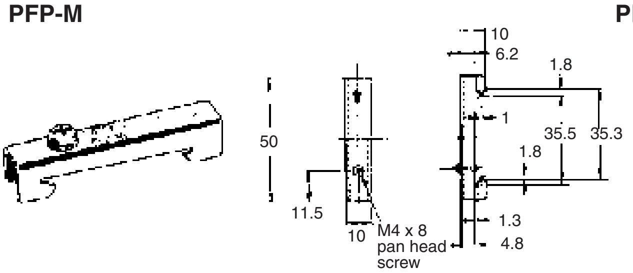
PFP-100N2



Note: The value shown in parentheses are for the PFP-50N.

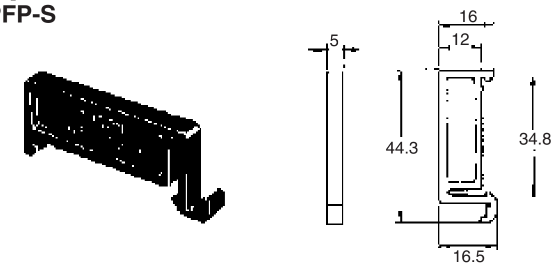
End Plate

PFP-M



Spacer

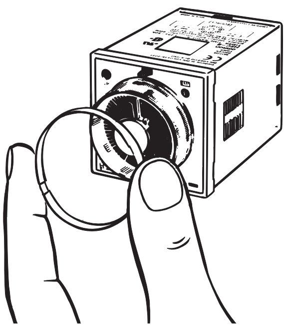
PFP-S



Time Setting Ring

Y92A-Y1

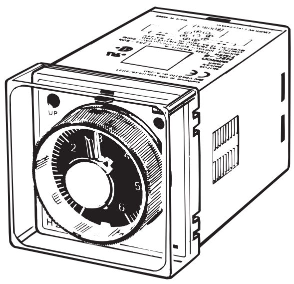
The time setting ring locks the time setting knob to store the set time to facilitate its resetting. A maximum of two time setting rings are connectable per timer.



Protective Cover

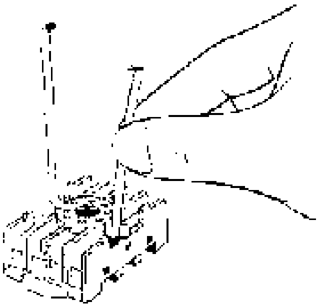
Y92A-48B

The protective cover shields the front panel, particularly the time setting section, from dust, dirt, and water, as well as prevents the set value from being altered due to accidental contact with the time setting knob.

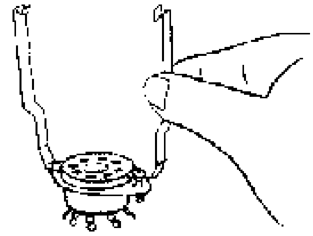


Timer Hold-down Clips

Y92H-2
(for PF085A/PF113A Connecting Socket)



Y92H-1
(for PL08/PL11 Connecting Socket)



Safety Precautions

⚠ CAUTION

This may occasionally cause electric shock, fire, or malfunction.
Never disassemble, repair, or modify the H2C.

This may occasionally cause electric shock, fire, or malfunction.
Do not allow metal fragments or lead wire scraps to fall inside the H2C.

■ Precautions for Safe Use

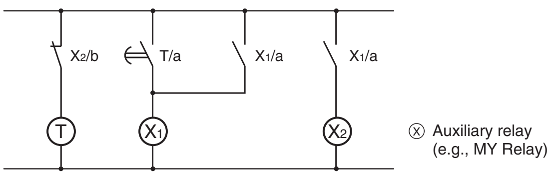
Observe the following items to ensure the safe use of this product.

Environmental Precautions

- Store the H2C within the specified ratings. If the H2C has been stored at temperatures –10°C or lower, let it stand for 3 hours or longer at room temperature before turning ON the power supply.
- Use the H2C within the specified ratings for operating temperature and humidity.
- Do not operate the H2C in locations subject to sudden or extreme changes in temperature, or locations where high humidity may result in condensation.
- Do not use the H2C in locations subject to vibrations or shock. Extended use in such locations may result in damage due to stress.
- Do not use the H2C in locations subject to excessive dust, corrosive gas, or direct sunlight.
- Install the H2C well away from any sources of static electricity, such as pipes transporting molding materials, powders, or liquids.
- The H2C is not waterproof or oil resistant.
  Do not use it in locations subject to water or oil.
- The life expectancy of internal components may be reduced if the H2C is mounted side-by-side.
- Do not use organic solvents (such as paint thinner or benzine), strong alkaline, or strong acids because they will damage the external finish.

Usage Precautions

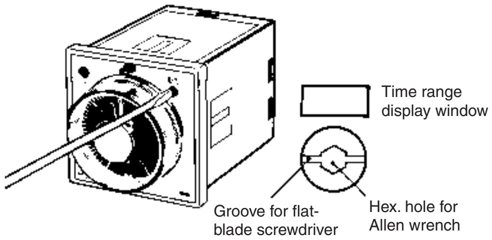
- Install a switch or circuit breaker that allows the operator to immediately turn OFF the power, and label it to clearly indicate its function.
- Be sure to wire the terminals correctly.
- Do not install input lines in the same duct or conduit as power supply or other high-voltage lines. Doing so may result in malfunction due to noise. Separate the input lines from high-voltage lines.
- Internal elements may be destroyed if a voltage outside the rated voltage is applied.
- Maintain voltage fluctuations in the power supply within the specified range.
- Use a switch, relay, or other contact so that the rated power supply voltage will be reached within 0.1 s. If the power supply voltage is not reached quickly enough, the H2C may malfunction or outputs may be unstable.
- Leaving the H2C with outputs ON at a high temperature for a long time may hasten the degradation of internal parts (such as electrolytic capacitors). Therefore, use the H2C in combination with relays and avoid leaving the H2C for more than 1 month with an output turned ON.



■ Precautions for Correct Use

How to Change the Time Range

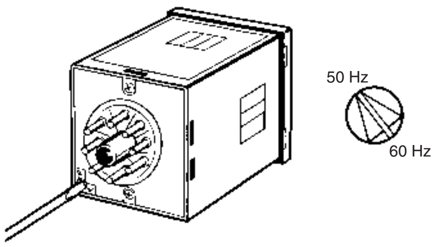
Change the time range by turning the knob clockwise using a flat-blade screwdriver or an Allen wrench. There are five possible settings. The selected time is displayed in the time range display window above the knob.



Do not change the time range while the timer is in operation.

How to Select Power Frequency

Before using the timer, set the frequency selector located at the rear panel to the proper power frequency (50 to 60 Hz).



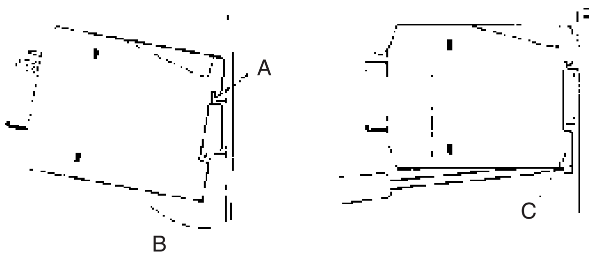
How to Mount the Timer on Mounting DIN-rail

Mounting

First hook portion A of the timer to the mounting DIN-rail, then press the timer in direction B.

Dismounting

Pull out portion C with a round-blade screwdriver and remove the timer from the mounting DIN-rail.



Electrical Set

The motor and clutch do not need to be reset simultaneously.

Use the voltage applied to the clutch for resetting with the H2C-□R. Do not allow power to be continuously applied to the motor and clutch for extended periods of time.

Others

Do not turn the operation time setting knob beyond the range of the scale. To achieve higher accuracy in setting, measure the operation time while turning the operation time setting knob.

The deviation and setting error for the operation time shows the percent of FS. The absolute value of the deviation and setting error will not change even if the set time is changed. The time specifications should therefore be selected to use the operation time as close to FS as possible.

At high temperatures, the operation voltage will be 90% or less if voltage is applied continuously after timeout. Be sure to keep the voltage within the allowable voltage fluctuation range.

Precautions for EN61812-1

The H2C (except for H2C-F☐) as a built-in timer conforms to EN61812-1, provided that the following conditions are satisfied.

Handling

Before dismounting the H2C from the Socket, make sure that no voltage is imposed on any terminal of the H2C.

Applicable Sockets: P2CF-☐☐, P2CF-☐☐-E, PF085A, PL☐☐.

Wiring

Basic insulation is ensured between the motor circuit, clutch circuit, and control output circuit. (However, the H2C-8 motor circuit and clutch circuit use the same input.) Basic insulation is also ensured between the output circuits of models with instantaneous output.

Basic insulation: Overvoltage category III, pollution degree 1 (See note.)

Operating parts: Reinforced insulation (double insulation)
(with a clearance of 5.5 mm and a creepage distance of 5.5 mm at 240 VAC)

Output parts: Basic insulation
(with a clearance of 3.0 mm and a creepage distance of 3.0 mm at 240 VAC)

Note: Overvoltage category II, pollution degree 1 if the Timer is mounted to the PL11 Socket.

Warranty and Application Considerations

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. L007-E2-10

In the interest of product improvement, specifications are subject to change without notice.

Counters

With over three decades in the counter market, Omron can provide a solution to every measurement process requirement, including total counting, timing, pre-set counting and specific cam positioning applications.

- Full range of battery-powered counters for total-, timing- and speed counting
- Pre-set version has highly visible colour-change feature
- Relay output and transistor output for pre-set counters
- Models available with communication capability
- Conform to all relevant safety standards
- LCD negative transmission back-lit display in most models

What is the type of counting application?

Totalising

Which size is required?

48 x 24 mm (1/32 DIN)

Which type of application?

Totalising → **H7EC**

Page D-7

Timer → **H7ET**

Page D-15

Speed → **H7ER**

Page D-23

Pre-set counter time count

Which size is required?

48 x 24 mm (1/32 DIN) → **H8GN counter / timer**

Page D-29

48 x 48 mm (1/16 DIN) → **H7CX**

Page D-55

H7CX series – multi-functional pre-set counter

The H7CX series offers the ultimate in versatility and intuitive programming. With a display choice of up to six digits the H7CX offers many added-value features, making it ideal for multiple uses.

Every model features a crystal-clear display for excellent visibility in all lighting conditions, dust- and water-proof front casing (IP66) that guarantees top performance under adverse conditions, and extensive functionality in its class. In addition, each unit in this series has the same “look and feel” with its uniform display design, the same front-panel rocker-keys for easy set-up and operation, and the same intuitive way of programming.

Counters

Cam positioner

Which size is required?

96 x 96 mm
(1/4 DIN)

H8PS

Page D-99

Table of contents

Selection Table

	Category	Totalisers				
Selection criteria						
	Model	H7EC	H7ET	H7ER	H7GP	H7HP
	Display	LCD			LCD negative transmissive	
	Size	1/32 DIN				72 x 36 mm
Outputs	Control outputs					
	5 stage					
	Total	■	■		□	□
	Time		■		□	□
	Preset					
	Batch					
	Dual					
	Tachometer	■		■		
Inputs	Control inputs	No-voltage, PNP / NPN, DC-voltage, AC / DC multi-voltage	No-voltage, PNP / NPN, DC-voltage, AC / DC multi-voltage	No-voltage, PNP / NPN	No-voltage or DC-voltage (switchable)	No-voltage or DC-voltage (switchable)
Features	Dual operation					
	Number of digits	8	7	4 or 5	6	7
	NPN / PNP switch	■	■	■	■	■
	Back-lit	□	□	□		
	External reset	■	■		■	■
	Manual reset	■	■		■	■
	Number of banks					
	Built-in sensor power supply					
	IP rating	IP66	IP66	IP66	IP66G	IP66G
Terminals	Screw terminals	■	■	■	■	■
	PCB terminals					
	11-pin socket					
Supply voltage	100 to 240 VAC				□	□
	12 to 24 VDC				□	□
	24 VDC	□	□	□		
	Comms					
Functions	Up	■	■		■	■
	Down					
	Up / down					
	Reversible					■
	Speed	0 to 30 Hz or 0 to 1 kHz		1 or 10 kHz	0 to 30 Hz or 0 to 5 kHz	1 to 30 Hz or 0 to 5 kHz
	Counting range	0 to 99999999	0.0 h to 999999.9 h <--> 0.0 h to 3999 d 23.9 h or 0 s to 999 h 59 min 59 s <--> 0.0 min to 9999 h 59.9 min	1000 s^{-1} or 1000 min^{-1}; 1000 s^{-1} or 1000 min^{-1} <--> 10000 min^{-1}	0.1 to 99999.9 h or 1 s to 99 h 59 m 59 s	0.1 to 99999.9 h or 1 s to 99 h 59 m 59 s
Colour	Beige	■	■	■	■	■
	Black	■	■	■	■	■
	Page	D-7	D-15	D-23	CD	CD

	Category	Totalisers	Pre-set counters		Cam positioners
Selection criteria					
	Model	H7E□-N□P	H8GN	H7CX	H8PS
	Display	LCD	LCD negative transmissive		
	Size	44.8 x 22.4 mm	1/32 DIN	1/16 DIN	1/4 DIN
Outputs	Control outputs		1 relay (SPDT)	1 relay (SPDT), transistor	NPN or PNP, cam outputs (8 lines), run out, tachometer
	5 stage				
	Total	□	■	□	
	Time	□	■		
	Preset		■	□	
	Batch		■	□	
	Dual		■	□	
	Tachometer			□	
Inputs	Control inputs	No-voltage	No-voltage	No-voltage, PNP / NPN	Encoder
Features	Dual operation		■	■	□
	Number of digits	7 or 8	PV: 4, SV: 4	PV: 4, SV: 4 or PV: 6, SV: 6	7
	NPN / PNP switch			■	
	Back-lit	■		■	■
	External reset	■	■	■	
	Manual reset	■	■	■	
	Number of banks		4		8 (16- and 32- output models only)
	Built-in sensor power supply			■	
	IP rating	IP00	IP66	IP66	IP40
Terminals	Screw terminals		■	■	■
	PCB terminals	■			■
	11-pin socket			□	
Supply voltage	100 to 240 VAC			■	
	12 to 24 VDC			■	
	24 VDC	3 VDC	■		■
	Comms		□		
Functions	Up	■	■	■	
	Down		■	■	
	Up / down			■	
	Reversible		■	■	
	Speed	0 to 30 Hz or 0 to 1 kHz	0 to 30 Hz or 0 to 5 kHz	0 to 30 Hz or 0 to 5 kHz	
	Counting range	0.0 h to 999999.9 h	-999 to 9999	-999 to 9999 or -99999 to 999999	
Colour	Beige	■			■
	Black		■	■	
	Page	CD	D-29	D-55	D-99

■ Standard □ Available No / not available

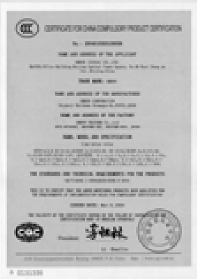
LEADING IN SERVICE

Focussed, progressive, distinctive. Be assured, choose Omron

At Omron we set high standards for ourselves. Our products are known all over the world for their unrivalled quality. But we offer more than just excellent quality. In an environment that places ever greater demands with regard to service, quality and costeffectiveness, other things are important too. Providing a top-quality service is what we do every day, including extra service as standard. This helps to ensure that we can provide tailor-made solutions for applications more effectively and more quickly.

More and more companies are choosing Omron as they seek to work in a partnership that is based on reliability and certainty.

Omron – the reassuring choice.



International standards and approvals

Our products carry all relevant international standards and approvals, including CCC (Chinese Compulsory Certification), which makes exporting your system much easier.

- Reliability, also for your customers
- Maximum flexibility
- Confidence

5-day repair service

More and more people are choosing Omron, as a high degree of reliability is a key feature of its products. You can always rely on Omron. Even if a product unexpectedly malfunctions, our repair team is ready to swing into action.

- Product repaired and returned to you within 5 days, including collection and delivery
- You can track the status of your repair on-line
- Repairs within warranty are completely free-of-charge

For more information please visit the Service & Support section at http://omron-industrial.com

EPLAN for Omron products

The majority of standard Omron products are provided in digital EPLAN format, which means that a few clicks of your mouse are all that is needed to design the right product into your switching panel.

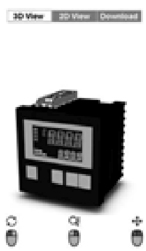
For more information please visit: http://omron-industrial.com/en/eplan/

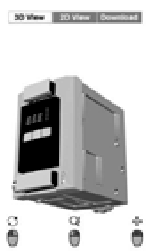
- Very easy to use
- Always the right product
- Reduced engineering time

Downloadable 2-D and 3-D CAD drawings

Designers of switching panels and machines can download clear 2-D and 3-D CAD drawings for all current products from http://omron-industrial.com/en/2D3D, which can easily be incorporated into your design.

- Large number of formats supported for greater flexibility
- Readily available
- Convenience that saves you time





Self-powered Totalizer
H7E

Compact Economical Totalizer with High Visibility Available with Backlit LCD Display

- Large display with 8.6-mm character height.
- Includes new models with backlight for improved visibility in dimly lit places. (Requires 24-VDC power supply.)
- Black and light-gray cases now available.
- PNP/NPN universal DC voltage input types now available.
- Battery is replaceable for Totalizer reuse and conservation of the environment.
- Key-protect switch to prevent faulty reset key operation.
- Dual operation mode.
- Front face compatible with NEMA4/IP66.
- Short body, all models have a depth of 48.5 mm.
- Finger protection terminal block conforms to VDE0106 Part100.
- Conforms to UL, CSA, and CE marking.
  Conforms to EN61010-1 (pollution degree 2/overvoltage category III.)
- Conforms to EMC standards and EN61326, thus allowing use in residential, commercial and light- and heavy-industry environments.
- Six-language instruction manual provided.
- PCB-mounting models available. (Requires 3-V power supply.)

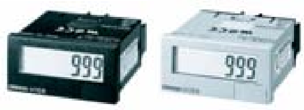
■ Broad Line-up of the H7E Series

H7E

H7EC

H7ET

H7ER



H7E□-N□P

Total Counter
- 8-digit

Time Counter
- 999999.9h/
  3999d23.9h
- 999h59min59s/
  9999h59.9min

Tachometer
- 1,000 s^{-1} with
  1 pulse/rev. encoder
- 1,000.0 s^{-1} with
  10 pulse/rev. encoder
- 1,000 min^{-1} with
  60 pulse/rev. encoder
- 10,000 min^{-1} with
  60 pulse/rev. encoder
- 1,000.0 min^{-1} with
  600 pulse/rev. encoder

PCB-mounting Counter
- Total Counter (8-digit)
- Time Counter (999999.9h)

Contents

Self-powered Totalizers

Self-powered Total Counter
H7EC

- Eight-digits, counting range 0 to 99999999.
- Dual input speed: 30 Hz ←→ 1 kHz (except for AC/DC multi-voltage input models)

Counters

Model Number Structure

■ Model Number Legend

H7EC - N □ - □ □
1 2 3

1. Count Input
None: No-voltage input
V: PNP/NPN universal DC voltage input
FV: AC/DC multi-voltage input

2. Case Color
None: Light gray
B: Black

3. Display
None: 7-segment LCD without backlight
H: 7-segment LCD with backlight

Ordering Information

■ Total Counters

Count input	Max. counting speed	Display	Model	
			Light-gray body	Black body
PNP/NPN universal DC voltage input	30 Hz ←→ 1 kHz (switchable)	7-segment LCD with backlight	H7EC-NV-H	H7EC-NV-BH
		7-segment LCD	H7EC-NV	H7EC-NV-B
AC/DC multi-voltage input	20 Hz	7-segment LCD	H7EC-NFV	H7EC-NFV-B
No-voltage	30 Hz ←→ 1 kHz (switchable)	7-segment LCD	H7EC-N	H7EC-N-B

■ Accessories (Order Separately)

Lithium Battery	Y92S-36	
Wire-wrap Terminal (set of two Terminals)	Y92S-37	
Compact Flush Mounting Bracket (See note.)	Y92F-35	
Flush Mounting Adapter	26 mm × 45.3 mm	Y92F-75
	27.5 mm × 52.5 mm	Y92F-76
	24.8 mm × 48.8 mm	Y92F-77B

Note: The New H7E models are supplied with a Y92F-34 Mounting Bracket.

Specifications

■ General

Item	H7EC-NV-□ H7EC-NV-□H	H7EC-NFV-□	H7EC-N-□
Operating mode	Up type		
Mounting method	Flush mounting		
External connections	Screw terminals, optional Wire-wrap Terminals (see note 1)		
Reset	External/Manual reset		
Number of digits	8		
Count input	PNP/NPN universal DC voltage input	AC/DC multi-voltage input	No-voltage input
Display	7-segment LCD with or without backlight, zero suppression (character height: 8.6 mm) (see note 2)		
Max. counting speed	30 Hz/1 kHz	20 Hz	30 Hz/1 kHz
Case color	Light gray or black (-B models)		
Attachment	Waterproof packing, flush mounting bracket		
Approved standard	UL863, CSA C22.2 No.14, Lloyds Conforms to EN61010-1/IEC61010-1 (Pollution degree2/overvoltage category III) Conforms to VDE0106/P100		

Note: 1. Separately ordered Wire-wrap Terminals (Y92S-37) are required.
2. Only PNP/NPN universal DC voltage input models (-H models) have a backlight.

■ Ratings

Item	H7EC-NV-□ H7EC-NV-□H	H7EC-NFV-□	H7EC-N-□
Supply voltage	Backlight model: 24 VDC (0.3 W max.) (only for backlight) No-backlight model: Not required (powered by built-in battery)	Not required (powered by built-in battery)	
Count input	High (logic) level: 4.5 to 30 VDC Low (logic) level: 0 to 2 VDC (Input impedance: Approx. 4.7 kΩ)	High (logic) level: 24 to 240 VAC/VDC, 50/60 Hz Low (logic) level: 0 to 2.4 VAC/VDC, 50/60 Hz	No voltage input Maximum short-circuit impedance: 10 kΩ max. Short-circuit residual voltage: 0.5 V max. Minimum open impedance: 750 kΩ min.
Reset input		No voltage input Maximum short-circuit impedance: 10 kΩ max. Short-circuit residual voltage: 0.5 V max. Minimum open impedance: 750 kΩ min.	
Max. counting speed (see note)	30 Hz or 1 KHz (Switchable with switch)	20 Hz	30 Hz or 1 KHz (Switchable with switch)
Minimum signal width	20 Hz: 25 ms 30 Hz: 16.7 ms 1 KHz: 0.5 ms		
Reset system	External reset and manual reset: Minimum signal width of 20 ms		
Terminal screw tightening torque	0.98 N·m max.		
Ambient temperature	Operating: -10°C to 55°C (with no condensation or icing) Storage: -25°C to 65°C (with no condensation or icing)		
Ambient humidity	Operating 25% to 85%		

Note: ON/OFF ratio 1:1

■ Characteristics

Item	H7EC-NV-□ H7EC-NV-□H	H7EC-NFV-□	H7EC-N-□
Insulation resistance	100 MΩ min. (at 500 VDC) between current-carrying metal parts and exposed non-current-carrying metal parts, and between the backlight power supply terminal and count input terminals/reset terminals for backlight models	100 MΩ min. (at 500 VDC) between current-carrying metal parts and exposed non-current-carrying metal parts and between count input terminals and reset terminals	100 MΩ min. (at 500 VDC) between current-carrying metal parts and exposed non-current-carrying metal parts
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between current-carrying metal parts and exposed non-current-carrying metal parts and between the backlight power supply terminal and count input terminals/reset terminals for backlight models	3,700 VAC, 50/60 Hz for 1 min between current-carrying metal parts and exposed non-current-carrying metal parts 2,200 VAC, 50/60 Hz for 1 min between reset terminals and exposed non-current-carrying metal parts and between count input terminals and reset terminals	1,000 VAC, 50/60 Hz for 1 min between current-carrying metal parts and exposed non-current-carrying metal parts
Impulse withstand voltage	4.5 kV between current-carrying terminal and exposed non-current-carrying metal parts	4.5 kV between current-carrying terminal and exposed non-current-carrying metal parts 3 kV between input terminals and reset terminals	4.5 kV between current-carrying terminal and exposed non-current-carrying metal parts
Noise immunity	Square-wave noise generated by noise simulator (pulse width: 100 ns/1 µs, 1-ns rise)		
	±600 V (Between count input terminals/Between reset terminals) ±480 V (Between the backlight power supply terminals for backlight models)	±1.5 kV (Between count input terminals) ±500 V (Between reset terminals)	±500 V (Between count input terminals/Between reset terminals)
Static immunity	±8 kV (malfunction)		
Vibration resistance	Malfunction: 0.15-mm single amplitude at 10 to 55 Hz for 10 min each in 3 directions Destruction: 0.375-mm single amplitude at 10 to 55 Hz for 2 hrs each in 3 directions		
Shock resistance	Malfunction: 200 m/s^2 3 times each in 6 directions Destruction: 300 m/s^2 3 times each in 6 directions		
EMC	(EMI) EN61326 Emission Enclosure: EN55011 Group 1 class B (EMS) EN61326 Immunity ESD: EN61000-4-2: 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: EN61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity RF-interference from Pulse-modulated Radio Waves: EN61000-4-3: 10 V/m (900 MHz ± 5 MHz) (level 3) Immunity Conducted Disturbance: EN61000-4-6: 10 V (0.15 to 80 MHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power line (level 3) 2 kV I/O signal line (level 4)		
Degree of protection	Front panel: IP66, NEMA4 Terminal block: IP20		
Weight (see note)	No-backlight model: Approx. 60 g Backlight model: Approx. 65 g	Approx. 60 g	Approx. 60 g

Note: Weight includes waterproof packing and flush mounting bracket.

■ Reference Value

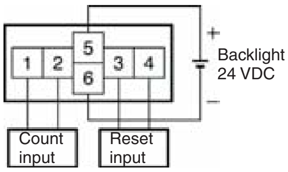
Item	Value	Note
Battery life	7 years min. with continuous input at 25°C (lithium battery)	The battery life is calculated according to the conditions in the left column and therefore is not a guaranteed value. Use these value as reference for maintenance or replacement.

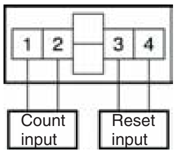
Connections

■ Terminal Arrangement

Bottom view: View of the Total Counter rotated horizontally 180°

Backlight Model **No-backlight Model**



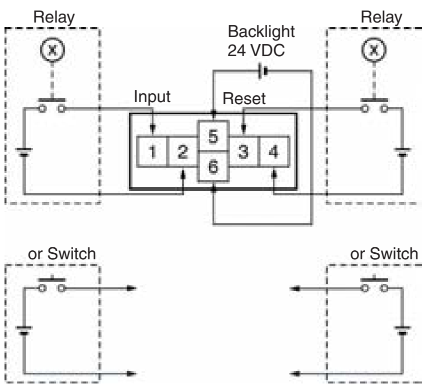


■ Connections

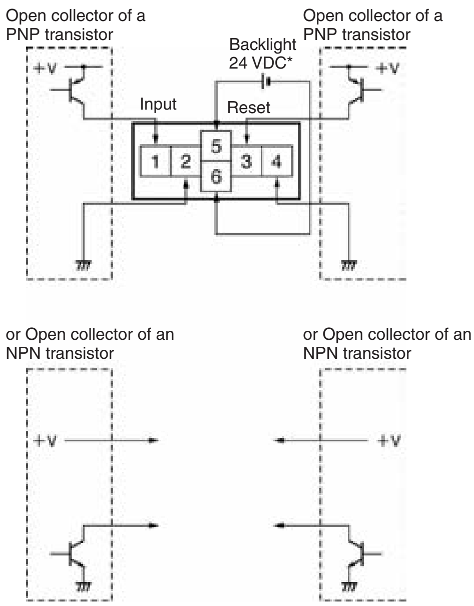
H7EC Total Counter

PNP/NPN Universal DC Voltage Input Model With Backlight

1. Contact Input (Input by a Relay or Switch Contact)



2. Solid-state Input



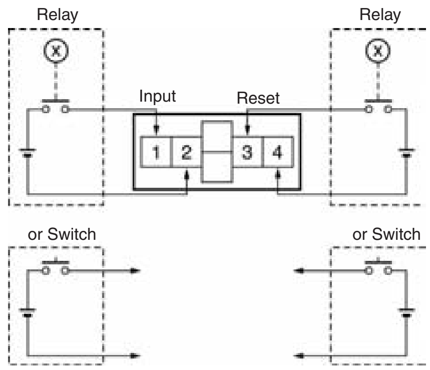
Note: 1. Terminals 2 and 4 (input circuit and reset circuit) are functionally isolated.

2. Select input transistors according to the following:
Dielectric strength of the collector ≥ 50 V
Leakage current < 100 µA

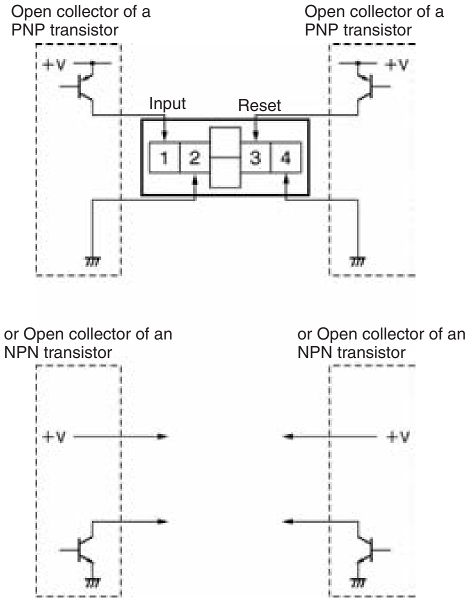
Note: *Recommended Power supply; eg. OMRON S8VS

PNP/NPN Universal DC Voltage Input Model Without Backlight

1. Contact Input (Input by a Relay or Switch Contact)



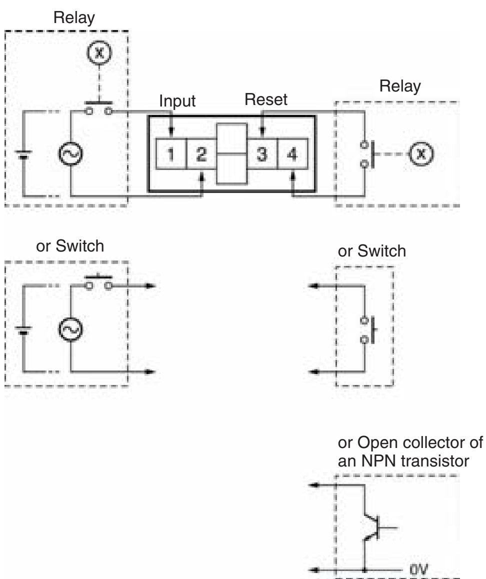
2. Solid-state Input



Note: 1. Terminals 2 and 4 (input circuit and reset circuit) are functionally isolated.

2. Select input transistors according to the following:
Dielectric strength of the collector ≥ 50 V
Leakage current < 100 µA

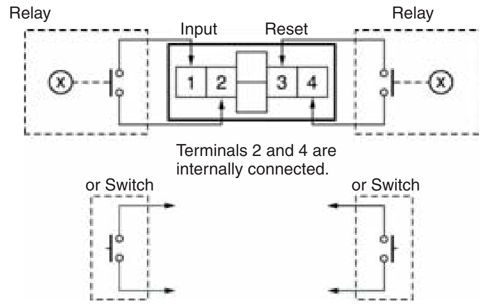
AC/DC Multi-voltage Input Model



Note: Select input transistors according to the following:
Dielectric strength of the collector ≥ 50 V
Leakage current < 1 µA

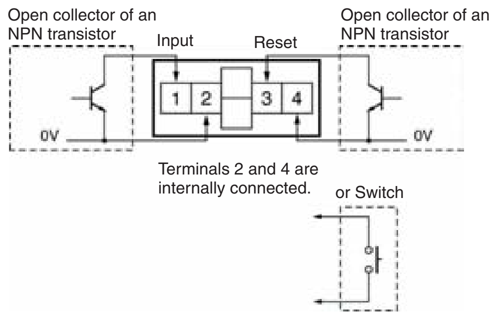
No-voltage Input Model

1. Contact Input (Input by a Relay or Switch Contact)



Note: Use Relays and Switches that have high contact reliability because the current flowing from terminals 1 or 3 is small. It is recommended that OMRON's G3TA-IA/ID be used as the SSR.

2. Solid-state Input
(Open Collector Input of an NPN Transistor)



Note: 1. Residual voltage in the output section of Proximity Sensors or Photoelectric Sensors becomes less than 0.5 V because the current flowing from terminals 1 or 3 is small thus allowing easy connection.

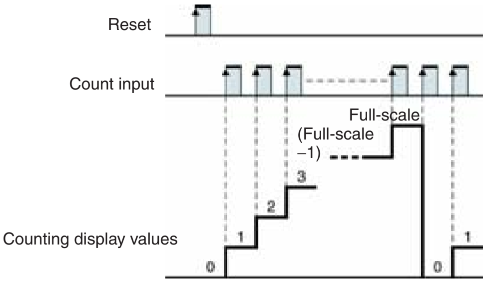
2. Select input transistors according to the following:
Dielectric strength of the collector ≥ 50 V
Leakage current < 1 µA

Operation

■ Operating Modes

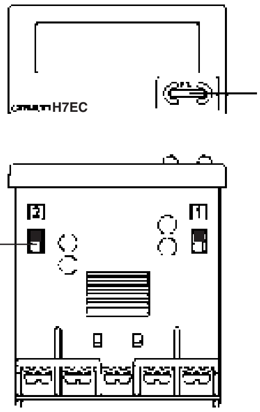
H7EC Total Counter

Incrementing Operation (Up)



Nomenclature

Front view



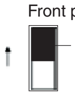
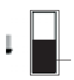
Bottom view

Reset Key

Reset the count value. Not operable under key-protect.

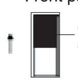
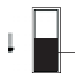
Counting speed switch

For all models except for H7EC-NFV-□. If the counting speed setting is changed, the present value will not be held and so press the Reset Key on the front panel.

Setting (see note)	Counting speed
Front panel 	30 Hz (default setting)
 Terminal block	1 kHz

Key-protect Switch

The Reset Key is not operable while the key-protect switch is set to ON.

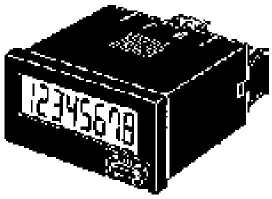
Setting (see note)	Key-protect
Front panel 	OFF (default setting)
 Terminal block	ON

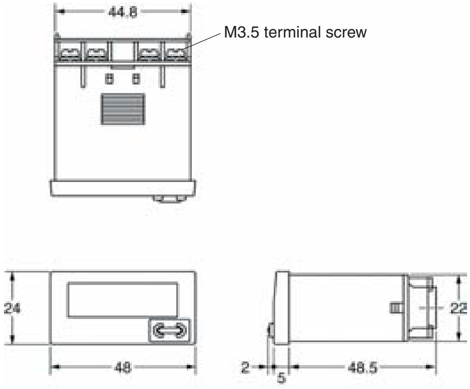
Note: Perform switch setting before mounting to a control panel.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

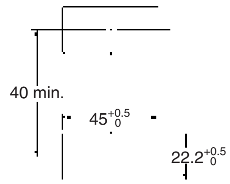
H7EC-N



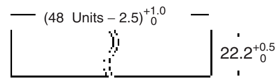


Panel Cutout

Separate mounting

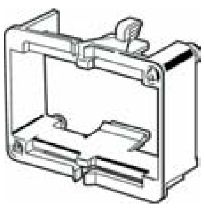


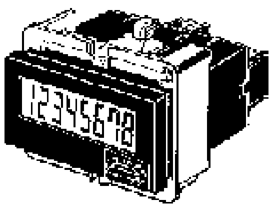
Dense mounting

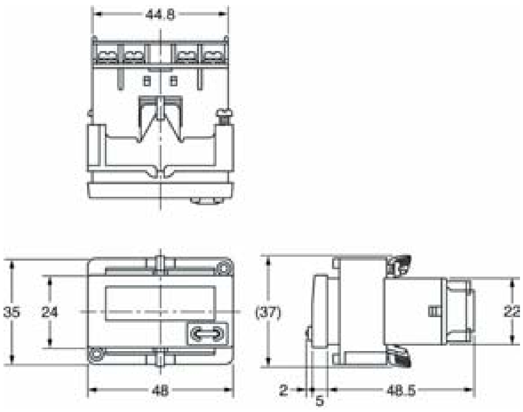


Waterproofing is not possible for dense mounting

Dimensions with Flush Mounting Bracket







- When mounting, insert the Counter into the cutout, insert the adapter from the back and push in the Counter while making the gap between the front panel and the cutout panel as small as possible. Use screws to secure the Counter. If waterproofing is desired, insert the waterproof packing.
- When several Counters are installed, ensure that the ambient temperature will not exceed specifications.
- The appropriate thickness of the panel is 1 to 5 mm.

Note: A Compact Flush Mounting Bracket (Y92F-35) can also be used. Refer to *Accessories* for details.

Self-powered Time Counter
H7ET

- Seven digits, time range 0 to 3999d23.9h.
- Dual time range: 999999.9 ←→ 3999d23.9h or 999h59m59s ←→ 9999h59.9m

Model Number Structure

■ Model Number Legend

H7ET - N☐☐ - ☐☐
1 2 3 4

1. Count Input
None: No-voltage input
V: PNP/NPN universal DC voltage input
FV: AC/DC multi-voltage input

2. Time Range
None: 999999.9h/3999d23.9h
1: 999h59m59s/9999h59.9m

3. Case Color
None: Light gray
B: Black

4. Display
None: 7-segment LCD without backlight
H: 7-segment LCD with backlight

Ordering Information

■ Time Counters

Timer input	Display	Time range			
		999999.9h ←→ 3999d23.9h (switchable)		999h59min59s ←→ 9999h59.9min (switchable)	
		Light-gray body	Black body	Light-gray body	Black body
PNP/NPN universal DC voltage input	7-segment LCD with backlight	H7ET-NV-H	H7ET-NV-BH	H7ET-NV1-H	H7ET-NV1-BH
	7-segment LCD	H7ET-NV	H7ET-NV-B	H7ET-NV1	H7ET-NV1-B
AC/DC multi-voltage input	7-segment LCD	H7ET-NFV	H7ET-NFV-B	H7ET-NFV1	H7ET-NFV1-B
No-voltage input	7-segment LCD	H7ET-N	H7ET-N-B	H7ET-N1	H7ET-N1-B

■ Accessories (Order Separately)

Lithium Battery	Y92S-36	
Wire-wrap Terminal (set of two terminals)	Y92S-37	
Compact Flush Mounting Bracket (See note.)	Y92F-35	
Flush Mounting Adapter	26 mm × 45.3 mm	Y92F-75
	27.5 mm × 52.5 mm	Y92F-76
	24.8 mm × 48.8 mm	Y92F-77B

Note: The New H7E models are supplied with a Y92F-34 Mounting Bracket.

Specifications

■ General

Item	H7ET-NV-□ H7ET-NV-□H	H7ET-NFV-□	H7ET-N-□	H7ET-NV1-□ H7ET-NV1-□H	H7ET-NFV1-□	H7ET-N1-□
Operating mode	Accumulating					
Mounting method	Flush mounting					
External connections	Screw terminals					
Reset	External/Manual reset					
Display	7-segment LCD with or without backlight, zero suppression (character height: 8.6 mm) (see note 1)					
Number of digits	7					
Time range	0.0h to 999999.9h ←→ 0.0h to 3999d23.9h (switchable with switch)			0s to 999h59min59s ←→ 0.0min to 9999h59.9min (switchable with switch)		
Timer input	PNP/NPN universal DC voltage input	AC/DC multi-voltage input	No-voltage input	PNP/NPN universal DC voltage input	AC/DC multi-voltage input	No-voltage input
Case color	Light gray or black (-B models)					
Attachment	Waterproof packing, flush mounting bracket, time unit labels (see note 2)					
Approved standard	UL863, CSA C22.2 No.14, Lloyds Conforms to EN61010-1/IEC61010-1 (pollution degree2/overvoltage category III) Conforms to VDE0106/P100					

Note: 1. Only PNP/NPN universal DC voltage input models (-H models) have a backlight.
2. "-hours", "-d-h", "-h-m", and "-h-m-s" labels are included.

■ Ratings

Item	H7ET-NV□-□ H7ET-NV□-□H	H7ET-NFV□-□	H7ET-N□-□
Supply voltage	Backlight model: 24 VDC (0.3 W max.) (for backlight) No-backlight model: Not required (powered by built-in battery)	Not required (powered by built-in battery)	
Timer input	High (logic) level: 4.5 to 30 VDC Low (logic) level: 0 to 2 VDC (Input impedance: Approx. 4.7 kΩ)	High (logic) level: 24 to 240 VAC/VDC, 50/60 Hz Low (logic) level: 0 to 2.4 VAC/VDC, 50/60 Hz	No voltage input Maximum short-circuit impedance: 10 kΩ max. Short-circuit residual voltage: 0.5 V max. Minimum open impedance: 750 kΩ min.
Reset input		No voltage input Maximum short-circuit impedance: 10 kΩ max. Short-circuit residual voltage: 0.5 V max. Minimum open impedance: 750 kΩ min.	
Minimum pulse width	1 s		
Reset system	External reset and manual reset: Minimum signal width of 20 ms		
Terminal screw tightening torque	0.98 N·m max.		
Ambient temperature	Operating: -10°C to 55°C (with no condensation or icing) Storage: -25°C to 65°C (with no condensation or icing)		
Ambient humidity	Operating: 25% to 85%		

■ Characteristics

Item	H7ET-NV□-□ H7ET-NV□-H□	H7ET-NFV□-□	H7ET-N□-□
Time accuracy	±100 ppm (25°C)		
Insulation resistance	100 MΩ min. (at 500 VDC) between current-carrying metal parts and exposed non-current-carrying metal parts, and between the backlight power supply and timer input terminals/reset terminals for backlight models	100 MΩ min. (at 500 VDC) between current-carrying metal parts and exposed non-current-carrying metal parts and between timer input terminals and reset terminals	100 MΩ min. (at 500 VDC) between current-carrying metal parts and exposed non-current-carrying metal parts
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between current-carrying metal parts and exposed non-current-carrying metal parts and between the backlight power supply and timer input terminals/reset terminals for backlight models	3,700 VAC, 50/60 Hz for 1 min between timer input terminals and exposed non-current-carrying metal parts 2,200 VAC, 50/60 Hz for 1 min between reset terminals and exposed non-current-carrying metal parts and between timer input terminals and reset terminals	1,000 VAC, 50/60 Hz for 1 min between current-carrying metal parts and exposed non-current-carrying metal parts
Impulse withstand voltage	4.5 kV between current-carrying terminal and exposed non-current-carrying metal parts	4.5 kV between current-carrying terminal and exposed non-current-carrying metal parts 3 kV between timer input terminals and reset terminals	4.5 kV between current-carrying terminal and exposed non-current-carrying metal parts
Noise immunity	Square-wave noise generated by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise)		
	±600 V (Between timer input terminals/Between reset terminals) ±480 V (Between the backlight power supply terminals for backlight models)	±1.5 kV (Between timer input terminals) ±500 V (Between reset terminals)	±500 V (Between timer input terminals/Between reset terminals)
Static immunity	±8 kV (malfunction)		
Vibration resistance	Malfunction: 0.15-mm single amplitude at 10 to 55 Hz for 10 min each in 3 directions Destruction: 0.375-mm single amplitude at 10 to 55 Hz for 2 hrs each in 3 directions		
Shock resistance	Malfunction: 200 m/s^2 3 times each in 6 directions Destruction: 300 m/s^2 3 times each in 6 directions		
EMC	(EMI) EN61326 Emission Enclosure: EN55011 Group 1 class B (EMS) EN61326 Immunity ESD: EN61000-4-2: 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: EN61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity RF-interference from Pulse-modulated Radio Waves: EN61000-4-3: 10 V/m (900 MHz ± 5 MHz) (level 3) Immunity Conducted Disturbance: EN61000-4-6: 10 V (0.15 to 80 MHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power line (level 3) 2 kV I/O signal line (level 4)		
Degree of protection	Front panel: IP66, NEMA4 with waterproof packing Terminal block: IP20		
Weight (see note)	No-backlight model: Approx. 60 g Backlight model: Approx. 65 g	Approx. 60 g	Approx. 60 g

Note: Weight includes waterproof packing and flush mounting bracket.

■ Reference Value

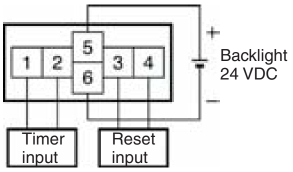
Item	Value	Note
Battery life	10 years min. with continuous input at 25°C (lithium battery)	The battery life is calculated according to the conditions in the left column and therefore is not a guaranteed value. Use these value as reference for maintenance or replacement.

Connections

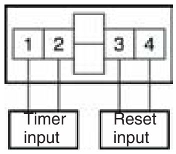
■ Terminal Arrangement

Bottom view: View of the Time Counter rotated horizontally 180°

Backlight Model



No-backlight Model

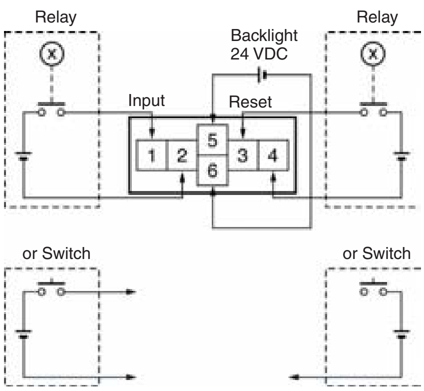


■ Connections

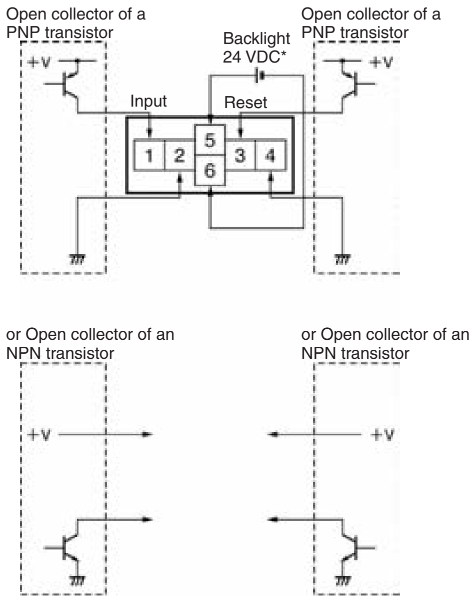
H7ET Time Counter

PNP/NPN Universal DC Voltage Input Model With Backlight

1. Contact Input (Input by a Relay or Switch Contact)



2. Solid-state Input



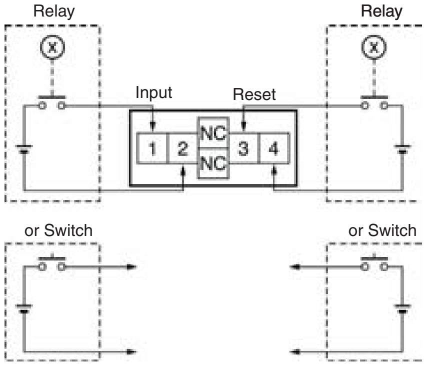
Note: 1. Terminals 2 and 4 (input circuit and reset circuit) are functionally isolated.

2. Select input transistors according to the following:
Dielectric strength of the collector ≥ 50 V
Leakage current < 1 μA

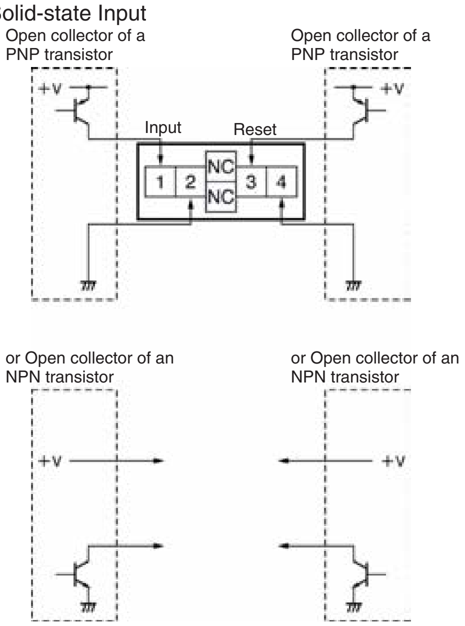
Note: *Recommended power supply; eg. OMRON S8VS

PNP/NPN Universal DC Voltage Input Model Without Backlight

1. Contact Input (Input by a Relay or Switch Contact)



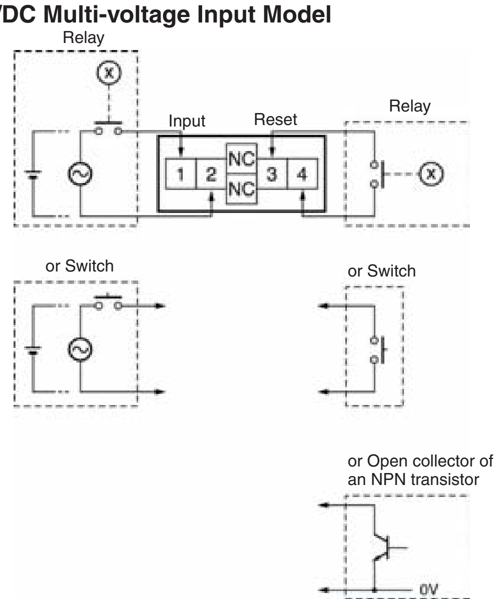
2. Solid-state Input



Note: 1. Terminals 2 and 4 (input circuit and reset circuit) are functionally isolated.

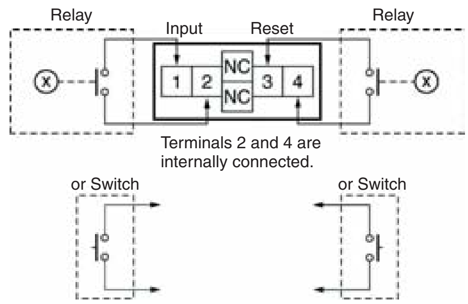
2. Select input transistors according to the following:
Dielectric strength of the collector ≥ 50 V
Leakage current < 1 µA

AC/DC Multi-voltage Input Model



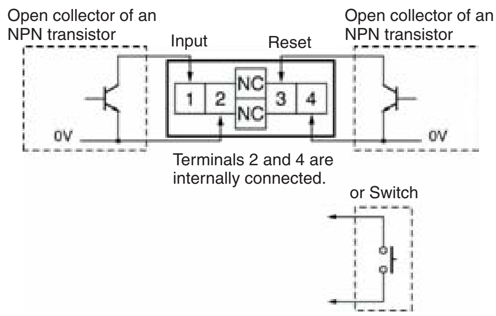
No-voltage Input Model

1. Contact Input (Input by a Relay or Switch Contact)



Note: Use Relays and Switches that have high contact reliability because the current flowing from terminals 1 or 3 is as small as approx. 10 µA. It is recommended that OMRON's G3TA-IA/ID be used as the SSR.

2. Solid-state Input
(Open Collector Input of an NPN Transistor)



Note: 1. Residual voltage in the output section of Proximity Sensors or Photoelectric Sensors becomes less than 0.5 V because the current flowing from terminals 1 or 3 is as small as approx. 10 µA, thus allowing easy connection.

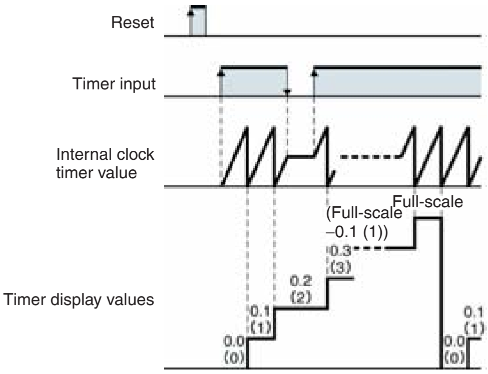
2. Select input transistors according to the following:
Dielectric strength of the collector ≥ 50 V
Leakage current < 1 µA

Operation

■ Operating Modes

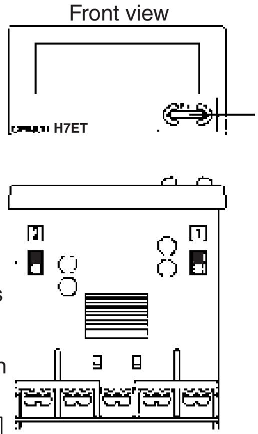
H7ET Time Counter

Incrementing Operation (Up)



Nomenclature

Front view



Bottom view

Reset Key
Reset the count value. Not operable under key-protect.

Time-range switch
If the time-range setting is changed, the present value will not be held and so press the Reset Key on the front panel.

Setting (see note)	Time range	
	H7ET-N□□-□□	H7ET-N□□1-□□
Front panel ↑ Concave side	0.0h to 3999d23.9h	0s to 999h59min59s (default setting)
↓ Concave side Terminal block	0.0h to 999999.9h (default setting)	0.0min to 9999h59.9min

Note: Perform switch setting before mounting to a control panel.

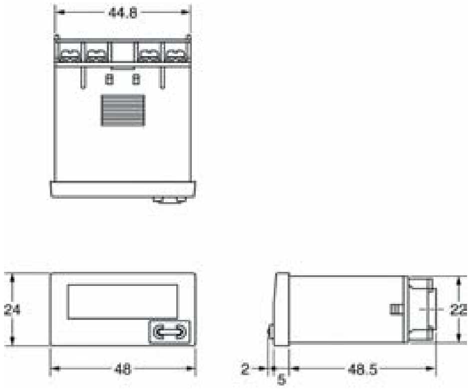
Key-protect Switch
The Reset Key is not operable while the key-protect switch is set to ON.

Setting (see note)	Key-protect
Front panel ↑ Concave side	OFF (default setting)
↓ Concave side Terminal block	ON

Dimensions

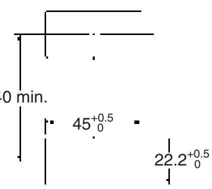
Note: All units are in millimeters unless otherwise indicated.

H7ET-N

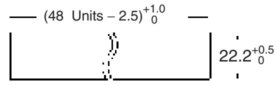


Panel Cutout

Separate mounting



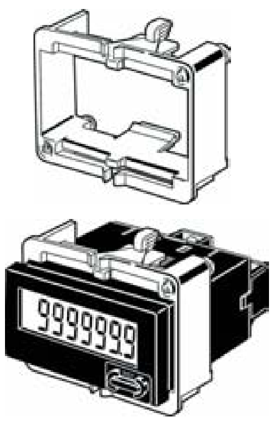
Dense mounting

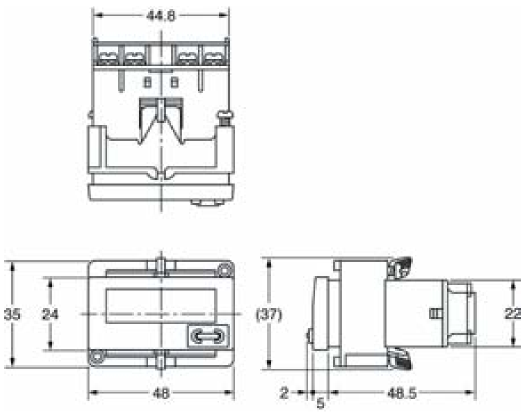


Waterproofing is not possible for dense mounting

- When mounting, insert the Counter into the cutout, insert the adapter from the back and push in the Counter while making the gap between the front panel and the cutout panel as small as possible. Use screws to secure the Counter. If waterproofing is desired, insert the waterproof packing.
- When several Counters are installed, ensure that the ambient temperature will not exceed specifications.
- The appropriate thickness of the panel is 1 to 5 mm.

Dimensions with Flush Mounting Bracket





Note: A Compact Flush Mounting Bracket (Y92F-35) can also be used. Refer to *Accessories* for details.

Self-powered Tachometer
H7ER

- Revolutions displayed up to five digits.
- Dual revolution display according to encoder resolution used; 1000 s^{-1}/1000 min^{-1} or 1000.0 s^{-1} /1000.0 min^{-1}
- Switchable dual revolution display type available (-NV1 models); extended up to 10000 min^{-1}

Model Number Structure

■ Model Number Legend

H7ER - N☐☐ - ☐☐
1 2 3 4

1. Count Input
None: No-voltage input
V: PNP/NPN universal DC voltage input

2. Number of Digits
None: 4 digits
1: 5 digits

3. Case Color
None: Light gray
B: Black

4. Display
None: 7-segment LCD without backlight
H: 7-segment LCD with backlight

Ordering Information

■ Tachometers

Count input	Display	Max. revolutions displayed (applicable encoder resolution)			
		1000 s^{-1} (1 pulse/rev.), 1000 min^{-1} (60 pulse/rev.)		1000.0 s^{-1} (10 pulse/rev.), 1000.0 min^{-1} (600 pulse/rev.) ←→ 10000 min^{-1} (60 pulse/rev.) (switchable)	
		Light-gray body	Black body	Light-gray body	Black body
PNP/NPN universal DC voltage input	7-segment LCD with backlight	H7ER-NV-H	H7ER-NV-BH	H7ER-NV1-H	H7ER-NV1-BH
	7-segment LCD	H7ER-NV	H7ER-NV-B	H7ER-NV1	H7ER-NV1-B
No-voltage input	7-segment LCD	H7ER-N	H7ER-N-B	---	---

■ Accessories (Order Separately)

Lithium Battery	Y92S-36	
Wire-wrap Terminal (Set of two Terminals)	Y92S-37	
Compact Flush Mounting Bracket (See note.)	Y92F-35	
Flush Mounting Adapter	26 mm × 45.3 mm	Y92F-75
	27.5 mm × 52.5 mm	Y92F-76
	24.8 mm × 48.8 mm	Y92F-77B

Note: The New H7E models are supplied with a Y92F-34 Mounting Bracket.

Specifications

■ General

Item	H7ER-NV-□ H7ER-NV-□H	H7ER-N-□	H7ER-NV1-□ H7ER-NV1-□H
Operating mode	Up type		
Mounting method	Flush mounting		
External connections	Screw terminals, Wire-wrap Terminals (see note 3)		
Display	7-segment LCD with or without backlight, zero suppression (character height: 8.6 mm) (see note 4)		
Number of digits	4		5
Count input	PNP/NPN universal DC voltage input	No-voltage input	PNP/NPN universal DC voltage input
Max. counting speed	1 kHz		10 kHz
Max. revolutions displayed (see note 5)	1,000 s^{-1} (When encoder resolution of 1 pulse/rev is used.) 1,000 min^{-1} (When encoder resolution of 60 pulse/rev is used.)		1,000.0 s^{-1} (When encoder resolution of 10 pulse/rev is used.) 1,000.0 min^{-1} (When encoder resolution of 600 pulse/rev is used.) ←→ 10,000 min^{-1} (When encoder resolution of 60 pulse/rev is used.) (Switchable with switch)
Attachment	Waterproof packing, flush mounting bracket, revolution unit labels (see note 5)		
Approved standard	UL863, CSA C22.2 No.14, Lloyds Conforms to EN61010-1/IEC61010-1 (Pollution degree2/overvoltage category III) Conforms to VDE0106/P100		

Note: 1. Reset is not available.
2. When there is no input, the display will be 0.0 or 0.
3. Separately ordered Wire-wrap Terminals (Y92S-37) are required.
4. Only PNP/NPN Universal DC voltage input models have a backlight.
5. "rpm", "rps", "s^{-1}" and "min^{-1}" labels are included.

■ Ratings

Item	H7ER-NV□-□ H7ER-NV□-□H	H7ER-N-□
Supply voltage	Backlight model: 24 VDC (0.3 W max.) (for backlight lit) No-backlight model: Not required (powered by built-in battery)	Not required (powered by built-in battery)
Count input	High (logic) level: 4.5 to 30 VDC Low (logic) level: 0 to 2 VDC (Input impedance: Approx. 4.7 kΩ)	No voltage input Maximum short-circuit impedance: 10 kΩ max. Short-circuit residual voltage: 0.5 V max. Minimum open impedance: 750 kΩ min.
Max. counting speed	4-digit models:1 kHz 5-digit models:10 kHz	1 kHz
Minimum signal width	10 kHz: 0.05 ms 1 kHz: 0.5 ms	
Terminal screw tightening torque	0.98 N·m max.	
Ambient temperature	Operating: -10°C to 55°C (with no condensation or icing) Storage: -25°C to 65°C (with no condensation or icing)	
Ambient humidity	Operating: 25% to 85%	

■ Characteristics

Item	H7ER-NV□-□ H7ER-NV□-□H	H7ER-N-□
Insulation resistance	100 MΩ min. (at 500 VDC) between current-carrying metal parts and exposed non-current-carrying metal parts, and between the backlight power supply and count input terminals/reset terminals for backlight models	100 MΩ min. (at 500 VDC) between current-carrying metal parts and exposed non-current-carrying metal parts
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between current-carrying metal parts and exposed non-current-carrying metal parts and between the backlight power supply and count input terminals/reset terminals for backlight models	1,000 VAC, 50/60 Hz for 1 min between current-carrying metal parts and exposed non-current-carrying metal parts
Impulse withstand voltage	4.5 kV between current-carrying terminal and exposed non-current-carrying metal parts	
Noise immunity	Square-wave noise generated by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise)	
	±600 V (Between count input terminals) ±480 V (Between the backlight power supply terminals for backlight models)	±500 V (Between count input terminals)
Static immunity	±8 kV (malfunction)	
Vibration resistance	Malfunction: 0.15-mm single amplitude at 10 to 55 Hz for 10 min each in 3 directions Destruction: 0.375-mm single amplitude at 10 to 55 Hz for 2 hrs each in 3 directions	
Shock resistance	Malfunction: 200 m/s² 3 times each in 6 directions Destruction: 300 m/s² 3 times each in 6 directions	
EMC	(EMI) EN61326 Emission Enclosure: EN55011 Group 1 class B (EMS) EN61326 Immunity ESD: EN61000-4-2: 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: EN61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity RF-interference from Pulse-modulated Radio Waves: EN61000-4-3: 10 V/m (900 MHz ± 5 MHz) (level 3) Immunity Conducted Disturbance: EN61000-4-6: 10 V (0.15 to 80 MHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power line (level 3) 2 kV I/O signal line (level 4)	
Degree of protection	Front panel: IP66, NEMA4 with waterproof packing Terminal block: IP20	
Weight (see note)	No-backlight model: Approx. 60 g Backlight model: Approx. 65 g	

Note: Weight includes waterproof packing and flush mounting bracket.

■ Reference Value

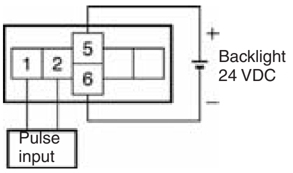
Item	Value	Note
Battery life	7 years min. with continuous input at 25°C (lithium battery)	The battery life is calculated according to the conditions in the left column and therefore is not a guaranteed value. Use these value as reference for maintenance or replacement.

Connections

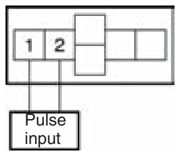
■ Terminal Arrangement

Bottom view: View of the Tachometer rotated horizontally 180°

Backlight Model



No-backlight Model

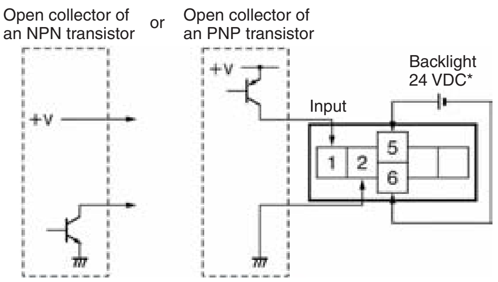


■ Connections

H7ER Tachometer

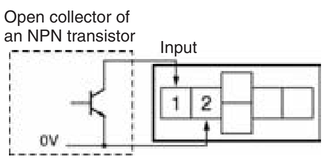
Note: Select input transistors according to the following:
Dielectric strength of the collector ≥ 50 V
Leakage current < 100 µA (1 µA for no-voltage input model)

PNP/NPN Universal DC Voltage Input Models With Backlight
Transistor Input

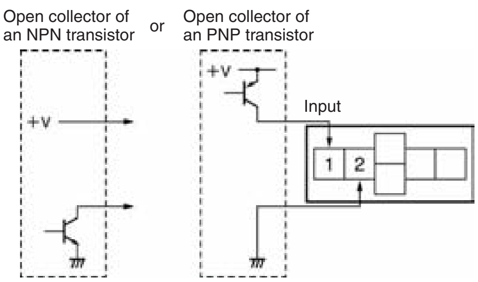


*Recommended power supply; eg. OMRON S8VS

No-voltage Input Model
Transistor Input (Open Collector of an NPN Transistor)



PNP/NPN Universal DC Voltage Input Models Without Backlight
Transistor Input

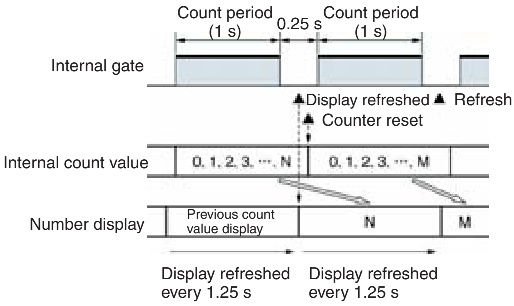


Operation

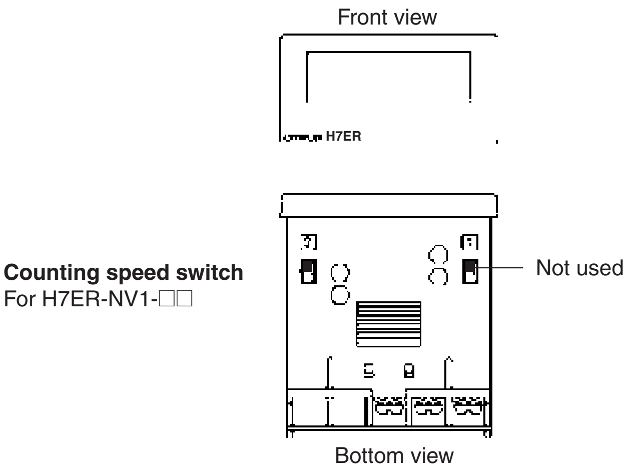
■ Operating Modes

H7ER Tachometer

Incrementing Operation
Within Unit Time (Up)



Nomenclature



Counting Speed Switch Settings and Unit Label Application

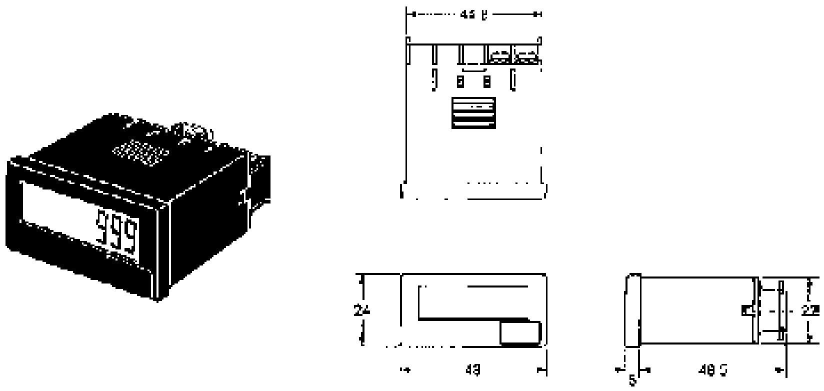
Model	Counting speed switch setting (see note)	Max. revolutions displayed	Applicable encoder resolution	Applicable unit label
H7ER-NV1-□□	Front panel ↑ Concave side	10000 min^{-1} (default setting)	60 pulse/rev.	"min^{-1}" or "rpm"
	↓ Concave side Terminal block	1000.0 min^{-1}	600 pulse/rev.	"min^{-1}" or "rpm"
		1000.0 s^{-1}	10 pulse/rev.	"s^{-1}" or "rps"
H7ER-N-□ H7ER-NV-□□	No setting is required	1000 min^{-1}	60 pulse/rev.	"min^{-1}" or "rpm"
		1000 s^{-1}	1 pulse/rev.	"s^{-1}" or "rps"

Note: Perform switch setting before mounting to a control panel.

Dimensions

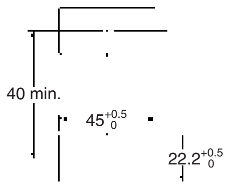
Note: All units are in millimeters unless otherwise indicated.

H7ER-N

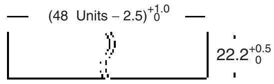


Panel Cutout

Separate mounting

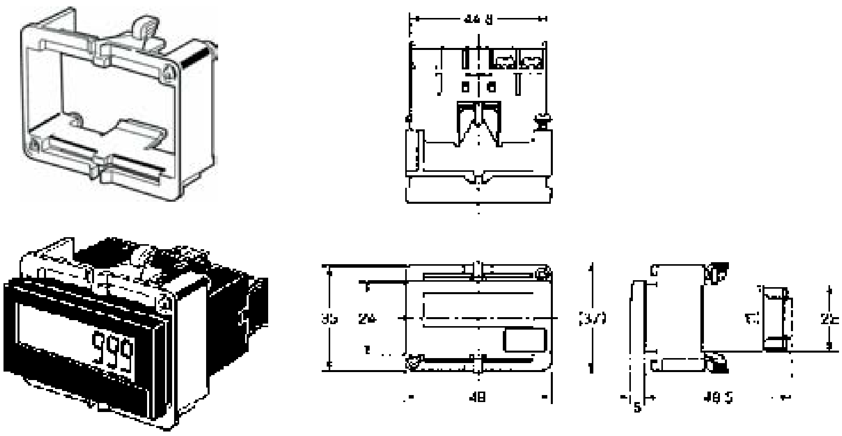


Dense mounting



Waterproofing is not possible for dense mounting

Dimensions with Flush Mounting Bracket



- When mounting, insert the Counter into the cutout, insert the adapter from the back and push in the Counter while making the gap between the front panel and the cutout panel as small as possible. Use screws to secure the Counter. If waterproofing is desired, insert the waterproof packing.
- When several Counters are installed, ensure that the ambient temperature will not exceed specifications.
- The appropriate thickness of the panel is 1 to 5 mm.

Note: A Compact Flush Mounting Bracket (Y92F-35) can also be used. Refer to *Accessories* for details.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Preset Counter/Timer H8GN

World's Smallest Compact Preset Counter/ Timer

1/32-mm DIN with Communications

- Only 48 x 24 x 83 mm (W x H x D)
- Switch between 4-digit preset counter and 4-digit timer operation.
- While using the preset counter, it is possible to switch the display to monitor the totalizing count value (8 digits).
- Built-in prescaling for counter operation.
- ON/OFF-duty adjustable flicker mode that can be used to perform cyclic control is available for timer operation.
- Four preset values that can be changed by the front panel key (SV-bank).
- Finger protection terminal block to meet VDE0106/P100.
- Panel surface compatible with NEMA4X/IP66.
- Conforms to UL, CSA, and IEC safety standards as well as CE Marking.
- Six-language instruction manual provided.

Model Number Structure

■ Model Number Legend

H8GN-AD-□
1 2

1. **Supply Voltage**
   D: 24 VDC

2. **Communications Output Type**
   None: Communications not supported
   FLK: RS-485

Ordering Information

■ List of Models

Supply voltage	Output	Communications	
		No communications	RS-485
24 VDC	Contact output (SPDT)	H8GN-AD	H8GN-AD-FLK

Specifications

■ Ratings

Rated supply voltage		24 VDC
Operating voltage range		85% to 110% of rated supply voltage
Power consumption		1.5 W max. (for max. DC load) (Inrush current: 15 A max.)
Mounting method		Flush mounting
External connections		Screw terminals (M3 screws)
Terminal screw tightening torque		0.5 N·m max.
Attachment		Waterproof packing, flush mounting bracket
Display		7-segment, negative transmissive LCD; time display (h, min, s); CMW, OUT, RST, TOTAL Present value (red, 7-mm-high characters); Set value (green, 3.4-mm-high characters)
Digits		PV: 4 digits SV: 4 digits When total count value is displayed: 8 digits (Zeros suppressed)
Memory backup		EEPROM (non-volatile memory) (number of writes: 100,000 times)
Counter	**Maximum counting speed**	30 Hz or 5 kHz (See note.)
	Counting range	–999 to 9,999
	Input modes	Increment, decrement, individual, quadrature inputs
	Output modes	N, F, C, or K
Timer	**Time ranges**	0.000 to 9.999 s, 0.00 to 99.99 s, 0.0 to 999.9 s, 0 to 9999 s, 0 min 00 s to 99 min 59 s, 0.0 to 999.9 min, 0 h 00 min to 99 h 59 min, 0.0 h to 999.9 h, 0 h to 9999 h
	Timer modes	Elapsed time (Up), remaining time (Down)
	Output modes	A, B, D, E, F, or Z
Inputs	**Input signals**	For Counter: CP1, CP2, and reset For Timer: Start, gate, and reset
	Input method	No-voltage input (contact short-circuit and open input) Short-circuit (ON) impedance: 1 KΩ max. (Approx. 2 mA runoff current at 0 Ω) Short-circuit (ON) residual voltage: 2 VDC max. Open (OFF) impedance: 100 kΩ min. Applied voltage: 30 VDC max.
	Start, reset, gate	Minimum input signal width: 1 or 20 ms (selectable)
	Power reset	Minimum power-opening time: 0.5 s
Control output		SPDT contact output: 3 A at 250 VAC/30 VDC, resistive load (cos ϕ = 1)
Minimum applied load		10 mA at 5 VDC (failure level: P, reference value)
Reset system		External, manual, and power supply resets (for timer in A, B, D, E, or Z modes)
Sensor waiting time		260 ms max. (Inputs cannot be received during sensor wait time if control outputs are turned OFF.)

Note: The figures given for maximum counting speed are for incrementing or decrementing operation with a prescale value of ×1. If prescaling is used and 5 kHz is set, the maximum counting speed will be reduced to about half. The maximum counting speed will also be reduced to about half when the up/down mode is selected.

■ Characteristics

Timer function	**Accuracy of operating time and setting error (including temperature and voltage effects)**	Signal start: ± 0.03% ± 30 ms max. Power-ON start: ± 0.03% ± 50 ms max.
Insulation resistance		100 MΩ min. (at 500 VDC)
Dielectric strength		1,500 VAC, 50/60 Hz for 1 min between output terminals and non-current-carrying metal parts 510 VAC, 50/60 Hz for 1 min between current-carrying terminals (except output terminals) and non-current-carrying metal parts 1,500 VAC, 50/60 Hz for 1 min between output terminals and current-carrying terminals (except output terminals) 500 VAC, 50/60 Hz for 1 min between communications terminals and current-carrying terminals (except output terminals) 1,000 VAC, 50/60 Hz for 1 min between contacts not located next to each other
Noise immunity		Square-wave noise by noise simulator; ±480 V (between power terminals), ± 600 V (between input terminals)
Static immunity		± 8 kV (malfunction), ± 15 kV (destruction)
Vibration resistance	**Malfunction**	10 to 55 Hz with 0.35-mm single amplitude each in three directions for 10 min
	Destruction	10 to 55 Hz with 0.75-mm single amplitude each in three directions for 2 h
Shock resistance	**Malfunction**	100 m/s^2, 3 times each in six directions
	Destruction	300 m/s^2, 3 times each in six directions
Life expectancy	**Mechanical**	10 million operations
	Electrical	100,000 operations min. (3 A at 250 VAC, resistive load) (See note.)
Ambient temperature	**Operating**	–10°C to 55°C (with no icing or condensation)
	Storage	–25°C to 65°C (with no icing or condensation)
Ambient humidity		25% to 85%
EMC		(EMI): EN61326 Emission Enclosure: EN55011 Group 1 Class A (EMS): EN61326 Immunity ESD: EN61000-4-2: 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Immunity RF-interference: EN61000-4-3: 10 V/m (Amplitude-modulated, 80 MHz to 1 GHz) (level 3); 10 V/m (Pulse-modulated, 900 MHz ± 5 MHz) (level 3) Immunity Conducted Disturbance: EN61000-4-6: 3 V (0.15 to 80 MHz) (level 2) Immunity Burst: EN61000-4-4: 2 kV power-line (level 3); 1 kV I/O signal-line (level 4); 1 kV communications-line (level 3) Immunity Surge: EN61000-4-5: 1 kV between lines (power and output lines) (level 3); 2 kV between grounds (power and output lines) (level 3)
Approved standards		UL508, CSA C22.2 No.14 Conforms to EN61010-1/IEC61010-1 (Pollution degree 2/overvoltage category II) Conforms to VDE0106/P 100 (Finger Protection)
Case color		Rear section: Gray smoke; Front section: N1.5 (black)
Degree of protection		Panel surface: IP66 and NEMA Type 4X (indoors) Rear case: IP20 Terminal block: IP20
Weight		Approx. 80 g

Note: Refer to the *Life-test Curve*.

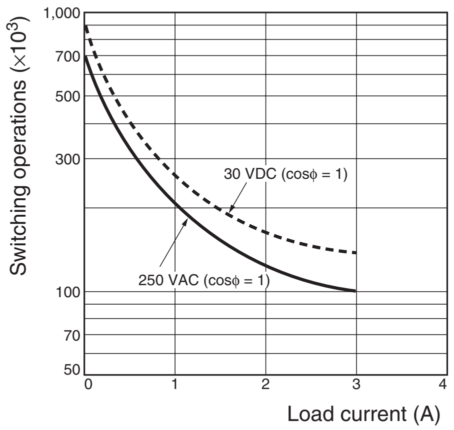
■ Communications Specifications

Transmission path connections	Multidrop
Communications method	RS-485 (two-wire, half duplex)
Synchronization method	Start-stop synchronization
Baud rate (See note.)	1,200/2,400/4,800/9,600 bit/s
Transmission code	ASCII
Data bit length (See note.)	7 or 8 bits
Stop bit length (See note.)	1 or 2 bits
Error detection (See note.)	Vertical parity (none, even, or odd) (See note.) Block check character (BCC)
Flow control	Not supported.
Interface	RS-485
Retry function	Not supported.
Communications buffer	40 bytes
Reading and writing from H8GN	Reading present value and totalizing count value; reading/writing preset and set values; switching between SV-banks; switching between communications write-enabled/write-prohibited; reading/writing other initial and advanced function setting parameters

Note: The baud rate, data bit length, stop bit length, and vertical parity can be individually set using the communications setting level.

■ Life-test Curve (Reference Values)

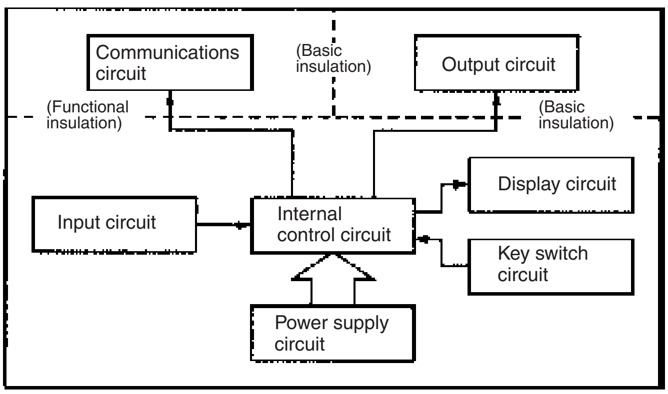
Resistive Load



Reference: A maximum current of 0.15 A can be switched at 125 VDC (cosϕ = 1) and a maximum current of 0.1 A can be switched if L/R is 7 ms. In both cases, a life of 100,000 operations can be expected. The minimum applicable load is 10 mA at 5 VDC (failure level: P).

Connections

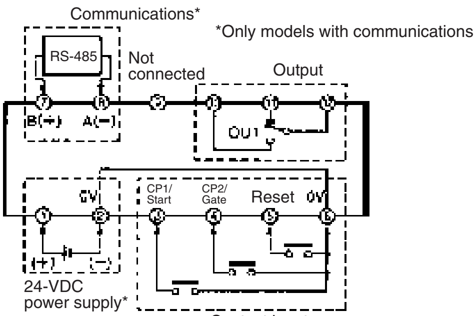
■ Block Diagram



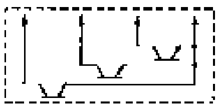
■ I/O Functions

Inputs	**Counter inputs**	**CP1/CP2**	• Receive count signals. • Receive increment, decrement, individual, and quadrature inputs. • In increment mode and decrement mode, CP1 is used for the count input and CP2 is used for count prohibit input.
		Reset	• Resets the present value. (Totalizing count value is not reset.) (In increment mode or increment/decrement mode, the present value returns to 0; in Decrement Mode the present value returns to the set value.) • The count input is not received during resetting. • The RST indicator is lit during resetting.
	Timer inputs	**Start**	• Starts timing.
		Reset	• Resets the timer. (In elapsed time mode the time returns to 0; in remaining time mode, the time returns to the set value.) • During resetting, timing stops and the control output turns OFF. • The RST indicator is lit during resetting.
		Gate	• Prohibits timing operation.
Outputs		**OUT**	• Output made according to the output mode setting when the set value is reached.

■ Terminal Arrangement



Contact inputs

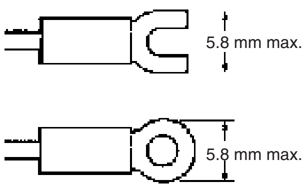

Open-collector inputs

Note: (2) and (6) are connected internally.
Do not use unused terminals as relay terminals.

Note: *Recommended power supply; eg. OMRON S8VS

■ Wiring

Use the following type of crimp terminals for M3 screw.



Nomenclature

No. 1 Display
Displays the present value or parameter type. When totalizing count is displayed, the leftmost 4 digits of the 8-digit totalizing count will be displayed. (Zeros suppressed)

Operation display 2

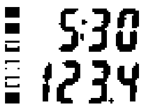
Indicator	Meaning
CMW	Lit when communications writing is enabled.
RST	Lit during reset using reset input or Reset Key.
OUT	Lit when control output is ON.
TOTAL	Lit when totalizing count value is displayed.

Operation display 1
Displays the time unit when the timer function has been selected.

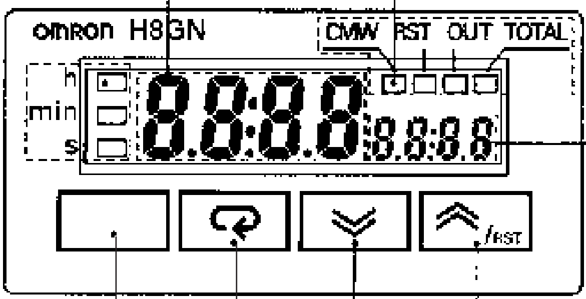
Example

5 h 30 min

123.4 s



Flashes while timer is on 0.0 min, 0 h 00 min, 0.0 h, or 0 h.



No. 2 Display
Displays set value or set value of the parameter.
Displays the rightmost 4 digits of the count value (8 digits) when the H8GN is used as a totalizing counter. (Zeros suppressed)

Level Key
Press this key to select the setup level. The setup level is selected in order "operation level" ←→ "adjustment level", "initial setting level" ←→ "communications setting level".

Mode Key
Press this key to select parameters within each level.

Down Key
Each press of this key decreases values displayed on the No. 2 display. Hold down this key continuously to decrease values quickly. Also returns setting items.

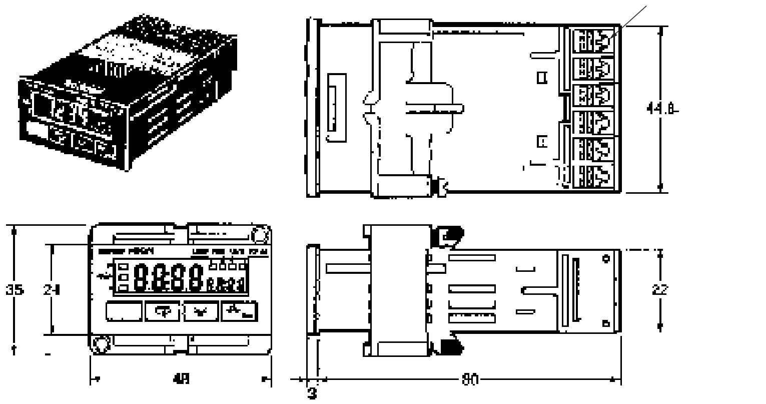
Up/Reset Key
Each press of this key increases values displayed on the No. 2 display. Hold down this key continuously to increase values quickly. Also advances setting items.

Reset Function
To reset the present value, press this key while the present value is displayed.
If this key is pressed while the totalizing count value is displayed, the totalizing count value and the present value will be reset.

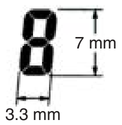
Dimensions

Note: All units are in millimeters unless otherwise indicated.

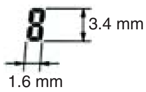
H8GN



No. 1 display digit size



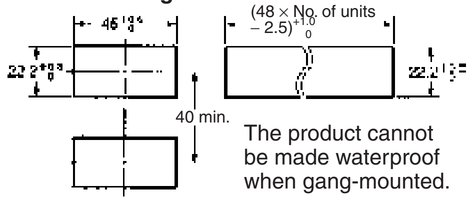
No. 2 display digit size



Panel cutout

Separate mounting

Gang mounting



The product cannot be made waterproof when gang-mounted.

- Insert the H8GN in the square cutout, insert the adapter from the back, and push the H8GN into the cutout as far as possible. Use screws to secure the H8GN. To make the H8GN waterproof, insert waterproof packing and tighten the screws.

- When mounting two or more products in a cutout, be sure that the ambient temperature does not exceed the specifications.

Precautions

⚠ Caution

Do not use the product in locations subject to flammable or explosive gases. Doing so may result in explosion.

⚠ Caution

The service life of the output relays depends on the switching capacity and switching conditions. Consider the actual application conditions and use the product within the rated load and electrical service life. Using the product beyond its service life may result in contact deposition or burning.

⚠ Caution

Do not disassemble, repair, or modify the product. Doing so may result in electric shock, fire, or malfunction.

⚠ Caution

Do not allow metal objects or conductive wires to enter the product. Doing so may result in electric shock, fire, or malfunction.

Other Precautions

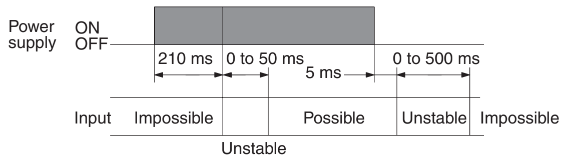
- Store at the specified temperature. If the H8GN has been stored at a temperature of less than –10°C, allow the H8GN to stand at room temperature for at least 3 hours before use.
- Use the product within the ratings specified for vibration, shock, submerging in water, and exposure to oil.
- Do not use the product in locations subject to dust, corrosive gases, or direct sunlight.
- Use the product within the ratings specified for temperature and humidity.
- The product is designed for 24 VDC. Applying voltages other than the rated one such as 100 to 240 VAC may damage the internal elements.
- Separate the input signal devices, input signal cables, and the product from the source of noise or high-tension cables producing noise.
- Separate the product from the source of static electricity when using the product in an environment where a large amount of static electricity is produced (e.g., forming compounds, powders, or fluid materials being transported by pipe).
- Do not expose the product to organic solvent such as thinner or benzine, strong alkali materials, or strong acid materials. Doing so may damage the product surface.

Application Precautions

1. Do not use the product in locations where condensation may occur due to high humidity or where temperature changes are severe.
2. Be sure to wire terminals correctly, with the correct polarity.
3. Maintain the power supply voltage within the allowable ranges.
4. Connect the power supply through a relay or switch so that the voltage reaches a fixed value immediately. If the voltage increases gradually the power supply may be reset or outputs may turn ON.
5. When the power is turned ON, an inrush current (approx. 15 A) will flow momentarily. Depending on power supply capacities, the product may not start due to this leakage current. The power supply must be of a sufficiently large capacity.
6. For the main power supply or the power supply for input devices, use a power supply transformer whose primary side is insulated from the secondary side and whose secondary side is not grounded.
7. Leaving the H8GN with outputs ON at a high temperature for a long time may hasten the degradation of internal parts (such as electrolytic capacitors). Therefore, use the product in combination with relays and avoid leaving the product as long as more than 1 month with the output turned ON.

Power Supplies

When turning the power ON and OFF, input signal reception is possible, unstable, or impossible as shown in the diagram below.



Turn the power ON and OFF using a relay with a rated capacity of 15 A minimum to prevent contact deterioration due to inrush current caused by turning the power ON and OFF.

When power is turned ON, a starting current flows momentarily. Therefore, pay attention to the overcurrent detection level of the power supply used.

Timer Control with Power Start

To allow for the startup time of peripheral devices (sensors, etc.), the H8GN starts timing operation between 210 to 260 ms after power is turned ON (see diagram above). For this reason, in operations where timing starts from power ON, the time display will actually start from 258 ms. If the set value is 258 ms or less, the time until output turns ON will be a fixed value between 210 and 260. (Normal operation is possible for set value of 259 ms or more.) In applications where a set value of 258 ms or less is required, use start timing with signal input.

When the H8GN is used with power start in F mode (i.e., accumulative operation with output on hold), there will be a timer error (approximately 100 ms each time the H8GN is turned ON) due to the characteristics of the internal circuitry. Use the H8GN with signal start if timer accuracy is required.

Changing the Set Value

In Counter Operation

When changing the set value during operation, the output will turn ON if the set value equals the present value.

In Timer Operation

When changing the set value during operation, if the set value is changed in so that the conditions below are satisfied, the Timer operates in the same way as when the present value reaches the set value because a constant read-in system is in use. Depending on the output mode, this may result in output turning ON.

Timer mode UP: Present value ≥ set value
Timer mode DOWN: Elapsed time ≥ set value
(Present value = 0)

Note: When in DOWN mode, the amount set value is changed is added to or subtracted from the present value.

Operation with a Set value of 0

In Counter Operation

The output will turn ON if the set value (0) equals the present value. The output will be OFF while the Reset Key is pressed or the reset input is ON.

In Timer Operation

a) When the output mode is set to A, B (one-shot output), D, or F, output will turn ON when the start signal is input.

b) When the output mode is set to B (hold output), E, or Z, output will remain OFF even when the start signal is input.

Response Delay Time When Resetting

The following table shows the delay from when the reset signal is input until the output is turned OFF.

Minimum reset signal width	Output delay time
1 ms	3.7 to 6.0 ms
20 ms	19 to 21 ms

Output Delay Time

The following table shows the delay from when the timer value passes the set value until the output is produced.

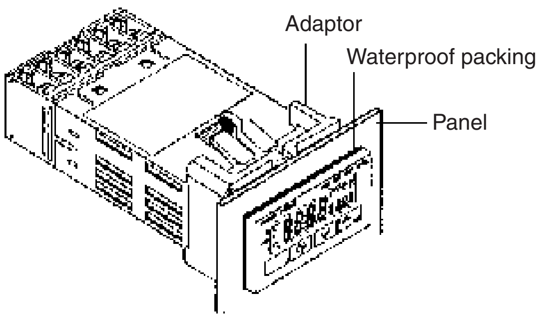
Actual Measurements in N or K Mode

Control output	Max. counting speed	Output delay time*
Contact output	30 Hz	17.3 to 18.9 ms
	5 kHz	3.5 to 5.2 ms

*The variation in delays is due to different modes and conditions.

Mounting

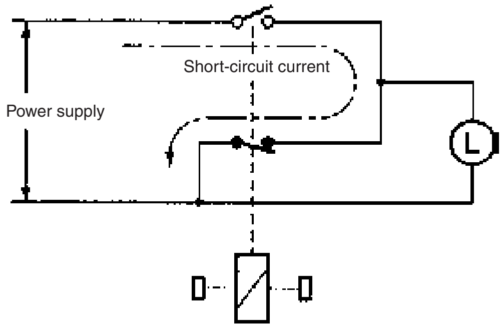
Tighten the two mounting screws on the Adaptor. Tighten them alternately, a little at a time, so as to keep them at an equal tightness.



The H8GN's panel surface is water-resistive (conforming to NEMA 4X (indoors) and IP66). In order to prevent the internal circuit from water penetration through the space between the Counter and operating panel, attach a rubber packing (provided with the H8GN) between the Counter and operating panel and secure the rubber packing with the Y92F-34 Flush-mounting Adaptor.

Output

The SPDT (single-pole, double-throw) consists of an SPST-NO contact and an SPST-NC contact. Do not form a circuit with 3-point short-circuit (power short-circuiting with arc).



Reference

For details about communications functions, refer to H8GN Preset Counter/Timer User's Manual (Catalog No. M066).

Operating Procedures

■ Initial Setup

The and Keys are used to switch between setup menus, and the amount of time that you hold the keys down for determines which setup menu you move to. This section describes two typical examples.

Note: In the following sections, "PV" is used to indicate a present value and "SV" to indicate a set value.

1. Using the H8GN as a Counter

Typical Application Examples

1. Changing Set Values

Set value and selections in each display can be changed by pressing the and Keys.

2. Displays

No. 1 display No. 2 display

Typical Application

Input mode	Individual input
Output mode	F (overcount)
Counting speed	30 Hz
Input signal width	20 ms
Decimal point	None
Prescale	None

• Setup Procedure

Power ON — Power ON

Operation Level

Present value (PV)/ set value (SV)

Press the Level Key for at least 3 s. Operation stops.

Initial Setting Level

Check Counter/ Timer selection — Check Counter/Timer selection — Function: Cnt

Set input mode — Use the and Keys to set the input mode to individual mode. — Input mode: Ud-b

Set output mode — Use the and Keys to set the output mode to F. — Output mode: F

Check counting speed — Check the counting speed. — Counting speed: 30Hz

Check input signal width — Check the input signal width — Input signal width: 20ms

Press the Level Key for at least 1 s. Operation starts.

Operation Level

Set SV — Press the and Keys to change the set value to 100. — PV/SV: 100

Reset PV — Press the Key. — PV: 0

Start operation — Operate

• Confirming Set Values

Set values are effective two seconds after key operation is stopped or when the or Key is pressed.

2. Using the H8GN as a Timer

Typical Application Examples

1. Changing Set Values

Set value and selections in each display can be changed by pressing the and Keys.

2. Display

No. 1 Display No. 2 Display

Typical Application Examples

Time range	0.0 to 999.9 s
Timer mode	DOWN (remaining time)
Output mode	A mode
Output time	Hold
Input signal width	20 ms

• Setup Procedure

Power ON

Power ON

Operation Level

Present value (PV)/ set value (SV)

Press the Level Key for at least 3 s. Operation stops.

Initial Setting Level

Set Counter/Timer selection — Use the and Keys to select the timer function. — Function: tim

Set time range — Use the and Keys to set the time range to 999.9 s — Time range: ---.- s

Check timer mode — Use the and Keys to set the timer mode to remaining time. — Timer mode: down

Check output mode — Check the output mode. — Output mode: A

Check output time — Check the output time. — Output time: 0.00 s

Check input signal width — Check the input signal width. — Input signal width: 20 ms

Press the Level Key for at least 1 s. Operation starts.

Operation Level

Set SV — Use the and Keys to set the SV to 10.0. — PV/SV: 10.0

Reset PV — Press the Key. — PV: 0.0

Start operation — Operate

• Confirming Set Values

Set values are effective two seconds after key operation is stopped or when the or Key is pressed.

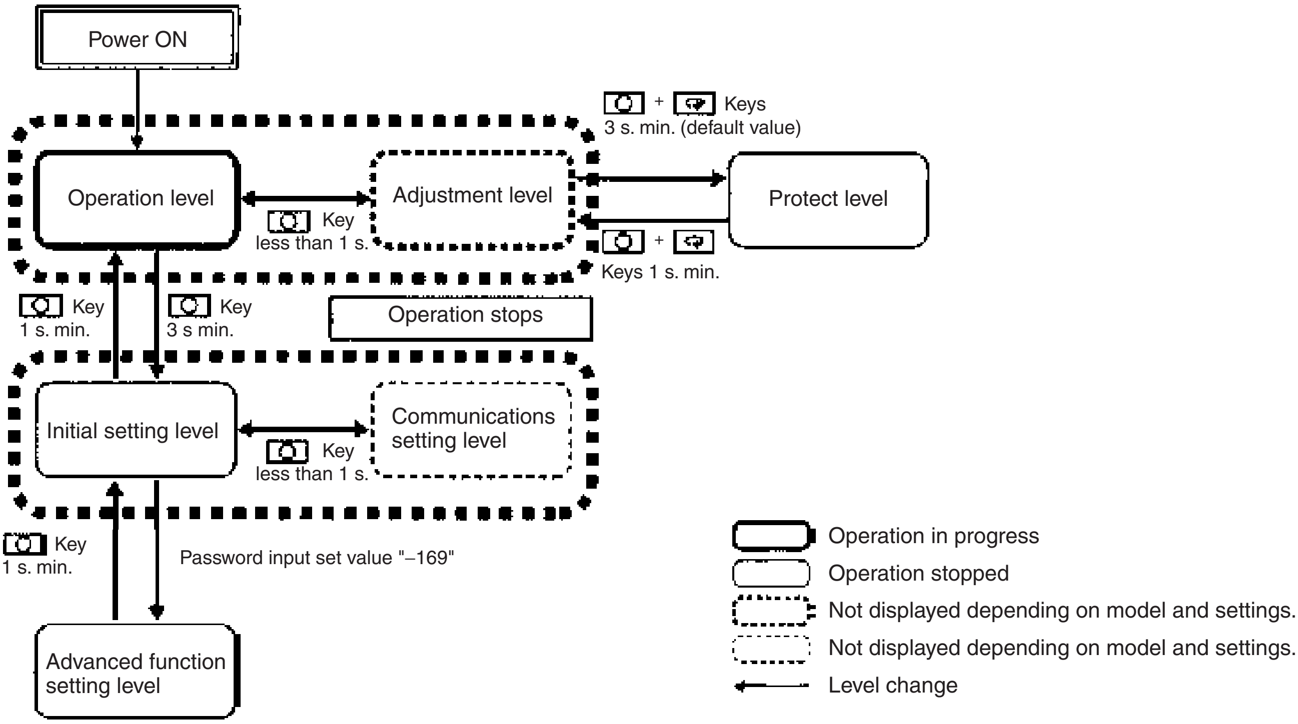
Counters

■ Setting Specifications after Turning ON Power

Outline of Operation Procedure

Key Operation

In the following descriptions, all the parameters are introduced in the display sequence. Some parameters may not be displayed depending on the protection settings and operating conditions.



Note: Of these levels, the initial setting level, communications setting level, and advanced function setting level can be used only when operation has stopped. Control output is stopped when these three levels are selected. When switched back to the operation level from one of these levels, operation will start.

Description of Each Level

Operation Level

- This level is displayed when you turn the power ON. You can move to the protect level, initial setting level, and adjustment level from this level.
- Normally, select this level during operation.
- During operation, the present value, set value, totalizing count value, and setting number of SV-bank can be monitored using the Key.

Adjustment Level

- To select this level, press the Key once for less than one second.
- This level is for entering set value (SV 0 to 3) for operation. This level contains parameters for communications writing enable/disable, set value of SV-bank, and cycle time (timer Z mode).
- You can move to the top parameter of the operation level, protect level, or initial setting level from here.

Initial Setting Level

- To select this level, press the Key for at least three seconds in the operation level or adjustment level.
- This level is for selecting the function, input mode, time range, timer mode, output mode, output time, counting speed, input signal width, decimal point position, prescale value, and rising/falling edge for input signal.
- You can move to the advanced function setting level or communications setting level from this initial setting level. To return to the operation level, press the Key for at least one second. To move to the communications setting level, press the key once for less than one second.

Protect Level

- To select this level, simultaneously press the and Keys for at least three seconds (default value). This level is to prevent unwanted or accidental modification of parameters. Protected levels will not be displayed, and so the parameters in that level cannot be modified.

Communications Setting Level

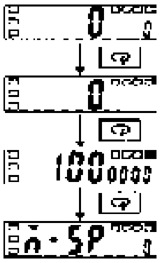
- To select this level, press the Key once for less than one second in the initial setting level. When the communications function is used, set the communications conditions in this level. Communicating with a personal computer (host computer) allows set values to be read and written.

Advanced Function Setting Level

- To select this level, you must change the initial settings/communications protection setting in the protect level to "0" and then enter the password ("–169") in the initial setting level.
- This level is for initializing settings, enabling SV-bank and totalizing counter use, setting display auto-return time, and move- to-protect-level time.
- You can move to the initial setting level from this level.

Parameters

Operation Level



(1) PV/SV

(2) PV

(3) Totalizing count value

(4) SV-bank

1. PV/SV

This display appears when the power is turned ON. No. 1 display shows the present value and No. 2 display shows the set value. The values displayed will be determined by the settings for Counter/Timer selection, time range, timer mode, and decimal point position made in the initial setting level.

Use the and Keys to change the settings.

2. PV

No. 1 display will show the present value and No. 2 display will remain blank. The values displayed will be determined by the settings for Counter/Timer selection, time range, timer mode, and decimal point position made in the initial setting level.

Press the Key to reset the present value.

3. Totalizing Count Value

The totalizing count value is displayed only if "totalizing counter used" in the advanced function setting level has been set to ON.

The leftmost four digits of the 8-digit totalizing count value will be shown in No. 1 display and the rightmost four digits will be shown in No. 2 display.

=Totalizing count value: 12,345,687

Press the Key to simultaneously reset the totalizing count value and the present value.

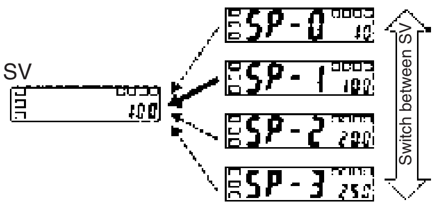
	Key during PV display	Key during totalizing count value display
PV	0→1→2→3→0→1→2→0→1→2	
Totalizing count value	0→1→2→3→3→4→5→0→1→2	

Refer to ***Input/Output Mode Settings*** on page D-49 for information on totalizing counter operation.

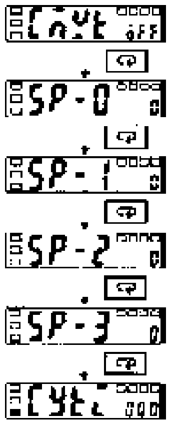
4. SV-bank (n-SP)

SV-bank is displayed only when "SV-bank used" in the advanced function setting level has been set to ON.

Select the SV-bank (SV 0 to 3). To use the SV-bank function, the four set values (SV 0 to 3) can be set beforehand in the adjustment level. The keys on the front of the Unit can then be used during operation to switch between the set values. For models with built-in communications, communications can be used to switch between the set values.



Adjustment Level



(1) Communications writing control

(2) SV 0

(2) SV 1

(2) SV 2

(2) SV 3

(3) Cycle time

1. Communications Writing Control (CMWT)

Communications writing control is displayed only for models with communications.

Allows or prohibits communications to write data from a personal computer (host computer). Communications can be used to read data regardless of this setting.

2. SV 0 to 3 (SP-0, SP-1, SP-2, SP-3)

SV 0 to 3 is displayed only when "SV-bank used" in the advanced function setting level has been set to ON.

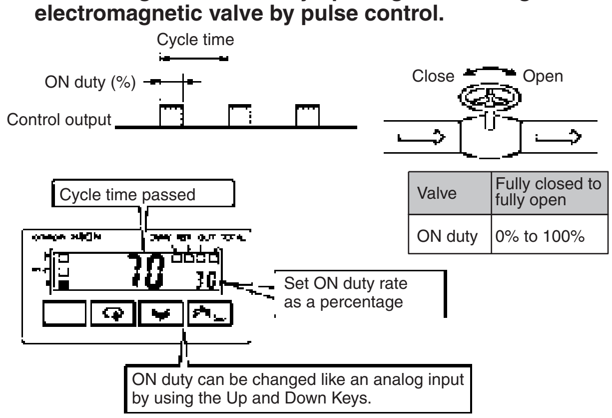
Used to set the set value when the SV-bank function is used. The operator can use the keys on the front to switch between the set values (SV 0 to 3). When the set value is changed in operation mode, the set value (SV 0 to 3) set in the adjustment level for SV-bank will also change.

3. Cycle Time (CYCT)

Cycle time is displayed only when the "output mode for timer function" in the initial setting level has been set to "Z."

Sets the cycle time used for ON/OFF-duty adjustable flicker mode (Z). Cyclic control can be performed easily in ON/OFF-duty adjustable flicker mode by first setting the cycle time in the adjustment level and by using the set value in operation level to change the ON-duty ratio.

Controlling the flowrate by opening and closing the electromagnetic valve by pulse control.



Valve	Fully closed to fully open
ON duty	0% to 100%

Refer to ***Input/Output Mode Settings*** on page D-50 for information on ON/OFF-duty adjustable flicker mode operation.

Initial Setting Level

(1) Counter/Timer selection

(2) Input mode

(3) Time range

(4) Timer mode

(5) Output mode for counter function

(6) Output mode for timer function

(7) Output time

(8) Counting speed

(9) Input signal width

(10) Decimal point position

(11) Prescale value

(12) Input signal edge

(13) Move to advanced function setting level

1. Counter/Timer Selection (FUnC)

Select to use the H8GN as either a counter or a timer.

2. Input Mode (Cntm)

The input mode is displayed only when "Counter/Timer selection" in the initial setting level has been set to counter.

When the H8GN is to be used as a counter, select increment, decrement, individual, or quadrature for the input mode. If increment or decrement is selected, the input signal edge for CP1 (count input) can be switched using the input signal edge setting.

Refer to ***Input/Output Modes and Count Values*** on page D-48 for information on input mode operations.

3. Time Range (tımr)

The time range is displayed only when "Counter/Timer selection" in the initial setting level has been set to timer.

When the H8GN is to be used as a timer, set the time range to be timed.

4. Timer Mode (tımm)

The timer mode is displayed only when "Counter/Timer selection" in the initial setting level has been set to timer.

When the H8GN is to be used as a timer, set the elapsed or remaining time mode.

5. Output Mode for Counter Function (oUtm)

The output mode is displayed only when "Counter/Timer selection" in the initial setting level has been set to counter.

When the H8GN is to be used as a counter, set the output mode.

Refer to ***Input/Output Mode Settings*** on page D-49 for information on output mode operations.

6. Output Mode for Timer Function (oUtm)

The output mode is displayed only when "Counter/Timer selection" in the initial setting level has been set to counter.

When the H8GN is to be used as a timer, set the output mode.

Refer to ***Input/Output Mode Settings*** on page D-49 for information on output mode operations.

7. Output Time (otım)

The output time is displayed only when "output mode for counter function" in the initial setting level has been set to C or K or when "output mode for timer function" in the initial setting level has been set to A or B.

When using one-shot output in the H8GN, set the output time for the one-shot output (0.01 to 99.99 s).

One-shot output can be used only when the C or K output mode is selected for counter function or A or B output mode is selected for timer function.

If the output time is set to "0" when selecting timer function, the output will be held. The output time cannot be set to "0" for counter function.

8. Counting Speed (CntS)

The counting speed is displayed only when "Counter/Timer selection" in the initial setting level has been set to counter.

When the H8GN is used as a counter, the operator can switch between maximum counting speeds (30 Hz/5 kHz) for CP1 and CP2.

Set to 30 Hz when using a contact for the input signal. When the counting speed is set to 30 Hz, input signal chattering is removed.

9. Input Signal Width (ıFLt)

Switches between minimum input signal widths (20 ms/1 ms) for start, reset and gate inputs. All input signal widths are set together via external input.

When the counter function is selected, only the reset input is set, but when the timer function is selected the start, gate, and reset inputs are all set together.

Set to 20 ms when using a contact for the input signal. When the input signal width is set to 20 ms, input signal chattering is removed.

10. Decimal Point Position (dP)

The decimal point position is displayed only when "Counter/Timer selection" in the initial setting level has been set to counter.

This determines the decimal point position for PV, SV, SV-bank (SV 0 to 3), and totalizing count values. Press the ⊡ Key to move the decimal point to the left and press the ⊡ Key to move it to the right.

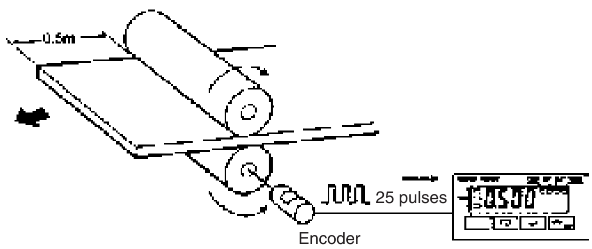
11. Prescale Value (PSCL)

The prescale value is displayed only when "Counter/Timer selection" in the initial setting level has been set to counter.

Converts the counter input pulse to any value within the setting range (0.001 to 9.999).

Example: To have a display of □□.□□ m for a system that outputs 25 pulses when the object has been moved forward 0.5 m, perform the following steps.

1. Set the decimal point position to before the second-last digit.
2. Set the prescale value to 0.02 (0.5 ÷ 25).



12.Input Signal Edge (EdGE)

The input signal edge will be displayed only when the “input mode” at the initial setting level has been set to increment or decrement.

Switches the CP1 input edge when the H8GN is used as an incrementing or decrementing counter. In the counter increment or decrement modes, CP2 will function as the gate input and CP1 counting will be prohibited while CP2 is ON.

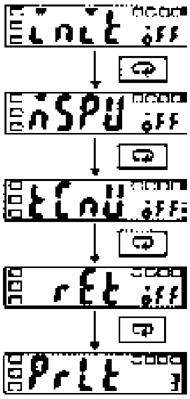
Refer to ***Input/Output Modes and Count Values*** on page D-48 for information on input mode operations.

13.Move to Advanced Function Setting Level (Amov)

This will be displayed only when the “initial setting/communications protection” in protect level is set to 0.

This setting enables the advanced function settings to utilize the counter/timer functions to the maximum. To move to the advanced function setting level, enter the password (–169) from the initial setting level.

Advanced Function Setting Level



(1) Parameter initialization

(2) SV-bank used

(3) Totalizing counter used

(4) Display auto-return time

(5) Move-to-protect-level time

1. Parameter Initialization (init)

Used to return all settings to default values.

Turn ON parameter initialization and shift to another display to return all settings to default values.

2. SV-bank Used (nSPU)

Set "SV-bank used" to ON and operate the keys from the panel to switch between SV 0 to 3.

To use the SV-bank function, the set value (SV 0 to 3) must be set beforehand in the adjustment level. These set value are then used during operation by operating the keys on the front of the Unit.

3. Totalizing Counter Used (tCnU)

Set totalizing counter use to ON to display and enable use of the totalizing counter in the operation level.

The totalizing counter displays the leftmost four digits of the 8-digit totalizing count on No. 1 display and the rightmost four digits on No. 2 display to enable 8-digit counting.

4. Display Auto-return Time (rEt)

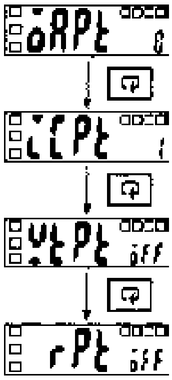
If this function is used, the display in the operation and adjustment levels will automatically return to the PV/SV display if no key operations have been made for the set period. (setting range: 1 to 99 s.)

The time before auto-return of the display can be set here. If this setting is set to OFF, the auto-return function will not operate.

5. Move-to-protect-level Time (PrLt)

If the and Keys are pressed for more than 3 seconds in the operation level, the display will move to the protect level. Use this setting to change the time that the key must be pressed to any time within the setting range (3 to 30 s).

Protect Level



(1) Operation/Adjustment Protection
Restricts menu display and writing in the operation and adjustment levels.

(2) Initial Setting/Communications Protection
Restricts menu display and moving to the initial setting level/communications setting level/advanced function setting level.

(3) Setting Change Protection
Restricts setting changes using front panel keys.

(4) Reset Key Protection
Restricts use of the Reset Key.

1. Operation/Adjustment Protection (oAPt)

The following table shows the protection given for each setting level.

Setting level	Operation level		Adjustment level
	PV/SV	Other	
0	Not protected	Not protected	Not protected
1	Not protected	Not protected	No display, no level shift
2	Not protected	No display, no level shift	No display, no level shift
3	Display only	No display, no level shift	No display, no level shift

Not protected: Display and setting changes are possible.
Display only: Display is possible.
No display, no level shift: Display and level shifts are not possible.

The initial setting level is 0 and no protection is given at this setting level.

2. Initial Setting/Communications Protection (iCPt)

Moving to initial setting, communications setting, or advanced function setting levels is restricted.

Setting	Initial setting level	Communications setting level	Advanced function setting level
0	OK	OK	OK
1	OK	OK	NO
2	NO	NO	NO

OK: Move to other levels possible
NO: Move to other levels not possible

The default setting is 1.

3. Setting Change Protection (WtPt)

Restricts setting changes using front panel keys.

Setting	Meaning
OFF	Settings can be changed by key operation.
ON	Settings cannot be changed by key operation. (Only protect level settings can be changed.)

The default setting is OFF.

4. Reset Key Protect (rPt)

Prohibits the use of the Reset Key.

Setting	Meaning
OFF	PV and totalizing count values can be reset by the Reset Key.
ON	PV and totalizing count values cannot be reset by the Reset Key.

The default setting is OFF.

Communications Setting Level

The communications specifications are set in the communications setting level. Make the individual communications settings from the front panel.

The communications parameters and their settings are listed in the following table.

Parameter	Display	Settings	Set value
Communications unit number	U-no	0 to 99	0 / 1 to 99
Baud rate	bPS	1.2, 2.4, 4.8, or 9.6 (kbps)	1.2 / 2.4 / 4.8 / 9.6
Communications data length	LEn	7/8 (bits)	7 / 8
Stop bits	SbIt	1/2	1 / 2
Parity	PrtY	None, even, or odd	nonE / EUEn / odd

Note: 1. The settings shown in reverse video are the default settings.

2. Settings made in the communications setting level are enabled when the power is turned ON again.

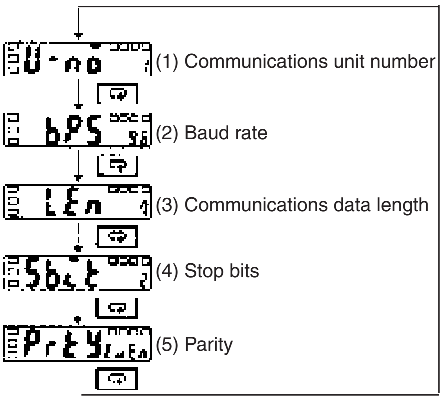
Before performing communications, perform the following procedure with the front panel keys to set the communications unit number, baud rate, and other settings. Refer to the communications manual for operation methods for other communications settings.

1.Press the Key for at least 3 seconds and move from the operation level to the initial setting level.

2.Press the Key and move from the initial setting level to the communications setting level.

3.Press the Key to change the settings items as shown below.

4.Use the and Keys to change the settings data.



Align each communications setting with the settings on the personal computer or other communications device.

1. Communications Unit Number (U-no)

When communicating with a host computer, set a unit number to enable the host computer to identify each unit. The number can be set in a range from 0 to 99 in increments of 1. The default unit number is 1. When using multiple units, the units will not function normally if the same unit number is set for more than one unit.

2. Baud Rate (bPS)

Set the baud rate for communications with the host computer. The settings correspond to the following baud rates.

1.2 (1,200 bps), 2.4 (2,400 bps), 4.8 (4,800 bps), and 9.6 (9,600 bps).

3. Communications Data Length (LEn)

The communications data length can be changed to either 7 or 8 bits.

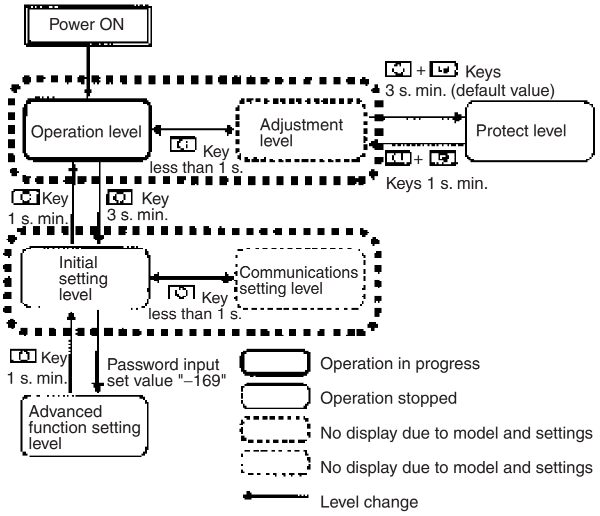
4. Stop Bits (SbIt)

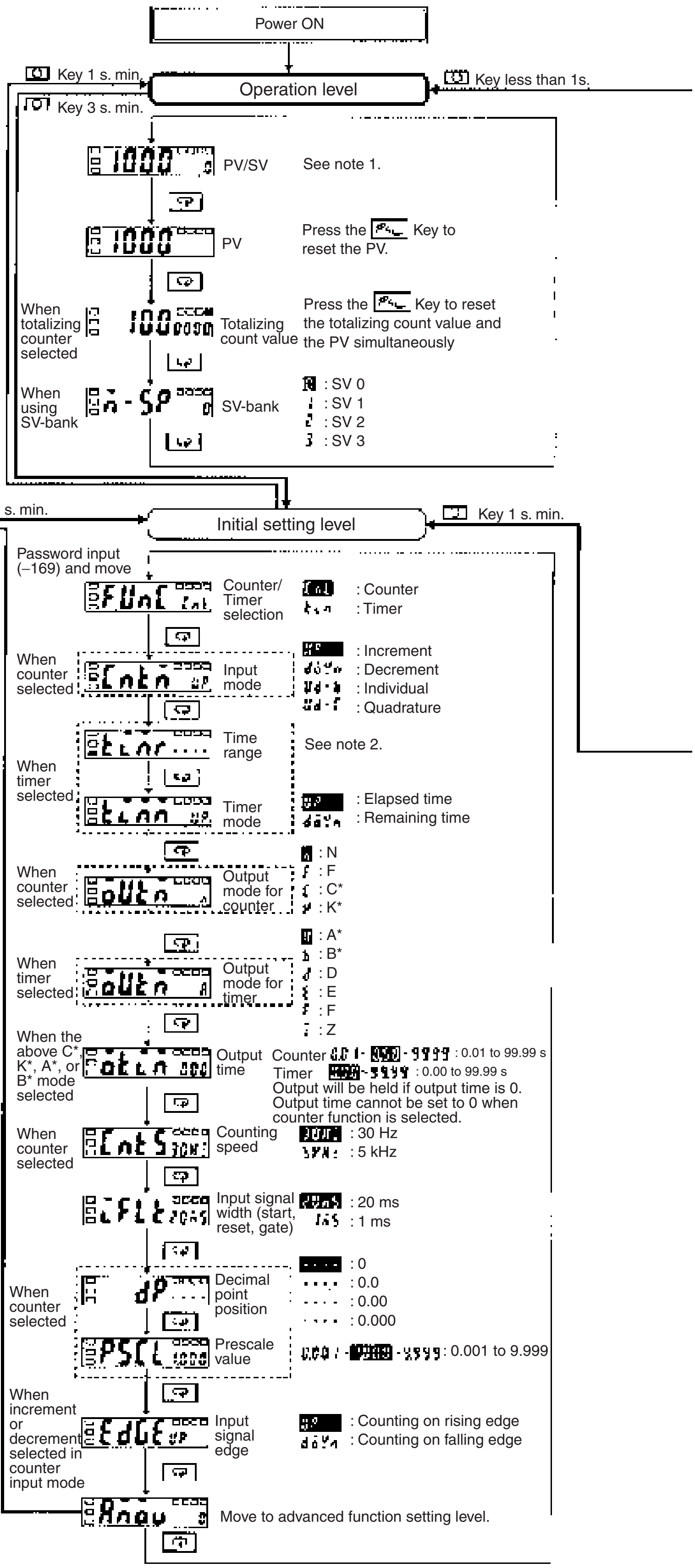
The stop bits can be set to either 1 or 2.

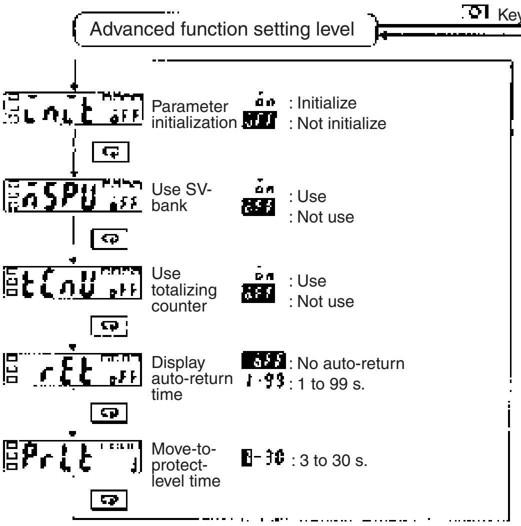
5. Parity (PrtY)

The parity can be set to none, even, or odd.

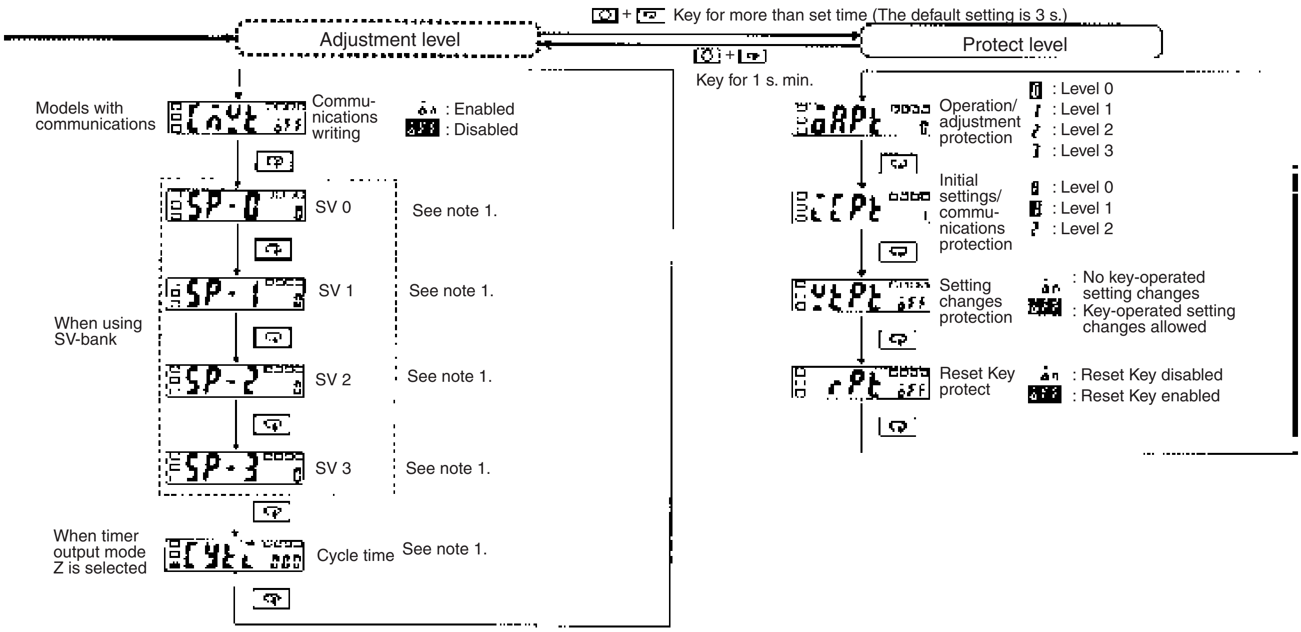
■ Parameters







Note : The parameters shown in reverse video are the default settings.



Note: 1. Counter (increment or decrement)

0~9999 : 0 to 9999

Counter (individual or quadrature)

-999- 0 -9999 : –999 to 9999

Timer (cycle time or mode other than output mode Z)

0.000~9.999 : 0.000 to 9.999 s

0.00~99.99 : 0.00 to 99.99 s

0.0~999.9 : 0.0 to 999.9s, min, h

0~9999 : 0 to 9999 s, h

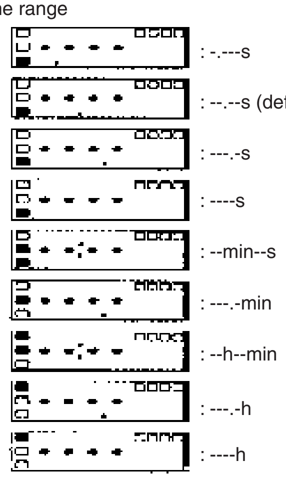
0.00~99.59 : 0 min 00 s to 99 min 59 s

0.00~99.59 : 0 h 00 min to 99 h 59 min

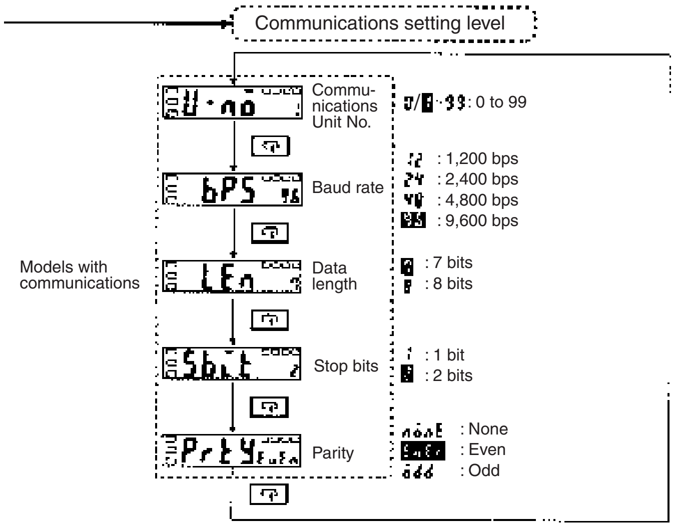
Timer (output mode Z)

0~100 : 0% to 100% (ON duty)

2. Time range



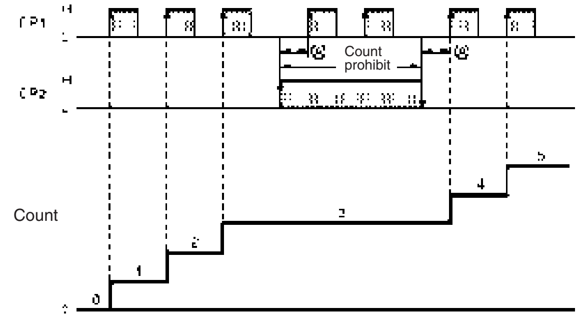
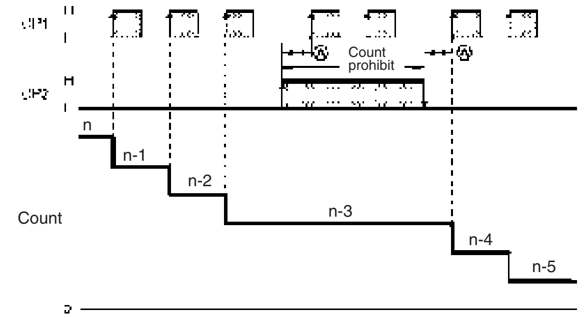
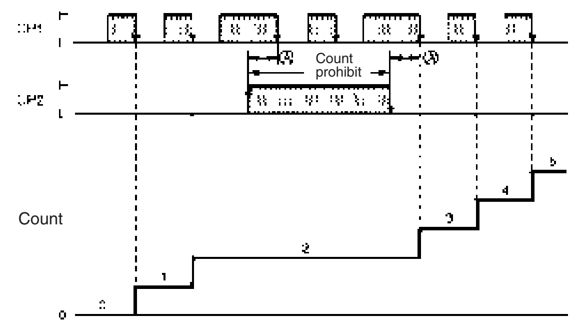
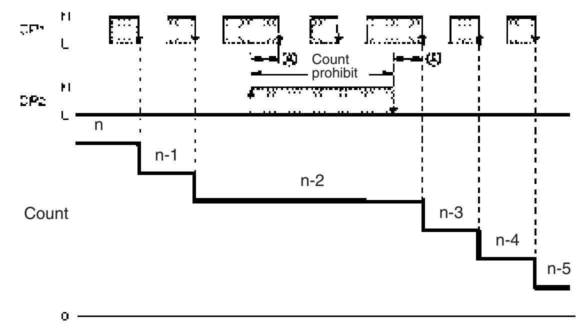
3. Displayed when level 0 is selected for initial setting/ communications protection in the protect level.

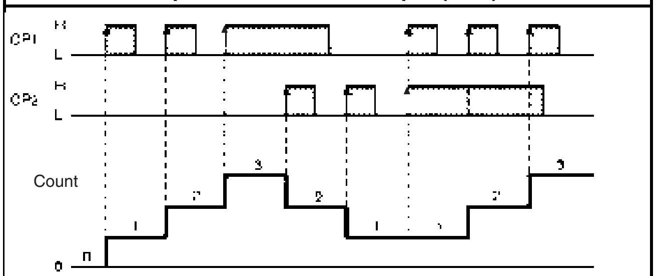


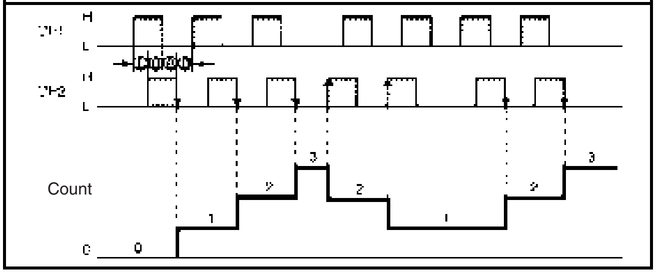
Note : Settings made in the communications setting level are enabled when the power is turned ON again.

■ Operating Mode

Input/Output Modes and Count Values

		Up (Increment) mode (UP)	Down (Decrement) mode (doWn)
Input edge	UP	CP1: Count input CP2: Count prohibit input 	CP1: Count input CP2: Count prohibit input 
	DOWN	CP1: Count input CP2: Count prohibit input 	CP1: Count input CP2: Count prohibit input 

Up/Down B Individual input (Ud-b)


Up/Down C quadrature input (Ud-C)


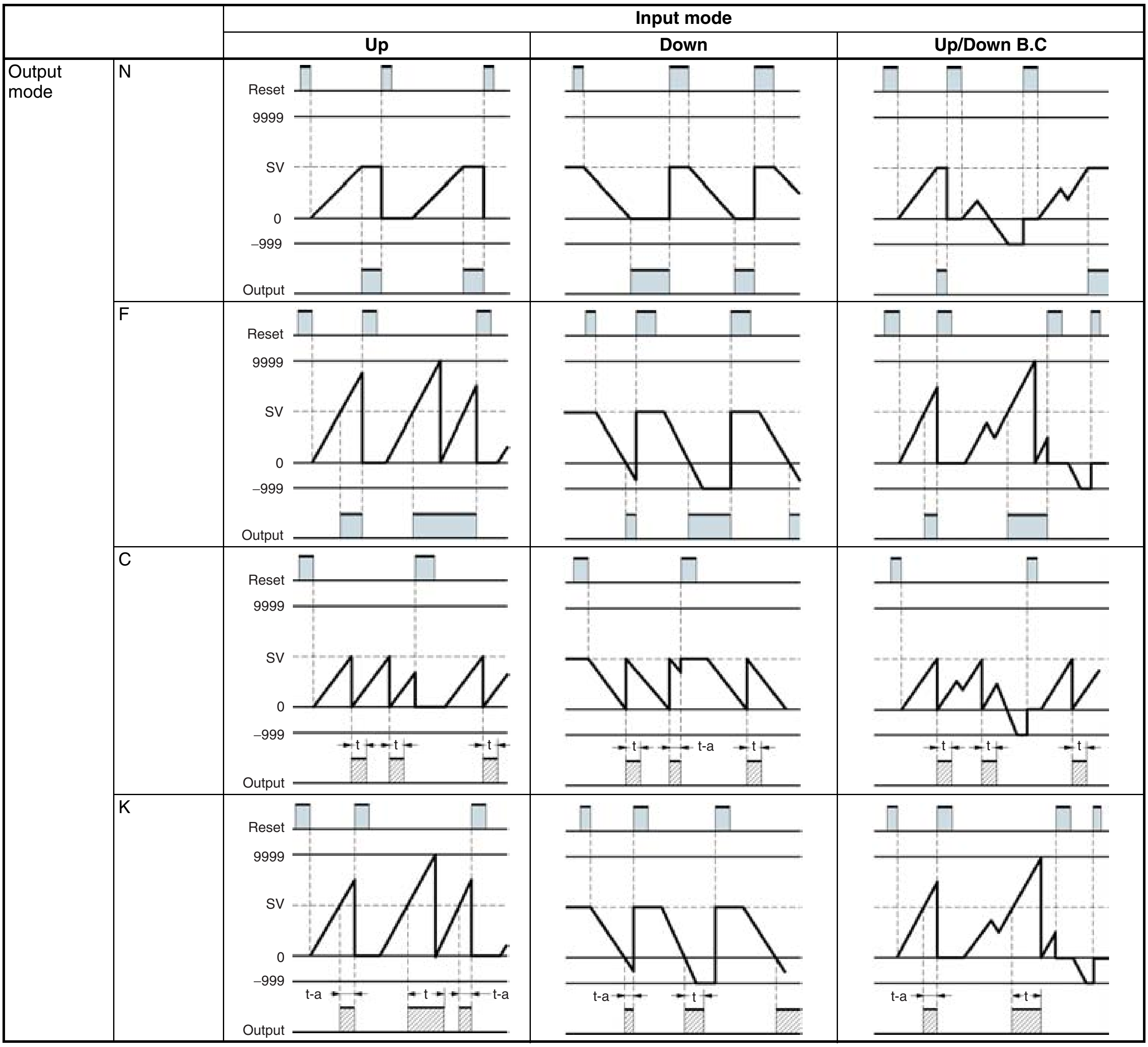
Note: 1. (A) indicates the minimum signal width and (B) requires at least 1/2 the minimum signal width. If these conditions are not met, a counting error (+1 or –1) may occur.

2. The following table explains the L and H symbols in the above graphics.

Symbol	Input
H	Short-circuited
L	Open

Input/Output Mode Settings

Counter Function

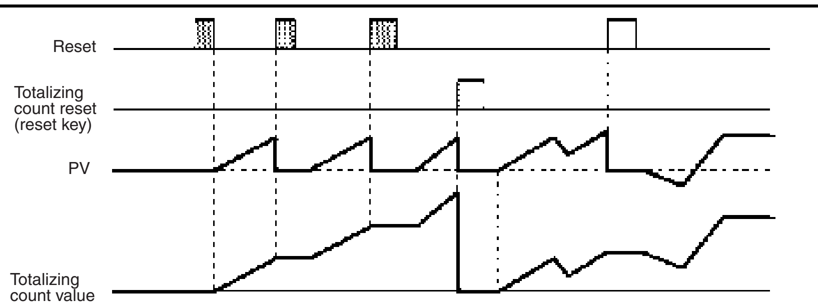


Note: 1. t: output time. t – a < t : Less than the output time.

2. If there is a power failure during output ON, output will turn ON again when the power supply has recovered. For one-shot output, an output will be made again for the duration of the output time setting once the power supply has resumed.

3. Output timing restarted during one-shot outputs is ignored.

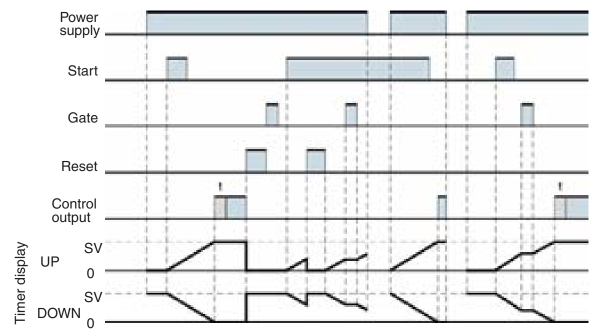
Totalizing Counter Operation



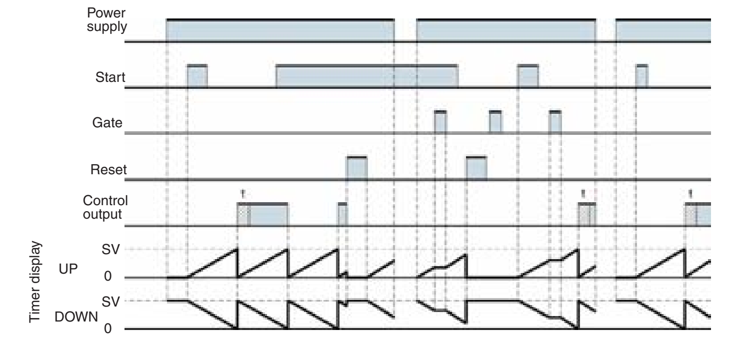
- Totalizing counter continues to count the present value, regardless of whether an reset input (by the reset key) has been made to reset the PV.
- When totalizing count value is reset, the PV is reset at the same time.
- The totalizing count range is 0 to 99,999,999. If the totalizing count exceeds 99,999,999, the count returns to 0. If the count drops below 0, it becomes 99,999,999.

Timer Function

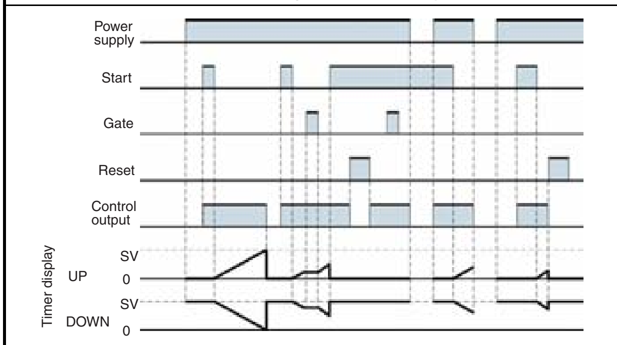
A mode: Signal ON-delay (See note.)



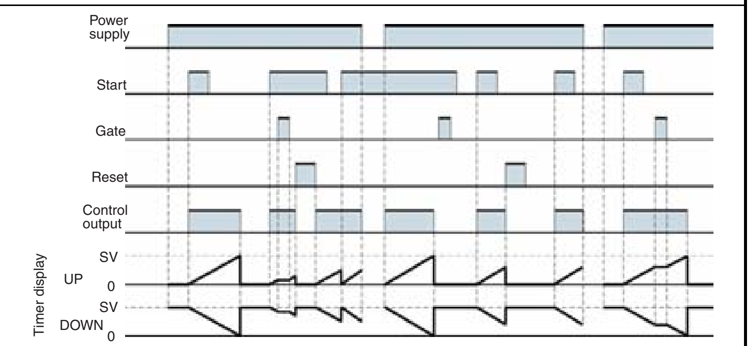
B mode: Flicker (See note.)



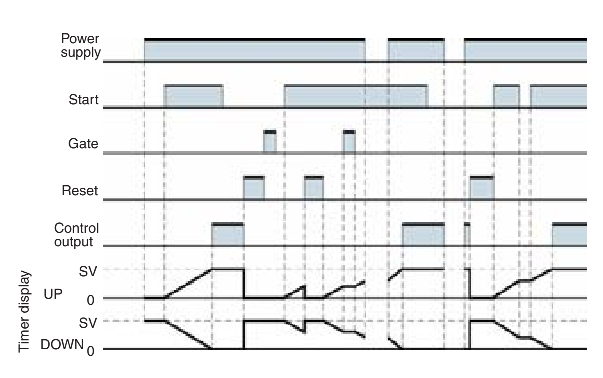
D mode: Signal OFF-delay



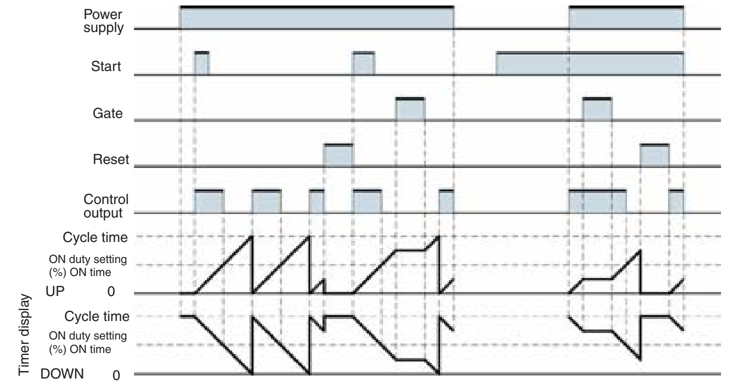
E mode: Interval

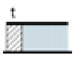


F mode: Accumulative



Z mode: ON/OFF-duty adjustable flicker

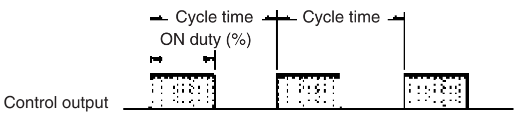


Note: One-shot output or HOLD output can be selected for output: 

Z Mode

Output quantity can be adjusted by changing the cycle time set in the adjustment level to 1 and by changing the ON duty (%) set value.

The set value shows the ON duty (%) and can be set to a value between 0 and 100 (%). When the cycle time is 0, the output will always be OFF. When the cycle time is not 0 and when ON duty has been set to 0 (%), the output will always be OFF. When ON duty has been set to 100 (%), the output will always be ON.



Troubleshooting

When an error occurs, the error code is displayed on the main display. Take countermeasures according to the code.

No. 1 display	No. 2 display	Error contents	Countermeasure
E111	No display	Memory error (RAM)	Turn the power OFF and ON again. If normal operation is still not restored, it may be necessary to repair or replace the H8GN. If normal operation is restored by turning the power supply OFF and ON, it is possible that there is noise interference. Check that there is nothing in the vicinity that may be the source of noise.
E111	SUM	Memory error (EEP)	
E1	No display	CPU error	
- - - - Flashes	Set value displayed or no display	Present value underflow	This is not an actual error. This display indicates that the present value has dropped to a value less than –999. Reset using reset input or pressing the Up Key when "- - - -" is displayed.

Note: Error codes are displayed only if PV/SV or PV is being displayed.

Counters

Additional Information

■ Parameters List

Fill in your set values in the *Set value* column of the following tables and utilize the tables for quick reference.

Protect Level

Parameter name	Parameter	Setting range	Default value	Unit	Set value
Operation/Adjustment Protection	oAPt	0 to 3	0		
Initial Setting/Communications Protection	iCPt	0 to 2	1		
Setting Change Protection	wtPt	on/oFF	oFF		
Reset Key Protection	rPt	on/oFF	oFF		

Operation Level

Parameter name			Parameter	Setting (display) range	Default value	Unit	Set value
Present value (PV)/ Set Value (SV)	PV	Counter		-999 to 9999/---- (PV<-999)	0		
		Timer		0.000 to 9.999 (Time range=-.---s)	0.000	Second	
				0.00 to 99.99 (Time range=--.--s)	0.00	Second	
				0.0 to 999.9 (Time range=---.-s)	0.0	Second	
				0 to 9999 (Time range=----s)	0	Second	
				0:00 to 99:59 (Time range=--min--s)	0:00	Minute: Second	
				0.0 to 999.9 (Time range=---.-min)	0.0	Minute	
				0:00 to 99:59 (Time range=--h--min)	0:00	Hour: Minute	
				0.0 to 999.9 (Time range=---.-h)	0.0	Hour	
				0 to 9999 (Time range=----h)	0	Hour	
	SV	Counter		0 to 9999 (Input mode=Up or Down)	0		
				-999 to 9999 (Input mode=Individual or quadrature)	0		
		Timer (Output mode: A, B, D, E, F)		0.000 to 9.999 (Time range=-.---s)	0.000	Second	
				0.00 to 99.99 (Time range=--.--s)	0.00	Second	
				0.0 to 999.9 (Time range=---.-s)	0.0	Second	
				0 to 9999 (Time range=----s)	0	Second	
				0:00 to 99:59 (Time range=--min--s)	0:00	Minute: Second	
				0.00 to 999.9 (Time range=---.-min)	0.0	Minute	
				0:00 to 99:59 (Time range=--h--min)	0:00	Hour: Minute	
				0.00 to 999.9 (Time range=---.-h)	0.0	Hour	
				0 to 9999 (Time range=----h)	0	Hour	
		Timer (Output mode: Z)		0 to 100	0	%	
PV				Same as for PV in the above PV/SV column.			
Totalizing count value				0 to 99999999	0		
SV-bank			m-SP	0/1/2/3	0		

Adjustment Level

Parameter name		Parameter	Setting range	Default value	Unit	Set value
Communications writing control		CMWT	ON/OFF	OFF		
SV 0		SP-0	Same as for PV in the above PV/SV column.			
SV 1		SP-1	Same as for PV in the above PV/SV column.			
SV 2		SP-2	Same as for PV in the above PV/SV column.			
SV 3		SP-3	Same as for PV in the above PV/SV column.			
Cycle time	Timer (Output mode=Z)	CYCT	0.000 to 9.999 (Time range=-.---s)	0.000	Second	
			0.00 to 99.99 (Time range=--.--s)	0.00	Second	
			0.0 to 999.9 (Time range=---.-s)	0.0	Second	
			0 to 9999 (Time range=----s)	0	Second	
			0:00 to 99:59 (Time range=--min--s)	0:00	Minute: Second	
			0.0 to 999.9 (Time range=---.-min)	0.0	Minute	
			0:00 to 99:59 (Time range=--h--min)	0:00	Hour: Minute	
			0.0 to 999.9 (Time range=---.-h)	0.0	Hour	
			0 to 9999 (Time range=----h)	0	Hour	

Initial Setting Level

Parameter name		Parameter	Setting range	Default value	Unit	Set value
Counter/Timer selection		FUNC	CNT/TIM	CNT		
Input mode		CNTM	UP/DOWN/UD-B/UD-C	UP		
Time range		TIMR	-.---S/--.--S/---.-S/----S/ --MIN--S/---.-MIN/--H--MIN/ ---.-H ----H	--.--	Second	
Timer mode		TIMM	UP/DOWN	UP		
Output mode for counter function		OUTM	N/F/C/K	N		
Output mode for timer function		OUTM	A/B/D/E/F/Z	A		
Output time	Counter	OTIM	0.01 to 99.99	0.50	Second	
	Timer		0.00 to 99.99	0.00	Second	
Counting speed		CNTS	30HZ/5KHZ	30HZ		
Input signal width		IFLT	20MS/1MS	20MS		
Decimal point position		DP	----/---.-/--.--/-.---	----		
Prescale value		PSCL	0.001 to 9.999	1.000		
Input signal edge		EDGE	UP/DOWN	UP		
Move to function setting level		AMOV	-999 to 9999	0		

Communications Setting Level

Parameter name	Parameter	Setting range	Default value	Unit	Set value
Communications unit number	U-NO	0 to 99	1		
Baud rate	BPS	1.2/2.4/4.8/9.6	9.6	kbps	
Communications data length	LEN	7/8	7	bit	
Stop bits	SBIT	1/2	2	bit	
Parity	PRTY	NONE/EVEN/ODD	EVEN		

Counters

Advanced Function Setting Level

Parameter name	Parameter	Setting range	Default value	Unit	Set value
Parameter initialization	init	on/oFF	oFF		
SV-bank used	mSPU	on/oFF	oFF		
Totalizing counter used	tCnU	on/oFF	oFF		
Display auto-return time	rEt	oFF/1 to 99	oFF	Second	
Move-to-protect-level time	PrLt	3 to 30	3	Second	

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. M065-E2-02

In the interest of product improvement, specifications are subject to change without notice.

Multifunction Preset Counter
H7CX

- Highly visible display with backlit negative transmissive LCD.
- Programmable PV color to visually alert when output status changes (screw terminal block models).
- Intuitive setting enabled using ergonomic up/down digit keys (4-digit models) and DIP switch.
- Configurable as 1-stage counter, 2-stage counter, total and pre-set counter, batch counter, dual counter, or tachometer. (Configurability varies with model.)
- PNP/NPN switchable input.
- Finger-safe terminals (screw terminal block models).
- Meets a variety of mounting requirements: Screw terminal block models, and pin-style terminal models.
- NEMA4/IP66 compliance.
- Six-language instruction manual.

Contents

Model Number Structure

■ Model Number Legend

H7CX-A□□□□□□
1 2 3 4 5 6

1. **External connection**
   None: Screw terminals
   11: 11-pin socket
2. **No. of digits**
   None: 6 digits
   4: 4 digits
3. **Stage setting**
   None: 1-stage setting
   U: Factory-set to 1-stage setting
   W: Factory-set to 2-stage setting
4. **Output type**
   None: Contact output or contact and transistor in combination
   S: Transistor output
5. **Supply voltage/external power supply**
   None: 100 to 240 VAC at 50/60 Hz with 12 VDC power supply
   D: 12 to 24 VDC without external power supply
   D1: 12 to 24 VDC or 24 VAC at 50/60 Hz with 12 VDC power supply
6. **Case color**
   None: Black
   G: Light gray (Munsell 5Y7/1): Produced upon request.

Ordering Information

■ List of Models

Supported configurations			• 1-stage counter • 1-stage counter with total counter				• 1-stage counter • 2-stage counter • 1-stage counter with total counter • 1-stage counter with batch counter • Dual counter (addition/subtraction) • Tachometer		• 1-stage counter • 2-stage counter • 1-stage counter with total counter • 1-stage counter with batch counter • Dual counter (addition only)
Sensor power supply	**Output type**	**Supply voltage**	**11-pin socket**		**Screw terminal**				
			1-stage				**1-stage (See note.)**	**2-stage**	
			6 digits	**4 digits**	**6 digits**	**4 digits**	**6 digits**	**6 digits**	**4 digits**
			H7CX-A11□	**H7CX-A114□**	**H7CX-A□**	**H7CX-A4□**	**H7CX-AU□**	**H7CX-AW□**	**H7CX-A4W□**
12 VDC	Contact output	100 to 240 VAC	H7CX-A11	H7CX-A114	H7CX-A	H7CX-A4	---	H7CX-AW	H7CX-A4W
		12 to 24 VDC/ 24 VAC	H7CX-A11D1	H7CX-A114D1	---	---	---	H7CX-AWD1	---
	Contact and transistor output	100 to 240 VAC	---	---	---	---	H7CX-AU	---	---
		12 to 24 VDC/ 24 VAC	---	---	---	---	H7CX-AUD1	---	---
	Transistor output	100 to 240 VAC	H7CX-A11S	H7CX-A114S	H7CX-AS	H7CX-A4S	---	H7CX-AWS	---
		12 to 24 VDC/ 24 VAC	H7CX-A11SD1	---	---	---	H7CX-AUSD1	H7CX-AWSD1	---
None	Contact output	12 to 24 VDC	---	---	H7CX-AD	H7CX-A4D	---	---	---
	Transistor output		---	---	H7CX-ASD	H7CX-A4SD	---	H7CX-AWSD	H7CX-A4WSD

Note: Can be used as a 2-stage counter. In this case, each output can be flexibly allocated to either stage 1 or 2.

■ Accessories (Order Separately)

Name		**Models**
Flush Mounting Adapter (See note 1.)		Y92F-30
Waterproof Packing (See note 1.)		Y92S-29
Track Mounting/Front Connecting Socket	11-pin	P2CF-11
	11-pin, finger-safe type	P2CF-11-E
Back Connecting Socket	11-pin	P3GA-11
	11-pin, finger-safe type	P3GA-11 with Y92A-48G (See note 2.)
Hard Cover		Y92A-48
Soft Cover		Y92A-48F1
Mounting Track	50 cm (l) × 7.3 mm (t)	PFP-50N
	1 m (l) × 7.3 mm (t)	PFP-100N
	1 m (l) × 16 mm (t)	PFP-100N2
End Plate		PFP-M
Spacer		PFP-S

Note: 1. Supplied with screw-terminal models (i.e., excluding H7CX-A11□/-A114□ models).
2. Y92A-48G is a finger-safe terminal cover attached to the P3GA-11 Socket.

Specifications

■ Ratings

Item	H7CX-A4□	H7CX-A□	H7CX-A114□	H7CX-A11□
Classification	Preset counter			
Supported configurations	1-stage counter, 1-stage counter with total counter (selectable)			
Rated supply voltage (See note 1.)	100 to 240 VAC (50/60 Hz), 12 to 24 VDC		100 to 240 VAC (50/60 Hz) 24 VAC (50/60 Hz)/12 to 24 VDC	
Operating voltage range	85% to 110% of rated supply voltage (90% to 110% at 12 VDC)			
Power consumption	Approx. 9.2 VA at 264 VAC Approx. 7.2 VA at 26.4 VAC Approx. 3.7 W at 12 VDC			
Mounting method	Flush mounting		Flush mounting, surface mounting, or DIN-rail mounting	
External connections	Screw terminals		11-pin socket	
Terminal screw tightening torque	0.5 N·m max.		---	
Display	7-segment, negative transmissive LCD;			
PV	11.5-mm-high characters, red or green (programmable)	9-mm-high characters, red or green (programmable)	11.5-mm-high characters, red	9-mm-high characters, red
SV	6-mm-high characters, green			
Digits	4 digits (–999 to 9,999) SV range: 0 to 9,999	6 digits (–99,999 to 999,999) SV range: –99,999 to 999,999 (See note 2.) or 0 to 999,999	4 digits (–999 to 9,999) SV range: 0 to 9,999	6 digits (–99,999 to 999,999) SV range: –99,999 to 999,999 (See note 2.) or 0 to 999,999
Max. counting speed	30 Hz or 5 kHz (selectable, ON/OFF ratio 1:1), common setting for CP1 and CP2			
Input modes	Increment, decrement, command, individual, and quadrature			
Input signals	CP1, CP2, reset, and total reset			
Input method	No-voltage input/voltage input (switchable) No-voltage input ON impedance: 1 kΩ max. (Leakage current: 5 to 20 mA at 0 Ω) ON residual voltage: 3 V max. OFF impedance: 100 kΩ min. Voltage input High (logic) level: 4.5 to 30 VDC Low (logic) level: 0 to 2 VDC (Input resistance: approx. 4.7 kΩ)			
Reset input	Minimum reset input signal width: 1 or 20 ms (selectable), common setting for all inputs			
Reset system	External, manual, and automatic reset (internal according to C, R, P, and Q mode operation)			
Output modes	N, F, C, R, K-1, P, Q, A	N, F, C, R, K-1, P, Q, A, K-2, D, L	N, F, C, R, K-1, P, Q, A	N, F, C, R, K-1, P, Q, A, K-2, D, L
One-shot output time	0.01 to 99.99 s			
Output type	Contact type: SPDT Transistor type: 1 transistor			
Control output	Contact output: 3 A at 250 VAC/30 VDC, resistive load (cosϕ=1) Minimum applied load: 10 mA at 5 VDC (failure level: P, reference value) Transistor output: NPN open collector, 100 mA at 30 VDC Residual voltage: 1.5 VDC max. (approx. 1 V) Leakage current: 0.1 mA max.			
	NEMA B300 Pilot Duty, 1/4 HP 3-A resistive load at 120 VAC, 1/3 HP 3-A resistive load at 240 VAC			
External power supply	12 VDC (±10%), 100 mA (except for H7CX-A□D models) Refer to *Precautions* for details.			
Key protection	Yes			
Prescaling function	Yes (0.001 to 9.999)	Yes (0.001 to 99.999)	Yes (0.001 to 9.999)	Yes (0.001 to 99.999)
Decimal point adjustment	Yes (rightmost 3 digits)			
Sensor waiting time	250 ms max. (Control output is turned OFF and no input is accepted during sensor waiting time.)			
Memory backup	EEPROM (overwrites: 100,000 times min.) that can store data for 10 years min.			
Ambient temperature	Operating: –10 to 55°C (–10 to 50°C if counters are mounted side by side) (with no icing or condensation) Storage: –25 to 65°C (with no icing or condensation)			
Ambient humidity	25% to 85%			
Case color	Black (N1.5), light gray (Munsell 5Y7/1, produced upon request)			
Attachments	Waterproof packing, flush mounting adapter		None	

Note: 1. Permissible ripple: 20% (p-p) max.

2. Only when the following modes are selected.
Input mode: command, individual, or quadrature; output mode: K-2, D, or L

■ Ratings (contd.)

Item		H7CX-A4W□	H7CX-AW□	H7CX-AU□
Classification		Preset counter	Preset counter/tachometer	
Supported configurations		1-stage counter, 2-stage counter, 1-stage counter with total counter, 1-stage counter with batch counter, dual counter (addition only) (selectable)	1-stage counter, 2-stage counter, 1-stage counter with total counter, 1-stage counter with batch counter, dual counter (addition/subtraction), tachometer (selectable)	
Rated supply voltage (See note 1.)		100 to 240 VAC (50/60 Hz), 12 to 24 VDC	100 to 240 VAC (50/60 Hz), 24 VAC (50/60 Hz)/12 to 24 VDC, 12 to 24 VDC	100 to 240 VAC (50/60 Hz), 24 VAC (50/60 Hz)/12 to 24 VDC
Operating voltage range		85% to 110% of rated supply voltage (90% to 110% at 12 VDC)		
Power consumption		Approx. 9.2 VA at 264 VAC Approx. 7.2 VA at 26.4 VAC Approx. 3.7 W at 12 VDC		
Mounting method		Flush mounting		
External connections		Screw terminals		
Terminal screw tightening torque		0.5 N·m max.		
Display		7-segment, negative transmissive LCD		
	PV	11.5-mm-high characters, red or green (programmable)	9-mm-high characters, red or green (programmable)	
	SV	6-mm-high characters, green		
Digits		4 digits (–999 to 9,999) SV range: 0 to 9,999	6 digits (–99,999 to 999,999 or 0 to 999,999 when using as Tachometer) SV range: –99,999 to 999,999 (See note 2.) or 0 to 999,999	
Input signals		CP1, CP2, reset 1, and reset 2		
Input method		No-voltage input/voltage input (switchable) No-voltage input ON impedance: 1 kΩ max. (Leakage current: 5 to 20 mA at 0 Ω) ON residual voltage: 3 V max. OFF impedance: 100 kΩ min. Voltage input High (logic) level: 4.5 to 30 VDC Low (logic) level: 0 to 2 VDC (Input resistance: approx. 4.7 kΩ)		
Counter	Max. counting speed	30 Hz or 5 kHz (selectable, ON/OFF ratio 1:1), common setting for CP1 and CP2		
	Input mode	Increment, decrement, command, individual, and quadrature		
	Reset input	Minimum reset input signal width: 1 or 20 ms (selectable), common setting for all inputs		
	Reset system	External, manual, and automatic reset (internal according to C, R, P, and Q mode operation)		
	Output modes	N, F, C, R, K-1, P, Q, A	N, F, C, R, K-1, P, Q, A, K-2, D, L, H	
	One-shot output time	0.01 to 99.99 s		
Tachometer	Pulse measurement method	---	Periodic measurement (Sampling period: 200 ms)	
	Max. counting speed	---	30 Hz or 10 kHz (selectable)	
	Measuring ranges	---	30 Hz: 0.01 to 30.00 Hz 10 kHz: 0.01 Hz to 10 kHz	
	Measuring accuracy	---	±0.1% FS ±1 digit max. (at 23 ±5°C)	
	Output modes	---	HI-LO, AREA, HI-HI, LO-LO	
	Auto-zero time	---	0.1 to 99.9 s	
	Startup time	---	0.0 to 99.9 s	
	Average processing	---	OFF/2/4/8 times	
Output type		H7CX-A4W/-AW/-AWD1: SPDT (OUT2) and SPST-NO (OUT1) H7CX-A4WSD/-AWS/-AWSD/-AWSD1: 2 transistors		H7CX-AU/-AUD1: SPDT and 1 transistor H7CX-AUSD1: 2 transistors (Output allocation possible)
Control output		Contact output: 3 A at 250 VAC/30 VDC, resistive load (cosϕ=1) Minimum applied load: 10 mA at 5 VDC (failure level: P, reference value) Transistor output: NPN open collector, 100 mA at 30 VDC Residual voltage: 1.5 VDC max. (approx. 1 V) Leakage current: 0.1 mA max.		
		NEMA B300 Pilot Duty, 1/4 HP 3-A resistive load at 120 VAC, 1/3 HP 3-A resistive load at 240 VAC		
External power supply		12 VDC (±10%) 100 mA (except for H7CX-A□D models) Refer to *Precautions* for details.		
Key protection		Yes		
Prescaling function		Yes (0.001 to 9.999)	Yes (0.001 to 99.999)	
Decimal point adjustment		Yes (rightmost 3 digits)		
Sensor waiting time		250 ms max. (Control output is turned OFF and no input is accepted during sensor waiting time.)		
Memory backup		EEPROM (overwrites: 100,000 times min.) that can store data for 10 years min.		
Ambient temperature		Operating: –10 to 55°C (–10 to 50°C if counters are mounted side by side) (with no icing or condensation) Storage: –25 to 65°C (with no icing or condensation)		
Ambient humidity		25% to 85%		
Case color		Black (N1.5), light gray (Munsell 5Y7/1, produced upon request)		
Attachments		Waterproof packing, flush mounting adapter	Waterproof packing, flush mounting adapter, labels for counter/tachometer DIP switch settings	

Note: 1. Permissible ripple: 20% (p-p) max.

2. Only when the following modes are selected.
- Input mode: command, individual, or quadrature; output mode: K-2, D, L, or H
- Dual count calculating mode: SUB; output mode: K-2, D, L, or H in dual counter operation

■ Characteristics

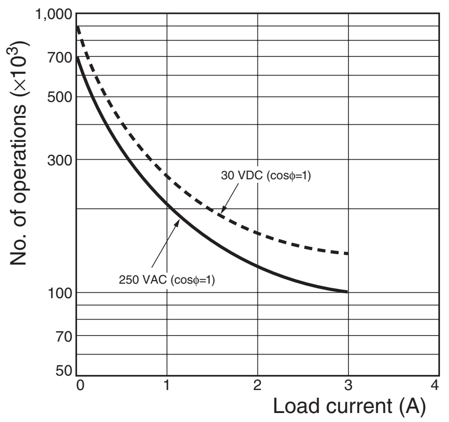
item	H7CX
Insulation resistance	100 MΩ min. (at 500 VDC) between current-carrying terminal and exposed non-current-carrying metal parts, and between non-continuous contacts
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between current-carrying metal parts and non-current-carrying metal parts 2,000 VAC (for 100 to 240 VAC), 50/60 Hz for 1 min between power supply and input circuit (1,000 VAC for 24 VAC/12 to 24 VDC) 1,000 VAC (for H7CX-□SD/-□SD1), 50/60 Hz for 1 min between control output, power supply, and input circuit (2,000 VAC for models other than H7CX-□SD/-□SD1) 1,000 VAC, 50/60 Hz for 1 min between non-continuous contacts
Impulse withstand voltage	3 kV (between power terminals) for 100 to 240 VAC, 1 kV for 24 VAC/12 to 24 VDC and 12 to 24 VDC 4.5 kV (between current-carrying terminal and exposed non-current-carrying metal parts) for 100 to 240 VAC, 1.5 kV for 24 VAC/12 to 24 VDC and 12 to 24 VDC
Noise immunity	±1.5 kV (between power terminals) for 100 to 240 VAC and 24 VAC/12 to 24 VDC, ±480 V for 12 to 24 VDC ±600 V (between input terminals) Square-wave noise by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise)
Static immunity	Destruction: 15 kV Malfunction: 8 kV
Vibration resistance	Destruction: 10 to 55 Hz with 0.75-mm single amplitude, four cycles each in three directions (8 minutes per cycle) Malfunction: 10 to 55 Hz with 0.35-mm single amplitude, four cycles each in three directions (8 minutes per cycle)
Shock resistance	Destruction: 294 m/s^2 each in three directions Malfunction: 98 m/s^2 each in three directions
Life expectancy	Mechanical: 10,000,000 operations min. Electrical: 100,000 operations min. (3 A at 250 VAC, resistive load) See *Life-test Curve* on page D-60.
Approved safety standards (See note 1.)	UL508/Listing, CSA C22.2 No. 14, conforms to EN61010-1 (Pollution degree 2/overvoltage category II) Conforms to VDE0106/P100 (finger protection).
EMC	(EMI) EN61326 Emission Enclosure: EN55011 Group 1 class A Emission AC mains: EN55011 Group 1 class A (EMS) EN61326 Immunity ESD: EN61000-4-2: 4 kV contact discharge (level 2); 8 kV air discharge (level 3) Immunity RF-interference: EN61000-4-3: 10 V/m (Amplitude-modulated, 80 MHz to 1 GHz) (level 3); 10 V/m (Pulse-modulated, 900 MHz ±5 MHz) (level 3) Immunity Conducted Disturbance: EN61000-4-6: 10 V (0.15 to 80 MHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power-line (level 3); 1 kV I/O signal-line (level 4) Immunity Surge: EN61000-4-5: 1 kV line to lines (power and output lines) (level 2); 2 kV line to ground (power and output lines) (level 3) Immunity Voltage Dip/Interruption EN61000-4-11: 0.5 cycle, 100% (rated voltage)
Degree of protection	Panel surface: IP66 and NEMA Type 4 (indoors) (See note 2.)
Weight	Approx. 140 g

Note: 1. To meet UL listing requirements with the H7CX-A11□ models, an OMRON P2CF-11-□ or P3GA-11 Socket must be mounted on the H7CX. Otherwise, H7CX-A11□ models are considered to meet UL508 recognition requirements.

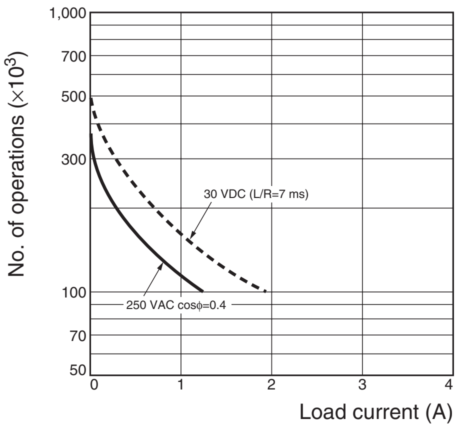
2. A waterproof packing is necessary to ensure IP66 waterproofing between the H7CX and installation panel.

■ Life-test Curve (Reference Values)

Resistive Load



Inductive Load



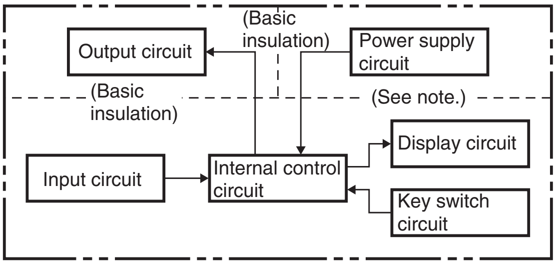
Reference: A current of 0.15 A max. can be switched at 125 VDC (cosϕ=1) and current of 0.1 A max. can be switched if L/R=7 ms. In both cases, a life of 100,000 operations can be expected. The minimum applicable load is 10 mA at 5 VDC (failure level: P).

■ Inrush Current (Reference Values)

Model	Voltage	Applied voltage	Inrush current (peak value)	Time
H7CX-A11/-AW	100 to 240 VAC	264 VAC	5.8 A	0.7 ms
H7CX-A11D1/-AWD1	24 VAC/12 to 24 VDC	26.4 VAC	10.4 A	1.2 ms
H7CX-AD	12 to 24 VDC	26.4 VDC	6.0 A	1.2 ms

Connections

■ Block Diagram



Note: All models except for H7CX-☐D (models with 12 to 24-VDC power supplies) have basic insulation.

■ I/O Functions

Using as a Counter

Inputs	**CP1, CP2**	• In general (except for dual counter mode) Reads counting signals Increment, decrement, command, individual, and quadrature inputs accepted. • When used as a dual counter Reads CP1 count signals with CP1 input and CP2 count signals with CP2 input. Increment signals can be input.
	Reset or Reset 1	• In general (except for dual counter mode) Resets present value and outputs (OUT2 when using the batch counter). (See note 1.) Counting cannot be performed during reset/reset 1 input. The reset indicator is lit during reset input. • When used as a dual counter Resets the CP1 present value (to 0). Counting for CP1 input cannot be performed during reset 1 input. The reset indicator is lit during reset 1 input.
	Total Reset or Reset 2 (See note 2.)	• When used as a 1-stage/2-stage counter Does not operate (Not used). • When used as a total and preset counter Resets the total count value. Holds the total count value at 0 during total reset input. • When used as a batch counter Resets the batch count value and batch output (OUT1). Holds the batch count value at 0 during reset 2 input. • When used as a dual counter Resets the CP2 present value. Counting for CP2 input cannot be performed during reset 2 input.
Outputs	**OUT1, OUT2**	Outputs take place according to designated output mode when corresponding preset is reached.

Note: 1. In increment mode or increment/decrement mode, the present value returns to 0; in decrement mode, the present value returns to the set value with 1-stage models, and returns to set value 2 with 2-stage models.

2. The reset indicator will not be lit when the total reset or reset 2 input is ON.

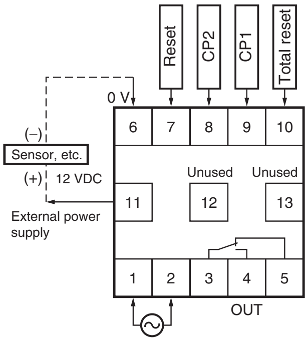
Using as a Tachometer

Inputs	**CP1, CP2**	Reads counting signals. (CP2 input is not used.)
	Reset 1, Reset 2	Holds the measurement value and outputs. (Reset 2 input is not used.) The reset indicator is lit during hold.
Outputs	**OUT1, OUT2**	Outputs signals according to the specified output mode when a set value is reached.

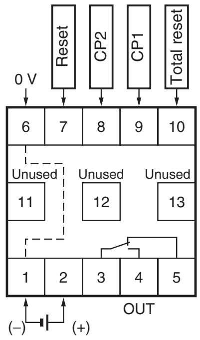
■ Terminal Arrangement

Confirm that the power supply meets specifications before use. Recommended power supply; eg. OMRON S8VS or S82K.

H7CX-A/-A4
1-stage Contact Output

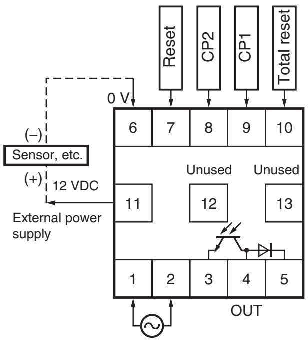


H7CX-AD/-A4D
1-stage Contact Output

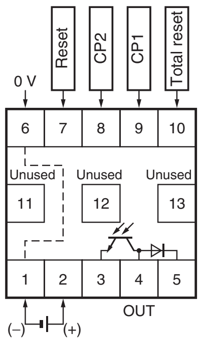


Note: Terminals 1 and 6 are connected internally.

H7CX-AS/-A4S
1-stage Transistor Output

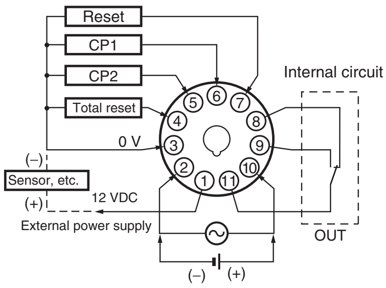


H7CX-ASD/-A4SD
1-stage Transistor Output

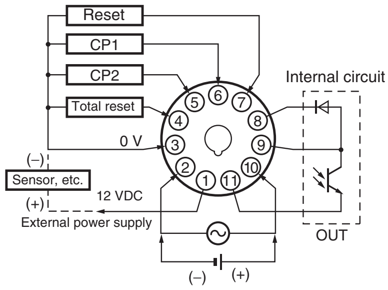


Note: Terminals 1 and 6 are connected internally.

H7CX-A11/-A114/-A11D1/-A114D1
1-stage Contact Output

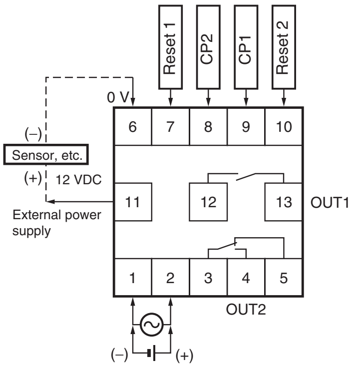


H7CX-A11S/-A114S/-A11SD1
1-stage Transistor Output

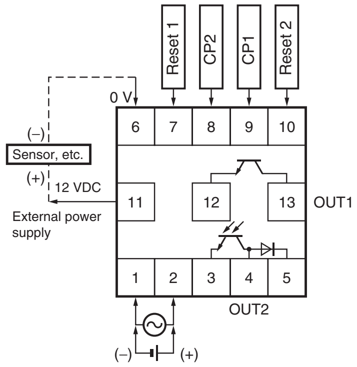


Note: Do not connect unused terminals as relay terminals.

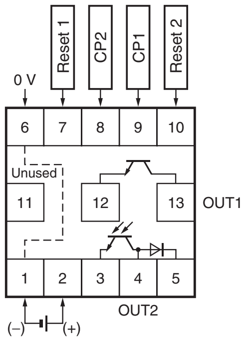
H7CX-AW/-A4W/-AWD1
2-stage Contact Output



H7CX-AWS/-AWSD1
2-stage Transistor Output

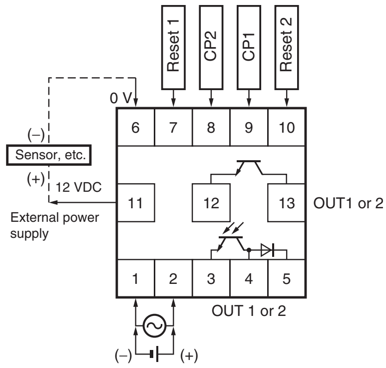


H7CX-AWSD/-A4WSD
2-stage Transistor Output



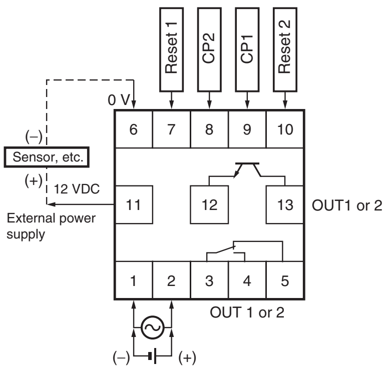
Note: 1. Terminals 1 and 6 are connected internally.
2. Do not connect unused terminals as relay terminals.

H7CX-AUSD1
1 or 2-stage Transistor Output



Note: Each output can be flexibly allocated to either stage 1 or 2 in function selection mode.

H7CX-AU/-AUD1
1-stage Contact, 1-stage Transistor Output

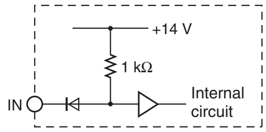


Note: Each output can be flexibly allocated to either stage 1 or 2 by setting in function selection mode.

Counters

Input Circuits

CP1, CP2, Reset/Reset 1, and Total Reset/Reset 2 Input



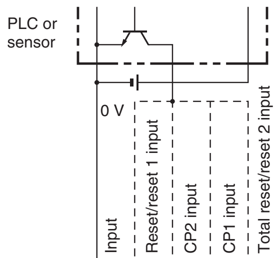
Note: The circuit shown above is for no-voltage input (NPN input).

Input Connections

The inputs of the H7CX are no-voltage (short-circuit or open) inputs or voltage inputs.

No-voltage Inputs (NPN Inputs)

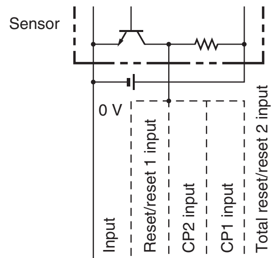
Open Collector



H7CX-A□	⑥	⑦	⑧	⑨	⑩
H7CX-A11□	③	⑦	⑤	⑥	④

Operates when the transistor turns ON.

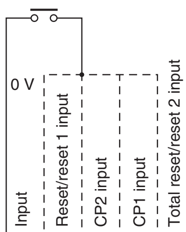
Voltage Output



H7CX-A□	⑥	⑦	⑧	⑨	⑩
H7CX-A11□	③	⑦	⑤	⑥	④

Operates when the transistor turns ON.

Contact Input



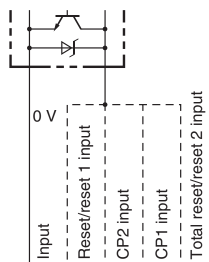
H7CX-A□	⑥	⑦	⑧	⑨	⑩
H7CX-A11□	③	⑦	⑤	⑥	④

Operates when the contact turns ON.

No-voltage Input Signal Levels

No-contact input	Short-circuit level Transistor ON Residual voltage: 3 V max. Impedance when ON: 1 KΩ max. (The leakage current is 5 to 20 mA when the impedance is 0 Ω.)
	Open level Transistor OFF Impedance when OFF: 100 KΩ min.
Contact input	Use contact which can adequately switch 5 mA at 10 V. Maximum applicable voltage: 30 VDC max.

DC Two-wire Sensor



H7CX-A□	⑥	⑦	⑧	⑨	⑩
H7CX-A11□	③	⑦	⑤	⑥	④

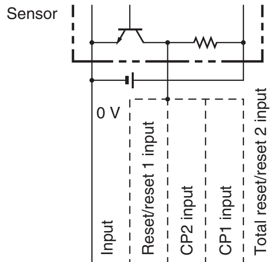
Operates when the transistor turns ON.

Applicable Two-wire Sensor

Leakage current:1.5 mA max.
Switching capacity:5 mA min.
Residual voltage:3 VDC max.
Operating voltage:10 VDC

Voltage Inputs (PNP Inputs)

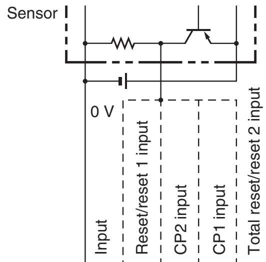
No-contact Input (NPN Transistor)



H7CX-A□	⑥	⑦	⑧	⑨	⑩
H7CX-A11□	③	⑦	⑤	⑥	④

Operates when the transistor turns OFF.

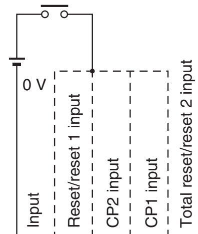
No-contact Input (PNP Transistor)



H7CX-A□	⑥	⑦	⑧	⑨	⑩
H7CX-A11□	③	⑦	⑤	⑥	④

Operates when the transistor turns ON.

Contact Input



H7CX-A□	⑥	⑦	⑧	⑨	⑩
H7CX-A11□	③	⑦	⑤	⑥	④

Operates when the contact turns ON.

Voltage Input Signal Levels

High level (Input ON):	4.5 to 30 VDC
Low level (Input OFF):	0 to 2 VDC
Maximum applicable voltage:	30 VDC max.
Input resistance:	Approx. 4.7 kΩ

Counters

Nomenclature

Indicators

① Reset Indicator (Orange)
Lit when the reset input (1) or reset key is ON.

② Key Protection Indicator (Orange)

③ Control Output Indicator (Orange)
OUT: One stage
OUT1, OUT2: Two stages

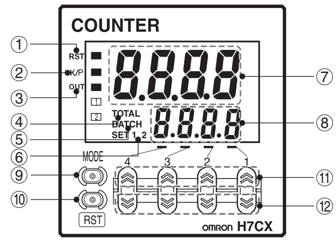
④ Total Count Indicator
Lit when the total count value is displayed.

⑤ Batch Indicator
Lit when the batch count value is displayed.

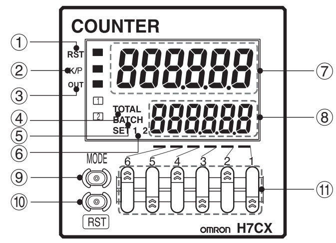
⑥ Set Value 1, 2 Stage Indicator

⑦ Present Value (Main Display)
Character height: 11.5 mm (6-digit: 9mm)

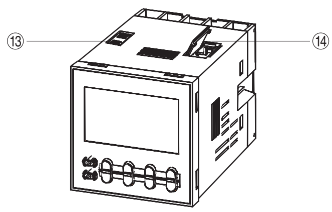
⑧ Set Value (Sub-display)
Character height: 6 mm



Front view of 4-digit model



Front view of 6-digit model



Operation Keys

⑨ Mode Key
Used to switch mode and setting items.

⑩ Reset Key
The operation of the reset function depends on the configuration selected as shown in the table below.

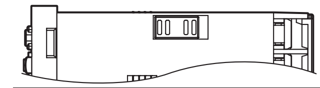
⑪ Up Keys: 1 to 4
(6-digit models: 1 to 6)

⑫ Down Keys: 1 to 4

Switches

⑬ Key Protect Switch

(Factory setting) OFF ⟷ ON



⑭ DIP Switch

Reset Operation by Reset Key

Configuration	Reset operation
1-stage/2-stage counter	Resets the present value and outputs.
Total and preset counter	• Resets the present value and outputs. • When the total count value is displayed, resets the present value, the total count value, and outputs.
Batch counter	• Resets the present value and OUT2. • When the batch count value is displayed, resets the present value, the batch count value, and outputs.
Dual counter	Resets the CP1 present value, CP2 present value, dual count value, and outputs.
Tachometer	Maintains the measured value and outputs (hold function).

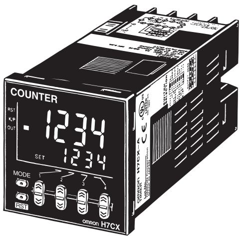
Dimensions

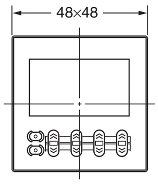
Note: All units are in millimeters unless otherwise indicated.

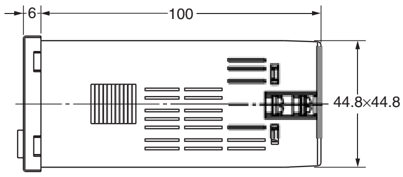
■ Counter (without Flush Mounting Adapter)

Screw-terminal Models with External Power Supplies (Flush Mounting)

- H7CX-A
- H7CX-AS
- H7CX-A4
- H7CX-A4S
- H7CX-AW
- H7CX-AWS
- H7CX-A4W
- H7CX-AWD1
- H7CX-AWSD1
- H7CX-AU
- H7CX-AUD1
- H7CX-AUSD1



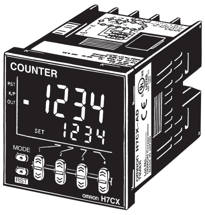


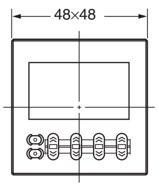


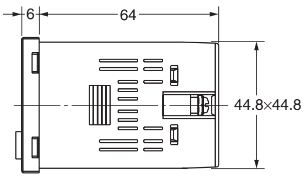
Note: M3.5 terminal screw (effective length: 6 mm)

Screw-terminal Models without External Power Supplies (Flush Mounting)

- H7CX-AD
- H7CX-ASD
- H7CX-A4D
- H7CX-A4SD
- H7CX-AWSD
- H7CX-AWSD



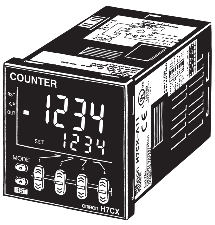


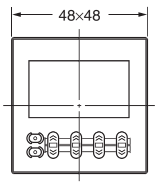


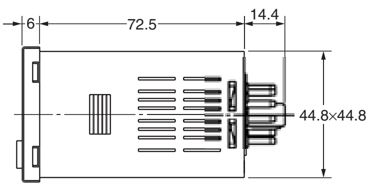
Note: M3.5 terminal screw (effective length: 6 mm)

11-pin Socket Models (Flush Mounting/Surface Mounting)

- H7CX-A11
- H7CX-A11S
- H7CX-A11D1
- H7CX-A11SD1
- H7CX-A114
- H7CX-A114S
- H7CX-A114D1





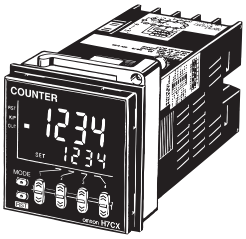


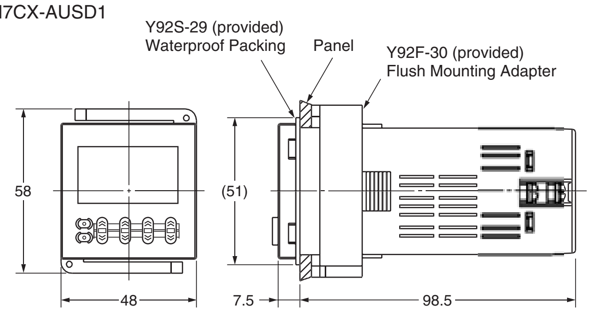
■ Dimensions with Flush Mounting Adapter

Screw-terminal Models with External Power Supplies

(Provided with Adapter and Waterproof Packing)

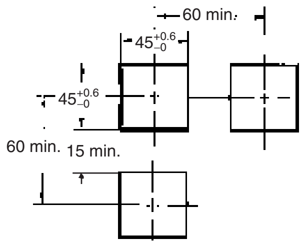
- H7CX-A
- H7CX-AS
- H7CX-A4
- H7CX-A4S
- H7CX-AW
- H7CX-AWS
- H7CX-A4W
- H7CX-AWD1
- H7CX-AWSD1
- H7CX-AU
- H7CX-AUD1
- H7CX-AUSD1





Panel Cutouts

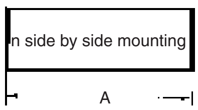
Panel cutouts are as shown below.
(according to DIN43700).



Note: 1. The mounting panel thickness should be 1 to 5 mm.

2. To allow easier operability, it is recommended that Adapters are mounted so that the gap between sides with hooks is at least 15 mm (i.e., so that the panel cutout interval is at least 60 mm).

3. It is possible to mount counters side by side, but only in the direction without the hooks. If they are mounted side-by-side, water-resistant specifications cannot be ensured.



$A = (48n - 2.5)^{+1}_{0}$

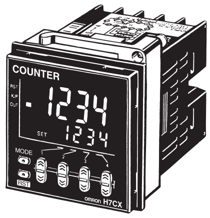
With Y92A-48F1 attached.
$A = \{48n–2.5 + (n–1) \times 4\}^{+1}_{0}$

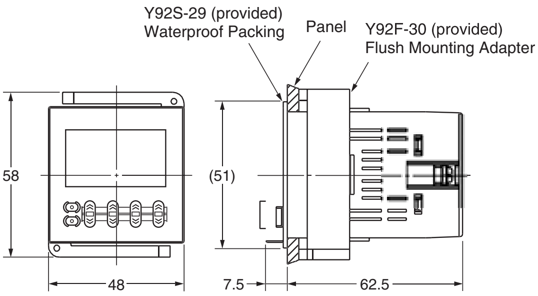
With Y92A-48 attached.
$A = (51n–5.5)^{+1}_{0}$

Screw-terminal Models without External Power Supplies

(Provided with Adapter and Waterproof Packing)

- H7CX-AD
- H7CX-ASD
- H7CX-A4D
- H7CX-A4SD
- H7CX-AWSD
- H7CX-A4WSD

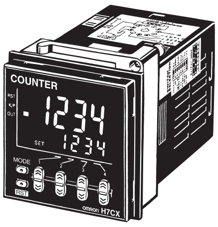


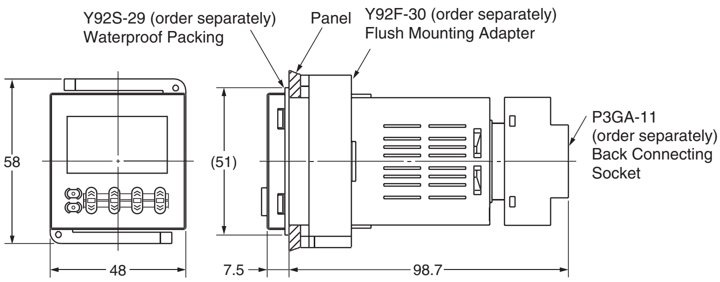


11-pin Socket Models

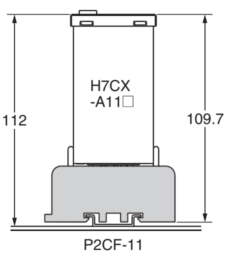
(Adapter and Waterproof Packing Ordered Separately)

- H7CX-A11
- H7CX-A11S
- H7CX-A11D1
- H7CX-A11SD1
- H7CX-A114
- H7CX-A114S
- H7CX-A114D1





■ Dimensions with Front Connecting Socket



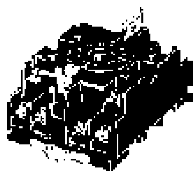
Note: These dimensions vary with the kind of DIN-rail (reference value).

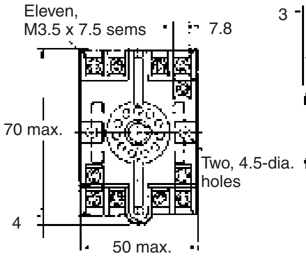
Accessories (Order Separately)

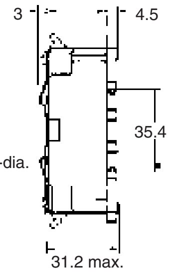
Note: All units are in millimeters unless otherwise indicated.

Track Mounting/Front Connecting Socket

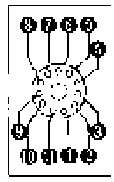
P2CF-11



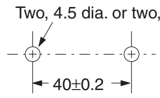




Terminal Arrangement/ Internal Connections (Top View)

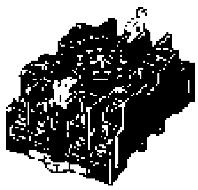


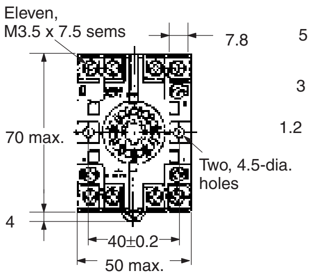
Surface Mounting Holes

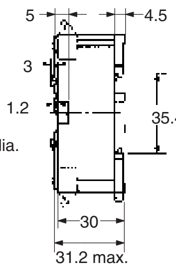


Note: Track mounting is also possible.

P2CF-11-E (Finger Safe Terminal Type) Conforming to VDE0106/P100

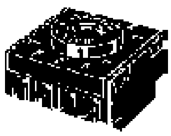


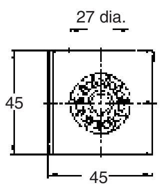


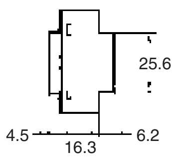


Back Connecting Socket

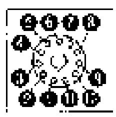
P3GA-11







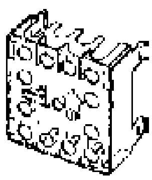
Terminal Arrangement/ Internal Connections (Bottom View)

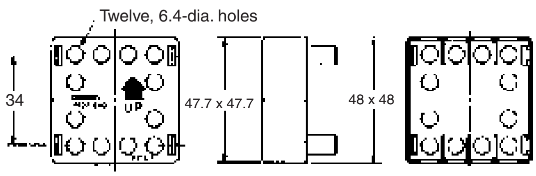


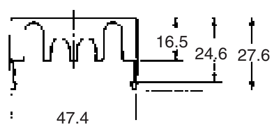
Note: Finger protection can be ensured by using in combination with the Y92A-48G Terminal Cover.

Finger Safe Terminal Cover Conforming to VDE0106/P100

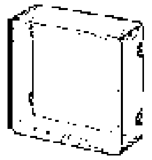
Y92A-48G (Attachment for P3GA-11 Socket)



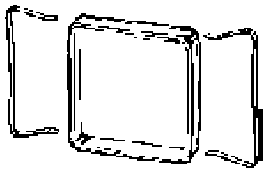




Hard Cover
Y92A-48



Soft Cover
Y92A-48F1

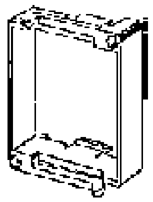


Note: 1. Depending on the operating environment, the condition of the Soft Cover may deteriorate, and it may shrink or become harder. Therefore, it is recommended that the Soft Cover is replaced regularly.

2. The H7CX's panel surface is water-resistive (conforming to IP66) and so even if drops of water penetrate the gaps between the keys, there will be no adverse effect on internal circuits. If, however, there is a possibility of oil being present on the operator's hands, use the Soft Cover. The Soft Cover ensures protection equivalent to IP54F against oil. Do not, however, use the H7CX in locations where it would come in direct contact with oil.

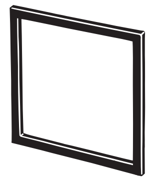
Flush Mounting Adapter
(provided with screw-terminal models)

Y92F-30

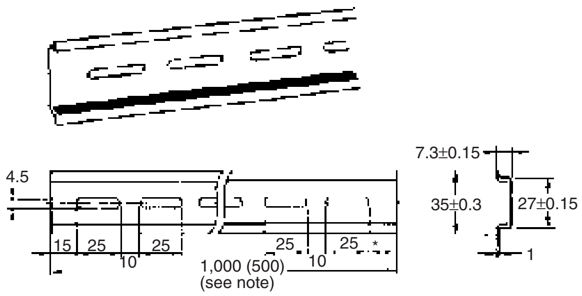


Waterproof Packing
(provided with screw-terminal models)

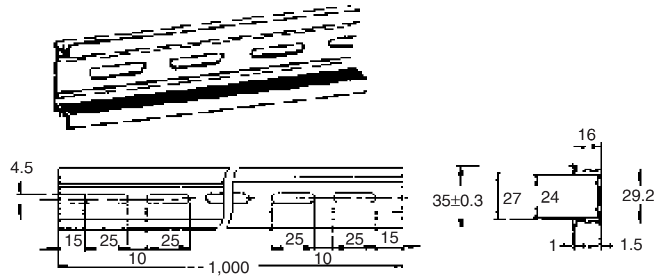
Y92S-29



Mounting DIN-rail
PFP-100N, PFP-50N

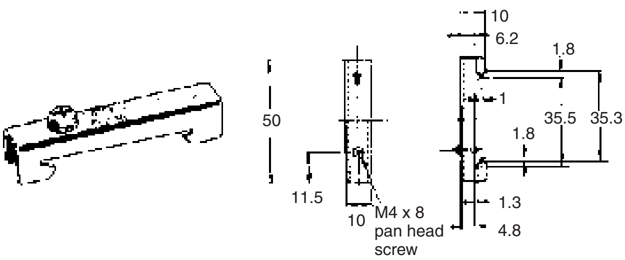


PFP-100N2

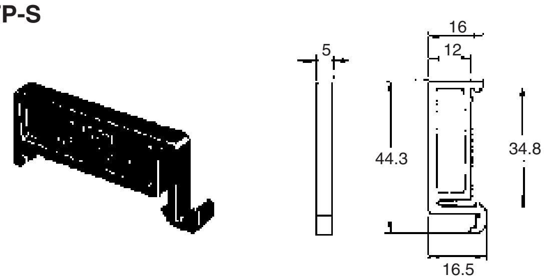


Note: The values shown in parentheses are for the PFP-50N.

End Plate
PFP-M



Spacer
PFP-S



Precautions

⚠ Caution

Do not use the product in locations subject to flammable or explosive gases. Doing so may result in explosion.

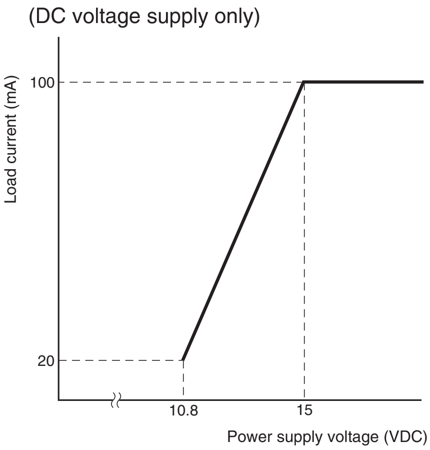
The service life of the output relays depends on the switching capacity and switching conditions. Consider the actual application conditions and use the product within the rated load and electrical service life. Using the product beyond its service life may result in contact deposition or burning.

Do not disassemble, repair, or modify the product. Doing so may result in electric shock, fire, or malfunction.

Do not allow metal objects or conductive wires to enter the product. Doing so may result in electric shock, fire, or malfunction.

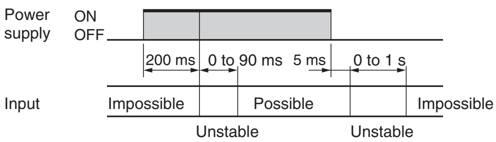
■ External Power Supply

The capacity of the external power supply is 100 mA at 12 V. When using a 24 VAC/12 to 24 VDC power supply, reduce the load with the power supply voltage, as shown in the following diagram (DC power supplies only).



■ Power Supplies

When turning the power ON and OFF, input signal reception is possible, unstable, or impossible as shown in the diagram below.



Turn the power ON and OFF using a relay with a rated capacity of 10 A minimum to prevent contact deterioration due to inrush current caused by turning the power ON and OFF.

Apply the power supply voltage through a relay or switch in such a way that the voltage reaches a fixed value immediately, otherwise they may not be reset or a counter error may result.

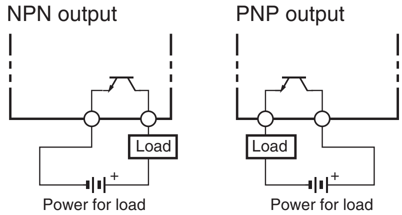
Be sure that the capacity of the power supply is large enough, otherwise the counter may not start due to inrush current (reference value: approx. 10 A, 1.2 ms at 26.4 VAC) that may flow for an instant when the counter is turned ON.

Make sure that the fluctuation of the supply voltage is within the permissible range.

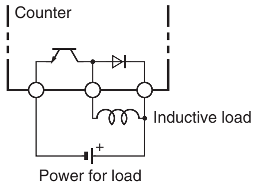
Make sure that the voltage applied is within the specified range, otherwise the internal elements of the counter may be damaged.

■ Transistor Output

The transistor output of the H7CX is isolated from the internal circuitry by a photocoupler, so the transistor output can be used as both NPN and PNP output.



The diode connected to the collector of the output transistor is used to absorb inverted voltage that is generated when an inductive load is connected to the H7CX.



■ Changing the Set Values

When changing the set value during operation, because the H7CX uses a constant read-in system, output will turn ON if the set value is equal to the present value.

■ Operation with a Set Value and Present Value of 0

If the set value and present value are both 0, output will turn ON. Output will turn OFF during reset.

■ Using the Prescaling Function

Observe the following points when setting a prescale value.

- Set the set value to a value less than {Maximum countable value – Prescale value}.

  Example: If the prescale value is 1.25 and the counting range is 0.000 to 999.999, set the set value to a value less than 998.749 (= 999.999 – 1.25).

- If the set value is set to a value greater than this, output will not turn ON.

Note: Output will turn ON, however, if a present value overflow occurs (FFFFFF or FFFF).

- Setting the prescale value incorrectly may result in incorrect counting operation. Be sure to set the prescale value correctly.

■ DIP Switch Setting

Ensure that the power is turned OFF before changing DIP switch settings. Changing DIP switch settings with the power turned ON may result in electric shock due to contact with terminals subject to high voltages.

■ Power Failure Backup

All data is stored in the EEPROM when there is power failure. The EEPROM can be overwritten more than 100,000 times. EEPROM is overwritten when the power is turned OFF or when settings are changed.

■ Self-diagnostic Function

The following displays will appear if an error occurs.

Main display	Sub-display	Error	Output status	Correction method	Set value after reset
------ (----) (See notes 1 and 2.)	No change	Present value underflow (See note 3.)	No change	Either press the reset key or turn ON reset input.	No change
FFFFFF (FFFF) (See notes 1 and 2.)	No change	Present value overflow (See note 4.)	No change	Either press the reset key or turn ON reset input. (See note 5.)	No change
E1	Not lit	CPU	OFF	Either press the reset key or reset the power supply.	No change
E2	Not lit	Memory error (RAM)	OFF	Reset the power supply.	No change
E2	SUM	Memory error (EEP) (See note 6.)	OFF	Reset to the factory settings using the reset key.	0

Note: 1. The display for 4-digit models is given in parentheses.
2. Display flashes (1-second cycles).
3. Occurs when the present value or the total count value goes below –99,999 (–999 with 4-digit models).
4. Occurs when the present value (or measurement value) reaches 999,999 (9,999 with 4-digit models) under the following conditions:
•The output mode is K-2, D, L, or H.
•The H7CX is set for dual counter or tachometer operation.
5. Except when the H7CX is set for tachometer operation.
6. Includes the case where the EEPROM has reached its overwrite lifetime.

■ Response Delay Time When Resetting (Transistor Output)

The following table shows the delay from when the reset signal is input until the output is turned OFF.

(Reference values)

Minimum reset signal width	Output delay time
1 ms	0.8 to 1.2 ms
20 ms	15 to 25 ms

■ Output Delay Time

The following table shows the delay from when the present value passes the set value until the output is produced.

Actual measurements in N and K-2 modes. (Reference values)

Control output type	Maximum counting speed	Output delay time
Contact output	30 Hz	16.5 to 24.0 ms
	5 kHz	3.7 to 5.6 ms
Transistor output	30 Hz	12.0 to 20.0 ms
	5 kHz	0.2 to 0.55 ms

Note: The above times may vary slightly depending on the mode or operating conditions.

■ Maximum Counting Speed for Batch Counter

The maximum counting speed for batch counter operation is 5 kHz. The batch counter counts the number of times the count reaches the set value.

■ Wiring

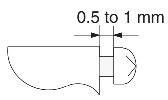
Wiring input lines in the same conduit as power lines or other high-voltage lines may result in malfunction due to noise. Wire the input lines separately, away from lines carrying high-voltages. In addition, make the input wiring as short as possible and use shield lines or metal wiring conduits.

Pay attention to terminal polarity to ensure correct wiring.

■ Mounting

Tighten the two mounting screws on the Adaptor. Tighten them alternately, a little at a time, so as to keep them at an equal tightness.

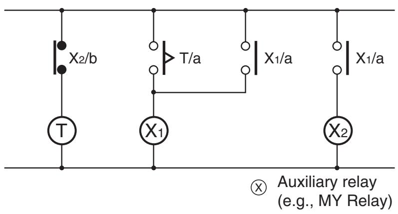
The H7CX's panel surface is water-resistive (conforming to NEMA 4 and IP66). In order to prevent the internal circuit from water penetration through the space between the timer and operating panel, attach a waterproof packing between the timer and installation panel and secure the waterproof packing with the Y92F-30 Flush-mounting Adapter.



It is recommended that the space between the screw head and the adapter should be 0.5 to 1 mm.

■ Operating Environment

- Use the product within the ratings specified for submerging in water and exposure to oil.
- Do not use the product in locations subject to vibrations or shocks. Using the product in such locations over a long period may result in damage due to stress.
- Do not use the product in locations subject to dust, corrosive gases, or direct sunlight.
- Separate the input signal devices, input signal cables, and the product from the source of noise or high-tension cables producing noise.
- Separate the product from the source of static electricity when using the product in an environment where a large amount of static electricity is produced (e.g., forming compounds, powders, or fluid materials being transported by pipe).
- Organic solvents (such as paint thinner), as well as very acidic or basic solutions might damage the outer casing of the H7CX.
- Use the product within the ratings specified for temperature and humidity.
- Do not use the product in locations where condensation may occur due to high humidity or where temperature changes are severe.
- Store at the specified temperature. If the H7CX has been stored at a temperature of less than -10°C, allow the H7CX to stand at room temperature for at least 3 hours before use.
- Leaving the H7CX with outputs ON at a high temperature for a long time may hasten the degradation of internal parts (such as electrolytic capacitors). Therefore, use the product in combination with relays and avoid leaving the product as long as more than 1 month with the output turned ON.



- The load current must be within the rated current.

■ Insulation

- Specifications call for basic insulation between the power supply and input terminals, between the power supply and output terminals, and between the input and output terminals. (The H7CX-A□D is not insulated between the power supply and input terminals.)
- Input and output terminals are connected to devices without exposed charged parts.
- Input and output terminals are connected to devices with basic insulation that is suitable for the maximum operating voltage.

Operating Procedures

■ Setting Procedure Guide

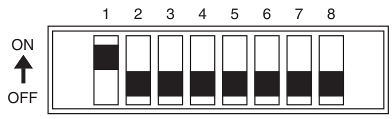
Setting for Counter Operation (1-stage/2-stage Counter, Total and Preset Counter, Batch Counter, Dual Counter)

When Using Basic Settings Only

Basic Settings

- Counting speed (30 Hz, 5 kHz)
- Input mode (UP, DOWN)
- Output mode (N, F, C, K-1)
- One-shot output time (0.5 s, 0.05 s)(See note 2.)
- Reset input signal width (20 ms, 1 ms)
- NPN/PNP input mode (NPN, PNP)

The settings can be performed easily with the DIP switch.
➡ For details on the setting methods, refer to page D-75.



When Using Settings Other than the Above

All the functions can be set with the operation keys.
➡ For details on the setting methods, refer to page D-76.

Other Settings

- Input mode (UP/DOWN A, UP/DOWN B, UP/DOWN C)
- Output mode (R, P, Q, A, K-2, D, L, H)
- One-shot output time (except for 0.5 s and 0.05 s) (See note 2.)

When Using Advanced Functions

Settings for advanced functions other than the basic settings above can be performed with the operation keys.
➡ For details on the setting methods, refer to page D-86.

Advanced Functions

- Dual count calculating mode
- Output 1 time (for 2-stage counter)
- Decimal point position
- Prescale value
- Display color
- Output allocation
- Key protect level

Note: 1. At the time of delivery, the H7CX is set to the 1-stage counter (2-stage counter for H7CX-AW☐/-A4W☐ models) configuration.
2. Set to output 2 time when using as a 2-stage counter or batch counter.

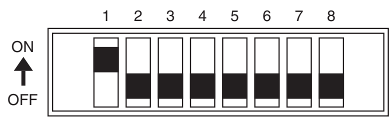
Setting for Tachometer Operation

When Using Basic Settings Only

Basic Settings

- Counting speed (30 Hz, 10 kHz)
- Output mode (HI-LO, AREA, HI-HI, LO-LO)
- Average processing (OFF, 2, 4, 8 times)
- NPN/PNP input mode (NPN, PNP)

The settings can be performed easily with the DIP switch.
➡ For details on the setting methods, refer to page D-76.



When Using Advanced Functions

Settings for advanced functions other than the basic settings above can be performed with the operation keys.
➡ For details on the setting methods, refer to page D-87.

Advanced Functions

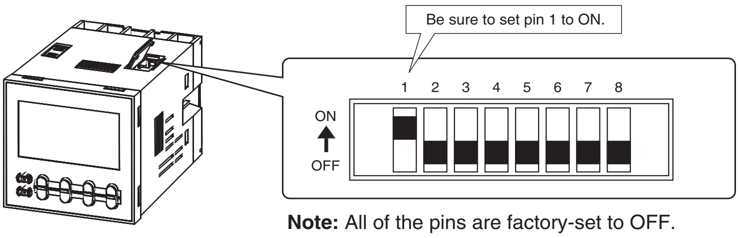
- Decimal point position
- Prescale value
- Auto-zero time
- Startup time
- Display color
- Output allocation
- Key protect level

Note: At the time of delivery, the H7CX is set to the 2-stage counter (1-stage counter for H7CX-AU☐ models) configuration.

■ Operating Procedures (Counter Function)

Settings for Basic Operations

Settings for basic functions can be performed with just the DIP switch.



Note: All of the pins are factory-set to OFF.

	Item	OFF	ON
1	DIP switch settings enable/disable	Disabled	Enabled
2	Counting speed	30 Hz	5 kHz
3	Input mode	UP (increment)	DOWN (decrement)
4	Output mode	Refer to the table on the right.	
5			
6	One-shot output time (See note.)	0.5 s	0.05 s
7	Reset input signal width	20 ms	1 ms
8	NPN/PNP input mode	NPN	PNP

Pin 4	Pin 5	Output mode
OFF	OFF	N
ON	OFF	F
OFF	ON	C
ON	ON	K-1

Note: Set to one-shot output 2 time when using as a 2-stage counter or batch counter.

Easy Confirmation of Switch Settings Using Indicators

The ON/OFF status of the DIP switch pins can be confirmed using the front display. For details, refer to page D-92.

Note: 1. Be sure to set pin 1 of the DIP switch to ON. If it is set to OFF, the DIP switch settings will not be enabled.

2. Changes to DIP switch settings are enabled when the power is turned ON.

3. When setting input modes, output modes, or output times that cannot be set with the DIP switch, all of the settings have to be made using the operation keys. For details on the setting methods, refer to page D-76. When making settings using the operation keys, be sure to set pin 1 of the DIP switch to OFF.

Switching to Total and Preset Counter, Batch Counter, and Dual Counter Operation (See note.)

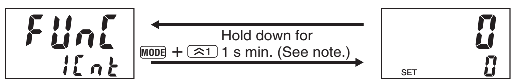
The H7CX is factory-set to the 1-stage counter (2-stage counter for H7CX-AW□/-A4W□ models) configuration. To change to a different configuration, use the procedure shown on the right. For details, refer to page 39.

Note: This includes changing the 2-stage counter (or 1-stage counter) configuration.

Power ON

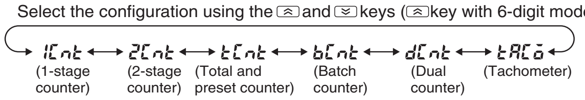
Run mode

Configuration selection mode



Note: The MODE key must be pressed before the key.

Select the configuration using the and keys (key with 6-digit models).



Note: The configurations that can be selected vary with the model.

Advanced-Function Settings

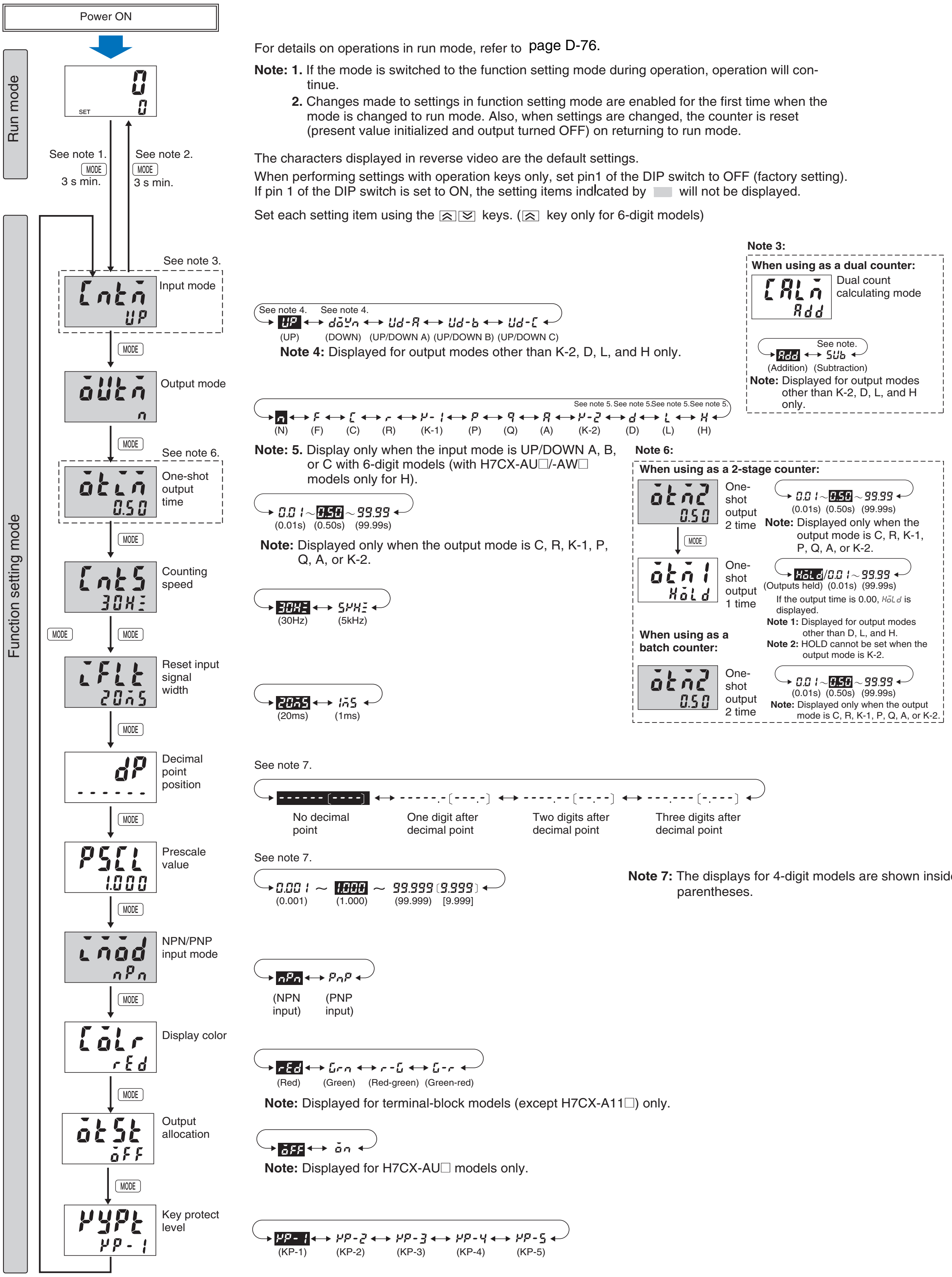
After making DIP switch settings for basic operations, advanced functions (see note) can be added using the operation keys.
For details, refer to page D-76.

Note: Advanced functions consist of the dual count calculating mode, output 1 time (for 2-stage counter), decimal point position,prescale value, display color, output allocation, and key protect level.

Settings for All Functions

Note: At the time of delivery, the H7CX is set to the 1-stage counter (2-stage counter for H7CX-AW☐/-A4W☐ models) configuration. When using as a 2-stage (or 1-stage) counter, total and preset counter, batch counter, or dual counter, switch to the configuration using the procedure given on page D-92.

Settings that cannot be performed with the DIP switch are performed with the operation keys.



Explanation of Functions

Input Mode (CntM) (Setting possible using DIP switch.)

Set increment mode (UP), decrement mode (DOWN), or one of the increment/decrement modes (UP/DOWN A, UP/DOWN B, or UP/DOWN C) as the input mode. Input modes other than UP or DOWN modes cannot be set using the DIP switch and so use the operation keys if other modes are required. (For details on the operation of the input modes, refer to Input Modes and Present Value on page D-80.)

Dual Count Calculating Mode (CALM)

When using as a dual counter, select either ADD (addition) or SUB (subtraction) as the calculation method for the dual count value. SUB mode can be used only when K-2, D, L, or H is selected as the output mode with 6-digit models.

ADD: Dual count value = CP1 PV + CP2 PV

SUB: Dual count value = CP1 PV – CP2 PV

Output Mode (OUTM) (Setting possible using DIP switch.)

Set the way that control output for the present value is output. The possible settings are N, F, C, R, K-1, P, Q, A, K-2, D, L, and H. Output modes other than N, F, C, or K-1 cannot be set using the DIP switch and so use the operation keys if other modes are required. The output modes that can be set vary with the model. (For details on the operation of the output modes, refer to Input/Output Mode Settings on page D-81.)

One-shot Output Time (OtCM) (Setting possible using DIP switch.)

Set the one-shot output time (0.01 to 99.99 s) for control output. One-shot output can be used only when C, R, K-1, P, Q, A, or K-2 is selected as the output mode. Output times other than 0.5 s or 0.05 s cannot be set with the DIP switch and so use the operation keys if other settings are required.

One-shot Output 2 Time (OtM2) (Setting possible using DIP switch.)

When using as a 2-stage counter or batch counter, set the one-shot output time (0.01 to 99.99 s) for control output (OUT2). One-shot output can be used only when C, R, K-1, P, Q, A, or K-2 is selected as the output mode. Output times other than 0.5 s or 0.05 s cannot be set with the DIP switch and so use the operation keys if other settings are required.

One-shot Output 1 Time (OtM1)

When using as a 2-stage counter, set the one-shot output time (0.01 to 99.99 s) for control output (OUT1). One-shot output can be used only when D, L, or H is selected as the output mode. If the output time is set to 0.00, HoLd is displayed, and outputs are held. HOLD cannot be set when the output mode is K-2.

Counting Speed (CntS) (Setting possible using DIP switch.)

Set the maximum counting speed (30 Hz/5 kHz) for CP1 and CP2 inputs together. If contacts are used for input signals, set the counting speed to 30 Hz. Processing to eliminate chattering is performed for this setting.

Reset Input Signal Width (CFLt) (Setting possible using DIP switch.)

Set the reset input signal width (20 ms/1 ms) for reset/reset 1 and total reset/reset 2 inputs together. If contacts are used for input signals, set the counting speed to 20 ms. Processing to eliminate chattering is performed for this setting.

Decimal Point Position (dP)

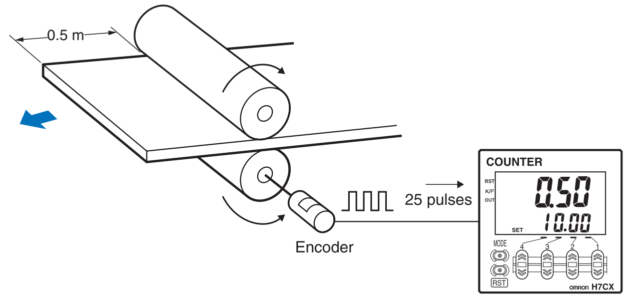
Decide the decimal point position for the present value, CP1/CP2 present values, set value (SV1, SV2), total count value, and dual count set value.

Prescale Value (PSCL)

Pulses input to the counter are converted according to the specified prescale value. (Setting range: 0.001 to 99.999 for 6-digit models and 0.001 to 9.999 for 4-digit models.)

Example: To display the feed distance for systems that output 25 pulses for a feed length of 0.5 m in the form □□.□□ m:

1. Set the decimal point position to 2 decimal places.
2. Set the prescale value to 0.02 (0.5÷25).



NPN/PNP Input Mode (CMod)

Select either NPN input (no-voltage input) or PNP input (voltage input) as the input format. The same setting is used for all external inputs. For details on input connections, refer to *Input Connection* on page D-64.

Display Color (COLr)

Set the color used for the present value.

	Output OFF (See note.)	Output ON (See note.)
rEd	Red (fixed)	
Grn	Green (fixed)	
r-G	Red	Green
G-r	Green	Red

Note: When using as a 2-stage counter, this is the status of output 2.

Output Allocation (OtSt)

When using H7CX-AU□ models as a 2-stage counter, the output can be flexibly allocated to either stage 1 or 2.
Transistor output can be allocated to SV1 and contact output for SV2 or vice verse, as in the following table.

H7CX-AU/-AUD1

	OUT1	OUT2
oFF	Transistor (12-13)	Contact (3, 4, 5)
on	Contact (3, 4, 5)	Transistor (12-13)

H7CX-AUSD1

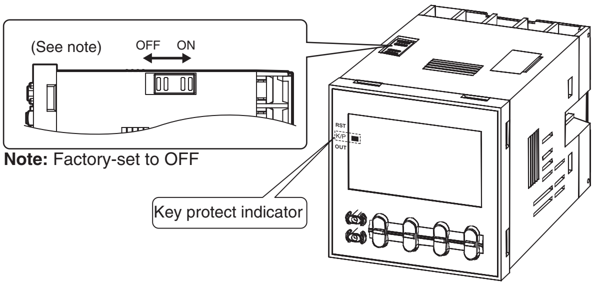
	OUT1	OUT2
oFF	Transistor (12-13)	Transistor with diode (3, 4, 5)
on	Transistor with diode (3, 4, 5)	Transistor (12-13)

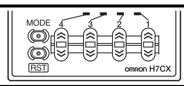
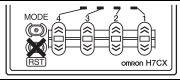
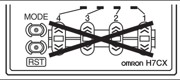
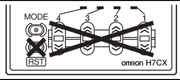
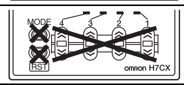
Counters

Key Protect Level (kYPt)

Set the key protect level.

When the key-protect switch in set to ON, it is possible to prevent setting errors by prohibiting the use of certain operation keys by specifying the key protect level (KP-1 to KP-5). The key protect indicator is lit while the key-protect switch is set to ON. Confirm the ON/OFF status of the key-protect switch after the H7CX is mounted to the panel.

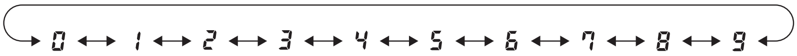


Level	Meaning	Details			
		Changing mode (See note.)	Switching display in run mode	Reset key	Up/down key (Up key for 6-digit models)
KP-1 (default setting)		No	Yes	Yes	Yes
KP-2		No	Yes	No	Yes
KP-3		No	Yes	Yes	No
KP-4		No	Yes	No	No
KP-5		No	No	No	No

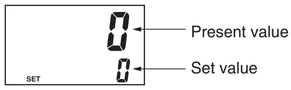
Note: Changing mode to configuration selection mode (MODE + ︽1 1 s min.) or function setting mode (MODE 3 s min.).

Operation in Run Mode

Set values for each digit as required using the ︽ and ︾ keys. (︽ key only for 6-digit models.)



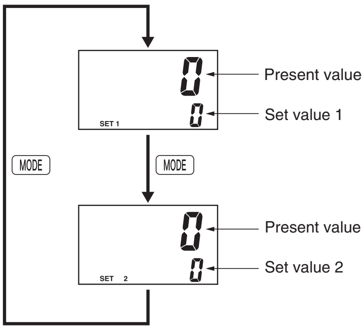
1-stage Counter



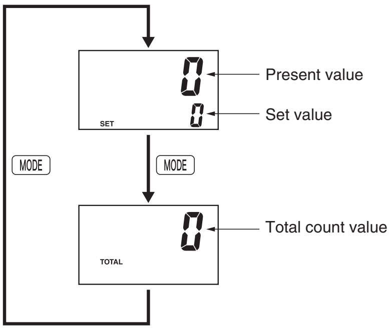
Present Value
Shows the present count value.

Set Value (Set Value 1, Set Value 2)
Set the set value. When the present value reaches the set value, signals are output according to the specified output mode.

2-stage Counter



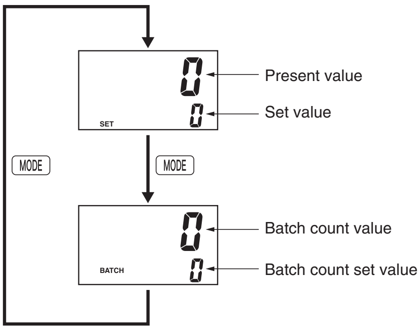
Total and Preset Counter



Present Value/Set Value
Same as 1-stage counter.

Total Count Value
Shows the present total count value.

Batch Counter

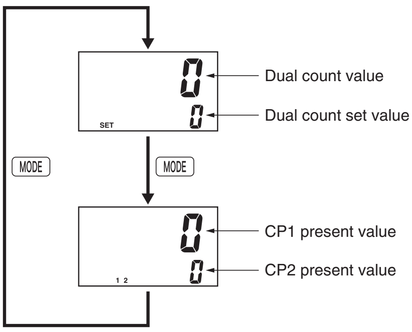


Present Value/Set Value
Same as 1-stage counter.

Batch Count Value
Shows the number of times the count has been completed for the present value.

Batch Count Set Value
Set the batch count set value. When the batch count value reaches the batch count set value, batch output (OUT1) turns ON.

Dual Counter



Dual Count Value
Shows the sum of the CP1 present value and CP2 present value when the dual count calculating mode is ADD and shows the value obtained by subtracting the CP2 present value from the CP1 present value when the dual count calculating mode is SUB.

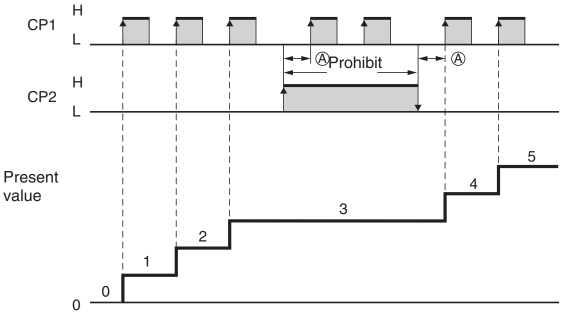
Dual Count Set Value
Set the dual count set value. When the dual count value reaches the dual count set value, signals are output according to the specified output mode.

CP1/CP2 Present Value
Show the present count values for CP1 and CP2 present values respectively.

Input Modes and Present Value

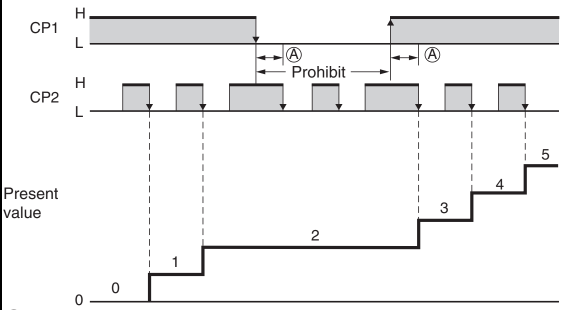
UP (Increment) Mode

CP1: Count input; CP2: Prohibit (gate) input



Ⓐ must be greater than the minimum signal width. (See note 2.)

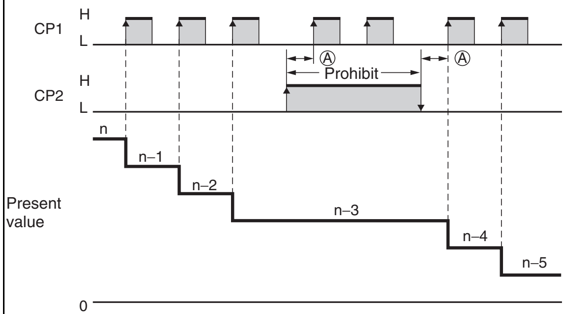
CP1: Prohibit (gate) input; CP2: Count input



Ⓐ must be greater than the minimum signal width. (See note 2.)

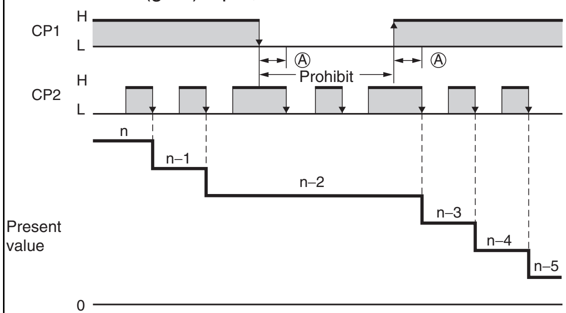
DOWN (Decrement) Mode

CP1: Count input; CP2: Prohibit (gate) input



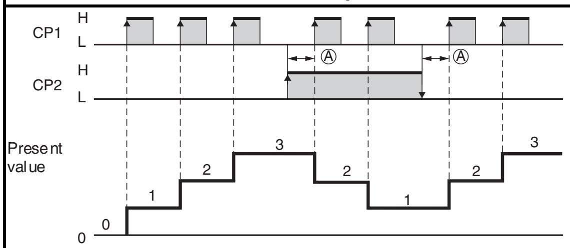
Ⓐ must be greater than the minimum signal width. (See note 2.)

CP1: Prohibit (gate) input; CP2: Present value



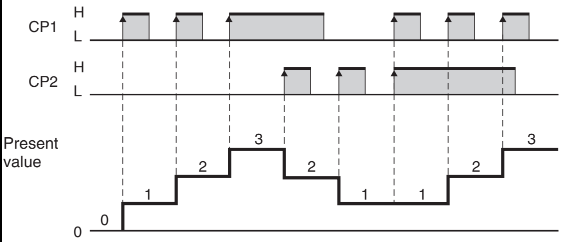
Ⓐ must be greater than the minimum signal width. (See note 2.)

UP/DOWN A Command Input Mode

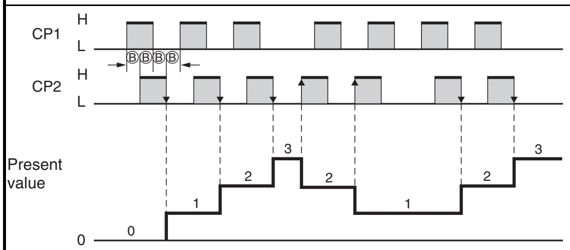


Ⓐ must be greater than the minimum signal width. (See note 2.)

UP/DOWN B Individual Input Mode



UP/DOWN C Quadrature Input Mode



Ⓑ must be at least 1/2 the minimum signal width. (See note 2.)

Note: 1. If the configuration selection is set to dual counter, CP1 and CP2 input will operate in the same way as the count input (CP1) of UP (increment) mode.

2. Ⓐ must be greater than the minimum signal width and Ⓑ must be at least 1/2 the minimum signal width. If they are less, a count error of ±1 may occur.
Minimum signal width: 16.7 ms (when maximum counting speed = 30 Hz)
100 µs (when maximum counting speed = 5 kHz)

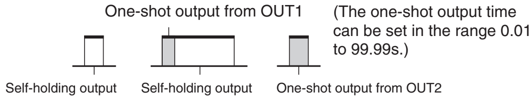
3. The meaning of the H and L symbols in the tables is explained below.

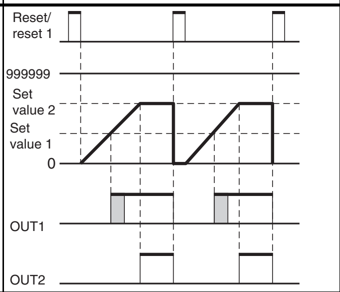
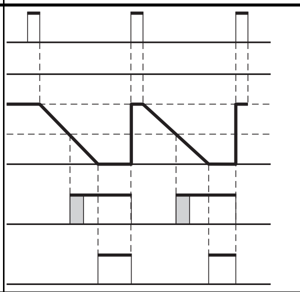
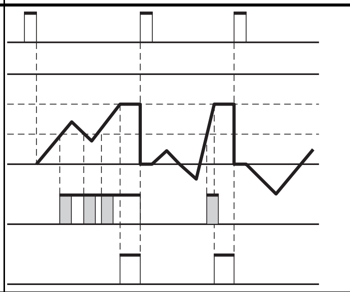
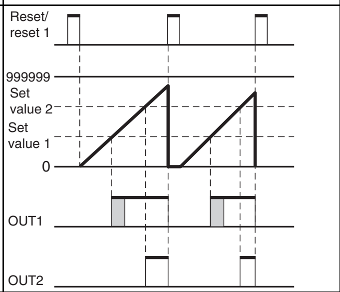
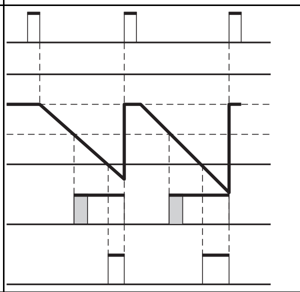
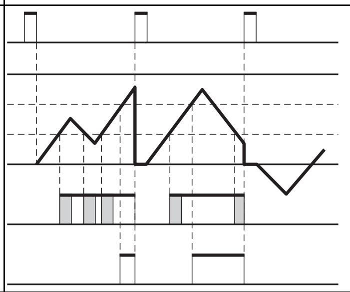
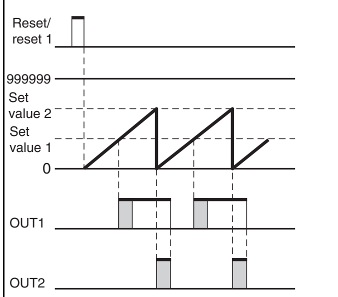
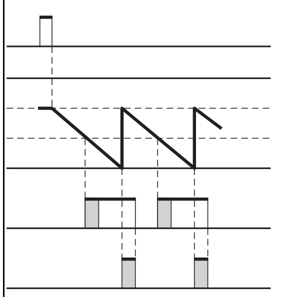
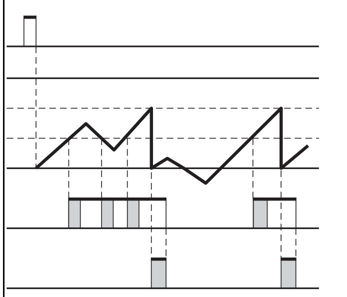
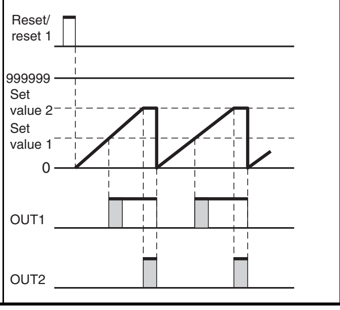
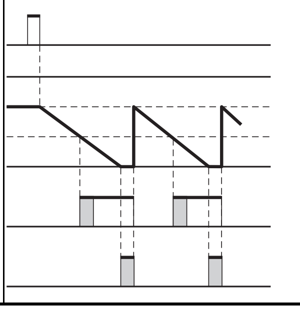
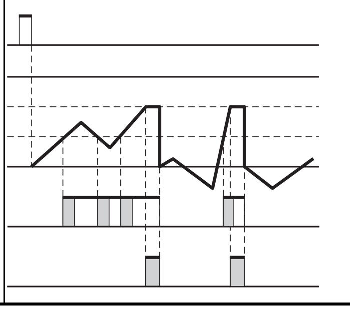
Input method Symbol	No-voltage input (NPN input)	Voltage input (PNP input)
H	Short-circuit	4.5 to 30 VDC
L	Open	0 to 2 VDC

Input/Output Mode Settings

Operation for 1-stage models is the same as that for OUT2.

When using a 2-stage model as a 1-stage counter, total and preset counter, or dual counter, OUT1 and OUT2 turn ON and OFF simultaneously.



		Input mode			Operation after count completion
		UP	DOWN	UP/DOWN A, B, C	
Output mode setting	N				The outputs and present value display are held until reset/reset 1 is input.
	F				The present value display continues to increase/decrease. The outputs are held until reset/reset 1 is input.
	C				As soon as the count reaches SV, the present value display returns to the reset start status. The present value display does not show the present value upon count-up. The outputs repeat one-shot operation. OUT1 self-holding output turns OFF after the OUT2 one-shot output time.The OUT1 one-shot output time is independent of OUT2.
	R				The present value display returns to the reset start status after the one-shot output time. The outputs repeat one-shot operation. OUT1 self-holding output turns OFF after the OUT2 one-shot output time.The OUT1 one-shot output time is independent of OUT2.

Note: 1. The full scale (FS) for H7CX 4-digit models is 9999.

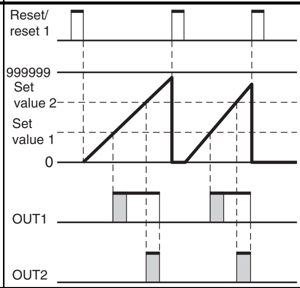
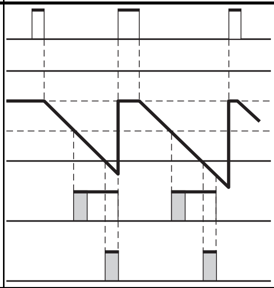
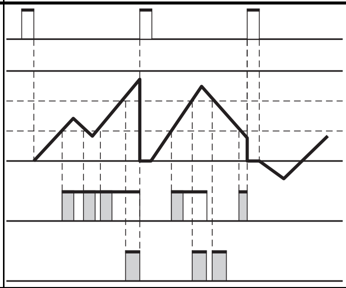
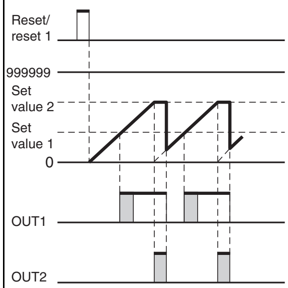
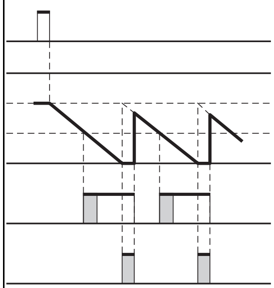
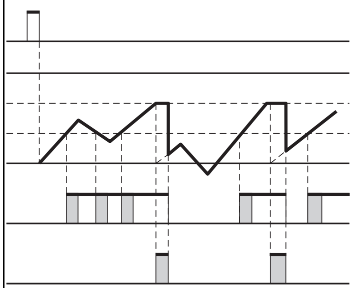
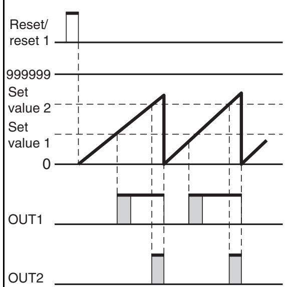
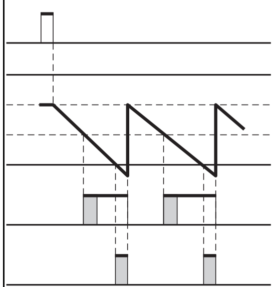
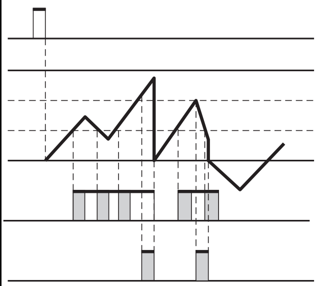
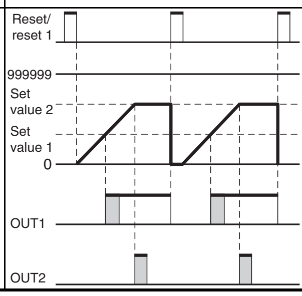
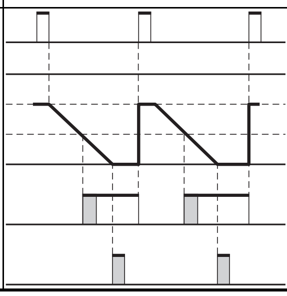
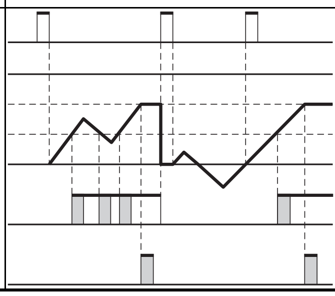
2. When the present value reaches 999999, it returns to 0.

3. Counting cannot be performed during reset/reset 1 input.

4. If reset/reset 1 is input while one-shot output is ON, one-shot output turns OFF.

5. If there is power failure while output is ON, output will turn ON again when the power supply has recovered. For one-shot output, output will turn ON again for the duration of the output time setting once the power supply has recovered.

6. Do not use the counter function in applications where the count may be completed (again) while one-shot output is ON.

		Input mode			Operation after count completion
		UP	DOWN	UP/DOWN A, B, C	
Output mode setting	K-1				The present value display continues to increase/decrease. OUT1 self-holding output turns OFF after the OUT2 one-shot output time.The OUT1 one-shot output time is independent of OUT2.
	P				The present value display does not change during the one-shot output time period, but the actual count returns to the reset start status. The outputs return to the one-shot start state and repeat one-shot operation. OUT1 self-holding output turns OFF after the OUT2 one-shot output time. The OUT1 one-shot output time is independent of OUT2.
	Q				The present value continues to increase/decrease for the one-shot output time, but returns to the reset start status after the one-shot output time has elapsed. The outputs repeat one-shot operation. OUT1 self-holding output turns OFF after the OUT2 one-shot output time. The OUT1 one-shot output time is independent of OUT2.
	A				The present value display and OUT1 self-holding output is held until reset/reset 1 is input. OUT1 and OUT2 are independent.

Note: 1. The full scale (FS) for H7CX 4-digit models is 9999.

2. When the present value reaches 999999, it returns to 0.

3. Counting cannot be performed during reset/reset 1 input.

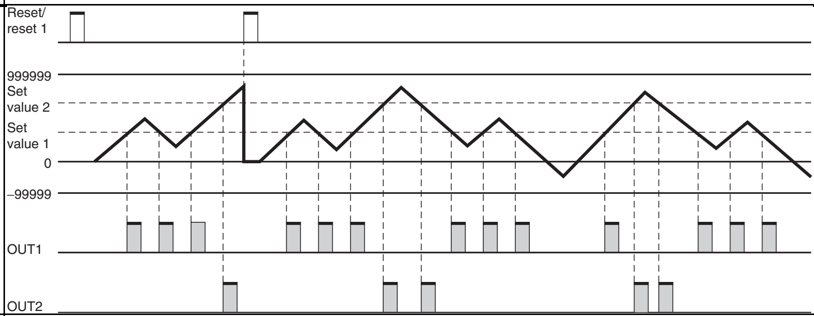
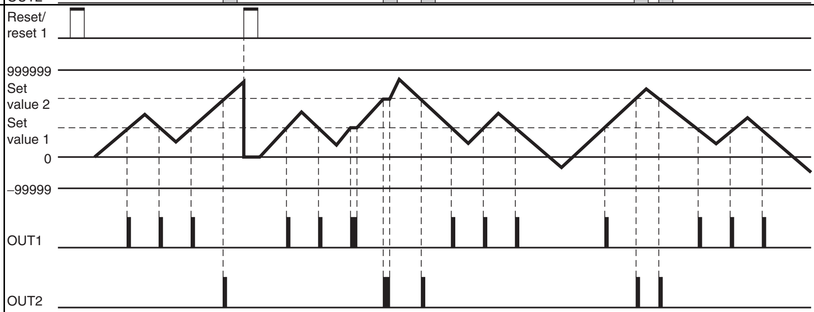
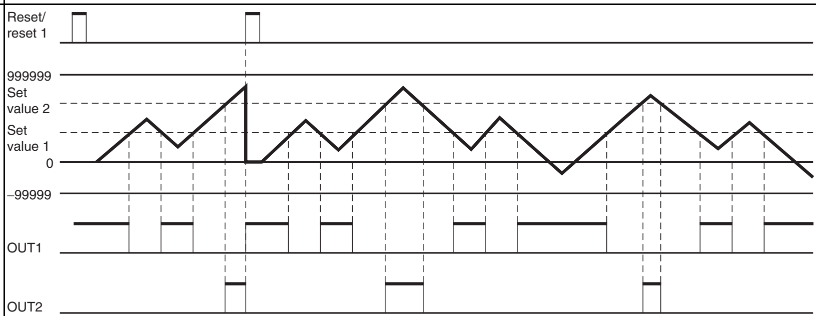
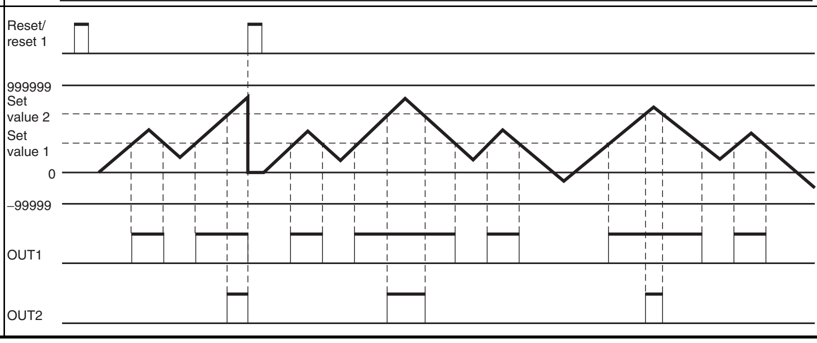
4. If reset/reset 1 is input while one-shot output is ON, one-shot output turns OFF.

5. If there is power failure while output is ON, output will turn ON again when the power supply has recovered. For one-shot output, output will turn ON again for the duration of the output time setting once the power supply has recovered.

6. Do not use the counter function in applications where the count may be completed (again) while one-shot output is ON.

Self-holding output · Instantaneous (equals) output · One-shot output

(The one-shot output time can be set in the range 0.01 to 99.99s.)

		Input mode UP/DOWN A, B, C	Operation after count completion
Output mode setting	K-2		The display continues to increase/decrease until the overflow or underflow value is reached. One-shot output only.
	D		The display continues to increase/decrease until the overflow or underflow value is reached. The outputs are ON while the count is equal.
	L		The display continues to increase/decrease until the overflow or underflow value is reached. OUT1 is held while the present value is less than or equal to set value 1. OUT2 is held while the present value is greater than or equal to set value 2.
	H		The display continues to increase/decrease until the overflow or underflow value is reached. OUT1 is held while the present value is greater than or equal to set value 1. OUT2 is held while the present value is greater than or equal to set value 2. **Note:** H mode is available only when using a 6-digit model as a 2-stage counter.

Note: 1. Counting cannot be performed during reset/reset 1 input.

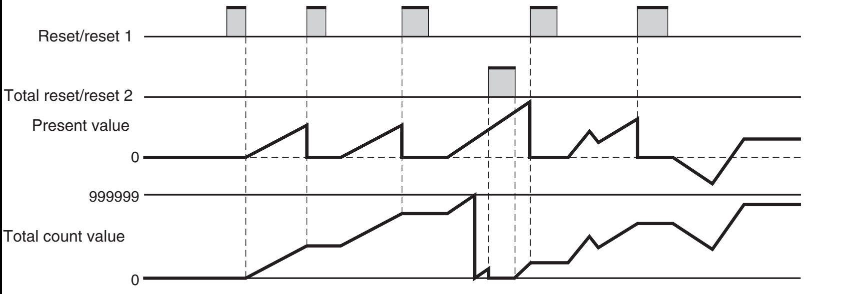
2. If reset/reset 1 is input while one-shot output is ON, one-shot output turns OFF.

3. If there is power failure while output is ON, output will turn ON again when the power supply has recovered. For one-shot output, output will turn ON again for the duration of the output time setting once the power supply has recovered.

4. Do not use the counter function in applications where the count may be completed (again) while one-shot output is ON.

Total and Preset Counter Operation

The H7CX has a total counter, separate from the 1-stage preset counter, for counting the total accumulated value.

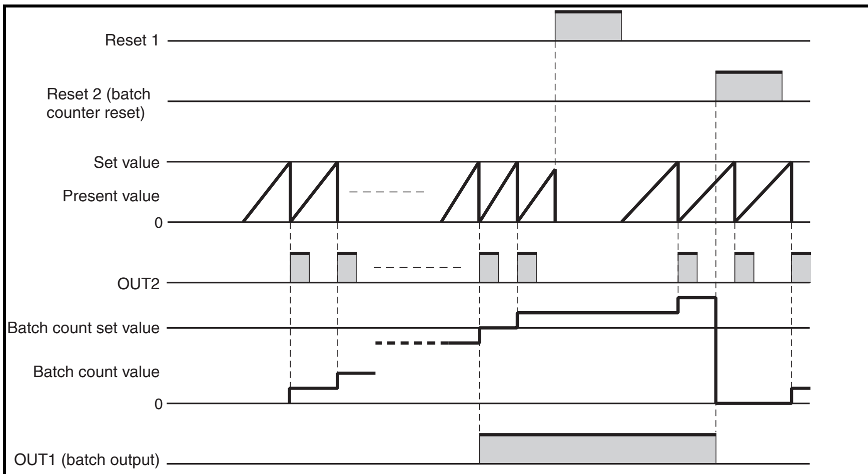


Note: The full scale (FS) for H7CX 4-digit models is 9999.

- The total counter continues to count the total accumulated value when the present value is reset using reset/reset 1 input (reset key).
- The total count value is reset when the total reset/reset 2 input is turned ON. If the reset key is pressed while the total count value is displayed, the total count value is reset. The present value is also reset at this time.
- The counting range of the total counter is –99,999 to 999,999 (–999 to 9,999). The total count value returns to 0 when it reaches the full scale limit.

Batch Counter Operation

The H7CX has a batch counter, separate from the 1-stage preset counter, for counting the number of times the count has been completed.



Note: The above is for when the output mode is C.

- The batch counter continues after count completion.
- Batch output is held until batch counter reset is input.
- When the batch counter reset input is turned ON, the batch count value is reset, and batch output turns OFF.
- If the reset key is pressed while the batch count value is displayed, the batch count value is reset and batch output turns OFF. The present value is also reset at this time.

Note: 1. The batch count value is held at 0 during batch counter reset input.

2. If the batch count set value is 0, batch count will be performed but there will be no batch output.

3. The batch count value returns to 0 when it reaches 999,999 (9,999 for 4-digit models).

4. Once batch input has been turned ON, it will return to the ON state after power interruptions.

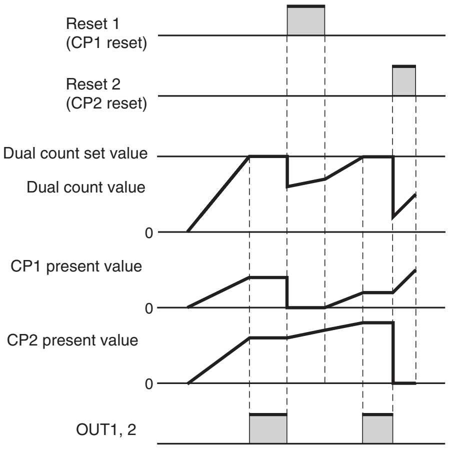
5. If the batch count set value is changed from a value that is greater than the batch count value to one that is less, batch output will turn ON.

6. After batch output turns ON, the ON state will be held even if the batch count set value is changed to a value greater than the batch count value.

Dual Counter Operation

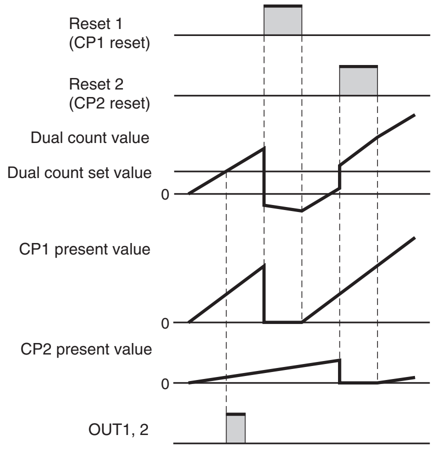
Using the dual counter allows the count from 2 inputs to be added or subtracted and the result displayed. It is possible to specify a set value for which output turns ON when the set value matches the added or subtracted result.
OUT1 and OUT2 turn ON and OFF simultaneously.

Dual Count Calculating Mode = ADD
Dual count value = CP1 PV + CP2 PV



Note: The above is for when the output mode is N.

Dual Count Calculating Mode = SUB
Dual count value = CP1 PV – CP2 PV



Note: The above is for when the output mode is K-2. SUB mode can be used only when K-2, D, L, or H is selected as the output mode with 6-digit models.

- The operation after count completion for the dual counter value is determined by the output mode.
- The CP1 present value is reset when reset 1 input is turned ON and the CP2 present value is reset when reset 2 input is turned ON.
- If the reset key is pressed while the dual count value, CP1 present value, or CP2 present value is displayed, all of the present values are reset and outputs turn OFF. At this time, counting is not possible for CP1 or CP2 inputs.

Note: 1. Counting is not possible for CP1 during reset 1 input. CP2 will not be affected. The dual count value will be calculated based on a CP1 present value of 0.

2. Counting is not possible for CP2 during reset 2 input. CP1 will not be affected. The dual count value will be calculated based on a CP2 present value of 0.

3. The counting range for the dual count value is –99,999 to 999,999 (–999 to 9,999 for 4-digit models). The counting ranges for the CP1 present value and CP2 present value are 0 to 999,999 (0 to 9,999 for 4-digit models). If a present value exceeds 999,999 (9,999 for 4-digit models), FFFFFF (FFFF for 4-digit models) will be displayed to indicate an overflow, and all counting will stop.

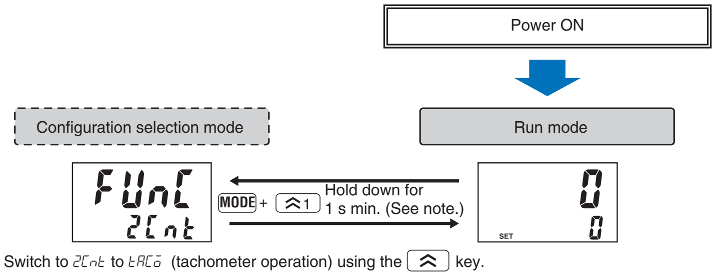
Reset Function List

Function	1-stage/2-stage counter	Total and preset counter		Batch counter		Dual counter	
Screen displayed in run mode	**Present value/ set value (1, 2)**	**Present value/ set value**	**Total count value**	**Present value/ set value**	**Batch count value/batch count set value**	**Dual count value/dual count set value**	**CP1 present value/CP2 present value**
Reset/reset 1	Present value and output reset.	Present value and output reset.		Present value and output reset.		Only the CP1 present value is reset.	
Total reset/reset 2	No effect.	Only the total count value is reset.		Batch count value and batch output reset.		Only the CP2 present value is reset.	
Reset key	Present value and output reset.	Present value and output reset.	Present value, total count value, and output reset.	Present value and output reset.	Present value, batch count value, output and batch output reset.	CP1 present value, CP2 present value, dual count value, and output reset.	

■ Operating Procedures (Tachometer Function)

Switching from Counter to Tachometer

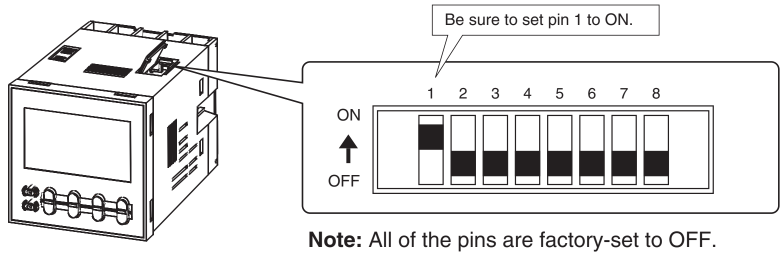
The H7CX is factory-set to the 2-stage counter (1-stage counter for H7CX-AU□ models) configuration. To switch to the tachometer configuration, use the procedure shown on the right. For details, refer to page D-92.



Note: The MODE key must be pressed before the ⩯1 key.

Settings for Basic Operations

Settings for basic functions can be performed with just the DIP switch.



Note: All of the pins are factory-set to OFF.

	Item	OFF	ON
1	DIP switch settings enable/disable	Disabled	Enabled
2	Counting speed	30 Hz	10 kHz
3	Tachometer output mode	Refer to the table on the right.	
4			
5	Average processing	Refer to the table on the right.	
6			
7	---	---	---
8	NPN/PNP input mode	NPN	PNP

Pin 3	Pin 4	Tachometer output mode
OFF	OFF	Upper and lower limit
ON	OFF	Area
OFF	ON	Upper limit
ON	ON	Lower limit

Pin 5	Pin 6	Average processing
OFF	OFF	OFF (no average processing)
ON	OFF	2 times
OFF	ON	4 times
ON	ON	8 times

Easy Confirmation of Switch Settings Using Indicators

The ON/OFF status of the DIP switch pins can be confirmed using the front display. For details, refer to page D-92.

Note: 1. Be sure to set pin 1 of the DIP switch to ON. If it is set to OFF, the DIP switch settings will not be enabled.

2. Changes to DIP switch settings are enabled when the power is turned ON.

Advanced-Function Settings

After making DIP switch settings for basic operations, advanced-functions (see note) can be added using the operation keys. For details, refer to page D-76.

Note: Advanced functions consist of decimal point position, prescale value, auto-zero time, startup time, display color, output allocation, and key protect level.

Settings for Advanced Functions

Note: When using as a tachometer, switch to the tachometer configuration using the procedure given on page D-92.

Settings that cannot be performed with the DIP switch are performed with the operation keys.

Power ON

Run mode

(See note 1.) MODE 3s min.

(See note 2.) MODE 3s min.

Note: 1. If the mode is switched to the function setting mode during operation, operation will continue.tion, operation will continue.

2. Changes made to settings in function setting mode are enabled for the first time when the mode is changed to run mode. Also, whensettings are changed, the counter is re-set (measured values initial-ized and output turned OFF) on returning to run mode.

For details on operations in run mode, refer to page D-90.

The characters displayed in reverse video are the initial values.

When performing settings with operation keys only, set pin1 of the DIP switch to OFF (factory setting).
If pin 1 of the DIP switch is set to ON, the setting items indicated by ▭ will not be displayed.

Set each setting item using the ⌃ keys.

Function setting mode

Setting item	Settings (press MODE to advance to the next item)
Tachometer output mode	(HI-LO) → (AREA) → (HI-HI) → (LO-LO)
Counting speed	(30Hz) → (10kHz)
Decimal point position	(No decimal point) → (One digit after decimal point) → (Two digits after decimal point) → (Three digits after decimal point)
Prescale value	0.001 ~ 1.000 ~ 99.999 (0.001) (1.000) (99.999)
Average processing	(No average processing) → 2 (Average of 2 measure-) → 4 (Average of 4 measure-) → 8 (Average of 8 measure-)
Auto-zero time	0.1 ~ 99.9 (0.1s) (99.9s)
Startup time	0.0 ~ 99.9 (0.0s) (99.9s)
NPN/PNP input mode	(NPN input) → (PNP input)
Display color	(Red) → (Green) → (Red-green) → (Green-red)
Output allocation	OFF ↔ ON
Key protect level	(KP-1) → (KP-2) → (KP-3) → (KP-4) → (KP-5)

Note: Displayed for H7CX-AU☐ models

Explanation of Functions

Tachometer Output Mode (tōtñ) (Setting possible using DIP switch.)

Set the output method for control output based on the OUT1/OUT2 set value. Upper and lower limit (HI-LO), area (AREA), upper limit (HI-HI), and lower limit (LO-LO) can be set.
(For details on the operation of the output modes, refer to Output Mode Settings on page D-91.)

Counting Speed (CntS) (Setting possible using DIP switch.)

Set the maximum counting speed (30 Hz/10 kHz) for CP1 input. If contacts are used for input signals, set the counting speed to 30 Hz. Processing to eliminate chattering is performed for this setting.

Decimal Point Position (dP)

Decide the decimal point position for the measurement value, OUT1 set value, and OUT2 set value.

Prescale Value (PSCL)

It is possible to display the rate of rotation or the speed of a device or machine to which the H7CX is mounted by converting input pulses to a desired unit. If this prescaling function is not used, the input frequency (Hz) will be displayed.

The relationship between display and input is determined by the following equation. Set the prescale value according to the unit to be displayed.

Displayed value = f × a
f: Input pulse frequency (number of pulses in 1 second)
a: Prescale value

1. Displaying Rotation Rate

Display unit	Prescale value (a)
rpm	1/N × 60
rps	1/N

N: Number of pulses per revolution

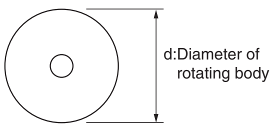
Example: In order to display the rate of rotation for a machine that outputs 5 pulses per revolution in the form □□.□ rpm:

1. Set the decimal point position to 1 decimal place.
2. Using the formula, set the prescale value to 1/N × 60 = 60/5 = 12.

2. Displaying Speed

Display unit	Prescale value (a)
m/min	πd × 1/N × 60
m/s	πd × 1/N

N: Number of pulses per revolution
d: Diameter of rotating body (m)
πd: Circumference (m)



Average Processing (AUG) (Setting possible using DIP switch.)

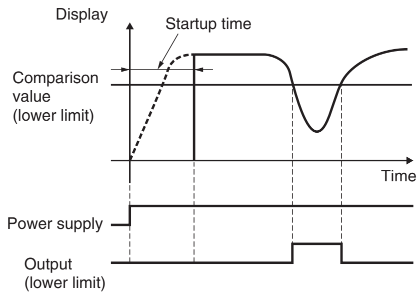
Flickering display and output chattering can be prevented using average processing (simple averaging). Average processing can be set to one of four levels: no average processing, 2 times (i.e., the average of 2 measurement values), 4 times, or 8 times. The measurement cycle will be equal to the sampling cycle (200 ms) multiplied by the average processing setting (i.e., the number of times). Average processing enables fluctuating input signals to be displayed stably. Set the optimum number of times for the application.

Auto-zero Time (AUtZ)

It is possible to set the H7CX so that if there is no pulse for a certain time the display is force-set to 0. This time is called the auto-zero time. Set the auto-zero time to a time slightly longer than the estimated interval between input pulses and within the setting range (0.1 to 99.9 s). It will not be possible to make accurate measurements if the auto-zero time is set to a time shorter than the input pulse cycle. Setting a time that is too long may also result in problems, such as a time-lag between rotation stopping and the alarm turning ON.

Startup Time (Stmr)

In order to prevent undesired output resulting from unstable input immediately after the power supply is turned ON, it is possible to prohibit measurement for a set time (0.0 to 99.9 s), the startup time. It can also be used to stop measurement and disable output until the rotating body reaches the normal rate of rotation, after the power supply to the H7CX and rotating body are turned ON at the same time.



NPN/PNP Input Mode (imod)

Select either NPN input (no-voltage input) or PNP input (voltage input) as the input format. The same setting is used for all external inputs. For details on input connections, refer to *The circuit shown above is for no-voltage input (NPN input).* on page D-64.

Display Color (CoLr)

Set the color used for the measurement value.

Setting	Control output OFF	Control output ON
rEd	Red (fixed)	
Grn	Green (fixed)	
r-G (See note 1.)	Measured value displayed in red when both control outputs 1 and 2 are OFF.	Measured value displayed in green when either control output 1 or control output 2 is ON.
G-r (See note 2.)	Measured value displayed in green when both control outputs 1 and 2 are OFF.	Measured value displayed in red when either control output 1 or control output 2 is ON.

Note: 1. If the tachometer output mode is set to AREA, however, the measured value is displayed in red when control output 1 is OFF and in green when control output 1 is ON.

2. If the tachometer output mode is set to AREA, however, the measured value is displayed in green when control output 1 is OFF and in red when control output 1 is ON.

Output Allocation (oUtSt)

When using H7CX-AU□ models as 2-stage counter, each output can be flexibly allocated to either stage 1 or 2.
Transistor output placed for SV1 and contact output for SV2 or vice verse, as in the following table.

H7CX-AU/-AUD1

	OUT1	OUT2
oFF	Transistor (12-13)	Contact (3, 4, 5)
on	Contact (3, 4, 5)	Transistor (12-13)

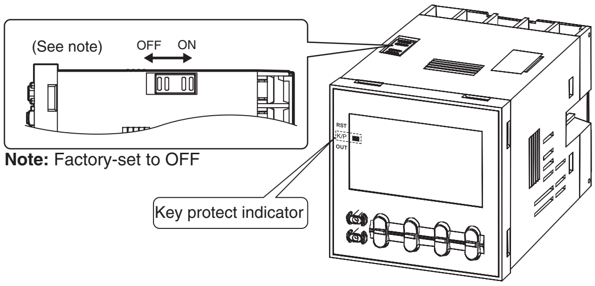
H7CX-AUSD1

	OUT1	OUT2
oFF	Transistor (12-13)	Transistor with diode (3, 4, 5)
on	Transistor with diode (3, 4, 5)	Transistor (12-13)

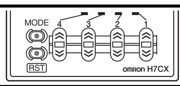
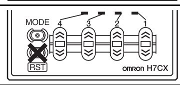
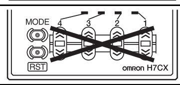
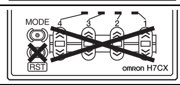
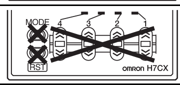
Key Protect Level (KYPt)

Set the key protect level.

When the key-protect switch in set to ON, it is possible to prevent setting errors by prohibiting the use of certain operation keys by specifying the key protect level (KP-1 to KP-5). The key protect indicator is lit while the key-protect switch is set to ON. Confirm the ON/OFF status of the key-protect switch after the H7CX is mounted to the panel.



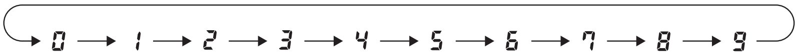
Note: Factory-set to OFF

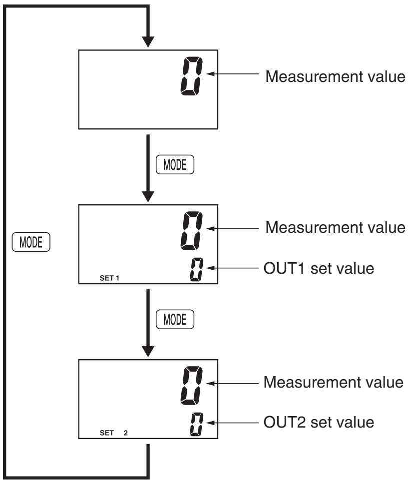
Level	Meaning	Details			
		Changing mode (See note.)	Switching display during operation	Reset key	Up/down key (Up key for 6-digit models)
KP-1 (default setting)		No	Yes	Yes	Yes
KP-2		No	Yes	No	Yes
KP-3		No	Yes	Yes	No
KP-4		No	Yes	No	No
KP-5		No	No	No	No

Note: Changing mode to configuration selection mode (MODE + ⩓1 1 s min.) or function setting mode (MODE 3 s min.).

Operation in Run Mode

Set values for each digit as required using the key.





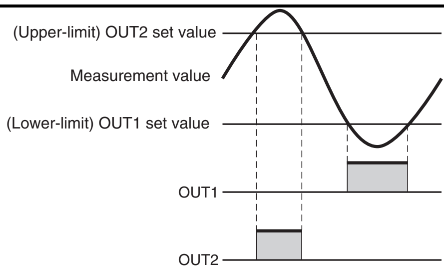
Measurement Value
Displays the currently measured value.

OUT1/OUT2 Set Value
Set OUT1 set value and OUT2 set value. The measurement value is compared to OUT1 set value and OUT2 set value and output is made according to the selected output mode.

Output Mode Settings

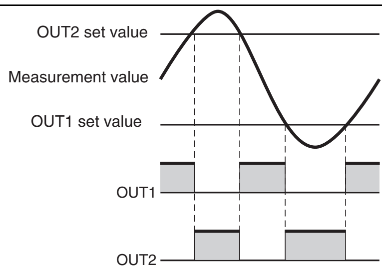
Output mode setting

Upper and lower limit (HI-LO)



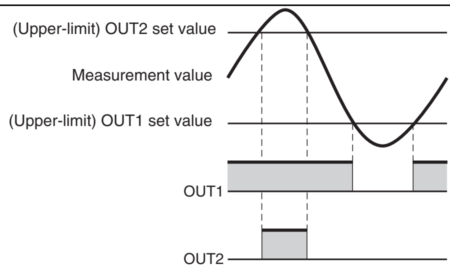
ON condition for OUT1: measurement value ≤ OUT1 set value
ON condition for OUT2: measurement value ≥ OUT2 set value

Area (AREA)



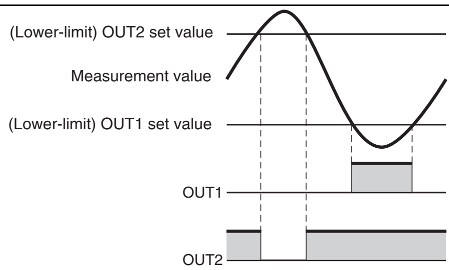
Condition	OUT1 set value ≤ OUT2 set value	OUT1 set value > OUT2 set value
ON condition for OUT1	OUT1 set value ≤ measurement value ≤ OUT2 set value	OUT2 set value ≤ measurement value ≤ OUT1 set value
ON condition for OUT2	measurement value < OUT1 set value or measurement value > OUT2 set value	measurement value < OUT2 set value or measurement value > OUT1 set value

Upper limit (HI-HI)



ON condition for OUT1: Measurement value ≥ OUT1 set value
ON condition for OUT2: Measurement value ≥ OUT2 set value

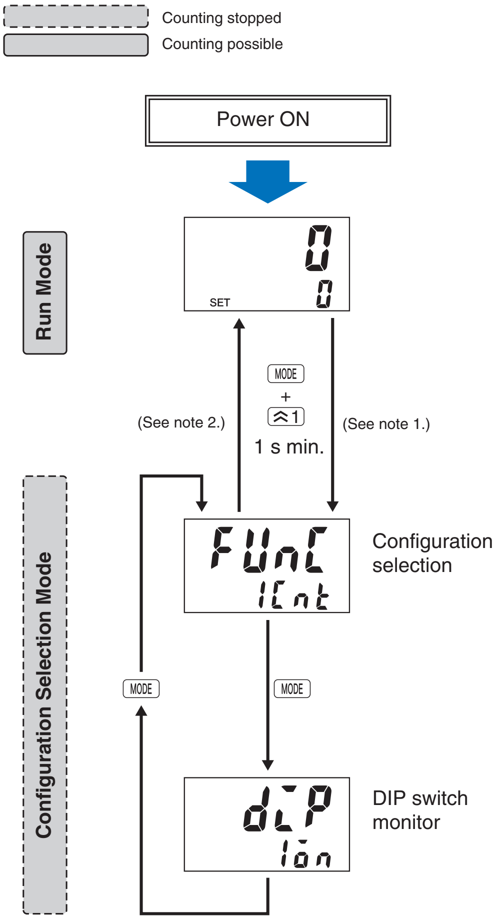
Lower limit (LO-LO)

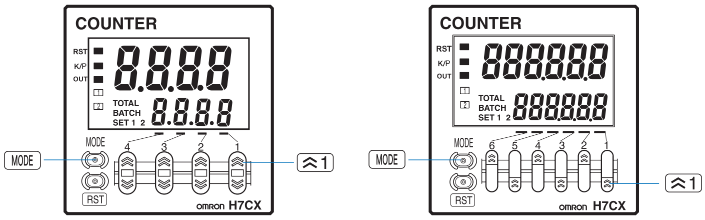


ON condition for OUT1: Measurement value ≤ OUT1 set value
ON condition for OUT2: Measurement value ≤ OUT2 set value

Operation in Configuration Selection Mode

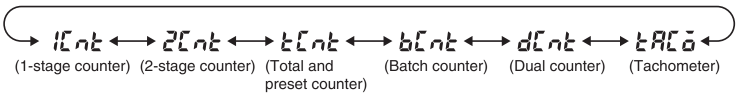
Select which H7CX configuration is used (i.e., 1-stage counter, 2-stage counter, total and preset counter, batch counter, dual counter, or tachometer) in configuration selection mode. The H7CX is also equipped with a DIP switch monitor function, a convenient function that enables the settings of the DIP switch pins to be confirmed using the front display.





To change the mode to configuration selection mode, press the [1] Key for 1 s min. with the [MODE] key held down. The mode will not change if the [1] key is pressed first.

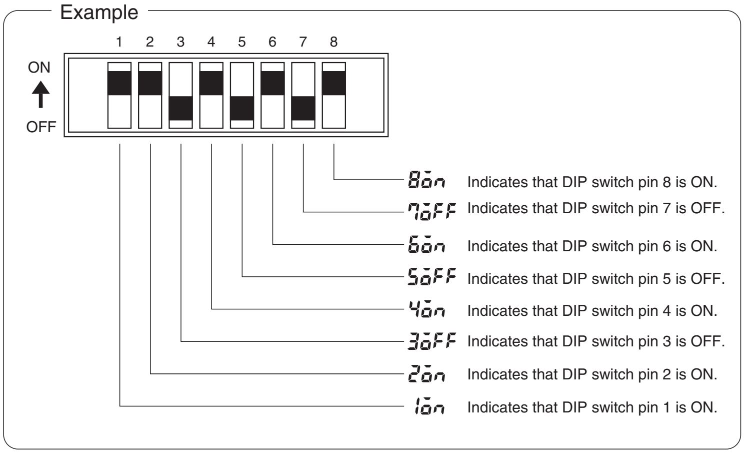
Select the configuration using the [up][down] keys. ([up] key only for 6-digit models)
The H7CX is factory-set to the 1-stage counter configuration (2-stage counter configuration with H7CX-AW□/-A4W□ models).



The configuration that can be selected depend on the model.

The status of the DIP switch pins (1 to 8) can be confirmed using the [up][down] keys.

Note: This display is possible only if DIP switch pin 1 (DIP switch settings) is set to ON (i.e., enabled).



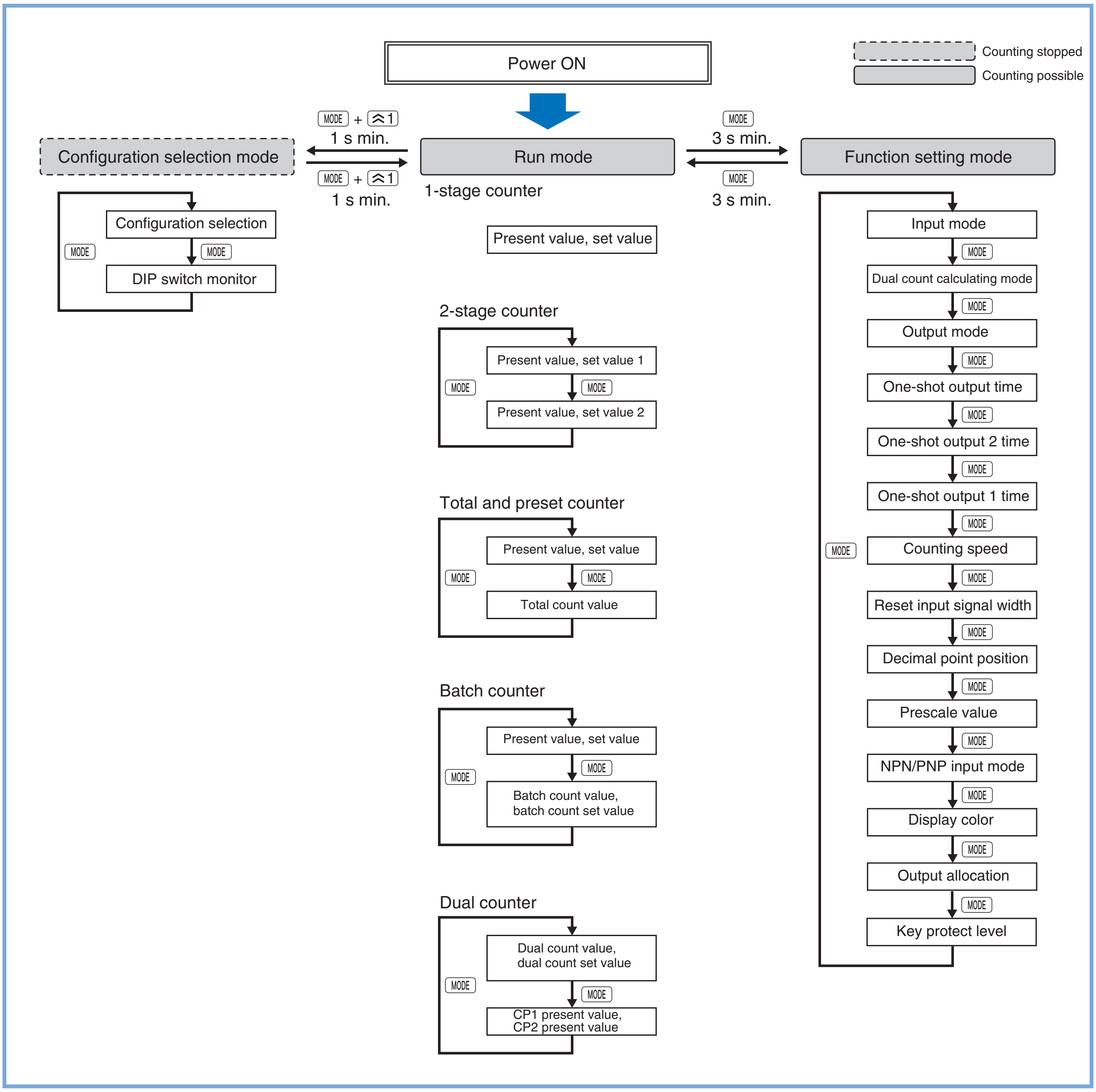
Note: 1. When the mode is changed to configuration selection mode, the present value is reset, outputs turns OFF, and counting (measuring) stops.

2. Setting changes made in configuration selection mode are enabled when the mode is changed to run mode. If the configuration is changed, the set value (or set value 1 and set value 2), OUT1 set value or OUT2 set value are initialized.

Additional Information

■ Using the Operation Keys

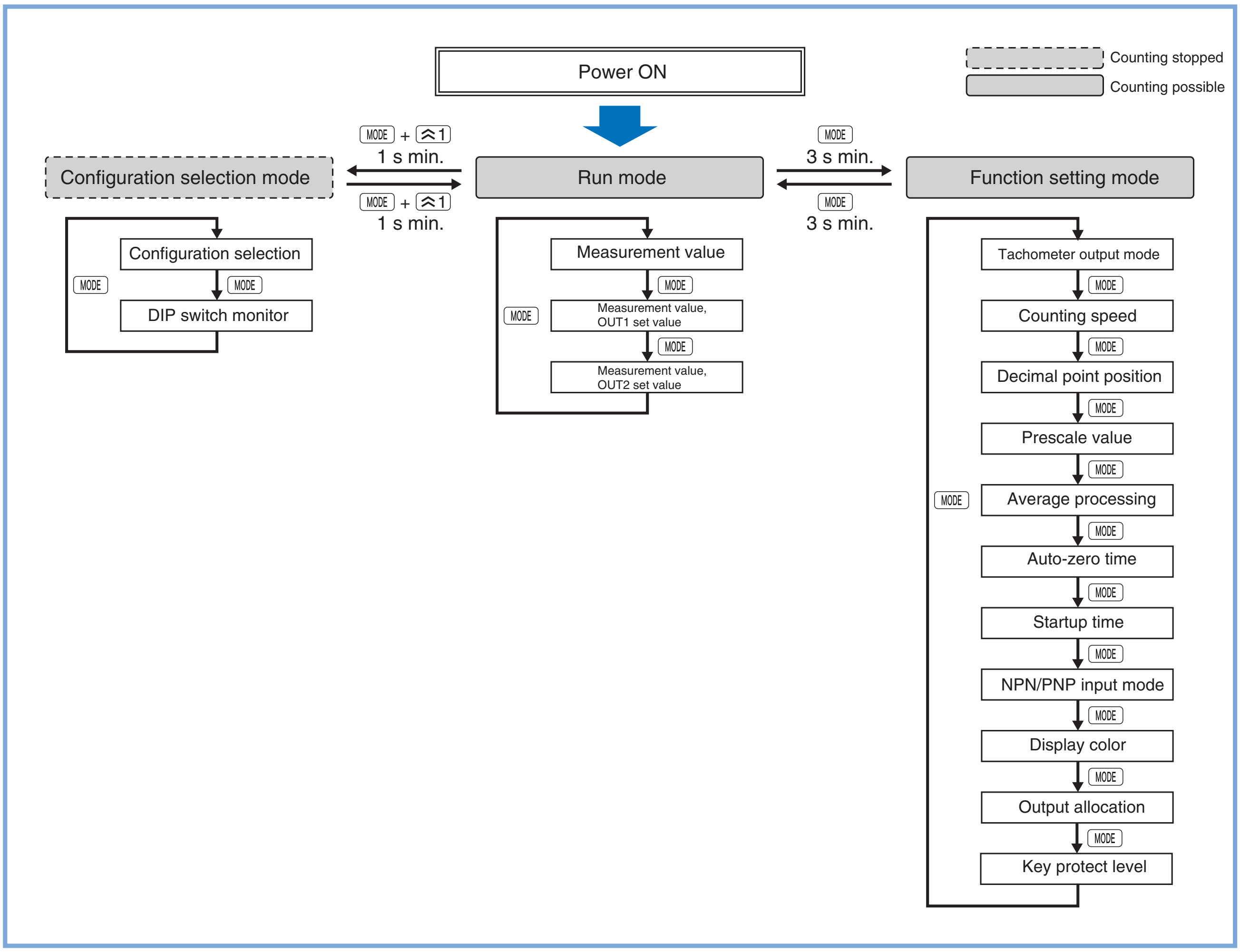
Counter Operation



Note: 1. Perform settings using the ⌃ and ⌄ keys (⌃ key only with 6-digit models).

2. The above flowcharts outline the procedures for all models. For more details on each model, refer to page D-75.

Tachometer Operation



Note: 1. All setting changes are performed using the ⩓ key.

2. For details, refer to page D-87.

■ Lists of Settings

Fill in your set values in the set value column of the following tables and utilize the tables for quick reference.

Configuration Selection Mode

Parameter name	Parameter	Setting range	Default value	Unit	Set value
Configuration selection	FUnC	1Cnt/2Cnt/tCnt/bCnt/dCnt/tACo (See note 1.)	1Cnt (See note 2.)	---	
DIP switch monitor	dIP	on/oFF	oFF	---	---

Note: 1. The setting range varies with the model.

2. The default value for H7CX-AW□/-A4W□ models is 2Cnt.

Settings for Counter Operation

Run Mode

• **1-stage Counter**

Parameter name		Parameter	Setting range	Default value	Unit	Set value
Present value, set value	Present value	---	-99999 to 999999 (-999 to 9999)	0	--	---
	Set value	---	0 to 999999 (0 to 9999) (For conditions other than those described in note 1.)	0	---	
			-99999 to 999999 (-999 to 9999) (See note 1.)			

• **2-stage Counter**

Parameter name		Parameter	Setting range	Default value	Unit	Set value
Present value, set value 1	Present value	---	-99999 to 999999 (-999 to 9999)	0	---	---
	Set value 1	---	0 to 999999 (0 to 9999) (For conditions other than those described in note 1.)	0	---	
			-99999 to 999999 (-999 to 9999) (See note 1.)	0		
Present value, set value 2	Present value	---	-99999 to 999999 (-999 to 9999)	0	---	---
	Set value 2	---	0 to 999999 (0 to 9999) (For conditions other than those described in note 1.)	0	---	
			-99999 to 999999 (-999 to 9999) (See note 1.)	0		

• **Total and Preset Counter**

Parameter name		Parameter	Setting range	Default value	Unit	Set value
Present value, set value	Present value	---	-99999 to 999999 (-999 to 9999)	0	---	---
	Set value	---	0 to 999999 (0 to 9999) (For conditions other than those described in note 1.)	0	---	
			-99999 to 999999 (-999 to 9999) (See note 1.)			
Total count value		---	-99999 to 999999 (-999 to 9999)	0	---	---

• **Batch Counter**

Parameter name		Parameter	Setting range	Default value	Unit	Set value
Present value, set value	Present value	---	-99999 to 999999 (-999 to 9999)	0	---	---
	Set value	---	0 to 999999 (0 to 9999) (For conditions other than those described in note 1.)	0	---	
			-99999 to 999999 (-999 to 9999) (See note 1.)			
Batch count value, batch count set value	Batch count value	---	0 to 999999 (0 to 9999)	0	---	---
	Batch count set value	---	0 to 999999 (0 to 9999)	0	---	

• **Dual Counter**

Parameter name		Parameter	Setting range	Default value	Unit	Set value
Dual count value, dual count set value	Dual count value	---	-99999 to 999999 (-999 to 9999)	0	---	---
	Dual count set value	---	0 to 999999 (0 to 9999) (For conditions other than those described in note 2.)	0	---	
			-99999 to 999999 (-999 to 9999) (See note 2.)			
CP1 present value, CP2 present value	CP1 present value	---	0 to 999999 (0 to 9999)	0	---	---
	CP2 present value	---	0 to 999999 (0 to 9999)	0	---	---

Note: 1. The input mode is increment/decrement mode and the output mode is K-2, D, L, or H.

2. The dual count calculating mode is subtraction mode and the output mode is K-2, D, L, or H.

Function Setting Mode

Parameter name	Parameter	Setting range	Default value	Unit	Set value
Input mode	Cntm	UP/doWn/Ud-A/Ud-b/Ud-C (See note 1.)	UP	---	
Dual count calculating mode	CALn	Add/SUb (See note 1.)	Add	---	
Output mode	oUtm	n/F/C/r/K-1/P/Q/A/K-2/d/L/H (See note 2.)	n	---	
One-shot output time	otim	0.01 to 99.99	0.50	s	
One-shot output 2 time	otm2	0.01 to 99.99	0.50	s	
One-shot output 1 time	otm1	HoLd/0.01 to 99.99 (See note 3.)	HoLd	s	
Counting speed	CntS	30Hz/5kHz	30Hz	---	
Reset input signal width	iFLt	20mS/1mS	20mS	---	
Decimal point position	dP	------/-----.-/----.--/---.--- (----/---.-/--.--/-.---)	------ (----)		
Prescale value	PSCL	0.001 to 99.999 (0.001 to 9.999)	1.000	---	
NPN/PNP input mode	imod	nPn/PnP	nPn	---	
Display color	CoLr	rEd/Grn/r-G/G-r	rEd	---	
Output allocation	otSt	oFF/on	oFF	---	
Key protect level	KYPt	KP-1/KP-2/KP-3/KP-4/KP-5	KP-1	---	

Note: 1. The setting range varies with the output mode.

2. The setting range varies with the model and the input mode.

3. HOLD cannot be set when the output mode is K-2.

Settings for Tachometer Operation

Run Mode

Parameter name		Parameter	Setting range	Default value	Unit	Set value
Measurement value		---	0 to 999999	0	---	---
Measurement value, OUT1 set value	Measurement value	---	0 to 999999	0	---	---
	OUT1 set value	---	0 to 999999	0	---	
Measurement value, OUT2 set value	Measurement value	---	0 to 999999	0	---	---
	OUT2 set value	---	0 to 999999	0	---	

Function Setting Mode

Parameter name	Parameter	Setting range	Default value	Unit	Set value
Tachometer output mode	totm	HoLd/ArEA/HCHC/LoLo	HCLo	---	
Counting speed	CntS	30HZ/10kHZ	30HZ	---	
Decimal point position	dP	------/-----.-/----.--/---.---	------	---	
Prescale value	PSCL	0.001 to 99.999	1.000	---	
Average processing	AvG	oFF/2/4/8	oFF	---	
Auto-zero time	AUtZ	0.1 to 99.9	99.9	---	
Startup time	Stmr	0.0 to 99.9	0.0	s	
NPN/PNP input mode	imod	nPn/PnP	nPn	s	
Display color	CoLr	rEd/Grn/r-G/G-r	rEd	---	
Output allocation	otSt	oFF/on	oFF	---	
Key protect level	kYPt	kP-1/kP-2/kP-3/kP-4/kP-5	kP-1	---	

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. M070-E2-03 In the interest of product improvement, specifications are subject to change without notice.

Cam Positioner
H8PS

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments. Refer to *Warranty and Application Considerations* (page 131), and *Safety Precautions* (pages 115 and 116).

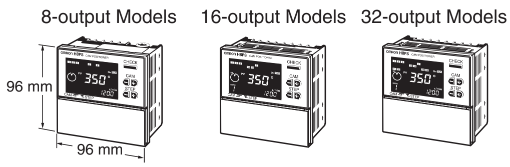
This Compact Cam Positioner, Popular for It's Ease-of-use, Now Comes with Even Better Functions.

- Compact 8-, 16-, and 32-output Models available that are 1/4-DIN size at 96 x 96 mm.
- High-speed operation at 1,600 r/min and high-precision settings to 0.5° ensure widespread application.
- Highly visible display with backlit negative transmissive LCD.
- Advance angle compensation function to compensate for output delays.
- Bank function for multi-product production (8 banks). (H8PS-16□/-32□ models.)

Features

Models with 8, 16, or 32 Outputs

The lineup includes Models with 32 outputs in a compact 1/4-DIN size. Using the optional Parallel Input Adapter (Y92C-30) enables expanding to up to 64 outputs for one encoder to support anything from a simple positioning application to a large-scale system.



Simple Programming

The programming method is designed based on a one key-one action concept for settings that could not be simpler. Both initial settings and factory adjustments are effort-free.

Large, Backlit Negative LCDs

Large LCDs, red for the process value and green for set values, show a wealth of operation information, making operating status visible at a glance.

High Speed Up To 1,600 r/min
High Precision Up To 0.5° (at 720 Resolution)

High-speed, high-precision applications can be easily handled and productivity increased.

Bank Function for Multi-product Production

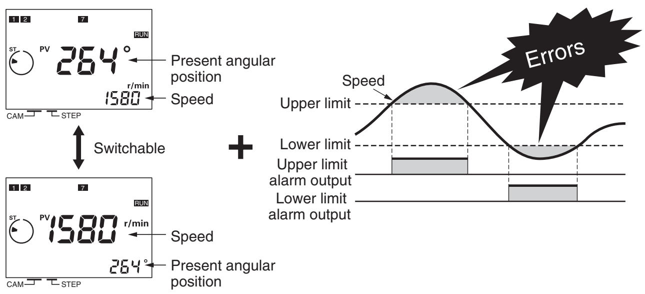
Up to eight different programs can be registered in advance to enable fast and easy switching between products (16/32-output Models only).

USB Communications for Easy Setting from a Computer

Optional Support Software can be used to enable programming from a personal computer via USB communications. Programs can be easily copied, saved, printed, and much more.

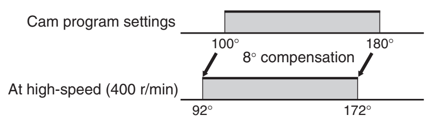
Speed Display and Speed Alarm Output

Both the speed (rotations/minutes) and present angular position can be displayed at the same time. Alarm outputs can be produced for both upper and lower speed limits.



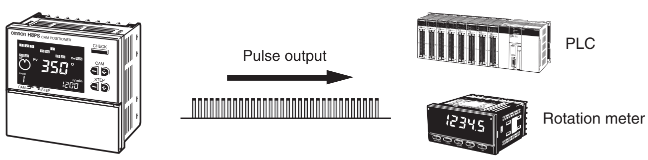
Advance Angle Compensation Function to Compensate for Output Delays

The advance angle compensation (ADV) function automatically advances the ON/OFF angle of outputs in proportion to machine (encoder) speed to compensate for the delay in timing of ON/OFF operation. ADV values can be set individually for 7 cam outputs.



Pulse Output for Timing Control

The number of pulses per rotation and the pulse output start angle can be set to enable operations like adjusting timing with a PLC or outputting to a rotation meter.



Model Number Structure

■ Model Number Legend

H8PS-□□□□
1 2 3 4

1. **Number of outputs**
   8: 8 outputs
   16: 16 outputs
   32: 32 outputs

2. **Panel language**
   B: English

3. **Mounting method**
   None:Flush mounting
   F: Surface mounting/ track mounting

4. **Output configuration**
   None:NPN transistor output
   P: PNP transistor output

Ordering Information

■ List of Models

Cam Positioner

Number of outputs	Mounting method	Output configuration	Bank function	Model
8 outputs	Flush mounting	NPN transistor output	No	H8PS-8B
		PNP transistor output		H8PS-8BP
	Surface mounting/ track mounting	NPN transistor output		H8PS-8BF
		PNP transistor output		H8PS-8BFP
16 outputs	Flush mounting	NPN transistor output	Yes	H8PS-16B
		PNP transistor output		H8PS-16BP
	Surface mounting/ track mounting	NPN transistor output		H8PS-16BF
		PNP transistor output		H8PS-16BFP
32 outputs	Flush mounting	NPN transistor output		H8PS-32B
		PNP transistor output		H8PS-32BP
	Surface mounting/ track mounting	NPN transistor output		H8PS-32BF
		PNP transistor output		H8PS-32BFP

Dedicated Absolute Encoder

Type	Resolution	Cable length	Model
Economy	256	2 m	E6CP-AG5C-C 256 2M
Standard	256	1 m	E6C3-AG5C-C 256 1M
		2 m	E6C3-AG5C-C 256 2M
	360		E6C3-AG5C-C 360 2M
	720		E6C3-AG5C-C 720 2M
Rigid	256	2 m	E6F-AG5C-C 256 2M
	360		E6F-AG5C-C 360 2M
	720		E6F-AG5C-C 720 2M

Accessories (Order Separately)

Name	Specification	Model
Discrete Wire Output Cable	2 m	Y92S-41-200
Connector-type Output Cable	2 m	E5ZE-CBL200
Support Software	CD-ROM	H8PS-SOFT-V1
USB Cable	A miniB, 2 m	Y92S-40
Shaft Coupling for the E6CP	Axis: 6 mm dia.	E69-C06B
Shaft Coupling for the E6C3	Axis: 8 mm dia.	E69-C08B
Shaft Coupling for the E6F	Axis: 10 mm dia.	E69-C10B
Extension Cable (See note.)	5 m (same for E6CP, E6C3, and E6F)	E69-DF5
Parallel Input Adapter	Two Units can operate in parallel.	Y92C-30
Protective Cover	---	Y92A-96B
Watertight Cover	---	Y92A-96N
Track Mounting Base	---	Y92F-91
Mounting Track	50 cm × 7.3 mm (ℓ × t)	PFP-50N
	1 m × 7.3 mm (ℓ × t)	PFP-100N
	1 m × 16 mm (ℓ × t)	PFP-100N2
End Plate	---	PFP-M
Spacer	---	PFP-S

Note: Ask your OMRON representative about the availability of non-standard lengths.

Specifications

■ Ratings

Item			H8PS-□B	H8PS-□BF	H8PS-□BP	H8PS-□BFP
Rated supply voltage			24 VDC			
Operating voltage range			85% to 110% of rated supply voltage			
Mounting method			Flush mounting	Surface mounting, track mounting	Flush mounting	Surface mounting, track mounting
Power consumption			Approx. 4.5 W at 26.4 VDC for 8-output models Approx. 6.0 W at 26.4 VDC for 16-/32-output models			
Inputs	Encoder input		Connections to a dedicated absolute encoder			
	External inputs	Input signals	8-output Models: None 16-/32-output Models: Bank inputs 1/2/4, origin input, start input			
		Input type	No voltage inputs: ON impedance:1 kΩ max. (Leakage current: approx. 2 mA at 0 Ω) ON residual voltage: 2 V max., OFF impedance: 100 kΩ min., Applied voltage: 30 VDC max. Minimum input signal width: 20 ms			
Outputs	Cam outputs RUN output		NPN open-collector transistor outputs 30 VDC max., 100 mA max. (Do not exceed 1.6 A total for all cam outputs and the RUN output.), residual voltage: 2 VDC max.		PNP open-collector transistor outputs 30 VDC max. (26.4 VDC for 16-/32-output Models), 100 mA max. (Do not exceed 1.6 A total for all cam outputs and the RUN output.), residual voltage: 2 VDC max.	
	Pulse output		NPN open-collector transistor output 30 VDC max., 30 mA max., residual voltage: 0.5 VDC max.		PNP open-collector transistor output 30 VDC max. (26.4 VDC for 16-/32-output Models) 30 mA max., residual voltage: 2 VDC max.	
	Number of outputs		8-output Models: 8 cam outputs, 1 RUN output, 1 pulse output 16-output Models: 16 cam outputs, 1 RUN output, 1 pulse output 32-output Models: 32 cam outputs, 1 RUN output, 1 pulse output			
Number of banks			8 banks (for 16-/32-output Models only)			
Display method			7-segment, negative transmissive LCD (Main Display: 11 mm (red), Sub-display: 5.5 mm (green))			
Memory backup method			EEPROM (overwrites: 100000 times min.) that can store data for 10 years min.			
Ambient operating temperature			–10 to 55°C (with no icing or condensation)			
Storage temperature			–25 to 65°C (with no icing or condensation)			
Ambient humidity			25% to 85%			
Degree of protection			Panel surface: IP40, Rear case: IP20			
Case color			Light gray (Munsell 5Y7/1)			

■ Characteristics

Setting unit		0.5° increments at a resolution of 720, 1° increments at a resolution of 256 or 360 (See note 1.)
Number of steps		Up to 10 steps can be set for each cam to turn the output ON/OFF 10 times. (See note 2.)
Inputs	**Encoder input**	Connections to a dedicated absolute encoder • Response rotation speed (in Run/Test Mode) 1600 r/min max. at a resolution of 256 or 360 (1200 r/min max. if ADV function is set for 4 or more cams) (See notes 3 and 4.) 800 r/min max. at a resolution of 720 (600 r/min max. if ADV function is set for 4 or more cams) • Includes error data detection
Encoder cable extension distance		256/360 resolution 100 m max. at 330 r/min or less 52 m max. at 331 to 1200 r/min (331 to 900 r/min if ADV function is set for 4 or more cams) 12 m max. at 1201 to 1600 r/min (901 to 1200 r/min if ADV function is set for 4 or more cams) 720 resolution 100 m max. at 330 r/min or less 52 m max. at 331 to 600 r/min (331 to 450 r/min if ADV function is set for 4 or more cams) 12 m max. at 601 to 800 r/min (451 to 600 r/min if ADV function is set for 4 or more cams)
Output response time		0.3 ms max.
Insulation resistance		100 MΩ min. (at 500 VDC) between current-carrying terminals and exposed non-current-carrying metal parts, between all current-carrying parts and the USB connector
Dielectric strength		1000 VAC, 50/60 Hz for 1 min between current-carrying terminals and exposed non-current-carrying metal parts 500 VAC, 50/60 Hz for 1 min between current-carrying section and USB connector, and between current-carrying terminals and non-current-carrying metal part of output connector
Impulse withstand voltage		1 kV between power terminals 1.5 kV between current-carrying terminals and exposed non-current-carrying metal parts
Noise immunity		±480 V between power terminals, ±600 V between input terminals Square-wave noise by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise)
Static immunity		8 kV (malfunction), 15 kV (destruction)
Vibration resistance	**Destruction**	10 to 55 Hz with 0.75-mm single amplitude each in 3 directions for 2 hours each
	Malfunction	10 to 55 Hz with 0.5-mm single amplitude each in 3 directions for 10 minutes each
Shock resistance	**Destruction**	300 m/s^2 3 times each in 6 directions
	Malfunction	200 m/s^2 3 times each in 6 directions
Approved safety standards		cULus (Listing): UL508/CSA C22.2 No. 14
EMC		(EMI) EN61326 Emission Enclosure: EN55011 Group1 Class A (EMS) EN61326 Immunity ESD: EN61000-4-2: 4 kV contact discharge 8 kV air discharge Immunity RF-interference: EN61000-4-3: 10 V/m (Amplitude-modulated, 80 MHz to 1 GHz) 10 V/m (Pulse-modulated, 900 MHz ±5 MHz) Immunity Conducted Disturbance EN61000-4-6: 10 V (0.15 to 80 MHz) Immunity Burst: EN61000-4-4: 2 kV for power-line 1 kV for I/O signal-line Immunity Surge: EN61000-4-5: 1 kV line to line (power line) 2 kV line to ground (power line)
Weight		Approx. 300 g (Cam Positioner main unit only)

Note: 1. Cam output precision, however, is 2° max. for Encoder with 256 resolution (P/R).

2. Although 32-output Models can have 10 steps set for any one output, there must be no more than 160 steps total set for all cam outputs.

3. The maximum is 1000 r/min when an E6CP-AG5C-C Encoder is connected.

4. ADV stands for Advance Angle Compensation.

■ Functions

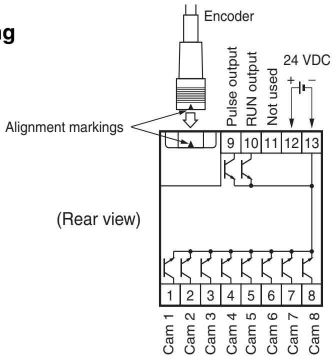
Item	H8PS-8□	H8PS-16□	H8PS-32□
Encoder rotation direction switching	Encoder data can be set with a DIP switch to forward (CW) or reverse (CCW) direction.		
Encoder origin designation	The present display angular position can be set to 0° (origin) by pressing the ORIGIN Key on the front panel.	The present display angular position can be set to 0° (origin) by using the origin input terminal or the ORIGIN Key on the front panel. **Note:** All banks use the same origin.	
Angle display switch	Converts the Absolute Encoder value display from 256 divisions/revolution to 360°/revolution.		
Rotation display monitor	Graphically displays the Encoder rotational angular position.		
Teaching function	Sets the cam output ON/OFF angle based on actual machine (Encoder) operation.		
Pulse output	Outputs a preset number of pulses per Encoder rotation. It also sets the pulse output start angle.		
Switching the angle and speed displays	Displays both the present angular position and the number of Encoder revolutions (speed) in Run Mode. Switches back and forth between the main display showing the present angular position with the sub-display showing the speed and the main display showing the speed with the sub-display showing the present angular position.		
Bank function	---	Enables the entire cam program to be changed at one time by switching banks (0 to 7). The bank that is running can be switched using the bank input terminal or the BANK Key on the front panel. Also enables programs to be copied between banks.	
Advance angle compensation (ADV) function	Automatically advances the ON/OFF angle of cam outputs in proportion to machine (encoder) speed to compensate for the delay in timing of ON/OFF operation. ADV values can be set individually for 7 cam outputs.		
Speed alarm output	A specified cam output can be used as an Encoder speed alarm output. The function can output upper and lower limit speed alarms.		
All protection function	Disables all key and switch operations in Run Mode to prevent incorrect or unauthorized operation.		
Cam protection function	Prohibits program changes at the cam output level. Any cam numbers can be protected.		
Step number limit	Limits the number of steps that can be set per cam output. Prohibits incorrect operations by adding to the program.		
Output prohibit	---	The start input can be turned OFF in Run or Test Mode to prohibit cam output. **Note:** Use this function carefully for the application because no cam outputs are provided when the start input is turned OFF.	
Support Software settings	---	Programs can be uploaded or downloaded easily by connecting a personal computer to the Cam Positioner using a USB Cable (Y92S-40, sold separately) and the Support Software (H8PS-SOFT-V1, sold separately).	

Connections

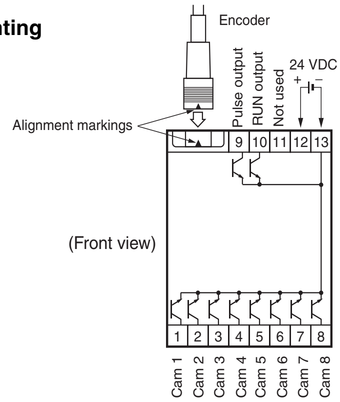
■ Terminal Arrangement

H8PS-8☐ (8-output Models)

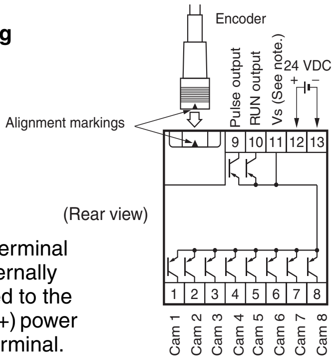
NPN Output, Flush Mounting H8PS-8☐



NPN Output, Surface Mounting H8PS-8☐F

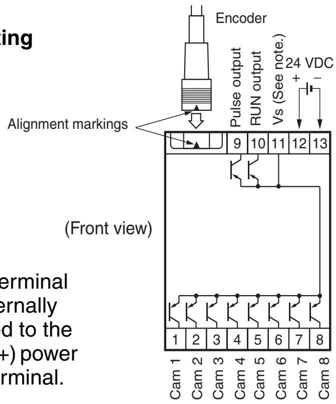


PNP Output, Flush Mounting H8PS-8☐P



Note: The VS terminal is not internally connected to the positive (+) power supply terminal.

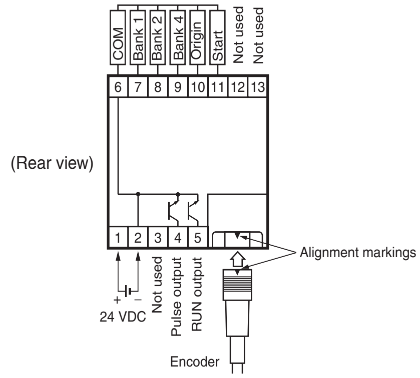
PNP Output, Surface Mounting H8PS-8☐FP



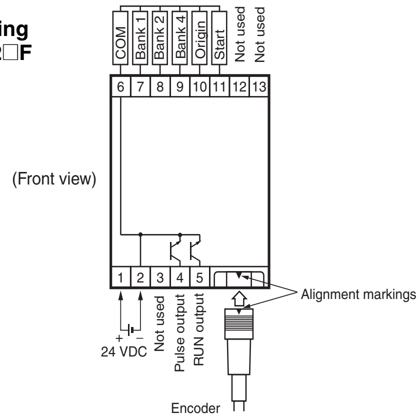
Note: The VS terminal is not internally connected to the positive (+) power supply terminal.

H8PS-16☐/-32☐ (16-/32-output Models)

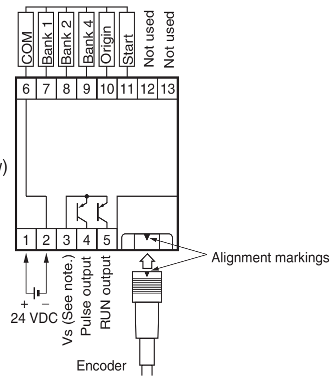
NPN Output, Flush Mounting H8PS-16☐/-32☐



NPN Output, Surface Mounting H8PS-16☐F/-32☐F

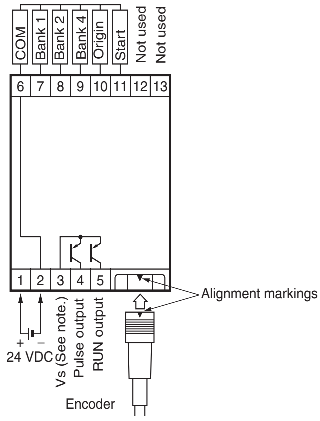


PNP Output, Flush Mounting H8PS-16☐P/-32☐P



Note: The VS terminal is not internally connected to the positive (+) power supply terminal.

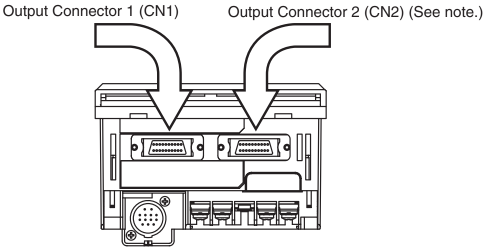
PNP Output, Surface Mounting H8PS-16☐FP/-32☐FP



Note: The VS terminal is not internally connected to the positive (+) power supply terminal.

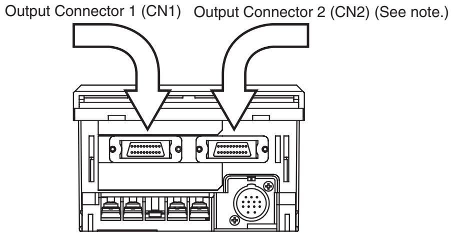
Output Cable Connections (16-/32-output Models Only)

Flush Mounting Models



(Bottom view)

Surface Mounting Models

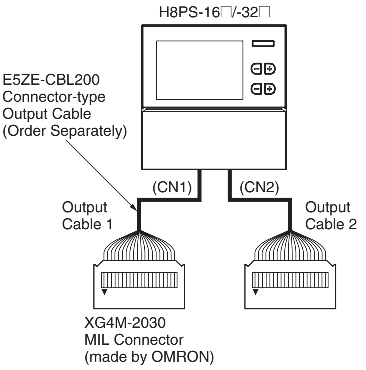


(Bottom view)

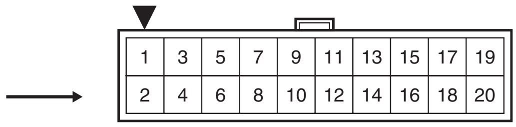
Output Connector	Output signals
Output Connector 1 (CN1)	Cam 1 to Cam 16, COM, Vs
Output Connector 2 (CN2) (See note.)	Cam 17 to Cam 32, COM, Vs

Note: The 16-output Models do not have CN2 Connectors.

1. E5ZE-CBL200 Connector-type Output Cable (Order Separately) Connections



Pin Arrangement of XG4M-2030 Connectors



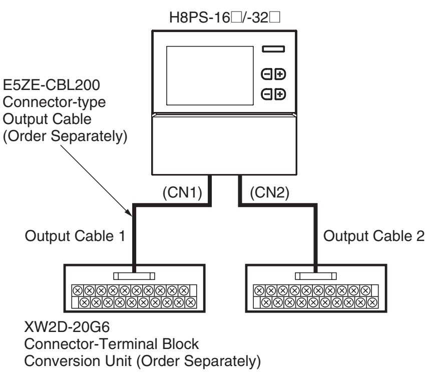
Output Cable 1 Wiring Table

Outputs	Connector pin No.	Outputs	Connector pin No.
Cam 1	20	**Cam 9**	19
Cam 2	18	**Cam 10**	17
Cam 3	16	**Cam 11**	15
Cam 4	14	**Cam 12**	13
Cam 5	12	**Cam 13**	11
Cam 6	10	**Cam 14**	9
Cam 7	8	**Cam 15**	7
Cam 8	6	**Cam 16**	5
COM	4	**COM**	3
Vs	2	**Vs**	1

Output Cable 2 Wiring Table

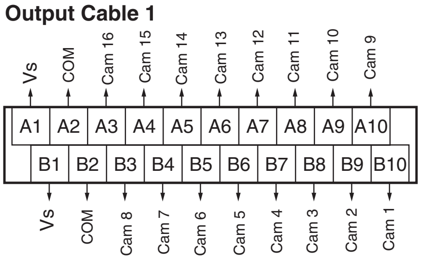
Outputs	Connector pin No.	Outputs	Connector pin No.
Cam 17	20	**Cam 25**	19
Cam 18	18	**Cam 26**	17
Cam 19	16	**Cam 27**	15
Cam 20	14	**Cam 28**	13
Cam 21	12	**Cam 29**	11
Cam 22	10	**Cam 30**	9
Cam 23	8	**Cam 31**	7
Cam 24	6	**Cam 32**	5
COM	4	**COM**	3
Vs	2	**Vs**	1

Using Connector-Terminal Block Conversion Units

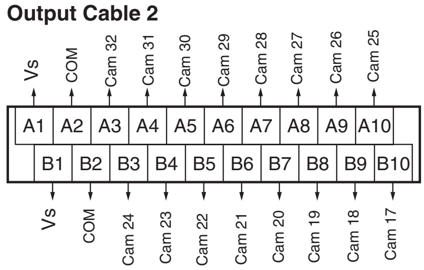


Terminal Arrangement of the XW2D-20G6 Connector-Terminal Block Conversion Unit

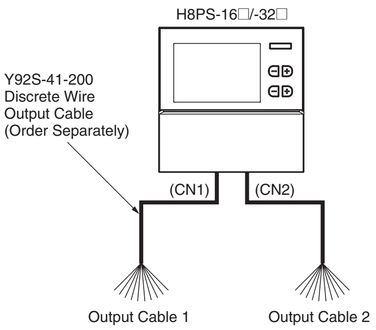
Output Cable 1



Output Cable 2



2. Y92S-41-200 Discrete Wire Output Cable (Order Separately) Connections



Output Cable 1 Wiring Table

Outputs	Cable color	Marks	Marking color	Outputs	Cable color	Marks	Marking color
Cam 1	Orange	■	Black	Cam 9	Orange	■	Red
Cam 2	Gray	■	Black	Cam 10	Gray	■	Red
Cam 3	White	■	Black	Cam 11	White	■	Red
Cam 4	Yellow	■	Black	Cam 12	Yellow	■	Red
Cam 5	Pink	■	Black	Cam 13	Pink	■	Red
Cam 6	Orange	■ ■	Black	Cam 14	Orange	■ ■	Red
Cam 7	Gray	■ ■	Black	Cam 15	Gray	■ ■	Red
Cam 8	White	■ ■	Black	Cam 16	White	■ ■	Red
COM	Yellow	■ ■	Black	COM	Yellow	■ ■	Red
Vs	Pink	■ ■	Black	Vs	Pink	■ ■	Red

Output Cable 2 Wiring Table

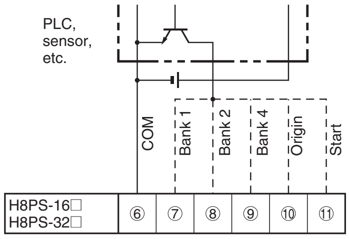
Outputs	Cable color	Marks	Marking color	Outputs	Cable color	Marks	Marking color
Cam 17	Orange	■	Black	Cam 25	Orange	■	Red
Cam 18	Gray	■	Black	Cam 26	Gray	■	Red
Cam 19	White	■	Black	Cam 27	White	■	Red
Cam 20	Yellow	■	Black	Cam 28	Yellow	■	Red
Cam 21	Pink	■	Black	Cam 29	Pink	■	Red
Cam 22	Orange	■ ■	Black	Cam 30	Orange	■ ■	Red
Cam 23	Gray	■ ■	Black	Cam 31	Gray	■ ■	Red
Cam 24	White	■ ■	Black	Cam 32	White	■ ■	Red
COM	Yellow	■ ■	Black	COM	Yellow	■ ■	Red
Vs	Pink	■ ■	Black	Vs	Pink	■ ■	Red

■ Input Connections

Only the Encoder inputs are connected with 8-output Models. The inputs are no-voltage (short-circuit or open) inputs.

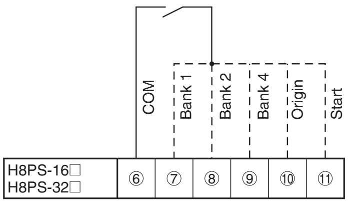
No-voltage Inputs

Open Collector



Note: Operates when the transistor turns ON.

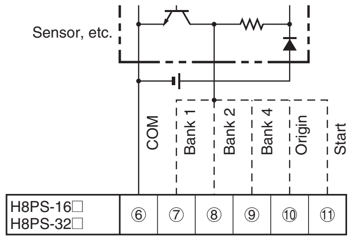
Contact Input



Note: Operates when the contact turns ON.

Voltage-output sensors can also be connected.

Connection Examples



Note: Operates when the transistor turns ON.

No-voltage Input Signal Levels

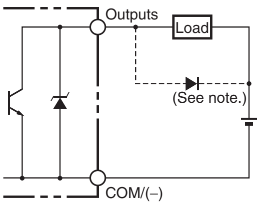
No-contact inputs	Short-circuit level for transistor ON	• Residual voltage: 2 V max. • Impedance when ON: 1 kΩ max. (The leakage current is approx. 2 mA when the impedance is 0 Ω.)
	Open level for transistor OFF	• Impedance when OFF: 100 kΩ min.
Contact inputs	Use a contact that can adequately switch 2 mA at 5 V.	

Note: Use a maximum DC power supply of 30 V.

■ Output Connections

Note: Internal circuit damage may result from a short circuit in the load.

NPN Output Models

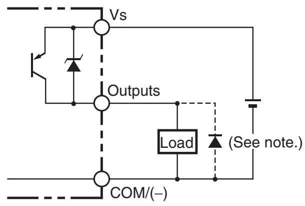


Note: Always connect a diode to absorb counter-electromotive force when connecting an inductive load.

Item	Cam outputs, RUN output	Pulse output
Output method	NPN open collector	
Dielectric strength	30 VDC	
Rated current	100 mA (See note.)	30 mA
Residual voltage	2 VDC max.	0.5 VDC max.
Leakage current	100 µA max.	5 µA max.

Note: Do not exceed 1.6 A total for all cam outputs and the RUN output.

PNP Output Models



Note: Always connect a diode to absorb counter-electromotive force when connecting an inductive load.

Item	Cam outputs, RUN output	Pulse output
Output method	PNP open collector	
Dielectric strength	8-output Models: 30 VDC 16-/32-output Models: 26.4 VDC	
Rated current	100 mA (See note.)	30 mA
Residual voltage	2 VDC max.	
Leakage current	100 µA max.	

Note: Do not exceed 1.6 A total for all cam outputs and the RUN output.

Operating Mode

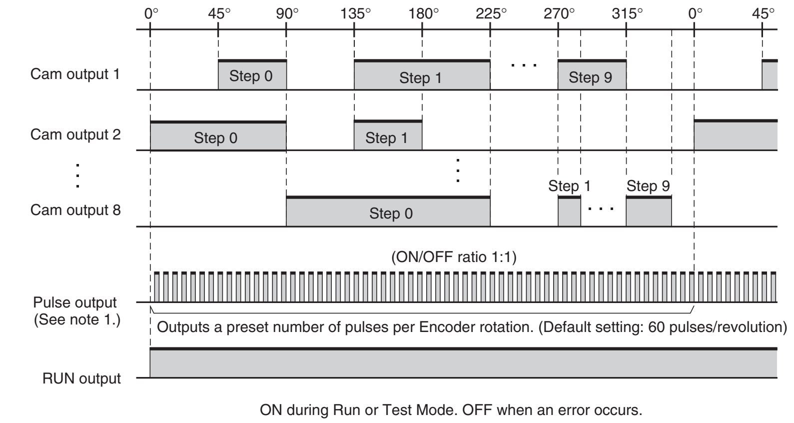
■ Functions

The H8PS Cam Positioner receives angle signal inputs from the Dedicated Absolute Encoder and outputs the preset ON/OFF angles as cam outputs.

Program Examples

1. H8PS-8□ (8-output Models)

Cam output (cam number)	Step 0		Step 1		. . .	Step 9	
	ON angle	OFF angle	ON angle	OFF angle		ON angle	OFF angle
1	45°	90°	135°	225°		270°	315°
2	0°	90°	135°	180°		---	---
⋮							
8	90°	225°	270°	285°		315°	345°



Note 1: The number of pulses per Encoder rotation and the pulse output start angle can be set.
Note 2: With counterclockwise rotation (359°, 358° ...1°, 0°), step 0 for cam output 1 turns ON at 89° and OFF at 44° at in the diagram.

2. H8PS-16□ /-32□ (16-/32-output Models)

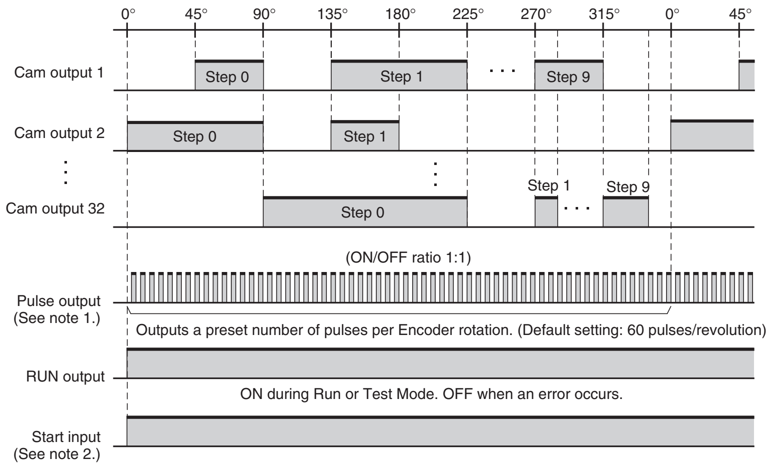
Cam Program (Bank No. 7)

Cam Program (Bank No. 2)

Cam Program (Bank No. 1)

Cam Program (Bank No. 0)

Cam output (cam number)	Step 0		Step 1		. . .	Step 9	
	ON angle	OFF angle	ON angle	OFF angle		ON angle	OFF angle
1	45°	90°	135°	225°		270°	315°
2	0°	90°	135°	180°		---	---
⋮							
32	90°	225°	270°	285°		315°	345°



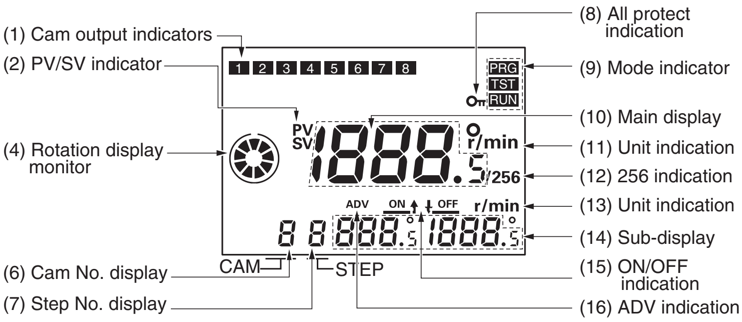
Note 1: The number of pulses per Encoder rotation and the pulse output start angle can be set.
Note 2: Be sure to turn ON the start input in Run and Test modes. Otherwise, there will be no outputs (output prohibited), including the cam outputs, pulse output, and RUN output.
Note 3: With counterclockwise rotation (359°, 358° ...1°, 0°), step 0 for cam output 1 turns ON at 89° and OFF at 44° in the diagram.

Note: The entire cam program can be changed at one time with 16- and 32-output Models with the bank function (banks 0 to 7).
For details on the procedure for switching banks, refer to page 126.

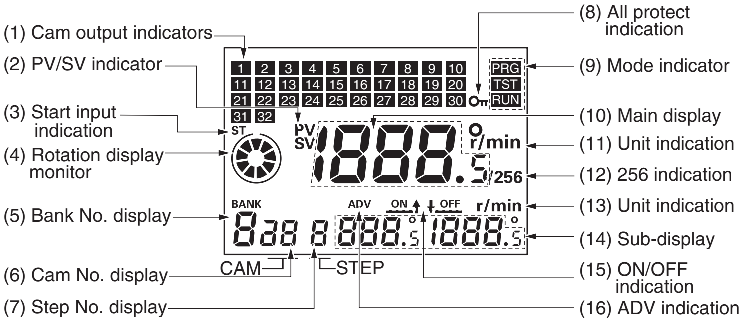
Nomenclature

Displays

8-output Models



16-/32-output Models

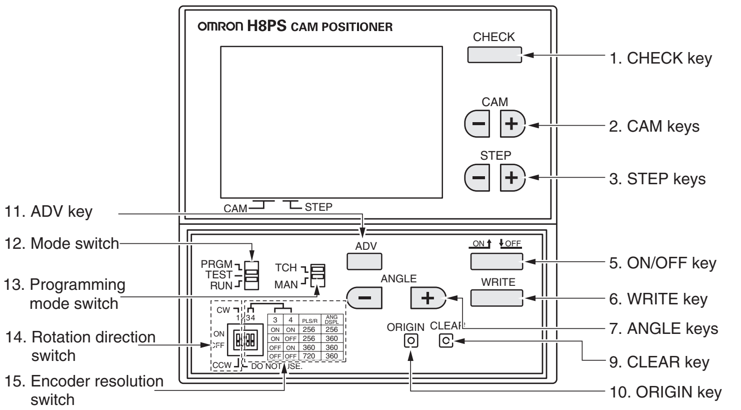


Display Details

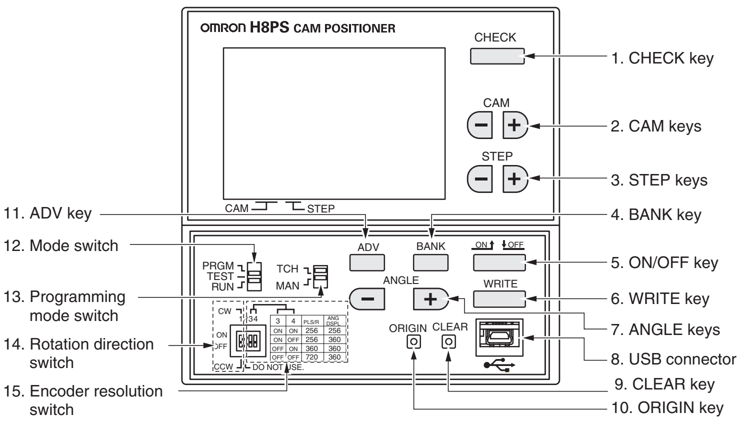
No.	Display color	Description
(1)	Orange	Lit while cam outputs are ON.
(2)	Red	PV: Lit while the present angular position or speed is displayed in main display. SV: Lit while the setting value is displayed in main display.
(3)	Orange	Lit while the start input is ON in Run or Test Mode. Not lit when an error occurs.
(4)	Orange	Displays Encoder present angular position, direction, and speed guidelines.
(5)	Green	Displays the bank number that is running in Run or Test Mode and the bank number selected in Programming Mode.
(6)	Green	Displays the cam number for the angle setting displayed on sub-display.
(7)	Green	Displays the step number for the angle setting displayed on sub-display.
(8)	Orange	Lit while the All Protection function is enabled.
(9)	Orange	The indicator for the selected mode is lit. PRG: Programming Mode TST: Test Mode RUN: Run Mode
(10)	Red	Displays the present angular position or the speed and settings being made.
(11)	Red	Displays units for the angle or the speed displayed on main display.
(12)	Red	Lit while using an Encoder with a resolution of 256 if 256° display is selected.
(13)	Green	Displays units for the angle or the speed displayed on sub-display.
(14)	Green	Displays the speed or the ON/OFF angle settings.
(15)	Green	Indicates whether main display displays the ON or OFF angle setting.
(16)	Green	Lit while setting the Advance Angle Compensation (ADV) Function.

Operation Keys

8-output Models



16-/32-output Models



Operation Key Details

No.	Description
1	Displays program details in Run Mode.
2	Selects the cam number with + − Keys.
3	Selects the step number with + − Keys.
4	Selects the bank number.
5	Selects the ON angle, or OFF angle
6	Writes the set data to memory.
7	Changes the angle or other setting value with + − Keys.
8	Connects the Cam Positioner to a personal computer via USB cable (order separately) for programming with the Support Software (order separately).
9	Moves to the screen for clearing settings
10	Designates the current angle of the machine (Encoder) as the origin (0°).
11	Programming or Test Mode: Press to shift to the ADV function setting screen. Programming Mode: Press and hold at least 3 s to shift to the Function Setting Mode. Run Mode: Press and hold at least 5 s to enable/disable the All Protection function.
12	Switches modes. Programming Mode (PRGM): Used to write cam programs, set the ADV function, etc. Test Mode (TEST): Used to modify settings while the Encoder is running. Run Mode (RUN): Used for normal operation and to check the cam program.
13	Select the method used for programming cams. Teaching: ON/OFF Angles can be set based on actual machine (Encoder) operation. Manual: ANGLE Keys can be used to set ON/OFF angles.
14	Sets the H8PS rotation direction (rotation display monitor, etc.) to the machine (Encoder) rotation direction.
15	Sets the resolution of the connected Encoder. Also sets the unit for angle display when using an Encoder with a resolution of 256.

Dimensions

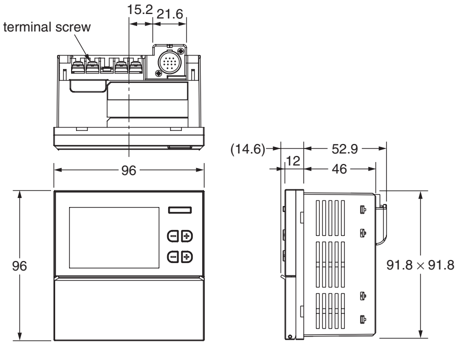
Note: All units are in millimeters unless otherwise indicated.

■ Main Unit

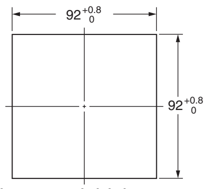
Cam Positioners

Flush Mounting Models

H8PS-8B□ (8-output Models)

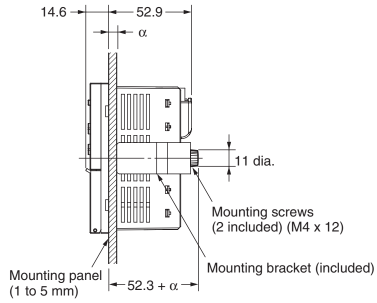


Panel Cutout
(according to DIN 43700)



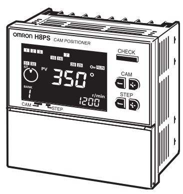
Note: Mounting panel thickness must be 1 to 5 mm.

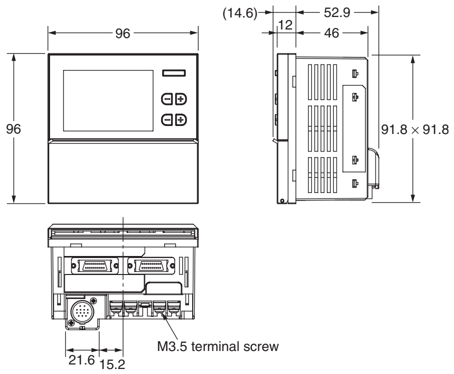
Flush mounting



Note: An 8-output Model is shown in the above diagrams. The Encoder is connected from the bottom with 16-/32-output Models.

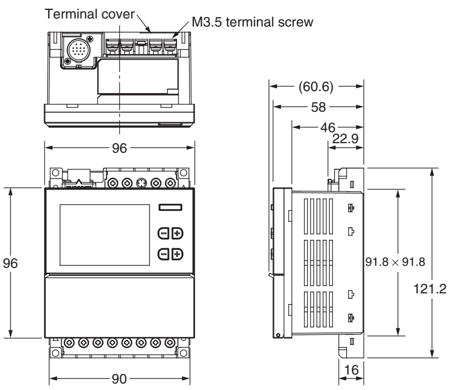
H8PS-16B□ (16-output Models)
H8PS-32B□ (32-output Models)



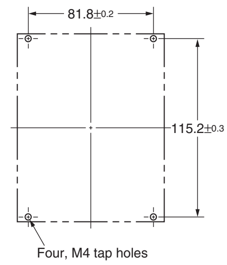


Surface Mounting Models

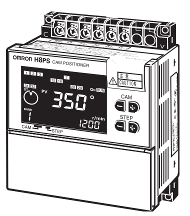
H8PS-8BF□ (8-output Models)

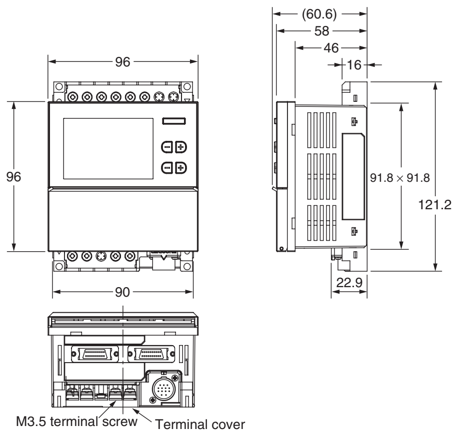


Mounting holes

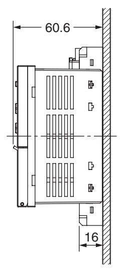


H8PS-16BF□ (16-output Models)
H8PS-32BF□ (32-output Models)

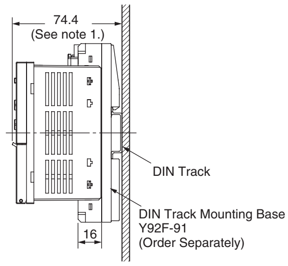




Surface Mounting



Track Mounting

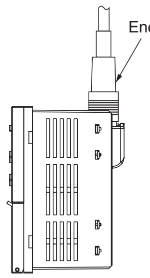


Note: 1. These dimensions vary with the kind of DIN track (reference value).

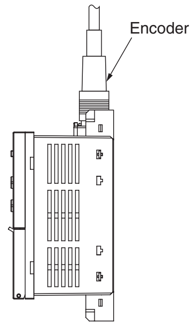
2. An 8-output Model is shown in the above diagrams. The Encoder is connected from the bottom with 16-/32-output Models.

Encoder Connecting Direction

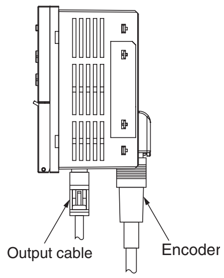
H8PS-8B□



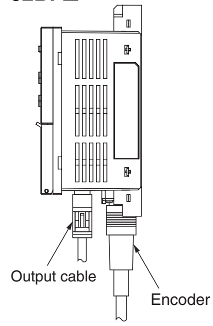
H8PS-8BF□



H8PS-16B□
H8PS-32B□



H8PS-16BF□
H8PS-32BF□

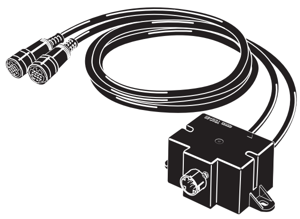


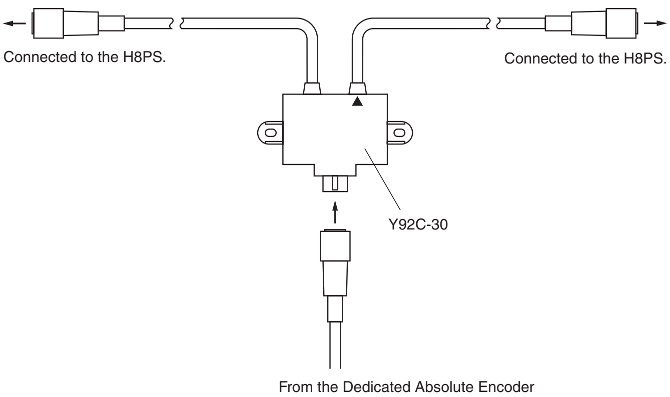
■ Accessories (Order Separately)

Parallel Input Adapters

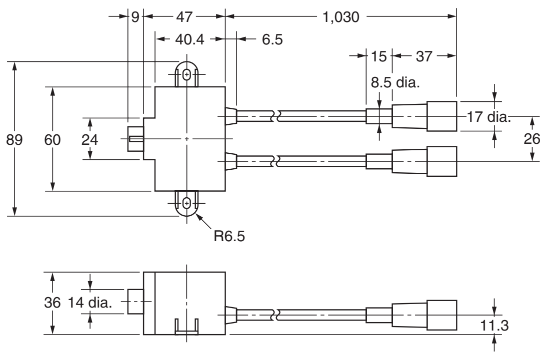
Y92C-30

This Adapter enables two H8PS Cam Positioners to share signals from an Encoder.

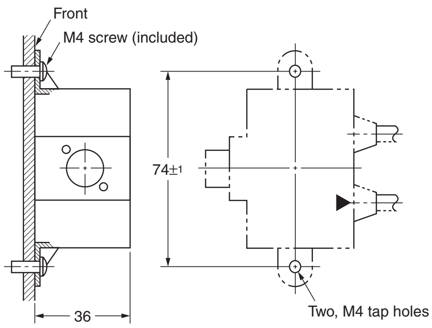




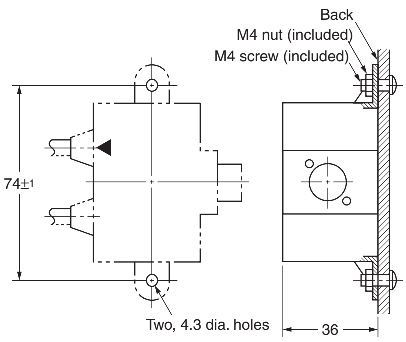
Use the cable marked with a triangle when connecting only one H8PS Cam Positioner to the Parallel Input Adapter.



• Panel Surface Mounting



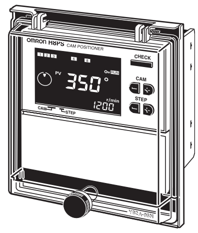
• Panel Back Mounting

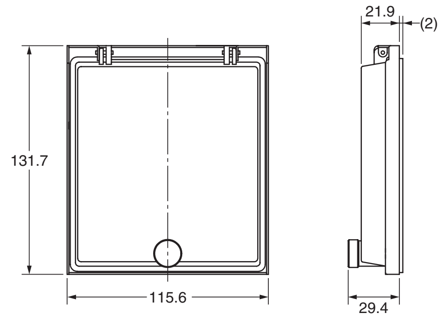


■ Accessories (Order Separately)

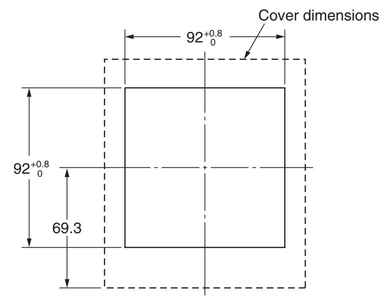
Watertight Cover

Y92A-96N





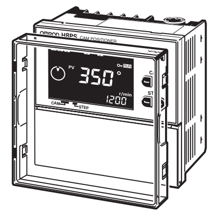
Panel Cutout



Use for flush mounting when waterproofing is required. The Y96A-96N conforms to IP66 and NEMA4 (for indoor use) standards for waterproofing.
The operating environment may cause the waterproof packing to deteriorate, shrink, or harden. Therefore, it is recommended that the packing be replaced regularly.

Protective Cover

Y92A-96B

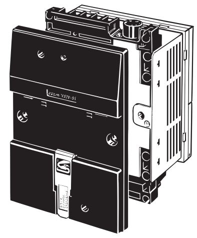


A hardened Y92A-96B Protective Cover is available.
Use it for the following:

- To protect the front panel from dust and dirt.
- To prevents the set value from being altered due to accidental contact with the keys or switches.

DIN Track Mounting Base

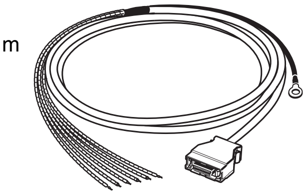
Y92F-91



Discrete Wire Output Cable

Y92S-41-200

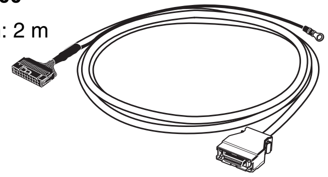
Cable length: 2 m



Connector-type Output Cable

E5ZE-CBL200

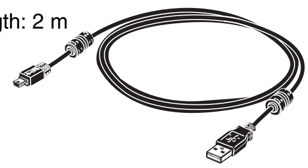
Cable length: 2 m



USB Cable

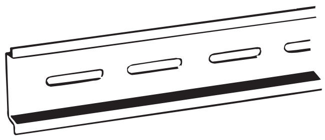
Y92S-40

Cable length: 2 m

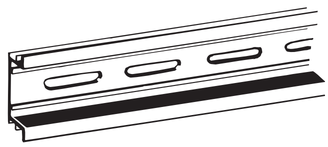


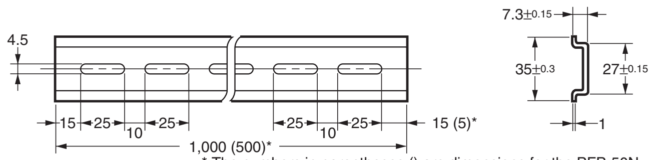
Mounting Track

PFP-100N
PFP-50N

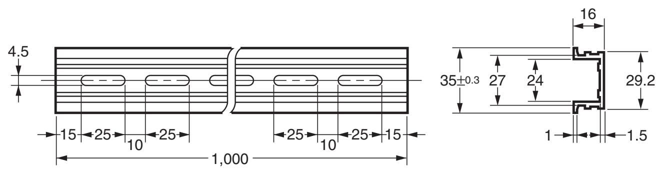


PFP-100N2



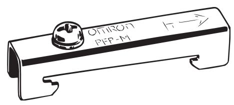


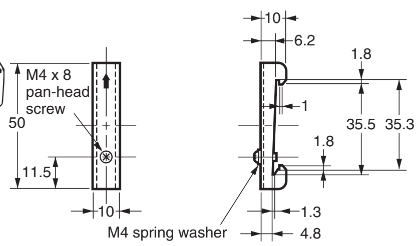
* The numbers in parentheses () are dimensions for the PFP-50N.



End Plate

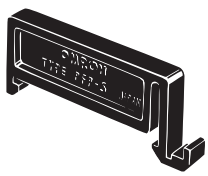
PFP-M

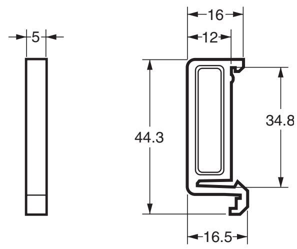




Spacer

PFP-S





E6CP-A/E6C3-A/E6F-A Rotary Encoders (Absolute)

- Combining this Encoder with an H8PS Cam Positioner enables high-precision detection of the operation timing of various automatic machines.
- The E6CP-A is a low-cost, money-saving Encoder.
- The standard E6C3-A is well suited to environments subject to water and oil.
- The standard E6F-A is a rigid type that is compatible with high shaft-tolerance applications as well as environments subject to water and oil.

Note: Refer to the relevant datasheet for details.

Ratings and Characteristics

Item	E6CP-AG5C-C	E6C3-AG5C-C	E6F-AG5C-C
Rated supply voltage	12 VDC −10% to 24 VDC +15%, ripple (p-p) 5% max.		
Current consumption (See note 1.)	70 mA max.		60 mA max.
Resolution (pulses per rotation)	256 (8-bit)	256 (8-bit), 360 (9-bit), or 720 (10-bit)	
Output code	Gray binary		
Output configuration	NPN open-collector output		
Output capacity	Applied voltage: 28 VDC max. Sink current: 16 mA max. Residual voltage:0.4 V max. (sink current at 16 mA)	Applied voltage: 30 VDC max. Sink current: 35 mA max. Residual voltage:0.4 V max. (sink current at 35 mA)	
Logic	Negative logic (H = 0, L = 1)		
Accuracy	Within ±1°		
Rotation direction	Clockwise (viewed from the shaft) for output code increment		
Rise and fall times of output	1.0 μs max. (control output voltage: 16 V; load resistance: 1 kΩ; output cord: 2 m max.)	1.0 μs max. (control output voltage: 5 V; load resistance: 1 kΩ; output cord: 2 m max.)	
Starting torque	0.98 m N·m max.	10 m N·m max. (at room temperature), 30 m N·m max. (at low temperature)	9.8 m N·m max. (at room temperature), 14.7 m N·m max. (at low temperature)
Moment of inertia	1×10^{-6} kg·m^2 max.	2.3×10^{-6} kg·m^2 max.	1.5×10^{-6} kg·m^2 max.
Shaft-load tolerance: Radial	30 N	80 N	120 N
Shaft-load tolerance: Thrust	20 N	50 N	
Max. permissible rotation	1000 r/min	5000 r/min	
Ambient temperature	−10 to 55°C (with no icing)	−10 to 70°C (with no icing)	
Storage temperature	−25 to 85°C (with no icing)		−25 to 80°C (with no icing)
Ambient humidity	35% to 85% (with no condensation)		
Degree of protection	IEC standard IP50	IEC standard IP65 (JEM standard IP65f) (See note 2.)	IEC standard IP65 (JEM standard IP65f)
Insulation resistance	20 MΩ min. (at 500 VDC) between charged parts and the case		
Dielectric strength	500 VAC, 50/60 Hz for 1 min between charged parts and the case		
Vibration resistance	Destruction: 10 to 55 Hz,1.5-mm double amplitude for 2 hr each in X, Y, and Z directions	Destruction: 10 to 500 Hz, 2-mm double amplitude, 150 m/s^2 3 times each in X, Y, and Z directions, 11-min sweep time	Destruction: 10 to 500 Hz,1.5-mm double amplitude 3 times each in X, Y, and Z directions, 11-min sweep time
Shock resistance	Destruction: 1000 m/s^2 3 times each in X, Y, and Z directions		
Weight	Approx. 200 g (with 2-m cord)	Approx. 300 g (with 1-m cord)	Approx. 500 g (with 2-m cord)
Datasheet Cat. No.	---	F058	E283

Note: 1. The following inrush currents flow when the power is turned ON.
E6CP-AG5C-C: Approx. 8 A (time: approx. 0.3 ms),
E6C3-AG5C-C: Approx. 6 A (time: approx. 0.8 ms),
E6F-AG5C-C: Approx. 9 A (time: approx. 5 μs)

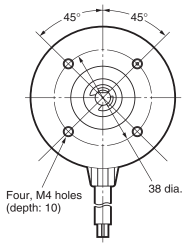
2. JEM1030: Applicable as of 1991

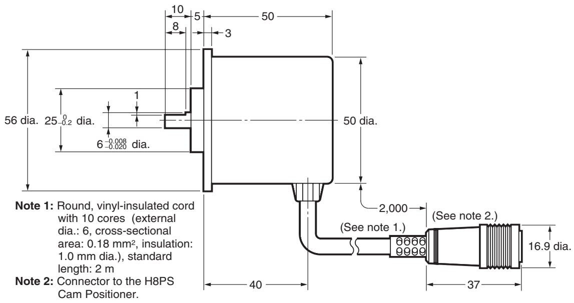
Dimensions

Note: All units are in millimeters unless otherwise indicated.

E6CP-AG5C-C

Note: Order the E69-C06B Coupling separately.

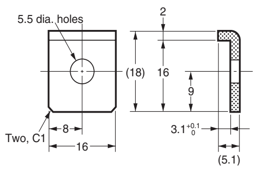




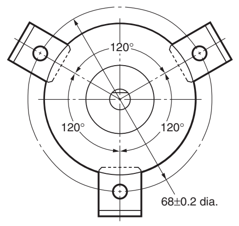
Note 1: Round, vinyl-insulated cord with 10 cores (external dia.: 6, cross-sectional area: 0.18 mm², insulation: 1.0 mm dia.), standard length: 2 m

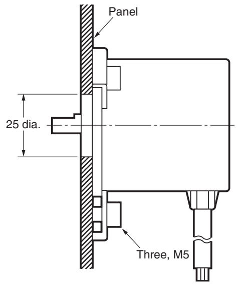
Note 2: Connector to the H8PS Cam Positioner.

Accessory Mounting Bracket (Included)



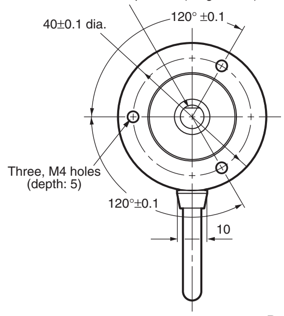
Bracket Mounting Diagram

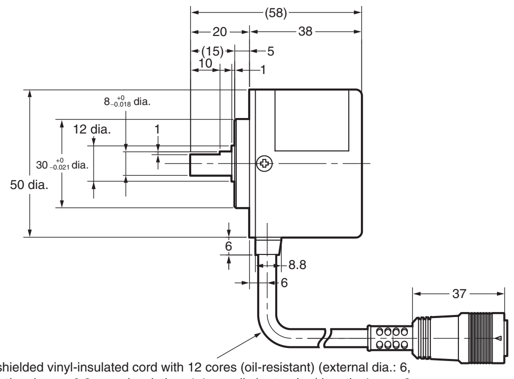




E6C3-AG5C-C

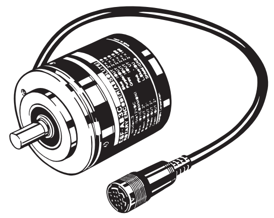
Note: Order the E69-C08B Coupling separately.



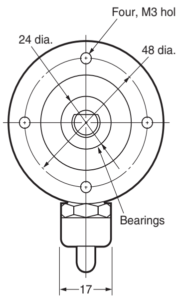


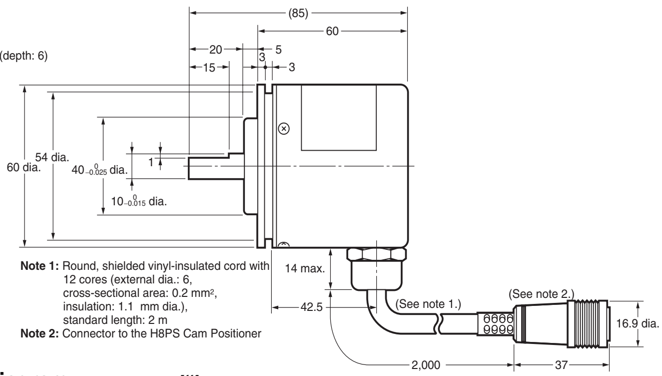
Round, shielded vinyl-insulated cord with 12 cores (oil-resistant) (external dia.: 6, cross-sectional area: 0.2 mm², insulation: 1.1 mm dia.), standard length: 1 m or 2 m

E6F-AG5C-C



Note: Order the E69-C10B Coupling separately.

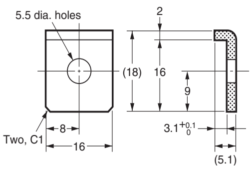




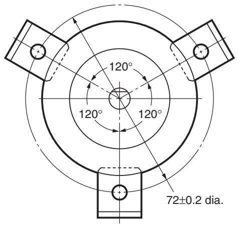
Note 1: Round, shielded vinyl-insulated cord with 12 cores (external dia.: 6, cross-sectional area: 0.2 mm², insulation: 1.1 mm dia.), standard length: 2 m

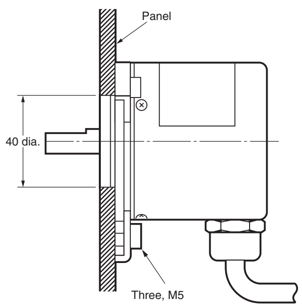
Note 2: Connector to the H8PS Cam Positioner

Accessory Mounting Bracket (included)



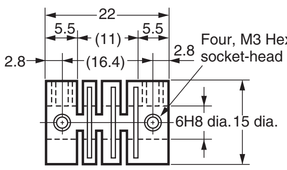
Bracket Mounting Diagram





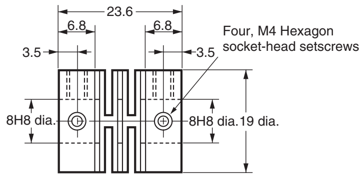
Accessories (Order Separately)

E69-C06B Shaft Coupling (for the E6CP)



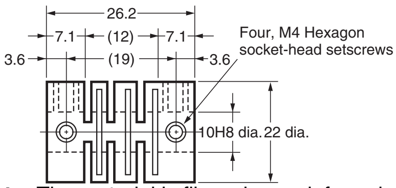
Note: The material is fiber-glass-reinforced polybutylene terephthalate resin (PBT).

E69-C08B Shaft Coupling (for the E6C3)



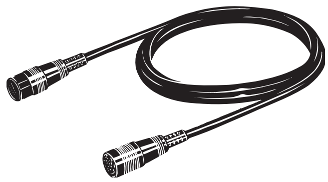
Note: The material is fiber-glass-reinforced polybutylene terephthalate resin (PBT).

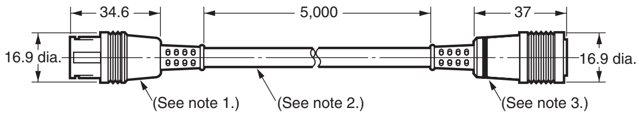
E69-C10B Shaft Coupling (for the E6F)



Note: The material is fiber-glass-reinforced polybutylene terephthalate resin (PBT).

E69-DF5 Extension Cable





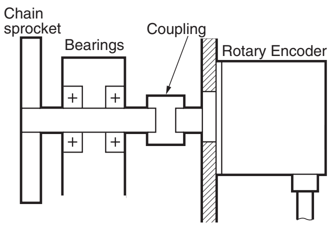
Note 1: E6F-AG5C-C, E6CP-AG5C-C, and E6C3-AG5C-C Connectors for the H8PS.
Note 2: 6-dia., 12-core shielded cord (cross-sectional area: 0.2 mm², insulation: 1.1 mm dia.), standard length: 5 m
Note 3: Connected to the H8PS Cam Positioner.

Note: Refer to “Characteristics” on page 102 for the maximum cable length.

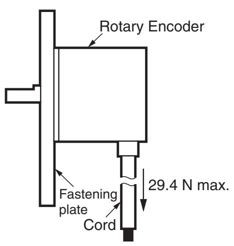
Safety Precautions (Encoder)

■ Precautions for Correct Use

- Do not subject the E6CP Encoder to oil or water.
- The Encoder consists of high-precision components. Handle it with utmost care and do not drop it, otherwise malfunctioning may result.
- When connecting the shaft of the Encoder with a chain timing belt or gear, connect the chain timing belt or gear with the shaft via a bearing or coupling as shown in the following diagram.



- If the decentering or declination value exceeds the tolerance, an excessive load imposed on the shaft may damage or shorten the life of the Encoder.
- Do not place excessive loads on the shaft if the shaft is connected to a gear.
- The tightening torque must not exceed the value given in the table at the right when the Rotary Encoder is mounted with screws.
- Do not pull wires with a force greater than 29.4 N while the Rotary Encoder is secured and wired.



- Do not subject the shaft to shock. Therefore, do not strike the shaft or coupling with a hammer when inserting the shaft into the coupling.
- Make sure there is no foreign matter in the Connector before connecting it to the Encoder.

Mounting Procedure

1 Insert the shaft into the Coupling.

Do not secure the Coupling and shaft with screws at this time.

2 Secure the Encoder.

Refer to the table for the maximum insertion lengths of the shaft into the Coupling.

Coupling	Maximum insertion length
E69-C06B	5.5 mm
E69-C08B	6.8 mm
E69-C10B	7.1 mm

3 Secure the Coupling.

Coupling	Tightening torque
E69-C06B	0.25 N·m
E69-C08B	0.44 N·m
E69-C10B	0.44 N·m

4 Connect the power and I/O lines.

Be sure to turn OFF the Encoder before connecting the lines.

5 Turn ON the power and check the outputs.

Safety Precautions (Cam Positioner)

⚠ CAUTION
Tighten terminal screws to a torque of 0.80 N·m so that they do not become loose. Minor fires or malfunction may occasionally occur.
For 16- and 32-output Models, leave the protective label attached to the H8PS when wiring. Removing the label before wiring may occasionally result in fire if foreign matter enters the Unit. Remove the label after the completion of wiring to ensure proper heat dissipation. Leaving the label attached may occasionally result in fire.
Do not disassemble, modify, or repair the H8PS or touch any of the internal parts. Otherwise, minor electric shock, fire, or malfunction may occasionally occur.
Do no allow metal fragments, lead wire scraps, or chips from processing during installation to fall inside the H8PS. Otherwise, minor electric shock, fire, or malfunction may occasionally occur.
Do not touch the terminals when power is being supplied. For Surface-mounting H8PS, always connect the terminal cover for after completing wiring. Otherwise, minor injury due to electric shock may occasionally occur.

■ Precautions for Safe Use

Observe the following items to ensure the safe use of this product.

Environmental Precautions

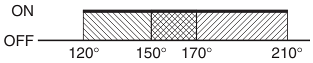
- Store the H8PS within specified ratings. If the H8PS has been stored at temperatures −10°C or lower, let it stand for 3 hours or longer at room temperature before turning ON the power supply.
- Use the H8PS within the specified ratings for operating temperature and humidity.
- Do not operate the H8PS in locations subject to sudden or extreme changes in temperature, or locations where high humidity may result in condensation.
- Do not use the H8PS in locations subject to vibrations or shock. Extended use in such locations may result in damage due to stress.
- Do not use the H8PS in locations subject to excessive dust, corrosive gas, or direct sunlight.
- Install the H8PS well away from any sources of static electricity, such as pipes transporting molding materials, powders, or liquids.
- The H8PS is not waterproof or oil resistant.
  Do not use it in locations subject to water or oil.
- The life expectancy of internal components may be reduced if the H8PS is mounted side-by-side.
- Do not use organic solvents (such as paint thinner or benzine), strong alkaline, or strong acids because they will damage the external finish.

Usage Precautions

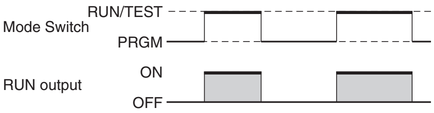
- Install a switch or circuit breaker that allows the operator to immediately turn OFF the power, and label it to clearly indicate its function.
- Pay careful attention to polarity to avoid wrong connections when wiring terminals.
- Do not connect more than two crimp terminals to the same terminal.
- Use the specified wires for wiring.
  Applicable Wires
  AWG24 to AWG18 (cross-sectional area of 0.208 to 0.832 mm^2)
  Solid or twisted wires of copper
- Do not connect loads that exceed the rated output current. The output elements may be destroyed, possibly resulting in short-circuit or open-circuit faults.
- Always connect a diode to protect against counterelectromotive force when using an inductive load. Counterelectromotive force may destroy output elements, possibly resulting in short-circuit or open-circuit faults.
- Use the specified cables to connect outputs.
- Do not install input lines in the same duct or conduit as power supply or other high-voltage lines. Doing so may result in malfunction due to noise. Separate the input lines from high-voltage lines.
- Internal elements may be destroyed if a voltage outside the rated voltage is applied.
- Maintain voltage fluctuations in the power supply within the specified range.
- Use a switch, relay, or other contact so that the rated power supply voltage will be reached within 0.1 s. If the power supply voltage is not reached quickly enough, the H8PS may malfunction or outputs may be unstable.
- Do not turn OFF the power supply when changing or deleting settings. The contents of the EEPROM may be corrupted.

■ Precautions for Correct Use

- A cam output will remain ON if the set angles for two steps overlap for the same cam number.
  Step 1: 120° ON → 170° OFF
  Step 2: 150° ON → 210° OFF

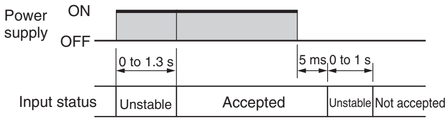


- A step will produce no output if the ON and OFF angle for the step are the same.
- The RUN output does not turn ON during programming.

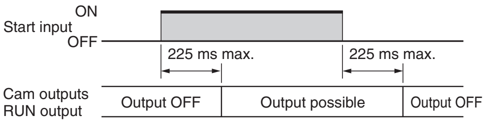


Note: The RUN output turns ON with the timing shown in the diagram, but it remains OFF when an error occurs. Thus, you can use the output as a timing signal during operation, including trial operation.

- Input signals may be accepted, not accepted, or unstable for the following times when the power supply is turned ON or OFF. Set the system to allow leeway in the timing of input signals. Approx. 1 second is required from the time the power supply is turned ON until outputs are made. Refer to the *Operation Manual* (Cat. No. Z199) for information on other timing.



- When using 16-/32-output Modules, the operation timing of the outputs will be as shown below in relation to the ON/OFF timing of the start input. Refer to *Bank Functions (F7/F8/F9)* on page 127 when switching banks.



- Do not subject H8PS Connectors (outputs, Encoder) to more than 30 N of force.
- Confirm the waveform of the power supply circuit and install a surge absorber. Surge or noise applied to the power supply may destroy internal elements or cause malfunctions.
- Switch the power supply circuit with a device rated at 3.5 A or higher.
- Inrush current of approximately 3.5 A will flow for a short period of time when the power supply is turned ON. The H8PS may not start if the capacity of the power supply is not sufficient. Be sure to use a power supply with sufficient capacity.
- EEPROM is used as memory when the power is interrupted. The write life of the EEPROM is 100000 writes. The EEPROM is written when settings are changed or deleted or when the resolution is changed.
- Make sure that all settings are appropriate for the application. Unexpected operation resulting in property damage or accidents may occur if the settings are not appropriate.
- Connect all negative (–) terminals, COM terminals, and Vs terminals.
- When using the Y92C-30 Parallel Input Adapter for parallel operation, do not connect more than two H8PS Cam Positioners to the same Encoder.

Refer to the following manual for precautions in using the Cam Positioner and other information required for operation:
H8PS Cam Positioner Operation Manual (Cat. No. Z199)

Operating Procedures

■ Flow of Operation

Initial Settings

- **Setting Resolution and Rotation Direction** — The Encoder resolution and rotation direction is set on a DIP switch.
⇛ For details on the setting methods, refer to page 21.
- **Setting the Origin** — The Encoder is mounted to the machine and the origin for operation is determined.
⇛ For details on the setting methods, refer to page 21.

Setting Functions (Advanced function) — Parameters can be set in Function Setting Mode to perform more advanced operations.
⇛ For details, refer to page 26 *Advanced Functions*.

Programming Cams (Programming Mode)

- **Setting ON/OFF Angles** — There are three methods that can be used to set or change ON/OFF angles (i.e., cam programming).
  - Using the ANGLE Keys (Manual Mode)
  - Actually turning the Encoder (Teaching Mode)
  - Setting from personal computer using Support Software (order separately)

  ⇛ For details on the setting methods, refer to pages 22 to 23.
- **Setting the ADV Function** (Advanced function) — Advance angle compensation (ADV) function can be set if required.
⇛ For details on the setting methods, refer to page 27.

Checking Timing (Test Mode) — The machine is operated and outputs are actually made to check the timing of operation. If the timing of operation is not correct, it can be changed.
⇛ For details, refer to page 23.

Operation (Run Mode) — Operation is started.
⇛ For details, refer to page 24.

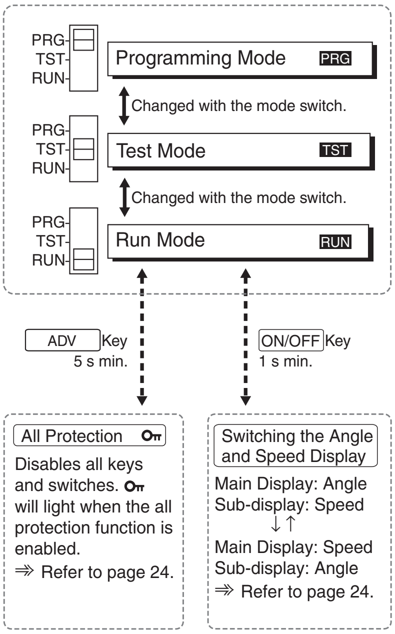
- **Checking ON/OFF Angle Settings** — The ON/OFF angles that have been set can be checked.
⇛ For details, refer to page 24.

Clearing Settings — Deletes settings. There are two methods that can be used to delete settings.
- Clearing all programs (deletes all programming)
- Clearing individual steps, cams, and banks

⇛ For details, refer to page 25.

■ Settings for Basic Functions

Changing the Mode



Programming Mode

Used to write cam programs, set the advance angle compensation function, etc.
All outputs will remain OFF.

Test Mode

Used to write cam programs, set the advance angle compensation function, and perform other operations while actually turning ON outputs to confirm operation timing. This mode is also used to adjust settings during operation.

Run Mode

Used for normal operation. Settings, such as writing cam programs and setting the advance angle compensation function, cannot be performed.

Setting Resolution and Rotation Direction

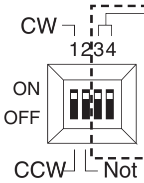
One of three resolutions can be selected for the Encoder connected to the H8PS: 256, 360, or 720. The resolution and display angle are set here.

Turn OFF the power supply.

↓

Set the display angle and the Encoder resolution.

Open the front cover at the lower part of the H8PS and set pins 3 and 4 on the DIP switch.



3	4	Resolution	Display angle
ON	ON	256	256
ON	OFF	256	360
OFF	ON	360	360
OFF	OFF	720	360

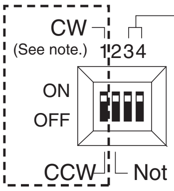
(See note 2.)

Note 1: Default settings are shown in reverse type.
Note 2: When using an Encoder with a resolution of 256, displaying 360° directly is not possible. The H8PS thus provides a convenient setting that enables converting the display and settings to 360° when using an Encoder with a resolution of 256. When using a 360° display, however, some angles will not be displayed.

↓

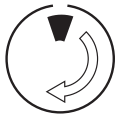
Check the rotation direction of the machine (Encoder).

Turn ON the power supply.
Turn the Encoder in the actual direction of operation and confirm that the rotation display monitor turns clockwise.
If the monitor turns counterclockwise, turn OFF the power supply and change pin 1 on the DIP switch to CCW.



3	4	Resolution	Display angle
ON	ON	256	256
ON	OFF	256	360
OFF	ON	360	360
OFF	OFF	720	360

Rotation Display Monitor



Note: Default setting.

↓

Connect the machine (Encoder) and turn ON the power supply.

↓

End of preparations.

Note: Changes to DIP switch settings are enabled when the power is turned ON.

Setting the Origin

The origin of the Cam Positioner is set to match the origin of the machine (Encoder). The same origin is used for all banks.
(The bank function is supported only for 16-/32-output models.)

Example: Setting the Present Angular Position of 150° to 0°

Change the mode. — Set the mode switch to PRGM.

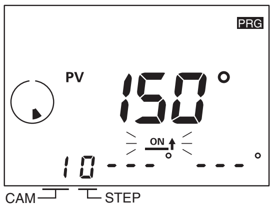
Set the programming mode switch. — Set the programming mode switch to TCH.

Mode	Programming mode
PRG / TST / RUN	TCH / MAN

↓

Set the machine to its origin.

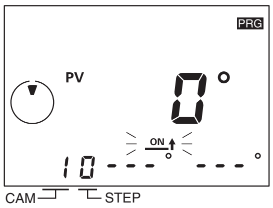
Turn the machine (Encoder) to the position of the desired origin (150° in this example).



↓

Specify the origin.

Press the ORIGIN Key. (See note.)
In approx. 1 s, the present angular position display will change to 0° and the previous display will return.



Note: With 16-/32-output models, the origin input from the terminal block can be turned ON to specify the origin.

↓

End

Setting ON/OFF Angles in Manual Mode

ON/OFF angles can be set manually using the ANGLE Keys [+] [−] on the front of the Cam Positioner.

Example: Setting Step 1 of Cam No. 2 to Turn ON at 28° and Turn OFF at 51°

Change the mode. Set the mode switch to PRGM.

Set the programming mode switch. Set the programming mode switch to MAN.

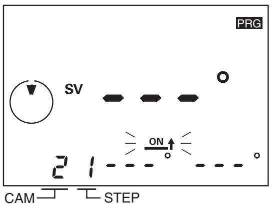
Mode	Programming mode
PRGM – TEST – RUN –	TCH – MAN –

Set the bank No. Banks can be specified only for 16-/32-output models.

- Press the [BANK] Key to specify the bank number and then press the [WRITE] Key.

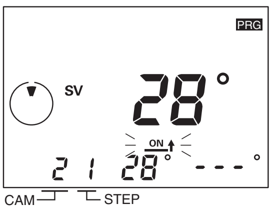
Set the cam and step No.

- Press the CAM Keys [+] [−] to specify cam No. 2.
- Press the STEP Keys [+] [−] to specify step No. 1.



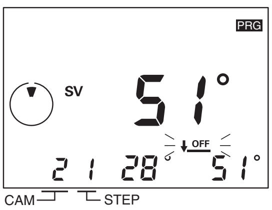
Set the ON angle.

- Press the [ON↑ ↓OFF] Key to flash the "ON↑".
- Press the ANGLE Keys [+] [−] to set an angle of 28 and then press the [WRITE] Key.



Set the OFF angle.

- Press the [ON↑ ↓OFF] Key to flash the "↓OFF".
- Press the ANGLE Keys [+] [−] to set an angle of 51 and then press the [WRITE] Key.



End

Note: Pressing the [+] or [−] Key continually will automatically increment or decrement the value. Pressing the other key during automatic increment or decrement will increase the speed.

Setting ON/OFF Angles in Teaching Mode

ON/OFF angles can be set based on actual machine (Encoder) operation.

Example: Setting the ON/OFF Angles by Teaching Step 2 of Cam No. 3

Change the mode. Set the mode switch to PRGM.

Set the programming mode switch. Set the programming mode switch to TCH.

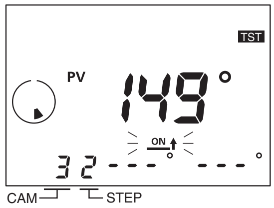
Mode	Programming mode
PRGM – TEST – RUN –	TCH – MAN –

Set the bank No. Banks can be specified only for 16-/32-output models.

- Press the [BANK] Key to specify the bank number and then press the [WRITE] Key.

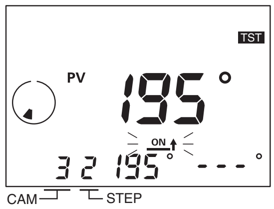
Set the cam and step No.

- Press the CAM Keys [+] [−] to specify cam No. 3.
- Press the STEP Keys [+] [−] to specify step No. 2.



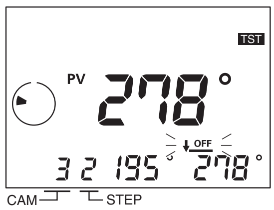
Set the ON angle.

- Press the [ON↑ ↓OFF] Key to flash the "ON↑".
- Turn the machine (Encoder) to the desired ON angle. (195° in this example)
- Press the [WRITE] Key.



Set the OFF angle.

- Press the [ON↑ ↓OFF] Key to flash the "↓OFF".
- Turn the machine (Encoder) to the desired OFF angle. (278° in this example)
- Press the [WRITE] Key.



End

Setting ON/OFF Angles Using Support Software

With 16-/32-output models, programs can be uploaded or downloaded easily with the optional Support Software (H8PS-SOFT-V1) by connecting a personal computer to the Cam Positioner using the optional Y92S-40 USB cable.

Support Software Functions

- Writing cam programs
- Setting functions
- Editing, saving, and printing programs
- Displaying and printing cam program operation charts
- Simple simulations of programs

  Applicable OS: Windows 98, 2000, ME, or XP

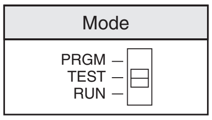
Refer to the user's manual for the Support Software for details.

Checking Timing (Test Mode)

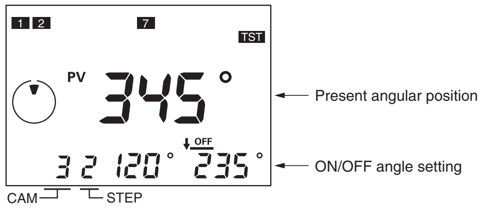
Testing Operation

Operation can be tested to check operation timing.

- Set the mode switch to TEST.



- Operate the Encoder and check the timing of operation.



- If the timing is not correct, change the ON/OFF angle settings.
  The settings can be changed in Test Mode.

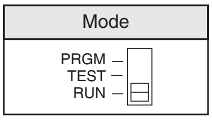
Note: 1. Outputs will turn ON and OFF in Test Mode. Confirm system safety before switching to Test Mode.

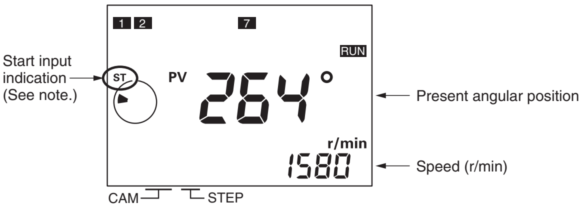
2. With 16-/32-output model, be sure to turn ON the start input. Outputs are not turned ON unless the start input is turned ON.

Operation (Run Mode)

Starting Operation

• Set the mode switch to RUN to start operation.

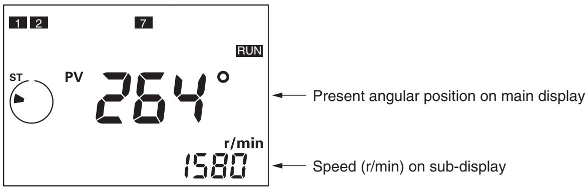




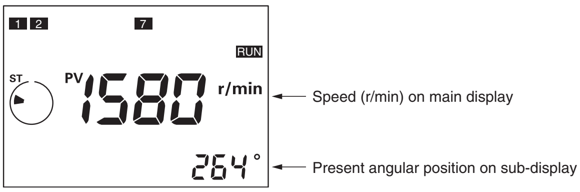
Note: For 16/32-output models, be sure that the start input is ON and that the start input indicator is lit. Outputs (including the cam, pulse, and run outputs) will not function if the start input is OFF. The 8-output models do not have a start input.

Switching the Angle and Speed Displays

• Press the ON↑ ↓OFF Key for at least 1 s in Run Mode to reverse the display positions of the present angular position and speed (r/min) between main display and sub-display.



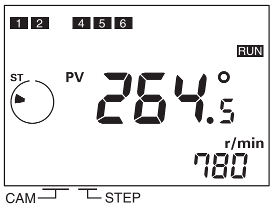
Press the ON↑ ↓OFF Key for 1 s min.



All Protection Function

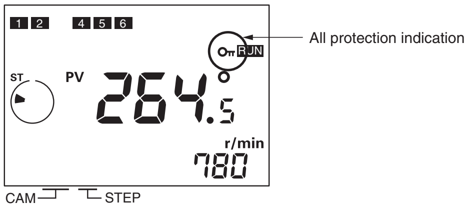
The all protection function locks the H8PS in Run Mode and prohibits any changes to settings. It can be used to prevent incorrect or unauthorized operation. If the ADV Key is pressed for at least 5 s in Run Mode, the All Protection indicator will light on the display and all keys and switches will be disabled. If the mode switch is changed to Programming or Test Mode while protection is enabled, the All Protection indicator will flash to indicate that settings cannot be changed. If a setting on the DIP switch is changed while protection is enabled, the All Protection indicator will flash when the power supply is turned ON to indicate that settings cannot be changed.

All Protection Function Disabled (Normal Operation)



Press the ADV Key for 5 s min.

All Protection Function Enabled



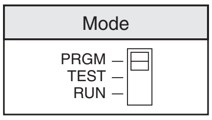
Checking ON/OFF Angle Settings

• During Run Mode, the CAM Keys + − and STEP Keys + − can be used to check the ON/OFF angle settings for any step. Also, the CHECK Key can be pressed to check the ON/OFF angle settings in order for all steps starting from cam 1. If there is no key operation for 10 s or longer during the checking operation, the previous display will be resumed.

Clearing Settings

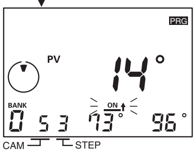
Clearing All Programs

The all clear function can be used to delete all cam programs, the settings for advance angle compensation function, and all other settings. All settings in the Function Setting Mode will be returned to their default settings.

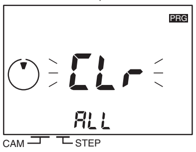


Set the mode switch to PRGM or TEST.

Initial Display



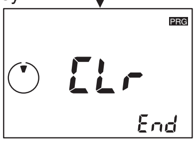
Press the CLEAR Key for 3 s min.



Confirm that CLr flashes on the display.

Press the WRITE Key.

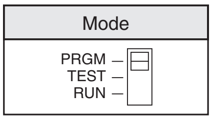
CLEAR Key



After the completion of all clear processing, the screen displays End for approximately one second and then resume the previously displayed screen. If the CLEAR Key is pressed again before pressing the WRITE Key, the settings will not be deleted and the previous display will be resumed.

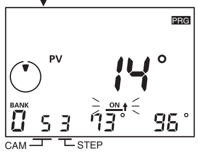
Clearing Individual Steps, Cams, and Banks

ON/OFF angle settings can be deleted by step, by cam, or by bank. If settings are deleted by cam, the settings for the advance angle compensation (ADV) function will not be deleted. If settings are deleted by bank, the settings for the ADV function will also be deleted. Settings in the Function Setting Mode will not be deleted.



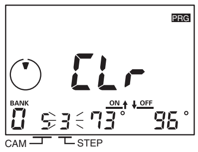
Set the mode switch to PRGM or TEST.

Initial Display

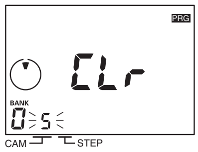


Press the CLEAR Key.

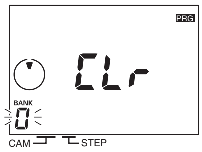
Screens for Individually Clearing Items



Deleting Settings by Step
Press the STEP Keys + − to specify the step to be deleted.



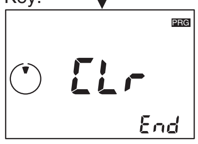
Deleting Settings by Cams
Press the CAM Keys + − to specify the cam to be deleted.



Deleting Settings by Banks
Press the BANK Key to specify the bank to be deleted.

Press the WRITE Key.

CLEAR Key.



After the completion of all clear processing, the screen displays End for approximately one second and then resume the previously displayed screen. If the CLEAR Key is pressed again before pressing the WRITE Key, the settings will not be deleted and the previous display will be resumed.

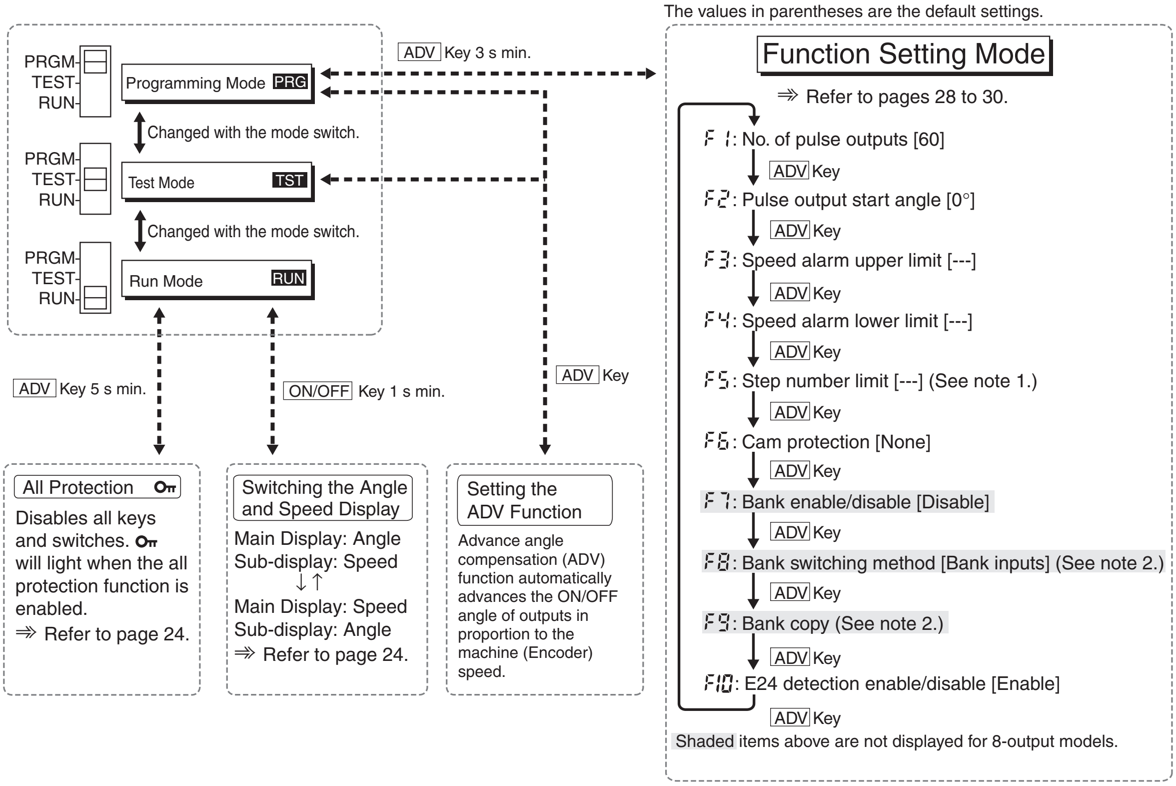
Counters

■ Advanced Functions

Set the advanced functions as required to perform more advanced operation. Outlines of the advanced functions are provided on the following pages. For details, refer to the *Operation Manual* (Cat. No. Z199).

Mode Transitions

The values in parentheses are the default settings.

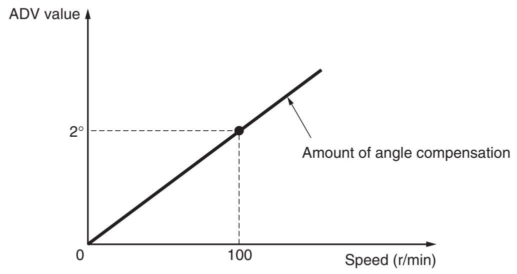


Note 1: The default setting is for 10 steps for all cams.
Note 2: Not displayed when F7 is disabled.

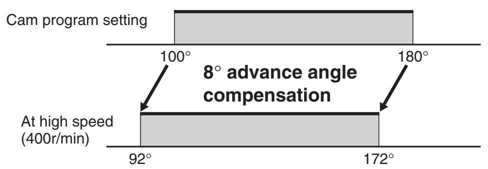
Advance Angle Compensation (ADV) Function

The advance angle compensation function automatically advances the ON/OFF angle of cam outputs in proportion to machine (encoder) speed. As the speed of the machine increases, the system can be affected by the delay in outputs. If the ADV function is used, the output delay caused by higher speeds is automatically compensated.

As shown in the following diagram, ADV function is used to linearly compensate outputs according to the speed based on the ADV value setting for a specific speed.



Note: The maximum amount of angle compensation is 360°.



Example: ADV Value Set to 2° at 100 r/min

ADV value can be set independently for cams 1 to 7 (7 total). For the ADV function, the speed and the amount of angle compensation are set. If "- - -" is displayed for any setting, the ADV function is disabled.

The setting ranges are given in the following table.

Encoder		Speed	ADV value
Resolution	Display angle		
256	256	"- - -", 1 to 1,600	"- - -", 0 to 255
256	360	"- - -", 1 to 1,600	"- - -", 0 to 359
360	---	"- - -", 1 to 1,600	"- - -", 0 to 359
720	---	"- - -", 1 to 800	"- - -", 0 to 359.5

Note: Default settings are shown in reverse type.

The maximum response speed will decrease as shown in the following table when ADV values are set for 4 cams or more.

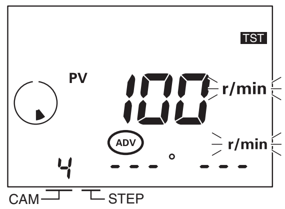
Number of cams with ADV settings	Encoder resolution	Max. response speed
0 to 3	256/360	1,600r/min
	720	800r/min
4 to 7	256/360	1,200r/min
	720	600r/min

Note: Even if the ADV value is set to 0°, the cam must be included in the number of cams with ADV settings.

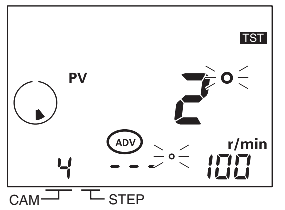
Example: Setting the ADV Value to 2° at 100 r/min for Cam 4

1. Set the mode switch to PRGM or TEST.
2. Set cam number 4 with the CAM Keys [+][−]. (See note.)
3. Press the [ADV] Key to move to the ADV function setting display and confirm that "ADV" is displayed.

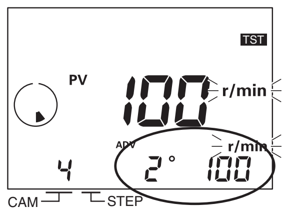
Setting Display



4. Set the speed to 100 with the ANGLE Keys [+][−] and then press the [WRITE] Key.



5. Set the ADV value to 2 with the ANGLE Keys [+][−].



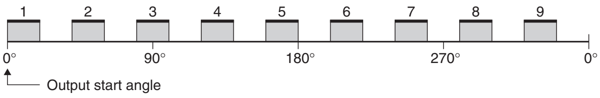
6. Press the [WRITE] Key to write the settings to memory.
7. Press the [ADV] Key after finishing setting the ADV function. The previous display in Programming or Test Mode will be resumed.

Note: If the bank function is being used, set the bank number before setting the cam number.

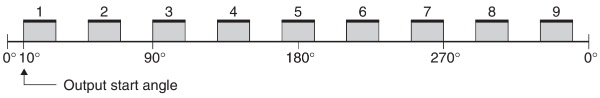
Pulse Output (F1/F2)

Outputs a preset number of pulses per Encoder rotation. Pulses are output at a 1:1 ON/OFF ratio and pulse output can be started from a specified angle.

Operation for 9 Output Pulses and a Start Angle of 0°



Operation for 9 Output Pulses and a Start Angle of 10°



Number of Output Pulses (F1)

Select the number of pulses per rotation from the following table.

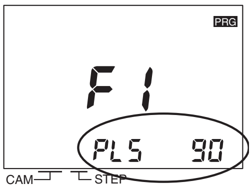
Encoder resolution	Settable number of pulses
256	1, 2, 3, 4, 5, 6, 9, 10, 12, 15, 18, 20, 30, 36, 45, 60, 90
360	1, 2, 3, 4, 5, 6, 9, 10, 12, 15, 18, 20, 30, 36, 45, 60, 90, 180
720	1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 20, 24, 30, 36, 40, 45, 60, 72, 90, 120, 180, 360

Note: Default settings are shown in reverse type.

Example: Setting 90 Pulses per Rotation

The number of pulses is set using the F1 menu in the Function Setting Mode.

Setting Display



Set the number of pulses with the ANGLE Keys + − and then press the WRITE Key.

Pulse Output Start Angle (F2)

The setting ranges are given in the following table.

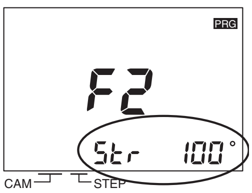
Encoder		Start angle
Resolution	Display angle	
256	256	0 to 255°
256	360	0 to 359° (See note 2.)
360	---	0 to 359°
720	---	0 to 359.5°

Note: 1. Default settings are shown in reverse type.
2. The output accuracy is 2° maximum, so not all angles can be set.

Example: Setting the Pulse Output Start Angle to 100°

The starting angle for pulse outputs is set using the F2 menu in the Function Setting Mode.

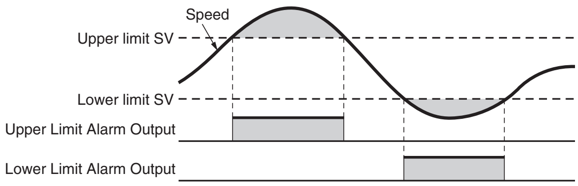
Setting Display



Set the pulse output start angle to 100 with the ANGLE Keys + − and then press the WRITE Key.

Speed Alarm Outputs (F3/F4)

Specific cam outputs can be used as Encoder speed alarm outputs. Alarms can be output for upper and lower speed limits.



The speed alarm outputs are assigned to cam outputs as shown in the following table. The speed alarms are set to "- - -" for the default settings, i.e., the normal cam outputs are enabled. If a speed alarm is set to any value but "- - -", the normal cam output for the corresponding cam number will be disabled.

	Upper Limit Alarm Output	Lower Limit Alarm Output
H8PS-8□ (8 outputs)	Cam 7	Cam 8
H8PS-16□ (16 outputs)	Cam 15	Cam 16
H8PS-32□ (32 outputs)	Cam 31	Cam 32

The setting ranges for the upper and lower limits speed alarm are given in the following table.

Encoder resolution	Speed
256, 360	"- - -" or 0 to 1,600 r/min
720	"- - -" or 0 to 800 r/min

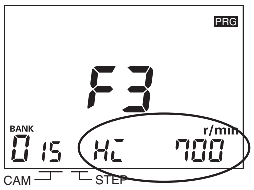
Note: Default settings are shown in reverse type.

Speed Alarm Upper Limit (F3)

Example: Setting the Upper Limit Set Value to 700 r/min for a 16-output Model

The upper limit set value is set using the F3 menu in the Function Setting Mode.

Upper Limit Setting Display



Set the upper limit set value to 700 with the ANGLE Keys + − and then press the WRITE Key. (See note.)

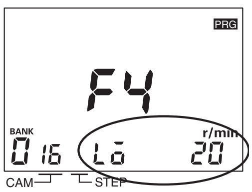
Note: If banks are being used, the bank number must be set.

Speed Alarm Lower Limit (F4)

Example: Setting the Lower Limit Set Value to 20 r/min for a 16-output Model

The lower limit set value is set using the F4 menu in the Function Setting Mode.

Lower Limit Setting Display



Set the upper limit set value to 20 with the ANGLE Keys + − and then press the WRITE Key.

Note: If banks are being used, the bank number must be set.

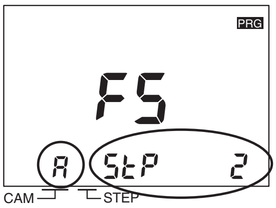
Step Number Limit (F5)

With the H8PS, up to 10 steps can be set to turn the output ON/OFF 10 times for each cam. The number of steps that can be set, however, can be restricted to prevent programming from being added through operating mistakes. Settings can be made for all cams at once or each cam individually. The default setting for the Step Number Limit is 10 steps for all cams.

Example: Limiting the Number of Steps to 2 for All Cams Collectively.

The maximum number of steps to be set is set using the F5 menu in the Function Setting Mode.

Display for Collective Settings



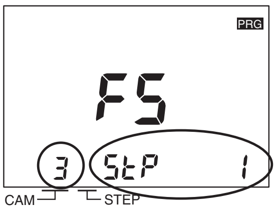
Set the cam number to A with the CAM Keys [+][−] and set the maximum number of steps to 2 with the Angle Keys [+][−]. Press the WRITE Key to write the setting to memory.

The cam number can be set to A on the setting display to set all cams at once. If the number of steps is displayed as "- - -" when the cam number is A, the collective settings for all cams are disabled.

Example: Limiting the Number of Steps to 1 for Cam 3.

The maximum number of steps to be set is set using the F5 menu in the Function Setting Mode.

Display for Individual Settings



Set the cam number to 3 with the CAM Keys [+][−] and set the maximum number of steps to 1 with the Angle Keys [+][−]. Press the WRITE Key to write the setting to memory.

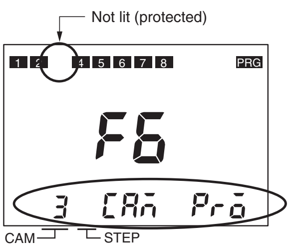
Cam Protection (F6)

Cam programs can be write-protected. Use this setting to protect the programs for only specific cam numbers. Protected cam numbers will not be displayed in Programming Mode or Test Mode. Writing or changing programs will not be possible. Protected cam numbers will also not be displayed in Run Mode and cannot be checked. The default settings are for no protection for all cams.

Example: Protecting Cam 3 with an 8-output Model

Cam protection is set using the F6 menu in the Function Setting Mode.

Setting Display



Set the cam number to be protected (and not displayed) to 3 with the CAM Keys [+][−] and then press the WRITE Key. The output display will go out.

Bank Functions (F7/F8/F9)

The bank function is supported by 16-/32-output models. Banks enable changing the entire cam program at once by switching bank numbers (0 to 7).

Cam Program (Bank No. 7)

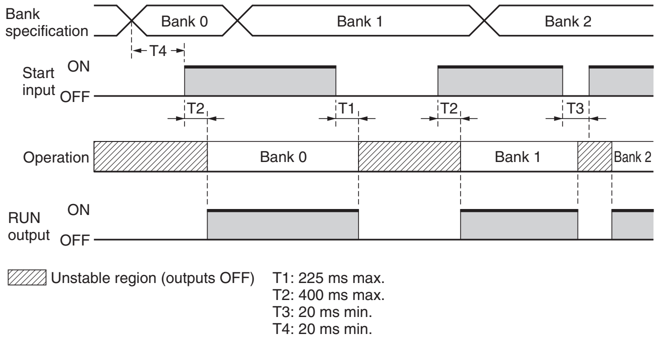
Cam Program (Bank No. 2)

Cam Program (Bank No. 1)

Cam Program (Bank No. 0)

Control output (cam number)	Step 0		Step 1			Step 9	
	ON angle	OFF angle	ON angle	OFF angle		ON angle	OFF angle
1	45°	90°	135°	225°		270°	315°
2	0°	90°	135°	180°		---	---
32	90°	225°	270°	285°		315°	345°

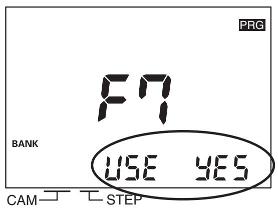
In Run Mode or Test Mode, the start input must be turned OFF and ON as shown in the following diagram in order to change banks. Control the start input when changing banks.



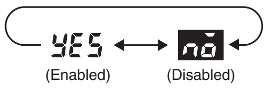
Bank Enable/Disable (F7)

The default setting disables the bank function. To use banks, change the setting using the F7 menu in the Function Setting Mode.

Setting Display



Enable or disable the bank function with the ANGLE Keys [+][−].



Bank Switching Method (F8)

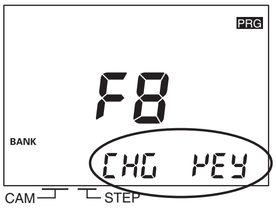
The following methods can be used to switch the bank: the bank inputs on the terminal block or the BANK Key on the front of the Cam Positioner. The method is set using the F8 menu in the Function Setting Mode.

Setting	Display	Description
Bank input (IN)	In	Banks can be changed only with the bank inputs. Even if a different bank number is displayed in Programming Mode, the bank specified with the bank inputs will be used after switching to Run Mode or Test Mode.
Bank Key (KEY)	KEY	Banks can be changed only with the BANK Key. Bank inputs are disabled.

Note: 1. Default settings are shown in reverse type.

2. This setting can be made only when the Bank Function (F7) has been enabled.

Setting Display



Use the ANGLE Keys [+][−] to set the bank switching method.

The bank inputs on the terminal block are used as shown in the following table.

Bank No.	Bank input terminals		
	1	2	4
0	OFF	OFF	OFF
1	ON	OFF	OFF
2	OFF	ON	OFF
3	ON	ON	OFF
4	OFF	OFF	ON
6	ON	OFF	ON
6	OFF	ON	ON
7	ON	ON	ON

ON: Shorted to COM terminal.

OFF: Open

Bank Copy (F9)

Programs can be copied between banks. This function is convenient to copy a program to a different bank when only some of the ON/OFF angle settings need to be changed.

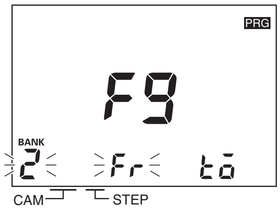
Note: This operation can be used only when the Bank Function (F7) has been enabled.

Example: Copying the Program in Bank 2 to Bank 3

Banks are copied using the F9 menu in the Function Setting Mode.

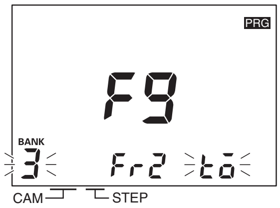
Setting Display

1. Set the number of the bank to be copied.



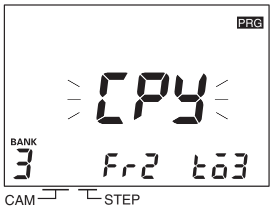
Set bank number 2 (the copy source) with the BANK Key and then press the WRITE Key.

2. Set the number of the bank to receive the copy.



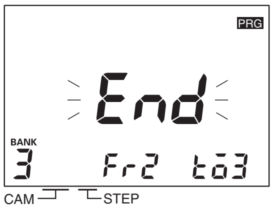
Set bank number 3 (the copy destination) with the BANK Key and then press the WRITE Key.

3. Execute the copy.



Confirm that CPY is displayed and then press the WRITE Key again.

4. Copying completed.



After completion of copying End is displayed for approx. 1 s and the previous display will be resumed.

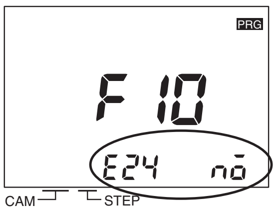
E24 Detection (F 10)

Displaying E24 errors (Encoder disconnected) can be disabled. The setting does not normally need to be changed. When the Y92C-30 Parallel Input Adapter (order separately) is used to connect more than one H8PS to the same Encoder, an E24 error can appear even if the Encoder connection is normal. If this happens, use the E24 Detection function (F10) in the Function Setting Mode to disable E24 detection displays.

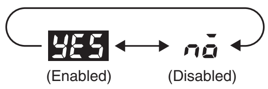
Setting	Display	Description
Enabled	YES	An E24 error will be displayed if the Encoder is not connected correctly in Run Mode or Test Mode.
Disabled	no	An E24 error will not be displayed even if an Encoder is not connected.

Note: Default settings are shown in reverse type.

Setting Display



Enable or disable E24 detection with the ANGLE Keys [+][−].



■ Self Diagnostic Function

The following displays will appear on the main display if an error occurs. If an error occurs, all outputs (including cam, pulse, and run outputs) will be turned OFF.

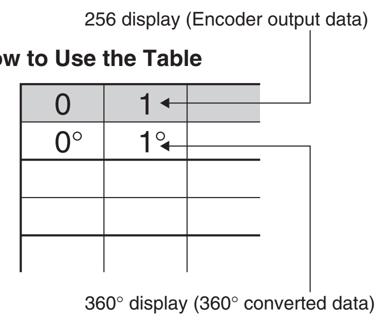
Display	Meaning	Recovery method
E00	Origin designation data error	Press the CLEAR Key for at least 3 s. All settings, including the origin designation data, will be initialized.
E11	Memory error: RAM error	Cycle the power supply.
E12	Memory error: Checksum error	Press the CLEAR Key for at least 3 s. All settings, including the origin designation data, will be initialized.
E13	CPU error	Cycle the power supply.
E21	Response speed exceeded	The Encoder is rotating faster than the allowable range. Reduce the speed to within the allowable range. Then cycle the power supply or switch to Programming Mode and then to Run Mode.
E22	Encoder data error	There are surges or noise around the product or in the wiring. Check the wiring and protect the product from surges and noise. Then cycle the power supply.
E23	Encoder resolution inconsistent	Set the Encoder resolution according to the specifications of the Encoder. Then cycle the power supply.
E24	Encoder disconnected	Connect the Encoder connector properly. Then, cycle the power supply or switch to Programming Mode and then to Run Mode.

Angle Data Table

To assist with programming when using an Encoder with a resolution of 256/rotation, displays and settings may be done by conversion to 360 degrees by setting a pin on the DIP switch inside the front cover. The following table shows the conversions.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0°	1°	3°	4°	6°	7°	8°	10°	11°	13°	14°	15°	17°	18°	20°	21°
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
23°	24°	25°	27°	28°	30°	31°	32°	34°	35°	37°	38°	39°	41°	42°	44°
32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
45°	46°	48°	49°	51°	52°	53°	55°	56°	58°	59°	60°	62°	63°	65°	66°
48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
68°	69°	70°	72°	73°	75°	76°	77°	79°	80°	82°	83°	84°	86°	87°	89°
64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
90°	91°	93°	94°	96°	97°	98°	100°	101°	103°	104°	105°	107°	108°	110°	111°
80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
113°	114°	115°	117°	118°	120°	121°	122°	124°	125°	127°	128°	129°	131°	132°	134°
96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
135°	136°	138°	139°	141°	142°	143°	145°	146°	148°	149°	150°	152°	153°	155°	156°
112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
158°	159°	160°	162°	163°	165°	166°	167°	169°	170°	172°	173°	174°	176°	177°	179°
128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
180°	181°	183°	184°	186°	187°	188°	190°	191°	193°	194°	195°	197°	198°	200°	201°
144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
203°	204°	205°	207°	208°	210°	211°	212°	214°	215°	217°	218°	219°	221°	222°	224°
160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
225°	226°	228°	229°	231°	232°	233°	235°	236°	238°	239°	240°	242°	243°	245°	246°
176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
248°	249°	250°	252°	253°	255°	256°	257°	259°	260°	262°	263°	264°	266°	267°	269°
192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
270°	271°	273°	274°	276°	277°	278°	280°	281°	283°	284°	285°	287°	288°	290°	291°
208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
293°	294°	295°	297°	298°	300°	301°	302°	304°	305°	307°	308°	309°	311°	312°	314°
224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
315°	316°	318°	319°	321°	322°	323°	325°	326°	328°	329°	330°	332°	333°	335°	336°
240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255
338°	339°	340°	342°	343°	345°	346°	347°	349°	350°	352°	353°	354°	356°	357°	359°

How to Use the Table



Warranty and Application Considerations

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

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LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. M075-E2-03

In the interest of product improvement, specifications are subject to change without notice.

ZEN – the logical automatic tools for small-scale flexible control

The ZEN is a modular, expandable, programmable relay that is designed to provide flexible, automatic control for small-scale machines and facilities.
The ZEN combines all the functionality of timers, counters and relays to control multiple input and output signals, while being easy to install and program.
It enables any daily routine that involves switching and control to be easily automated, which saves time and effort.
And it is the perfect solution for building automation applications where multiple timer control is very important.

- 10 I/O models with 6 inputs and 4 outputs, expandable up to 34 I/Os
- 20 I/O models with 12 inputs and 8 outputs, expandable up to 44 I/Os
- With LCD screen, including calendar and clock function or LED indicator
- DC power supply units have analogue input
- Expansion units for 10 & 20 I/O versions with relay output or transistor

What functionality is required?

Economy type

How many I/O points?

- 10 (6 I, 4 O) Expandable up to 34 I/O → **ZEN-10C2**

- 20 (12 I, 8 O) Expandable up to 44 I/O → **ZEN-20C2**

LCD, buttons, calendar and clock

How many I/O points?

- 10 (6 I, 4 O) Expandable up to 34 I/O → **ZEN-10C1**

- 20 (12 I, 8 O) Expandable up to 44 I/O → **ZEN-20C1**

Expansion units

How many extra I/O points?

- 8 I/O (4 I, 4 O) → **ZEN-8E**

- 4 I/O (4 I or 4 O) → **ZEN-4E**

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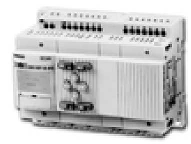
Category	ZEN											
												
Model	ZEN-10C1AR-A-V1	ZEN-10C2AR-A-V1	ZEN-10C1DR-D-V1	ZEN-10C2DR-D-V1	ZEN-10C1DT-D-V1	ZEN-10C2DT-D-V1	ZEN-20C1AR-A-V1	ZEN-20C2AR-A-V1	ZEN-20C1DR-D-V1	ZEN-20C2DR-D-V1	ZEN-20C1DT-D-V1	ZEN-20C2DT-D-V1
Selection criteria												
Type	LCD	LED	LCD	LED	LCD	LED	LCD	LED	LCD	LED	LCD	LED
Number of I/O points	10 expandable up to 34 I/O						20 expandable up to 44 I/O					
Inputs	6		6		6		12		12		12	
Inputs / power supply	100 to 240 VAC		24 VDC		24 VDC		100 to 240 VAC		24 VDC		24 VDC	
Outputs	4		4		4		8		8		8	
	Relays		Relays		Transistors		Relays		Relays		Transistors	
Features												
LCD, buttons, calendar and clock	■		■		■		■		■		■	
Analogue input (PNP)			■	■	■	■			■	■	■	■
Timers	16											
Holding timers	8											
Counters	16											
Weekly timers	16		16		16		16		16		16	
Calendar timers	16		16		16		16		16		16	
Displays	16		16		16		16		16		16	
Work bits	16											
Holding bits	16											
Analogue comparators (PNP)			4						4			
Comparators	16											
Page	E-3											

Accessories and options			
	EEPROM (for data security and copying)	ZEN-ME01	Enables programs and parameter settings to be saved or copied to another ZEN
	Battery (keeps time, date and bit values for 10 years at 25 °C)	ZEN-BAT01	10 year min. battery life (at 25 °C)
	Connecting cable for the programming software, RS-232C cable, 9-way 'D' connector for PC	ZEN-CIF01	2 m RS-232C (9-pin D-sub connector)
	Support software for Windows	ZEN-SOFT01-V3	Runs on Windows 95, 98, 2000, ME, XP, or NT 4.0
	PS unit 24 VDC, 1.3 A (30 W)	ZEN-PA03024	ZEN power supply unit
	ZEN kit - with LCD display AC version	ZEN-KIT01-EV3	Set containing CPU unit (ZEN-10C1AR-A-V1), support software connecting cable, ZEN support software and manual
	ZEN kit - with LCD Display DC version	ZEN-KIT02-EV3	Set containing CPU unit (ZEN-10C1DR-D-V1), support software connecting cable, ZEN support software and manual

Category	ZEN Expansion Modules					
						
Model	ZEN-4EA	ZEN-4ED	ZEN-4ER	ZEN-8EAR	ZEN-8EDR	ZEN-8EDT
Selection criteria						
Type						
Number of I/O points	4			8		
Inputs	4	4		4	4	4
Inputs / power supply	100 to 240 VAC	24 VDC	24 VDC	100 to 240 VAC	24 VDC	24 VDC
Outputs			4	4	4	4
			Relays	Relays	Relays	Transistors
Page	E-3					

Table of contents

■ Standard □ Available ☐ No / not available

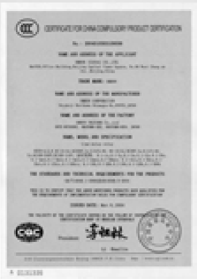
LEADING IN SERVICE

Focussed, progressive, distinctive. Be assured, choose Omron

At Omron we set high standards for ourselves. Our products are known all over the world for their unrivalled quality. But we offer more than just excellent quality. In an environment that places ever greater demands with regard to service, quality and costeffectiveness, other things are important too. Providing a top-quality service is what we do every day, including extra service as standard. This helps to ensure that we can provide tailor-made solutions for applications more effectively and more quickly.

More and more companies are choosing Omron as they seek to work in a partnership that is based on reliability and certainty.

Omron – the reassuring choice.



International standards and approvals

Our products carry all relevant international standards and approvals, including CCC (Chinese Compulsory Certification), which makes exporting your system much easier.

- Reliability, also for your customers
- Maximum flexibility
- Confidence

5-day repair service

More and more people are choosing Omron, as a high degree of reliability is a key feature of its products. You can always rely on Omron. Even if a product unexpectedly malfunctions, our repair team is ready to swing into action.

- Product repaired and returned to you within 5 days, including collection and delivery
- You can track the status of your repair on-line
- Repairs within warranty are completely free-of-charge

For more information please visit the Service & Support section at http://omron-industrial.com

EPLAN for Omron products

The majority of standard Omron products are provided in digital EPLAN format, which means that a few clicks of your mouse are all that is needed to design the right product into your switching panel.

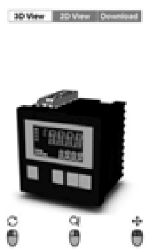
For more information please visit: http://omron-industrial.com/en/eplan/

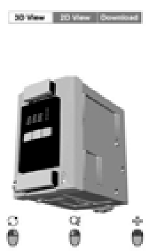
- Very easy to use
- Always the right product
- Reduced engineering time

Downloadable 2-D and 3-D CAD drawings

Designers of switching panels and machines can download clear 2-D and 3-D CAD drawings for all current products from http://omron-industrial.com/en/2D3D, which can easily be incorporated into your design.

- Large number of formats supported for greater flexibility
- Readily available
- Convenience that saves you time

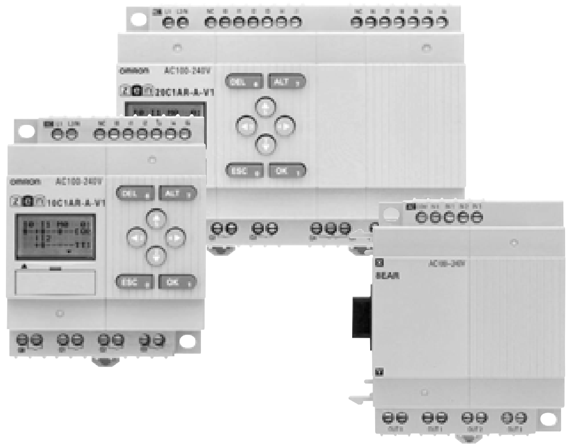




Programmable Relay
ZEN

Flexible Automation

- Two standard CPU's sizes; 10 I/O & 20 I/O
- All CPU models are extendable with maximum 3 expansion units.
- ZEN 10 I/O expandable up to 34 I/O
- ZEN 20 I/O expandable up to 44 I/O
- Version C1 are with LCD display with 4 lines and 12 characters, 8 programming / control buttons, Inputs / Power Supply, calendar & clock functionality.
- Version C2 is an economic type with LED status
- DC-models have 2 analogue inputs
- Inputs/Power Supply: 24 VDC or 100-240VAC
- Outputs: - Relays, 8A, 250 VAC
  - Transistors, 24 VDC, 500 mA
- Programming software optional



Model Number Structure

■ Model Number Legend

CPU units

ZEN-□□C□□□□-V1
1 2 3 4 5 6

1& 2. CPU model

10	10 I/O model
20	20 I/O model

3. Type classifier

1	LCD display, buttons, calendar & clock
2	LED indication

4. Input type

A	AC input
D	DC input

5. Output type

R	Relay output
T	Transistor output

6. Supply voltage

A	AC power supply
D	DC power supply

Expansions units

ZEN-□E□□
1 2 3

1. Number of I/O

8	4 inputs & 4 outputs
4	4 points or 4 outputs

2. Input type

A	AC input
D	DC input
	No input available

3. Output type

R	Relay output
T	Transistor output
	No output available

Ordering Information

List of models

Name	No. of I/O points	Display type	Power Supply voltage	Inputs		Outputs		Buttons, calendar & clock	Analog input	Model number
CPU Units	10	LCD	100 to 240 VAC	6	100 to 240 VAC	4	Relays	Yes	No	ZEN-10C1AR-A-V1
		LED						No	No	ZEN-10C2AR-A-V1
		LCD	24 VDC	6	24 VDC	4	Relays	Yes	Yes	ZEN-10C1DR-D-V1
		LED						No	Yes	ZEN-10C2DR-D-V1
		LCD	24 VDC	6	24 VDC	4	Transistors	Yes	Yes	ZEN-10C1DT-D-V1
		LED						No	Yes	ZEN-10C2DT-D-V1
	20	LCD	100 to 240 VAC	12	100 to 240 VAC	8	Relays	Yes	No	ZEN-20C1AR-A-V1
		LED						No	No	ZEN-20C2AR-A-V1
		LCD	24 VDC	12	24 VDC	8	Relays	Yes	Yes	ZEN-20C1DR-D-V1
		LED						No	Yes	ZEN-20C2DR-D-V1
		LCD	24 VDC	12	24 VDC	8	Transistors	Yes	Yes	ZEN-20C1DT-D-V1
		LED						No	Yes	ZEN-20C2DT-D-V1
Expansion I/O Units	8	-		4	100 to 240 VAC	4	Relays	-		ZEN-8EAR
		-		4	24 VDC	4	Relays	-		ZEN-8EDR
		-		4	24 VDC	4	Transistors	-		ZEN-8EDT
	4	-		4	100 to 240 VAC	-	-	-		ZEN-4EA
		-		4	24 VDC	-	-	-		ZEN-4ED
		-		-	-	4	Relays	-		ZEN-4ER

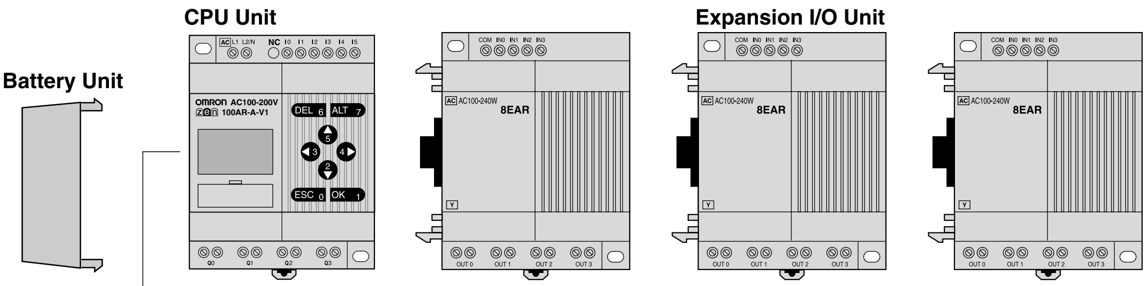
Accessories

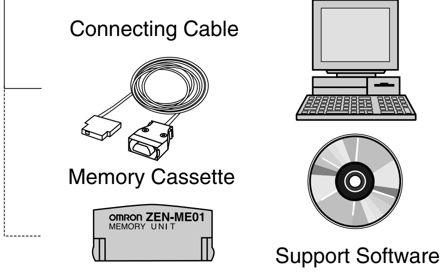
Name	Specifications	Remarks			Model number
Memory cassette	EEPROM (for data security and copying)	Enables programs and parameter settings to be saved or copied to another ZEN (See note.)			ZEN-ME01
			LCD type	LED type	
		Transfer from ZEN to Memory Cassette	Supported	Not Supported	
		Transfer from Memory Cassette to ZEN	Supported	Supported (Automatic transfer when power turned ON)	
		Memory Cassette initialization	Supported	Not Supported	
Connecting cable	2-m RS-232C (9-pin sub-D connector)	-			ZEN-CIF01
Battery Unit	10 years min. Battery life (at 25° C)	The program and parameter settings are backed up in the CPU Unit's internal EEPROM and will not be lost. Use the Battery Unit to prevent loss of calendar/clock, holding bits, holding timer present values, counter present values, and other data when the power is turned OFF for an extended time (for 2 days or more at 25° C). This data is otherwise backed up using RAM and a super-capacitor.			ZEN-BAT01
ZEN Support Software	Runs on Windows 95, 98, 2000, ME, XP or NT 4.0.	Specifically designed for the ZEN (CD-ROM).			ZEN-SOFT01-V3

Note: Memory Cassettes created using the CPU Unit can be read to the CPU Unit, regardless of which model is used, however the following points must be taken into consideration.

1. When using a Memory Cassette created with a V1 CPU Unit for a Pre-V1 CPU Unit, use the Memory Cassette within the ranges for the Pre-V1 CPU Unit's timers, holding timers, counters, weekly timers, calendar timers, and displays.
2. When using a Memory Cassette created with a CPU Unit with 20 I/O points for a CPU Unit with 10 I/O points, use only up to 6 inputs and 4 outputs for the I/O bit area.

System Configuration





- Up to 3 Expansion I/O Units can be connected, regardless of the I/O specifications or Unit type.
- The Connecting Cable and Memory Cassette cannot be connected to the ZEN at the same time.
- Programs cannot be written to LED-type CPU Units without the ZEN Support Software or a Memory Cassette.

■ Support Software and CPU Unit Combinations

Support Software Version		ZEN-SOFT01 Ver. 1.00	ZEN-SOFT01-V2 Ver. 2.00	ZEN-SOFT01-V3 Ver. 3.00
Pre-V1 Units		Can be used.	Can be used.	Can be used.
V1 Units	10 I/O points	Can be used, with restrictions (See note.)	Can be used, with restrictions (See note.)	Can be used.
	20 I/O points	Cannot be used.	Cannot be used.	Can be used.

Note: Only half of each of the timer, holding timer, counter, weekly timer, calendar timer, and display function areas can be used (i.e., the Pre-V1 bit range).

Specifications

■ General Specifications

Item	Specification	
	ZEN-☐0C☐AR-A-V1	ZEN-☐0C☐D☐-D-V1
Power supply voltage	100 to 240 VAC	24 VDC
Rated power supply voltage	85 to 264 VAC	20.4 to 26.4 VDC
Power consumption	30 VA max. (With 3 Expansion Units connected)	6.5 W max. (With 3 Expansion Units connected)
Inrush current	40 A max.	10 A max.
Insulation resistance	Between power supply AC external and input terminals, and relay output terminals: 20 M_ min. (at 500 VDC)	
Dielectric strength	Between power supply AC external and input terminals, and relay output terminals: 2,300 VAC, 50/60 Hz for 1 minute with leakage current of 1 mA max.	
Noise immunity	Conforms to IEC61000-4-4, 2 kV (power supply line)	
Vibration resistance	Conforms to JIS C0040, 10 to 57 Hz, amplitude 0.075 mm, 57 to 1,500 Hz, acceleration: 9.8 m/s2 80 minutes in X, Y, and Z directions (sweep time: 8 min (No. sweeps: 10 = 80 min.))	
Shock resistance	Conforms to JIS C0041. 147 m/s2, 3 times in X, Y, and Z directions.	
Ambient temperature	LCD-type CPU Unit (operation panel and calendar/clock function): 0 to 55°C LED-type CPU Unit (no operation panel or calendar/clock function): –25 to 55°C	
Ambient humidity	10% to 90% (with no condensation)	
Ambient conditions	No corrosive gases	
Ambient storage temperature	LCD-type CPU Unit (operation panel and calendar/clock function): –20 to 75°C LED-type CPU Unit (no operation panel or calendar/clock function): –40 to 75°C	

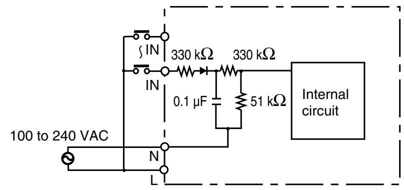
■ Performance Specifications

Item	Specification
Control method	Stored program control
I/O control method	Cyclic scan
Programming language	Ladder diagram
Program capacity	96 lines (3 input conditions and 1 output per line)
Max. No. of control I/O points	44 points CPU Unit: 12 inputs and 8 outputs Expansion I/O Units: 4 inputs and 4 outputs each, up to 3 Units.
LCD display	12 characters x 4 lines, with backlight (LCD-type CPU Unit only)
Operation keys	8 (4 cursor keys and 4 operation keys) (LCD-type CPU Unit only)
Memory backup	Internal EEPROM (or optional Memory Cassette) • User programs • Parameter settings Internal RAM, super-capacitor hold (or optional Battery Unit) • Holding bits • Holding timer and counter values Super capacitor hold (or optional Battery Unit) • Calendar and clock
Super-capacitor holding time	2 days min. (25°C)
Battery life (ZEN-BAT01)	10 years min. (25°C)
Time function (RTC)	ZEN☐0C1☐☐-☐ only, accuracy: 1 to 2 min/month (at 25°C)
Terminal block	Solid wiring terminal block (Used solid wire or pin crimp terminals.)
Power supply holding time	ZEN-☐0C☐AR-A: 10 ms min.ZEN-☐0C☐D☐-D: 2 ms min.
Weight	300 g max.

Input Specification

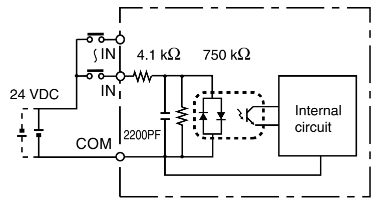
CPU Unit

AC Inputs (Not Isolated)

Item	Specifications	Circuit drawing
Input voltage	100 to 240 VAC +10%, –15%, 50/60 Hz	
Input impedance	680 k	
Input current	0.15 mA/100 VAC, 0.35 mA/240 VAC	
ON voltage	80 VAC min.	
OFF voltage	25 VAC max.	
ON response time	50 ms or 70 ms at 100 VAC (See note.)	
OFF response time	100 ms or 120 ms at 240 VAC (See note.)	

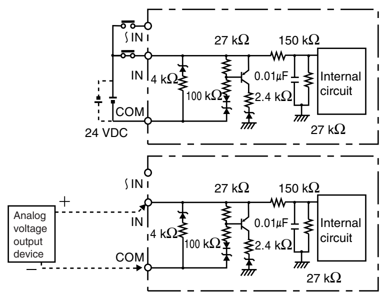
Note: Can be selected using the input filter settings

DC Inputs I0 to I3 (I0 to I9 for Units with 20 I/O points), V1 Units (Photocoupler Isolated).

Item	Specifications	Circuit drawing
Input voltage	24 VDC +10%, –15%	
Input impedance	5 k	
Input current	5 mA (typ.)	
ON voltage	16.0 VDC min.	
OFF voltage	5.0 VDC max.	
ON response time	15 ms or 50 ms (See note.)	
OFF response time		

Note: Can be selected using the input filter settings

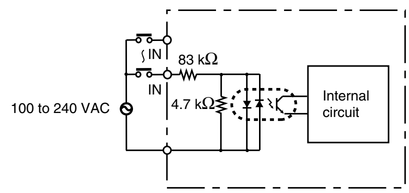
DC Inputs I14 and I15 (Ia and Ib for Units with 20 I/O points), V1 Units (Not Isolated)

Item		Specifications	Circuit drawing
DC inputs	Input voltage	24 VDC +10%, –15%	 When connecting analog I/O devices, always connect the negative (–) side to the COM terminal.
	Input impedance	5 k	
	Input current	5 mA (typ.)	
	ON voltage	14.0 VDC min.	
	OFF voltage	4.5 VDC max.	
	ON response time	15 ms or 50 ms (See note.)	
	OFF response time		
Analog inputs	Input range	0 to 10 V	
	External input impedance	150 k_ min.	
	Resolution	0.1 V (1/100 FS)	
	Overall accuracy (–25 to 55°C)	10% FS	
	AD conversion data	0 to 10.5 V (in increments of 0.1 V)	

Note: Can be selected using the input filter settings.

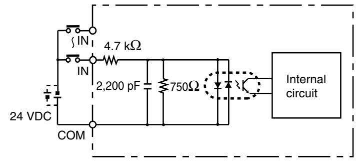
Expansion I/O Unit

AC Inputs (Photocoupler Isolated)

Item	Specifications	Circuit drawing
Input voltage	100 to 240 VAC +10%, –15%, 50/60 Hz	
Input impedance	83 k	
Input current	1.2 mA/100 VAC, 2.9 mA/240 VAC	
ON voltage	80 VAC min.	
OFF voltage	25 VAC max.	
ON response time	50 ms or 70 ms at 100 VAC (See note.)	
OFF response time	100 ms or 120 ms at 240 VAC (See note.)	

Note: Can be selected using the input filter settings.

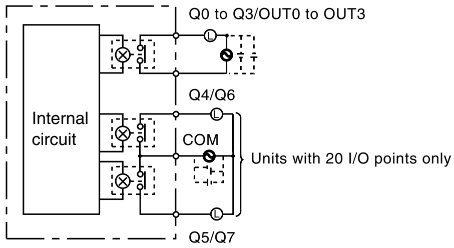
DC Inputs (Photocoupler Isolated)

Item	Specifications	Circuit drawing
Input voltage	24 VDC +10%, –15%	
Input impedance	4.7 k	
Input current	5 mA (typ.)	
ON voltage	16.0 VDC min.	
OFF voltage	5.0 VDC max.	
ON response time	15 ms or 50 ms (See note.)	
OFF response time		

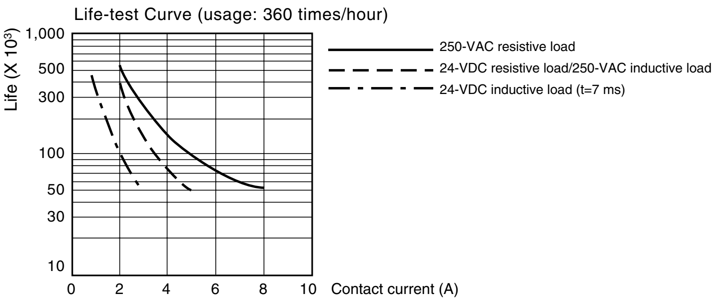
Note: Can be selected using the input filter settings.

■ Output Specifications (CPU Unit/Expansion I/O Unit)

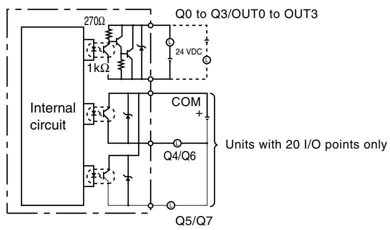
Relay Output Type

Item		Specifications	Circuit drawing
Maximum switching capacity		250 VAC/8 A (Resistive load: cos = 1) 24 VDC/5 A (Resistive load)	
Minimum switching capacity		5 VDC/10 mA (Resistive load)	
Relay life	Electrical	Resistive load: 50,000 times (cos = 1) Inductive load: 50,000 times (cos = 0.4)	
	Mechanical	10 million times	
ON response time		15 ms max.	
OFF response time		5 ms max.	

The life, under the worst conditions, of the output contacts used in ZEN relay outputs is given in the above table. Guidelines for the normal life of the relays are shown in the diagram on the right.



Transistor Output Type

Item	Specifications	Circuit drawing
Maximum switching capacity	24 VDC +10%, –15%, 500 mA	Each circuit is composed of an independent common circuit. 
Leakage current	0.1 mA max.	
Residual voltage	1.5 V max.	
ON response time	1 ms max.	
OFF response time	1 ms max.	

Operation

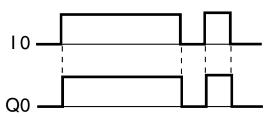
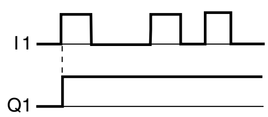
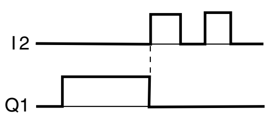
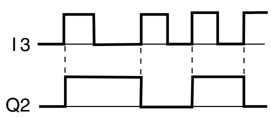
■ Bits

Name	Symbol	Bit addresses	No. of points	Operation	Details [2]
Input bits	I	I0 to Ib*	12	Reflect the ON/OFF status of the input devices connected to the input terminals on the CPU Unit.	-
Expansion input bits	X	X0 to Xb	12	Reflect the ON/OFF status of the input devices connected to the input terminals on the Expansion I/O Units.	
Output bits	Q	Q0 to Q7*	8	The ON/OFF status of these output bits is used to control the output devices connected to the output terminals on the CPU Unit.	1
Expansion output bits	Y	Y0 to Yb	12	The ON/OFF status of these output bits is used to control the output devices connected to the output terminals on the Expansion I/O Units.	
Work bits	M	M0 to Mf	16	Work bits can be used only within the ZEN program. I/Os for external devices cannot be made (i.e., all I/O is internal).	
Holding bits	H	H0 to Hf	16	Used the same as the work bits. However, if the power to the ZEN is turned OFF, these bits also maintain the previous ON/OFF status.	
Timers	T	T0 to Tf	16	X: ON-delay timer ■: (box) OFF-delay timer O: One-shot pulse timer F: Flashing pulse timer Functions are selected from the screen when parameter settings are made. Time units can be selected from the following: 0.01-s unit: 0.01 to 99.99 s min/s unit: 00 min 01 s to 99 min 59 s h/s unit: 00 h 01 min to 99 h 59 min	2
Holding timers	#	#0 to #7	8	Hold the present value being counted even if the trigger input or power supply is turned OFF and continue timing when the trigger input or power is restored.	
Counters	C	C0 to Cf	16	Reversible counters that can be incremented and decremented.	3
Weekly timers	@	@0 to @f	16	Turn ON and OFF during specified times on specified days.	4
Calendar timers	*	*0 to *f	16	Turn ON and OFF between specified dates.	5
Display bits	D	D0 to Df	16	Display any character string, time, or analog-converted display of timer or counter present values.	6
Analog comparator bits	A	A0 to A3	4	Used as program input conditions to output analog comparator comparison results. These bits can be used only for 24-VDC input CPU Units.	7
Timer/counter comparator bits	P	P0 to Pf	16	Compare the present values of timers (T), holding timers (#), and counters (C). Comparison can be made between the same two counters or timers, or with constants.	8
Button input bits	B	B0 to B7	8	Used as program input conditions and turn ON when operation keys are pressed in RUN Mode. These input bits can be used only with LCD-type CPU Units.	9

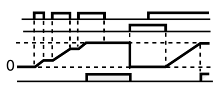
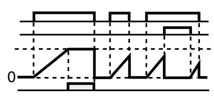
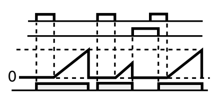
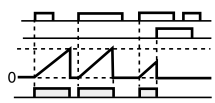
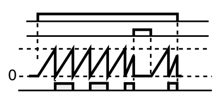
Note: * CPU Units with 10 I/O points have 6 input bits (I0 to I5) and 4 output bits (Q0 to Q3).

[2] More detail information on the coming pages

1 Additional Bit Output Functions

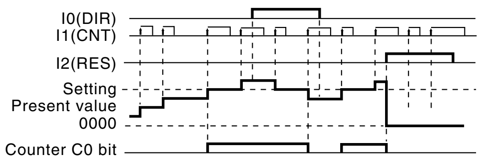
[: Normal	S: Set	R: Reset	A: Alternate
I0 —| |——————— [Q0	I1 —| |——————— SQ 1	I2 —| |——————— RQ 1	I3 —| |——————— AQ 2
			
Q0 will turn ON or OFF depending on the ON/OFF status of the execution condition I0.	Q1 will stay ON once the execution condition I1 has turned ON once. A reset is used to turn Q1 OFF.	Q1 is forced OFF when the execution condition I2 is turned ON.	Q2 alternates between turning ON and OFF when the execution condition I3 turns ON.

2 Using Timers and Holding Timers

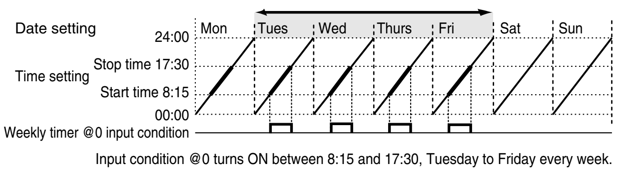
Available timers	Holding timers (#0 to #7)	Timers (T0 to Tf)			
Timer type	X	X	■	O	F
	ON-delay timer only	ON-delay timer	OFF-delay timer	One-shot pulse timer	Flashing pulse timer
Operation	Turns ON after set delay after the trigger input turns ON.	Turns ON after set delay after the trigger input turns ON.	Stays ON while the trigger input is ON and turns OFF after a set delay after the trigger input has turned OFF.	Turns ON for a set period after the trigger input turns ON and regardless of how long the trigger input remains ON.	Repeatedly turns ON and OFF in a set cycle while the switch is ON.
Trigger input Reset input Setting Present value Timer input condition					
Main applications	To continue operation after momentary power loss or power interruptions.		Useful for OFF delay circuits for lights or fans.	Useful for set operations where operation is always required during a regular period only.	Useful for flashing emergency lights or sounding buzzers as the output for an alarm circuit.
	When delayed operation or a time lag is required.				

3 Counter Operation

The counter bit turns ON when the counter value (present value) reaches the set value (present value ≥ set value). The count returns to 0 and the counter bit turns OFF when the reset input turns ON. Count inputs are not accepted while the reset input is turned ON. The counter present value and counter bit (ON/OFF) are held even if the operating mode is changed or the power supply is interrupted

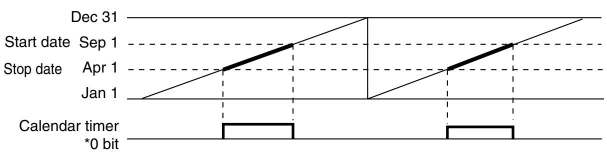


4 Weekly Timer Operation



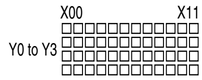
Input condition @0 turns ON between 8:15 and 17:30, Tuesday to Friday every week.

5 Calendar Timer Operation



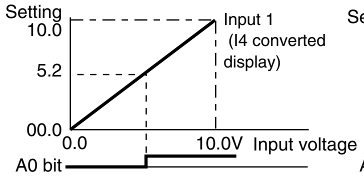
Bit *0 turns ON between April 1 and August 31.

6 Display Settings

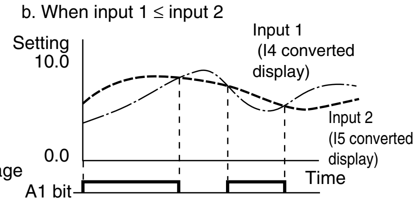
Backlight Terminal mode switching	L0: No backlight; Manual display L1: Backlight; Manual display L2: No backlight; Automatic display L3: Backlight; Automatic display	
Display start position	X (digit): 00 to 11 Y (line): 0 to 3	
Display object	CHR	Characters (up to 12 characters - English, numerals, symbols)
	DAT	Month/day (5 digits □□/□□)
	CLK	Hour/minute (5 digits □□:□□)
	I4 to I5	Analog-converted value (4 digits □□:□)
	T0 to Tf	Timer present value (5 digits □□.□□)
	#0 to#7	Holding timer present value (5 digits □□.□□)
	C0 to Cf	Counter present value (4 digits □□□□)
Monitoring	A: Can read settings during operation. D: Cannot read settings during operation.	

7 Analog Comparator Operation Example

a. When input 1 ≥ 5.2 V

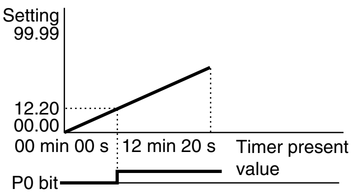


b. When input 1 ≤ input 2

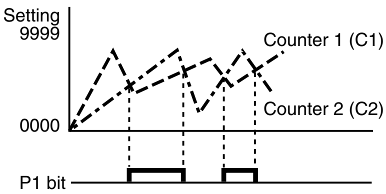


8 Timer/Counter Comparator Operations

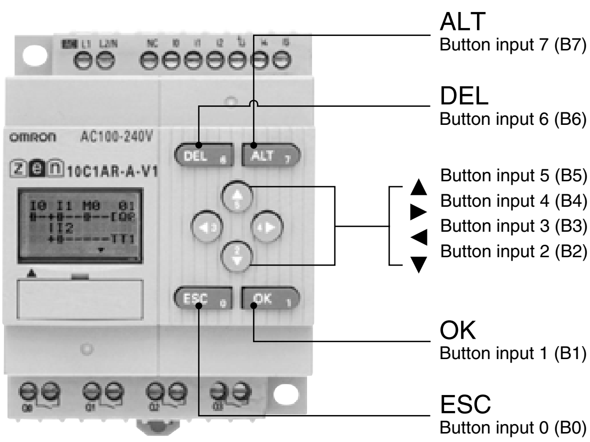
a. When Timer 0 (T0) ≥ 12 min 20 s



b. When Counter 1 (C1) is ≤ Counter 2 (C2).



9 Specifications for Button Input Bits



Programmable relays

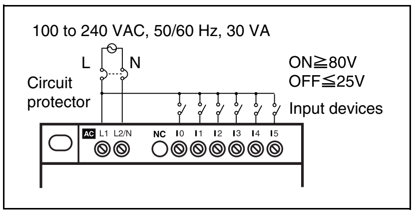
Connections

■ Input Circuit Wiring

CPU units with 10 I/O points

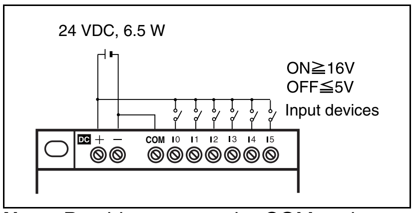
AC input

CPU Units with 10 I/O Points (V1 and Pre-V1 Units)



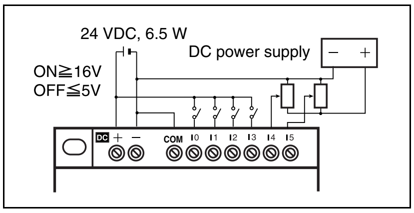
DC input

For connections to negative (–) common (V1 Units) (PNP-connection)



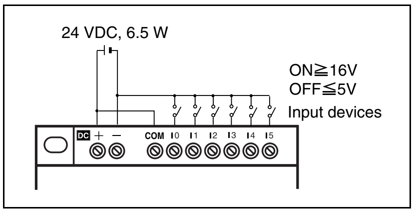
Note: Provide power to the COM and power supply terminals at the same time.

Input terminal I4/I5 analog input device connections (input range: 0 to 10 V) (PNP-connection)



Note: Always connect analog input devices to the negative (–) COM terminal.

For connections to positive (+) common (V1 Units) (NPN-connection)

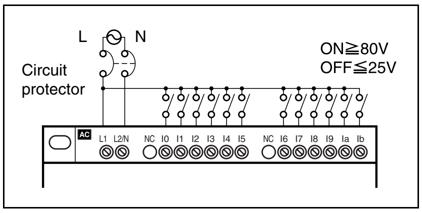


Note: I4/I5 cannot be used as analog input terminals with a positive (+) common terminal connection.

CPU Units with 20 I/O points

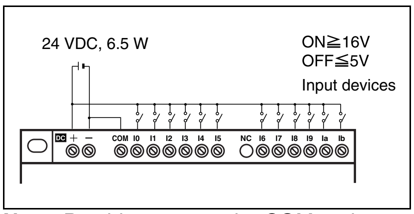
AC input

CPU Units with 20 I/O Points



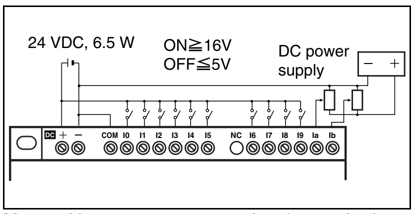
DC input

For connections to negative (–) common (PNP-connection)



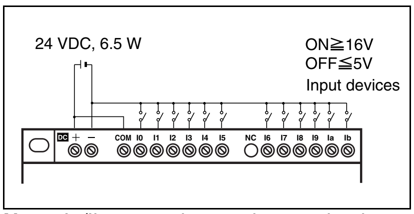
Note: Provide power to the COM and power supply terminals at the same time.

Input terminal Ia/Ib analog input device connections (input range: 0 to 10 V) (PNP-connection)



Note: Always connect analog input devices to the negative (–) COM terminal.

For connections to positive (+) common (NPN-connection)



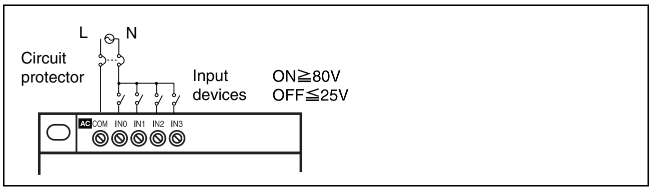
Note: Ia/Ib cannot be used as analog input terminals with a positive (+) common terminal connection.

Note: Provide power to the COM and power supply terminals at the same time.

Expansion I/O Units

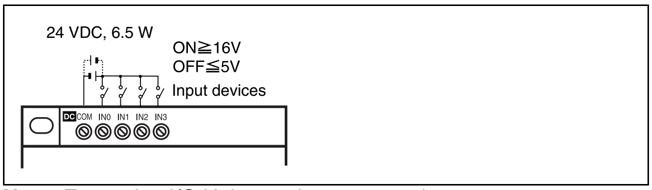
AC input

Expansion I/O Units



DC input

Expansion I/O Units (DC input type)

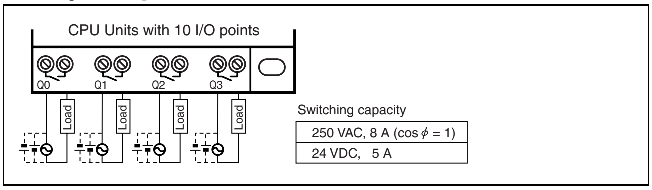


Note: Expansion I/O Units can be connected to either the positive (+) or negative (–) common terminal.

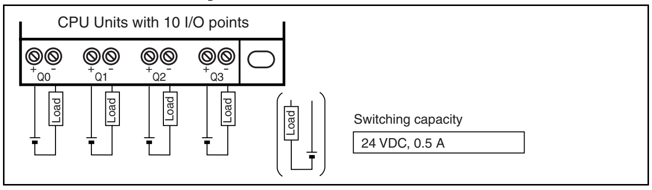
■ Output Circuit Wiring

CPU units with 10 I/O points

Relay output

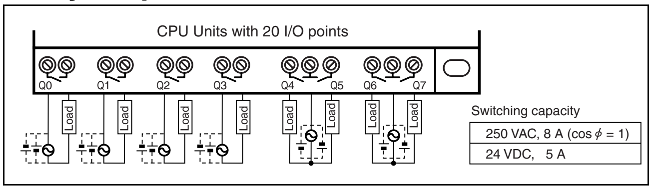


Transistor output

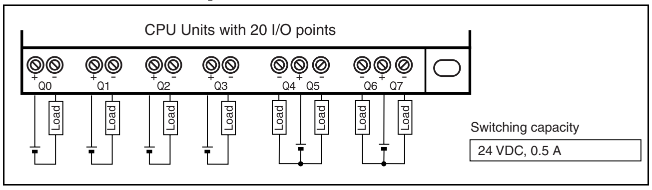


CPU units with 20 I/O points

Relay output

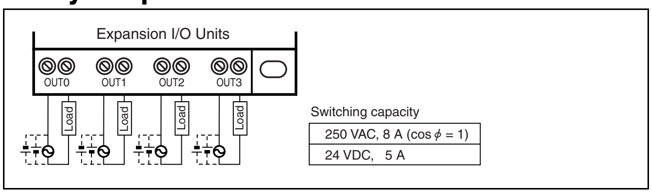


Transistor output

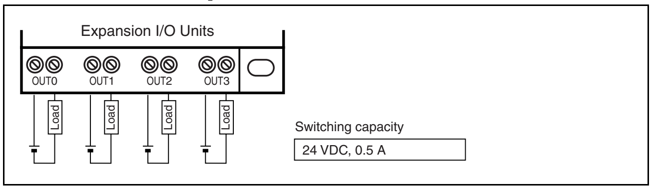


Expansion units with 10 I/O points

Relay output



Transistor output



Note: Units with Relay Outputs

All four relay output circuits in both CPU Units with 10 I/O points and Expansion I/O Units have independent contacts. CPU Units with 20 I/O points have 4 independent contacts (Q0 to Q3) and the remaining four (Q4 to Q7) have 2 points/common. There are no restrictions for polarity.

Note: Transistor Output Type

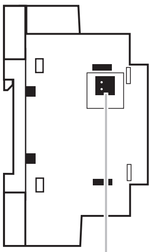
All four transistor output circuits in both CPU Units with 10 I/O points and Expansion I/O Units have independent contacts. CPU Units with 20 I/O points have 4 independent contacts (Q0 to Q3) and the remaining four (Q4 to Q7) have 2 points/common. The terminals have polarity, but the power supply and load connections can be swapped

Nomenclature

■ LCD type

10 I/O Units

Left Side

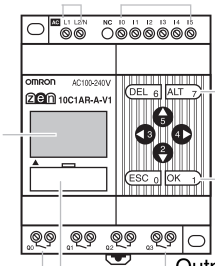


Battery Unit connector (Remove the seal to connect the Battery Unit.)

Front

Power supply terminals

Input terminals



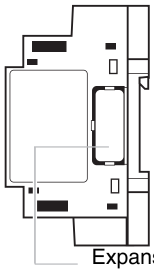
LCD

Operation buttons [1]

Output terminals

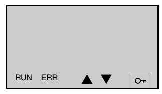
ZEN Support Software connector (also used for Memory Cassette.)

Right Side



Expansion Unit connector cover.
Remove this cover to connect Expansion Unit.

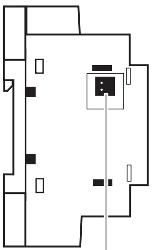
Icon Meanings



Icon	Meaning
RUN	Displayed while in RUN mode.
ERR	Indicates an error.
▲	Displayed when there is a higher-level menu or ladder program line than the one currently displayed.
▼	Displayed when there is a lower-level menu or ladder program line than the one currently displayed.
(key icon)	Displayed when a password has been set.

20 I/O Units

Left Side

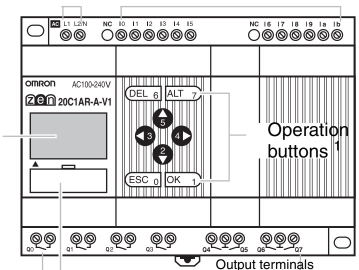


Battery Unit connector (Remove the seal to connect the Battery Unit.)

Front

Power supply terminals

Input terminals



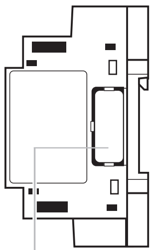
LCD

Operation buttons [1]

Output terminals

ZEN Support Software connector (also used for Memory Cassette.)

Right Side



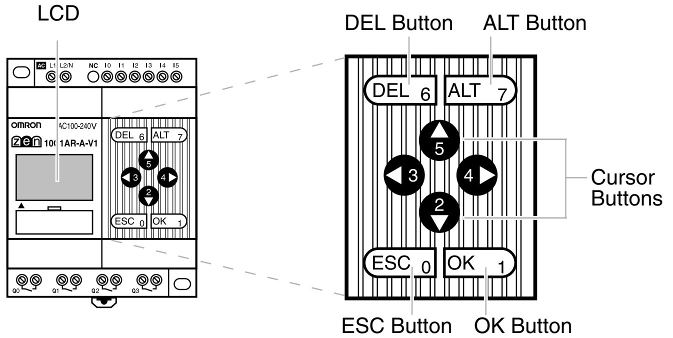
Expansion Unit connector cover.
Remove this cover to connect Expansion Unit.

Note: [1] See page E-11 for Specifiactios Buttons Input Bits

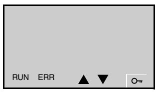
Display Screen and Basic Operations

The display screen for the LCD-type CPU Units and the operations of the buttons are shown below

.



Icon Meanings



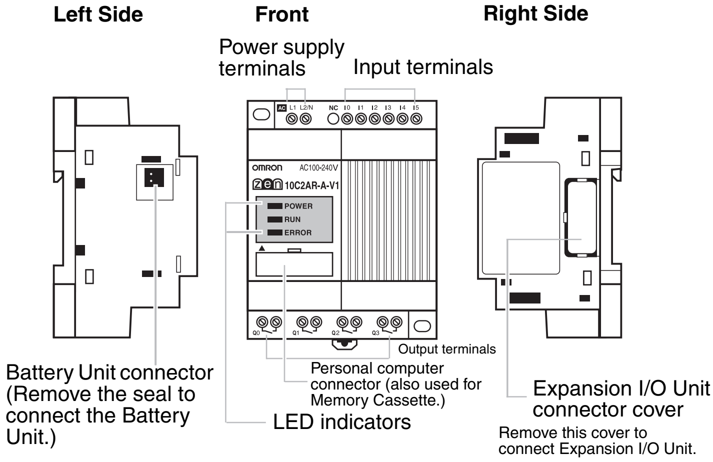
Icon	Meaning
RUN	Displayed while in RUN mode.
ERR	Indicates an error.
▲	Displayed when there is a higher-level menu or ladder program line than the one currently displayed.
▼	Displayed when there is a lower-level menu or ladder program line than the one currently displayed.
🔑	Displayed when a password has been set.

Operation Button Names and Operations

Button	Function			
	Menus	Writing ladder program	Setting parameters	Button switch (See page E-11)
DEL	---	Deletes inputs, outputs, connection lines, and blank lines.	---	B6 ON
ALT	---	Switches between normally open and normally closed conditions. Changes to connection line write mode. Inserts a line.	---	B7 ON
Up	Moves the cursor up and down.	Moves the cursor up and down. Selects bit types and functions.	Moves the cursor up and down. Changes numerals and parameters.	B5 ON
Down				B2 ON
Left	---	Moves the cursor right and left.	Moves the cursor right and left.	B3 ON
Right				B4 ON
ESC	Returns to the previous screen.	Cancels the setting and returns to the previous operation.	Cancels the setting and returns to the previous operation.	B0 ON
OK	Selects the menu item at the cursor position.	Confirms the setting.	Confirms the setting.	B1 ON

■ LED type

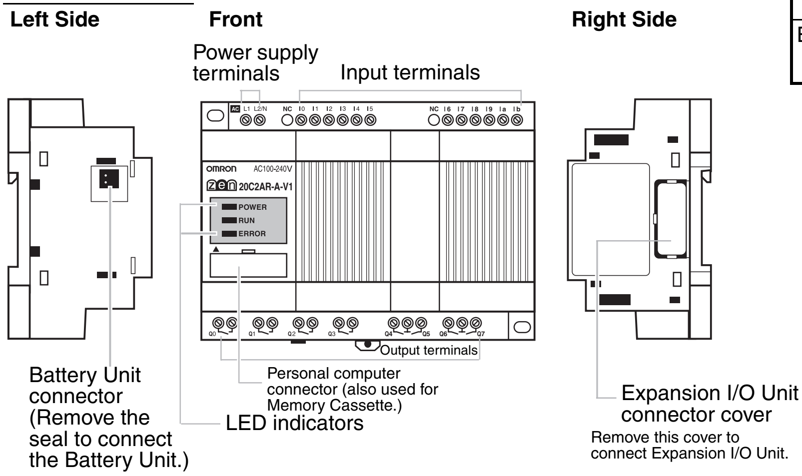
10 I/O Units



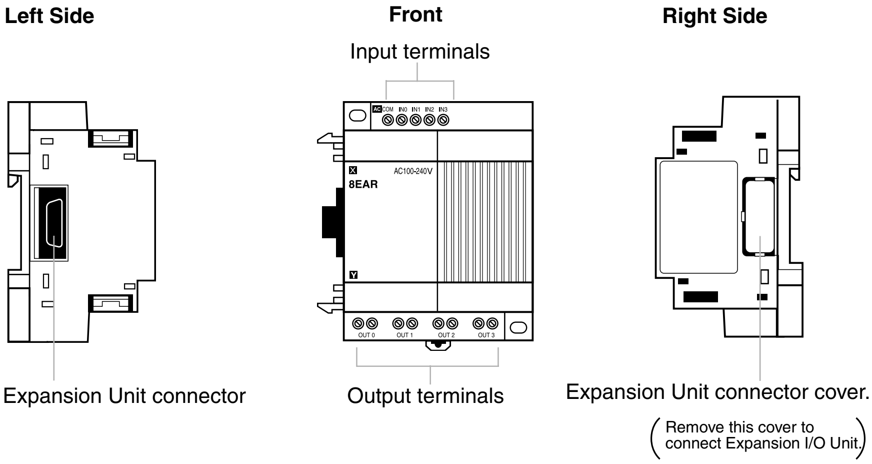
Indicators

Name	Color	Meaning	
POWER	Green	Lit	Power supplied
		Not lit	No power
RUN	Green	Lit	Operating (RUN)
		Not lit	Stopped (STOP)
ERROR	Red	Lit	Error
		Not lit	Normal

20 I/O Units

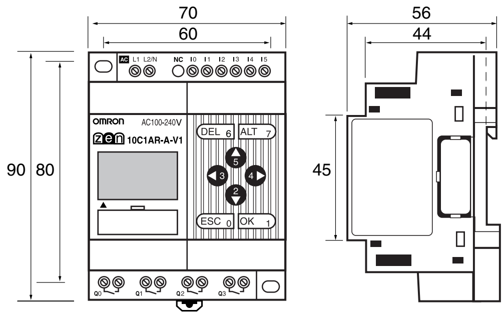


■ Expansion units

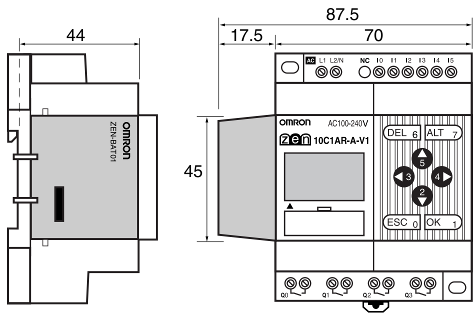


Dimensions (Unit: mm)

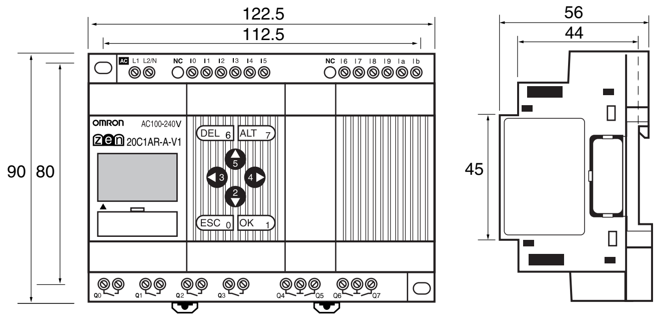
CPU Units with 10 I/O Points (LCD/LED Types)



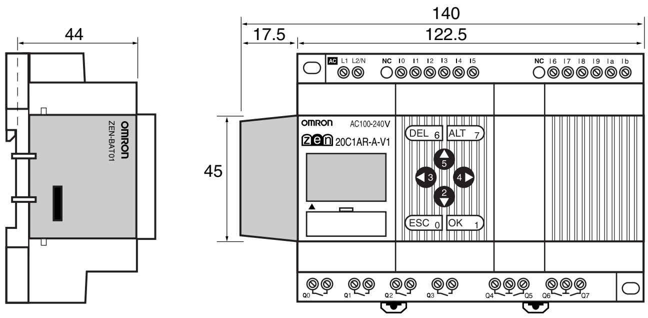
With Battery Unit Mounted



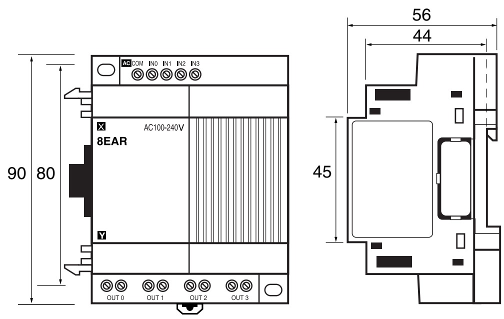
CPU Units with 20 I/O Points (LCD/LED Types)



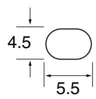
With Battery Unit Mounted



Expansion I/O Units (4 inputs, 4 outputs, 8 I/O)



Unit Mounting Hole (Same for all Units)



Precautions

For information on precautions please refer to ZEN operation manual Cat. No. Z183-E1.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. L01E-EN-01

Switching Mode Power Supply

ZEN-PA03024

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if your have any questions or comments. Refer to *Warranty and Application Considerations* (page E-26), and *Safety Precautions* (page E-24)

New Compact Power Supply (30 W) for ZEN Programmable Relays

- Slim size with a depth of 56 mm (W × H × D: 70 × 90 × 56 mm).
- EMI: Conforms to EN61000-6-3 (Class B).
- Allows parallel operation.
- Output voltage: 24 VDC; Output current: 1.3 A; Capacity: 30 W
- Safety standards: UL508/60950/1604, CSA C22.2 No. 14/60950/213, EN60950(VDE0806), EN50178(VDE0160)
- Uses lead-free soldering.
- Six-language instruction manual provided.

Programmable relays

Model Number Structure

■ Model Number Legend

ZEN-PA 030 24
1 2 3

1. **Unit**
   PA: Power supply unit
2. **Power Ratings**
   030: 30 W
3. **Output voltage**
   24: 24 V

Ordering Information

■ List of Models

Power ratings	Input voltage	Output voltage	Output current	Model number
30 W	100 to 240 VAC	24 VDC	1.3 A	ZEN-PA03024

■ Accessories (Order Separately)

Name		Models
Mounting DIN-rail	50 cm (l) × 7.3 mm (t)	PFP-50N
	1 m (l) × 7.3 mm (t)	PFP-100N
	1 m (l) × 16 mm (t)	PFP-100N2
End Plate		PFP-M
Spacer		PFP-S

Specifications

■ Ratings/Characteristics

Efficiency (typical)			80% min.
Input	Voltage		100 to 240 VAC (85 to 264 VAC), 95 to 350 VDC (See note 1.)
	Frequency		50/60 Hz (47 to 450 Hz)
	Current	100 VAC input	0.8 A max.
		200 VAC input	0.45 A max.
	Leakage current	100 VAC input	0.4 mA max.
		200 VAC input	0.75 mA max.
	Inrush current (See note 2.)	100 VAC input	25 A max.
		200 VAC input	50 A max.
Output	Voltage adjustment range (See note 3.)		-10 to 15% (with V.ADJ) of rated output voltage
	Ripple		2% (p-p) max. (-25 to -10°C: 4% max.)
	Input variation influence		0.5% max.
	Load variation influence (rated input voltage)		1.5% max.
	Temperature variation influence		0.05%/°C max.
	Start up time (See note 2.)		1,000 ms max. (100 VAC or 200 VAC, at rated output voltage)
	Hold time (See note 2.)		15 ms min., 20 ms (typical) (100 VAC or 200 VAC, at rated output voltage)
Additional functions	Overload protection (See note 2.)		105% to 135% of rated load current, inverted L drop, intermittent, automatic reset
	Parallel operation		Yes (2 units max. For details, refer to the derating curve in *Engineering Data*. For DC input, parallel operation is possible only for 110 to 350 VDC.)
	Series operation		No
Others	Ambient temperature		Operating: Refer to the derating curve in *Engineering Data*. (with no icing or condensation) Storage: -25 to 75°C (with no icing or condensation)
	Ambient humidity		Operating: 10 to 90% Storage: 10 to 90%
	Mounting method		DIN-rail mounting, surface mounting
	Dielectric strength		2.0 kVAC for 1 min. (between all inputs and exposed non-current-carrying metal parts; detection current: 10 mA max.) 3.0 kVAC for 1 min. (between all inputs and all outputs; detection current: 20 mA max.) 1.0 kVAC for 1 min. (between all outputs and non-current-carrying metal parts; detection current: 10 mA max.)
	Insulation resistance		100 MΩ min. (between all outputs and all inputs/exposed non-current-carrying metal parts) at 500 VDC
	Vibration resistance		10 to 55 Hz, 0.375-mm single amplitude for 2 h each in X, Y, and Z direction
	Shock resistance		300 m/s^2, 3 times each in ±X, ±Y, ±Z directions
	Output indicator		Yes (color: green)
	EMI	Conducted emissions	Conforms to EN61000-6-3 (Class B)
		Radiated emissions	Conforms to EN61000-6-3 (Class B)
	Approved standards		UL: UL508 Listing Class 2, 60950, 1604 (Class I/Division 2) cUL: CSA C22.2 No. 14 Class 2, No. 60950, No. 213 (Class I/Division 2) EN/VDE: EN60950 (=VDE0805), EN50178 (=VDE0160) Conforms to VDE0106/P100 (Finger protection)
	Weight		240 g max.

Note: 1. This product has been approved for safety standards only when an AC input is used. It has not been approved when a DC input is used.

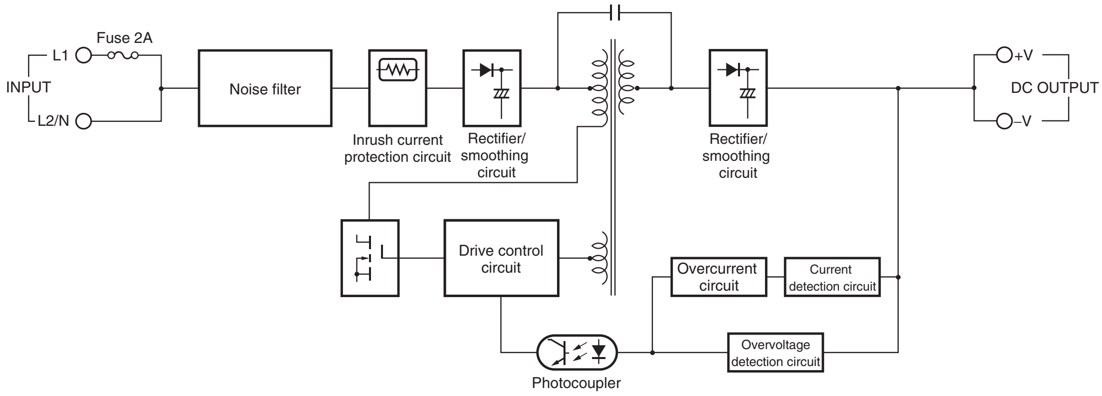
2. Refer to the Engineering Data section on page E-22 for details.

3. If the V. ADJ adjuster is turned, the voltage will increase by more than 15% of the voltage adjustment range.
Check the output voltage of the power supply when converting the output voltage, and make sure that the load will not be damaged.

Connections

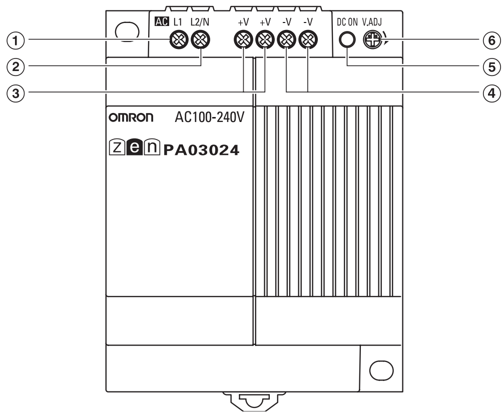
Block Diagram

ZEN-PA03024



Note: The Power Supply is provided with reinforced insulation between the input and output terminals.

Installation

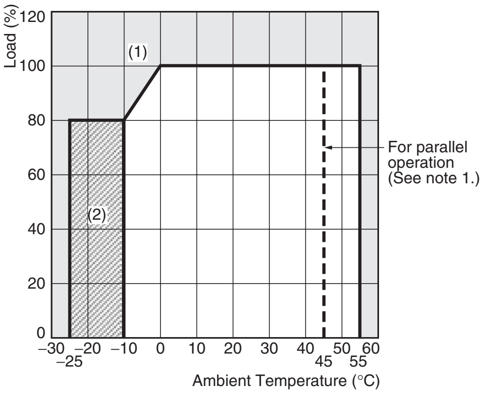


No.	Name	Function
1	**AC input terminal (L1)**	Connect the input line to this terminal. A fuse is included in the circuit.
2	**AC input terminal (L2/N)**	Connect the input line to this terminal. Negative pole for DC input.
3	**DC output terminals (+V)**	Connect the load lines to these terminals.
4	**DC output terminals (-V)**	Connect the load lines to these terminals.
5	**Output indicator (DC ON: Green)**	Lights while a direct current (DC) output is ON.
6	**Output voltage adjuster (V.ADJ)**	Use to adjust the voltage.

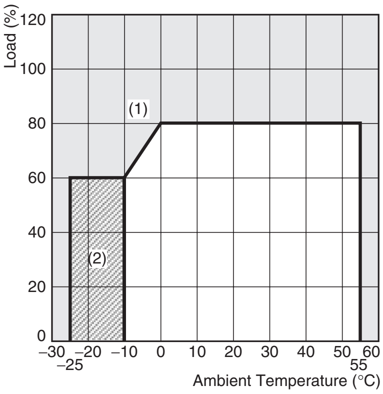
Engineering Data

■ Derating Curve

85 to 264 VAC or 110 to 350 VDC input



95 to 110 VDC input



Note: 1. The maximum ambient temperature for parallel operation is 45°C.

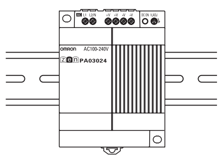
2. Parallel operation is not possible for an input of 95 to 110 VDC.

3. Although operation is possible in the (2) portion of the derating curve, performance may be adversely affected, i.e., ripple noise may increase.

4. Internal parts may occasionally deteriorate or be damaged. Do not use the Power Supply in areas outside the derating curve (i.e., the area shown by shading (1) in the above graph).

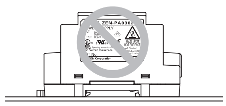
Installation

Correct



Standard mounting

Incorrect



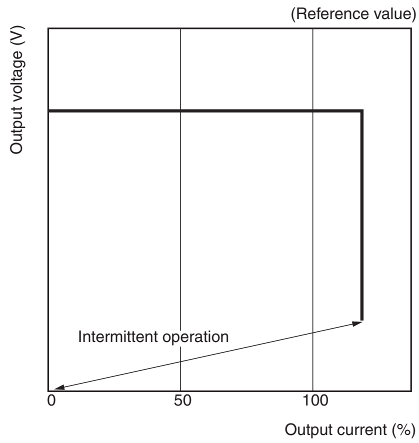
Face-up mounting

Note: 1. Improper mounting will interfere with heat dissipation and may occasionally result in deterioration or damage of internal parts. Use the standard mounting.

2. If there is a derating problem, use forced air-cooling. The ambient temperature is specified for a point 50 mm below the Power Supply.

■ Overload Protection

The Power Supply is provided with an overload protection function that protects the load and the power supply from possible damage by overcurrent. When the output current rises above 105% min. of the rated current, the protection function is triggered, decreasing the output voltage. When the output current falls within the rated range, the overload protection function is automatically cleared.

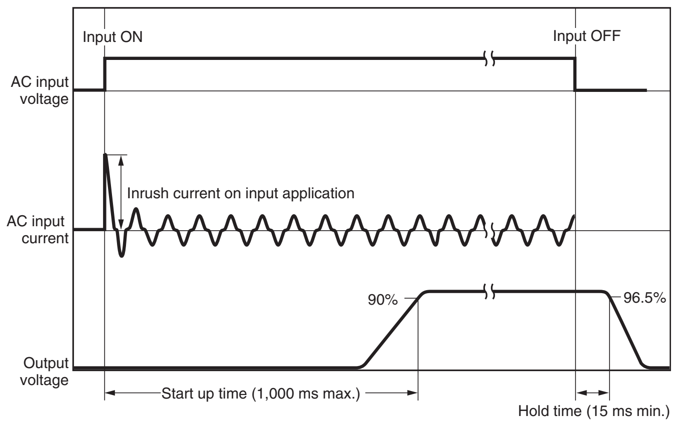


The values shown in the above diagrams are for reference only.

Note: 1. Internal parts may occasionally deteriorate or be damaged if a short-circuited or overcurrent state continues during operation.

2. Internal parts may possibly deteriorate or be damaged if the Power Supply is used for applications with frequent inrush current or overloading at the load end. Do not use the Power Supply for such applications.

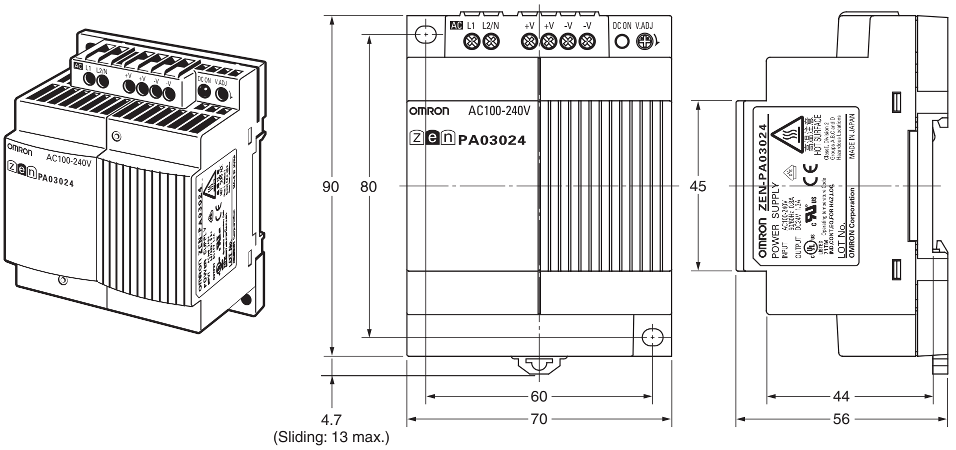
■ Inrush Current, Start Up Time, Hold Time



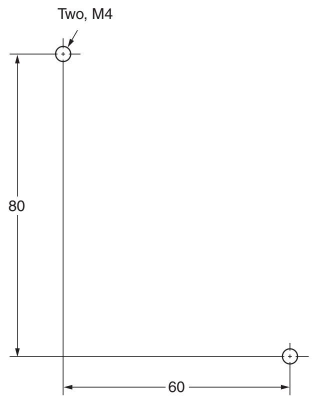
Dimensions

Note: All units are in millimeters unless otherwise indicated.

ZEN-PA03024

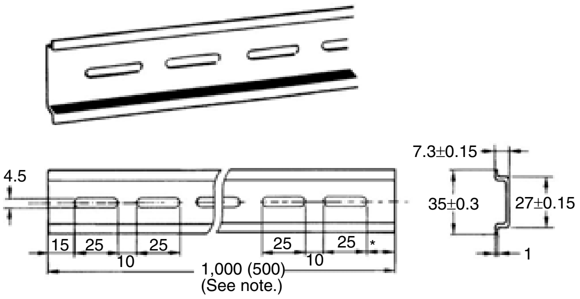


Surface Mounting Holes

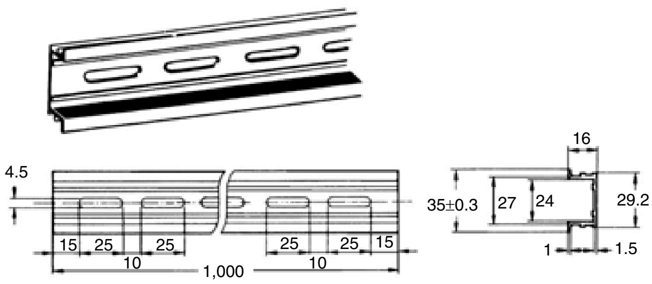


■ Accessories (Order Separately)

Mounting DIN-rail
PFP-100N, PFP-50N

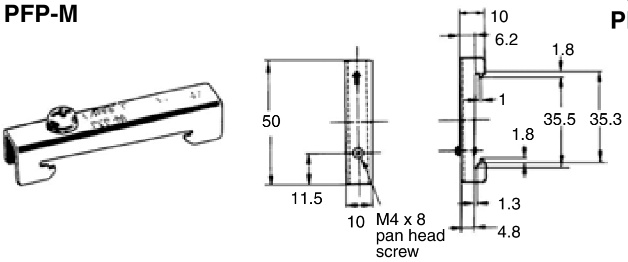


PFP-100N2

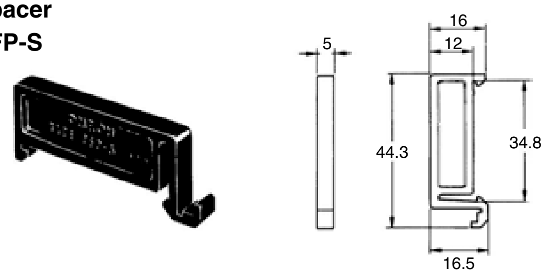


Note: The values shown in parentheses are for the PFP-50N.

End Plate
PFP-M



Spacer
PFP-S



Safety Precautions

⚠ CAUTION

Minor electric shock may occasionally occur. Do not disassemble the product or touch internal parts.

Minor fires may occasionally occur. Do not attempt to repair or modify the product.

Minor burns may occasionally occur. Do not touch the product while power is being supplied or immediately after power is turned OFF.

Minor fires may occasionally occur. Tighten terminal screws to a torque of 0.5 to 0.6 N·m so that they do not become loose.

Minor electric shock may occasionally occur during operation. Do not touch the input and output terminals while power is being supplied.

The product may occasionally be damaged. Do not allow any clippings or cuttings to enter the product during installation work.

Working voltage can be 350 V max. inside. This voltage can be also available 10 s after the switch off.

■ Precautions for Safe Use

The following precautions must be observed to ensure safety.

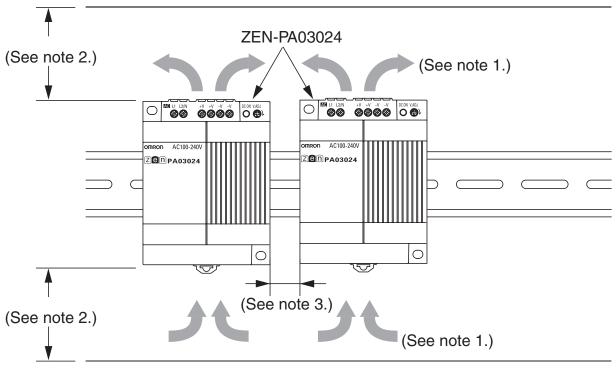
Mounting

- Mounting Direction
  (Refer to *Installation* in *Engineering Data* on page E-22.)

Standard Mounting	Valid
Horizontal Mounting	Invalid
Other Mounting	Invalid

  The internal parts may occasionally deteriorate or be broken due to adverse heat dissipation depending on the mounting status. Do not use the product in any way other than the standard mounting direction.
- Mounting Space
  Make sure that sufficient heat dissipation is provided when installing the Power Supply to increase its long-term reliability. Install the product in a location that allows a natural airflow to occur around the Power Supply.
  We recommend using End Plates (PFP-M) to secure the Power Supply and to ensure that a space of at least 10 mm is maintained between Power Supplies.

  If the installation space above and below the Power Supply is less than 50 mm, reduce the ambient temperature by 5°C. A minimum space of 20 mm is required.



Note: 1. Convection of air
2. 50 mm min.
3. 10 mm min.

Wiring

- Minor fire may possibly occur. Ensure that input and output terminals are wired correctly.
- Use the following material for the wires to be connected to the Power Supply to prevent smoking or ignition caused by abnormal loads.

  Use solid wires. Always attach pin crimp terminals when using stranded wire. The stripping distance should be 6.5 mm.

Recommended Wire Type

Solid wire	Cross section 0.5 to 2.5 mm^2 (Equivalent to AWG20 to AWG14)
Stranded wire	Cross section 0.5 to 2.5 mm^2 (Equivalent to AWG20 to AWG14)
Pin crimp terminals	Dia.: 1.1 to 2.3 mm

- Do not apply more than 100 N force to the terminal block when tightening the terminals.
- Be sure to remove the sheet covering the product before turning ON the Power Supply and confirm that nothing is interfering with heat dissipation.

Installation Environment

- Do not use the Power Supply in locations subject to shocks or vibrations. In particular, install the Power Supply as far away as possible from contactors or other devices that are a vibration source.
- Install the Power Supply well away from any sources of strong, high-frequency noise.

Operating and Storage Conditions

- When installing the Power Supply, check for any signs that the product or packaging has been struck. If internal parts have been damaged, overvoltages may be output depending on the location of the damage.
- Internal parts may occasionally deteriorate or be damaged. Store the Power Supply at a temperature of -25 to 65°C and a humidity of 10% to 90%.
- Internal parts may occasionally deteriorate or be damaged. Do not use the Power Supply in areas outside the derating curve (i.e., the area shown by shading (1) in the graph on page E-22). For UL508 Listing, the surrounding air temperature should be 40°C.
- Use the Power Supply at a humidity of 10% to 90%.
- Do not use the Power Supply in locations where condensation may occur due to high humidity or where temperature changes are severe.
- Do not use the Power Supply in locations subject to direct sunlight.
- Do not use the Power Supply in locations where liquids, foreign matter, or corrosive gases may enter the interior of products.

Overload Protection

- Internal parts may possibly deteriorate or be damaged if a short-circuited or overcurrent state continues during operation.
- Internal parts may possibly deteriorate or be damaged if the Power Supply is used for applications with frequent inrush current or overloading at the load end. Do not use the Power Supply for such applications.

Charging the Battery

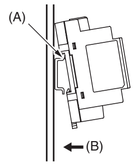
- This product is not intended to function as a battery charger. If a battery is to be connected as the load, mount an overcurrent limiting circuit and an overvoltage protection circuit.

Output Voltage Adjuster

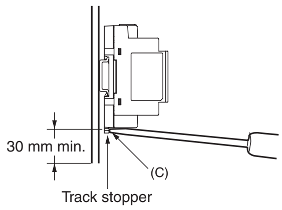
- The output voltage adjuster (V.ADJ) may possibly be damaged if it is turned with unnecessary force. Do not turn the adjuster with excessive force.
- After changing the setting of the adjuster, make sure that the output capacity and output current do not exceed the rated output capacity and rated output current.
- Output voltage is adjustable with the output voltage adjuster (V.ADJ) on the front surface of the product from -10% to +15% of the rated output voltage.
  Do not increase the output voltage by more than 10% when connected to a ZEN CPU Unit rated for 24 VDC.

DIN-rail Mounting

To mount the Power Supply on a DIN-rail, hook portion (A) of the Power Supply onto the track and press the Power Supply in direction (B).

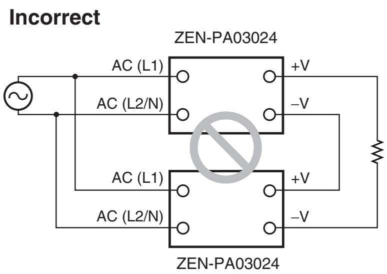


To dismount the Power Supply, pull down portion (C) with a flat-blade screwdriver and pull out the Power Supply.



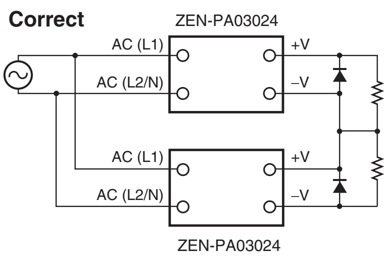
Series Operation

The Power Supply is not designed for series operation.



Output voltage (±)

Two Power Supplies can be used to create a ± output.



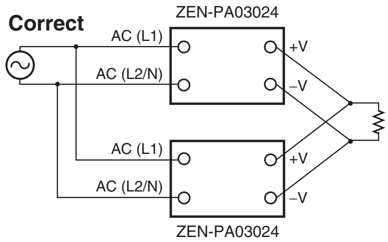
Note: When the load is an operational amplifier or other device allowing series operation, a startup failure may occur when the Power Supply is turned ON and internal circuits may be damaged. Connect a diode as shown in the figure to prevent this.

Use the following guidelines to select the diode.

Type	Schottky Barrier diode
Dielectric strength (V_{RRM})	Twice the rated output voltage or above
Forward current (I_F)	Twice the rated output voltage or above

Parallel Operation

Two Power Supplies can be operated in parallel.



Note: 1. For parallel operation, a maximum of two Power Supplies of the same model can be connected.

2. For a DC input, parallel operation is possible only for 110 to 350 VDC.

3. To ensure that the voltage drop between each Power Supply and the load is the same, use the same wire length and thickness to connect the load.

4. The load current will become imbalanced if the output voltages are different, possibly causing a serious reduction in the life of one of the Power Supplies. Adjust the output voltages of the Power Supplies to the same value.

In Case there is No Output Voltage

The possible cause for no output voltage may be the presence of an overload or overvoltage condition, or may be due to the functioning of a latching protective device. The latching protection may operate if a large amount of surge voltage such as a lightening surge occurs while turning ON the Power Supply.

In case there is no output voltage, please check the following points before contacting us:

- Check the overload protected status:
  Check whether the load is in overload status or is short-circuited. Remove wires to load when checking.
- Attempt to clear the latching protection function:
  Turn the power supply OFF once, and leave it OFF for at least 1 minute. Then turn it on again to see if this clears the condition.

Insulation Resistance Test

When performing the test, be sure to short-circuit all the output terminals to protect them from damage.

Dielectric Strength Test

- When a high voltage is applied between the input terminals and the output terminals, electric energy builds up across the inductor L and capacitor C of the internal noise filter. This energy may generate a voltage surge when a high voltage is applied to the Power Supply by a switch or timer, and as a result, the internal parts of the Power Supply may possibly be damaged. To prevent voltage impulses when testing, decrease the applied voltage using the variable resistor on the dielectric strength testing equipment, or apply the voltage so that it crosses the zero point when it rises or falls.
- When performing the test, be sure to short-circuit all the output terminals to protect them from damage.

Warranty and Application Considerations

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. L103-E2-01

Digital panel indicators

Omron's digital panel indicator series accepts a wide range of input signals (process, temperature, pulse/impulse, weight, etc.), that can be displayed in any required value. The series also includes a green / red colour change display feature, which clearly visualises the status of a process.

- Multiple inputs, including process, temperature, frequency and many more!
- Highly visible display provides a clear, highly stable read-out of values
- Large, front-panel keys for unambiguous, user-friendly programming
- Dust-proof and waterproof front case that complies with NEMA4X (IP66 equivalent) standards
- Wide range of models with communication capability including DeviceNet

Which size is required?

- **48 x 24 mm (1/32 DIN)**
  - Process / frequency / rate → **K3GN**

Page F-5

- **96 x 48 mm (1/8 DIN)**
  - General purpose — Which application is required?
    - Process → **K3MA-J**

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    - Temperature → **K3MA-L**

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    - Frequency / rate → **K3MA-F**

Page F-51

  - Advanced — Which application is required?
    - Process → **K3HB-X**

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    - Temperature → **K3HB-H**

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    - Weighing → **K3HB-V**

Page F-77

    - Linear sensor → **K3HB-S**

Page F-81

K3HB – Omron's new panel indicator

The K3HB indicators provide a bar graph position indication, which is unique in 1/8 DIN horizontal housing panel indicators. The sampling speed of this range has been increased to 50 times per second, or 2,000 times per second for the linear sensor indicator version.

Furthermore, users can specify DeviceNet communications, with the option of a DeviceNet output module delivering high-speed data communication with PLCs, without the need for special programming.

The full range of K3HB analogue input panel indicators includes a process indicator (K3HB-X), a temperature indicator (K3HB-H), a weighing indicator (K3HB-V) and a linear sensor indicator (K3HB-S). These indicators provide convenient, high-performance solutions in a broad spectrum of applications in the process industry, as well as in machinery applications such as binding, soldering, semiconductor manufacture, moulding and mixing machines. The K3HB indicators are modular in design, which enables users to select exactly the functionality they require.

Rotary pulse

K3HB-R

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Timer interval

K3HB-P

Page F-91

Up / down counting pulse

K3HB-C

Page F-97

Table of contents

Selection table

	Category	1/32 DIN Multi-function	1/8 DIN Standard			1/8 Advanced Analogue
Selection criteria						
	Model	**K3GN**	**K3MA-J**	**K3MA-L**	**K3MA-F**	**K3HB-X**
	Size	1/32 DIN	1/8 DIN			
Features	**Colour change display**	■	■	■	■	■
	Number of digits	5	5	4	5	5
	Leading zero suppression	■	■	■	■	■
	Forced zero function	■	■	■	■	■
	Min. / max. hold function	■	■	■	■	■
	Average processing	■	■	■	■	■
	User selectable inputs	■	■	■	■	■
	Start-up compensating time	■			■	
	Key protection	■	■	■	■	■
	Decimal point position setting	■	■	■	■	■
	Accuracy	±0.1% of full scale	±0.1% of full scale	±0.1% of full scale	±0.1% of full scale	±0.1% of full scale (DC voltage & DC current), ±0.5% of full scale (AC voltage & AC current)
	Input range	0 to 20 mA, 4 to 20 mA or 0 to 5 V, 1 to 5 V, -5 to 5 V, -10 to 10 V or 0 to 30 Hz or 0 to 5 kHz	0 to 20 mA, 4 to 20 mA or 0 to 5 V, 1 to 5 V, -5 to 5 V, -10 to 10 V	Pt100, JPt100 or thermocouple K, J, T, E, L, U, N, R, S, B	0 to 30 Hz or 0 to 5 kHz	0.000 to 10.000 A, 0.0000 to 19.999 mA, -199.99 to 199.99 mA, 4.000 to 20.000 mA, 0.0 to 400.0 V, 0.0000
	Sample rate	250 ms	250 ms	500 ms	-	20 ms
	Features	Remote / local processing, parameter initialisation, programmable output configuration, process value hold	Teaching, comparative output pattern selection, parameter initialisation, programmable output configuration, process value hold	Programmable output configuration, process value hold	Teaching, comparative output pattern selection, programmable output configuration, process value hold	Scaling, teaching, averaging, output hysteresis, output OFF-delay, output test, bank selection, reset, comparative output
	Sensor power supply				■	□
Front protection	**IP rating**	IP66	IP66	IP66	IP66	IP66
	Supply voltage	24 VDC	24 VAC / VDC or 100 to 240 VAC	24 VAC / VDC or 100 to 240 VAC	24 VAC / VDC or 100 to 240 VAC	100 to 240 VAC or 24 VAC / VDC
Inputs	**NPN**	■		■	■	□
	PNP	■		■	■	□
	Temperature					
	Contact				■	
	Voltage pulse				■	
	Load cell					
	DC voltage	■	■	■		□
	DC current	■	■			□
	AC voltage					□
	AC current					□
Outputs	**Relay**	■	■	■	■	□
	NPN	■				□
	PNP	■				□
	Linear					□
	BCD					
	Comms	■				□
	Page	F-5	F-19	F-35	F-51	F-69

1/8 Advanced Analogue			1/8 DIN Advanced Digital		
					
K3HB-H	**K3HB-V**	**K3HB-S**	**K3HB-C**	**K3HB-P**	**K3HB-R**
1/8 DIN					
■	■	■	■	■	■
5	5	5	5	5	5
■	■	■	■	■	■
■	■	■	■	■	■
■	■	■	■	■	■
■	■	■	■	■	■
■	■	■	■	■	■
					■
■	■	■	■	■	■
■	■	■	■	■	■
Thermocouple: ±0.3% of full scale, Pt-100: ±0.2% of full scale	±0.1% of full scale	One input: ±0.1% of full scale, two inputs: ±0.2% of full scale		±0.08% rgd ±1 digit	±0.006% rgd ±1 digit ±0.02% rgd ±1 digit
Pt100, thermocouple K, J, T, E, L, U, N, R, S, B, W	0.00 to 199.99 mV, 0.000 to 19.999 mV, 100.00 mV, 199.99 mV	0 to 20 mA, 4 to 20 mA, 0 to 5 V, -5 to 5 V, -10 to 10 V	No voltage contact: 30 Hz, voltage pulse: 50 kHz, open collector: 50 kHz	No voltage contact: 30 Hz, voltage pulse: 50 kHz, open collector: 50 kHz	No voltage contact: 30 Hz, voltage pulse: 50 kHz, open collector: 50 kHz
20 ms	20 ms	0.5 ms	-	-	-
Scaling, teaching, averaging, output hysteresis, output OFF-delay, output test, bank selection, reset, comparative output	Scaling, teaching, averaging, output hysteresis, output OFF-delay, output test, bank selection, reset, comparative output	Scaling, 2-input calculation, teaching, averaging, output hysteresis, output OFF-delay, output test, bank selection, reset, comparative output	Scaling, measurement operation selection, output hysteresis, output OFF-delay, output test, display value selection, display colour selection, key protection, bank selection, display refresh period, maximum / minimum hold, reset	Scaling, measurement operation selection, output hysteresis, output OFF-delay, output test, teaching, display value selection, display colour selection, key protection, bank selection, display refresh period, maximum / minimum hold, reset	Scaling, measurement operation selection, averaging, previous average value comparison, output hysteresis, output OFF-delay, output test, teaching, display value selection, display colour selection, key protection, bank selection, display refresh period, maximum / minimum hold, reset
□	□	□	□	□	□
IP66	IP66	IP66	IP66	IP66	IP66
100 to 240 VAC or 24 VAC / VDC	100 to 240 VAC or 24 VAC / VDC	100 to 240 VAC or 24 VAC / VDC	100 to 240 VAC or 24 VAC / VDC	100 to 240 VAC or 24 VAC / VDC	100 to 240 VAC or 24 VAC / VDC
□	□	□	■	■	■
□	□	□	■	■	■
■					
			■	■	■
	■				
		■			
		■			
□	□	□	□	□	□
□	□	□	□	□	□
□	□	□	□	□	□
□	□	□	□	□	□
			□	□	□
□	□	□	□	□	□
F-73	F-77	F-81	F-97	F-91	F-85

■ Standard □ Available ☐ No / not available

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Focussed, progressive, distinctive. Be assured, choose Omron

At Omron we set high standards for ourselves. Our products are known all over the world for their unrivalled quality. But we offer more than just excellent quality. In an environment that places ever greater demands with regard to service, quality and costeffectiveness, other things are important too. Providing a top-quality service is what we do every day, including extra service as standard. This helps to ensure that we can provide tailor-made solutions for applications more effectively and more quickly.

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- Maximum flexibility
- Confidence

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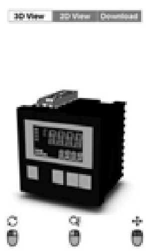
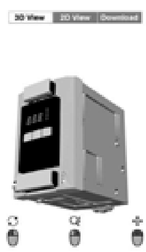
- Large number of formats supported for greater flexibility
- Readily available
- Convenience that saves you time





1/32 DIN Digital Panel Meter
K3GN

1/32 DIN Digital Panel Meter for Downsizing Equipment and Control Panels

- Compact size: 24x48x83 (HxWxD).
- Multi-input compatible: DC voltage/current, rotary pulse.
- Two display colors (switchable): green/red.
- Selectable outputs.
- CE marking and UL/CSA approval.
- Splash-proof construction (NEMA4X: equivalent to IP66).

⚠ Refer to *Safety Precautions* on page F-16.

NEW

Model Number Structure

■ Model Number Legend

K3GN-□□-□-□ 24 VDC
1 2 3 4

1. **Input Type**
   ND: DC voltage/current, NPN
   PD: DC voltage/current, PNP
2. **Output Type**
   C: 2 relay contact outputs (SPST-NO)
   C-FLK: 2 relay contact outputs (SPST-NO) and RS-485
   C-L1: 2 relay contact outputs (SPST-NO) and DC current (0 to 20 mA, 4 to 20 mA)
   C-L2: 2 relay contact outputs (SPST-NO) and DC voltage (0 to 5 V, 1 to 5 V, 0 to 10 V)
   T1: 3 transistor outputs (NPN open collector)
   T1-FLK: 3 transistor outputs (NPN open collector) and RS-485
   T1-L1: 3 transistor outputs (NPN open collector) and DC current (0 to 20 mA, 4 to 20 mA)
   T1-L2: 3 transistor outputs (NPN open collector) and DC voltage (0 to 5 V, 1 to 5 V, 0 to 10 V)
   T2: 3 transistor outputs (PNP open collector)
   T2-FLK: 3 transistor outputs (PNP open collector) and RS-485
3. **Option**
   None: None
   -400: Normally energized relays
4. **Supply Voltage**
   24 VDC: 24 VDC

Ordering Information

■ List of Models

Supply voltage	Input type	Output type		Model
		Judgement output	Data transmission output	
24 VDC	DC voltage, DC current, or NPN input	2 relay contact outputs (SPST-NO)	None	K3GN-NDC 24 VDC
			RS-485	K3GN-NDC-FLK 24 VDC
			DC current (0 to 20 mA, 4 to 20 mA)	K3GN-NDC-L1 24 VDC
			DC voltage (0 to 5 V, 1 to 5 V, 0 to 10 V)	K3GN-NDC-L2 24 VDC
		2 relay contact outputs (SPST-NO) Normally energized relays (See note.)	None	K3GN-NDC-400 24 VDC
			RS-485	K3GN-NDC-FLK-400 24 VDC
			DC current (0 to 20 mA, 4 to 20 mA)	K3GN-NDC-L1-400 24 VDC
			DC voltage (0 to 5 V, 1 to 5 V, 0 to 10 V)	K3GN-NDC-L2-400 24 VDC
		3 transistor outputs (NPN open collector)	None	K3GN-NDT1 24 VDC
			RS-485	K3GN-NDT1-FLK 24 VDC
			DC current (0 to 20 mA, 4 to 20 mA)	K3GN-NDT1-L1 24 VDC
			DC voltage (0 to 5 V, 1 to 5 V, 0 to 10 V)	K3GN-NDT1-L2 24 VDC
	DC voltage, DC current, or PNP input	2 relay contact outputs (SPST-NO)	None	K3GN-PDC 24 VDC
			RS-485	K3GN-PDC-FLK 24 VDC
		3 transistor outputs (PNP open collector)	None	K3GN-PDT2 24 VDC
			RS-485	K3GN-PDT2-FLK 24 VDC

Note: Refer to page 10 for information on models with normally energized relays.

Specifications

■ Ratings

Item		K3GN-ND With DC voltage, DC current, and NPN input	K3GN-PD With DC voltage, DC current, and PNP input
Supply voltage		24 VDC	
Operating voltage range		85% to 110% of the rated supply voltage	
Power consumption (at max. load) (See note 1.)		2.5 W max. (at max. DC load with all indicators lit)	
Input signal		DC voltage, DC current, no-voltage contact, open collector	
DC voltage/current input	**A/D conversion**	Double integral method	
Pulse signal input	**Pulse measurement method**	Periodic measurement method	
External power supply		None	
Control input		Present value hold or forced zero (selectable) (See note 2.)	
Outputs (Outputs depend on the model.)	**Relay contact output**	1 A, 30 VDC (resistive load), mechanical life: 50,000,000 operations min., electrical life: 100,000 operations min.	
	Transistor output	Max. load voltage: 24 VDC, Max. load current: 50 mA, Leakage current: 100 μ A max.	
	Communications output	RS-485 (2-wire, half-duplex)	
	Linear output	DC current (0 to 20 mA DC, 4 to 20 mA: Load: 500 Ω max., Resolution: Approx. 10,000) DC voltage (0 to 5 VDC, 1 to 5 VDC, 0 to 10 VDC: Load: 5k Ω min., Resolution: Approx. 10,000)	---
Display		Negative LCD (backlit LCD) display 7-segment digital display, character height: 7.0 mm, and single illuminated display	
Main functions		Scaling, prescaling, teaching, average processing, forced zero, display color selection, output type selection, key protection, startup compensation timer, hysteresis	
Ambient temperature		Operating: –10°C to 55°C (with no condensation or icing) Storage: –25°C to 65°C (with no condensation or icing)	
Ambient humidity		Operating: 25% to 85%	
Altitude		2,000 m max.	
Accessories		Rubber packing, fixture, operation manual	

Note: 1. A control power supply capacity greater than the rated capacity is required when the Digital Panel Meter is turned ON. Do not forget to take this into consideration when using several Digital Panel Meters. When power is supplied, all indicators will light and outputs will be OFF. When using startup compensation time operation, the display will read "00000" and all outputs will be OFF.

2. Enabled only when using DC voltage/current input. (Min.time for control signal input: 80 ms)

■ Characteristics

Item		K3GN-ND With DC voltage, DC current, and NPN input	K3GN-PD With DC voltage, DC current, and PNP input
Input signal		DC voltage/current (4 to 20 mA, 1 to 5 V, ±5 V, ±10 V) No-voltage contact (30 Hz max. with ON/OFF pulse width of 16 ms min.) Open collector (5 kHz max. with ON/OFF pulse width of 90 μs min.)	
Displayable range		5 digits (-19999 to 99999)	
Sampling period		250 ms	
Display refresh period		Sampling period (sampling times multiplied by number of averaging times if average processing is selected.)	
Comparative output response time (transistor outputs)		750 ms max. (transistor output) (The time required for the judgment output to be output if the input signal rapidly changes from 15% to 95% or from 95% to 15%.)	
Linear output response time		750 ms max. (The time required for the analog output to be output if the output signal rapidly changes from 15% to 95% or from 95% to 15%.)	---
Insulation resistance		20 MΩ min. (at 500 VDC) between external terminal and case. Insulation provided between inputs, outputs, and power supply.	
Dielectric strength		1,000 VAC for 1 min between external terminal and case.	
Noise immunity		±480 V on power supply terminals in normal mode, ±1,500 V in common mode, ±1 μs, or 100 ns for square-wave noise with 1 ns	
Vibration resistance		Vibration frequency: 10 to 55 Hz, Acceleration: 50 m/s² for 10 min each in X, Y, and Z directions	
Shock resistance		Models with transistor outputs: 150 m/s² three times each in 3 axes, 6 directions Models with contact outputs: 100 m/s² three times each in 3 axes, 6 directions	
Weight		Approx. 100 g (Main Unit only)	
Degree of protection	**Front panel**	NEMA4X for indoor use (equivalent to IP66),	
	Rear case	IP20	
	Terminals	IP00 and finger protection (VDE0106/100)	
Memory protection		Non-volatile memory (EEPROM) (possible to rewrite 100,000 times)	
Approved standards		UL508, CSA C22.2 No. 142	
EMC		(EMI) EN 61326 Industry Emission Enclosure: EN55011 Group 1 class A (EMS) EN 61326 Industry Immunity ESD: EN 61000-4-2: 4 kV (contact discharge) 8 kV (air discharge) Immunity RF-interference: EN 61000-4-3: 10 V/m (amplitude-modulated, 80 MHz to 1 GHz) Immunity Fast Transient Noise: EN 61000-4-4: 2 kV (power line) Immunity Burst Noise: 1 kV line to line (I/O signal line) Immunity Surge: EN 61000-4-5: 2 kV line to ground (power line) Immunity Conducted Disturbance EN 61000-4-6: 3 V (0.15 to 80 MHz) Immunity Power Frequency Magnetic EN 61000-4-8: 30 A/m (50 Hz) continuous time	

■ Input Ranges: Measurement Range and Accuracy

Input type in-t	**Analog** AnALG					**Pulse** PULSE			**Remote** rmt
	DC current input	**DC voltage input**				**Rotary pulse**			
Analog range rAnGE	**4 to 20 mA** 4-20	**Analog range** rAnGE	**1 to 5 V** 1-5	**±5 V** 5	**±10 V** 10	**Pulse frequency** P-FrE	**30 Hz** 30	**5 kHz** 5k	Range of display from -19999 to 99999 using communications.
Connection terminal	⑤-⑥	Connection terminal	④-⑤			Connection terminal	②-③		
Current range (mA) 20.00 4.00 0.00	22.00 0.00	Voltage range (V) 10.00 5.000 0.000 –5.000 –10.00	5.500 0.000	5.500 –5.500	11.00 –11.00	Frequency range (Hz) 5000 4000 3000 2000 1000 0.0	30.00 0.05	5000 0	
Input impedance	60 Ω	Input impedance	1 MΩ min.			---			---
Measurement accuracy	±0.1% full scale ± one digit max. (at 23±3°C)			±0.1% full scale ± one digit max. (at 23±5°C)		±0.1% full scale ± one digit max. (at 23±5°C)			---

Note: The shaded ranges indicate default settings.

Digital panel indicators

■ Input/Output Ratings

Relay Contact Output

(Incorporating G6K Relays)

Item	Resistive load (cosφ = 1)
Rated load	1 A at 30 VDC
Rated through current	1 A max. (at COM terminal)
Max. contact voltage	60 VDC
Max. contact current	1 A (at COM terminal)
Max. switching capacity	30 VA
Min. permissible load (P level, reference value)	10 mV, 10 μA
Mechanical life	50,000,000 operations min. (at a switching frequency of 36,000 operations/hr)
Electrical life (at an ambient temperature of 23°C)	100,000 operations min. (at the rated load with a switching frequency of 1,800 operations/hr)

Transistor Output

Rated load voltage	24 VDC
Max. load current	50 mA
Leakage current	100 μA max.

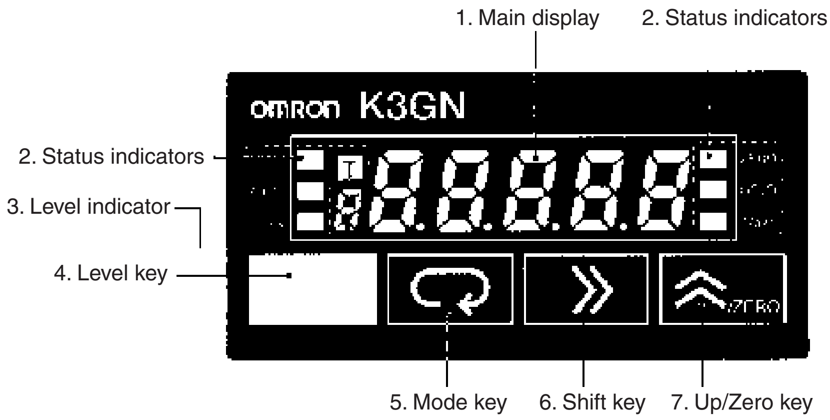
Communications Specifications

Item		RS-485
Communications method		2-wire, half-duplex
Synchronization method		Start-stop synchronization
Baud rate		1,200/2,400/4,800/9,600/19,200 bps
Transmission code		ASCII
Commu-nications	**Reading/ Writing to the K3GN**	Read/write comparative set values, read/write scaling values, enable/ disable the writing of data through communications, forced-zero control, and other data.

Linear Output

Item	0 to 20 mA	4 to 20 mA	0 to 5 V	1 to 5 V	0 to 10 V
Permissible load impedance	500 Ω max.		5 kΩ min.		
Resolution	Approx. 10,000				
Output error	±0.5% full scale		±0.5 full scale. ±0.15 V at 1 V or less (no output for 0 or less)		

Nomenclature



Name		Functions
1. Main display		Displays process values, parameters, and set values.
2. Status indicators	**OUT1**	Lit when output 1 is ON.
	OUT2	Lit when output 2 is ON.
	SV	Lit when a set value is being displayed or changed.
	T	Lit when the teaching function is enabled. Flashes when the K3GN is in teaching operation. Lit when a calibration value is being displayed during user calibration. Flashes while reading a calibration value.
	ZERO	Lit while the forced-zero function is activated.
	HOLD	Lit when HOLD input is ON.
	CMW	Lit when communications writing is “enabled” and is out when it is “disabled.”
3. Level indicator		Displays the current level that the K3GN is in. (See below for details.)
4. Level Key		Used to change the level.
5. Mode Key		Used to allow the Main display to indicate parameters sequentially.
6. Shift Key		Used to enable that set value to be changed. When changing a set value, this key is used to move along the digits.
7. Up/Zero Key		Used to change a set value. Used to set or clear a forced-zero function when a measurement value is being displayed.

Level indicator	Level
P	Protect
Not lit	Operation
A	Adjustment
S	Initial setting
C	Communications setting
F	Advanced function setting
U	User calibration

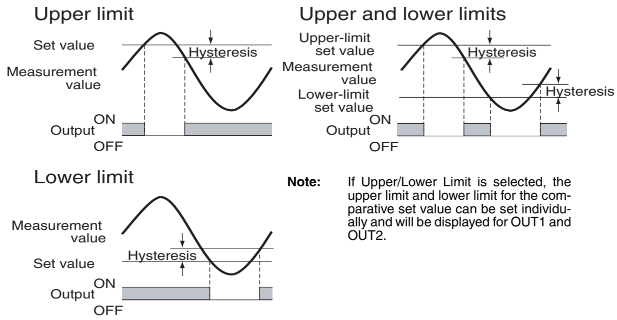
Models with Normally Energized Relays K3GN-NDC-□-400 24 VDC

- The drive operation for the output relay is reversed in these models.
- Relay contacts can be made open (i.e., OFF) when comparative set values are being judged. This is effective when constructing systems that take failsafe measures into consideration.

List of Models

Models with Normally Energized Relays
K3GN-NDC-400 24 VDC
K3GN-NDC-FLK-400 24 VDC
K3GN-NDC-L1-400 24 VDC
K3GN-NDC-L2-400 24 VDC

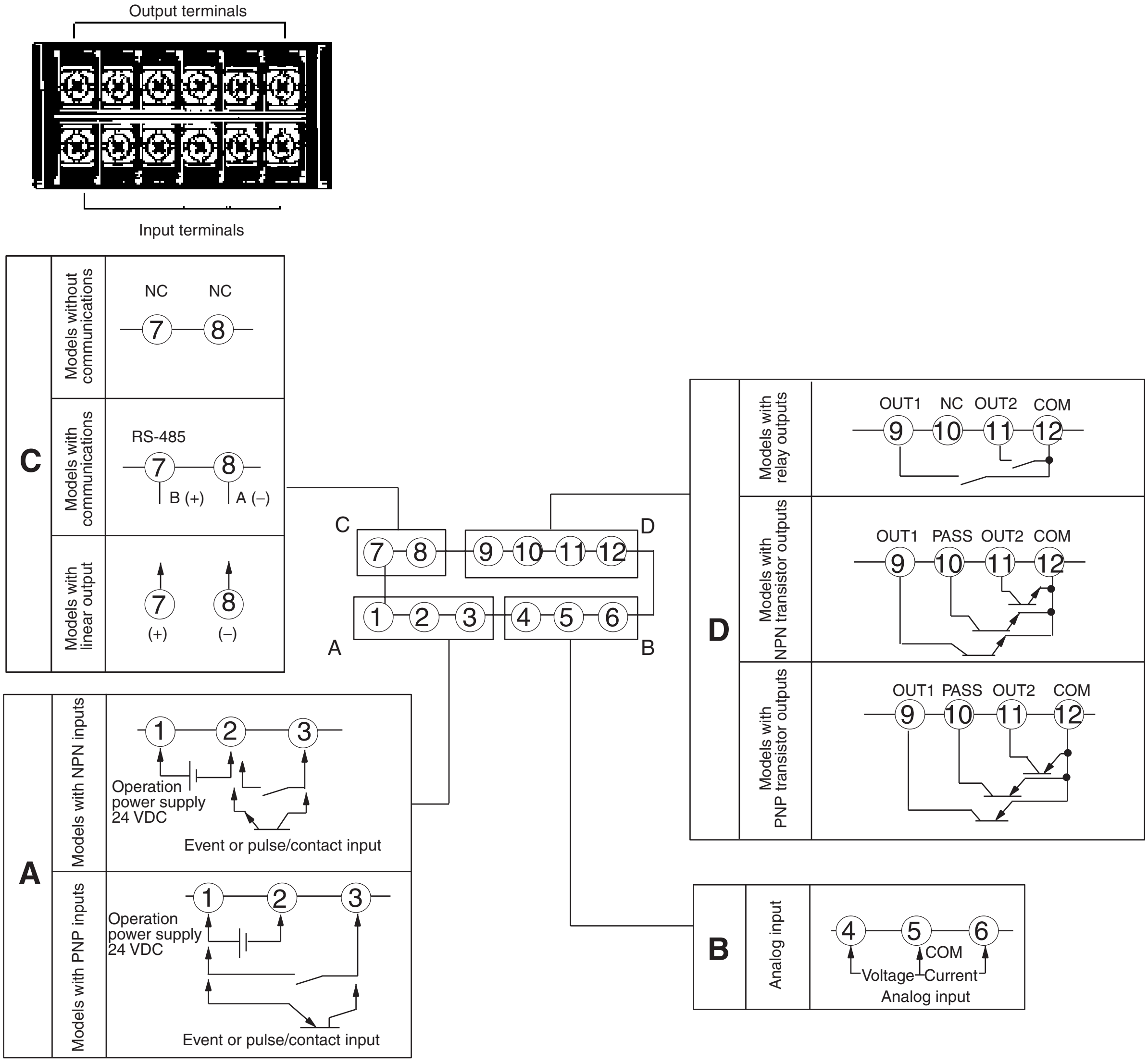
Relation between Output Type and Relay Output Operation



Note: If Upper/Lower Limit is selected, the upper limit and lower limit for the comparative set value can be set individually and will be displayed for OUT1 and OUT2.

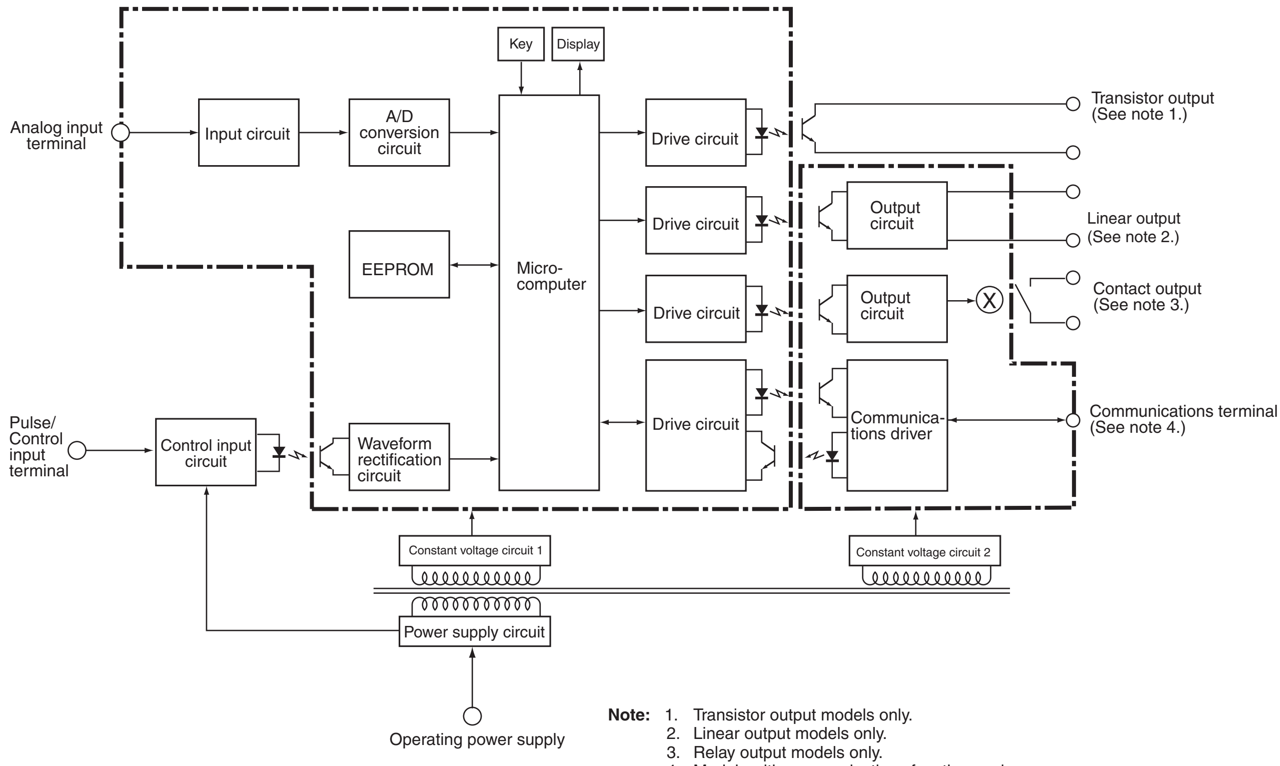
Connections

■ Terminal Arrangement



Terminal No.	Name	Description
①-②	Operation power	Connect the operation power supply.
③-②	Event input or pulse/contact input	Operates as follows depending on parameter setting: • Holds process value. • Calibrate the process value to zero and clear the forced-zero function. • Pulse or contact input.
③-①		
④,⑥-⑤	Analog input	Connect the voltage or current analog input.
⑦-⑧	Communications	RS-485 communications terminals.
	Linear output	0 to 20 mA DC, 4 to 20 mA DC
		0 to 5 VDC, 1 to 5 VDC, 0 to 10 VDC
⑨,⑪-⑫	Outputs	Outputs relay or transistor outputs. There is also a PASS output for models with transistor outputs.
⑨,⑩,⑪-⑫		

■ Block Diagram

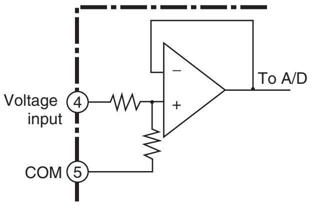


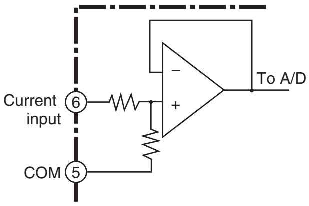
Note:
1. Transistor output models only.
2. Linear output models only.
3. Relay output models only.
4. Models with communications functions only.

■ Input Circuits

Analog Input (DC Voltage/Current)

Use terminal 5 for analog common.

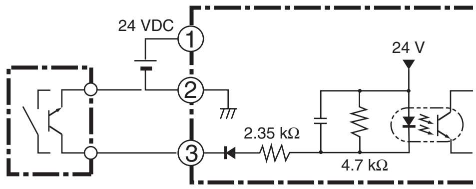




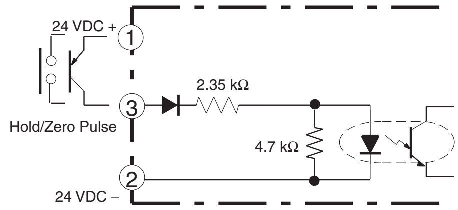
Pulse Input/Control Event Input (HOLD/ZERO)

- Use terminal 2 for the common terminal.
- Use the NPN open collector or the no-voltage contacts for the control input.

NPN Input

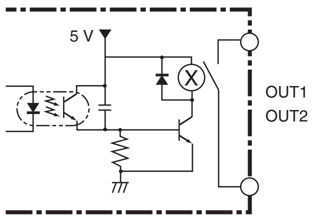


PNP Input



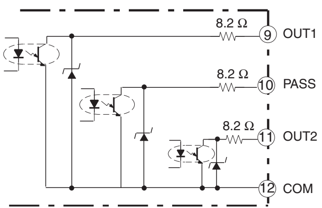
Comparative Output

Contact Output

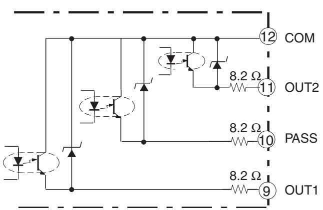


Transistor Output

NPN Output



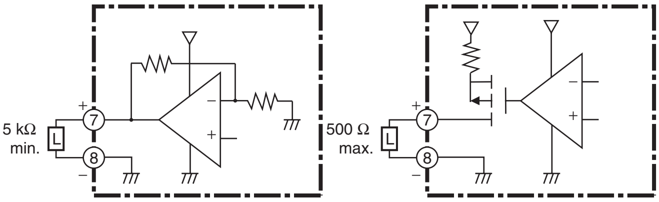
PNP Output



Linear Output

Linear voltage output

Linear current output



Note: The commons for linear output and transistor output on models with L1 and L2 are connected internally.
Depending on how the common is wired for externally connected devices, unwanted current paths for the linear output signal in the circuit may prevent the output signal from being output.
When connecting an external device, externally connect a relay to the transistor output or provide another means of insulation.

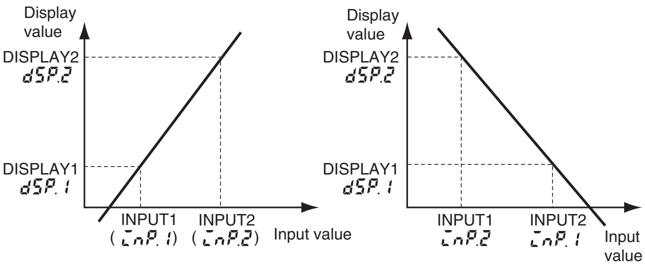
Operation

■ Main Functions

Scaling

The K3GN includes a scaling function that can convert the input signal to a desired value and display that value.

The displayed values can be freely adjusted to shift values, to create reversed displays, or to create positive/negative displays.



Teaching

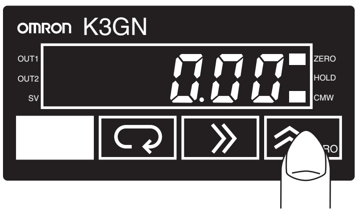
Teaching is used when using scaling or setting comparative set values to set the present measurement values as the set values instead of inputting with the Shift and Up/Zero Keys. Teaching is useful for making settings while checking the operation status of the K3GN.

Average Processing

Average processing can be performed for measurement values using four levels (OFF, 2 times, 4 times, or 8 times). Average processing stabilizes displayed values by averaging the corresponding input signals that fluctuate dynamically. Select the appropriate number of averaging times depending on the application.

Forced-zero Function

It is possible to shift from a value to the zero point with one touch of the Up/Zero Key on the front panel (for example, when adjusting reference values).



Note: This function can be used only when forced-zero operation protection is released.

Changing the Display Color

The color of the value displayed can be set to either red or green. Make the setting according to the purpose and application of the equipment in which the K3GN is installed. The display color can also be set to change from green to red, or from red to green, according to the status of the comparison criteria.

Output Type Selection

Output operation for comparative set values can be freely selected.
Upper limit: Output ON if the measurement value ≥ comparative set value.
Lower limit: Output ON if the measurement value ≤ comparative set value.
Upper/lower limit: Output ON if the measurement value ≥ comparative upper-limit set value or if the measurement value is ≤ the comparative lower-limit value.

Key Protection

Key protection is used to restrict changes to displays and settings using the front panel keys and to restrict menu display and movement of operation levels. This function is effective for preventing misuse during operation.

Startup Compensation Time (Rotary Pulse Input Only)

The startup compensation time parameter keeps the measurement operation from sending an unnecessary output corresponding to instantaneous, fluctuating input from the moment the K3GN is turned ON until the end of the preset period.

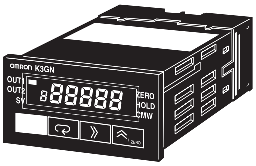
Hysteresis

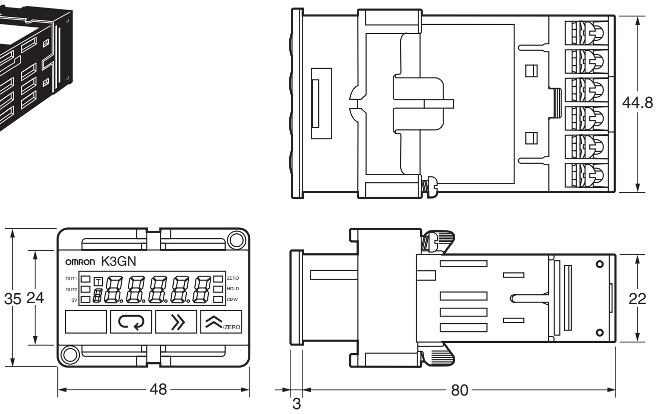
The hysteresis of comparative outputs can be set to prevent the chattering of relay or transistor outputs.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

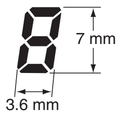
K3GN



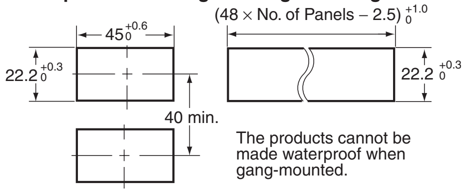


The K3GN uses M3 terminals. A terminal cover is provided.

Main Display Character Size



Panel Cutout Dimensions



- For installation, insert the K3GN panel into the rectangular hole, insert the adaptor from the rear, and push it in to reduce the gap between the panel surface and the adaptor. Secure the Unit with the screws. For water-proof installation, insert the rubber gasket onto the body of the K3GN.
- If multiple mounted Units are used, make sure the ambient temperature for the K3GN does not exceed the specified temperature.

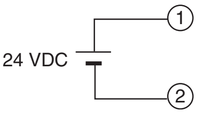
■ Wiring Precautions

- Wire the power supply with the correct polarity. Wiring with incorrect polarity may result in damage or burning.
- Wire the terminals using crimp terminals.
- Tighten terminal screws to a torque of approx. 0.5 N·m.
- Wire signal lines and power lines separately to reduce the influence of noise.

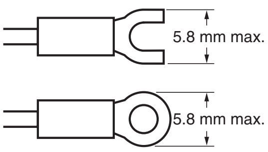
■ Wiring

Power Supply

- Input 24 VDC to terminals 1 and 2.



- Use M3 crimp terminals of the type shown below.



Measurement Input

The following table shows the relation between input ranges and input terminals.

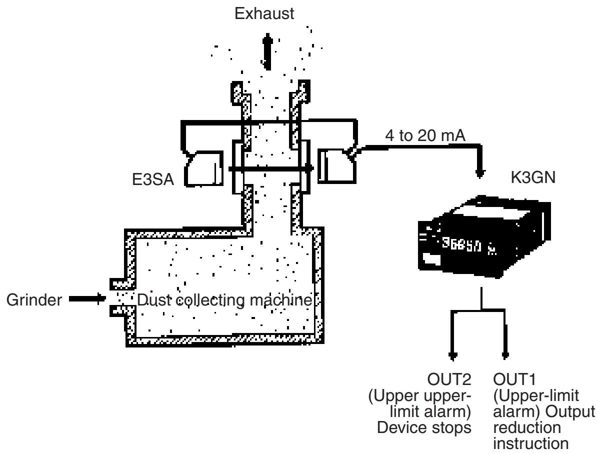
Input range		Input terminals
DC voltage/DC current	4 to 20 mA	⑤-⑥
	1 to 5 V	④-⑤
	±5 V	
	±10 V	
No-voltage contacts and NPN open collector (Models with NPN inputs)		②-③
No-voltage contacts and PNP open collector (Models with PNP inputs)		①-③

Be sure to read the Precautions for Correct Use and other information required when using the K3GN in the following user's manual.
K3GN Digital Panel Meter User's Manual (Cat.No. N102)

■ Application Examples

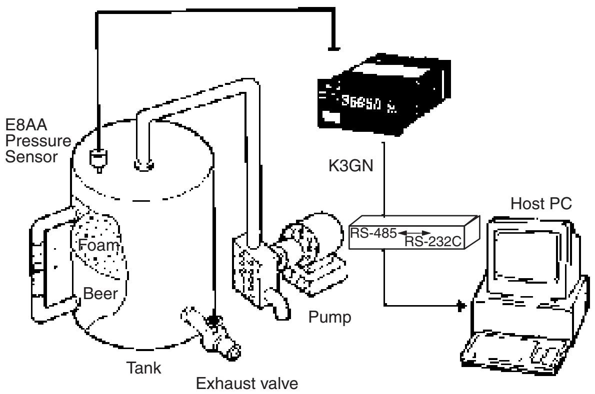
Detection of Dust Exhaust

The change in the density of the dust is detected via the E3SA and discriminated by the K3GN.



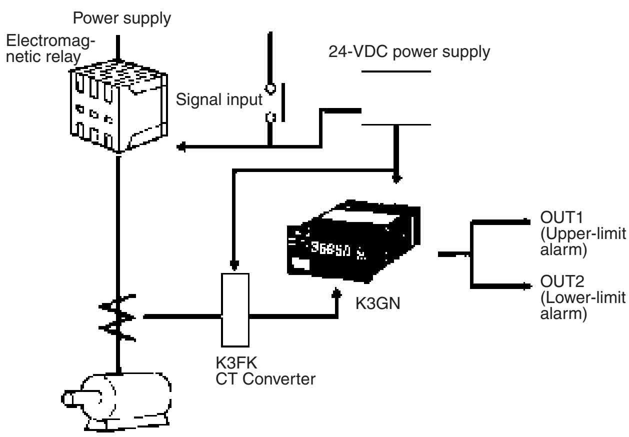
Monitoring of Tank Pressure

The output of the pressure sensor is processed and the pressure is displayed. Remote monitoring of the operation is possible with the communications function.



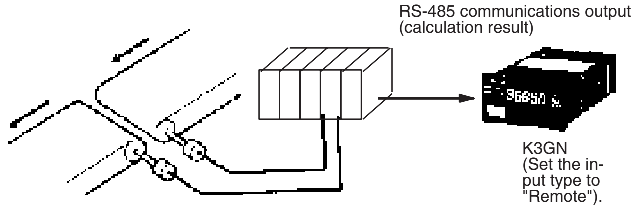
Monitoring of Motor Load Current

If the startup time compensation of the K3GN is enabled, the K3GN will not be influenced by the inrush current from starting the motor, and no signal will be output from the K3GN.



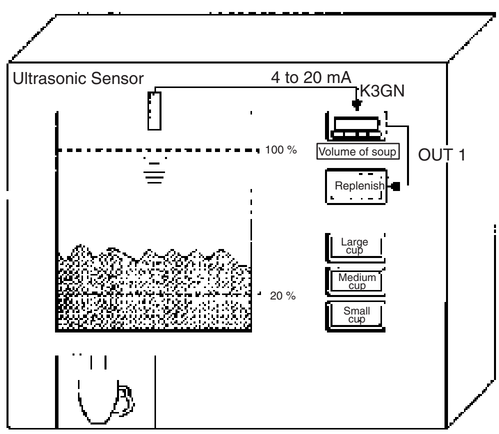
Monitoring Difference between Two Line Speeds

The difference between the two line speeds is calculated by the PLC and the result is written via RS-485 to the K3GN where it is displayed.

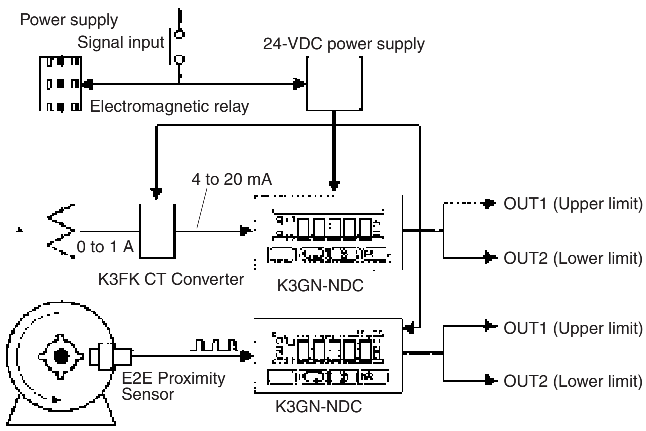


Monitoring the Remaining Quantity of Soup

The distance to the surface of the soup is detected with an ultrasonic sensor and, based on this distance, the K3GN displays the remaining quantity. When the remaining quantity of soup decreases to less than 20%, the K3GN lights the "Replenish" indicator.



Monitoring Number of Motor Revolutions



Safety Precautions

⚠ CAUTION
Do not touch the terminals while power is being supplied. Doing so may possibly result in electric shock.
Do not allow pieces of metal, wire clippings, or fine metallic shavings or filings to enter the product. Doing so may occasionally result in minor or moderate injury or in property damage due to electric shock, fire, or malfunction caused by internal short circuiting.
Do not use the product in locations where flammable or explosive gases are present. Doing so may occasionally result in minor or moderate explosion, causing minor or moderate injury, or property damage.
Do not use the equipment for measurements within Measurement Categories II, III, or IV (according to IEC 61010-1). Doing so may occasionally cause unexpected operation, resulting in minor or moderate injury, or damage to the equipment. Use the equipment for measurements only within the Measurement Category for which the product is designed.
Failure to perform correct setting of the product according to the application may occasionally cause unexpected operation, resulting in minor or moderate injury, or damage to the equipment. Ensure safety in the event of product failure by taking safety measures, such as installing a separate monitoring system.
Product failure may occasionally prevent operation of comparative outputs, resulting in damage to the connected facilities and equipment. Ensure safety in the event of product failure by taking safety measures, such as installing a separate monitoring system.
Tighten the screws on the terminal block and the connector locking screws securely using a tightening torque within the following ranges. Loose screws may occasionally cause fire, resulting in minor or moderate injury, or damage to the equipment. Terminal block screws: 0.43 to 0.58 N·m
Do not attempt to disassemble, repair, or modify the product. Doing so may occasionally result in minor or moderate injury due to electric shock.

■ Precautions for Safe Use

Environmental Precautions

1. Do not use the product in the following locations.
- Locations subject to direct radiant heat from heating equipment
- Locations where the product may come into contact with water or oil
- Locations subject to direct sunlight
- Locations where dust or corrosive gases (in particular, sulfuric or ammonia gas) are present
- Locations subject to extreme temperature changes
- Locations where icing or condensation may occur
- Locations subject to excessive shocks or vibration

2. Do not use the product in locations subject to temperatures or humidity levels outside the specified ranges or in locations prone to condensation. If the product is installed in a panel, ensure that the temperature around the product (not the temperature around the panel) does not go outside the specified range. Parts life is dependent on temperatures. A part life shortens when the temperature rises, and it lengthens when the temperature falls. Parts life can be lengthened by lowering the temperature inside the product.

3. In order to prevent inductive noise, wire the lines connected to the product separately from power lines carrying high voltages or currents. Do not wire in parallel with or in the same cable as power lines. Other measures for reducing noise include running lines along separate ducts and using shield lines.

4. Do not install the product near devices generating strong high-frequency waves or surges. When using a noise filter, check the voltage and current and install it as close to the product as possible. If several products are mounted side-by-side or arranged in a vertical line, the heat dissipation will cause the internal temperature of the product to rise, shortening the service life. If necessary, cool the products using a fan or other cooling method.

5. Take care when cleaning the product, because the exterior of the product may be damaged by organic solvents (thinner, benzine, etc.), strong alkaline materials and strong acid materials.

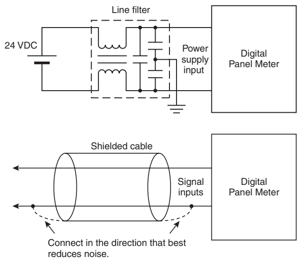
6. Avoid storing in high humidity or in a corrosive gas environment (including during transportation)

Precautions for Safe Use

1. Use and store within the proper temperature and humidity described in the specifications.
2. Provide sufficient space around the product for heat dissipation.
3. When using the product stored unused over a year after purchasing, the product features may not be utilized sufficiently.
4. Avoid storing outdoors or in a place that receives direct sunlight (including during transportation).
5. The service life of the output relays depends on the switching capacity and switching conditions. Consider the actual application conditions and use the product within the rated load and electrical service life. Using the product beyond its service life may result in contact welding or burning.
6. Be sure to confirm the name and polarity for each terminal before wiring the terminal block and connectors. Faulty wiring may cause destruction or burnout of internal parts.
7. Use the product within the noted supply voltage and rated load.
8. Do not connect anything to unused terminals.
9. Output turns OFF when the mode is changed or settings are initialized. Take this into consideration when setting up the control system.
10. Install an external switch or circuit breaker and label them clearly so that the operator can quickly turn OFF the power.
11. Ensure that the rated voltage is achieved no longer than 2 s after turning the power ON. When applying a voltage gradually, the power supply may not reset or the output may function in an uncertain manner.
12. Mount to a panel between 1 and 5 mm thick.
13. Use the specified size of crimp terminals (M3, width: 5.8 mm max.) for wiring. To connect bare wires, use AWG 28 to AWG 16 to wire the power supply terminals and AWG 22 to AWG 14 for other terminals. (Length of exposed wire: 6 to 8 mm)
14. Allow the product to operate without load for at least 15 minutes after the power is turned ON.

■ Precautions for Correct Use

1. Note that errors may be increased by the magnification of the scaling function.
2. When using a noise filter on the power supply, check that the filter is suitable for the supply voltage and current ratings, and then attach the noise filter as close as possible to the K3GN.



3. Avoid using the K3GN in places near a radio, television, or other wireless device. These devices can cause radio disturbances which will adversely affect the K3GN.

Warranty and Application Considerations

Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability.*

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. N160-E1-01 In the interest of product improvement, specifications are subject to change without notice.

Process Meter
K3MA-J

Highly Visible LCD Display with 2-color (Red and Green) LEDs

- Multi-range DC voltage/current input.
- Front-panel key operation for easy setting.
- Average processing function suppresses flicker.
- Scaling, front-panel forced-zero, zero-limit functions.
- Easy confirmation of max/min display.
- Short 80-mm depth (measured from edge of face plate).
- Finger protective cover (standard equipment) guards against electric shock.
- Water- and dust-proof NEMA4X (IP66 equivalent) front panel.
- Recognized to U.S. and Canadian requirements under the Component Recognition Program of UL.
- CE marking.

Model Number Structure

■ Model Number Legend

K3MA-J-□ ▭
1 2 3

1. Input Type
J: DC voltage/current

2. Output Type
None: No output
A2: 2 relay contact outputs (SPST-NO)

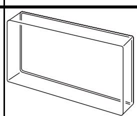
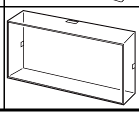
3. Supply Voltage
100-240VAC:100 to 240 VAC
24VAC/VDC:24 VAC/VDC

Ordering Information

■ List of Models

Input type	Supply voltage	Output	Model
DC voltage/current	100 to 240 VAC	None	K3MA-J 100-240VAC
		2 relay contact outputs (SPST-NO)	K3MA-J-A2 100-240VAC
	24 VAC/VDC	None	K3MA-J 24VAC/VDC
		2 relay contact outputs (SPST-NO)	K3MA-J-A2 24VAC/VDC

■ Accessories (Order Separately)

Name	Shape	Model
Splash-proof Soft Cover		K32-49SC
Hard Cover		K32-49HC

Specifications

■ Ratings

Model	K3MA-J 100-240VAC, K3MA-J-A2 100-240VAC	K3MA-J 24VAC/VDC, K3MA-J-A2 24VAC/VDC
Supply voltage	100 to 240 VAC	24 VAC/VDC
Operating voltage range	85% to 110% of the rated supply voltage	
Power consumption (under maximum load)	6 VA max.	4.5 VA max. (24 VAC) 4.5 W max. (24 VDC)
Insulation resistance	20 MΩ min. (at 500 VDC) between external terminal and case. Insulation provided between inputs, outputs, and power supply.	
Dielectric strength	2,000 VAC for 1 min between external terminal and case. Insulation provided between inputs, outputs, and power supply.	
Noise immunity	±1,500 V on power supply terminals in normal or common mode. ±1 μs, or 100 ns for square-wave noise with 1 ns.	±480 V on power supply terminals in normal mode. ±1,500 V in common mode. ±1 μs, or 100 ns for square-wave noise with 1 ns.
Vibration resistance	Vibration: 10 to 55 Hz, Acceleration: 50 m/s^2 5 min each in X, Y, and Z directions for 10 sweeps.	
Shock resistance	150 m/s^2 (100 m/s^2 for relay contact outputs) 3 times each on 3 axes, 6 directions.	
Ambient temperature	Operating:-10°C to 55°C (with no condensation or icing) Storage:-25°C to 65°C (with no condensation or icing)	
Ambient humidity	Operating:25% to 85% (with no condensation)	
Approved safety standards	UL3121-1, conforms to EN61010-1 (Pollution degree 2/overvoltage category II) Conforms to VDE0106/P100 (finger protection)	
EMC	(EMI)EN61326+A1Industry Emission Enclosure:CISPR 11 Group 1 class A: CISRP16-1/-2 Emission AC Mains:CISPR 11 Group 1 class A: CISRP16-1/-2 (EMS)EN61326+A1Industry Immunity ESD:EN61000-4-2:4 kV contact discharge 8 kV air discharge Immunity RF-interference:EN61000-4-3:10 V/m (amplitude-modulated, 80 MHz to 1 GHz) Electrical Fast Transient Noise:EN61000-4-4:2 kV (power line) Immunity Burst Noise:1 kV line to line (I/O signal line) Immunity Surge:EN61000-4-5:1 kV (power line) 2 kV line to ground (power line) Immunity Conducted Disturbance:EN61000-4-6:3 V (0.15 to 80 MHz) Immunity Voltage Dip/Interrupting:EN61000-4-11:0.5 cycle, 0, 180°, 100% (rated voltage)	
Weight	Approx. 200 g	

Characteristics

Input signal	DC voltage/current (0 to 20 mA, 4 to 20 mA, 0 to 5 V, 1 to 5 V, ±5 V, ±10 V)
A/D conversion	Double integral method
Sampling period	250 ms
Display refresh period	Sampling period (sampling times multiplied by number of measurements for averaging if average processing is selected.)
Max. displayed digits	5 digits (-19999 to 99999)
Display	7-segment digital display, Character height: 14.2 mm
Polarity display	"-" is displayed automatically with a negative input signal.
Zero display	Leading zeros are not displayed.
Scaling function	Programmable with front-panel key inputs (range of display: -19999 to 99999). The decimal point position can be set as desired.
Hold function	Max. hold (maximum value), Min. hold (minimum value)
Hysteresis setting	Programmable with front-panel key inputs (0001 to 9999).
Other functions	Forced-zero (with front-panel key) Zero-limit Scaling teach function Display color change (green (red), green, red (green), red) OUT type change (upper limit, lower limit, upper/lower limit) Average processing (simple average)
Output	Relays: 2 SPST-NO
Delay in comparative outputs	750 ms max.
Degree of protection	Front panel: NEMA4X for indoor use (equivalent to IP66) Rear case: IEC standard IP20 Terminals: IEC standard IP00 + finger protection (VDE0106/100)
Memory protection	Non-volatile memory (EEPROM) (possible to rewrite 100,000 times)

Digital panel indicators

Measuring Ranges

Process Voltage/Current Inputs

Input	Measuring range	Measuring accuracy	Input impedance	Displayable range
DC voltage	1.000 to 5.000 V	±0.1% FS ±1 digit max. (at 23±3°C)	1 MΩ min.	–19999 to 99999 (with scaling function)
	0.000 to 5.000 V			
	–5.000 to 5.000 V	±0.1% FS ±1 digit max. (at 23±5°C)		
	–10.00 to 10.00 V			
DC current	4.00 to 20.00 mA/ 0.00 to 20.00 mA	±0.1% FS ±1 digit max. (at 23±3°C)	45 Ω	

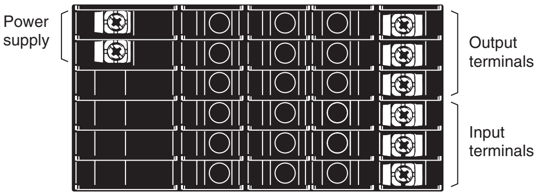
Input/Output Ratings

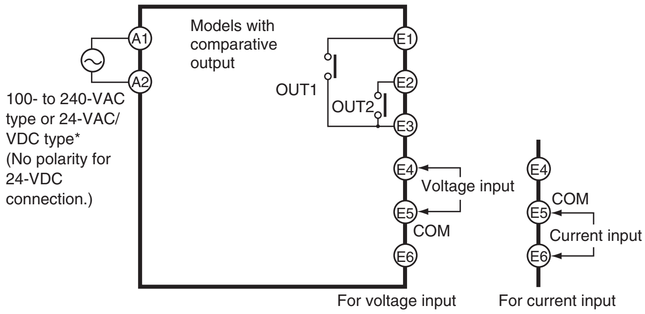
Relay Contact Output

Item	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4, L/R=7 ms)
Rated load (UL ratings)	5 A at 250 VAC, 5 A at 30 VDC	1.5 A at 250 VAC, 1.5 A at 30 VDC
Rated carry current	5 A max. (at COM terminal)	
Max. contact voltage	250 VAC, 150 VDC	
Max. contact current	5 A (at COM terminal)	
Max. switching capacity	1,250 VA, 150 W	250 VA, 30 W
Min. permissible load (P level, reference value)	10 mA at 5 VDC	
Mechanical life	5,000,000 times min. (at a switching frequency of 1,200 times/min)	
Electrical life (at an ambient temperature of 20°C)	100,000 times min. (at a rated load switching frequency of 10 times/min)	

Connections

■ Terminal Arrangement

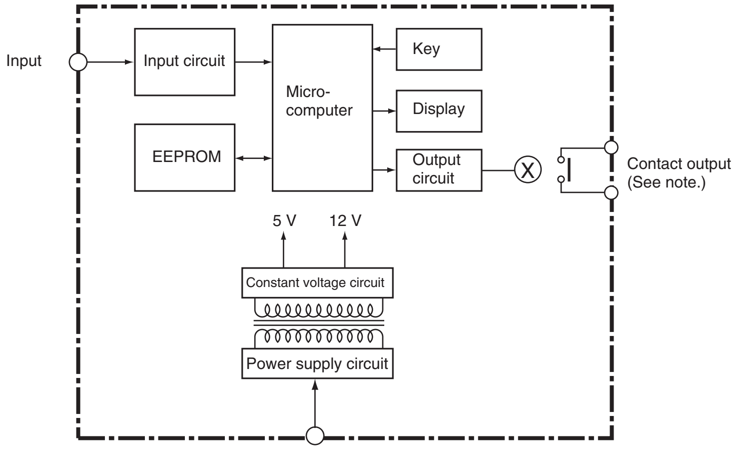




*Recommended DC power supply: eg. ORMON S8VS

Terminal No.	Name	Description
A1 - A2	Operation power	Connects the operation power supply.
E4 , E6 - E5	Analog input	Connects the voltage or current analog input.
E1 , E2 - E3	Outputs	Outputs the relay outputs.

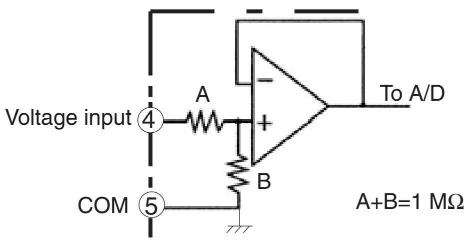
■ Block Diagram

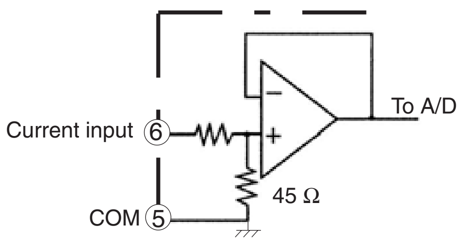


Note: Relay output models only.

■ Input Circuits

Analog Input (DC Voltage/Current)





Operation

■ Main Functions

Input Types and Ranges

Input type (setting parameter)	Function	Input range (setting parameters)	Setting range
Input range (in-t)	Selects DC voltage/current signal input	0 to 20 mA (0-20)	Displayable from -19999 to 99999 with scaling function. The position of the decimal point can be set as desired.
		4 to 20 mA (4-20)	
		0 to 5 V (0-5)	
		1 to 5 V (1-5)	
		±5 V (5)	
		±10 V (10)	

Note: The initial value for the input range is "4 to 20 mA (4-20)."

Scaling

• Analog (Process) Inputs

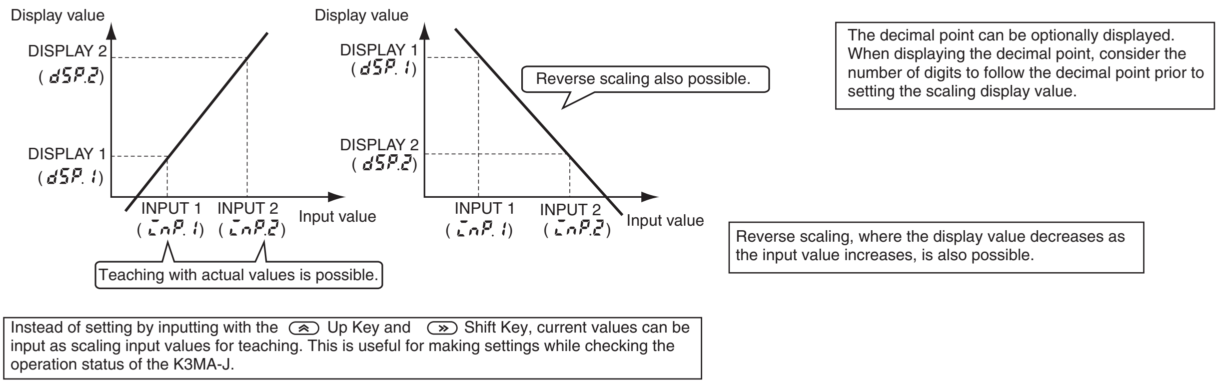
The K3MA-J converts input signals into desired physical values.

INPUT2:Any input value
DISPLAY2:Displayed value corresponding to INPUT2
INPUT1:Any input value
DISPLAY1:Displayed value corresponding to INPUT1

When DISPLAY1 is set for INPUT1, and DISPLAY2 is set for INPUT2, a line will be displayed joining the two points. (Raise shift, reverse scaling, plus/minus display, etc., can be adjusted as desired.)

Parameter	Setting value	Meaning
inp.1	-19999 to 99999	Input value for dSP. 1
dsp.1	-19999 to 99999	Display value for inP. 1
inp.2	-19999 to 99999	Input value for dSP.2
dsp.2	-19999 to 99999	Display value for inP.2

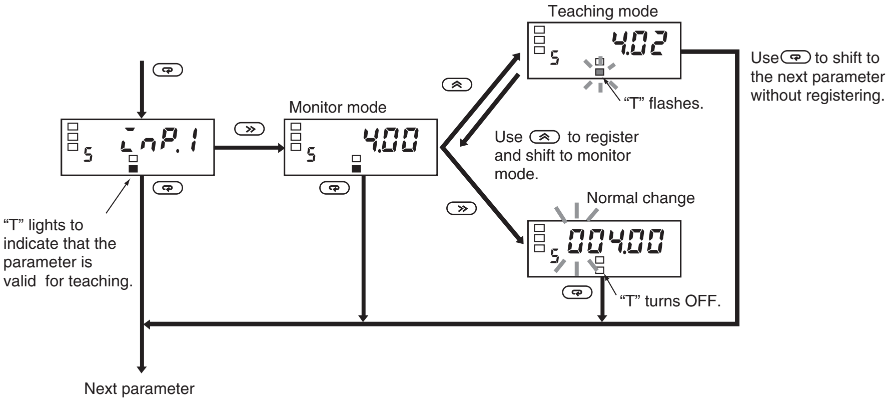
Parameter	Setting value	Meaning
dp	%.%%%%	Display four digits after decimal point
	%%.%%%	Display three digits after decimal point
	%%%.%%	Display two digits after decimal point
	%%%%.%	Display one digit after decimal point
	%%%%%	No decimal point



Convenient Functions

Scaling Teach

The parameters (inP.1, inP.2) for the K3MA-J's initial setting level can be set using actual input values with the teaching function. After displaying the parameters, the actual input settings can be made with the following operation.

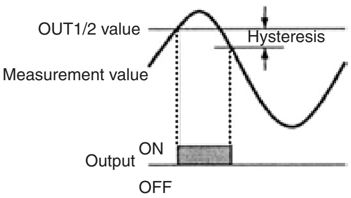


OUT Types (Comparative Output Models Only)

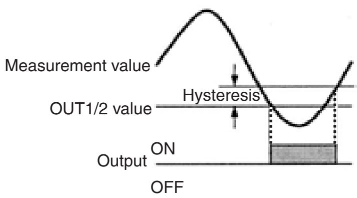
OUT 1 and OUT 2 can be set to operate in one of the three following modes in accordance with the compared values:

- Upper limit (High Acting):
  The output is turned ON when the measurement value is greater than its set value.
- Lower limit (Low Acting):
  The output is turned ON when the measurement value is less than its set value.
- Upper and lower limits (Outside Band Acting):
  An upper limit (H set value) and lower limit (L set value) can be set independently.
  The output is turned ON when the measurement value is greater than upper-limit set value or less than the lower-limit set value.

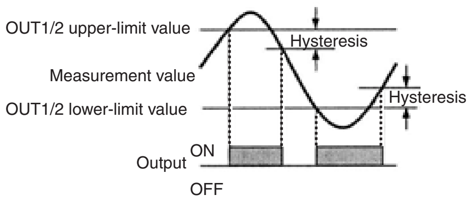
Upper Limit (High Acting)



Lower Limit (Low Acting)

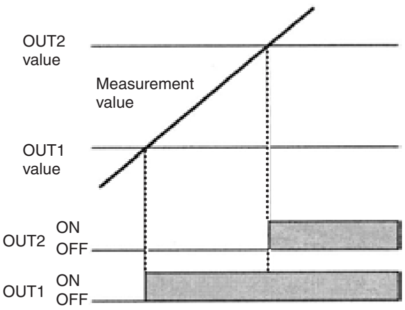


Upper and Lower Limits (Outside Band Acting)

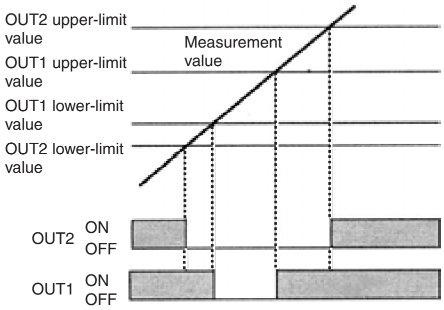


The three types of output operations shown above can be combined as desired. The following are examples of possible combinations.

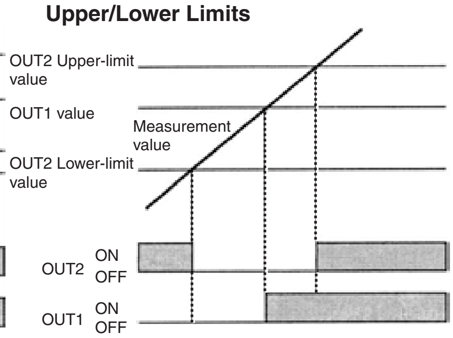
Upper Limit 2-stage Output



Threshold Output



Combination of Upper Limit and Upper/Lower Limits



Parameter Initialization

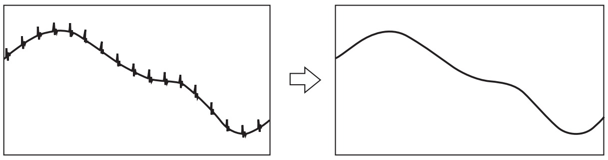
This function returns all of the parameters to their initial values.

Parameter	Setting value	Meaning
init	off	---
	on	Initializes all parameters.

Use this to reset the K3MA-J after returning it to its factory-set condition.

Average Processing

Average processing stabilizes displayed values to minimize flicker by averaging the fluctuating input signals. Average processing can be performed for the measurement values in either of four steps (OFF, 2 times, 4 times, or 8 times).

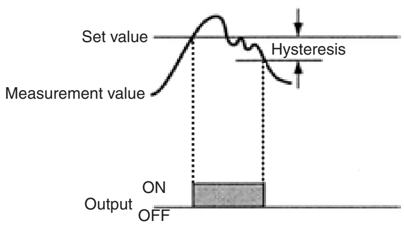


This is useful for ignoring rapid fluctuations, e.g., eliminating spike noise.

Hysteresis (Comparative Output Models Only)

The hysteresis of comparative outputs can be set to prevent chattering in the output when the measurement value fluctuates finely near the OUT value.

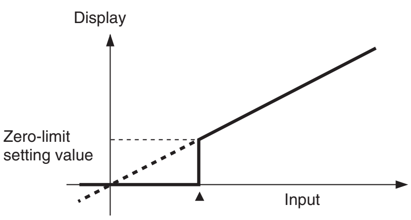
Upper limit (high acting)



Zero-limit Function

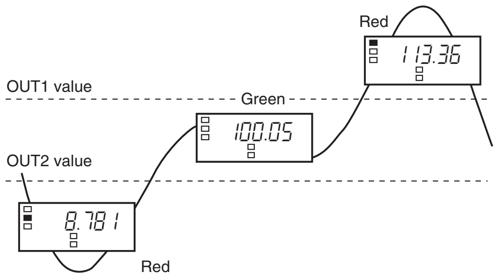
The zero-limit function changes any value below the set value to zero. This is useful when you want to change negative values to zero rather than display them, or when you want to make the display in the smallest part of the input range zero.

Parameter	Setting value	Meaning
=-lim	off	OFF: No zero-limit
	on	ON: Zero-limit
lim-p	0 to 99	0 to 99: Zero-limit value



Changing the Display Color

The color of the value displayed can be set to either red or green. For comparative output models, the display color can be set to change from green to red, or from red to green, according to the status of the comparison criterion.



Display Auto-return Time

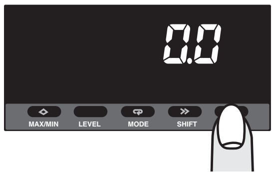
This function automatically returns the display to the operation level's current value if no keys are pressed for a preset time (called the display auto-return time).

Move-to-Protect-Level Time

The time required to shift to the protect level can be set as desired.

Forced-zero Function

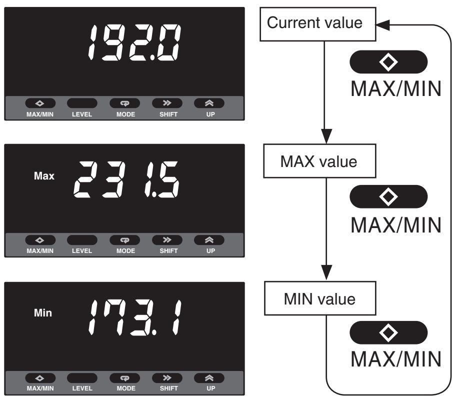
It is possible to shift from a value to the zero point with one touch of the Up Key on the front panel (for example, when adjusting reference values).



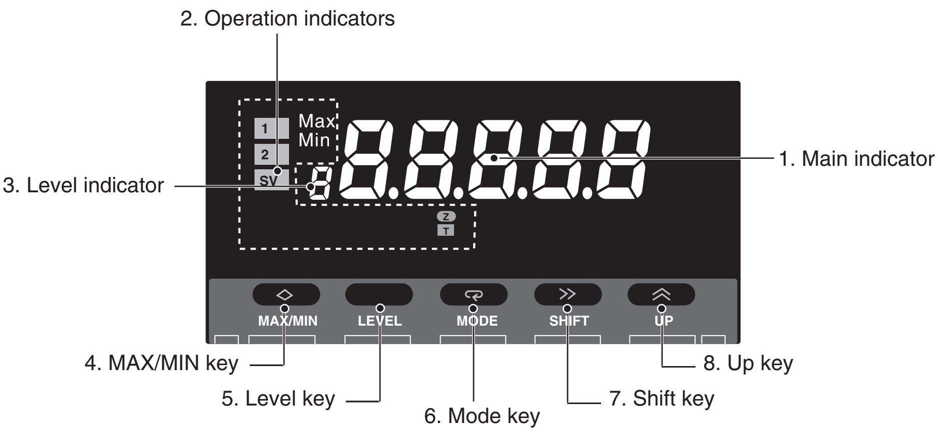
Note: Used only for releasing the forced-zero with the Protect menu.

MAX/MIN Display

The maximum and minimum measurement (display) values from the time the power is turned ON until the current time can be stored and displayed. This is useful, for example, when measuring the maximum value.



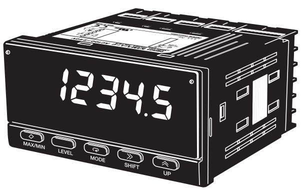
Nomenclature

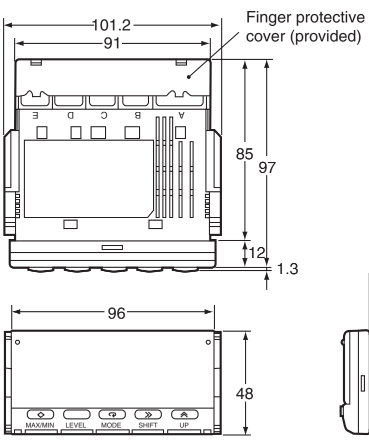


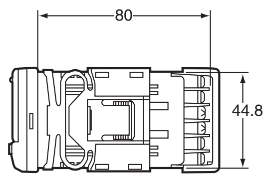
Name		Functions
1. Main indicator		Displays current values, parameters, and set values.
2. Operation indicators	1	Lit when output 1 is ON.
	2	Lit when output 2 is ON.
	SV	Lit when a set value is being displayed or changed.
	Max	Lit when the main indicator is showing the MAX value.
	Min	Lit when the main indicator is showing the MIN value.
	Z	Lit during the forced-zero operation.
	T	Lit when the teaching function is operable. Blinks while the teaching function is operating.
3. Level indicator		Displays the current level that the K3MA-J is in. (See below for details.)
4. MAX/MIN Key		Used to display the MAX and MIN values when a measurement value is being displayed.
5. Level Key		Used to change the level.
6. Mode Key		Used to allow the main indicator to indicate parameters sequentially.
7. Shift Key		Used to enable a set value to be changed. When changing a set value, this key is used to move along the digits.
8. Up Key		Used to change a set value. Used to set or clear a forced-zero function when a measurement value is being displayed.

Level indicator	Level
p	Protect
Not lit	Operation
s	Initial setting
f	Advanced-function setting

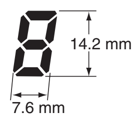
Dimensions



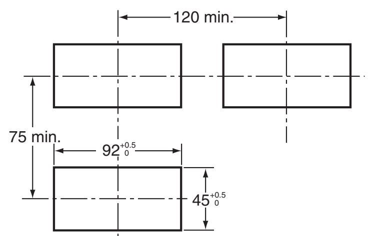




Main indicator character size



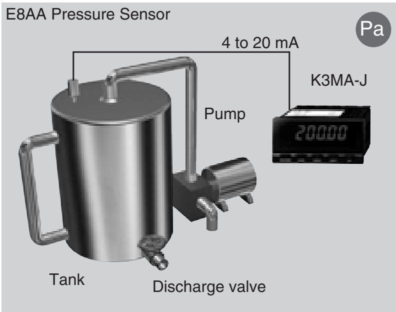
Panel cut-out



The K3MA-J uses M3 terminals.

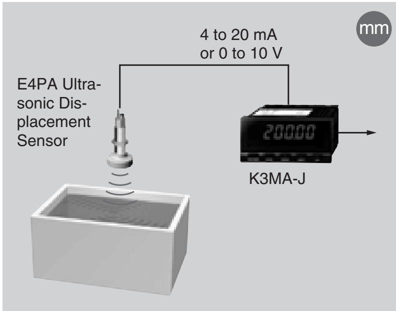
Application Examples

Monitoring interior tank pressure



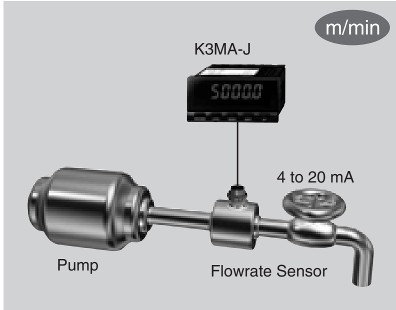
- Monitoring gas pressure
- Inspection instruments in food or pharmaceutical plants

Displaying/outputting liquid level



- Monitoring liquid level in cleaning tanks
- Water tanks, devices using chemicals, etc.

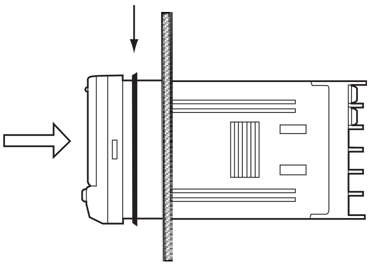
Flowrate sensor



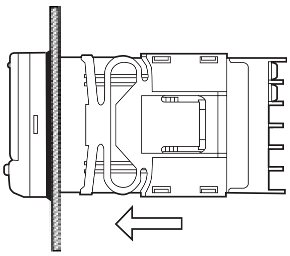
- Monitoring sendout flowrate
- Water processing devices, etc.

Installation

1. Insert the K3MA-J into the panel cut-out hole.
2. For a waterproof installation, insert the rubber gasket onto the body of the K3MA-J.



3. Fit the adaptor into the grooves on the left and right sides of the rear case, then push it until it contacts the panel to secure the K3MA-J.

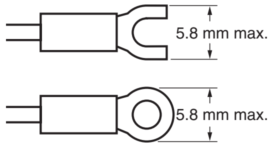


■ Wiring Precautions

- Use crimp terminals.
- Tighten the terminal screws to a torque of approximately 0.5 N·m.
- To avoid the influence of noise, route signal lines and power lines separately.

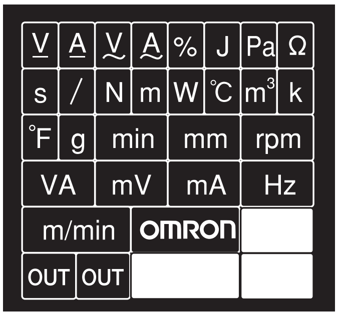
■ Wiring

- Use the following M3 crimp terminals.



■ Unit Labels (Provided)

- The unit labels are not attached to the K3MA-J. Select the desired labels from the provided sheet.



Note: For scales and gauges, use the unit labels that are specified by the relevant laws or regulations.

Precautions

WARNING

Do not touch any of the terminals while the power is being supplied. Doing so may result in electric shock.

Caution

Do not disassemble the product or touch the internal components of the product while the power is being supplied. Doing so may result in electric shock.

Caution

Do not allow metal objects or wire cuttings to enter the product. Doing so may result in electric shock, fire, or malfunction.

Caution

Perform correct settings for the product according to the control application. Failure to do so may cause unexpected operation, resulting in damage to the product or injury.

Caution

Take safety measures, such as installing a separate monitoring system, to ensure safety even if the product fails. Product failure may prevent comparative outputs from being generated, resulting in serious accidents.

Observe the following precautions to ensure safety.

1. Maintain the power supply voltage within the range specified in the specifications.
2. Maintain the load within the ratings specified in the specifications.
3. Check each terminal for correct number and polarity before connecting it. Incorrect or reverse connections may damage or burn out internal components in the product.
4. Tighten the terminal screws securely. The recommended tightening torque is 0.43 to 0.58 N·m. Loose screws may cause fire or malfunction.
5. Do not connect anything to unused terminals.
6. Provide a switch or circuit breaker so that operators can easily turn OFF the power supply when necessary. Also provide appropriate indications of such devices.
7. Do not attempt to disassemble, repair, or modify the product.
8. Do not use the product where flammable or combustible gases are present.

Application

General Precautions

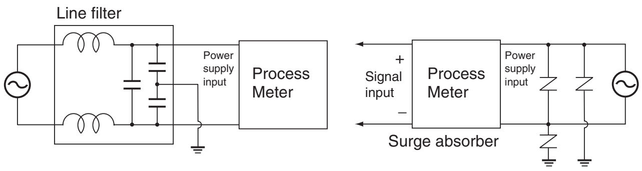
1. Do not use the product in the following locations:
    - Locations subject to direct radiant heat from heating equipment.
    - Locations subject to exposure to water, oil, or chemicals.
    - Locations subject to direct sunlight.
    - Locations subject to dust or corrosive gases (particularly sulfuric gas or ammonia gas).
    - Locations subject to severe changes in temperature.
    - Locations subject to icing or condensation.
    - Locations subject to shock or vibration.
2. Do not block heat dissipation around the product, i.e., provide sufficient space for heat dissipation.
3. Ensure that the rated voltage is reached within two seconds after the power is turned ON.
4. Conduct aging for 15 minutes min. after power is turned ON for correct measurement.
5. Do not touch the slit sections or terminals while the power is being supplied to prevent the product from being affected by static electricity.
6. Do not lay heavy objects on the product during use or storage. Doing so may deform or deteriorate the product.
7. Do not use paint thinner for cleaning. Use commercially available alcohol.

Mounting

- Mount the product to a panel that is 1 to 8 mm thick.
- Install the product in a horizontal position.
- Use crimp terminals that match screw sizes.

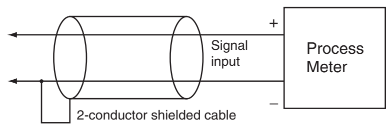
Noise Prevention

- Install the product as far as possible from devices that generate strong, high-frequency fields (such as high-frequency welders or sewing machines) or surges.
- Install surge absorbers or noise filters on nearby devices that generate noise (particularly, motors, transformers, solenoids, magnet coils, and other devices that have a high inductance component).



- To prevent inductive noise, separate the terminal block wiring for the product from high-voltage or high-current power lines. Do not route the wiring for the product in parallel with or tie it in a bundle with power lines.
  Take the following countermeasures against inductive noise in input lines.

Analog Signal Inputs



- When using a noise filter for the power supply, check for the voltage and current and install it as close as possible to the Process Meter.
- Do not install the product near radios, television sets, or wireless devices. Doing so may cause reception interference.

Increasing Service Life

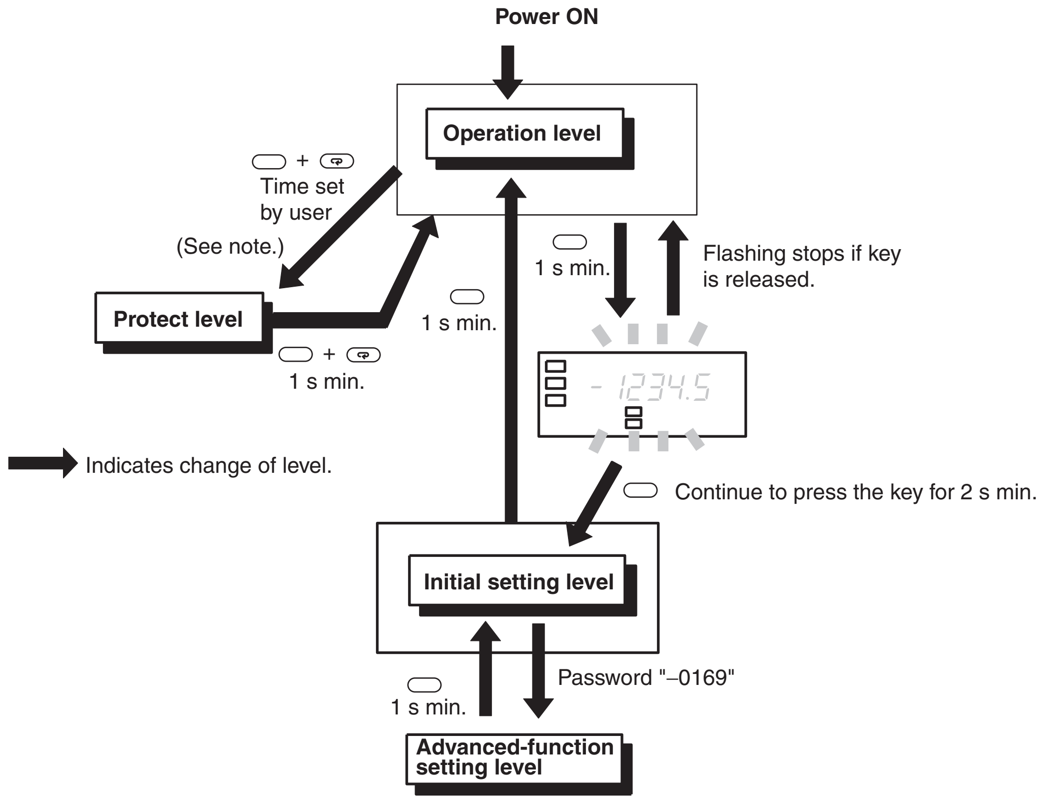
- Do not use the product in locations where the temperature or humidity exceeds the ratings or where condensation may occur. When installing the product in a panel, be sure that the temperature around the product (not the temperature around the panel) does not exceed the ratings. The product service life depends on the ambient temperature. The higher the ambient temperature, the shorter the service life. To extend the product service life, lower the temperature inside the Process Meter.
- Use and store the product within the temperature and humidity ranges given in the specifications. When gang-mounting Process Meters or arranging them vertically, heat generated by the Process Meters will cause the internal temperature to rise, reducing the service life. In such cases, consider forced cooling methods, such as using a fan to circulate air around the Process Meters. Do not, however, allow only the terminals to be cooled. Doing so will increase measurement error.
- The life of the output relays is greatly affected by the switching capacity and switching conditions. Use these relays within their rated load and electrical life. The contacts may fuse or burn if they are used past their electrical life.

Operating Procedures

■ Levels

“Level” refers to a grouping of parameters. The following table lists the operations that are possible in each of the levels, and the diagram tells how to move between levels. There are some parameters that are not displayed for certain models.

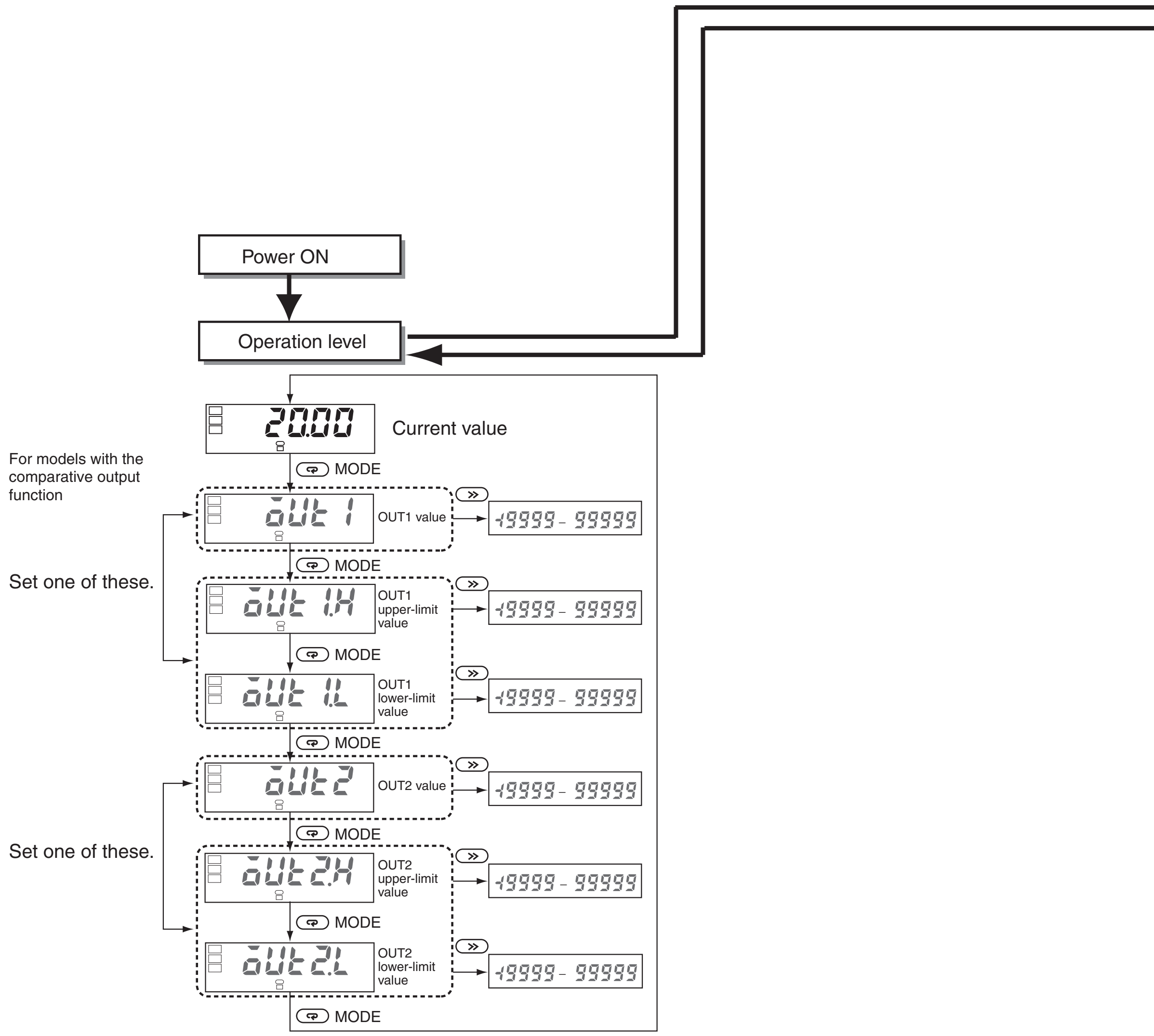
Level name	Function	Measurement
Protect	Setting lockouts.	Continue
Operation	Displaying current values, setting/clearing forced-zero function, and setting OUT 1/2 values.	Continue
Initial setting	Making initial settings of input type, scaling, output operating action, and other parameters.	Stopped
Advanced-function setting	Setting average processing, display color settings, and other advanced-function parameters.	Stopped

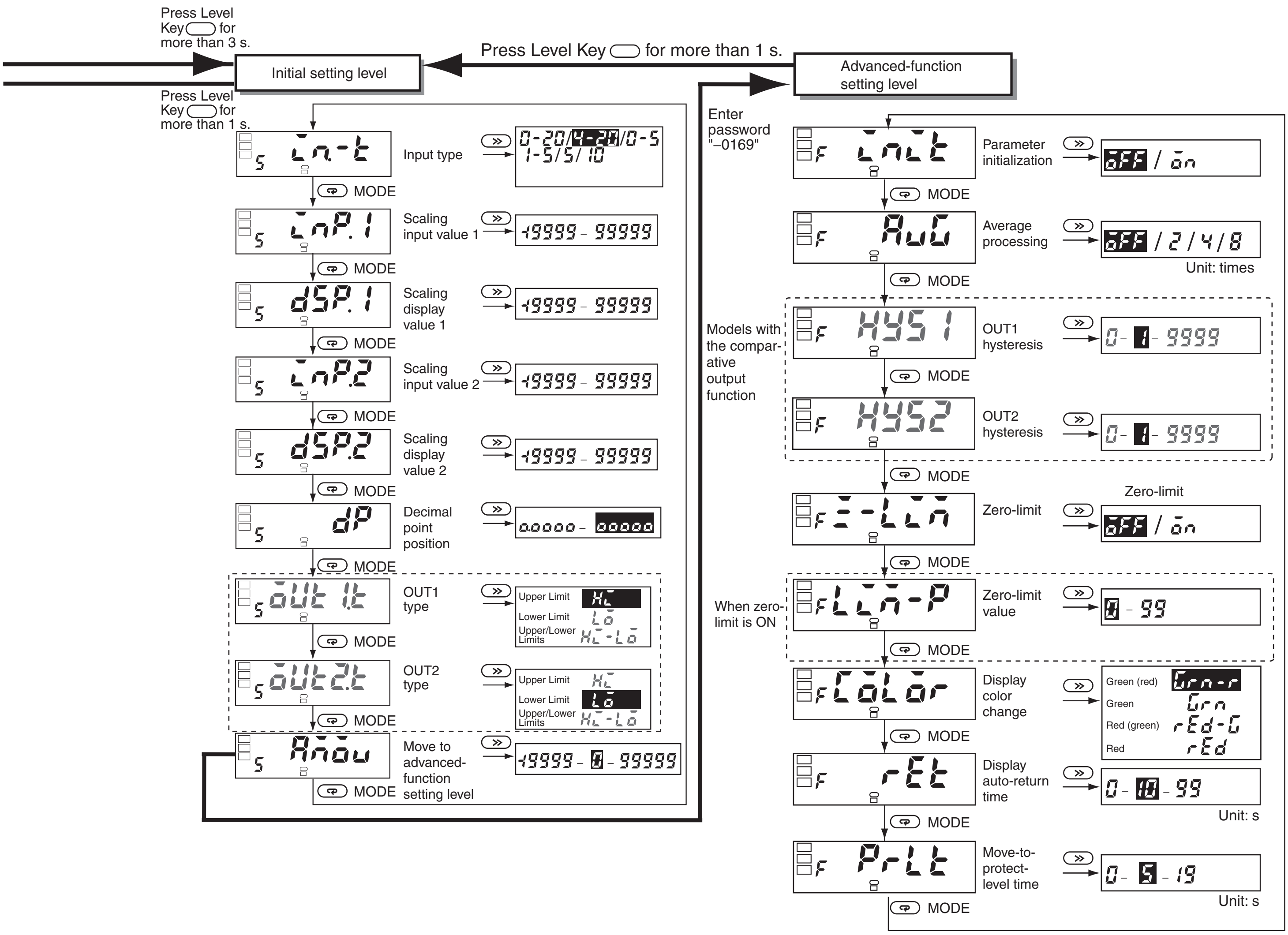


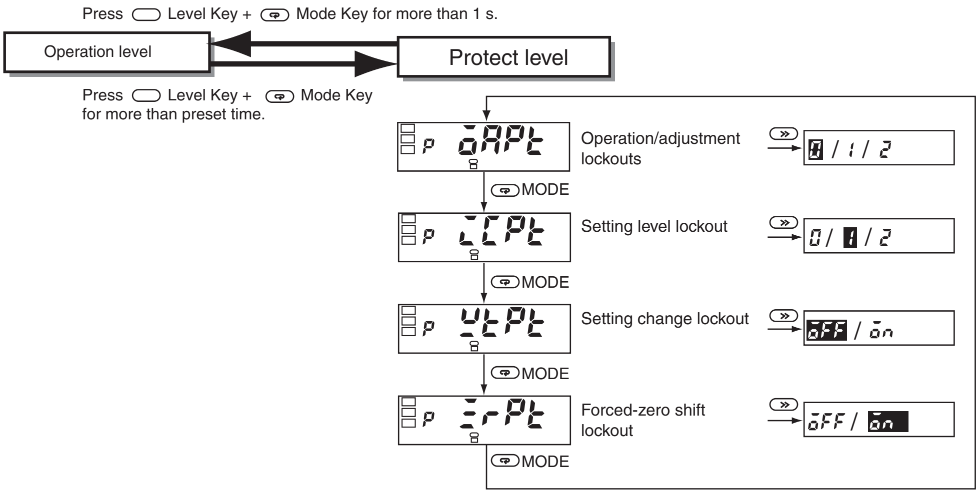
Note: The move-to-protect-level time can be set in the advanced-function setting level.

■ Parameters

Note: 1. Some parameters are not displayed for certain models.
2. The K3MA-J will stop measurement if the level is changed to the initial setting level or the advanced-function setting level.
3. If the input range is changed, some parameters are set to default values. Therefore, set the input range first.
4. Settings displayed in reversed colors are defaults.




Press Level Key for more than 3 s.
Press Level Key for more than 1 s.
Initial setting level
Press Level Key for more than 1 s.
Advanced-function setting level
Enter password "–0169"
Input type
0-20/4-20/0-5
1-5/5/10
MODE
Scaling input value 1
-19999 - 99999
MODE
Scaling display value 1
-19999 - 99999
MODE
Scaling input value 2
-19999 - 99999
MODE
Scaling display value 2
-19999 - 99999
MODE
Decimal point position
00000 - 00000
MODE
OUT1 type
Upper Limit
Lower Limit
Upper/Lower Limits
MODE
OUT2 type
Upper Limit
Lower Limit
Upper/Lower Limits
MODE
Move to advanced-function setting level
-19999 - 0 - 99999
MODE
Parameter initialization
MODE
Average processing
Unit: times
MODE
Models with the compar-ative output function
OUT1 hysteresis
0 - 1 - 9999
MODE
OUT2 hysteresis
0 - 1 - 9999
MODE
Zero-limit
Zero-limit
MODE
When zero-limit is ON
Zero-limit value
0 - 99
MODE
Display color change
Green (red)
Green
Red (green)
Red
MODE
Display auto-return time
0 - 10 - 99
Unit: s
MODE
Move-to-protect-level time
0 - 5 - 19
Unit: s
MODE



Operation/Adjustment Lockouts

Restricts key operations for operation level and adjustment level.

Parameter	Setting	Operation level	
		Current value display	Set value display
oapt	0	Allowed	Allowed
	1	Allowed	Allowed
	2	Allowed	Prohibited

- Initial setting is 0.
- This cannot be displayed on models not equipped with the comparative output function.

Setting Level Lockout

Restricts shifting to initial setting level or advanced-function setting level.

Parameter	Setting	Shift to initial setting level	Shift to advanced-function setting level
icpt	0	Allowed	Allowed
	1	Allowed	Prohibited
	2	Prohibited	Prohibited

Setting Change Lockout

Restricts setting changes by key operation. When this lockout is set, it is no longer possible to shift to a setting change mode.

Parameter	Setting	Setting change by key operation
wtpt	off	Allowed
	on	Prohibited

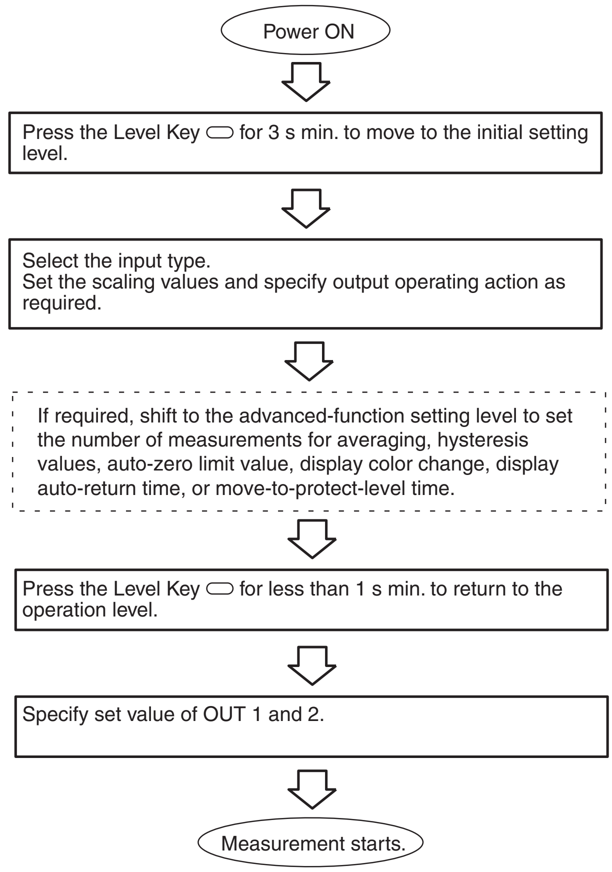
However, all protect level parameters can still be changed.

Forced-zero Lockout

Restricts the setting or release of a forced-zero by front-panel key operation.

Parameter	Setting	Setting/release of forced-zero by key operation
=rpt	off	Allowed
	on	Prohibited

■ Initial Settings

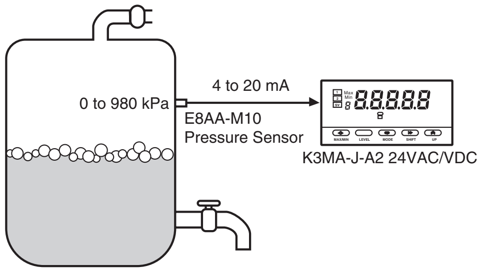


Setting Example

Initial Settings

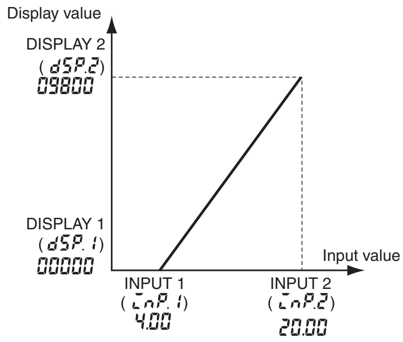
The settings for the following example are shown here.

Example: Tank pressure display



Here, the pressure inside the tank is to be displayed in units of 0.1 kPa.

- Pressure Sensor: E8AA-M10
  Measuring range: 0 to 980 kPa, output 4 to 20 mA



1. Set the K3MA-J input type to the 4 to 20 mA input range.
   Parameter: in-t (input type), Setting value: 4-20
2. Set the display values for the corresponding input values.
   Set the scaling as shown below for the following correspondence: input 4 mA-->display 0.0, input 20 mA-->display 980.0
   ParameterSetting value
   inP.1 (scaling input value 1)4.00
   dSP.1 (scaling display value 1)00000
   inP.2 (scaling input value 2)20.00
   dSP.2 (scaling display value 2)09800
   dP (decimal point position)oooo.o

Note: The decimal point position here refers to the position in the number after scaling. When setting the scaling display value, it is necessary to consider the number of digits to be displayed past the decimal point.

Troubleshooting

When an error occurs, error details will be displayed on the main indicator. Confirm the error from the main indicator and take the appropriate countermeasures.

Level display	Main indicator	Error contents	Countermeasures
Not lit	e111	RAM memory error	Repair is necessary. Consult your OMRON sales representative.
5	e111	EEPROM memory error	When this error is displayed, press the Level Key for 3 seconds, and the settings will be restored to the factory settings. If the error cannot be recovered, repair is necessary. Consult your OMRON sales representative.
Not lit	Flashes S.Err	You will see this indication when turning ON the product the first time after purchase. This is because the input signal value is 0 mA at that time even though the range is factory set to 4 to 20 mA.	At the initial setting level, set the input type and other parameters according to your application.
		Input error	Promptly change the input voltage/current to a value that falls within the measurement range. If the error cannot be recovered, repair is necessary. Consult your OMRON sales representative.
Not lit	Flashes 99999	The scaling display value exceeds 99999.	Promptly change the input to a value that falls within the specified range.
			The scaling value may be inappropriate. Review the scaling value at the initial setting level.
Not lit	Flashes -19999	The scaling display value is lower than -19999.	Promptly change the input to a value that falls within the specified range.
			The scaling value may be inappropriate. Review the scaling value at the initial setting level.

Warranty and Limitations of Liability

■ WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

■ LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

■ SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products.

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. N108-E2-04A In the interest of product improvement, specifications are subject to change without notice.

Temperature Meter
K3MA-L

Highly Visible LCD Display with 2-color (Red and Green) LEDs

- Wide input range - select from two types of platinum-resistance thermometers and ten types of thermocouples.
- Front-panel key operation for easy setting.
- Average processing function suppresses flicker.
- Temperature input shift and temperature unit selection functions.
- Easy confirmation of max/min display.
- Short 80-mm depth (measured from edge of face plate).
- Finger protective cover (standard equipment) protects against electric shock.
- Water- and dust-proof NEMA4X (IP66 equivalent) front panel.
- Recognized to conform to U.S. and Canadian requirements under the Component Recognition Program of UL.
- CE marking.

Model Number Structure

■ Model Number Legend

K3MA-L-□ □
1 2 3

1. Input Type
L: Platinum-resistance thermometer or thermocouple

2. Output Type
None: No output
C: With relay contact output (SPDT)

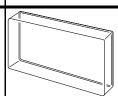
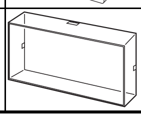
3. Supply Voltage
100-240VAC:100 to 240 VAC
24VAC/VDC:24 VAC/VDC

Ordering Information

■ List of Models

Input type	Supply voltage	Output	Model
Platinum-resistance thermometer or thermocouple	100 to 240 VAC	None	K3MA-L 100-240VAC
		1 relay contact output (SPDT)	K3MA-L-C 100-240VAC
	24 VAC/VDC	None	K3MA-L 24VAC/VDC
		1 relay contact output (SPDT)	K3MA-L-C 24VAC/VDC

■ Accessories (Order Separately)

Name	Shape	Model
Splash-proof Soft Cover		K32-49SC
Hard Cover		K32-49HC

Specifications

■ Ratings

	K3MA-L 100-240VAC, K3MA-L-C 100-240VAC	K3MA-L 24VAC/VDC, K3MA-L-C 24VAC/VDC
Supply voltage	100 to 240 VAC	24 VAC (50/60 Hz), 24 VDC
Operating voltage range	85% to 110% of the rated supply voltage	
Power consumption (under maximum load)	6 VA max.	4.5 VA max. (24 VAC) 4.5 W max. (24 VDC)
Insulation resistance	20 MΩ min. (at 500 VDC) between external terminal and case. Insulation provided between inputs, outputs, and power supply.	
Dielectric strength	2,000 VAC for 1 min between external terminal and case. Insulation provided between inputs, outputs, and power supply.	
Noise immunity	±1,500 V on power supply terminals in normal or common mode. ±1 µs, or 100 ns for square-wave noise with 1 ns.	±480 V on power supply terminals in normal mode. ±1,500 V in common mode. ±1 µs, or 100 ns for square-wave noise with 1 ns.
Vibration resistance	Vibration: 10 to 55 Hz, Acceleration: 50 m/s^2 5 min each in X, Y, and Z directions for 10 sweeps.	
Shock resistance	150 m/s^2 (100 m/s^2 for relay contact outputs) 3 times each on 3 axes, 6 directions.	
Ambient temperature	Operating:–10°C to 55°C (with no condensation or icing) Storage:–25°C to 65°C (with no condensation or icing)	
Ambient humidity	Operating:25% to 85% (with no condensation)	
Approved safety standards	UL3121-1, conforms to EN61010-1 (Pollution degree 2/overvoltage category II) Conforms to VDE0106/P100 (finger protection)	
EMC	(EMI)EN61326+A1Industry Emission Enclosure:CISPR 11 Group 1 class A: CISRP16-1/-2 Emission AC Mains:CISPR 11 Group 1 class A: CISRP16-1/-2 (EMS)EN61326+A1Industry Immunity ESD:EN61000-4-2:4 kV contact discharge 8 kV air discharge Immunity RF-interference:EN61000-4-3:10 V/m (amplitude-modulated, 80 MHz to 1 GHz) Electrical Fast Transient Noise:EN61000-4-4:2 kV (power line) Immunity Burst Noise:1 kV line to line (I/O signal line) Immunity Surge:EN61000-4-5:1 kV (power line) 2 kV line to ground (power line) Immunity Conducted Disturbance:EN61000-4-6:3 V (0.15 to 80 MHz) Immunity Voltage Dip/Interrupting:EN61000-4-11:0.5 cycle, 0, 180°, 100% (rated voltage)	
Weight	Approx. 200 g	

Characteristics

Indication accuracy (at 23±5°C) (See note.)	Thermocouple: (±0.5% of indication value or ±1°C, whichever greater) ±1 digit max. Platinum-resistance thermometer: (±0.5% of indication value or ±1°C, whichever greater) ±1 digit max.
Input	Thermocouple: K, J, T, E, L, U, N, R, S, B Platinum-resistance thermometer: JPt100, Pt100
Measurement method	Double integral method
Sampling period	500 ms
Display refresh period	Sampling period (sampling times multiplied by number of averaging times if average processing is selected.)
Max. displayed digits	4 digits (–1999 to 9999)
Display	7-segment digital display, Character height: 14.2 mm
Polarity display	"–" is displayed automatically with a negative input signal.
Zero display	Leading zeros are not displayed.
Input shift	Input shift equivalent to the setting value supported for all points within the sensor measurement range.
Hold function	Max hold (maximum value), Min hold (minimum value)
Hysteresis setting	Programmable with front-panel key inputs (0001 to 9999).
Other functions	Display color change (green (red), green, red (green), red) Average processing (simple average OFF/2/4/8 operations) Setting change lockout Parameter initialization
Output	Relay contact (SPDT)
Delay in comparative outputs	1 s max.
Degree of protection	Front panel: NEMA4X for indoor use (equivalent to IP66) Rear case: IEC standard IP20 Terminals: IEC standard IP00 + finger protection (VDE0106/100)
Memory protection	Non-volatile memory (EEPROM) (possible to rewrite 100,000 times)

Note: The indication accuracy of the K thermocouple at a temperature of –200 to 1300°C is ±2°C ±1 digit maximum.
The indication accuracy of the T and N thermocouples at a temperature of –100°C or less is ±2°C ±1 digit maximum.
The indicator accuracy of the U and L thermocouples at any temperature is ±2°C ±1 digit maximum.
The indication accuracy of the B thermocouple at a temperature of 400°C or less is unrestricted.
The indication accuracy of the R and S thermocouples at a temperature of 200°C or less is ±3°C ±1 digit maximum.

Measuring Ranges

Platinum-resistance Thermometer

Input		Pt100			JPt100	
Range	°C	–200 to 850	–199.9 to 500.0	0.0 to 100.0	–199.9 to 500.0	0.0 to 100.0
	°F	–300 to 1500	–199.9 to 900.0	0.0 to 210.0	–199.9 to 900.0	0.0 to 210.0
Parameter		0	1	2	3	4

Thermocouple

Input		K		J		T		E	L	U		N	R	S	B
Range	°C	–200 to 1300	–20.0 to 500.0	–100 to 850	–20.0 to 400.0	–200 to 400	–199.9 to 400.0	0 to 600	–100 to 850	–200 to 400	–199.9 to 400.0	–200 to 1300	0 to 1700	0 to 1700	100 to 1800
	°F	–300 to 2300	0.0 to 900.0	–100 to 1500	0.0 to 750	–300 to 700	–199.9 to 700.0	0 to 1100	–100 to 1500	–300 to 700	–199.9 to 700.0	–300 to 2300	0 to 3000	0 to 3000	300 to 3200
Parameter		5	6	7	8	9	10	11	12	13	14	15	16	17	18

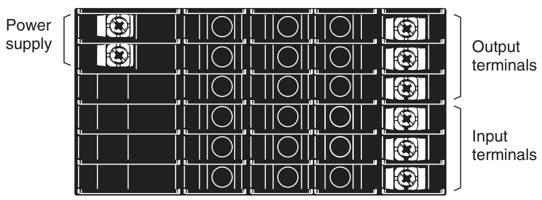
■ Input/Output Ratings

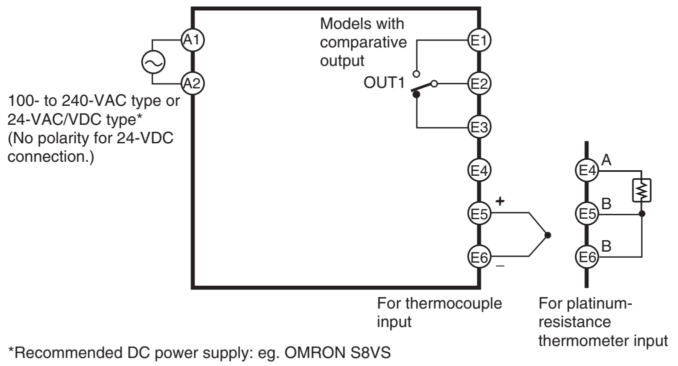
Relay Contact Output

Item	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4, L/R = 7 ms)
Rated load (UL ratings)	5 A at 250 VAC, 5 A at 30 VDC	1.5 A at 250 VAC, 1.5 A at 30 VDC
Rated carry current	5 A max. (at COM terminal)	
Max. contact voltage	400 VAC, 150 VDC	
Max. contact current	5 A (at COM terminal)	
Max. switching capacity	2,000 VA, 192 W	375 VA, 30 W
Min. permissible load (P level, reference value)	10 mA at 5 VDC	
Mechanical life	20,000,000 times min. (at a switching frequency of 1,200 time/min)	
Electrical life (at an ambient temperature of 20°C)	100,000 times min. (at a rated load switching frequency of 10 time/min)	

Connections

■ Terminal Arrangement

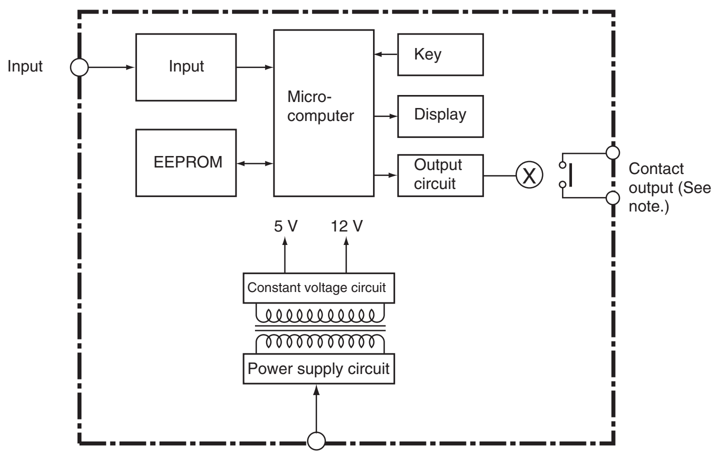




*Recommended DC power supply: eg. OMRON S8VS

Terminal No.	Name	Description
A1 - A2	Operation power	Connects the operation power supply.
E4 - E6 - E5	Thermocouple or platinum-resistance thermometer input	Connects the thermocouple or platinum-resistance thermometer input.
E1 , E2 - E3	Outputs	Outputs the relay outputs.

■ Block Diagram



Note: Relay output models only.

Operation

■ Main Functions

Input Types and Ranges

Parameter	Setting	Input type	Meaning		
in-t	0	Platinum-resistance thermometer	Pt100	–200 to 850°C	–300 to 1500°F
	1			–199.9 to 500.0°C	–1999 to 900.0°F
	2			0.0 to 100.0°C	0.0 to 210.0°F
	3		JPt100	–199.9 to 500.0°C	–199.9 to 900.0°F
	4			0.0 to 100.0°C	0.0 to 210.0°F
	5	Thermocouple	K	–200 to 1300°C	–300 to 2300°F
	6			–20.0 to 500.0°C	0.0 to 900.0°F
	7		J	–100 to 850°C	–100 to 1500°F
	8			–20.0 to 400.0°C	0.0 to 750.0°F
	9		T	–200 to 400°C	–300 to 700°F
	10			–199.9 to 400.0°C	–199.9 to 700.0°F
	11		E	0 to 600°C	0 to 1100°F
	12		L	–100 to 850°C	–100 to 1500°F
	13		U	–200 to 400°C	–300 to 700°F
	14			–199.9 to 400.0°C	–199.9 to 700.0°F
	15		N	–200 to 1300°C	–300 to 2300°F
	16		R	0 to 1700°C	0 to 3000°F
	17		S	0 to 1700°C	0 to 3000°F
	18		B	100 to 1800°C	300 to 3200°F

Note: The initial value is “5: thermocouple K (–200 to 1300°C/–300 to 2300°F).”

Temperature Unit Selection

Either centigrade (°C) or fahrenheit (°F) can be selected as the temperature unit.

Parameter	Setting	Meaning
d-u	c	Display in °C.
	f	Display in °F.

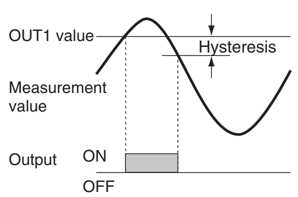
OUT Types (Comparative Output Models Only)

OUT 1 can be set to operate in one of the three following modes in accordance with the compared values:

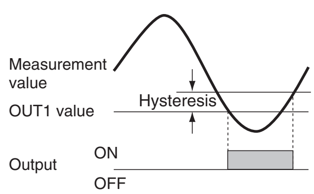
- Upper limit (High Acting):
  The output is turned ON when the measurement value is greater than its set value.
- Lower limit (Low Acting):
  The output is turned ON when the measurement value is less than its set value.
- Upper and lower limits (Outside Band Acting):
  An upper limit (H set value) and lower limit (L set value) can be set independently.
  The output is turned ON when the measurement value is greater than the upper-limit set value or less than the lower-limit set value.

Parameter	Setting	Meaning
out 1.t	hi	Upper limit: Alarm operates at upper limit.
	lo	Lower limit: Alarm operates at lower limit.
	hi-lo	Upper and lower limits: Alarm operates at upper and lower limits.

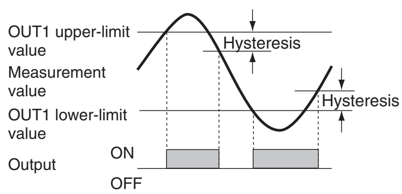
Upper Limit (High Acting)



Lower Limit (Low Acting)



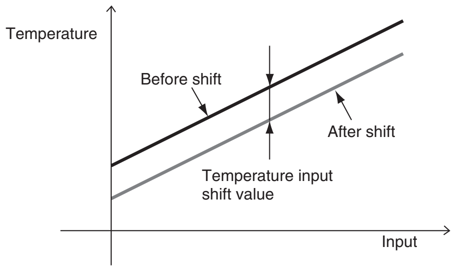
Upper and Lower Limits (Outside Band Acting)



Temperature Input Shift

Input shift equivalent to the setting value supported for all points within the sensor measurement range.

Parameter	Setting
ins	-1999 to 9999



Parameter Initialization

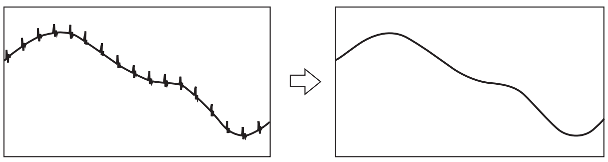
This function returns all of the parameters to their initial values.

Parameter	Setting	Meaning
init	off	---
	on	Initializes all parameters.

Use this to reset the K3MA-L after returning it to its factory-set condition.

Average Processing

Average processing stabilizes displayed values to minimize flicker by averaging the fluctuating input signals. Average processing can be performed for the measurement values in either of four steps (OFF, 2 times, 4 times, or 8 times).

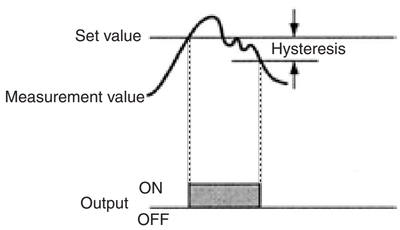


This is useful for ignoring rapid fluctuations, e.g., eliminating spike noise.

Hysteresis (Comparative Output Models Only)

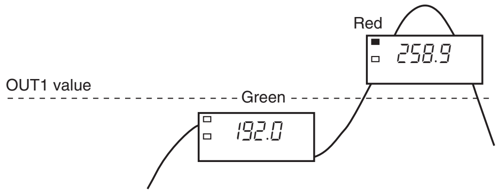
The hysteresis of comparative outputs can be set to prevent chattering in the output when the measurement value fluctuates finely near the OUT value.

Upper limit (high acting)



Changing the Display Color

The color of the value displayed can be set to either red or green. For comparative output models, the display color can be set to change from green to red, or from red to green, according to the status of the comparison criterion.



Display Auto-return Time

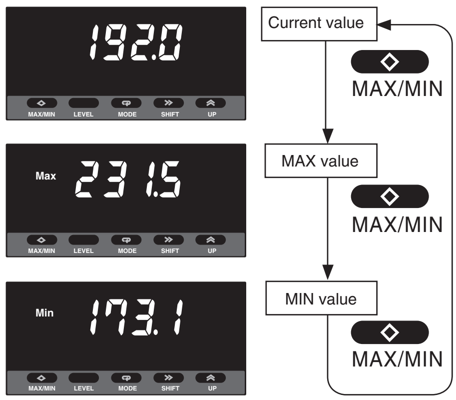
This function automatically returns the display to the operation level's current value if no keys are pressed for a preset time (called the display auto-return time).

Move-to-Protect-Level Time

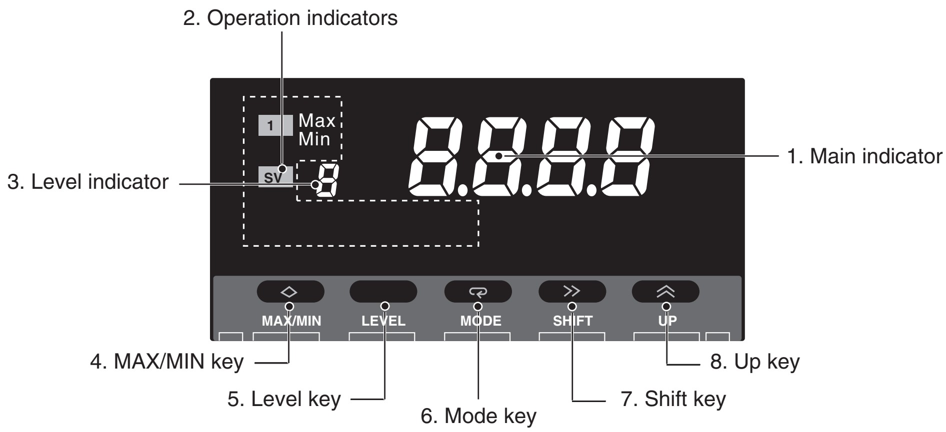
The time required to shift to the protect level can be set as desired.

MAX/MIN Display

The maximum and minimum measurement (display) values from the time the power is turned ON until the current time can be stored and displayed. This is useful, for example, when measuring the maximum value.



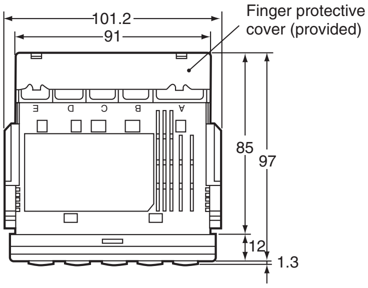
Nomenclature

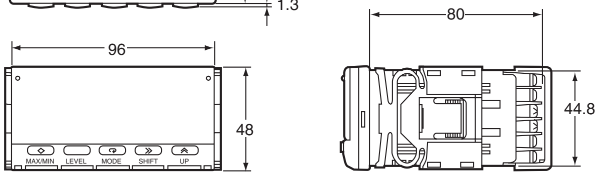


Name		Functions
1. Main indicator		Displays current values, parameters, and set values.
2. Operation indicators	1	Lit when output 1 is ON.
	SV	Lit when a set value is being displayed or changed.
	Max	Lit when the main indicator is showing the MAX value.
	Min	Lit when the main indicator is showing the MIN value.
3. Level indicator		Displays the current level that the K3MA-L is in. (See below for details.)
4. MAX/MIN Key		Used to display the MAX and MIN values when a measurement value is being displayed.
5. Level Key		Used to change the level.
6. Mode Key		Used to allow the main indicator to indicate parameters sequentially.
7. Shift Key		Used to enable a set value to be changed. When changing a set value, this key is used to move along the digits.
8. Up Key		Used to change a set value. Used to set or clear a forced-zero function when a measurement value is being displayed.

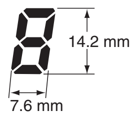
Level indicator	Level
p	Protect
Not lit	Operation
a	Adjustment
s	Initial setting
f	Advanced-function setting

Dimensions

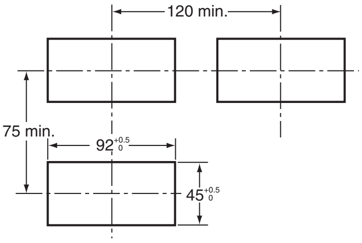




Main indicator character size



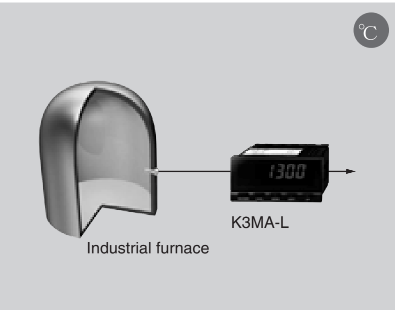
Panel cut-out



The K3MA-L uses M3 terminals.
A terminal cover is provided.

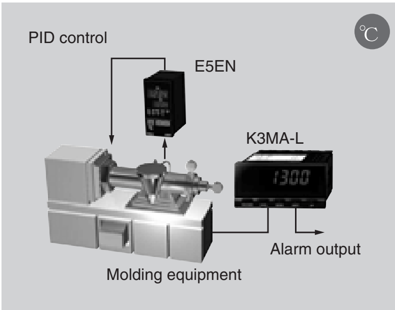
Application Examples

Monitoring the temperature of an industrial furnace



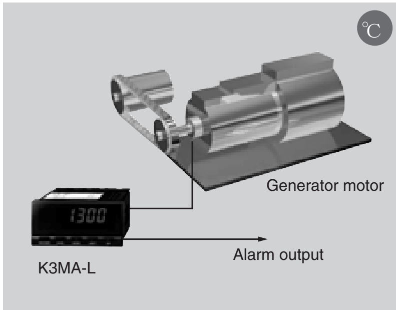
- Monitoring the temperature of an industrial furnace/sintering furnace.
- Monitoring/alarm function for disinfecting equipment.

Sending a temperature alarm for molding equipment



- Monitoring (failsafe checking) abnormal temperatures in molding equipment.
- Monitoring the liquid temperature for cleaning devices.

Monitoring the bearing temperature for a generator motor

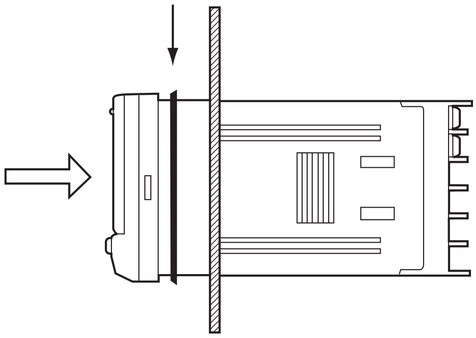


- Monitoring temperature rises in electric power generating facilities.
- Inspecting temperatures in machines and devices.

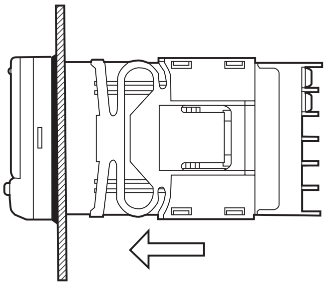
Installation

1. Insert the K3MA-L into the panel cut-out hole.

2. For a waterproof installation, insert the rubber gasket onto the body of the K3MA-L.



3. Fit the adaptor into the grooves on the left and right sides of the rear case, then push it until it contacts the panel to secure the K3MA-L.

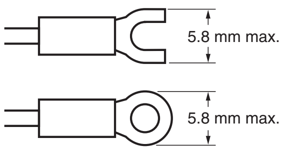


■ Wiring Precautions

- Use crimp terminals.
- Tighten the terminal screws to a torque of approximately 0.5 N·m.
- To avoid the influence of noise, route signal lines and power lines separately.

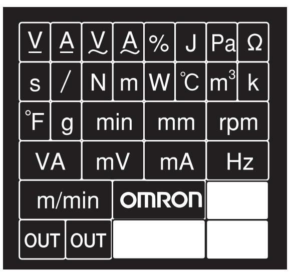
■ Wiring

- Use the following M3 crimp terminals.



■ Unit Labels (Provided)

- The unit labels are not attached to the K3MA-L. Select the desired labels from the provided sheet.



Note: For scales and gauges, use the unit labels that are specified by the relevant laws or regulations.

Precautions

⚠ WARNING

Do not touch any of the terminals while the power is being supplied. Doing so may result in electric shock.

⚠ Caution

Do not disassemble the product or touch the internal components of the product while the power is being supplied. Doing so may result in electric shock.

⚠ Caution

Do not allow metal objects or wire cuttings to enter the product. Doing so may result in electric shock, fire, or malfunction.

⚠ Caution

Perform correct settings for the product according to the control application. Failure to do so may cause unexpected operation, resulting in damage to the product or injury.

⚠ Caution

Take safety measures, such as installing a separate monitoring system, to ensure safety even if the product fails. Product failure may prevent comparative outputs from being generated, resulting in serious accidents.

Observe the following precautions to ensure safety.

1. Maintain the power supply voltage within the range specified in the specifications.
2. Maintain the load within the ratings specified in the specifications.
3. Check each terminal for correct number and polarity before connecting it. Incorrect or reverse connections may damage or burn out internal components in the product.
4. Tighten the terminal screws securely. The recommended tightening torque is 0.43 to 0.58 N·m. Loose screws may cause fire or malfunction.
5. Do not connect anything to unused terminals.
6. Provide a switch or circuit breaker so that operators can easily turn OFF the power supply when necessary. Also provide appropriate indications of such devices.
7. Do not attempt to disassemble, repair, or modify the product.
8. Do not use the product where flammable or combustible gases are present.

Application

General Precautions

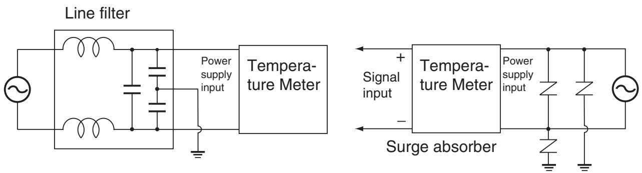
1. Do not use the product in the following locations:
    - Locations subject to direct radiant heat from heating equipment.
    - Locations subject to exposure to water, oil, or chemicals.
    - Locations subject to direct sunlight.
    - Locations subject to dust or corrosive gases (particularly, sulfuric gas or ammonia gas).
    - Locations subject to severe changes in temperature.
    - Locations subject to icing or condensation.
    - Locations subject to shock or vibration.
2. Do not block heat dissipation around the product, i.e., provide sufficient space for heat dissipation.
3. Ensure that the rated voltage is reached within two seconds after the power is turned ON.
4. Conduct aging for 15 minutes min. after power is turned ON for correct measurement.
5. Do not touch the slit sections or terminals while the power is being supplied to prevent the product from being affected by static electricity.
6. Do not lay heavy objects on the product during use or storage. Doing so may deform or deteriorate the product.
7. Do not use paint thinner for cleaning. Use commercially available alcohol.

Mounting

- Mount the product to a panel that is 1 to 8 mm thick.
- Install the product in a horizontal position.
- Use crimp terminals that match screw sizes.

Noise Prevention

- Install the product as far as possible from devices that generate strong, high-frequency fields (such as high-frequency welders or sewing machines) or surges.
- Install surge absorbers or noise filters on nearby devices that generate noise (particularly motors, transformers, solenoids, magnet coils, and other devices that have a high inductance component). Do not connect a surge absorber to the temperature sensor input section of the K3MA-L.



- To prevent inductive noise, separate the terminal block wiring for the product from high-voltage or high-current power lines. Do not route the wiring for the product in parallel with or tie it in a bundle with power lines.
  Take the following countermeasures against inductive noise in input lines.

  Temperature Inputs
  Separate the lead wire that connects the product with a temperature sensor from the load line to prevent the product from being affected by inductive noise.
- When using a noise filter for the power supply, check for the voltage and current and install it as close as possible to the Temperature Meter.
- Do not install the product near radios, television sets, or wireless devices. Doing so may cause reception interference.

Increasing Service Life

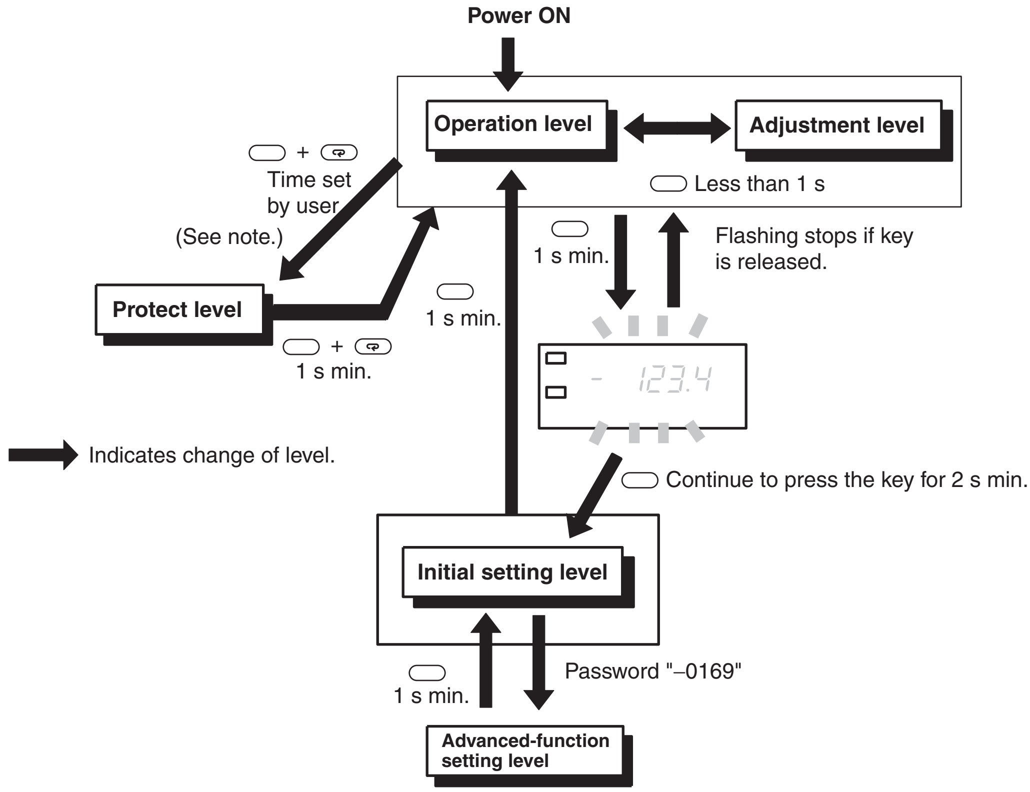
- Do not use the product in locations where the temperature or humidity exceeds the ratings or where condensation may occur. When installing the product in a panel, be sure that the temperature around the product (not the temperature around the panel) does not exceed the ratings. The product service life depends on the ambient temperature. The higher the ambient temperature, the shorter the service life. To extend the product service life, lower the temperature inside the Temperature Meter.
- Use and store the product within the temperature and humidity ranges given in the specifications. When gang-mounting Temperature Meters or arranging them vertically, heat generated by the Temperature Meters will cause the internal temperature to rise, reducing the service life. In such cases, consider forced cooling methods, such as using a fan to circulate air around the Temperature Meters. Do not, however, allow only the terminals to be cooled. Doing so will increase measurement error.
- The life of the output relays are greatly affected by the switching capacity and switching conditions. Use these relays within their rated load and electrical life. The contacts may fuse or burn if they are used past their electrical life.

Operating Procedures

■ Levels

“Level” refers to a grouping of parameters. The following table lists the operations that are possible in each of the levels, and the diagram tells how to move between levels. There are some parameters that are not displayed for certain models.

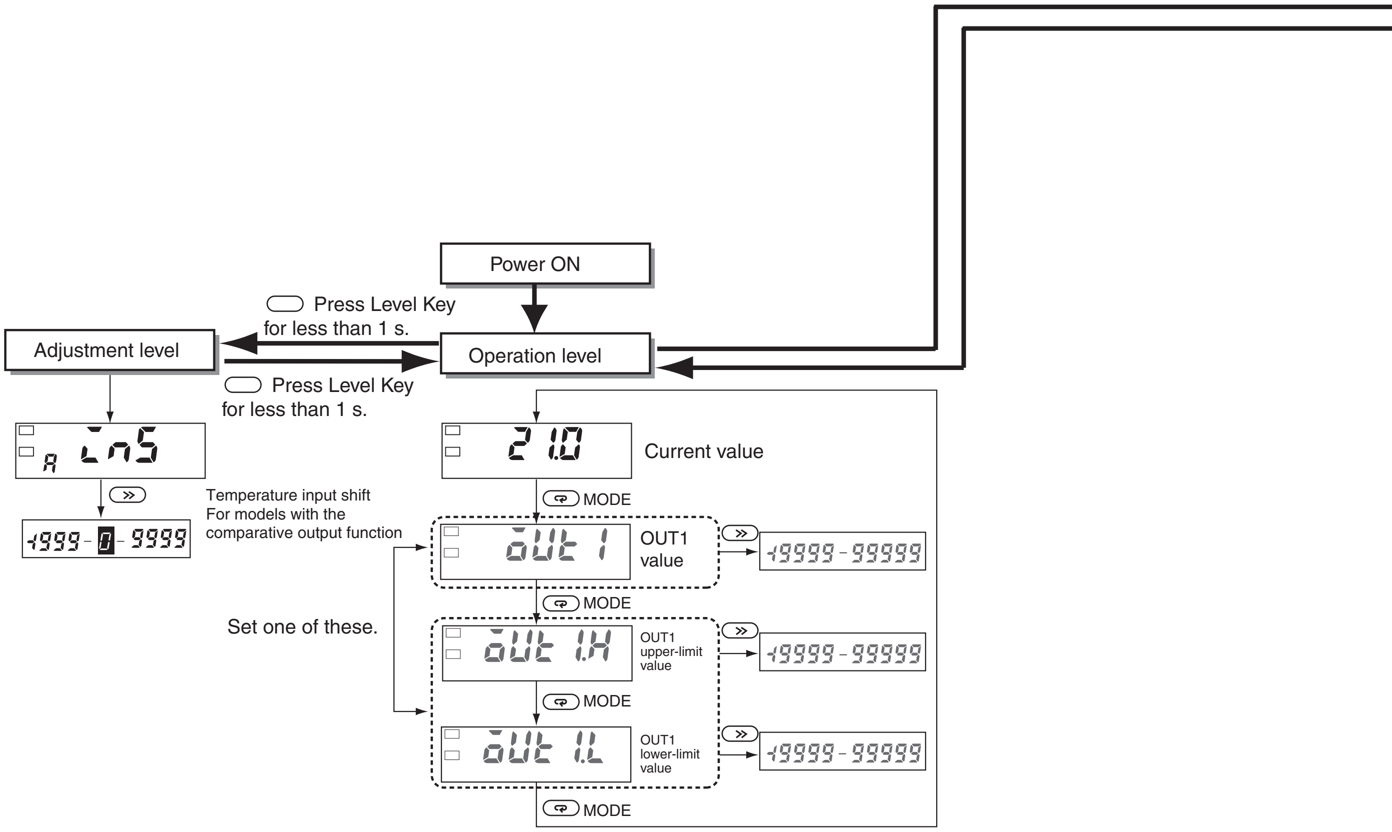
Level name	Function	Measurement
Protect	Setting lockouts.	Continue
Operation	Displaying current values, and setting OUT 1 value.	Continue
Adjustment	Setting communications writing control.	Continue
Initial setting	Making initial settings of input type, output operating action, and other parameters.	Stopped
Advanced-function setting	Setting average processing, display color settings, and other advanced function parameters.	Stopped

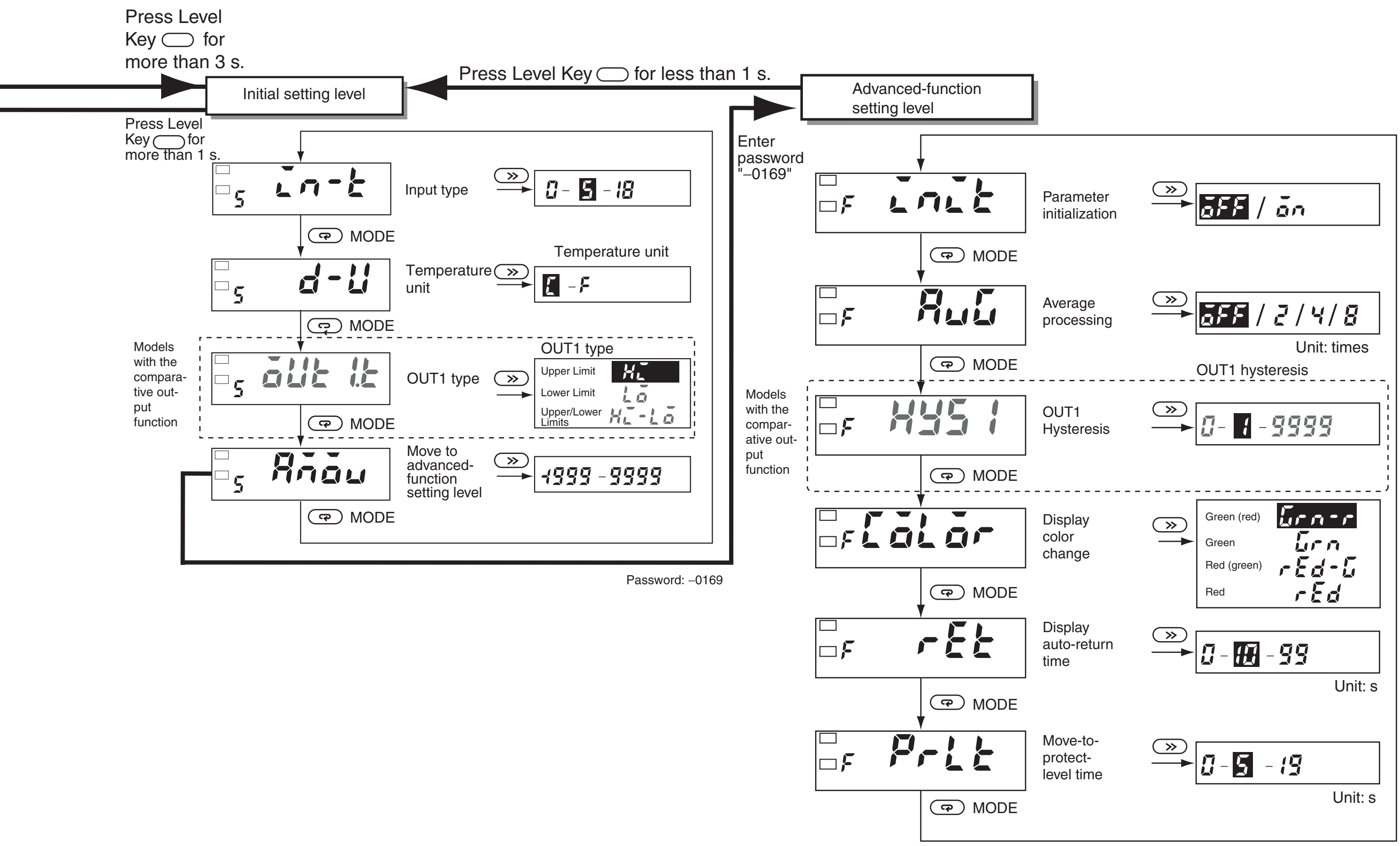


Note: The move-to-protect-level time can be set in the advanced-function setting level.

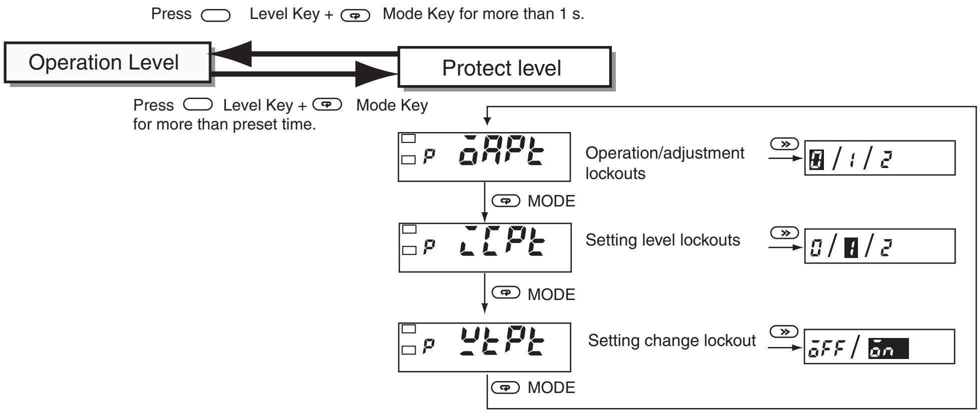
■ Parameters

Note: 1. Some parameters are not displayed for certain models.
2. The K3MA-L will stop measurement if the level is changed to the initial setting level or the advanced-function setting level.
3. If the input range is changed, some parameters are set to default values. Therefore, set the input range first.
4. Settings displayed in reversed colors are defaults.





Settings displayed in reversed colors are initial settings.



Operation/Adjustment Lockouts

Restricts key operations for operation level and adjustment level.

Parameter	Setting	Operation level		Moving to adjustment level
		Process value display	Set value display	
oapt	0	Allowed	Allowed	Allowed
	1	Allowed	Allowed	Prohibited
	2	Allowed	Prohibited	Prohibited

- Initial setting is 0.
- This cannot be displayed on models not equipped with the comparative output function.

Setting Level Lockouts

Restricts shifting to initial setting level or advanced-function setting level.

Parameter	Setting	Shift to initial setting level	Shift to advanced-function setting level
icpt	0	Allowed	Allowed
	1	Allowed	Prohibited
	2	Prohibited	Prohibited

Setting Change Lockout

Restricts setting changes by key operation. When this lockout is set, it is no longer possible to shift to a setting change mode.

Parameter	Setting	Setting change by key operation
wtpt	off	Allowed
	on	Prohibited

However, all protect level parameters can still be changed.

■ Initial Settings

Power ON

↓

Press the Level Key for 3 s min. to move to the initial setting level.

↓

Select the input type.

↓

If desired, shift to the adjustment level to set the temperature input shift value.

↓

If required, shift to the advanced-function setting level to set the number of measurements for averaging, hysteresis values, auto-zero time, display color change, display auto-return time, or move-to-protect-level time.

↓

Press the Level Key for less than 1 s min. to return to the operation level.

↓

Set the OUT values.

↓

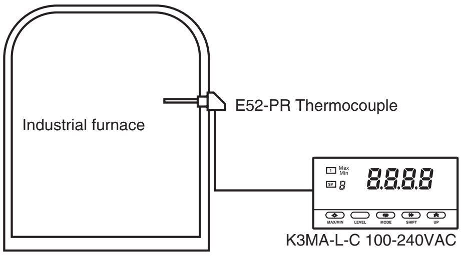
Measurement starts.

■ Setting Example

Initial Settings

The settings for the following example are shown here.

Example: Monitoring the temperature of an industrial furnace



Here, the temperature inside the furnace is to be displayed in centigrade (°C).
Temperature sensor: E52-PR Thermocouple, Measurement range: 0 to 1,400°C.

1. Set the K3MA-L input type to the thermocouple R input range.
   Parameter: in-t (input type), Setting value: 16
2. Select centigrade (°C) as the temperature unit.
   Parameter: d-U (temperature unit), Setting value: C

If you are using a comparative output model, make the setting as desired.

■ Troubleshooting

When an error occurs, error details will be displayed on the main indicator. Confirm the error from the main indicator and take the appropriate countermeasures.

Level display	Main indicator	Error contents	Countermeasures
Not lit	e111	RAM memory error	Repair is necessary. Consult your OMRON sales representative.
5	e111	EEPROM memory error	When this error is displayed, press the Level Key for 3 seconds, and the settings will be restored to the factory settings. If the error cannot be recovered, repair is necessary. Consult your OMRON sales representative.
Not lit	Flashes S.Err	Input error	Confirm that the temperature sensor is correctly connected, and that there are no broken signal lines to the temperature sensor. If the condition does not return to normal, repair is necessary. Consult your OMRON sales representative.
Not lit	Flashes 9999	The measurement value after temperature input correction exceeds 9999.	The temperature input correction value may be inappropriate. Use the adjustment level to review the temperature input correction value.
Not lit	Flashes -1999	The measurement value after temperature input correction is lower than –1999.	The temperature input correction value may be inappropriate. Use the adjustment level to review the temperature input correction value.

Warranty and Limitations of Liability

■ WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

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In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

■ SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products.

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. N109-E2-04 In the interest of product improvement, specifications are subject to change without notice.

Frequency/Rate Meter
K3MA-F

Highly Visible LCD Display with 2-color (Red and Green) LEDs

- Contact, NPN, PNP, or voltage pulse input.
- Front-panel key operation for easy setting.
- Average processing function suppresses flicker.
- Includes scaling, auto-zero time, startup compensation time functions.
- Easy confirmation of max/min display.
- Short 80-mm depth (measured from edge of face plate).
- Finger protective cover (standard equipment) guards against electric shock.
- Water- and dust-proof NEMA4X (IP66 equivalent) front panel.
- Recognized to U.S. and Canadian requirements under the Component Recognition Program of UL.
- CE marking.

Model Number Structure

■ Model Number Legend

K3MA-F-□ ▭
1 2 3

1. Input Type
F: Rotary pulse

2. Output Type
None: No output
A2: 2 relay contact outputs (SPST-NO)

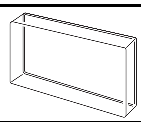
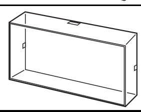
3. Supply Voltage
100-240VAC: 100 to 240 VAC
24VAC/VDC: 24 VAC/VDC

Ordering Information

■ List of Models

Input type	Supply voltage	Output	Model
Rotary pulse	100 to 240 VAC	None	K3MA-F 100-240VAC
		2 relay contact outputs (SPST-NO)	K3MA-F-A2 100-240VAC
	24 VAC/VDC	None	K3MA-F 24VAC/VDC
		2 relay contact outputs (SPST-NO)	K3MA-F-A2 24VAC/VDC

■ Accessories (Order Separately)

Name	Shape	Model
Splash-proof Soft Cover		K32-49SC
Hard Cover		K32-49HC

Specifications

■ Ratings

Model	K3MA-F 100-240VDC, K3MA-F-A2 100-240VAC	K3MA-F 24VAC/VDC, K3MA-F-A2 24VAC/VDC
Supply voltage	100 to 240 VAC	24 VAC/VDC
Operating voltage range	85% to 110% of the rated supply voltage	
Power consumption (under maximum load)	6 VA max.	4.5 VA max. (24 VAC) 4.5 W max. (24 VDC)
Insulation resistance	20 MΩ min. (at 500 VDC) between external terminal and case. Insulation provided between inputs, outputs, and power supply.	
Dielectric strength	2,000 VAC for 1 min between external terminal and case. Insulation provided between inputs, outputs, and power supply.	
Noise immunity	±1,500 V on power supply terminals in normal or common mode. ±1 µs, or 100 ns for square-wave noise with 1 ns.	±480 V on power supply terminals in normal mode. ±1,500 V in common mode. ±1 µs, or 100 ns for square-wave noise with 1 ns.
Vibration resistance	Vibration: 10 to 55 Hz, Acceleration: 50 m/s^2 5 min each in X, Y, and Z directions for 10 sweeps.	
Shock resistance	150 m/s^2 (100 m/s^2 for relay contact outputs) 3 times each on 3 axes, 6 directions.	
Ambient temperature	Operating: –10°C to 55°C (with no condensation or icing) Storage: –25°C to 65°C (with no condensation or icing)	
Approved safety standards	UL3121-1, conforms to EN61010-1 (Pollution degree 2/overvoltage category II) Conforms to VDE0106/P100 (finger protection)	
EMC	(EMI) EN61326+A1 Industry Emission Enclosure: CISPR 11 Group 1 class A: CISRP16-1/-2 Emission AC Mains: CISPR 11 Group 1 class A: CISRP16-1/-2 (EMS) EN61326+A1 Industry Immunity ESD: EN61000-4-2: 4 kV contact discharge 8 kV air discharge Immunity RF-interference: EN61000-4-3: 10 V/m (amplitude-modulated, 80 MHz to 1 GHz) Electrical Fast Transient Noise: EN61000-4-4: 2 kV (power line) Immunity Burst Noise: 1 kV line to line (I/O signal line) Immunity Surge: EN61000-4-5: 1 kV (power line) 2 kV line to ground (power line) Immunity Conducted Disturbance: EN61000-4-6: 3 V (0.15 to 80 MHz) Immunity Voltage Dip/Interrupting: EN61000-4-11: 0.5 cycle, 0, 180°, 100% (rated voltage)	
Weight	Approx. 200 g	

Characteristics

Input signal	No-voltage contact (30 Hz max., ON/OFF pulse width: 15 ms min.) Voltage pulse (5 kHz max., ON/OFF pulse width: 90 µs min., ON voltage: 4.5 to 30 V/OFF voltage: 0 to 2 V) Open collector (5 kHz max., ON/OFF pulse width 90 µs min.) **Connectable Sensors** ON residual voltage: 2.5 V max. OFF leakage current: 0.1 mA max. Load current: Must have switching capacity of 15 mA min. Must be able to dependably switch a load current of 5 mA max.
Measuring accuracy	±0.1%FS ±1 digit (at 23±5°C)
Measurement method	Cycle measurement
Max. displayed digits	5 digits (–19999 to 99999)
Display	7-segment digital display, Character height: 14.2 mm
Polarity display	"–" is displayed automatically with a negative input signal.
Zero display	Leading zeros are not displayed.
Scaling function	Programmable with front-panel key inputs (range of display: –19999 to 99999). The decimal point position can be set as desired.
Hold function	Max hold (maximum value), Min hold (minimum value)
Hysteresis setting	Programmable with front-panel key inputs (0001 to 9999).
Other functions	Scaling teach function Display color change (green (red), green, red (green), red) OUT type change (upper limit, lower limit, upper/lower limit) Average processing (simple average OFF/2/4/8 operations) Auto-zero time Startup compensation time Setting change lockout Parameter initialization Display auto-return time
Output	Relays: 2 SPST-NO
Delay in comparative outputs	750 ms max.
Degree of protection	Front panel: NEMA4X for indoor use (equivalent to IP66) Rear case: IEC standard IP20 Terminals: IEC standard IP00 + finger protection (VDE0106/100)
Memory protection	Non-volatile memory (EEPROM) (possible to rewrite 100,000 times)

Measuring Ranges

No-voltage Contact/Open Collector Inputs

Input	Measuring range	Measuring accuracy	Displayable range
No-voltage contact (30 Hz max.) with ON/OFF pulse width of 15 ms min.	0.05 to 30.00 Hz	±0.1% FS ±1 digit max. (at 23±5°C)	–19999 to 99999 (with scaling function)
Open collector (5 kHz max.) with ON/OFF pulse width of 90 µs min.	0 to 5 kHz		

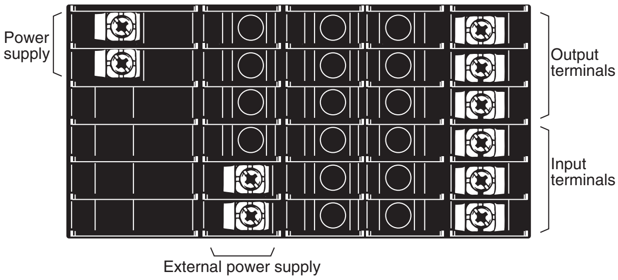
Input/Output Ratings

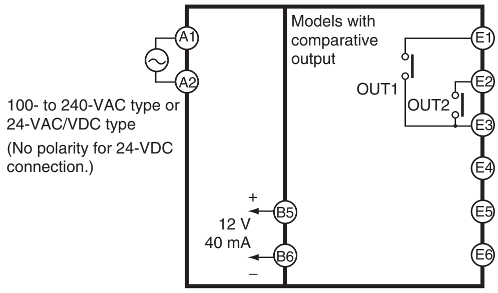
Relay Contact Output

Item	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4, L/R = 7 ms)
Rated load (UL ratings)	5 A at 250 VAC, 5 A at 30 VDC	1.5 A at 250 VAC, 1.5 A at 30 VDC
Rated carry current	5 A max. (at COM terminal)	
Max. contact voltage	250 VAC, 150 VDC	
Max. contact current	5 A (at COM terminal)	
Max. switching capacity	1,250 VA, 150 W	250 VA, 30 W
Min. permissible load (P level, reference value)	10 mA at 5 VDC	
Mechanical life	5,000,000 times min. (at a switching frequency of 1,200 times/min)	
Electrical life (at an ambient temperature of 20°C)	100,000 times min. (at a rated load switching frequency of 10 times/min)	

Connections

■ Terminal Arrangement

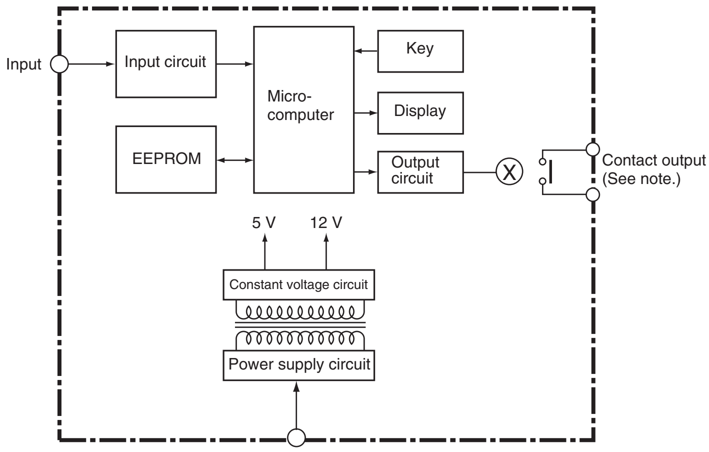




Note: Refer to Input Circuits on page F-55.

Terminal No.	Name	Description
A1 - A2	Operation power	Connects the operation power supply.
E4, E6 - E5	Pulse input	No-voltage contact/open collector input
E1, E2 - E3	Outputs	Outputs the relay outputs.
B5 - B6	External power supply	Use as the power supply for sensors.

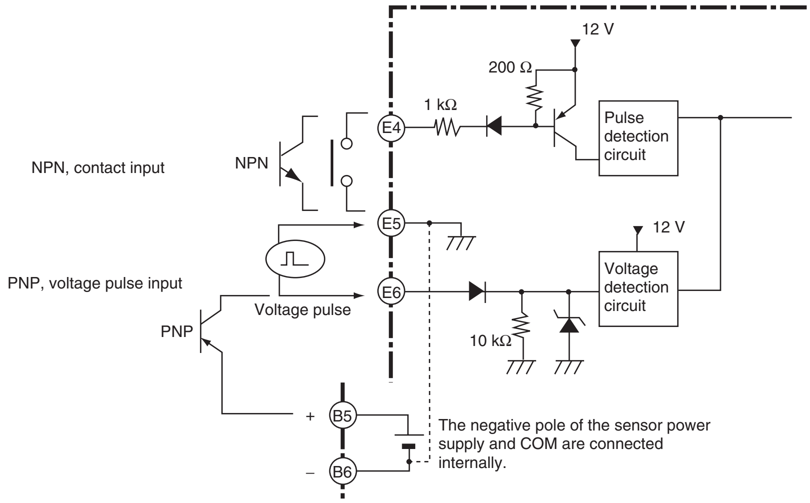
■ Block Diagram



Note: Relay output models only.

■ Input Circuits

Pulse Input



Operation

■ Main Functions

Input Types and Ranges

Frequency range (setting parameter)	Function	Input range (setting parameters)	Setting range
Pulse frequency selection (P-FrE)	Selects pulse input signal.	0.05 to 30.00 Hz (30)	Displayable from –19999 to 99999 with scaling function. The position of the decimal point can be set as desired.
		0 to 5 kHz (5k)	

Pulse Frequency Selection

Parameter	Setting value	Meaning
P-FrE	3	0.05 to 30.00 Hz measurement range
	5k	0 to 5 kHz measurement range

Note: The default value is "0 to 5 kHz (5k)."

Scaling

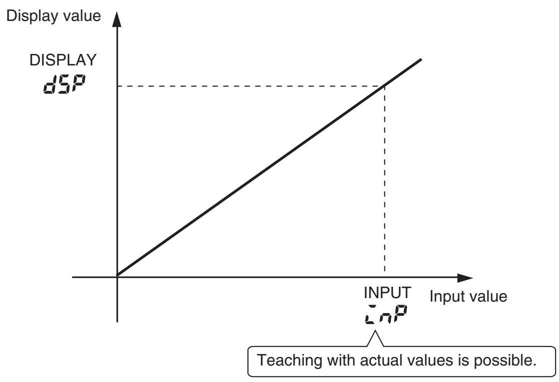
When the desired display value is set for a corresponding input, the value will be displayed on a line between two points determining the zero point.

Parameter	Setting value	Meaning
inP	0 to 99999	Input value for dSP
dSP	- 19999 to 99999	Display value for inP

Parameter	Setting value	Meaning
dP	0.0000	Display four digits after decimal point
	00.000	Display three digits after decimal point
	000.00	Display two digits after decimal point
	0000.0	Display one digit after decimal point
	00000	No decimal point

Note: The initial value will change depending on the pulse frequency selection.

- The decimal point can be optionally displayed.
- When displaying the decimal point, consider the number of digits to follow the decimal point prior to setting the scaling display value.
- If P-FrE is set to 30, the initial setting for the decimal display will be 000.00.

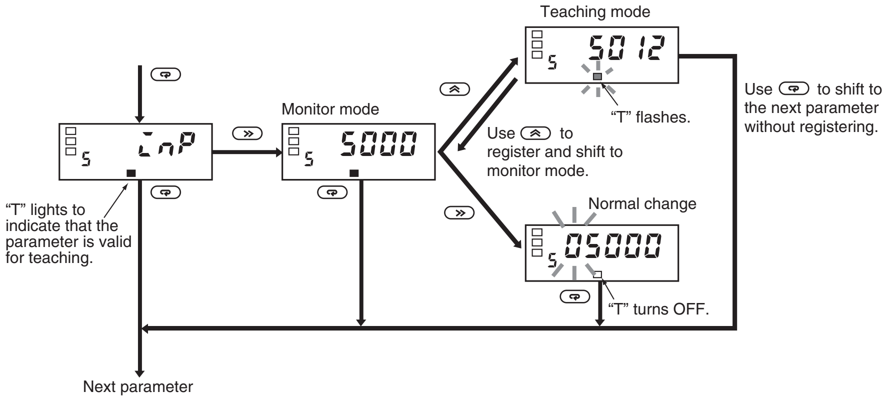


Instead of setting by inputting with the Up Key and Shift Key, current values can be input as scaling input values for teaching. This is useful for making settings while checking the operation status of the K3MA-F.

Convenient Functions

Scaling Teach

The parameter (inP) for the K3MA-F's initial setting level can be set using actual input values with the teaching function. After displaying the parameter, the actual input settings can be made with the following operation.

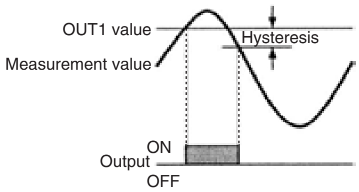


OUT Types (Comparative Output Models Only)

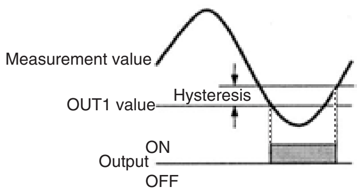
OUT 1 and OUT 2 can be set to operate in one of the three following modes in accordance with the compared values:

- Upper limit (High Acting):
  The output is turned ON when the measurement value is greater than its set value.
- Lower limit (Low Acting):
  The output is turned ON when the measurement value is less than its set value.
- Upper and lower limits (Outside Band Acting):
  An upper limit (H set value) and lower limit (L set value) can be set independently.
  The output is turned ON when the measurement value is greater than upper-limit set value or less than the lower-limit set value.

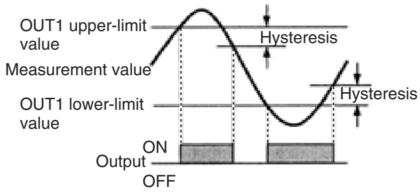
Upper Limit (High Acting)



Lower Limit (Low Acting)

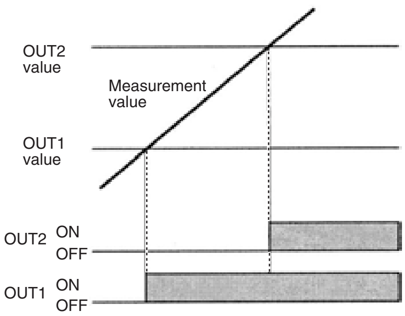


Upper and Lower Limits (Outside Band Acting)

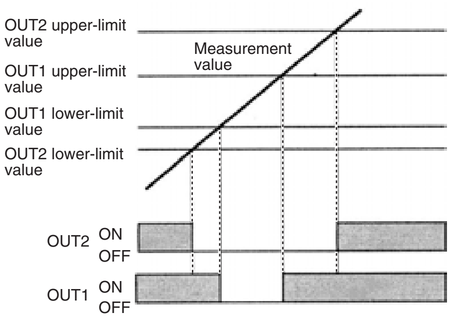


The three types of output operations shown above can be combined as desired. The following are examples of possible combinations.

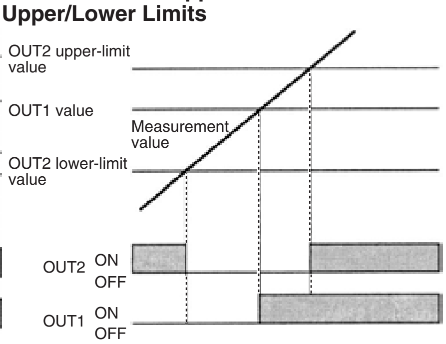
Upper Limit 2-stage Output



Threshold Output



Combination of Upper Limit and Upper/Lower Limits



Parameter Initialization

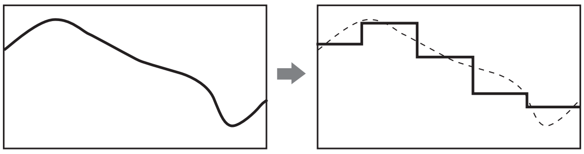
This function returns all of the parameters to their initial values.

Parameter	Setting value	Meaning
init	oFF	---
	on	Initializes all parameters.

Use this to reset the K3MA-F after returning it to its factory-set condition.

Average Processing

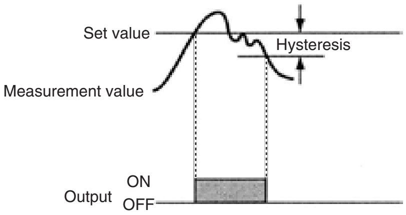
Average processing stabilizes the display by minimizing any pulsating or flicker caused by fluctuations in the pulse width of sensor input or by eccentricity in rotating shafts.



Hysteresis (Comparative Output Models Only)

The hysteresis of comparative outputs can be set to prevent chattering in the output when the measurement value fluctuates finely near the OUT value.

Upper limit (high acting)

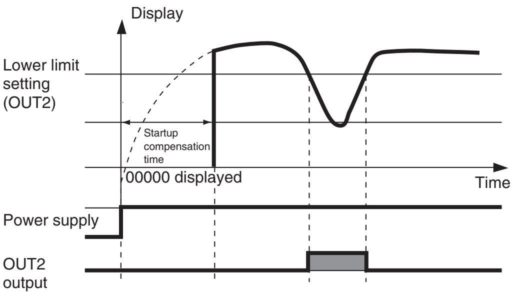


Auto-zero Time

This function sets the time for the display to return to zero when input pulses stop. Set the time longer than the expected input pulse cycle (the interval between one input pulse and the next). Proper measurement is not possible if the time is set shorter than the input pulse cycle.

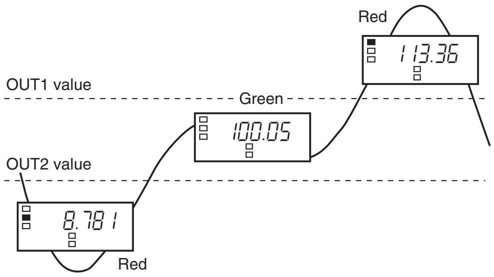
Startup Compensation Time

The startup compensation time cancels measurement for a predetermined time when turning power ON, to prevent unwanted output due to temporary input fluctuations.



Changing the Display Color

The color of the value displayed can be set to either red or green. For comparative output models, the display color can be set to change from green to red, or from red to green, according to the status of the comparison criterion.



Display Auto-return Time

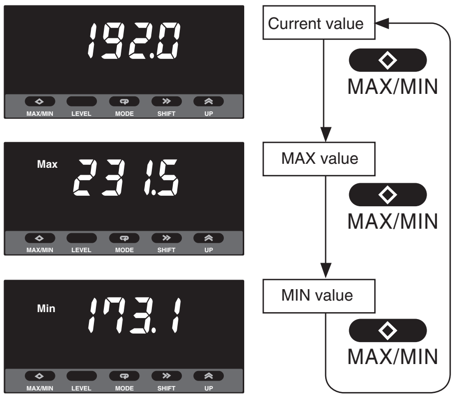
This function automatically returns the display to the operation level's current value if no keys are pressed for a preset time (called the display auto-return time).

Move-to-Protect-Level Time

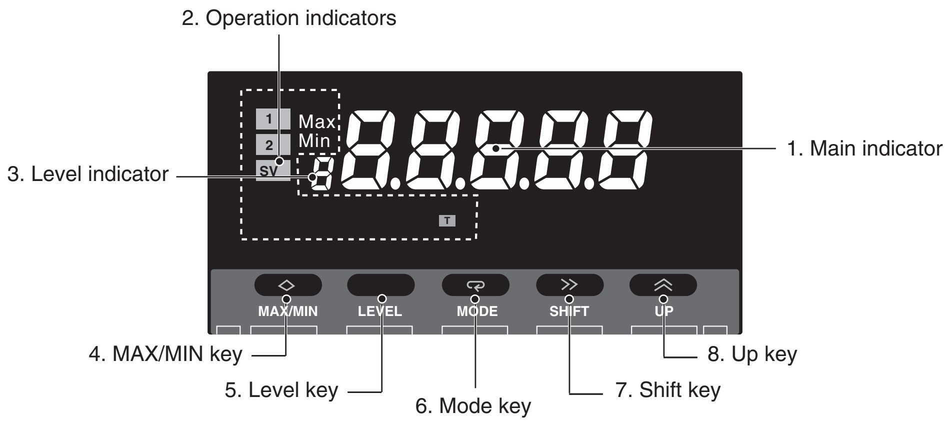
The time required to shift to the protect level can be set as desired.

MAX/MIN Display

The maximum and minimum measurement (display) values from the time the power is turned ON until the current time can be stored and displayed. This is useful, for example, when measuring the maximum value.



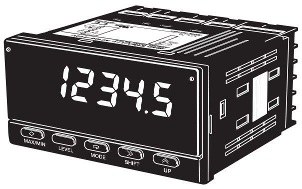
Nomenclature

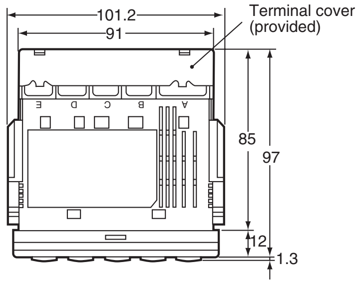


Name		Functions
1. Main indicator		Displays current values, parameters, and set values.
2. Operation indicators	1	Lit when output 1 is ON.
	2	Lit when output 2 is ON.
	SV	Lit when a set value is being displayed or changed.
	Max	Lit when the main indicator is showing the MAX value.
	Min	Lit when the main indicator is showing the MIN value.
	T	Lit when the teaching function is operable. Blinks while the teaching function is operating.
3. Level indicator		Displays the current level that the K3MA-F is in. (See below for details.)
4. MAX/MIN Key		Used to display the MAX and MIN values when a measurement value is being displayed.
5. Level Key		Used to change the level.
6. Mode Key		Used to allow the main indicator to indicate parameters sequentially.
7. Shift Key		Used to enable a set value to be changed. When changing a set value, this key is used to move along the digits.
8. Up Key		Used to change a set value. Used to set or clear a forced-zero function when a measurement value is being displayed.

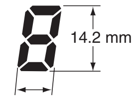
Level indicator	Level
P	Protect
Not lit	Operation
S	Initial setting
F	Advanced-function setting

Dimensions

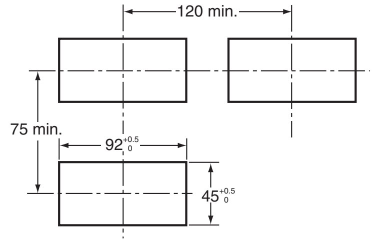


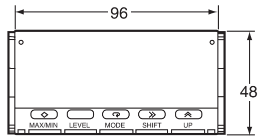


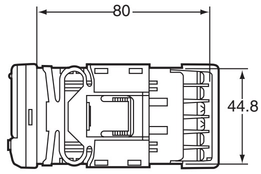
Main indicator character size



Panel cut-out



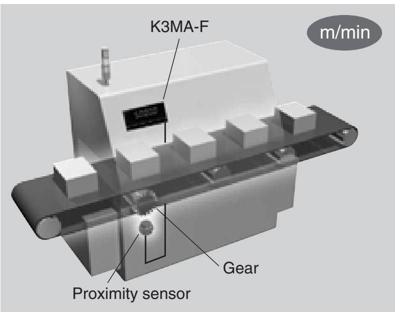




The K3MA-F uses M3 terminals.
A terminal cover is provided.

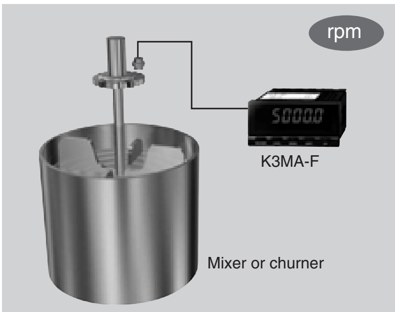
Application Examples

Displaying conveyor belt feed speed



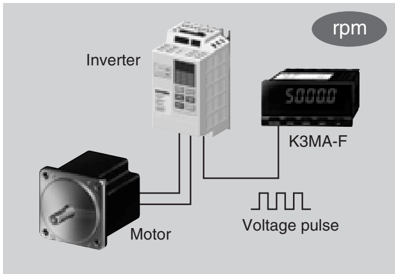
- Monitoring line speed for a reflow furnace
- Displaying feed speed for food processing, conveying, sintering

Monitoring the rotations of a mixer or churner



- Mixers for resin molding
- Powdering/pelleting machines, centrifugal separators

Displaying the monitor output from an inverter as rotations or line speed

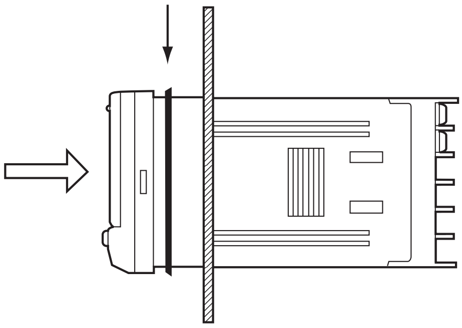


Note: If the monitor output from the inverter is analog, such as 0 to 10 V, use the K3MA-J.

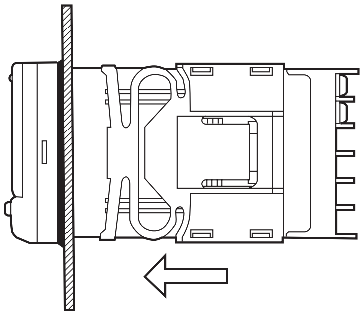
- Monitoring conveyor speed
- Machining equipment (grinders, polishers)

Installation

1. Insert the K3MA-F into the panel cut-out hole.
2. For a waterproof installation, insert the rubber gasket onto the body of the K3MA-F.



3. Fit the adaptor into the grooves on the left and right sides of the rear case, then push it until it contacts the panel to secure the K3MA-F.

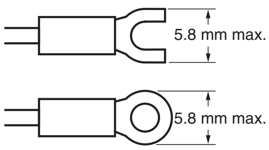


■ Wiring Precautions

- Use crimp terminals.
- Tighten the terminal screws to a torque of approximately 0.5 N·m.
- To avoid the influence of noise, route signal lines and power lines separately.

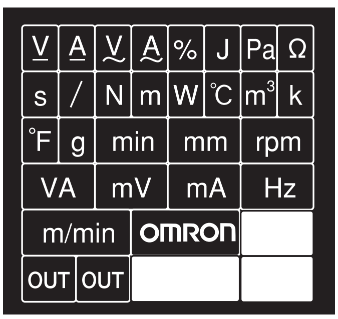
■ Wiring

- Use the following M3 crimp terminals.



■ Unit Labels (Provided)

- The unit labels are not attached to the K3MA-F. Select the desired labels from the provided sheet.



Note: For scales and gauges, use the unit labels that are specified by the relevant laws or regulations.

Precautions

⚠ WARNING

Do not touch any of the terminals while the power is being supplied. Doing so may result in electric shock.

⚠ Caution

Do not disassemble the product or touch the internal components of the product while the power is being supplied. Doing so may result in electric shock.

⚠ Caution

Do not allow metal objects or wire cuttings to enter the product. Doing so may result in electric shock, fire, or malfunction.

⚠ Caution

Perform correct settings for the product according to the control application. Failure to do so may cause unexpected operation, resulting in damage to the product or injury.

⚠ Caution

Take safety measures, such as installing a separate monitoring system, to ensure safety even if the product fails. Product failure may prevent comparative outputs from being generated, resulting in serious accidents.

Observe the following precautions to ensure safety.

1. Maintain the power supply voltage within the range specified in the specifications.
2. Maintain the load within the ratings specified in the specifications.
3. Check each terminal for correct number and polarity before connecting it. Incorrect or reverse connections may damage or burn out internal components in the product.
4. Tighten the terminal screws securely. The recommended tightening torque is 0.43 to 0.58 N·m. Loose screws may cause fire or malfunction.
5. Do not connect anything to unused terminals.
6. Provide a switch or circuit breaker so that operators can easily turn OFF the power supply when necessary. Also provide appropriate indications of such devices.
7. Do not attempt to disassemble, repair, or modify the product.
8. Do not use the product where flammable or combustible gases are present.

Application

General Precautions

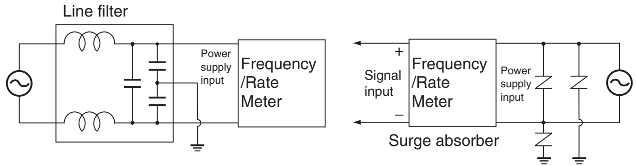
1. Do not use the product in the following locations:
   - Locations subject to direct radiant heat from heating equipment.
   - Locations subject to exposure to water, oil, or chemicals.
   - Locations subject to direct sunlight.
   - Locations subject to dust or corrosive gases (particularly sulfuric gas or ammonia gas).
   - Locations subject to severe changes in temperature.
   - Locations subject to icing or condensation.
   - Locations subject to shock or vibration.
2. Do not block heat dissipation around the product, i.e., provide sufficient space for heat dissipation.
3. Ensure that the rated voltage is reached within two seconds after the power is turned ON.
4. Conduct aging for 15 minutes min. after power is turned ON for correct measurement.
5. Do not touch the slit sections or terminals while the power is being supplied to prevent the product from being affected by static electricity.
6. Do not lay heavy objects on the product during use or storage. Doing so may deform or deteriorate the product.
7. Do not use paint thinner for cleaning. Use commercially available alcohol.

Mounting

- Mount the product to a panel that is 1 to 8 mm thick.
- Install the product in a horizontal position.
- Use crimp terminals that match screw sizes.

Noise Prevention

- Install the product as far as possible from devices that generate strong, high-frequency fields (such as high-frequency welders or sewing machines) or surges.
- Install surge absorbers or noise filters on nearby devices that generate noise (particularly motors, transformers, solenoids, magnet coils, and other devices that have a high inductance component).



- To prevent inductive noise, separate the terminal block wiring for the product from high-voltage or high-current power lines. Do not route the wiring for the product in parallel with or tie it in a bundle with power lines.
- When using a noise filter for the power supply, check for the voltage and current and install it as close as possible to the Frequency/Rate Meter.
- Do not install the product near radios, television sets, or wireless devices. Doing so may cause reception interference.

Increasing Service Life

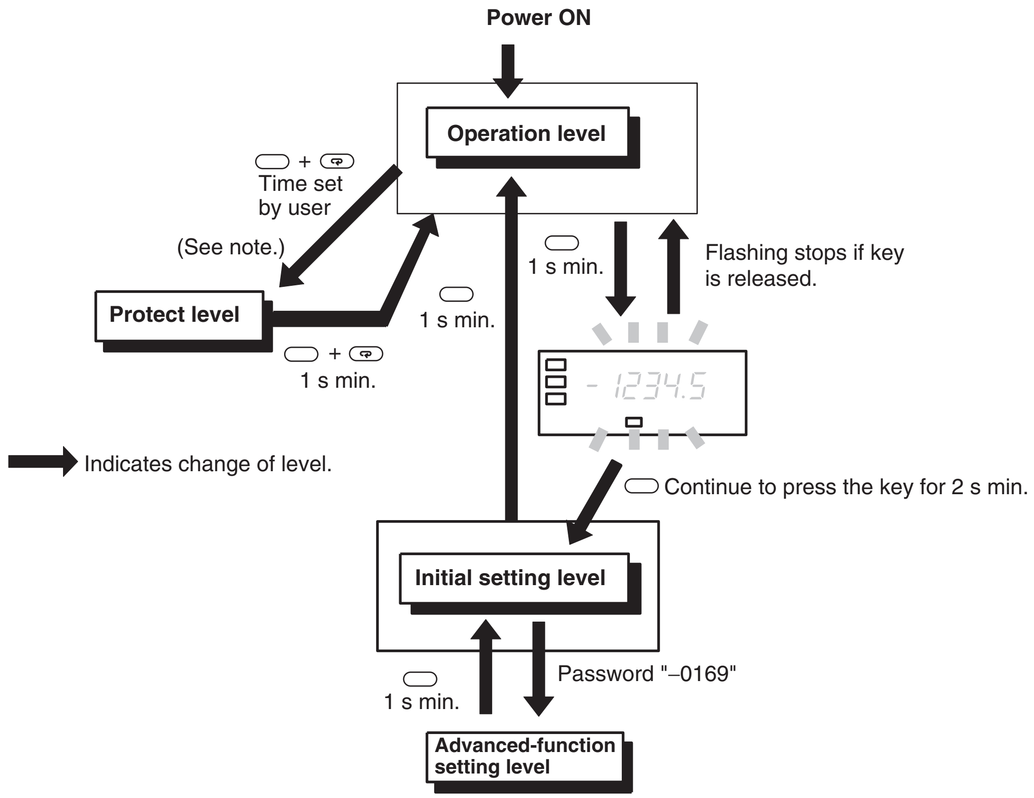
- Do not use the product in locations where the temperature or humidity exceeds the ratings or where condensation may occur. When installing the product in a panel, be sure that the temperature around the product (not the temperature around the panel) does not exceed the ratings. The product service life depends on the ambient temperature. The higher the ambient temperature, the shorter the service life. To extend the product service life, lower the temperature inside the Frequency/Rate Meter.
- Use and store the product within the temperature and humidity ranges given in the specifications. When gang-mounting Frequency/Rate Meters or arranging them vertically, heat generated by the Frequency/Rate Meters will cause the internal temperature to rise, reducing the service life. In such cases, consider forced cooling methods, such as using a fan to circulate air around the Frequency/Rate Meters. Do not, however, allow only the terminals to be cooled. Doing so will increase measurement error.
- The life of the output relays is greatly affected by the switching capacity and switching conditions. Use these relays within their rated load and electrical life. The contacts may fuse or burn if they are used past their electrical life.

Operating Procedures

■ Levels

“Level” refers to a grouping of parameters. The following table lists the operations that are possible in each of the levels, and the diagram tells how to move between levels. There are some parameters that are not displayed for certain models.

Level name	Function	Measurement
Protect	Setting lockouts.	Continue
Operation	Displaying current values, and setting OUT 1/2 set values.	Continue
Initial setting	Making initial settings of input type, scaling, output operating action, and other parameters.	Stopped
Advanced-function setting	Setting average processing, display color settings, and other advanced-function parameters.	Stopped

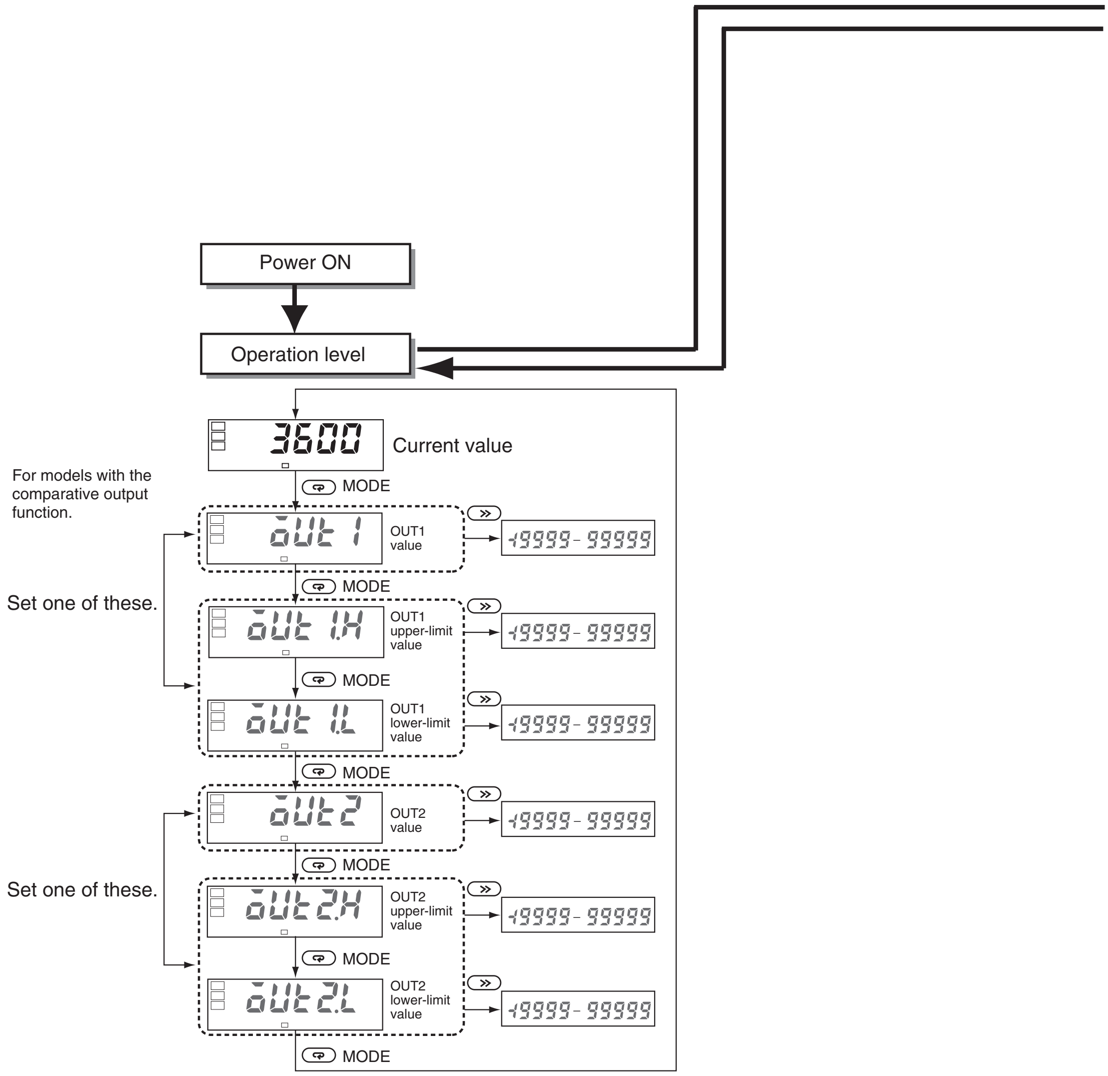


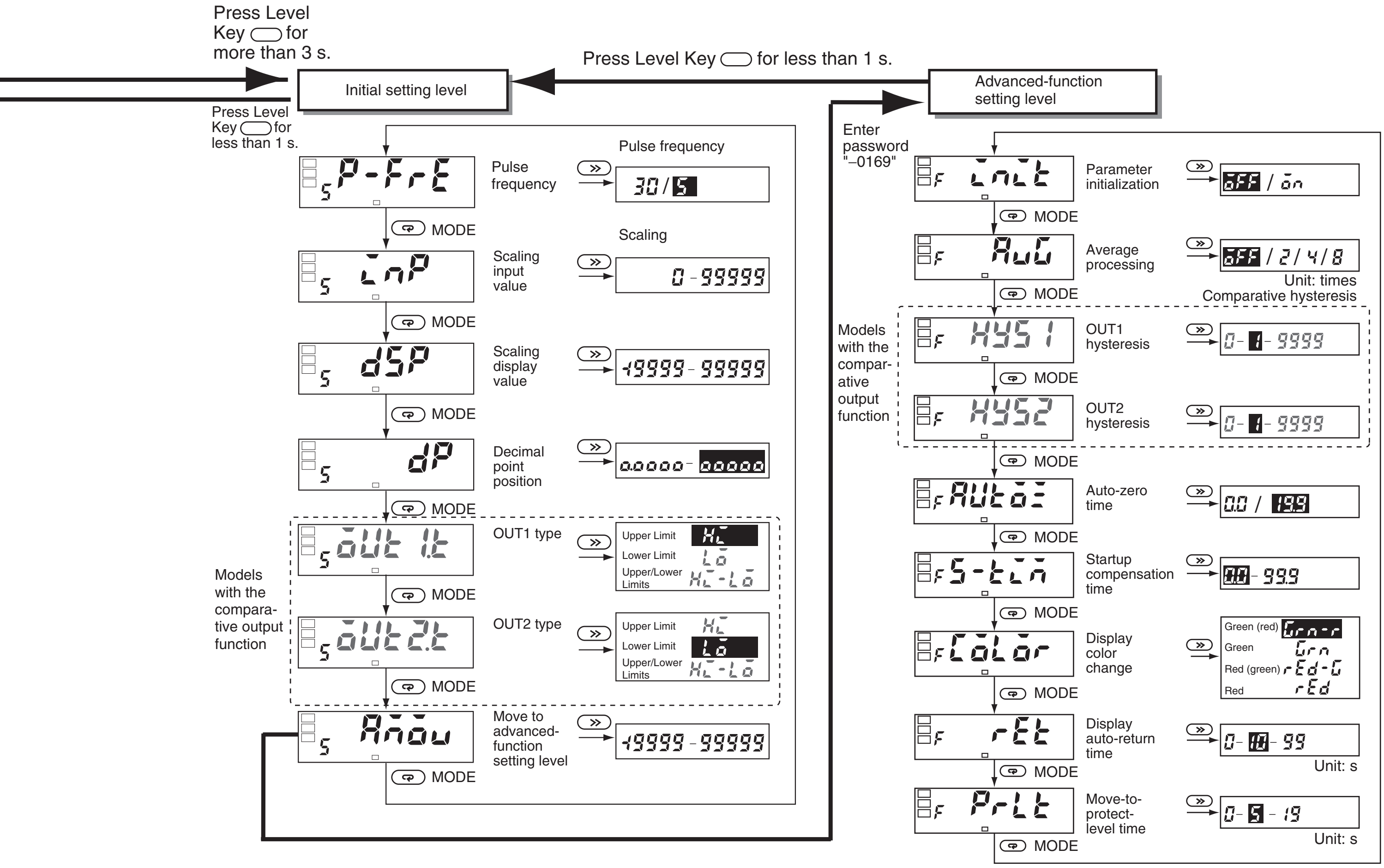
Note: The move-to-protect-level time can be set in the advanced-function setting level.

■ Parameters

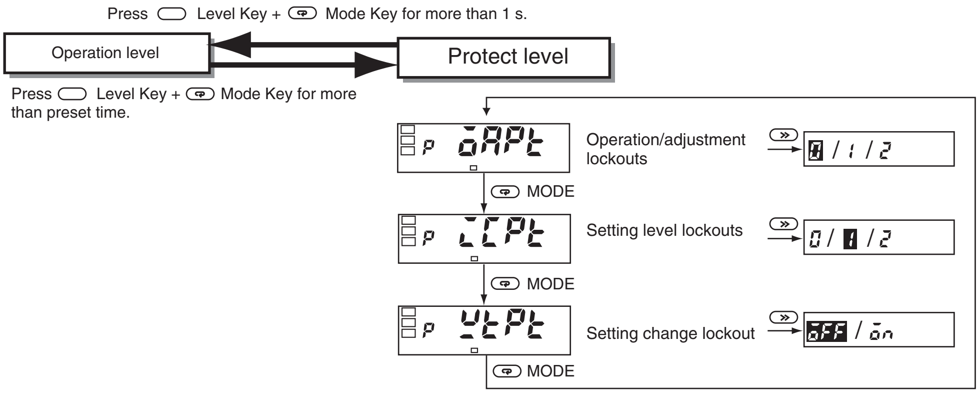
Note: 1. Some parameters are not displayed for certain models.

2. The K3MA-F will stop measurement if the level is changed to the initial setting level or the advanced-function setting level.
3. If the input range is changed, some parameters are set to default values. Therefore, set the input range first.
4. Settings displayed in reversed colors are defaults.





Settings displayed in reversed colors are initial settings.



Operation/Adjustment Lockouts

Restricts key operations for operation level and adjustment level.

Parameter	Setting	Operation level	
		Current value display	Set value display
oAPt	0	Allowed	Allowed
	1	Allowed	Allowed
	2	Allowed	Prohibited

- Initial setting is 0.
- This is not displayed on models with no comparative output function.

Setting Level Lockouts

Restricts shifting to initial setting level or advanced-function setting level.

Parameter	Setting	Shift to initial setting level	Shift to advanced-function setting level
iCPt	0	Allowed	Allowed
	1	Allowed	Prohibited
	2	Prohibited	Prohibited

Setting Change Lockout

Restricts setting changes by key operation. When this lockout is set, it is no longer possible to shift to a setting change mode.

Parameter	Setting	Setting change by key operation
wtPt	oFF	Allowed
	on	Prohibited

However, all protect level parameters can still be changed.

■ Initial Settings

Power ON

⇩

Press the Level Key for 3 s min. to move to the initial setting level.

⇩

Select the pulse frequency for measurement.
Set the scaling values and OUT type as required.

⇩

If required, shift to the advanced-function setting level to set the number of measurements for average processing, hysteresis values, auto-zero time, startup compensation time, display color change, display auto-return time, or move-to-protect-level time.

⇩

Press the Level Key for less than 1 s min. to return to the operation level.

⇩

Specify set value of OUT 1 and 2.

⇩

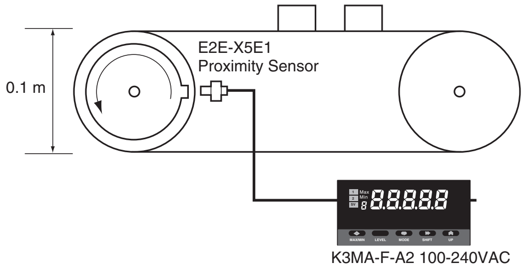
Measurement starts.

■ Setting Example

Initial Settings

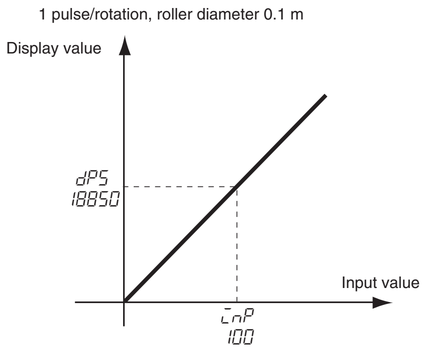
The settings for the following example are shown here.

Example: Display conveyor belt feed speed



Here, the conveyor belt feed speed is to be displayed in units of 0.1 m/min.

• Proximity Sensor: E2E-X5E1, NPN output



When displaying a flowrate (e.g., in ℓ/min or ℓ/h), make the scaling settings after confirming the I/O characteristics of the flowrate sensor. There are flowrate sensors that output analog signals. If this kind of flowrate sensor is used, consider using the K3MA-J.

1. Select the maximum input frequency for the K3MA-F.
Set the pulse frequency selection to either 30 Hz or 5 kHz. In the example, this is set to 30 Hz because the conveyor belt is turning at a slow speed.
Parameter: P-FrE (pulse frequency), Setting value: 30

2. Set the scaling. The relationship between the display value and the input value is shown in the following equation.

Rotations (rpm) = Frequency input/No. of pulses per rotation $\times$ 60

Cycle speed D (m/min) = Rotations $\times$ roll circumference
= $1/N \times f \times 60 \times d \times \pi$
N: No. of pulses per rotation
f: Frequency (Hz)
d: Roller diameter (m)

When the input conditions are applied to this equation, we obtain the following:
Display value = $1/1 \times f \times 60 \times 0.1 \times \pi$
For an input of 1 Hz, the display value is 18.8495 (m/min).
The scaling settings for the K3MA-F must be integers. Also, to decrease error, the scaling value is multiplied by 1,000, to obtain an input of 1000 Hz and a display value of 18850. However, because the display value in this case is displayed to the first decimal place, the scaling is set as shown in the following example so that 18850 is displayed for an input of 100 Hz.

Parameter	Setting value
CnP (scaling input value)	100
dSP (scaling display value)	18850
dP (decimal point position)	0000.0

Note: The decimal point position here refers to the position in the number after scaling. When setting the scaling display value, it is necessary to consider the number of digits to be displayed past the decimal point.

■ Troubleshooting

When an error occurs, error details will be displayed on the main indicator. Confirm the error from the main indicator and take the appropriate countermeasures.

Level display	Main indicator	Error contents	Countermeasures
Not lit	E111	RAM memory error	Repair is necessary. Consult your OMRON sales representative.
5	E111	EEPROM memory error	When this error is displayed, press the Level Key for 3 seconds, and the settings will be restored to the factory settings. If the error cannot be recovered, repair is necessary. Consult your OMRON sales representative.
Not lit	Flashes 99999	The scaling display value exceeds 99999.	Promptly change the input to a value that falls within the specified range. The scaling value may be inappropriate. Review the scaling value at the initial setting level.
Not lit	Flashes -19999	The scaling display value is lower than –19999.	Promptly change the input to a value that falls within the specified range. The scaling value may be inappropriate. Review the scaling value at the initial setting level.

Warranty and Limitations of Liability

■ WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

■ LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

■ SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products.

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. N107-E2-03A In the interest of product improvement, specifications are subject to change without notice.

Process Indicator
K3HB-X

A Process Indicator Ideal for Discriminating and Displaying Measurements for Voltage/Current Signals

- Easy recognition of judgement results using color display that can be switched between red and green.
- Equipped with a position meter for monitoring operating status trends.
- External event input allows use in various measurement and discrimination applications.
- Series expanded to include DeviceNet models.
- Short body with depth of only 95 mm (from behind the front panel), or 97 mm for DeviceNet models.
- UL certification approval (Certification Mark License).
- CE Marking conformance by third party assessment body.
- Water-resistant enclosure conforms to NEMA 4X (equivalent to IP66).
- Capable of high-speed sampling at 50 times per second (20 ms)
- Easy-to-set two-point scaling allows conversion and display of any user-set values.

Refer to *Precautions on CD.*

Model Number Structure

■ Model Number Legend

Base Units and Optional Boards can be ordered individually or as sets.

Base Units

K3HB-X□ ▭
1 5

1. Input Sensor Codes

VD: DC voltage input
AD: DC current input
VA: AC voltage input
AA: AC current input

5. Supply Voltage

100-240 VAC: 100 to 240 VAC
24 VAC/VDC: 24 VAC/VDC

Optional Board

Sensor Power Supply/Output Boards

K33-□
2

Relay/Transistor Output Boards

K34-□
3

Event Input Boards

K35-□
4

Base Units with Optional Boards

K3HB-X□-□□□ ▭
1 2 3 4 5

2. Sensor Power Supply/Output Type Codes

None: None
CPA: Relay output (PASS: SPDT) + Sensor power supply (12 VDC +/–10%, 80 mA) (See note 1.)
L1A: Linear current output (DC0(4) – 20 mA) + Sensor power supply (12 VDC +/–10%, 80 mA) (See note 2.)
L2A: Linear voltage output (DC0(1) – 5 V, 0 to 10 V) + Sensor power supply (12 VDC +/–10%, 80 mA) (See note 2.)
A: Sensor power supply (12 VDC +/–10%, 80 mA)
FLK1A: Communications (RS-232C) + Sensor power supply (12 VDC +/–10%, 80 mA) (See note 2.)
FLK3A: Communications (RS-485) + Sensor power supply (12 VDC +/–10%, 80 mA) (See note 2.)

3. Relay/Transistor Output Type Codes

None: None
C1: Relay contact (H/L: SPDT each)
C2: Relay contact (HH/H/LL/L: SPST-NO each)
T1: Transistor (NPN open collector: HH/H/PASS/L/LL)
T2: Transistor (PNP open collector: HH/H/PASS/L/LL)
BCD: BCD output + transistor output (NPN open collector: HH/H/PASS/L/LL)
DRT:DeviceNet (See note 2.)

4. Event input Type Codes

None: None
1: 5 points (M3 terminal blocks) NPN open collector
2: 8 points (10-pin MIL connector) NPN open collector
3: 5 points (M3 terminal blocks) PNP open collector
4: 8 points (10-pin MIL connector) PNP open collector

Note: 1. CPA can be combined with relay outputs only.
2. Only one of the following can be used by each Digital Indicator:
RS-232C/RS-485 communications, a linear output, or DeviceNet communications.

Accessories (Sold Separately)

K32-DICN: Special Cable (for event inputs, with 8-pin connector)
K32-BCD: Special BCD Output Cable

Specifications

■ Ratings

Power supply voltage		100 to 240 VAC (50/60 Hz), 24 VAC/VDC, DeviceNet power supply: 24 VDC
Allowable power supply voltage range		85% to 110% of the rated power supply voltage, DeviceNet power supply: 11 to 25 VDC
Power consumption (See note 1.)		100 to 240 V: 18 VA max. (max. load) 24 VAC/DC: 11 VA/7 W max. (max. load)
Current consumption		DeviceNet power supply: 50 mA max. (24 VDC)
Input		DC voltage, DC current, AC voltage, AC current
A/D conversion method		Delta-Sigma method
External power supply		See Sensor Power Supply/Output Type Codes
Event inputs (See note 2.)	**Timing input**	NPN open collector or no-voltage contact signal ON residual voltage: 3 V max. ON current at 0 Ω: 17 mA max. Max. applied voltage: 30 VDC max. OFF leakage current: 1.5 mA max.
	Startup compensation timer input	NPN open collector or no-voltage contact signal ON residual voltage: 2 V max. ON current at 0 Ω: 4 mA max. Max. applied voltage: 30 VDC max. OFF leakage current: 0.1 mA max.
	Hold input	
	Reset input	
	Forced-zero input	
	Bank input	
Output ratings (depends on the model)	**Relay output**	250 VAC, 30 VDC, 5 A (resistive load) Mechanical life expectancy: 5,000,000 operations, Electrical life expectancy: 100,000 operations
	Transistor output	Maximum load voltage: 24 VDC, Maximum load current: 50 mA, Leakage current: 100 μA max.
	Linear output	Linear output 0 to 20 mA DC, 4 to 20 mA: Load: 500 Ω max, Resolution: Approx. 10,000, Output error: ±0.5% FS Linear output 0 to 5 VDC, 1 to 5 VDC, 0 to 10 VDC: Load: 5 kΩ max, Resolution: Approx. 10,000, Output error: ±0.5% FS (1 V or less: ±0.15 V; not output for 0 V or less)
Display method		Negative LCD (backlit LED) display 7-segment digital display (Character height: PV: 14.2 mm (green/red); SV: 4.9 mm (green))
Main functions		Scaling function, measurement operation selection, averaging, previous average value comparison, forced-zero, zero-limit, output hysteresis, output OFF delay, output test, teaching, display value selection, display color selection, key protection, bank selection, display refresh period, maximum/minimum hold, reset
Ambient operating temperature		−10 to 55°C (with no icing or condensation)
Ambient operating humidity		25% to 85%
Storage temperature		−25 to 65°C (with no icing or condensation)
Altitude		2,000 m max.
Accessories		Watertight packing, 2 fixtures, terminal cover, unit stickers, instruction manual. DeviceNet models also include a DeviceNet connector (Hirose HR31-5.08P-5SC(01)) and crimp terminals (Hirose HR31-SC-121) (See note 3.)

Note: 1. DC power supply models require a control power supply capacity of approximately 1 A per Unit when power is turned ON. Particular attention is required when using two or more DC power supply models. The OMRON S8VS-series DC Power Supply Unit is recommended.

2. PNP input types are also available.

3. For K3HB-series DeviceNet models, use only the DeviceNet Connector included with the product. The crimp terminals provided are for Thin Cables.

Characteristics

Display range		−19,999 to 99,999
Sampling period		20 ms (50 times/second)
Comparative output response time		DC input: 100 ms max.; AC input: 300 ms max.
Linear output response time		DC input: 150 ms max.; AC input: 420 ms max.
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		2,300 VAC for 1 min between external terminals and case
Noise immunity		100 to 240 VAC models: ±1,500 V at power supply terminals in normal or common mode (waveform with 1-ns rising edge and pulse width of 1 μs/100 ns) 24 VAC/VDC models: ±1,500 V at power supply terminals in normal or common mode (waveform with 1-ns rising edge and pulse width of 1 μs/100 ns)
Vibration resistance		Frequency: 10 to 55 Hz; Acceleration: 50 m/s^2, 10 sweeps of 5 min each in X, Y, and Z directions
Shock resistance		150 m/s^2 (100 m/s^2 for relay outputs) 3 times each in 3 axes, 6 directions
Weight		Approx. 300 g (Base Unit only)
Degree of protection	**Front panel**	Conforms to NEMA 4X for indoor use (equivalent to IP66)
	Rear case	IP20
	Terminals	IP00 + finger protection (VDE0106/100)
Memory protection		EEPROM (non-volatile memory) Number of rewrites: 100,000
Applicable standards		UL61010C-1, CSA C22.2 No. 1010.1 (evaluated by UL) EN61010-1 (IEC61010-1): Pollution degree 2/Overvoltage category II EN61326: 1997, A1: 1998, A2: 2001
EMC		EMI: EN61326+A1 industrial applications Electromagnetic radiation interference CISPR 11 Group 1, Class A: CISPRL16-1/-2 Terminal interference voltage CISPR 11 Group 1, Class A: CISPRL16-1/-2 EMS: EN61326+A1 industrial applications Electrostatic Discharge Immunity EN61000-4-2: 4 kV (contact), 8 kV (in air) Radiated Electromagnetic Field Immunity EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Electrical Fast Transient/Burst Immunity EN61000-4-4: 2 kV (power line), 1 kV (I/O signal line) Surge Immunity EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted Disturbance Immunity EN61000-4-6: 3 V (0.15 to 80 MHz) Voltage Dips and Interruptions Immunity EN61000-4-11: 0.5 cycle, 0°/180°, 100% (rated voltage)

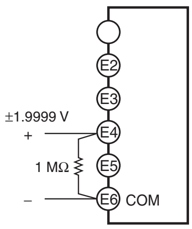
■ Input Range (Measurement Range and Accuracy) CAT II

Input type	Range	Set value	Measurement range	Input impedance	Accuracy	Allowable instantaneous overload (30 s)
K3HB-XVD DC voltage	A	A ud	±199.99 V	10 MΩ min.	±0.1%rdg ± 1 digit max.	±400 V
	B	b ud	±19.999 V	1 MΩ min.		±200 V
	C	C ud	±1.9999 V			
	D	d ud	1.0000 to 5.0000 V			
K3HB-XAD DC current	A	A Ad	±199.99 mA	1 Ω max.	±0.1%rdg ± 1 digit max.	±400 mA
	B	b Ad	±19.999 mA	10 Ω max.		±200 mA
	C	C Ad	±1.9999 mA	33 Ω max.		
	D	d Ad	4.000 to 20.000 mA	10 Ω max.		
K3HB-XVA AC voltage (See note 4.)	A	A uA	0.0 to 400.0 V	1 MΩ min.	±0.3%rdg ± 5 digits max.	700 V
	B	b uA	0.00 to 199.99 V			
	C	C uA	0.000 to 19.999 V		±0.5%rdg ± 10 digits max.	400 V
	D	d uA	0.0000 to 1.9999 V			
K3HB-XAA AC current	A	A AA	0.000 to 10.000 A	(0.5 VA CT) (See note 3.)	±0.5%rdg ± 20 digits max.	20 A
	B	b AA	0.0000 to 1.9999 A	(0.5 VA CT) (See note 3.)		
	C	C AA	0.00 to 199.99 mA	1 Ω max.	±0.5%rdg ± 10 digits max.	2 A
	D	d AA	0.000 to 19.999 mA	10 Ω max.		

Note: 1. The accuracy is for an input frequency range of 40 Hz to 1 kHz (except for AD current input A and B ranges) and an ambient temperature of 23 ±5°C. The error, however, increases below 10% of the maximum input value.
DC voltage input (all ranges): 10% or less of max. input = ±0.15% FS
DC current input (all ranges): 10% or less of max. input = ±0.1% FS
AC voltage input (A: 0.0 to 400.0 V): 10% or less of max. input = ±0.15% FS
AC voltage input (B: 0.00 to 199.99 V): 10% or less of max. input = ±0.2% FS
AC voltage input (C: 0.000 to 19.999 V; D: 0.0000 to 1.9999 V): 10% or less of max. input = ±1.0% FS
AC current input (A: 0.000 to 10.000 A): 10% or less of max. input = ±0.25% FS
AC current input (B: 0.0000 to 1.9999 A): 10% or less of max. input = ±0.5% FS
AC current input, (C: 0.00 to 199.99 mA; D: 0.000 to 19.999 A): 10% or less of max. input = ±0.15% FS
When DC voltage input models are used with a ±1.9999 V range, make sure that the connections between input terminals are not open. If the input terminals are open, the display will show large variations. Connect resistance of approximately 1 MΩ between the input terminals if they are open.

2. The letters "rdg" mean "reading" and refer to the input error.

3. The value (0.5 VA CT) is the VA consumption of the internal CT (current transformer).



4. The K3HB-XVA□□ complies with UL standards when the applied input voltage is within the range 0 to 150 VAC.
If the input voltage is higher than 150 VAC, install an external transformer or take other measures to drop the voltage to 150 VAC or lower.

Temperature Indicator

K3HB-H

New High-speed, High-precision Temperature Indicator

- Easy recognition of judgement results using color display that can be switched between red and green.
- Equipped with a position meter for monitoring operating status trends.
- External event input allows use in various measurement and discrimination applications.
- Series expanded to include DeviceNet models.
- Short body with depth of only 95 mm (from behind the front panel), or 97 mm for DeviceNet models.
- UL certification approval (Certification Mark License).
- CE Marking conformance by third party assessment body.
- Water-resistant enclosure conforms to NEMA 4X (equivalent to IP66).
- Capable of high-speed sampling at 50 times per second (20 ms).
- High-resolution of 0.01°C with platinum-resistance thermometer Pt100 input. Thermocouple sensor inputs also support a resolution of 0.1°C for all ranges.
- Temperature input shift is easily set using two points.

Refer to *Precautions on CD.*

Model Number Structure

■ Model Number Legend

Base Units and Optional Boards can be ordered individually or as sets.

Base Units

K3HB-H□ □
1 5

1. Input Sensor Codes

TA: Temperature input
Thermocouple input/Platinum-resistance thermometer input

5. Supply Voltage

100-240 VAC: 100 to 240 VAC
24 VAC/VDC: 24 VAC/VDC

Optional Board

Sensor Power Supply/Output Boards

K33-□
2

Relay/Transistor Output Boards

K34-□
3

Event Input Boards

K35-□
4

Base Units with Optional Boards

K3HB-H□-□□□ □
1 2 3 4 5

2. Sensor Power Supply/Output Type Codes

None: None
CPA: Relay output (PASS: SPDT) + Sensor power supply (12 VDC +/–10%, 80 mA) (See note 1.)
L1A: Linear current output (DC0(4) – 20 mA) + Sensor power supply (12 VDC +/–10%, 80 mA) (See note 2.)
L2A: Linear voltage output (DC0(1) – 5 V, 0 to 10 V) + Sensor power supply (12 VDC +/–10%, 80 mA) (See note 2.)
A: Sensor power supply (12 VDC +/–10%, 80 mA)
FLK1A: Communications (RS-232C) + Sensor power supply (12 VDC +/–10%, 80 mA) (See note 2.)
FLK3A: Communications (RS-485) + Sensor power supply (12 VDC +/–10%, 80 mA) (See note 2.)

3. Relay/Transistor Output Type Codes

None: None
C1: Relay contact (H/L: SPDT each)
C2: Relay contact (HH/H/LL/L: SPST-NO each)
T1: Transistor (NPN open collector: HH/H/PASS/L/LL)
T2: Transistor (PNP open collector: HH/H/PASS/L/LL)
BCD: BCD output + transistor output (NPN open collector: HH/H/PASS/L/LL)
DRT: DeviceNet (See note 2.)

4. Event input Type Codes

None: None
1: 5 points (M3 terminal blocks) NPN open collector
2: 8 points (10-pin MIL connector) NPN open collector
3: 5 points (M3 terminal blocks) PNP open collector
4: 8 points (10-pin MIL connector) PNP open collector

Note: 1. CPA can be combined with relay outputs only.
2. Only one of the following can be used by each Digital Indicator:
RS-232C/RS-485 communications, a linear output, or DeviceNet communications.

Accessories (Sold Separately)

K32-DICN: Special Cable (for event inputs, with 8-pin connector)
K32-BCD: Special BCD Output Cable

Specifications

■ Ratings

Power supply voltage		100 to 240 VAC (50/60 Hz), 24 VAC/VDC, DeviceNet power supply: 24 VDC
Allowable power supply voltage range		85% to 110% of the rated power supply voltage, DeviceNet power supply: 11 to 25 VDC
Power consumption (See note 1.)		100 to 240 V: 18 VA max. (max. load) 24 VAC/DC: 11 VA/7 W max. (max. load)
Current consumption		DeviceNet power supply: 50 mA max. (24 VDC)
Input		Platinum-resistance thermometer: Pt100 Thermocouple: K, J, T, E, L, U, N, R, S, B, W
A/D conversion method		Delta-Sigma method
External power supply		See Sensor Power Supply/Output Type Codes
Event inputs (See note 2.)	**Timing input**	NPN open collector or no-voltage contact signal ON residual voltage: 3 V max. ON current at 0 Ω: 17 mA max. Max. applied voltage: 30 VDC max. OFF leakage current: 1.5 mA max.
	Startup compensation timer input	NPN open collector or no-voltage contact signal ON residual voltage: 2 V max. ON current at 0 Ω: 4 mA max. Max. applied voltage: 30 VDC max. OFF leakage current: 0.1 mA max.
	Hold input	
	Reset input	
	Bank input	
Output ratings (depends on the model)	**Relay output**	250 VAC, 30 VDC, 5 A (resistive load) Mechanical life expectancy: 5,000,000 operations, Electrical life expectancy: 100,000 operations
	Transistor output	Maximum load voltage: 24 VDC, Maximum load current: 50 mA, Leakage current: 100 μA max.
	Linear output	Linear output 0 to 20 mA DC, 4 to 20 mA: Load: 500 Ω max, Resolution: Approx. 10,000, Output error: ±0.5% FS Linear output 0 to 5 VDC, 1 to 5 VDC, 0 to 10 VDC: Load: 5 kΩ max, Resolution: Approx. 10,000, Output error: ±0.5% FS (1 V or less: ±0.15 V; not output for 0 V or less)
Display method		Negative LCD (backlit LED) display 7-segment digital display (Character height: PV: 14.2 mm (green/red); SV: 4.9 mm (green)
Main functions		Scaling function, measurement operation selection, averaging, previous average value comparison, zero-limit, output hysteresis, output OFF delay, output test, display value selection, display color selection, key protection, bank selection, display refresh period, maximum/minimum hold, reset
Ambient operating temperature		–10 to 55°C (with no icing or condensation)
Ambient operating humidity		25% to 85%
Storage temperature		–25 to 65°C (with no icing or condensation)
Altitude		2,000 m max.
Accessories		Watertight packing, 2 fixtures, terminal cover, unit stickers, instruction manual. DeviceNet models also include a DeviceNet connector (Hirose HR31-5.08P-5SC(01)) and crimp terminals (Hirose HR31-SC-121) (See note 3.)

Note: **1.** DC power supply models require a control power supply capacity of approximately 1 A per Unit when power is turned ON. Particular attention is required when using two or more DC power supply models. The OMRON S8VS-series DC Power Supply Unit is recommended.
2. PNP input types are also available.
3. For K3HB-series DeviceNet models, use only the DeviceNet Connector included with the product. The crimp terminals provided are for Thin Cables.

■ Characteristics

Display range		–19,999 to 99,999
Accuracy		Thermocouple input: (±0.3% PV or ±1°C, whichever is larger) ± 1 digit max. (See note.) Platinum resistance thermometer input: (±0.2% PV or ±0.8°C, whichever is larger) ± 1 digit max.
Sampling period		20 ms (50 times/second)
Comparative output response time		Platinum-resistance thermometer input range: 120 ms max. Thermocouple input range: 180 ms max.
Linear output response time		Platinum-resistance thermometer input range: 170 ms max. Thermocouple input range: 230 ms max.
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		2,300 VAC for 1 min between external terminals and case
Noise immunity		100 to 240 VAC models: ±1,500 V at power supply terminals in normal or common mode (waveform with 1-ns rising edge and pulse width of 1 µs/100 ns) 24 VAC/VDC models: ±1,500 V at power supply terminals in normal or common mode (waveform with 1-ns rising edge and pulse width of 1 µs/100 ns)
Vibration resistance		Frequency: 10 to 55 Hz; Acceleration: 50 m/s^2, 10 sweeps of 5 min each in X, Y, and Z directions
Shock resistance		150 m/s^2 (100 m/s^2 for relay outputs) 3 times each in 3 axes, 6 directions
Weight		Approx. 300 g (Base Unit only)
Degree of protection	**Front panel**	Conforms to NEMA 4X for indoor use (equivalent to IP66)
	Rear case	IP20
	Terminals	IP00 + finger protection (VDE0106/100)
Memory protection		EEPROM (non-volatile memory) Number of rewrites: 100,000
Applicable standards		UL61010C-1, CSA C22.2 No. 1010.1 (evaluated by UL) EN61010-1 (IEC61010-1): Pollution degree 2/Overvoltage category II EN61326: 1997, A1: 1998, A2: 2001
EMC		EMI: EN61326+A1 industrial applications Electromagnetic radiation interference CISPR 11 Group 1, Class A: CISPRL16-1/-2 Terminal interference voltage CISPR 11 Group 1, Class A: CISPRL16-1/-2 EMS: EN61326+A1 industrial applications Electrostatic Discharge Immunity EN61000-4-2: 4 kV (contact), 8 kV (in air) Radiated Electromagnetic Field Immunity EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Electrical Fast Transient/Burst Immunity EN61000-4-4: 2 kV (power line), 1 kV (I/O signal line) Surge Immunity EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted Disturbance Immunity EN61000-4-6: 3 V (0.15 to 80 MHz) Voltage Dips and Interruptions Immunity EN61000-4-11: 0.5 cycle, 0°/180°, 100% (rated voltage)

Note: K, T, N (–100°C or less): ±2°C ±1 digit max.
U, L: ±2°C ±1 digit max.
B (400°C max.): Nothing specified.
R, S (200°C max.): ±3°C ±1 digit max.
W: (±0.3% PV or ±3°C whichever is larger) ±1 digit max.

■ Input Ranges

Platinum-resistance Thermometer/Thermocouple

Input type	Platinum-resistance thermometer		Thermocouple												
Name	Pt100		K		J		T	E	L	U	N	R	S	B	W (W/Re 5-26)
Connected terminals	E4 – E5 – E6		E5 – E6												
Temperature range (°C), upper	850.0	150.00	1300.0	500.0	850.0	400.0	400.0	600.0	850.0	400.0	1300.0	1700.0	1700.0	1800.0	2300.0
Temperature range (°C), lower	–200.0	–150.00	–200.0	–20.0	–100.0	–20.0	–200.0	0.0	–100.0	–200.0	–200.0	0.0	0.0	100.0	0.0
Setting code	0-Pt	1-Pt	2-K	3-K	4-J	5-J	6-T	7-E	8-L	9-U	10-N	11-R	12-S	13-B	14-W
Minimum setting unit (comparative set value)	0.1°C	0.01°C	0.1°C												

The range shown in dark shading indicates the factory setting.

Celsius/Fahrenheit Correlation Values and Setting/Specified Ranges

Input type	Setting range		Indication range	
	°C	°F	°C	°F
Pt100 (1)	–200.0 to 850.0	–300.0 to 1500.0	–305.0 to 955.0	–480.0 to 1680.0
Pt100 (2)	–150.00 to 150.00	–199.99 to 300.00	–180.00 to 180.00	–199.99 to 350.00
K (1)	–200.0 to 1300.0	–300.0 to 2300.0	–350.0 to 1450.0	–560.0 to 2560.0
K (2)	–20.0 to 500.0	0.0 to 900.0	–72.0 to 552.0	–90.0 to 990.0
J (1)	–100.0 to 850.0	–100.0 to 1500.0	–195.0 to 945.0	–260.0 to 1660.0
J (2)	–20.0 to 400.0	0.0 to 750.0	–62.0 to 442.0	–75.0 to 825.0
T	–200.0 to 400.0	–300.0 to 700.0	–260.0 to 460.0	–400.0 to 800.0
E	0.0 to 600.0	0.0 to 1100.0	–60.0 to 660.0	–110.0 to 1210.0
L	–100.0 to 850.0	–100.0 to 1500.0	–195.0 to 945.0	–260.0 to 1660.0
U	–200.0 to 400.0	–300.0 to 700.0	–260.0 to 460.0	–400.0 to 800.0
N	–200.0 to 1300.0	–300.0 to 2300.0	–350.0 to 1450.0	–560.0 to 2560.0
R	0.0 to 1700.0	0.0 to 3000.0	–170.0 to 1870.0	–300.0 to 3300.0
S	0.0 to 1700.0	0.0 to 3000.0	–170.0 to 1870.0	–300.0 to 3300.0
B	100.0 to 1800.0	300.0 to 3200.0	–70.0 to 1970.0	10.0 to 3490.0
W	0.0 to 2300.0	0.0 to 4100.0	–230.0 to 2530.0	–410.0 to 4510.0

Weighing Indicator
K3HB-V

An Ideal Indicator for OK/NG Judgements in Automated and Picking Machines, Measuring Factors such as Pressure, Load, Torque, and Weight Using Load Cell Signal Input.

- Easy recognition of judgement results using color display that can be switched between red and green.
- Equipped with a position meter for monitoring operating status trends.
- External event input allows use in various measurement and discrimination applications.
- Series expanded to include DeviceNet models.
- Short body with depth of only 95 mm (from behind the front panel), or 97 mm for DeviceNet models.
- UL certification approval (Certification Mark License).
- CE Marking conformance by third party assessment body.
- Water-resistant enclosure conforms to NEMA 4X (equivalent to IP66).
- Capable of high-speed sampling at 50 times per second (20 ms)
- Easy-to-set two-point scaling allows conversion and display of any user-set values.

Refer to *Precautions on CD.*

Model Number Structure

■ Model Number Legend

Base Units and Optional Boards can be ordered individually or as sets.

Base Units

K3HB-V□ □
1 5

1. **Input Sensor Codes**
   LC: Load cell input (DC low-voltage input)
5. **Supply Voltage**
   100-240 VAC: 100 to 240 VAC
   24 VAC/VDC: 24 VAC/VDC

Optional Board

Sensor Power Supply/Output Boards

K33-□
2

Relay/Transistor Output Boards

K34-□
3

Event Input Boards

K35-□
4

Base Units with Optional Boards

K3HB-V□-□□□ □
1 2 3 4 5

2. **Sensor Power Supply/Output Type Codes**
   None: None
   CPB: Relay output (PASS: SPDT) + Sensor power supply (10 VDC +/–5%, 100 mA) (See note 1.)
   L1B: Linear current output (DC0(4) – 20 mA) + Sensor power supply (10 VDC +/–5%, 100 mA) (See note 2.)
   L2B: Linear voltage output (DC0(1) – 5 V, 0 to 10 V) + Sensor power supply (10 VDC +/–5%, 100 mA) (See note 2.)
   B: Sensor power supply (10 VDC +/–5%, 100 mA)
   FLK1B: Communications (RS-232C) + Sensor power supply (10 VDC +/–5%, 100 mA) (See note 2.)
   FLK3B: Communications (RS-485) + Sensor power supply (10 VDC +/–5%, 100 mA) (See note 2.)
3. **Relay/Transistor Output Type Codes**
   None: None
   C1: Relay contact (H/L: SPDT each)
   C2: Relay contact (HH/H/LL/L: SPST-NO each)
   T1: Transistor (NPN open collector: HH/H/PASS/L/LL)
   T2: Transistor (PNP open collector: HH/H/PASS/L/LL)
   BCD: BCD output + transistor output (NPN open collector: HH/H/PASS/L/LL)
   DRT:DeviceNet (See note 2.)
4. **Event input Type Codes**
   None: None
   1: 5 points (M3 terminal blocks) NPN open collector
   2: 8 points (10-pin MIL connector) NPN open collector
   3: 5 points (M3 terminal blocks) PNP open collector
   4: 8 points (10-pin MIL connector) PNP open collector

Note: 1. CPB can be combined with relay outputs only.
2. Only one of the following can be used by each Digital Indicator:
RS-232C/RS-485 communications, a linear output, or DeviceNet communications.

Accessories (Sold Separately)

K32-DICN: Special Cable (for event inputs, with 8-pin connector)
K32-BCD: Special BCD Output Cable

Specifications

■ Ratings

Power supply voltage		100 to 240 VAC (50/60 Hz), 24 VAC/VDC, DeviceNet power supply: 24 VDC
Allowable power supply voltage range		85% to 110% of the rated power supply voltage, DeviceNet power supply: 11 to 25 VDC
Power consumption (See note 1.)		100 to 240 V: 18 VA max. (max. load) 24 VAC/DC: 11 VA/7 W max. (max. load)
Current consumption		DeviceNet power supply: 50 mA max. (24 VDC)
Input		DC voltage
A/D conversion method		Delta-Sigma method
External power supply		See Sensor Power Supply/Output Type Codes
Event inputs (See note 2.)	**Timing input**	NPN open collector or no-voltage contact signal ON residual voltage: 3 V max. ON current at 0 Ω: 17 mA max. Max. applied voltage: 30 VDC max. OFF leakage current: 1.5 mA max.
	Startup compensation timer input	NPN open collector or no-voltage contact signal ON residual voltage: 2 V max. ON current at 0 Ω: 4 mA max. Max. applied voltage: 30 VDC max. OFF leakage current: 0.1 mA max.
	Hold input	
	Reset input	
	Forced-zero input	
	Bank input	
Output ratings (depends on the model)	**Relay output**	250 VAC, 30 VDC, 5 A (resistive load) Mechanical life expectancy: 5,000,000 operations, Electrical life expectancy: 100,000 operations
	Transistor output	Maximum load voltage: 24 VDC, Maximum load current: 50 mA, Leakage current: 100 μA max.
	Linear output	Linear output 0 to 20 mA DC, 4 to 20 mA: Load: 500 Ω max, Resolution: Approx. 10,000, Output error: ±0.5% FS Linear output 0 to 5 VDC, 1 to 5 VDC, 0 to 10 VDC: Load: 5 kΩ max, Resolution: Approx. 10,000, Output error: ±0.5% FS (1 V or less: ±0.15 V; not output for 0 V or less)
Display method		Negative LCD (backlit LED) display 7-segment digital display (Character height: PV: 14.2 mm (green/red); SV: 4.9 mm (green)
Main functions		Scaling function, measurement operation selection, averaging, previous average value comparison, forced-zero, zero-limit, output hysteresis, output OFF delay, output test, teaching, display value selection, display color selection, key protection, bank selection, display refresh period, maximum/minimum hold, reset
Ambient operating temperature		–10 to 55°C (with no icing or condensation)
Ambient operating humidity		25% to 85%
Storage temperature		–25 to 65°C (with no icing or condensation)
Altitude		2,000 m max.
Accessories		Watertight packing, 2 fixtures, terminal cover, unit stickers, operation manual. DeviceNet models also include a DeviceNet connector (Hirose HR31-5.08P-5SC(01)) and crimp terminals (Hirose HR31-SC-121) (See note 3.)

Note: 1. DC power supply models require a control power supply capacity of approximately 1 A per Unit when power is turned ON. Particular attention is required when using two or more DC power supply models. The OMRON S8VS-series DC Power Supply Unit is recommended.

2. PNP input types are also available.

3. For K3HB-series DeviceNet models, use only the DeviceNet Connector included with the product. The crimp terminals provided are for Thin Cables.

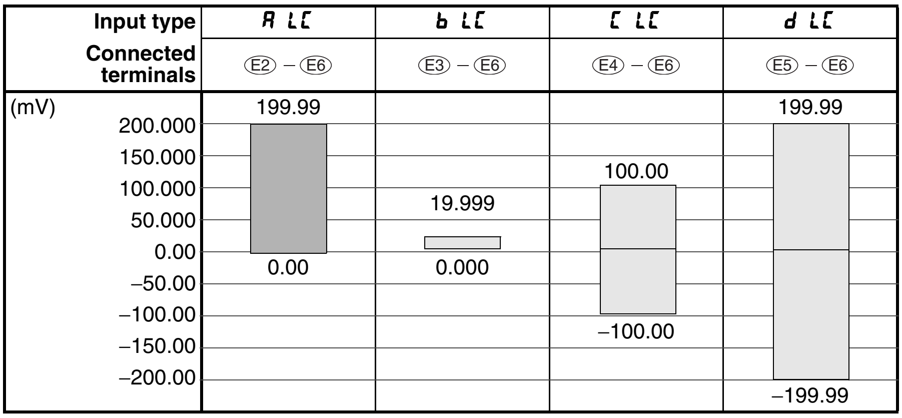
■ Characteristics

Display range		−19,999 to 99,999
Sampling period		20 ms (50 times/second)
Comparative output response time		100 ms max.
Linear output response time		150 ms max.
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		2,300 VAC for 1 min between external terminals and case
Noise immunity		100 to 240 VAC models: ±1,500 V at power supply terminals in normal or common mode (waveform with 1-ns rising edge and pulse width of 1 µs/100 ns) 24 VAC/VDC models: ±1,500 V at power supply terminals in normal or common mode (waveform with 1-ns rising edge and pulse width of 1 µs/100 ns)
Vibration resistance		Frequency: 10 to 55 Hz; Acceleration: 50 m/s^2, 10 sweeps of 5 min each in X, Y, and Z directions
Shock resistance		150 m/s^2 (100 m/s^2 for relay outputs) 3 times each in 3 axes, 6 directions
Weight		Approx. 300 g (Base Unit only)
Degree of protection	**Front panel**	Conforms to NEMA 4X for indoor use (equivalent to IP66)
	Rear case	IP20
	Terminals	IP00 + finger protection (VDE0106/100)
Memory protection		EEPROM (non-volatile memory) Number of rewrites: 100,000
Applicable standards		UL61010C-1, CSA C22.2 No. 1010.1 (evaluated by UL) EN61010-1 (IEC61010-1): Pollution degree 2/Overvoltage category II EN61326: 1997, A1: 1998, A2: 2001
EMC		EMI: EN61326+A1 industrial applications Electromagnetic radiation interference CISPR 11 Group 1, Class A: CISPRL16-1/-2 Terminal interference voltage CISPR 11 Group 1, Class A: CISPRL16-1/-2 EMS: EN61326+A1 industrial applications Electrostatic Discharge Immunity EN61000-4-2: 4 kV (contact), 8 kV (in air) Radiated Electromagnetic Field Immunity EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Electrical Fast Transient/Burst Immunity EN61000-4-4: 2 kV (power line), 1 kV (I/O signal line) Surge Immunity EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted Disturbance Immunity EN61000-4-6: 3 V (0.15 to 80 MHz) Voltage Dips and Interruptions Immunity EN61000-4-11: 0.5 cycle, 0°/180°, 100% (rated voltage)

■ Input Ranges (Measurement Range and Accuracy)

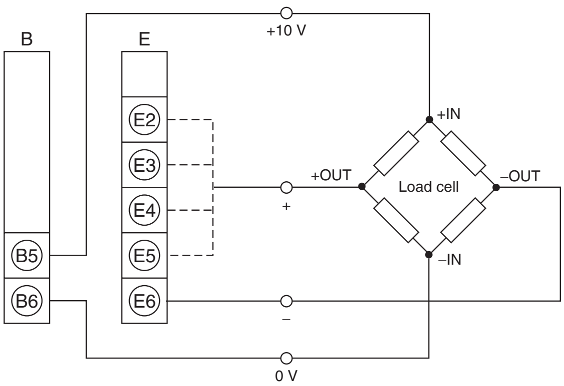
Input type	Range	Set value	Measurement range	Input impedance	Accuracy	Allowable instantaneous overload (30 s)
K3HB-VLC Load Cell, mV	A	A ud	0.00 to 199.99 mV	1 MΩ min.	±0.1%rdg ± 1 digit max.	±200 V
	B	b ud	0.000 to 19.999 mV		±0.1%rdg ± 5 digits max.	
	C	C ud	±100.00 mV		±0.1%rdg ± 3 digits max.	
	D	d ud	±199.99 mV		±0.1%rdg ± 1 digit max.	

Note: 1. The accuracy is for an ambient temperature of 23±5°C. For all ranges,10% or less of max. input ±0.1% FS.
2. The letters “rdg” mean “reading.”



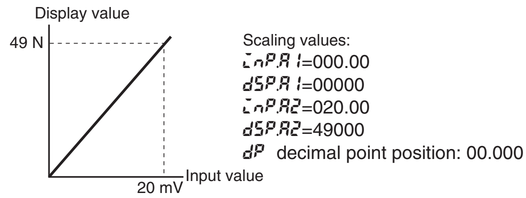
The area shown in dark shading indicates the factory setting.

■ Load Cell Wiring Example



■ Scaling Example Using Range A

Indicated on the K3HB-V as 0 to 49N in the load cell specifications (rated load 49N, recommended applied voltage 10 V, rated output 2 mV/V) (See note.)



Note: 2 mV/V indicates a load cell output of 2 mV for 1 V applied voltage for the rated load (when using a load of 1 N). When the applied voltage is 10 V, the load cell output is 20 mV (2 mV × 10).

Linear Sensor Indicator
K3HB-S

A Linear Sensor Indicator Capable of High-speed Response at 2,000 Times per Second

- Effective for high-speed measurement and discrimination with a sampling period of 0.5 ms and output response time of 1 ms max.
- Easy recognition of judgement results using color display that can be switched between red and green.
- Equipped with a position meter that represents measured amounts and relative positions.
- Zero calibration can be performed easily with the forced zero function.
- Series expanded to include DeviceNet models.
- Short body with depth of only 95 mm (from behind the front panel), or 97 mm for DeviceNet models.
- UL certification approval (Certification Mark License).
- CE Marking conformance by third party assessment body.
- Water-resistant enclosure conforms to NEMA 4X (equivalent to IP66).

Refer to *Precautions on CD.*

Model Number Structure

■ Model Number Legend

Base Units and Optional Boards can be ordered individually or as sets.

Base Units

K3HB-S□ □
1 5

1. Input Sensor Codes

SD: DC Process input

5. Supply Voltage

100-240 VAC: 100 to 240 VAC
24 VAC/VDC: 24 VAC/VDC

Base Units with Optional Boards

K3HB-S□-□□□ □
1 2 3 4 5

2. Sensor Power Supply/Output Type Codes

None: None
CPA: Relay output (PASS: SPDT) + Sensor power supply (12 VDC +/–10%, 80 mA) (See note 1.)
L1A: Linear current output (DC0(4) – 20 mA) + Sensor power supply (12 VDC +/–10%, 80 mA) (See note 2.)
L2A: Linear voltage output (DC0(1) – 5 V, 0 to 10 V) + Sensor power supply (12 VDC +/–10%, 80 mA) (See note 2.)
A: Sensor power supply (12 VDC +/–10%, 80 mA)
FLK1A: Communications (RS-232C) + Sensor power supply (12 VDC +/–10%, 80 mA) (See note 2.)
FLK3A: Communications (RS-485) + Sensor power supply (12 VDC +/–10%, 80 mA) (See note 2.)

Optional Board

Sensor Power Supply/Output Boards

K33-□
2

Relay/Transistor Output Boards

K34-□
3

Event Input Boards

K35-□
4

3. Relay/Transistor Output Type Codes

None: None
C1: Relay contact (H/L: SPDT each)
C2: Relay contact (HH/H/LL/L: SPST-NO each)
T1: Transistor (NPN open collector: HH/H/PASS/L/LL)
T2: Transistor (PNP open collector: HH/H/PASS/L/LL)
BCD: BCD output + transistor output (NPN open collector: HH/H/PASS/L/LL)
DRT:DeviceNet (See note 2.)

4. Event input Type Codes

None: None
1: 5 points (M3 terminal blocks) NPN open collector
2: 8 points (10-pin MIL connector) NPN open collector
3: 5 points (M3 terminal blocks) PNP open collector
4: 8 points (10-pin MIL connector) PNP open collector

Note: 1. CPA can be combined with relay outputs only.
2. Only one of the following can be used by each Digital Indicator:
RS-232C/RS-485 communications, a linear output, or DeviceNet communications.

Accessories (Sold Separately)

K32-DICN: Special Cable (for event inputs, with 8-pin connector)
K32-BCD: Special BCD Output Cable

Specifications

■ Ratings

Power supply voltage		100 to 240 VAC (50/60 Hz), 24 VAC/VDC, DeviceNet power supply: 24 VDC
Allowable power supply voltage range		85% to 110% of the rated power supply voltage, DeviceNet power supply: 11 to 25 VDC
Power consumption (See note 1.)		100 to 240 V: 18 VA max. (max. load) 24 VAC/DC: 11 VA/7 W max. (max. load)
Current consumption		DeviceNet power supply: 50 mA max. (24 VDC)
Input		DC voltage/current
A/D conversion method		Sequential comparison system
External power supply		See Sensor Power Supply/Output Type Codes
Event inputs (See note 2.)	**Timing input**	NPN open collector or no-voltage contact signal ON residual voltage: 3 V max. ON current at 0 Ω: 17 mA max. Max. applied voltage: 30 VDC max. OFF leakage current: 1.5 mA max.
	Startup compensation timer input	NPN open collector or no-voltage contact signal ON residual voltage: 2 V max. ON current at 0 Ω: 4 mA max. Max. applied voltage: 30 VDC max. OFF leakage current: 0.1 mA max.
	Hold input	
	Reset input	
	Forced-zero input	
	Bank input	
Output ratings (depends on the model)	**Relay output**	250 VAC, 30 VDC, 5 A (resistive load) Mechanical life expectancy: 5,000,000 operations, Electrical life expectancy: 100,000 operations
	Transistor output	Maximum load voltage: 24 VDC, Maximum load current: 50 mA, Leakage current: 100 μA max.
	Linear output	Linear output 0 to 20 mA DC, 4 to 20 mA: Load: 500 Ω max, Resolution: Approx. 10,000, Output error: ±0.5% FS Linear output 0 to 5 VDC, 1 to 5 VDC, 0 to 10 VDC: Load: 5 kΩ max, Resolution: Approx. 10,000, Output error: ±0.5% FS (1 V or less: ±0.15 V; not output for 0 V or less)
Display method		Negative LCD (backlit LED) display 7-segment digital display (Character height: PV: 14.2 mm (green/red); SV: 4.9 mm (green)
Main functions		Scaling function, 2-input calculation function, measurement operation selection, averaging, previous average value comparison, forced-zero, zero-limit, output hysteresis, output OFF delay, output test, teaching, display value selection, display color selection, key protection, bank selection, display refresh period, maximum/minimum hold, reset
Ambient operating temperature		–10 to 55°C (with no icing or condensation)
Ambient operating humidity		25% to 85%
Storage temperature		–25 to 65°C (with no icing or condensation)
Altitude		2,000 m max.
Accessories		Watertight packing, 2 fixtures, terminal cover, unit stickers, instruction manual. DeviceNet models also include a DeviceNet connector (Hirose HR31-5.08P-5SC(01)) and crimp terminals (Hirose HR31-SC-121) (See note 3.)

Note: 1. DC power supply models require a control power supply capacity of approximately 1 A per Unit when power is turned ON. Particular attention is required when using two or more DC power supply models. The OMRON S8VS-series DC Power Supply Unit is recommended.

2. PNP input types are also available.

3. For K3HB-series DeviceNet models, use only the DeviceNet Connector included with the product. The crimp terminals provided are for Thin Cables.

Characteristics

Display range		−19,999 to 99,999
Sampling period		One input: 0.5 ms; Two inputs: 1.0 ms
Comparative output response times (transistor outputs)	**One input**	OFF to ON: 1 ms max., ON to OFF: 1.5 ms max.
	Two inputs	OFF to ON: 2 ms max., ON to OFF: 2.5 ms max.
Linear output response time	**One input**	51 ms max.
	Two inputs	52 ms max.
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		2,300 VAC for 1 min between external terminals and case
Noise immunity		100 to 240 VAC models: ±1,500 V at power supply terminals in normal or common mode (waveform with 1-ns rising edge and pulse width of 1 μs/100 ns) 24 VAC/VDC models: ±1,500 V at power supply terminals in normal or common mode (waveform with 1-ns rising edge and pulse width of 1 μs/100 ns)
Vibration resistance		Frequency: 10 to 55 Hz; Acceleration: 50 m/s^2, 10 sweeps of 5 min each in X, Y, and Z directions
Shock resistance		150 m/s^2 (100 m/s^2 for relay outputs) 3 times each in 3 axes, 6 directions
Weight		Approx. 300 g (Base Unit only)
Degree of protection	**Front panel**	Conforms to NEMA 4X for indoor use (equivalent to IP66)
	Rear case	IP20
	Terminals	IP00 + finger protection (VDE0106/100)
Memory protection		EEPROM (non-volatile memory) Number of rewrites: 100,000
Applicable standards		UL61010C-1, CSA C22.2 No. 1010.1(evaluated by UL) EN61010-1 (IEC61010-1): Pollution degree 2/Overvoltage category II EN61326: 1997, A1: 1998, A2: 2001
EMC		EMI: EN61326+A1 industrial applications Electromagnetic radiation interference CISPR 11 Group 1, Class A: CISPRL16-1/-2 Terminal interference voltage CISPR 11 Group 1, Class A: CISPRL16-1/-2 EMS: EN61326+A1 industrial applications Electrostatic Discharge Immunity EN61000-4-2: 4 kV (contact), 8 kV (in air) Radiated Electromagnetic Field Immunity EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Electrical Fast Transient/Burst Immunity EN61000-4-4: 2 kV (power line), 1 kV (I/O signal line) Surge Immunity EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted Disturbance Immunity EN61000-4-6: 3 V (0.15 to 80 MHz) Voltage Dips and Interruptions Immunity EN61000-4-11: 0.5 cycle, 0°/180°, 100% (rated voltage)

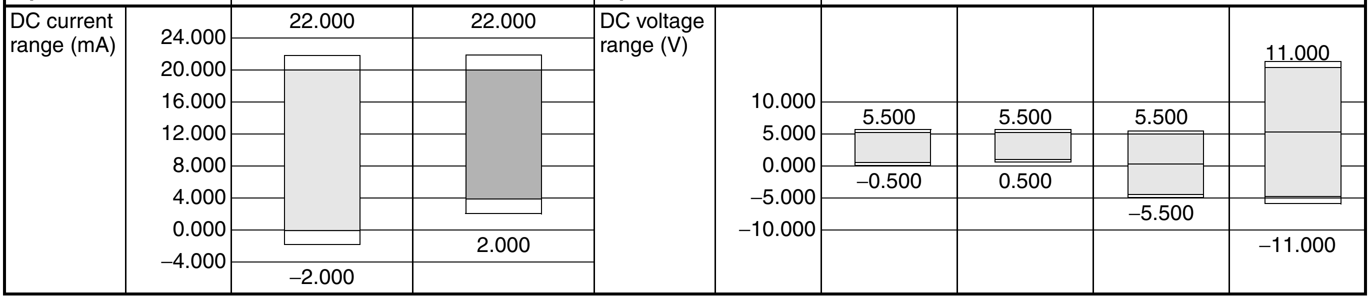
Digital panel indicators

Input Ranges (Measurement Ranges and Accuracy)

Input	Input type	Measurement range	Indication range	Input impedance	Accuracy (at 23±5°C)	Maximum absolute rated input
K3HB-SSD DC voltage/current input	0 to 20 mA	0.000 to 20.000 mA	−2.000 to 22.000 mA	120 Ω max.	One input: ±0.1% F.S. ±1 digit max. Two inputs: ±0.2% F.S. ±1 digit max.	±31 mA
	4 to 20 mA	4.000 to 20.000 mA	2.000 to 22.000 mA			
	0 to 5 V	0.000 to 5.000 V	−0.500 to 5.500 mA	1 MΩ min.		±10 V
	1 to 5 V	1.000 to 5.000 V	0.500 to 5.500 V			
	±5 V	±5.000 V	± 5.500 V			
	±10 V	±10.000 V	± 11.000 V			±14.5 V

Note: The accuracy is for an ambient temperature of 23±5°C.

Input type		DC current input		Input type		DC voltage input			
Connected terminals		0-20	4-20	Connected terminals		0-5	1-5	5	10
Input A	in-tA	E2 – E3		Input A	in-tA	E4 – E3			
Input B	in-tb	E1 – E3		Input B	in-tb	E5 – E3			



The range shown in dark shading indicates the factory setting.

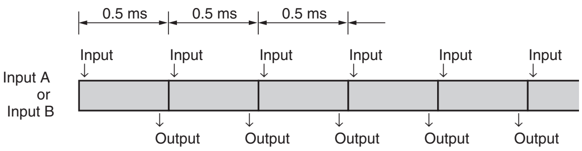
Sampling and Comparative Output Response Times

The K3HB-S sampling and comparative output response times depend on the calculation methods, timing hold type, and, for simple averaging, the averaging times. Refer to the following description for details.

■ Output Refresh Period

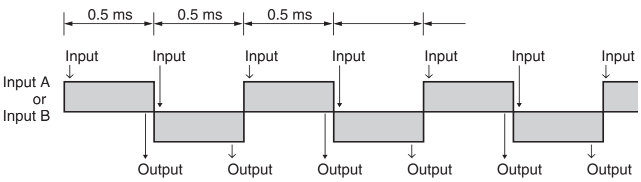
The K3HB-S repeats input reads, calculation, and judgement output processing. The output refresh period differs depending on whether there are one or two inputs, as outlined below.

One Input



Input read	Every 0.5 ms
Output refresh	Every 0.5 ms

Two inputs

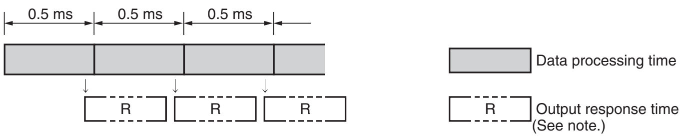


Input read	Input A: Every 1 ms
	Input B: Every 1 ms
Output refresh	Every 0.5 ms

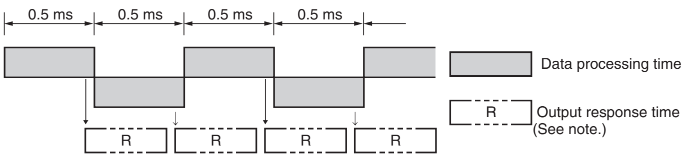
■ Output Response Time

The comparative output response time is the sum of the data processing time and the output (relay or transistor) response time.

One Input



Two Inputs



Note: For transistor outputs:
For one input: OFF to ON 1 ms and ON to OFF 1.5 ms
For two inputs: OFF to ON 2 ms and ON to OFF 2.5 ms
For relay outputs:
The relay operation time of 15 ms is added to the transistor output response times.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. N131-E1-04

Rotary Pulse Indicator

K3HB-R

Digital Rotary Pulse Meter Capable of 50 kHz Measurements

- Measures High-speed Pulses at 50 kHz.
  Provides high-speed pulse measurements up to 50 kHz of rotary encoder or ON/OFF pulse signals and can perform rotating measurement of high-speed rotating objects.

Note: No-voltage contacts of up to 30 Hz are supported.

- Six Measurement Operations Including Rotation (rpm)/ Circumferential Speed, Ratio, and Cumulative
  One Rotary Pulse Meter has 6 rotary pulse measurement functions to support a variety of pulse measurement applications. Select the best function for your application from the following: rotation (rpm)/ circumferential speed, absolute ratio, error ratio, error, flow rate ratio, and passing time.

⚠ Refer to *Precautions Common to all K3HB-R/-P/-C* on CD..

NEW

Digital panel indicators

Model Number Structure

■ Model Number Legend

Base Units and Optional Boards can be ordered individually or as sets.

Base Units

K3HB-R □ □□□
1 5

1. **Input Sensor Codes**
   NB: NPN input/voltage pulse input
   PB: PNP input
5. **Supply Voltage**
   100-240 VAC:100 to 240 VAC
   24 VAC/VDC: 24 VAC/VDC

Optional Board

Sensor Power Supply/Output Boards

K33-□
2

Relay/Transistor Output Boards

K34-□
3

Event Input Boards

K35-□
4

Base Units with Optional Boards

K3HB-R□-□□□ □□□
1 2 3 4 5

2. **Sensor Power Supply/Output Type Codes**
   None: None
   CPA: Relay output (PASS: SPDT) + Sensor power supply (12 VDC±10%, 80 mA) (See note 1.)
   L1A: Linear current output (DC0(4)-20 mA) + Sensor power supply (12 VDC±10%, 80 mA) (See note 2.)
   L2A: Linear voltage output (DC0(1)-5 V, 0 to 10 V) + Sensor power supply (12 VDC±10%, 80 mA) (See note 2.)
   A: Sensor power supply (12 VDC ±10%, 80 mA)
   FLK1A: Communications (RS-232C) + Sensor power supply (12 VDC±10%, 80 mA) (See note 2.)
   FLK3A: Communications (RS-485) + Sensor power supply (12 VDC±10%, 80 mA) (See note 2.)
3. **Relay/Transistor Output Type Codes**
   None: None
   C1: Relay contact (H/L: SPDT each)
   C2: Relay contact (HH/H/LL/L: SPST-NO each)
   T1: Transistor (NPN open collector: HH/H/PASS/L/LL)
   T2: Transistor (PNP open collector: HH/H/PASS/L/LL)
   BCD: BCD output + transistor output (NPN open collector: HH/H/PASS/L/LL)
   DRT: DeviceNet (See note 2.)
4. **Event input Type Codes**
   None: None
   1: 5 points (M3 terminal blocks) NPN open collector
   2: 8 points (10-pin MIL connector) NPN open collector
   3: 5 points (M3 terminal blocks) PNP open collector
   4: 8 points (10-pin MIL connector) PNP open collector

Note: 1. CPA can be combined with relay outputs only.
2. Only one of the following can be used by each Digital Indicator:
RS-232C/RS-485 communications, BCD communications, or DeviceNet communications.

Accessories (Sold Separately)

K32-DICN: Special Cable (for event inputs with 8-pin connector)
K32-BCD: Special BCD Output Cable

Specifications

■ Ratings

Supply voltage		100 to 240 VAC, 24 VAC/VDC, DeviceNet power supply: 24 VDC
Allowable power supply voltage range		85% to 110% of the rated power supply voltage, DeviceNet power supply: 11 to 25 VDC
Power consumption (See note 1.)		100 to 240 VAC: 18 VA max. (max. load) 24 VAC/DC: 11 VA/7 W max. (max. load)
Current consumption		DeviceNet power supply: 50 mA max. (24 VDC)
Input		No-voltage contact, voltage pulse, open collector
External power supply		12 VDC ±10%, 80 mA (models with external power supply only)
Event inputs (See note 2.)	**Startup compensation timer input**	NPN open collector or no-voltage contact signal ON residual voltage: 2 V max. ON current at 0 Ω: 4 mA max. Max. applied voltage: 30 VDC max. OFF leakage current: 0.1 mA max.
	Hold input	
	Reset input	
	Bank input	
Output ratings (depends on the model)	**Relay output**	250 VAC, 30 VDC, 5 A (resistive load) Mechanical life expectancy: 5,000,000 operations, Electrical life expectancy: 100,000 operations
	Transistor output	Maximum load voltage: 24 VDC, Maximum load current: 50 mA, Leakage current: 100 µA max.
	Linear output	Linear output 0 to 20 mA DC, 4 to 20 mA: Load: 500 Ω max, Resolution: Approx. 10,000, Output error: ±0.5% FS Linear output 0 to 5 VDC, 1 to 5 VDC, 0 to 10 VDC: Load: 5 kΩ max, Resolution: Approx. 10,000, Output error: ±0.5% FS (1 V or less: ±0.15 V; not output for 0 V or less)
Display method		Negative LCD (backlit LED) display 7-segment digital display (Character height: PV: 14.2 mm (green/red); SV: 4.9 mm (green))
Main functions		Scaling function, measurement operation selection, averaging, previous average value comparison, output hysteresis, output OFF delay, output test, teaching, display value selection, display color selection, key protection, bank selection, display refresh period, maximum/minimum hold, reset
Ambient operating temperature		–10 to 55°C (with no icing or condensation)
Ambient operating humidity		25% to 85%
Storage temperature		–25 to 65°C (with no icing or condensation)
Altitude		2,000 m max.
Accessories		Watertight packing, 2 fixtures, terminal cover, unit stickers, instruction manual. DeviceNet models also include a DeviceNet connector (Hirose HR31-5.08P-5SC(01)) and crimp terminals (Hirose HR31-SC-121) (See note 3.)

Note: 1. DC power supply models require a control power supply capacity of approximately 1 A per Unit when power is turned ON. Particular attention is required when using two or more DC power supply models. The OMRON S8VS-series DC Power Supply Unit is recommended.

2. PNP input types are also available.

3. For K3HB-series DeviceNet models, use only the DeviceNet Connector included with the product. The crimp terminals provided are for Thin Cables.

■ Characteristics

Display range		–19,999 to 99,999
Measurement accuracy (at 23±5°C)		Functions F1, F6: ±0.006% rgd ±1 digit (for voltage pulse/open collector sensors) Functions F2 to F5: ±0.02% rgd ±1 digit (for voltage pulse/open collector sensors)
Measurement range		Functions F1 to F6: 0.5 mHz to 50 kHz (for voltage pulse/open collector sensors)
Input signals		No-voltage contact (30-Hz max. with ON/OFF pulse width of 15 ms min.) Voltage pulse (50-KHz max. with ON/OFF pulse width of 9 μs min.; ON voltage: 4.5 to 30 V; OFF voltage: –30 to 2 V; input impedance: 10 kΩ) Open collector (50-KHz max. with ON/OFF pulse width of 9 μs min.)
Connectable sensors		ON residual voltage: 3 V max. OFF leakage current: 1.5 mA max. Load current: Must have a switching capacity of 20 mA or higher. Must be able to properly switch load currents of 5 mA or less.
Comparative output response time (transistor output)		Functions F1 to F6: 100 ms max. (time until the comparative output is made when there is a forced sudden change in the input signal from 15% to 95% or 95% to 15%.)
Linear output response time		Functions F1 to F6: 110 ms max. (time until the final analog output value is reached when there is a forced sudden change in the input signal from 15% to 95% or 95% to 15%.)
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		2,300 VAC for 1 min between external terminals and case
Noise immunity		100 to 240 VAC models: ±1,500 V at power supply terminals in normal or common mode (waveform with 1-ns rising edge and pulse width of 1 μs/100 ns) 24 VAC/VDC models: ±1,500 V at power supply terminals in normal or common mode (waveform with 1-ns rising edge and pulse width of 1 μs/100 ns)
Vibration resistance		Frequency: 10 to 55 Hz; Acceleration: 50 m/s^2, 10 sweeps of 5 min each in X, Y, and Z directions
Shock resistance		150 m/s^2 (100 m/s^2 for relay outputs) 3 times each in 3 axes, 6 directions
Weight		Approx. 300 g (Base Unit only)
Degree of protection	**Front panel**	Conforms to NEMA 4X for indoor use (equivalent to IP66)
	Rear case	IP20
	Terminals	IP00 + finger protection (VDE0106/100)
Memory protection		EEPROM (non-volatile memory) Number of rewrites: 100,000
Applicable standards		UL61010C-1, CSA C22.2 No. 1010.1 (evaluated by UL) EN61010-1 (IEC61010-1): Pollution degree 2/Overvoltage category II EN61326: 1997, A1: 1998, A2: 2001
EMC		EMI: EN61326+A1 industrial applications Electromagnetic radiation interference CISPR 11 Group 1, Class A: CISPRL16-1/-2 Terminal interference voltage CISPR 11 Group 1, Class A: CISPRL16-1/-2 EMS: EN61326+A1 industrial applications Electrostatic Discharge Immunity EN61000-4-2: 4 kV (contact), 8 kV (in air) Radiated Electromagnetic Field Immunity EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz, 1.4 to 2 GHz) Electrical Fast Transient/Burst Immunity EN61000-4-4: 2 kV (power line), 1 kV (I/O signal line) Surge Immunity EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted Disturbance Immunity EN61000-4-6: 3 V (0.15 to 80 MHz) Power Frequency Magnetic Immunity EN61000-4-8: 30 A/m (50 Hz) continuous time Voltage Dips and Interruptions Immunity EN61000-4-11: 0.5 cycle, 0°/180°, 100% (rated voltage)

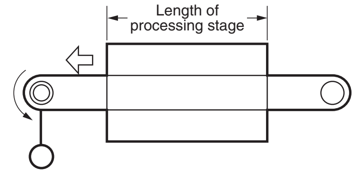
Operation

■ Functions (Operating Modes)

F1 to F6

Functions F1 to F6 provide rpm/circumferential speed and other calculation displays by measuring continuous pulses (frequencies).

Example



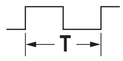
Function name	Function No.
Rpm/circumferential speed	F1
Absolute ratio	F2
Error ratio	F3
Rotational difference	F4
Flow rate ratio	F5
Passing time	F6

F1: Displays rotation (rpm) or circumferential speed for one input.

F2 to F5: Displays the calculation result for two rotation (rpm) speeds.

F6: Displays the passing time calculated from the circumferential speed and the length of the processing stage for one input.

The basic principle used by the Digital Indicator to calculate the rotation speed (rpm) display is to count the ON/OFF time (T) for input sensor or other device inputs using the internal system clock, and then automatically calculate the frequency. This frequency (f) is multiplied by 60 and displayed as the rotation (rpm) speed.

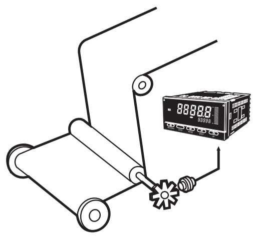
Input sensor or other input pulse ON/OFF time (T) = 

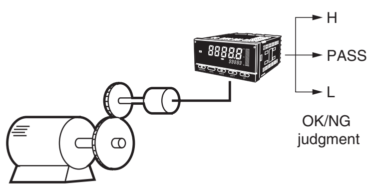
Frequency (f) = $\frac{1}{T}$

- Rotation speed (rpm) = f × 60
- Circumferential speed = Roll circumference × Rotation speed (rpm)
- Passing time= $\frac{\text{Length of processing stage}}{\text{Circumferential speed}}$

These calculations are automatically made internally and displayed whenever any input pulse is received.

Function	Operation	Operation image (application)
F1 Rpm/circumferential speed/ Instantaneous flowrate	Measures frequency for input A and displays the rotation (rpm) or circumferential speed proportional to the input frequency.	Measuring roller winding speed / Measuring motor speed (for product testing)

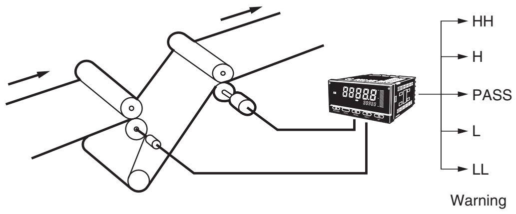
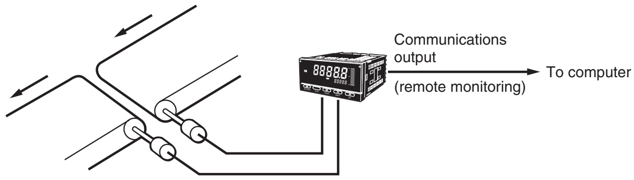
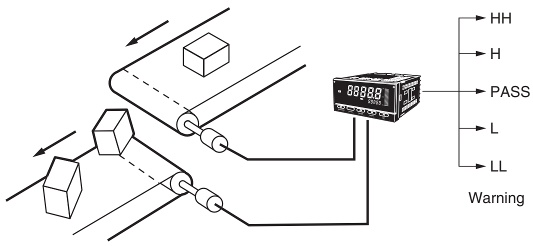
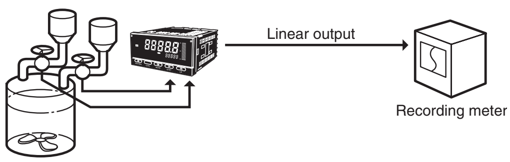
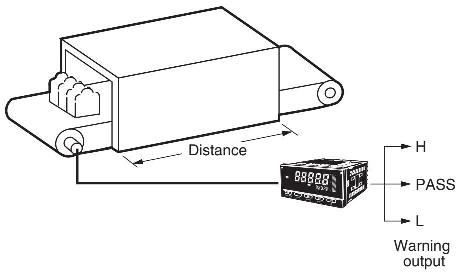




Calculation	Display unit	Prescale value (α)
Rotation speed	rpm	1/N
	rps	1/60 N
Frequency (of input pulse)	Hz	1/60
	kHz	1/60000
Circumferential speed	mm/s	1000 πd/60 N
	cm/s	100 πd/60 N
	m/s	πd/60 N
	m/min	πd/N
	km/h	0.06 πd/N
Instantaneous flowrate	ℓ/min	Check the output specifications of the input device and calculate the prescale value from the following equation: Display value D = fa × 60 × α
	ℓ/h	

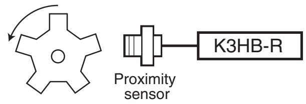
N = Pulses per rotation

πd = Circumferential length per rotation

<table>
<tr><th>Function</th><th>Operation</th><th>Operation image (application)</th></tr>
<tr><td>F2
Absolute ratio</td><td>Multiples input B divided by input A ($\frac{B}{A}$) by 100 and displays the ratio as a percentage (%).
Display unit: %</td><td>Measuring the speed ratio between two rollers

</td></tr>
<tr><td>F3
Error ratio</td><td>Multiplies the error between input A and input B ($\frac{B}{A}$ −1) by 100 and displays the ratio as a percentage (%).
Display unit: %</td><td>Measuring the line speed error ratio between two conveyors

</td></tr>
<tr><td>F4
Rotational difference</td><td>Displays the difference between input A and input B (B - A) as the rotation (rpm) speed error or circumferential speed error.
Display unit:
rpm, rps, rph,
Hz, kHz, mm/s, m/s
m/min, km/h
l/min, l/h, etc.</td><td>Measuring the rotation (rpm)/circumferential speed error (absolute error) between two conveyors

</td></tr>
<tr><td>F5
Flow rate ratio</td><td>Displays the flow rate ratio of B from inputs A and B ($\frac{B}{A+B}$) as a ratio (%).
Display unit: %</td><td>Monitoring liquid mixture flow rate ratio

</td></tr>
<tr><td>F6
Passing time</td><td>Passing time (s) = 1/fa × α
fa: Input frequency (Hz)
Set the prescale value for the desired display unit using the following table for reference.
<table>
<tr><th>Calculation</th><th>Display unit</th><th>Prescale value (α)</th></tr>
<tr><td>Passing time</td><td>s</td><td>L/(πd/N)</td></tr>
</table>
N = Pulses per rotation
πd = Circumferential length per rotation (m)
L = Length of process (m)</td><td>Displaying the passing time for a conveyor line

</td></tr>
</table>

■ What Is Prescaling?

To make calculations using the input pulse to display rotation (rpm) or circumferential speed, the number of pulses per rotation or the length of the circumference must be multiplied by a certain coefficient. This coefficient is called the prescale value.



Rotation speed (rpm) = f × 60 × a

f: Input pulse frequency (No. of pulses per second)

a: Prescale value

If there are 5 pulses per rotation, then

a = 1/5 (= 0.2 = 2 × 10^{-1})

and an accurate rotation speed (rpm) can be calculated.

The actual setting is X = 2.0000 (mantissa) and Y = 10^{-1} (exponent).

■ What Is the Auto-zero Function?

(Set this function before using the Digital Indicator.)

If a function F1 to F6 is set, the frequency can be force-set to zero if there is no input pulse for a set period. This period is called the auto-zero time. Set the auto-zero time to slightly longer than the longest input pulse interval. (The display will not easily return to zero if the auto-zero time is too long or left at the default setting.)

Time Unit Settings

Setting	Meaning
SCAL	Prescale value menu setting
min	Minute display
H.mm.SS	h.mm.ss display
mm.SS.d	mm.ss.d display (d = tenths of a second)

Note: Time unit can be set only when passing time (F6) is selected.

Input Type Setting

	NO: Voltage pulse high	NC: Voltage pulse low
No-contact or voltage pulse input	00	01
Contact	10	11

Note: Set to 10 or 11 when there is a large variation in the display. The largest measurement range is 30 Hz.

OMRON

Timer Interval Indicator
K3HB-P

Digital Time Interval Meter for Measuring Passing Speed, Time, or Cycle between Two Points.

- Measures Wide Range of Pulse Interval Times
  Measures, calculates, and displays pulse intervals between two points. Wide range for pulse interval measurements, from 10 ms to 3,200 s, max.
- Six Measurement Operations, Including Passing Speed, Time, and Cycle Measurement between Two Points
  One Digital Time Interval Meter has six measurement functions, to support a variety of pulse interval measurement applications. Select the best function for your application from the following: Passing speed, cycle, time difference, time band, measuring length, and interval.

NEW

⚠ Refer to *Precautions Common to all K3HB-R/-P/-C* on CD..

Digital panel indicators

Model Number Structure

■ Model Number Legend

Base Units and Optional Boards can be ordered individually or as sets.

Base Units

K3HB-P □ □
1 5

1. **Input Sensor Codes**
   NB: NPN input/voltage pulse input
   PB: PNP input
5. **Supply Voltage**
   100-240 VAC: 100 to 240 VAC
   24 VAC/VDC: 24 VAC/VDC

Optional Board

Sensor Power Supply/Output Boards

K33-□
2

Relay/Transistor Output Boards

K34-□
3

Event Input Boards

K35-□
4

Base Units with Optional Boards

K3HB-P□-□□□ □
1 2 3 4 5

2. **Sensor Power Supply/Output Type Codes**
   None: None
   CPA: Relay output (PASS: SPDT) + Sensor power supply (12 VDC±10%, 80 mA) (See note 1.)
   L1A: Linear current output (DC0(4)-20 mA) + Sensor power supply (12 VDC±10%, 80 mA) (See note 2.)
   L2A: Linear voltage output (DC0(1)-5 V, 0 to 10 V) + Sensor power supply (12 VDC±10%, 80 mA) (See note 2.)
   A: Sensor power supply (12 VDC ±10%, 80 mA)
   FLK1A: Communications (RS-232C) + Sensor power supply (12 VDC±10%, 80 mA) (See note 2.)
   FLK3A: Communications (RS-485) + Sensor power supply (12 VDC±10%, 80 mA) (See note 2.)
3. **Relay/Transistor Output Type Codes**
   None: None
   C1: Relay contact (H/L: SPDT each)
   C2: Relay contact (HH/H/LL/L: SPST-NO each)
   T1: Transistor (NPN open collector: HH/H/PASS/L/LL)
   T2: Transistor (PNP open collector: HH/H/PASS/L/LL)
   BCD: BCD output + transistor output (NPN open collector: HH/H/PASS/L/LL)
   DRT: DeviceNet (See note 2.)
4. **Event input Type Codes**
   None: None
   1: 5 points (M3 terminal blocks) NPN open collector
   2: 8 points (10-pin MIL connector) NPN open collector
   3: 5 points (M3 terminal blocks) PNP open collector
   4: 8 points (10-pin MIL connector) PNP open collector

Note: 1. CPA can be combined with relay outputs only.
2. Only one of the following can be used by each Digital Indicator:
RS-232C/RS-485 communications, a linear output, or DeviceNet communications.

Accessories (Sold Separately)

K32-DICN: Special Cable (for event inputs with 8-pin connector)
K32-BCD: Special BCD Output Cable

Specifications

■ Ratings

Supply voltage		100 to 240 VAC, 24 VAC/VDC, DeviceNet power supply: 24 VDC
Allowable power supply voltage range		85% to 110% of the rated power supply voltage, DeviceNet power supply: 11 to 25 VDC
Power consumption (See note 1.)		100 to 240 VAC: 18 VA max. (max. load) 24 VAC/DC: 11 VA/7 W max. (max. load)
Current consumption		DeviceNet power supply: 50 mA max. (24 VDC)
Input		No-voltage, voltage pulse, open collector
External power supply		12 VDC 10%, 80 mA (for models with external power supplies only)
Event inputs (See note 2.)	**Hold input**	NPN open collector or no-voltage contact signal ON residual voltage: 2 V max. ON current at 0 Ω: 4 mA max. Max. applied voltage: 30 VDC max. OFF leakage current: 0.1 mA max.
	Reset input	
	Bank input	
Output ratings (depends on the model)	**Relay output**	250 VAC, 30 VDC, 5 A (resistive load) Mechanical life expectancy: 5,000,000 operations, Electrical life expectancy: 100,000 operations
	Transistor output	Maximum load voltage: 24 VDC, Maximum load current: 50 mA, Leakage current: 100 μA max.
	Linear output	Linear output 0 to 20 mA DC, 4 to 20 mA: Load: 500 Ω max, Resolution: Approx. 10,000, Output error: ±0.5% FS Linear output 0 to 5 VDC, 1 to 5 VDC, 0 to 10 VDC: Load: 5 kΩ max, Resolution: Approx. 10,000, Output error: ±0.5% FS (1 V or less: ±0.15 V; not output for 0 V or less)
Display method		Negative LCD (backlit LED) display 7-segment digital display (Character height: PV: 14.2 mm (green/red); SV: 4.9 mm (green))
Main functions		Scaling function, measurement operation selection, output hysteresis, output OFF delay, output test, teaching, display value selection, display color selection, key protection, bank selection, display refresh period, maximum/minimum hold, reset
Ambient operating temperature		–10 to 55°C (with no icing or condensation)
Ambient operating humidity		25% to 85%
Storage temperature		–25 to 65°C (with no icing or condensation)
Altitude		2,000 m max.
Accessories		Watertight packing, 2 fixtures, terminal cover, unit stickers, instruction manual. DeviceNet models also include a DeviceNet connector (Hirose HR31-5.08P-5SC(01)) and crimp terminals (Hirose HR31-SC-121) (See note 3.)

Note: 1. DC power supply models require a control power supply capacity of approximately 1 A per Unit when power is turned ON. Particular attention is required when using two or more DC power supply models. The OMRON S8VS-series DC Power Supply Unit is recommended.

2. PNP input types are also available.

3. For K3HB-series DeviceNet models, use only the DeviceNet Connector included with the product. The crimp terminals provided are for Thin Cables.

■ Characteristics

Display range	–19,999 to 99,999
Measurement accuracy (at 23±5°C)	±0.08% rgd ±1 digit (for voltage pulse/open collector sensors)
Measurement range	Functions F1, F3, and F4: 10 ms to 3,200 s Function F2: 20 ms to 3,200 s Functions F5 and F6: 0 to 4 gigacounts
Input signals	• No-voltage contact (30 Hz max. with ON/OFF pulse width of 15 ms min.) • Voltage pulse (see table below) • Open collector (see table below)

• Voltage pulse

Mode	Input frequency range	ON/OFF pulse width	ON voltage	OFF voltage	Input impedance
F1 to F4	0 to 50 kHz	9 µs min.	4.5 to 30 V	–30 to 2 V	10 kΩ
F5, F6	0 to 30 kHz	16 µs min.			

• Open collector

Mode	Input frequency range	ON/OFF pulse width
F1 to F4	0 to 50 kHz	9 µs min.
F5, F6	0 to 30 kHz	16 µs min.

Note: The Digital Time Interval Meter will malfunction if a pulse greater than the input frequency range is input. SYSERR may appear on the display.

Connectable sensors		ON residual voltage: 3 V max. OFF leakage current: 1.5 mA max. Load current: Must have a switching capacity of 20 mA or higher. Must be able to properly switch load currents of 5 mA or less.
Comparative output response time (transistor output)		2 ms max. (time until the comparative output is made when there is a forced sudden change in the input signal from 15% to 95% or 95% to 15%)
Linear output response time		10 ms max. (time until the final analog output value is reached when there is a forced sudden change in the input signal from 15% to 95% or 95% to 15%)
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		2,300 VAC for 1 min between external terminals and case
Noise immunity		100 to 240 VAC models: ±1,500 V at power supply terminals in normal or common mode (waveform with 1-ns rising edge and pulse width of 1 µs/100 ns) 24 VAC/VDC models: ±1,500 V at power supply terminals in normal or common mode (waveform with 1-ns rising edge and pulse width of 1 µs/100 ns)
Vibration resistance		Frequency: 10 to 55 Hz; Acceleration: 50 m/s^2, 10 sweeps of 5 min each in X, Y, and Z directions
Shock resistance		150 m/s^2 (100 m/s^2 for relay outputs) 3 times each in 3 axes, 6 directions
Weight		Approx. 300 g (Base Unit only)
Degree of protection	**Front panel**	Conforms to NEMA 4X for indoor use (equivalent to IP66)
	Rear case	IP20
	Terminals	IP00 + finger protection (VDE0106/100)
Memory protection		EEPROM (non-volatile memory) Number of rewrites: 100,000
Applicable standards		UL61010C-1, CSA C22.2 No. 1010.1 (evaluated by UL) EN61010-1 (IEC61010-1): Pollution degree 2/Overvoltage category II EN61326: 1997, A1: 1998, A2: 2001
EMC		EMI: EN61326+A1 industrial applications Electromagnetic radiation interference CISPR 11 Group 1, Class A: CISPRL16-1/-2 Terminal interference voltage CISPR 11 Group 1, Class A: CISPRL16-1/-2 EMS: EN61326+A1 industrial applications Electrostatic Discharge Immunity EN61000-4-2: 4 kV (contact), 8 kV (in air) Radiated Electromagnetic Field Immunity EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz, 1.4GHz to 2 GHz) Electrical Fast Transient/Burst Immunity EN61000-4-4: 2 kV (power line), 1 kV (I/O signal line) Surge Immunity EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted Disturbance Immunity EN61000-4-6: 3 V (0.15 to 80 MHz) Power Frequency Magnetic Immunity EN61000-4-8: 30 A/m (50 Hz) continuous time Voltage Dips and Interruptions Immunity EN61000-4-11: 0.5 cycle, 0°/180°, 100% (rated voltage)

Operation

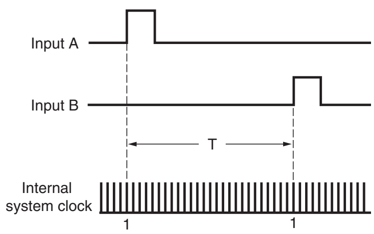
■ Functions (Operating Modes)

F1 to F6

These functions use the internal system clock to measure the time between pulses or the pulse ON time and then display time measurements or a variety of other calculations.

Function name	Function No.
Passing speed	F1
Cycle	F2
Time difference	F3
Time band	F4
Measuring length	F5
Interval	F6

Example: F1 Passing Speed

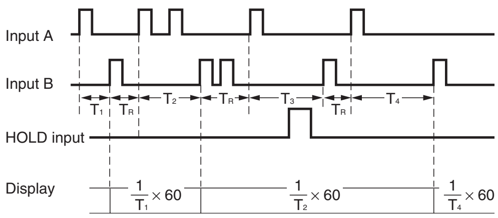


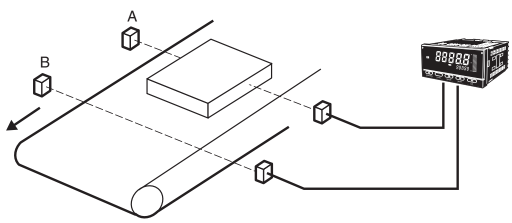
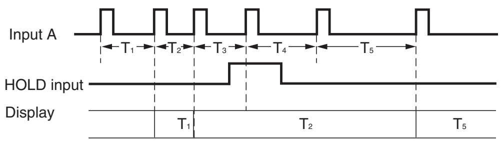
The time (T) between input A pulse and input B pulse is measured by the internal system clock. If, for example, the system clock measures 100,000 counts during time T, then

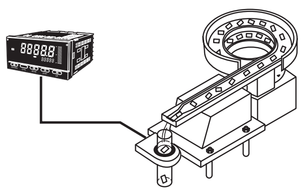
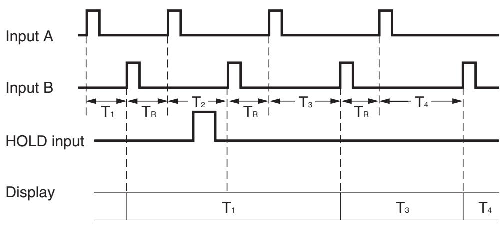
$T = 1$ system clock count (0.5 μs) $\times$ 100,000

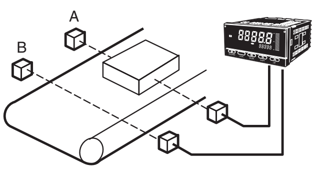
$T = 0.05$ s

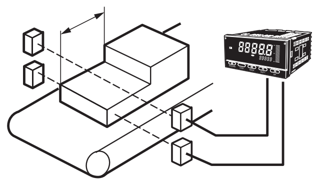
F1 (the passing speed) is calculated internally using the formula $\frac{1}{T} \times 60$ (m/min), and the display, in this example, would be $\frac{1}{0.05\,\text{s}} \times 60 =$ 1200 (m/min).

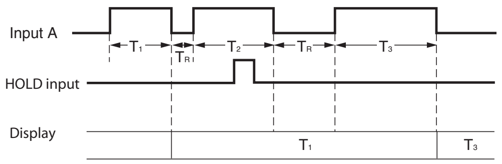
<table>
<tr><th>Function</th><th>Operation</th><th>Operation image (application)</th></tr>
<tr><td>F1
Passing speed</td><td>The reciprocal of the time (T) from input A ON to input B ON is multiplied by 60 and displayed.


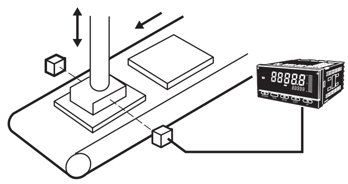
• Recovery time (T_R) of 20 ms is required before starting the next measurement.
(Display unit:
mm/s, m/s
m/min, km/h, etc.)</td><td>Measuring workpiece passing speed between A and B

</td></tr>
<tr><td>F2
Cycle</td><td>Measures and displays input A cycle (T).


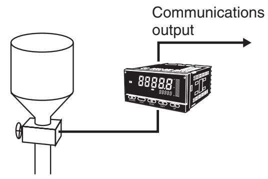
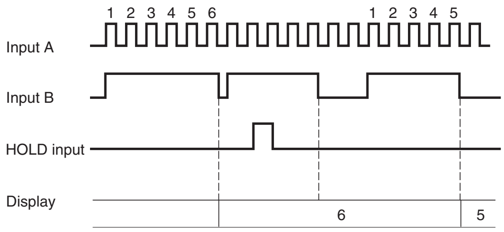
Measurement range: 20 ms to 3,200 s
(Display unit:
ms, s, min.,
min.s.1/10 s)</td><td>Measuring feed cycles for parts
</td></tr>
<tr><td>F3
Time difference</td><td>Displays the time (T) from input A ON to input B ON.


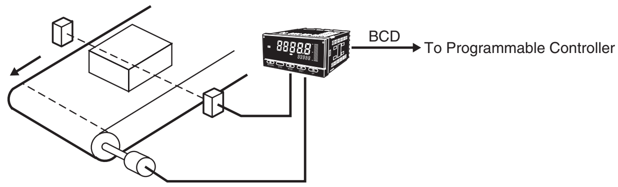
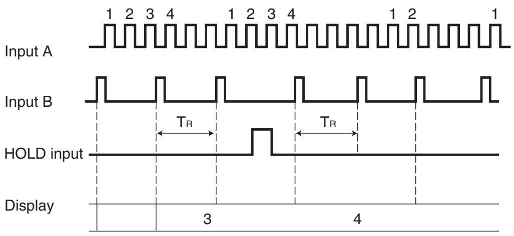
Measurement range: 10 ms to 3,200 s
• Recovery time (TR) of 20 ms is required before starting the next measurement.
(Display unit:
ms, s, min.,
min.s.1/10 s)</td><td>Measuring workpiece passing time between A and B


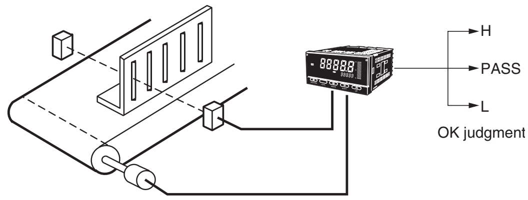
Measuring the length of a workpiece step by changing prescale values.
</td></tr>
</table>

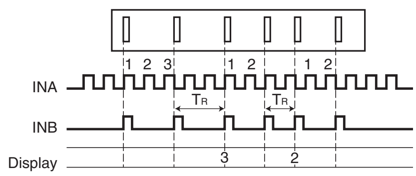
<table>
<tr><th>Function</th><th>Operation</th><th>Operation image (application)</th></tr>
<tr><td>F4
Time band</td><td>Displays input A ON time (T).


Measurement range: 10 ms to 3,200 s
• Recovery time (TR) of 20 ms is required before starting the next measurement.
(Display unit: ms, s, min., min.s.1/10 s)</td><td>Monitoring the ON time of a printing press


Managing the valve release time

</td></tr>
<tr><td>F5
Measuring length</td><td>Displays the number of input A pulses while input B is ON.


• Recovery time (TR) of 20 ms is required before starting the next measurement.
(Display unit: mm, cm, m, etc.)</td><td>Measuring workpiece length

</td></tr>
<tr><td>F6
Interval</td><td>Displays the number of input A pulses from when input B turns ON until input B turns ON again. Measurement is made every other time input B turns ON.


• Recovery time (TR) of 20 ms is required before starting the next measurement.
(Display unit: mm, cm, m, etc.)</td><td>Measuring slit intervals



</td></tr>
</table>

■ What Is Prescaling?

To make calculations using the input pulse to display the passing speed between two points, the distance between the two points and the display unit must be set and the internally measured time multiplied by a certain coefficient. This coefficient is called the prescale value. (For information on settings details, refer to the User's Manual.)

Time Unit Settings

Setting	Meaning
SCAL	Prescale value menu setting
min	Minute display
H.mm.SS	h.mm.ss display
mm.SS.d	mm.ss.d display (d = tenths of a second)

Input Type Setting

	NO: Voltage pulse high	NC: Voltage pulse low
No-contact or voltage pulse input	00	01
Contact	10	11

Note: Set to 10 or 11 when there is a large variation in the display. The largest measurement range is 30 Hz.

Up/Down Counting Pulse Indicator
K3HB-C

Measure High-speed Up/down Pulses with this Up/down Pulse Meter.

- Perfect for Measuring Rotary Encoder and ON/OFF Pulse Signals at High Speed

  Cumulative pulse input is 50 kHz, quadrature pulse inputs are 25 kHz, and up/down pulse inputs are 30 kHz.

Note: No-voltage contacts of up to 30 Hz are supported.

- The count value can be converted to any value.

  The length equivalent for any pulse can be set to any desired value.
  This is effective for feed amount and position monitor displays.

⚠ Refer to *Precautions Common to all K3HB-R/-P/-C* on CD.

NEW

Model Number Structure

■ Model Number Legend

Base Units and Optional Boards can be ordered individually or as sets.

Base Units

K3HB-C □ □
1 5

1. **Input Sensor Codes**
   NB: NPN input/voltage pulse input
   PB: PNP input
5. **Supply Voltage**
   100-240 VAC: 100 to 240 VAC
   24 VAC/VDC: 24 VAC/VDC

Optional Board

Sensor Power Supply/Output Boards

K33-□
2

Relay/Transistor Output Boards

K34-□
3

Event Input Boards

K35-□
4

Base Units with Optional Boards

K3HB-C□-□□□ □
1 2 3 4 5

2. **Sensor Power Supply/Output Type Codes**
   None: None
   CPA: Relay output (PASS: SPDT) + Sensor power supply (12 VDC±10%, 80 mA) (See note 1.)
   L1A: Linear current output (DC0(4)-20 mA) + Sensor power supply (12 VDC±10%, 80 mA) (See note 2.)
   L2A: Linear voltage output (DC0(1)-5 V, 0 to 10 V) + Sensor power supply (12 VDC±10%, 80 mA) (See note 2.)
   A: Sensor power supply (12 VDC ±10%, 80 mA)
   FLK1A: Communications (RS-232C) + Sensor power supply (12 VDC±10%, 80 mA) (See note 2.)
   FLK3A: Communications (RS-485) + Sensor power supply (12 VDC±10%, 80 mA) (See note 2.)
3. **Relay/Transistor Output Type Codes**
   None: None
   C1: Relay contact (H/L: SPDT each)
   C2: Relay contact (HH/H/LL/L: SPST-NO each)
   T1: Transistor (NPN open collector: HH/H/PASS/L/LL)
   T2: Transistor (PNP open collector: HH/H/PASS/L/LL)
   BCD: BCD output + transistor output (NPN open collector: HH/H/PASS/L/LL)
   DRT: DeviceNet (See note 2.)
4. **Event input Type Codes**
   None: None
   1: 5 points (M3 terminal blocks) NPN open collector
   2: 8 points (10-pin MIL connector) NPN open collector
   3: 5 points (M3 terminal blocks) PNP open collector
   4: 8 points (10-pin MIL connector) PNP open collector

Note: 1. CPA can be combined with relay outputs only.
2. Only one of the following can be used by each Digital Indicator:
RS-232C/RS-485 communications, a linear output, or DeviceNet communications.

Accessories (Sold Separately)

K32-DICN: Special Cable (for event inputs with 8-pin connector)
K32-BCD: Special BCD Output Cable

Specifications

■ Ratings

Supply voltage		100 to 240 VAC, 24 VAC/VDC, DeviceNet power supply: 24 VDC
Allowable power supply voltage range		85% to 110% of the rated power supply voltage, DeviceNet power supply: 11 to 25 VDC
Power consumption (See note 1.)		100 to 240 VAC: 18 VA max. (max. load) 24 VAC/DC: 11 VA/7 W max. (max. load)
Current consumption		DeviceNet power supply: 50 mA max. (24 VDC)
Input		No-voltage, voltage pulse, open collector
External power supply		12 VDC±10% 80 mA
Event inputs	**Hold input** **Reset input** **Bank input**	NPN open collector or no-voltage contact signal ON residual voltage: 2 V max. ON current at 0 Ω: 4 mA max. Max. applied voltage: 30 VDC max. OFF leakage current: 0.1 mA max.
Output ratings (depends on the model)	**Relay output**	250 VAC, 30 VDC, 5 A (resistive load) Mechanical life expectancy: 5,000,000 operations, Electrical life expectancy: 100,000 operations
	Transistor output	Maximum load voltage: 24 VDC, Maximum load current: 50 mA, Leakage current: 100 μA max.
	Linear output	Linear output 0 to 20 mA DC, 4 to 20 mA: Load: 500 Ω max, Resolution: Approx. 10,000, Output error: ±0.5% FS Linear output 0 to 5 VDC, 1 to 5 VDC, 0 to 10 VDC: Load: 5 kΩ max, Resolution: Approx. 10,000, Output error: ±0.5% FS (1 V or less: ±0.15 V; not output for 0 V or less)
Display method		Negative LCD (backlit LED) display 7-segment digital display (Character height: PV: 14.2 mm (green/red); SV: 4.9 mm (green))
Main functions		Scaling function, measurement operation selection, output hysteresis, output OFF delay, output test, display value selection, display color selection, key protection, bank selection, display refresh period, maximum/minimum hold, reset
Ambient operating temperature		–10 to 55°C (with no icing or condensation)
Ambient operating humidity		25% to 85%
Storage temperature		–25 to 65°C (with no icing or condensation)
Altitude		2,000 m max.
Accessories		Watertight packing, 2 fixtures, terminal cover, unit stickers, instruction manual. DeviceNet models also include a DeviceNet connector (Hirose HR31-5.08P-5SC(01)) and crimp terminals (Hirose HR31-SC-121) (See note 3.)

Note: 1. DC power supply models require a control power supply capacity of approximately 1 A per Unit when power is turned ON. Particular attention is required when using two or more DC power supply models. The OMRON S8VS-series DC Power Supply Unit is recommended.

2. For K3HB-series DeviceNet models, use only the DeviceNet Connector included with the product. The crimp terminals provided are for Thin Cables.

■ Characteristics

<table>
<tr><td colspan="2">Display range</td><td>–19,999 to 99,999</td></tr>
<tr><td colspan="2">Measurement range</td><td>Functions F1, F2: ±2 gigacounts
Functions F3 : 0 to 4 gigacounts</td></tr>
<tr><td colspan="2">Input signals</td><td>• No-voltage contact (30 Hz max. with ON/OFF pulse width of 15 ms min.)
• Voltage pulse
<table>
<tr><th>Mode</th><th>Input frequency range</th><th>ON/OFF pulse width</th><th>ON voltage</th><th>OFF voltage</th><th>Input impedance</th></tr>
<tr><td>F1</td><td>0 to 30 kHz</td><td>16 μs min.</td><td rowspan="3">4.5 to 30 V</td><td rowspan="3">–30 to 2 V</td><td rowspan="3">10 kΩ</td></tr>
<tr><td>F2</td><td>0 to 25 kHz</td><td>20 μs min.</td></tr>
<tr><td>F3</td><td>0 to 50 kHz</td><td>9 μs min.</td></tr>
</table>
• Open collector
<table>
<tr><th>Mode</th><th>Input frequency range</th><th>ON/OFF pulse width</th></tr>
<tr><td>F1</td><td>0 to 30 kHz</td><td>16 μs min.</td></tr>
<tr><td>F2</td><td>0 to 25 kHz</td><td>20 μs min.</td></tr>
<tr><td>F3</td><td>0 to 50 kHz</td><td>9 μs min.</td></tr>
</table>
Note: The Up/Down Counting Pulse Meter will malfunction if a pulse greater than the input frequency range is input. SYSERR may appear on the display.</td></tr>
<tr><td colspan="2">Connectable sensors</td><td>ON residual voltage: 3 V max.
OFF leakage current: 1.5 mA max.
Load current: Must have a switching capacity of 20 mA or higher.
Must be able to properly switch load currents of 5 mA or less.</td></tr>
<tr><td colspan="2">Max. No. of display digits</td><td>5 (–19999 to 99999)</td></tr>
<tr><td colspan="2">Comparative output response time</td><td>1 ms max.: Transistor output; 10 ms max.: Relay contact output
(time until the comparative output is made when there is a forced sudden change in the input signal from 15% to 95% or 95% to 15%)</td></tr>
<tr><td colspan="2">Linear output response time</td><td>10 ms max. (time until the final analog output value is reached when there is a forced sudden change in the input signal from 15% to 95% or 95% to 15%)</td></tr>
<tr><td colspan="2">Insulation resistance</td><td>20 MΩ min. (at 500 VDC)</td></tr>
<tr><td colspan="2">Dielectric strength</td><td>2,300 VAC for 1 min between external terminals and case</td></tr>
<tr><td colspan="2">Noise immunity</td><td>100 to 240 VAC models:
±1,500 V at power supply terminals in normal or common mode
(waveform with 1-ns rising edge and pulse width of 1 μs/100 ns)
24 VAC/VDC models:
±1,500 V at power supply terminals in normal or common mode
(waveform with 1-ns rising edge and pulse width of 1 μs/100 ns)</td></tr>
<tr><td colspan="2">Vibration resistance</td><td>Frequency: 10 to 55 Hz; Acceleration: 50 m/s², 10 sweeps of 5 min each in X, Y, and Z directions</td></tr>
<tr><td colspan="2">Shock resistance</td><td>150 m/s² (100 m/s² for relay outputs) 3 times each in 3 axes, 6 directions</td></tr>
<tr><td colspan="2">Weight</td><td>Approx. 300 g (Base Unit only)</td></tr>
<tr><td rowspan="3">Degree of protection</td><td>Front panel</td><td>Conforms to NEMA 4X for indoor use (equivalent to IP66)</td></tr>
<tr><td>Rear case</td><td>IP20</td></tr>
<tr><td>Terminals</td><td>IP00 + finger protection (VDE0106/100)</td></tr>
<tr><td colspan="2">Memory protection</td><td>EEPROM (non-volatile memory)
Number of rewrites: 100,000</td></tr>
<tr><td colspan="2">Applicable standards</td><td>UL61010C-1, CSA C22.2 No. 1010.1 (evaluated by UL)
EN61010-1 (IEC61010-1): Pollution degree 2/Overvoltage category II
EN61326: 1997, A1: 1998, A2: 2001</td></tr>
<tr><td colspan="2">EMC</td><td>EMI: EN61326+A1 industrial applications
Electromagnetic radiation interference
CISPR 11 Group 1, Class A: CISPRL16-1/-2
Terminal interference voltage
CISPR 11 Group 1, Class A: CISPRL16-1/-2
EMS: EN61326+A1 industrial applications
Electrostatic Discharge Immunity
EN61000-4-2: 4 kV (contact), 8 kV (in air)
Radiated Electromagnetic Field Immunity
EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz, 1.4 to 2 GHz)
Electrical Fast Transient/Burst Immunity
EN61000-4-4: 2 kV (power line), 1 kV (I/O signal line)
Surge Immunity
EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line)
Conducted Disturbance Immunity
EN61000-4-6: 3 V (0.15 to 80 MHz)
Power Frequency Magnetic Immunity
EN61000-4-8: 30 A/m (50 Hz) continuous time
Voltage Dips and Interruptions Immunity
EN61000-4-11: 0.5 cycle, 0°/180°, 100% (rated voltage)</td></tr>
</table>

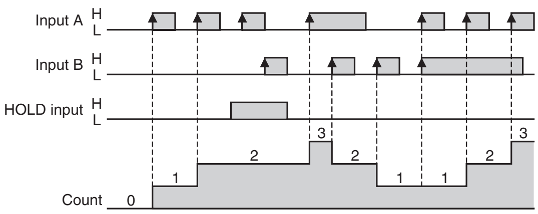
Operation

■ Functions (Operating Modes)

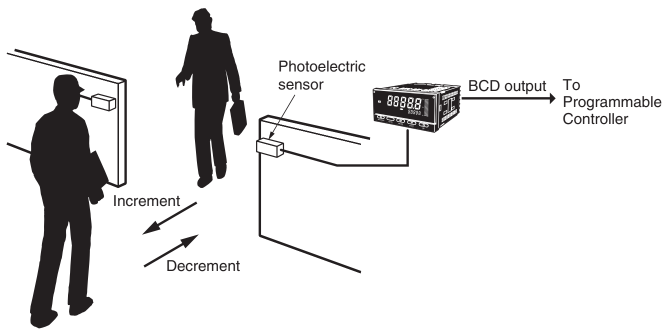
F1 to F3

Function name	Function No.
Individual inputs	F 1
Phase differential inputs	F2
Pulse counting input	F3

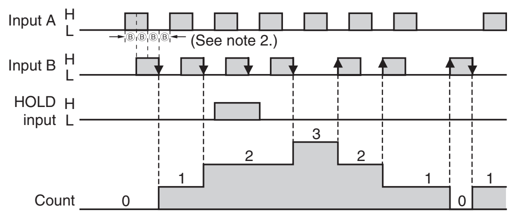
<table>
<tr><th>Function</th><th>Operation</th><th>Operation image (application)</th></tr>
<tr><td>F1
Individual inputs</td><td>Counts input A as incremental pulses and input B as decremental pulses. The count is incremented on the rising edge of input A and decremented on the rising edge of input B. If both inputs rise at the same time, the count is not changed. The count is incremented when input B is later than input A and decremented when input B is earlier than input A.



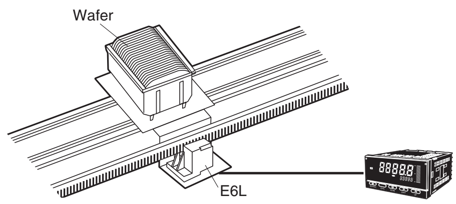
</td><td>Counting the number of people entering an area



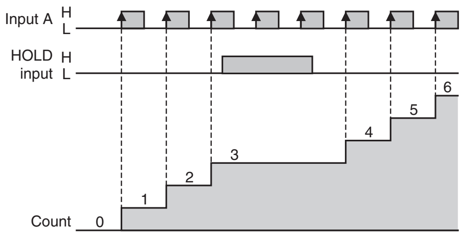
</td></tr>
<tr><td>F2
Phase differential inputs</td><td>This function is normally used when connected to an incremental rotary encoder. The count is incremented on the falling edge of input B when input A is OFF. The count is decremented on the rising edge of input B when input A is OFF.



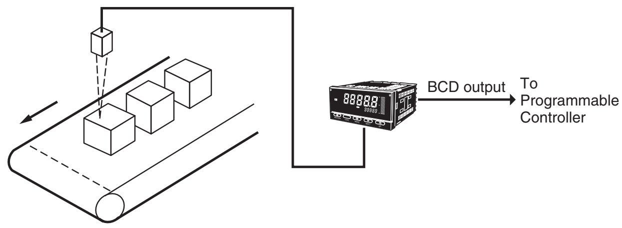
</td><td>Detecting position and speed on a semiconductor wafer conveyor line



</td></tr>
<tr><td>F3
Pulse counting input</td><td>Counted on the rising edge of input A



</td><td>Counting the number of workpieces



</td></tr>
</table>

Note: 1. Meaning of H and L in Display

Symbol Input method	No-voltage input
H	Short-circuit
L	Open

2. Requires at least half the minimum signal width. If there is less than half, a ±1 count error may occur.

Input Type Setting

	NO: Voltage pulse high	NC: Voltage pulse low
No-contact or voltage pulse input	00	01
Contact	10	11

What Is Prescaling?

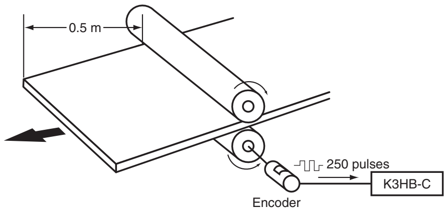
Prescaling converts the count value to any numeric value.

To display □□□□.□ mm in a system that outputs 250 pulses for a 0.5-m feed,

the length per pulse = 500 mm (0.5 m) ÷ 250 = 2.

1. The prescale value for the K3HB-C is set using the mantissa X × exponent Y,
so the prescale value = 2.0000 × 10°,
X = 2.000, and Y = 00.

2. Next, set the decimal point position for one digit to the right of the decimal point: □□□□.□



Digital panel indicators

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

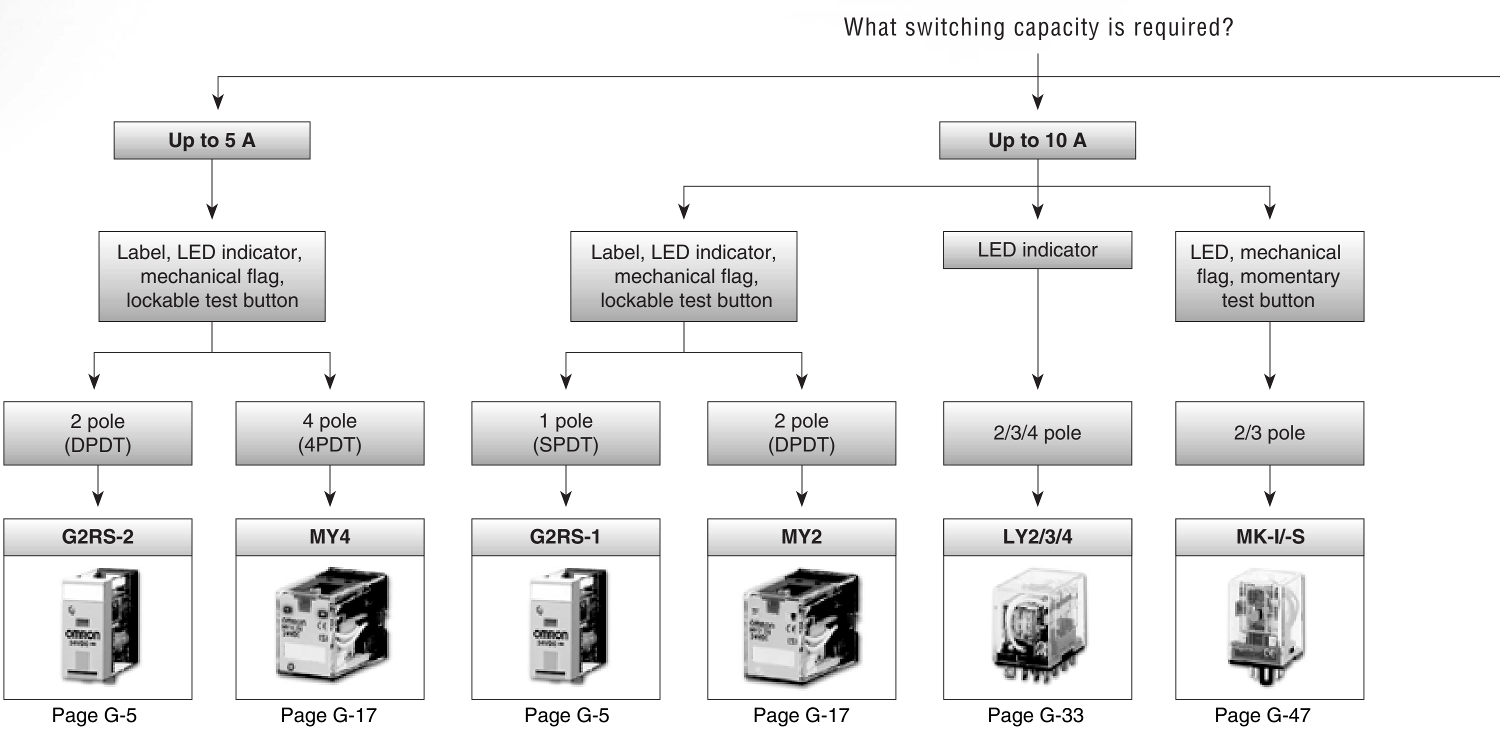
Cat. No. N135-E2-02

Electromechanical relays

The general-purpose relay outperforming all others!

The MYS gives you peace of mind

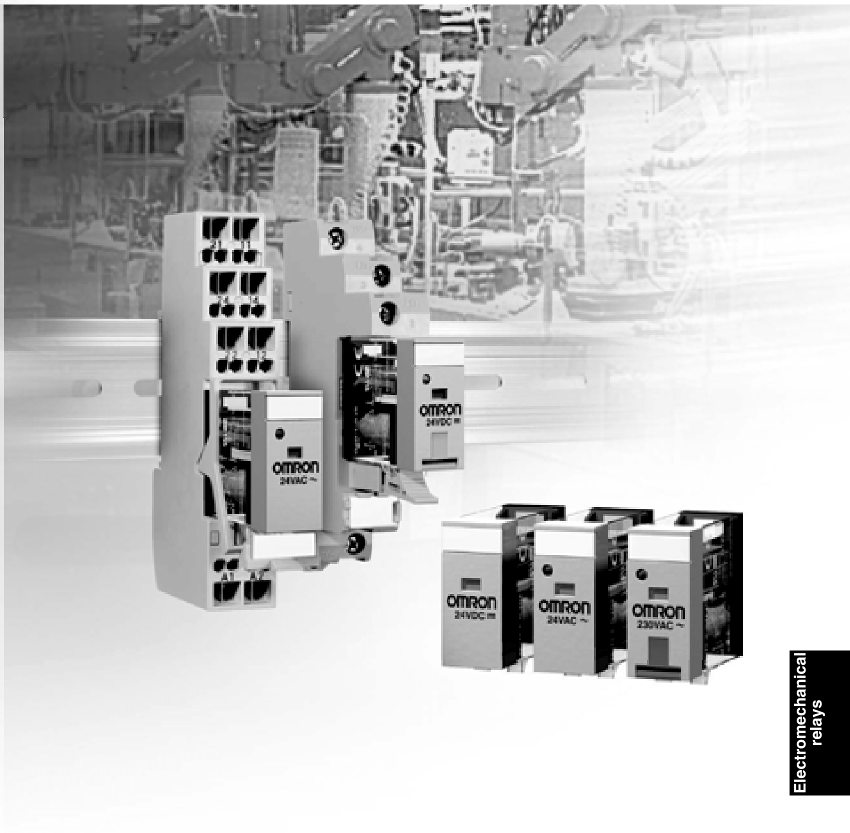
The MYS general-purpose relay series sets the standard in terms of performance and reliability. With features such as LED indicators and colour-coded two-way action test buttons, these truly versatile relays bring enhanced flexibility for more user-friendly installation, commissioning and operation. They meet all relevant international standards, including UL, CSA, VDE, LR and CE. And they are available with screw terminal or Screw-Less Clamp (SLC) terminal sockets for maximum installation flexibility. No wonder they're first choice among relay users!

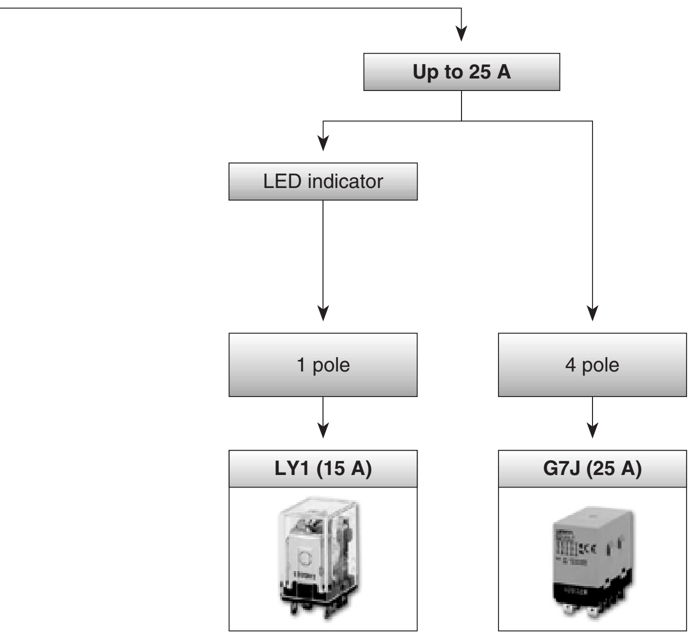


Ever get excited about relays?

Let G2RS turn you on!

Since pioneering the widespread use of slim-line interface relays over a decade ago Omron has consistently set new standards in relay design, and G2RS relays are no exception. They offer unrivalled reliability, performance and product choice, which makes them the preferred choice for relay users. They meet all relevant international standards, including UL, CSA, VDE, LR and CE. And plug-in relay users have the choice of screw terminal or Screw-Less Clamp (SLC) terminal sockets for maximum installation flexibility. The G2RS series make relays exciting again!





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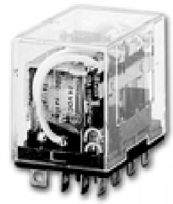
Selection table





	Type	General purpose relays											
Selection criteria	Family	G2RS				MY			LY				
	Label	With label							Without label				
	Flag	Mechanical flag							No mechanical flag				
	1 pole	■							■				
	2 pole				■	■				■	■		
	3 pole											■	
	4 pole						■	■					■
	Contacts	SPDT	SPST-NO bifurcated	SPDT bifurcated	DPDT	DPDT	4PDT	4PDT bifurcated	SPDT	DPDT	DPDT bifurcated	3PDT	4PDT
Features	LED indicator	□	□	□	□	□	□	□	□	□	□	□	□
	Momentary test button	□			□	□	□	□					
	Lockable test button	□			□	□	□	□					
	Min. load	100 mA	1 mA	1 mA	10 mA	1 mA	1 mA	0.1 mA	100 mA	100 mA	10 mA	100 mA	100 mA
	Max. current	10 A	1 A	1 A	5 A	10 A	5 A	5 A	15 A	10 A	7 A	10 A	10 A
	SLC socket	■	■	■	■	■	■	■					
	Sealed type						□	□					
	Plug-in / solder terminals	■	■	■	■	■	■	■	□	□	□	□	□
	PCB terminals					■	■	■	□	□	□	□	□
	Quick connect terminals												
	Diode	□	□	□	□	□	□	□	□	□	□	□	□
	Varistor					□	□	□	□	□	□		
AC voltage	6 V					■	■	■	■	■	■	■	■
	12 V					■	■	■	■	■	■	■	■
	24 V	■	■	■	■	■	■	■	■	■	■	■	■
	48 / 50 V					■	■	■	■	■	■	■	■
	110 / 120 V	■	■	■	■	■	■	■	■	■	■	■	■
	220 / 240 V	■	■	■	■	■	■	■	■	■	■	■	■
DC voltage	6 V	■	■	■	■	■	■	■	■	■	■	■	■
	12 V	■	■	■	■	■	■	■	■	■	■	■	■
	24 V	■	■	■	■	■	■	■	■	■	■	■	■
	48 / 50 V	■	■	■	■	■	■	■	■	■	■	■	■
	110 / 120 V					■	■	■	■	■	■	■	■
	Page	G-5				G-17			G-33				

General purpose relays										Special purpose relays		
												
MK-I		MK-S		G7J				G7L		MYK	MY4H	G4Q
Without label												
Mechanical flag				No mechanical flag						Mechanical flag	No mechanical flag	
				■				■				
■		■			■				■	■		■
	■		■			■						
							■				■	
DPDT	3PDT	DPDT	3PDT	SPST-NC	DPST-NO / NC	3PDT-NO	4PST-NO	SPST-NO	DPST-NO	DPDT	4PDT bifurcated	DPDT
□	□	□	□									
		■	■					□	□			
10 mA	10 mA	10 mA	10 mA	100 mA 10 mA	100 mA	100 mA 10 mA	100 mA 10 mA	100 mA	100 mA	1 mA	0.1 mA	100 mA
10 A	10 A	10 A	10 A	8 A	25 A	25 A	25 A	30 - 25 - 20 A		3 A	3 A	5 A
											■	
■	■	■	■	■	■	■	■	■	■	■	■	■
				■	■	■	■	■	■	■		
				■	■	■	■	■	■	■		
□	□	□	□									
□	□	□	□									
■	■	■	■							■		■
■	■	■	■					■	■	■		■
■	■	■	■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■	■		■
■	■	■	■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■	■		■
■	■	■	■					■	■	■		■
■	■	■	■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■	■		■
■	■	■	■	■	■	■	■	■	■	■		■
G-47				G-59				CD		CD	CD	CD

■ Standard □ Available ☐ No / not available

LEADING IN SERVICE

Focussed, progressive, distinctive. Be assured, choose Omron

At Omron we set high standards for ourselves. Our products are known all over the world for their unrivalled quality. But we offer more than just excellent quality. In an environment that places ever greater demands with regard to service, quality and costeffectiveness, other things are important too. Providing a top-quality service is what we do every day, including extra service as standard. This helps to ensure that we can provide tailor-made solutions for applications more effectively and more quickly.

More and more companies are choosing Omron as they seek to work in a partnership that is based on reliability and certainty.

Omron – the reassuring choice.

International standards and approvals

Our products carry all relevant international standards and approvals, including CCC (Chinese Compulsory Certification), which makes exporting your system much easier.

- Reliability, also for your customers
- Maximum flexibility
- Confidence

5-day repair service

More and more people are choosing Omron, as a high degree of reliability is a key feature of its products. You can always rely on Omron. Even if a product unexpectedly malfunctions, our repair team is ready to swing into action.

- Product repaired and returned to you within 5 days, including collection and delivery
- You can track the status of your repair on-line
- Repairs within warranty are completely free-of-charge

For more information please visit the Service & Support section at http://omron-industrial.com

EPLAN for Omron products

The majority of standard Omron products are provided in digital EPLAN format, which means that a few clicks of your mouse are all that is needed to design the right product into your switching panel.

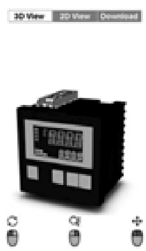
For more information please visit: http://omron-industrial.com/en/eplan/

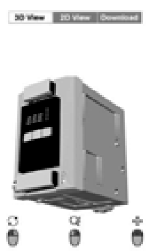
- Very easy to use
- Always the right product
- Reduced engineering time

Downloadable 2-D and 3-D CAD drawings

Designers of switching panels and machines can download clear 2-D and 3-D CAD drawings for all current products from http://omron-industrial.com/en/2D3D, which can easily be incorporated into your design.

- Large number of formats supported for greater flexibility
- Readily available
- Convenience that saves you time



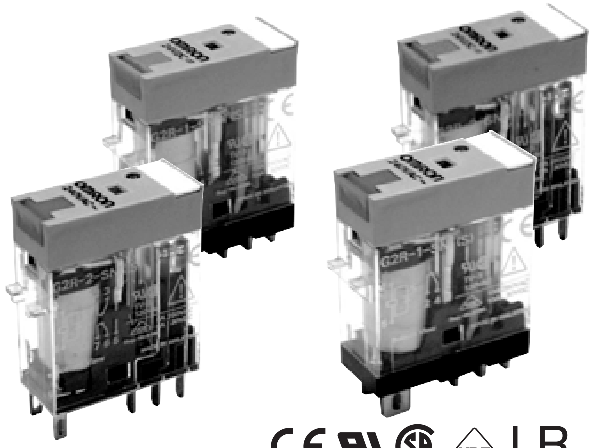


General-purpose Relay

G2RS

Slim and Space-saving Power Plug-in Relay

- Lockable test button models now available.
- Built-in mechanical operation indicator.
- Provided with nameplate.
- AC type is equipped with a coil-disconnection self-diagnostic function (LED type).
- High switching power (1-pole: 10 A).
- Environment-friendly (Cd, Pb free).
- Wide range of Sockets also available.



Model Number Structure

■ Model Number Legend

G2R □ -□ □ □ - □ □ -□
1 2 3 4 5 6 7

1. **Relay Function**
   Blank: General-purpose
2. **Number of Poles**
   1: 1 pole
   2: 2 poles
3. **Contact Form**
   Blank: SPDT
4. **Contact Type**
   Blank: Single
5. **Terminals**
   S: Plug-in
6. **Classification**
   Blank: General-purpose
   N: LED indicator
   D: Diode
   ND: LED indicator and diode
   NI: LED indicator with test button
   NDI: LED indicator and diode with test button
7. **Rated Coil Voltage**

Ordering Information

■ List of Models

Classification		Enclosure rating	Coil ratings	Contact form	
				SPDT	DPDT
Plug-in terminal	General-purpose	Unsealed	AC/DC	G2R-1-S	G2R-2-S
	LED indicator			G2R-1-SN	G2R-2-SN
	LED indicator with test button			G2R-1-SNI	G2R-2-SNI
	Diode		DC	G2R-1-SD	G2R-2-SD
	LED indicator and diode			G2R-1-SND	G2R-2-SND
	LED indicator and diode with test button			G2R-1-SNDI	G2R-2-SNDI

Note: When ordering, add the rated coil voltage and "(S)" to the model number. Rated coil voltages are given in the coil ratings table.
Example: G2R-1-S 12 VDC (S)——— New model
Rated coil voltage

Accessories (Order Separately)

Connecting Sockets

Applicable Relay model	DIN-rail/surface-mounting Socket		Back-mounting Socket	
	Screwless clamp terminal	Screw terminal	Terminals	Model
1 pole G2R-1-S(N)(D)(ND)(NI)(NDI)	• P2RF-05S (See note.) + (P2CM-S (option))	• P2RF-05-E • P2RF-05	PCB terminals	P2R-05P, P2R-057P
			Solder terminals	P2R-05A
2 poles G2R-2-S(N)(D)(ND)(NI)(NDI)	• P2RF-08S (See note.) + (P2CM-S (option))	• P2RF-08-E • P2RF-08	PCB terminals	P2R-08P, P2R-087P
			Solder terminals	P2R-08A

Note: Use of the P2CM Clip & Release Lever is recommended to ensure stable mounting.

Accessories for Screwless Clamp Terminal Socket (Option)

Name	Model
Clip & Release Lever	P2CM-S
Nameplate	R99-11 Nameplate for MY
Socket Bridge	P2RM-SR (for AC), P2RM-SB (for DC)

Mounting DIN-rails

Applicable Socket	Description	Model
DIN-rail-connecting Socket	Mounting DIN-rail	50 cm (ℓ) x 7.3 mm (t): PFP-50N 1 m (ℓ) x 7.3 mm (t): PFP-100N 1 m (ℓ) x 16 mm (t): PFP-100N2
	End plate	PFP-M
	Spacer	PFP-S
Back-connecting Socket	Mounting plate	P2R-P*

*Used to mount several P2R-05A and P2R-08A Connecting Sockets side by side.

Specifications

Coil Ratings

Rated voltage		Rated current*		Coil resistance*	Coil inductance (H) (ref. value)		Must operate voltage	Must release voltage	Max. voltage	Power consumption (approx.)
		50 Hz	60 Hz		Armature OFF	Armature ON	% of rated voltage			
AC	24 V	43.5 mA	37.4 mA	253 Ω	0.81	1.55	80% max.	30% max.	110%	0.9 VA at 60 Hz
	110 V	9.5 mA	8.2 mA	5,566 Ω	13.33	26.83				
	120 V	8.6 mA	7.5 mA	7,286 Ω	16.13	32.46				
	230 V	4.4 mA	3.8 mA	27,172 Ω	72.68	143.90				
	240 V	3.7 mA	3.2 mA	30,360 Ω	90.58	182.34				

Rated voltage		Rated current*	Coil resistance*	Coil inductance (H) (ref. value)		Must operate voltage	Must release voltage	Max. voltage	Power consumption (approx.)
				Armature OFF	Armature ON	% of rated voltage			
DC	6 V	87.0 mA	69 Ω	0.25	0.48	70% max.	15% min.	110%	0.53 W
	12 V	43.2 mA	278 Ω	0.98	2.35				
	24 V	21.6 mA	1,113 Ω	3.60	8.25				
	48 V	11.4 mA	4,220 Ω	15.2	29.82				

***** The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of ±10%.

■ Contact Ratings

Number of poles	1 pole		2 poles	
Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)
Rated load	10 A at 250 VAC; 10 A at 30 VDC	7.5 A at 250 VAC; 5 A at 30 VDC	5 A at 250 VAC; 5 A at 30 VDC	2 A at 250 VAC; 3 A at 30 VDC
Rated carry current	10 A		5 A	
Max. switching voltage	440 VAC, 125 VDC		380 VAC, 125 VDC	
Max. switching current	10 A		5 A	
Max. switching power	2,500 VA, 300 W	1,875 VA, 150 W	1,250 VA, 150 W	500 VA, 90 W
Failure rate (reference value)	100 mA at 5 VDC		10 mA at 5 VDC	

Note: P level: λ_{60} = 0.1 x 10^{-6}/operation

■ Characteristics

Item	1 pole	2 poles
Contact resistance	100 mΩ max.	
Operate (set) time	15 ms max.	
Release (reset) time	AC: 10 ms max.; DC: 5 ms max. (w/built-in diode: 20 ms max.)	AC: 15 ms max.; DC: 10 ms max. (w/built-in diode: 20 ms max.)
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)	
Insulation resistance	1,000 MΩ min. (at 500 VDC)	
Dielectric strength	5,000 VAC, 50/60 Hz for 1 min between coil and contacts*; 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity	5,000 VAC, 50/60 Hz for 1 min between coil and contacts*; 3,000 VAC, 50/60 Hz for 1 min between contacts of different polarity 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)	
Shock resistance	Destruction: 1,000 m/s² Malfunction: 200 m/s² when energized; 100 m/s² when not energized	
Endurance	Mechanical: AC coil: 10,000,000 operations min.; DC coil: 20,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr under rated load) (DC coil type)	
Ambient temperature	Operating: –40°C to 70°C (with no icing or condensation)	
Ambient humidity	Operating: 5% to 85%	
Weight	Approx. 21 g	

Note: Values in the above table are the initial values.
*4,000 VAC, 50/60 Hz for 1 minute when the P2R-05A or P2R-08A Socket is mounted.

■ Approved Standards

UL 508 (File No. E41643)

Model	Contact form	Coil ratings	Contact ratings	Operations
G2R-1-S	SPDT	5 to 110 VDC 5 to 240 VAC	10 A, 30 VDC (resistive) 10 A, 250 VAC (general use) TV-3 (NO contact only)	6 x 10^3
G2R-2-S	DPDT		5 A, 30 VDC (resistive) 5 A, 250 VAC (general use) TV-3 (NO contact only)	6 x 10^3

IEC/VDE (EN61810)

Contact form	Coil ratings	Contact ratings	Operations
1 pole	6, 12, 24, 48 VDC 24, 110, 120, 230, 240 VAC	5 A, 440 VAC (cosϕ = 1.0) 10 A, 250 VAC (cosϕ = 1.0) 10 A, 30 VDC (0 ms)	100 x 10^3
2 poles	6, 12, 24, 48 VDC 24, 110, 120, 230, 240 VAC	5 A, 250 VAC (cosϕ =1.0) 5 A, 30 VDC (0 ms)	100 x 10^3

CSA 22.2 No.0, No.14 (File No. LR31928)

Model	Contact form	Coil ratings	Contact ratings	Operations
G2R-1-S	SPDT	5 to 110 VDC 5 to 240 VAC	10 A, 30 VDC (resistive) 10 A, 250 VAC (general use) TV-3 (NO contact only)	6 x 10^3
G2R-2-S	DPDT		5 A, 30 VDC (resistive) 5 A, 250 VAC (general use) TV-3 (NO contact only)	6 x 10^3

LR

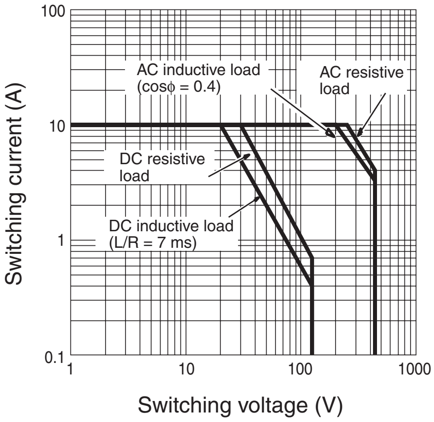
Number of poles	Coil ratings	Contact ratings	Operations
1 pole	5 to 110 VDC 5 to 240 VDC	10 A, 250 VAC (general use) 7.5 A, 250 VAC (PF0.4) 10 A, 30 VDC (resistive) 5A, 30VDC (L/R=7ms)	100 x 10^3
2 poles	5 to 110 VDC 5 to 240 VDC	5 A, 250 VAC (general use) 2 A, 250 VAC (PF0.4) 5 A, 30 VDC (resistive) 3A, 30VDC (L/R=7ms)	100 x 10^3

Engineering Data

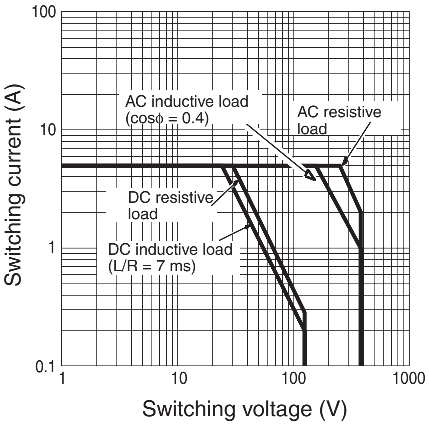
Maximum Switching Power

Plug-in Relays

G2R-1-S



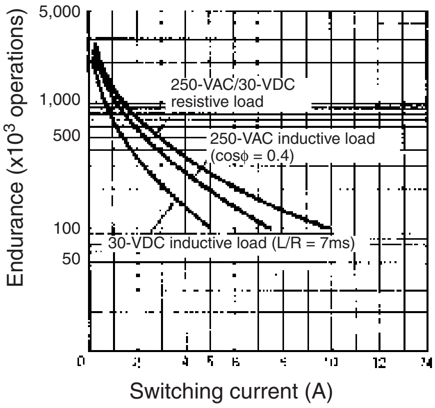
G2R-2-S



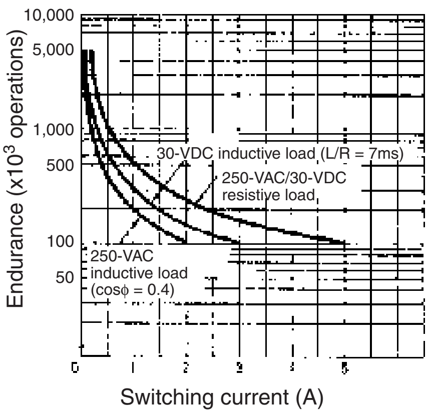
Endurance

Plug-in Relays

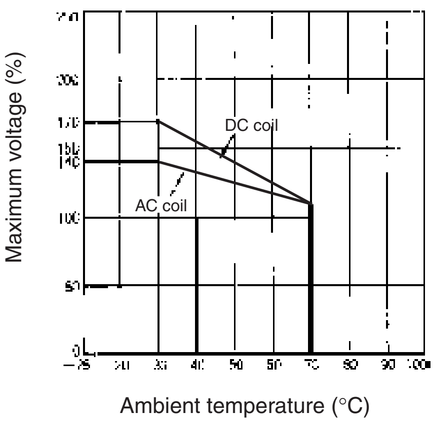
G2R-1-S



G2R-2-S



Ambient Temperature vs Maximum Coil Voltage

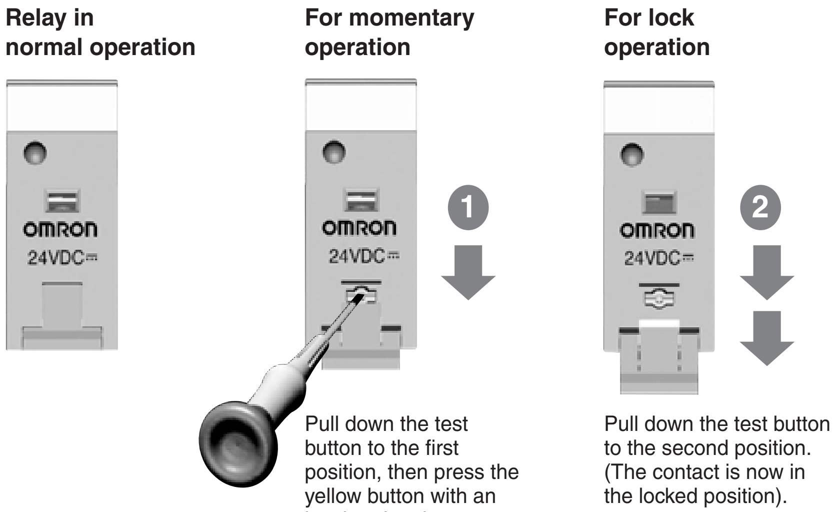


Note: The maximum voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Technical and Environmental Properties

Properties	1-Pole and 2 Pole Model	
DIN-railing Resistance	Base 250	
Environmental Protection	RT 1	
Flammability Class	Base, Insulator, Spool Case, Indicator, Pushbutton	UL 94V-0 UL 94V-2
Pollution degree	2	
Creepage Distance	8 mm	
Clearance Distance	8 mm	
Contact Material	AgSnIn	

Two-way action test button



Pull down the test button to the first position, then press the yellow button with an insulated tool to operate the contact.

Pull down the test button to the second position. (The contact is now in the locked position).

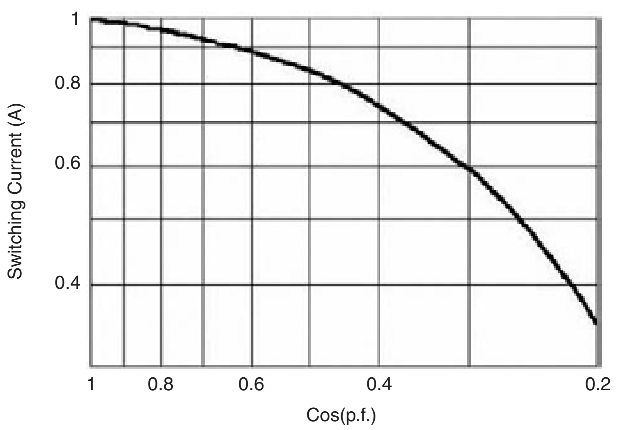
Typical information for reference only

The following data is provided as experimental and/or calculated data for reference only. These fall under the category of typical behaviour and the operation of individual relays will vary according to the exact operating conditions

Typical Operate / Release times	1 pole model	2 pole model
AC Type (operate / release time)	6 / 8 ms	6 / 10 ms
DC Type (operate / release time)	12 / 4 ms	11 / 15 ms

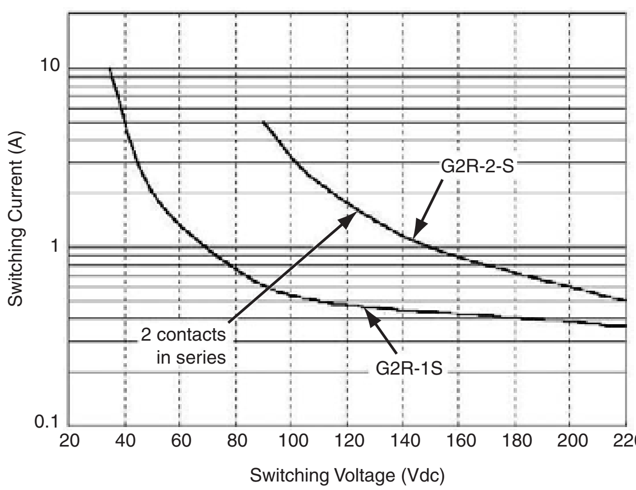
Multiple Contact DC Switching Capacity

Load Reduction Factor



For AC inductive loads (such as solenoids, contactor coils, etc.) the reduction factor corresponding to cos(p.f.) (cosine of power factor) is multiplied by the rated current in order to identify the maximum allowable current. This approximation is not valid for loads with high inrush currents such as electric motors or fluorescent lamps.

Switching capacity of DC resistive load



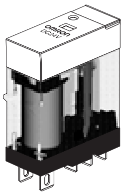
Dimensions

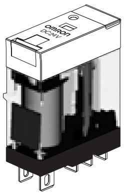
Note: All units are in millimeters unless otherwise indicated.

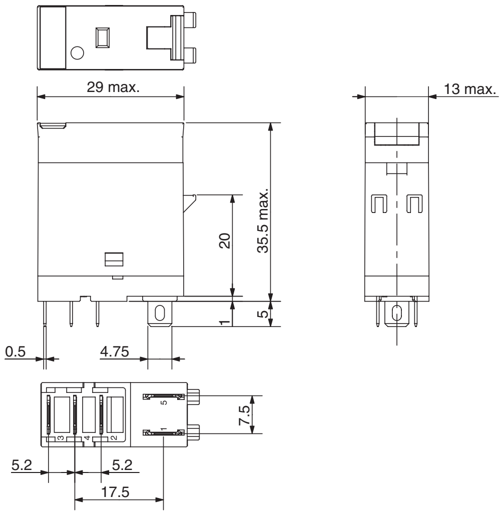
Relays with Plug-in Terminals

SPDT Relays

G2R-1-S, G2R-1-SN, G2R-1-SNI
G2R-1-SD, G2R-1-SND, G2R-1-SNDI

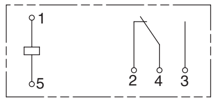




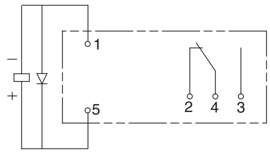


Terminal Arrangement/Internal Connections (Bottom View)

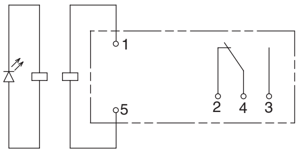
G2R-1-S



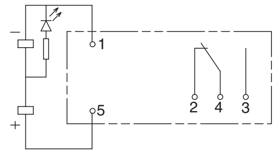
G2R-1-SD (DC)



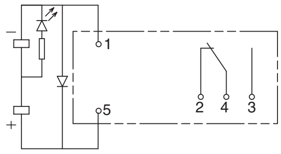
G2R-1-SN, G2R-1-SNI (AC)



G2R-1-SN, G2R-1-SNI (DC)

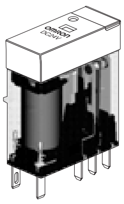


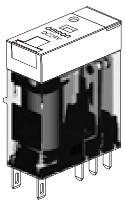
G2R-1-SND, G2R-1-SNDI (DC)

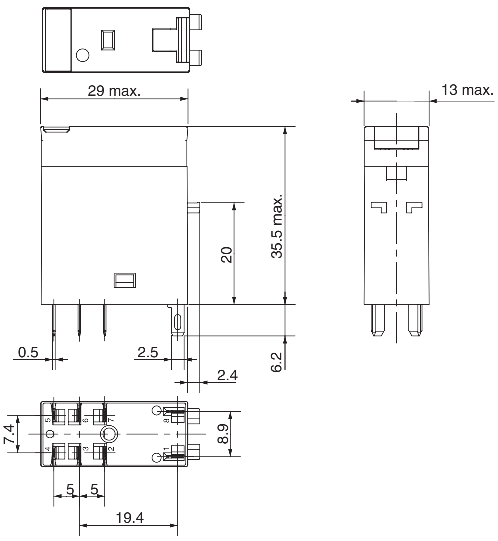


DPDT Relays

G2R-2-S, G2R-2-SN, G2R-2-SNI
G2R-2-SD, G2R-2-SND, G2R-2-SNDI

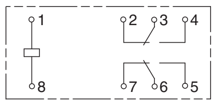




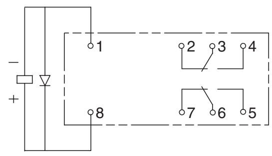


Terminal Arrangement/Internal Connections (Bottom View)

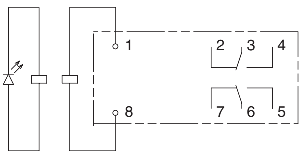
G2R-2-S



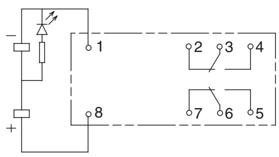
G2R-2-SD (DC)



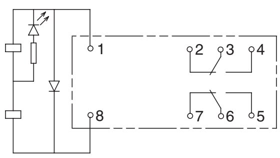
G2R-2-SN, G2R-2-SNI (AC)



G2R-2-SN, G2R-2-SNI (DC)

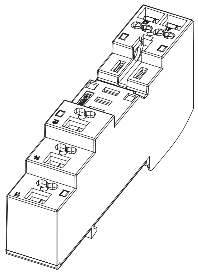


G2R-2-SND, G2R-2-SNDI (DC)

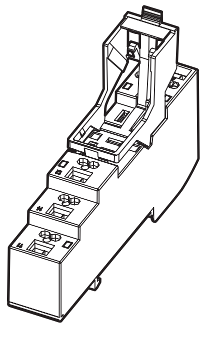


DIN-rail/Surface Mounting Sockets

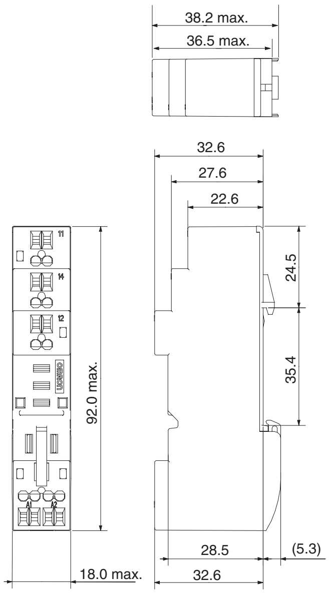
P2RF-05-S



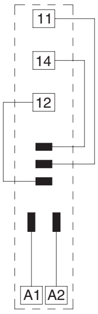
Standard model



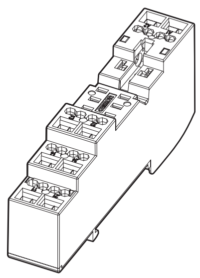
Option (with ejector and label attached)



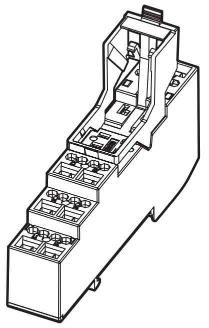
Terminal Arrangement (Top View)



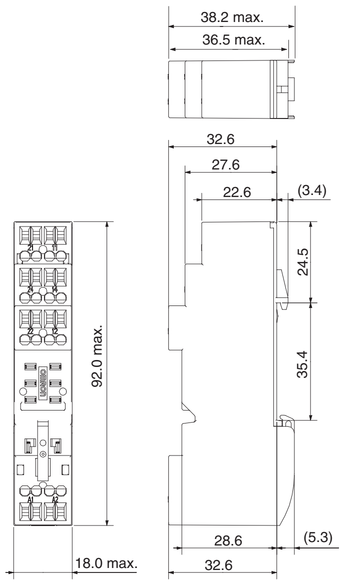
P2RF-08-S



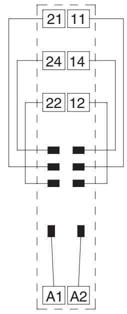
Standard model



Option (with ejector and label attached)

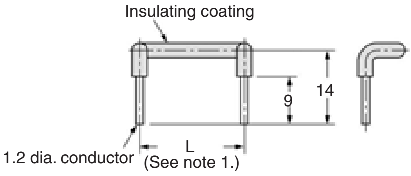


Terminal Arrangement (Top View)

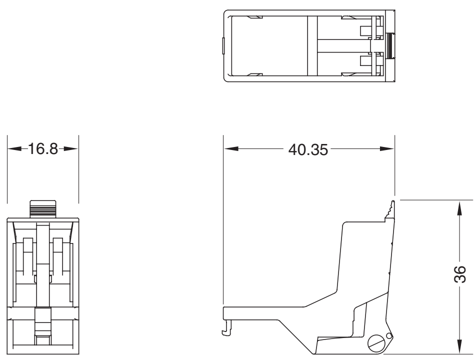


Accessories for P2RF-□-S

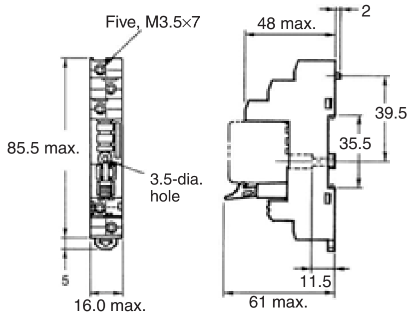
Socket Bridge



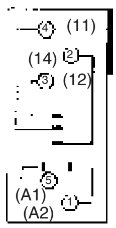
Clip and Release Lever



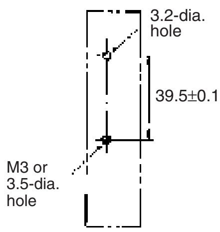
P2RF-05-E



Terminal Arrangement (Top View)

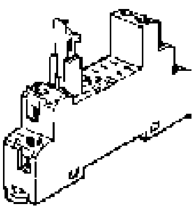


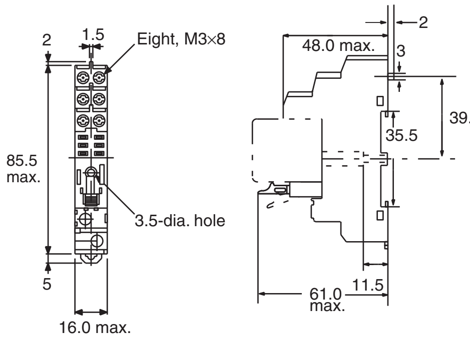
Mounting Holes (for Surface Mounting)



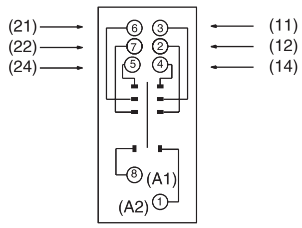
Note: Pin numbers in parentheses apply to DIN standard.

P2RF-08-E

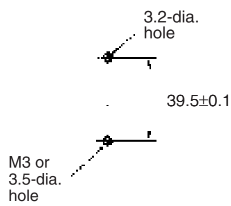




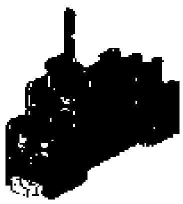
Terminal Arrangement (Top View)

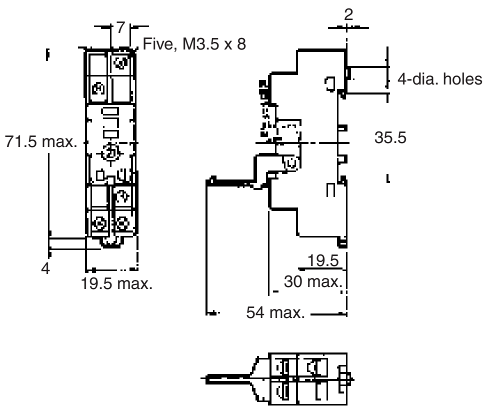


Mounting Holes (for Surface Mounting)

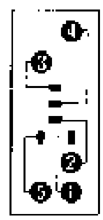


P2RF-05

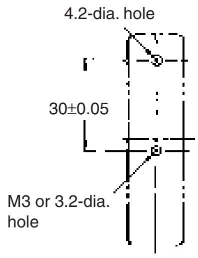




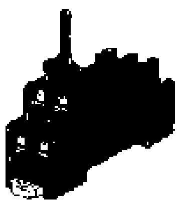
Terminal Arrangement (Top View)

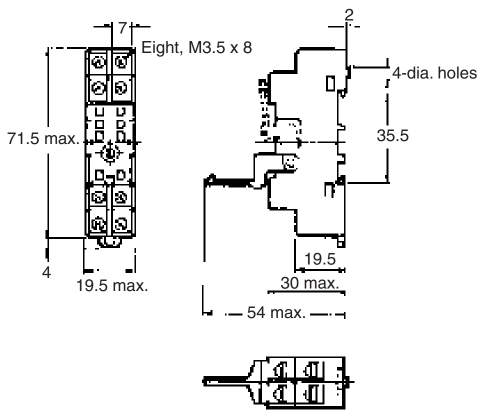


Mounting Holes (for Surface Mounting)

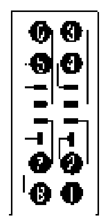


P2RF-08

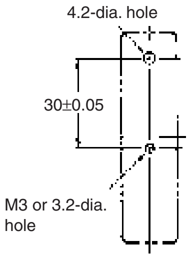




Terminal Arrangement (Top View)

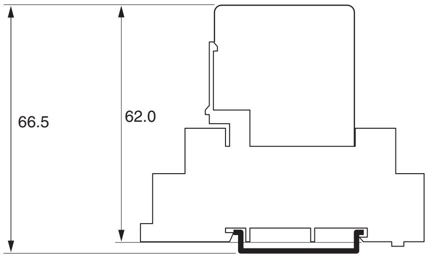


Mounting Holes (for Surface Mounting)

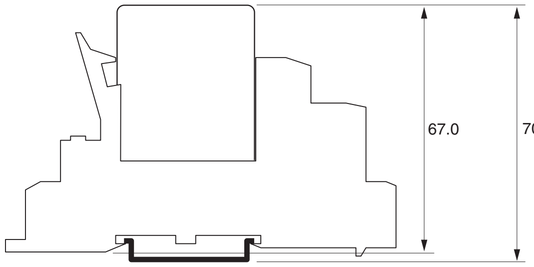


Mounting Height of Relay with DIN-rail/Surface Mounting Sockets

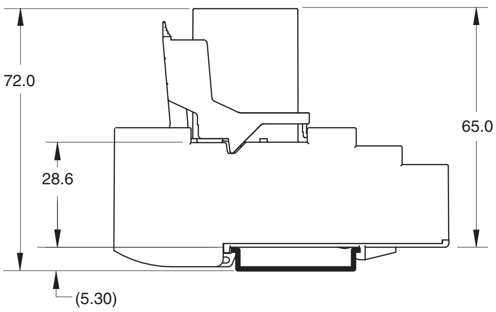
P2RF-□



P2RF-□-E

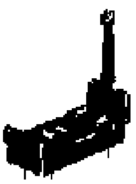


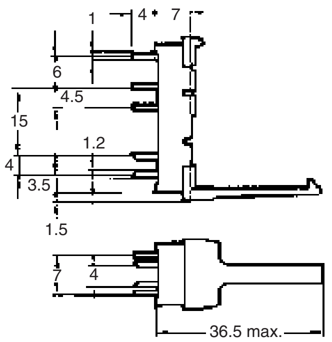
P2RF-□-S

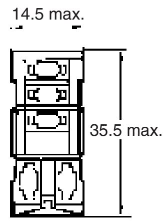


Back-connecting Sockets

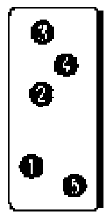
P2R-05P (1-pole)





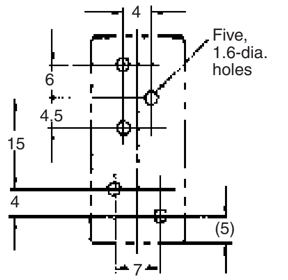


Terminal Arrangement (Bottom View)

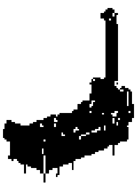


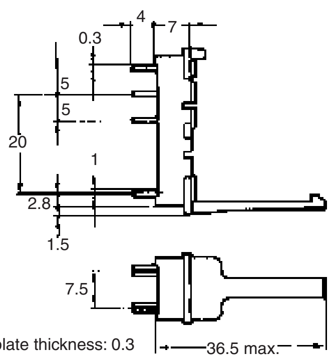
Mounting Holes

Tolerance: ±0.1

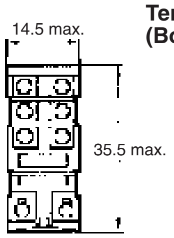


P2R-08P (2-pole)

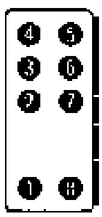




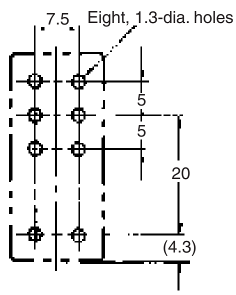
Terminal plate thickness: 0.3



Terminal Arrangement (Bottom View)

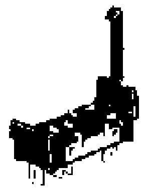


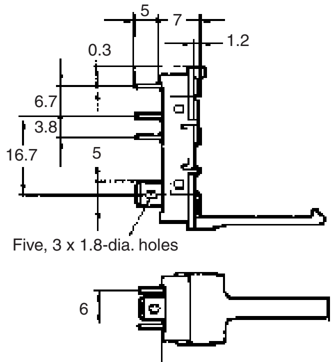
Mounting Holes

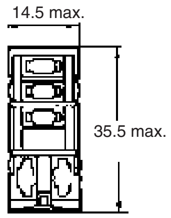


Electromechanical relays

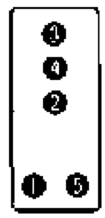
P2R-05A (1-pole)



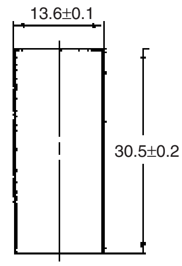




Terminal Arrangement (Bottom View)

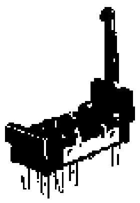


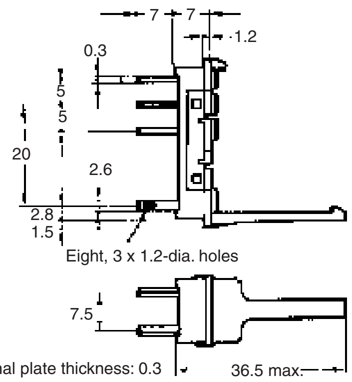
Panel Cutout

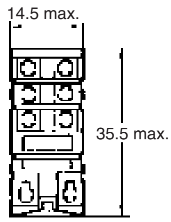


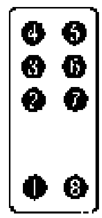
Recommended thickness of the panel is 1.6 to 2.0 mm

P2R-08A (2-pole)

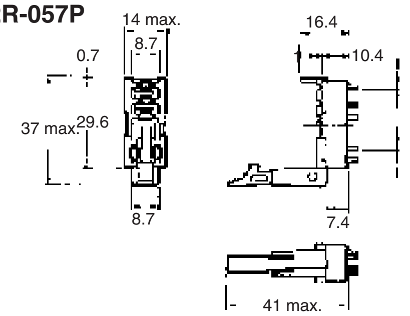




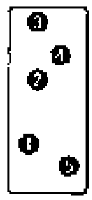




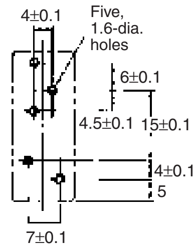
P2R-057P



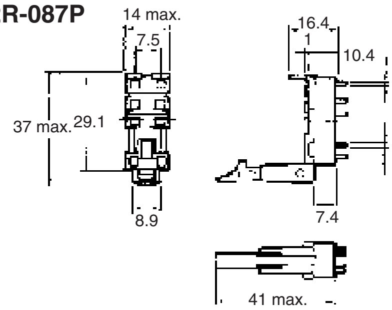
Terminal Arrangement (Bottom View)



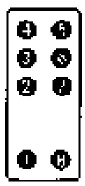
Mounting Holes



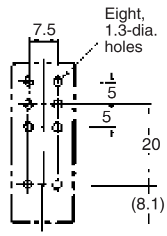
P2R-087P



Terminal Arrangement (Bottom View)

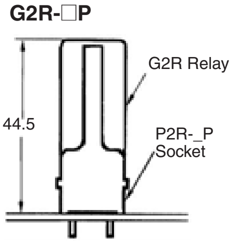


Mounting Holes

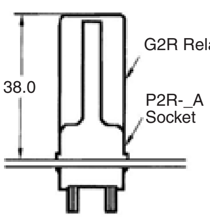


Mounting Height of Relay with Back-connecting Sockets

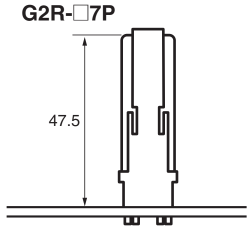
G2R-□P



G2R-□A

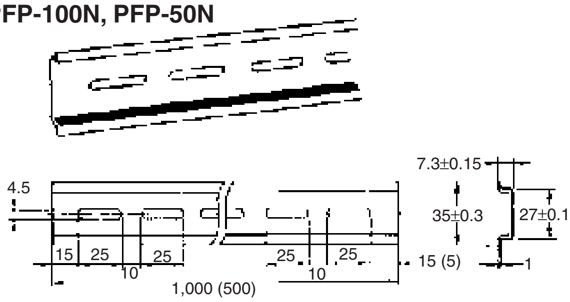


G2R-□7P

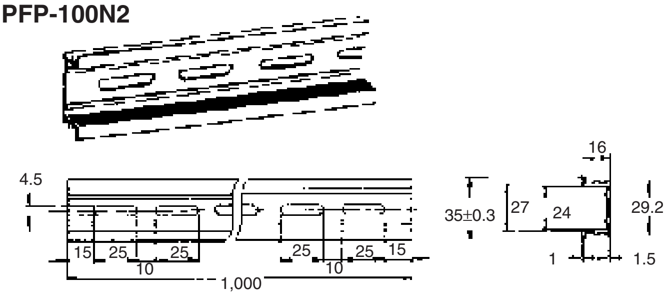


Mounting DIN-rails

PFP-100N, PFP-50N



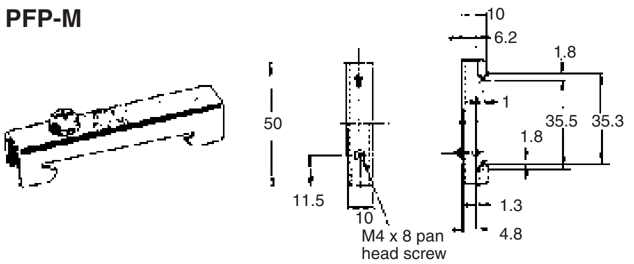
PFP-100N2



It is recommended to use a panel 1.6 to 2.0 mm thick.

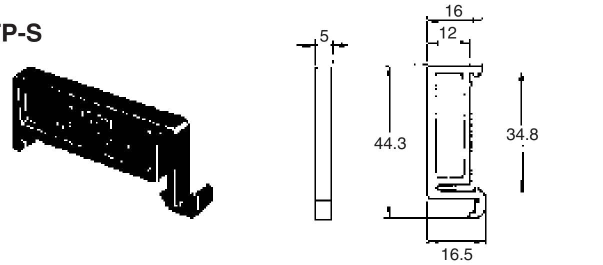
End Plate

PFP-M



Spacer

PFP-S



Precautions

⚠ Caution

Do not use the test button for any purpose other than testing. Be sure not to touch the test button accidentally as this will turn the contacts ON. Before using the test button, confirm that circuits, the load, and any other connected item will operate safely.

⚠ Caution

Check that the test button is released before turning ON relay circuits.

⚠ Caution

If the test button is pulled out too forcefully, it may bypass the momentary testing position and go straight into the locked position.

⚠ Caution

Use an insulated tool when you operate the test button.

Precautions for P2RF-□-S Connection

- Do not move the screwdriver up, down, or from side to side while it is inserted in the hole. Doing so may cause damage to internal components (e.g., deformation of the clamp spring or cracks in the housing) or cause deterioration of insulation.
- Do not insert the screwdriver at an angle. Doing so may break the side of the socket and result in a short-circuit.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J140-E2-01A

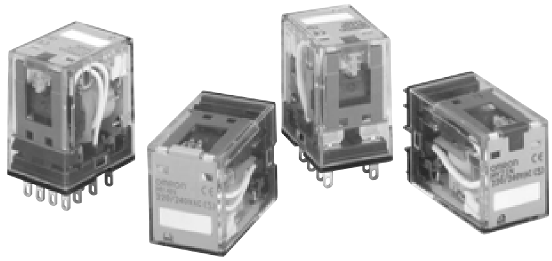
In the interest of product improvement, specifications are subject to change without notice.

General-purpose Relay

MY New model

Versatile and Function-filled Miniature Power Relay for Sequence Control and Power Switching Applications

- Models with lockable test buttons now available.
- Many variations possible through a selection of operation indicators (mechanical and LED indicators), lockable test button, built-in diode and CR (surge suppression), bifurcated contacts, etc.
- Arc barrier standard on 4-pole Relays.
- Dielectric strength: 2,000 VAC (coil to contact)
- Environment-friendly cadmium-free contacts.
- Safety standard approvals obtained.
- Wide range of Sockets (PY, PYF Series) and optional parts are available.
- Max. Switching Current: 2-pole: 10 A, 4-pole: 5 A
- Provided with nameplate.



LR

Ordering Information

■ Relays

Standard Coil Polarity

Type	Contact form	Plug-in socket/Solder terminals		Without LED indicator
		Standard with LED indicator	With LED indicator and lockable test button	
Standard	DPDT	MY2N	MY2IN	MY2
	4PDT	MY4N	MY4IN	MY4
	4PDT (bifurcated)	MY4ZN	MY4ZIN	MY4Z
With built-in diode (DC only)	DPDT	MY2N-D2	MY2IN-D2	---
	4PDT	MY4N-D2	MY4IN-D2	---
	4PDT (bifurcated)	MY4ZN-D2	MY4ZIN-D2	---
With built-in CR (220/240 VAC, 110/120 VAC only)	DPDT	MY2N-CR	MY2IN-CR	---
	4PDT	MY4N-CR	MY4IN-CR	---
	4PDT (bifurcated)	MY4ZN-CR	MY4ZIN-CR	---

Reverse Coil Polarity

Type	Contact form	Plug-in socket/Solder terminals	
		With LED indicator	With LED indicator and lockable test button
Standard (DC only)	DPDT	MY2N1	MY2IN1
	4PDT	MY4N1	MY4IN1
	4PDT (bifurcated)	MY4ZN1	MY4ZIN1
With built-in diode (DC only)	DPDT	MY2N1-D2	MY2IN1-D2
	4PDT	MY4N1-D2	MY4IN1-D2
	4PDT (bifurcated)	MY4ZN1-D2	MY4ZIN1-D2

Note: When ordering, add the rated coil voltage and "(s)" to the model number. Rated coil voltages are given in the coil ratings table.

Example: MY2 6VAC (S)

New model

Rated coil voltage

■ Accessories (Order Separately)

Sockets

Poles	Front Mounting Socket (DIN-rail/ screwless clamp [SLC])	Front-mounting Socket (DIN-rail/ screw mounting)	Back-mounting Socket				
			Solder terminals		Wire-wrap terminals		PCB terminals
			Without clip	With clip	Without clip	With clip	
2	PYF08S	PYF08A-E PYF08A-N	PY08	PY08-Y1	PY08QN PY08QN2	PY08QN-Y1 PY08QN2-Y1	PY08-02
4	PYF14S	PYF14A-E PYF14A-N PYF14-ESS PYF14-ESN	PY14	PY14-Y1	PY14QN PY14QN2	PY14QN-Y1 PY14QN2-Y1	PY14-02

Socket Hold-down Clip Pairing

Relay type	Poles	Front Mounting Socket (DIN-rail/screwless clamp [SLC])		Front-connecting Socket (DIN-rail screw mounting)		Back-connecting Socket			
						Solder/Wire-wrap terminals		PCB terminals	
				Socket	Clip	Socket	Clip	Socket	Clip
Without 2-pole test button	2	PYF08S	PYCM-08S	PYF08A-E PYF08A-N	PYC-A1	PY08(QN)	PYC-P PYC-P2	PY08-02	PYC-P PYC-P2
	4	PYF14S	PYCM-14S	PYF14A-E PYF14A-N		PY14(QN)		PY14-02	
				PYF14-ESS PYF14-ESN	PYC-0 (metal) PYC35 (plastic)				
2-pole test button	2	PYF08S	PYCM-08S	PYF08A-E PYF08A-N	PYC-E1	PY08(QN)	PYC-P2	PY08-02	PYC-P2

Mounting Plates for Sockets

Socket model	For 1 Socket	For 18 Sockets	For 36 Sockets
PY08, PY08QN(2), PY14, PY14QN(2)	PYP-1	PYP-18	PYP-36

Note: PYP-18 and PYP-36 can be cut into any desired length in accordance with the number of Sockets.

DIN-rail and Accessories

Supporting DIN-rail (length = 500 mm)	PFP-50N
Supporting DIN-rail (length = 1,000 mm)	PFP-100N, PFP-100N2
End Plate	PFP-M
Spacer	PFP-S

Specifications

■ Coil Ratings

Rated voltage		Rated current		Coil resistance	Coil inductance (reference value)		Must operate voltage	Must release voltage	Max. voltage	Power consumption (approx.)
		50 Hz	60 Hz		Arm. OFF	Arm. ON	% of rated voltage			
AC	6 V*	214.1 mA	183 mA	12.2 Ω	0.04 H	0.08 H	80% max.	30% min.	110%	1.0 to 1.2 VA (60 Hz)
	12 V	106.5 mA	91 mA	46 Ω	0.17 H	0.33 H				
	24 V	53.8 mA	46 mA	180 Ω	0.69 H	1.30 H				
	48/50 V*	24.7/ 25.7 mA	21.1/ 22.0 mA	788 Ω	3.22 H	5.66 H				
	110/120 V	9.9/10.8 mA	8.4/9.2 mA	4,430 Ω	19.20 H	32.1 H				0.9 to 1.1 VA (60 Hz)
	220/240 V	4.8/5.3 mA	4.2/4.6 mA	18,790 Ω	83.50 H	136.4 H				
DC	6 V*	151 mA		39.8 Ω	0.17 H	0.33 H		10% min.		0.9 W
	12 V	75 mA		160 Ω	0.73 H	1.37 H				
	24 V	37.7 mA		636 Ω	3.20 H	5.72 H				
	48 V*	18.8 mA		2,560 Ω	10.60 H	21.0 H				
	100/110 V	9.0/9.9 mA		11,100 Ω	45.60 H	86.2 H				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for rated currents and ±15% for DC coil resistance.

2. Performance characteristic data are measured at a coil temperature of 23°C.

3. AC coil resistance and impedance are provided as reference values (at 60 Hz).

4. Power consumption drop was measured for the above data. When driving transistors, check leakage current and connect a bleeder resistor if required.

5. Rated voltage denoted by "*" will be manufactured upon request. Ask your OMRON representative.

■ Contact Ratings

Item	2-pole		4-pole		4-pole (bifurcated)	
	Resistive load ($\cos\phi = 1$)	Inductive load ($\cos\phi = 0.4$, L/R = 7 ms)	Resistive load ($\cos\phi = 1$)	Inductive load ($\cos\phi = 0.4$, L/R = 7 ms)	Resistive load ($\cos\phi = 1$)	Inductive load ($\cos\phi = 0.4$, L/R = 7 ms)
Rated load	5A, 250 VAC 5A, 30 VDC	2A, 250 VAC 2 A, 30 VDC	3 A, 250 VAC 3 A, 30 VDC	0.8 A, 250 VAC 1.5 A, 30 VDC	3 A, 250 VAC 3 A, 30 VDC	0.8 A, 250 VAC 1.5 A, 30 VDC
Carry current	10 A (see note)		5 A (see note)			
Max. switching voltage	250 VAC 125 VDC		250 VAC 125 VDC			
Max. switching current	10 A		5 A			
Max. switching power	2,500 VA 300 W	1,250 VA 300 W	1,250 VA 150 W	500 VA 150 W	1,250 VA 150 W	500 VA 150 W
Failure rate (reference value)	5 VDC, 1 mA		1 VDC, 1 mA		1 VDC, 100 µA	

Note: Don't exceed the carry current of a Socket in use. Please see page G-26.

■ Characteristics

Item	All Relays
Contact resistance	100 mΩ max.
Operate time	20 ms max.
Release time	20 ms max.
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1.0 min (1,000 VAC between contacts of same polarity)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 200 m/s^2
Endurance	See the following table.
Ambient temperature	Operating: –55°C to 70°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 35 g

Note: The values given above are initial values.

■ Endurance Characteristics

Pole	Mechanical life (at 18,000 operations/hr)	Electrical life (at 1,800 operations/hr under rated load)
2-pole	AC:50,000,000 operations min. DC:100,000,000 operations min.	500,000 operations min.
4-pole		200,000 operations min.
4-pole (bifurcated)	20,000,000 operations min.	100,000 operations min.

Approved Standards

VDE Recognitions (File No. 112467UG, IEC 255, VDE 0435)

No. of poles	Coil ratings	Contact ratings	Operations
2	6, 12, 24, 48/50, 100/110 110/120, 200/220, 220/240 VAC 6, 12, 24, 48, 100/110, 125 VDC	10 A, 250 VAC (cosϕ=1) 10 A, 30 VDC (L/R=0 ms)	10 x 10^3
4		5 A, 250 VAC (cosϕ=1) 5 A, 30 VDC (L/R=0 ms)	100 x 10^3 MY4Z AC; 50 x 10^3

UL508 Recognitions (File No. 41515)

No. of poles	Coil ratings	Contact ratings	Operations
2	6 to 240 VAC 6 to 125 VDC	10 A, 30 VDC (General purpose) 10 A, 250 VAC (General purpose)	6 x 10^3
4		5 A, 250 VAC (General purpose) 5 A, 30 VDC (General purpose)	

CSA C22.2 No. 14 Listings (File No. LR31928)

No. of poles	Coil ratings	Contact ratings	Operations
2	6 to 240 VAC 6 to 125 VDC	10 A, 30 VDC 10 A, 250 VAC	6 x 10^3
4		5 A, 250 VAC (Same polarity) 5 A, 30 VDC (Same polarity)	

IMQ (File No. EN013 to 016)

No. of poles	Coil ratings	Contact ratings	Operations
2	6, 12, 24, 48/50, 100/110 110/120, 200/220, 220/240 VAC 6, 12, 24, 48, 100/110, 125 VDC	10 A, 30 VDC 10 A, 250 VAC	10 x 10^3
4		5 A, 250 VAC 5 A, 30 VDC	100 x 10^3 MY4Z AC; 50 x 10^3

LR Recognitions (File No. 98/10014)

No. of poles	Coil ratings	Contact ratings	Operations
2	6 to 240 VAC 6 to 125 VDC	10 A, 250 VAC (Resistive) 2 A, 250 VAC (PF0.4) 10 A, 30 VDC (Resistive) 2 A, 30 VDC (L/R=7 ms)	50 x 10^3
4		5 A, 250 VAC (Resistive) 0.8 A, 250 VAC (PF0.4) 5 A, 30 VDC (Resistive) 1.5 A, 30 VDC (L/R=7 ms)	50 x 10^3

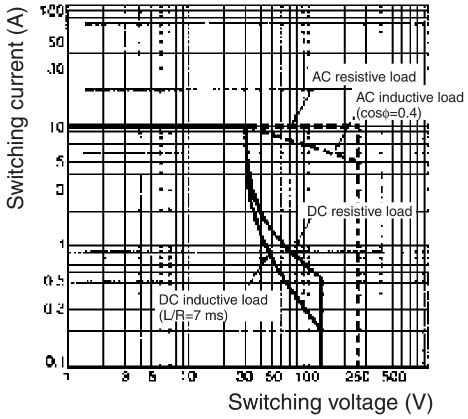
SEV Listings (File No. 99.5 50902.01)

No. of poles	Coil ratings	Contact ratings	Operations
2	6 to 240 VAC 6 to 125 VDC	10 A, 250 VAC 10 A, 30 VDC	10 x 10^3
4		5 A, 250 VAC 5 A, 30 VDC	100 x 10^3 MY4Z AC; 50 x 10^3

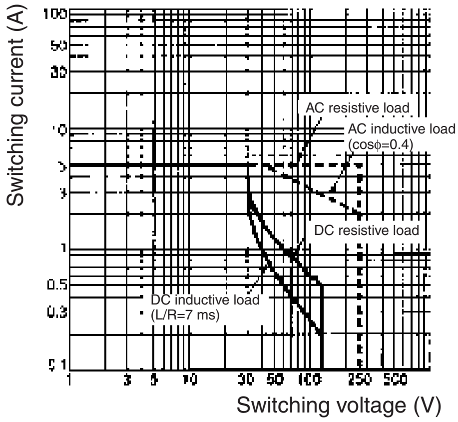
Engineering Data

Maximum Switching Power

MY2

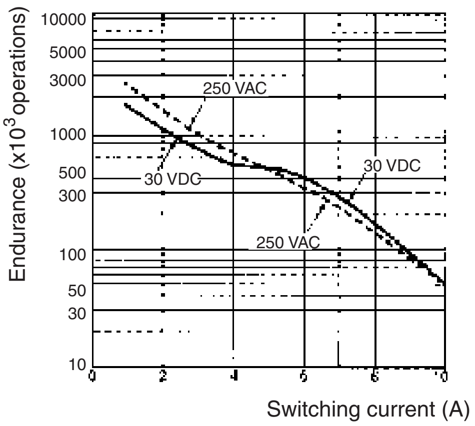


MY4, MY4Z

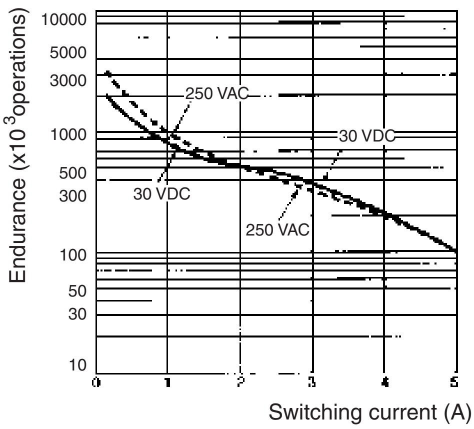


Endurance

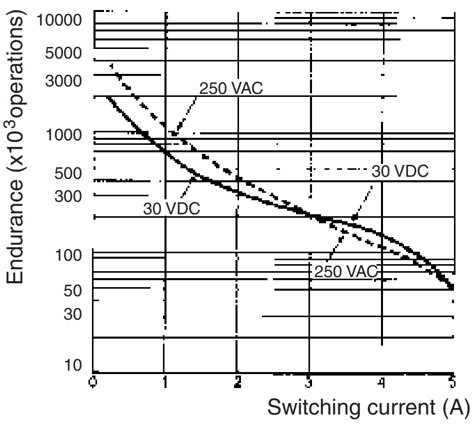
MY2 (Resistive Loads)



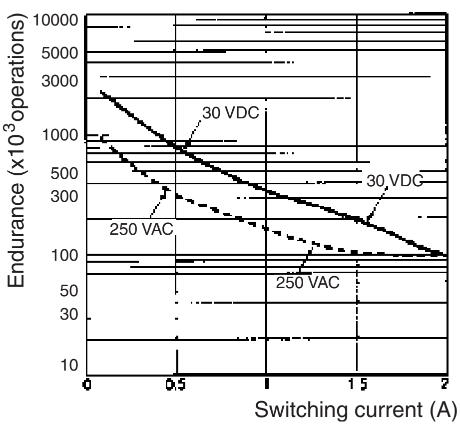
MY2 (Inductive Loads)



MY4 (Resistive Loads)

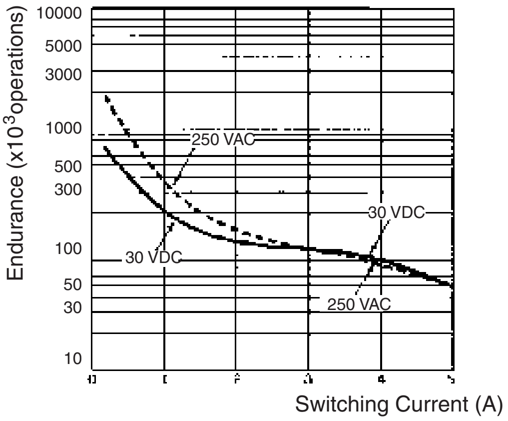


MY4 (Inductive Loads)

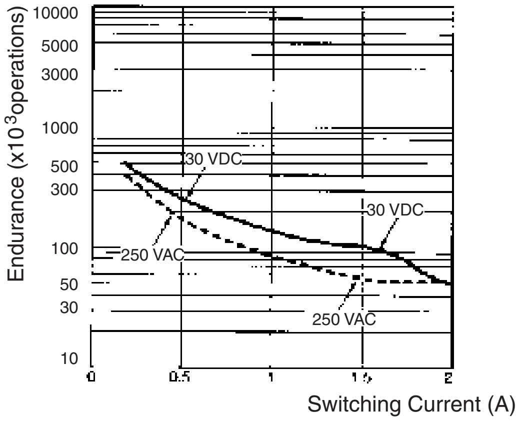


Electromechanical relays

MY4Z (Resistive Loads)



MY4Z (Inductive Loads)



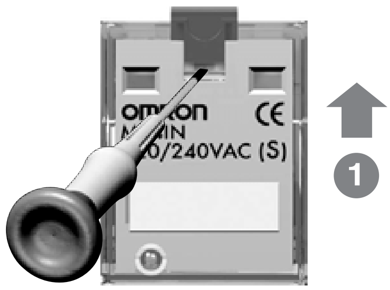
Technical and Environmental Properties

	2-Pole model	4-Pole model
DIN-railing Resistance	600 CTI (base)	600 CTI (base)
Environmental Protection	RT1	RT1
Flammability Class	Base, Insulator, Spool Case, Indicator, Nameplate, Push Button	ul 94V-0 ul 94V-2
Pollution Degree	2	1
Creepage Distance	4.0 mm	3.2 mm
Clearance Distance	3.0 mm	3.0 mm
Contact Material	Ag	AgNi + Au

Two-way action test button

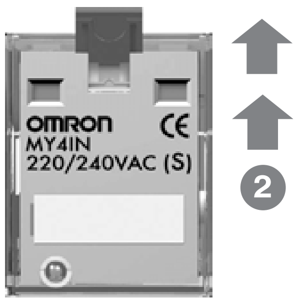
Relay in normal operation

For momentary operation



Push up the test button to the first position, then press the yellow button with an insulated tool to operate the contact.

For lock operation



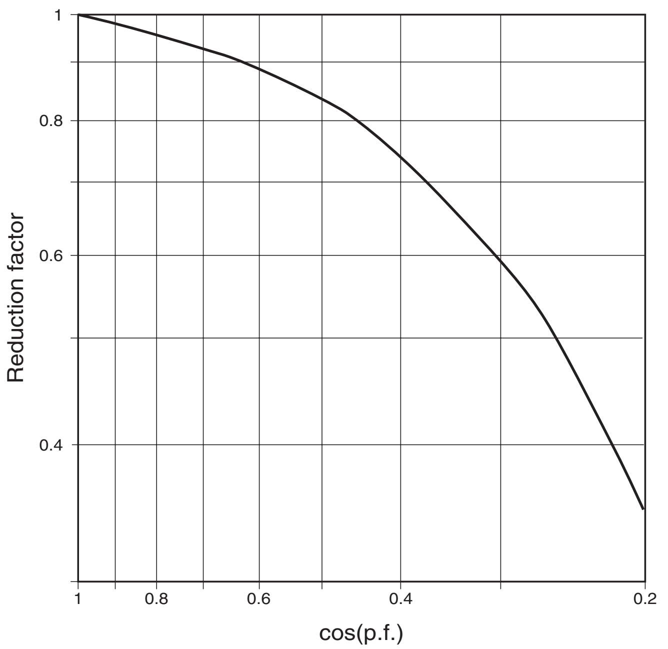
Push up the test button to the second position. (The contact is now in the locked position).

Typical information for reference only

The following data is provided as experimental and/or calculated data for reference only. These figures fall under the category of typical behaviour and the operation of individual relays will vary according to the exact operating conditions.

Typical Operate / Release Times	2-Pole model	4-Pole model
AC Type (operate / release time)	8 ms/8 ms	10 ms/10 ms
DC Type (operate / release time)	14 ms/4 ms	14 ms/6 ms

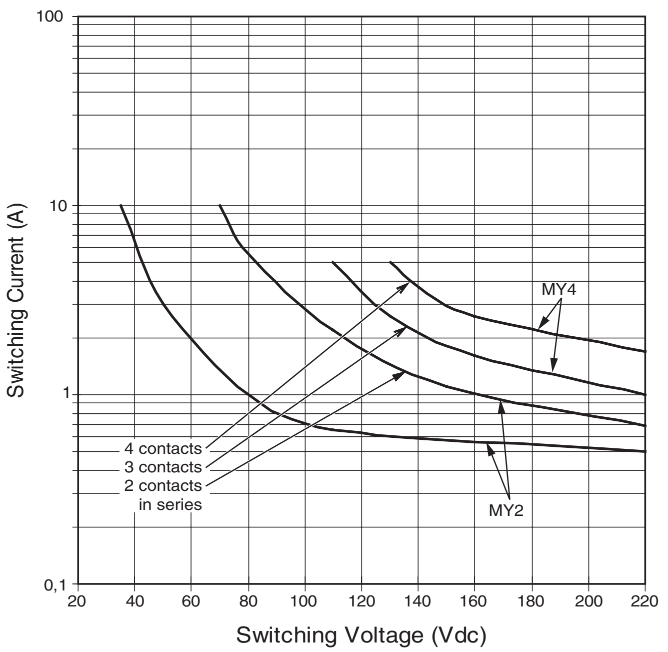
Load reduction Factor



For AC inductive loads (such as solenoids, contactors coils, etc.) the reduction factor corresponding to cos(p.f.) (cosine of the power factor) is multiplied by the rated current in order to identify the maximum allowable current. This approximation is not valid for loads with high inrush currents such as electric motors or fluorescent lamps.

Multiple Contact DC Switching Capacity

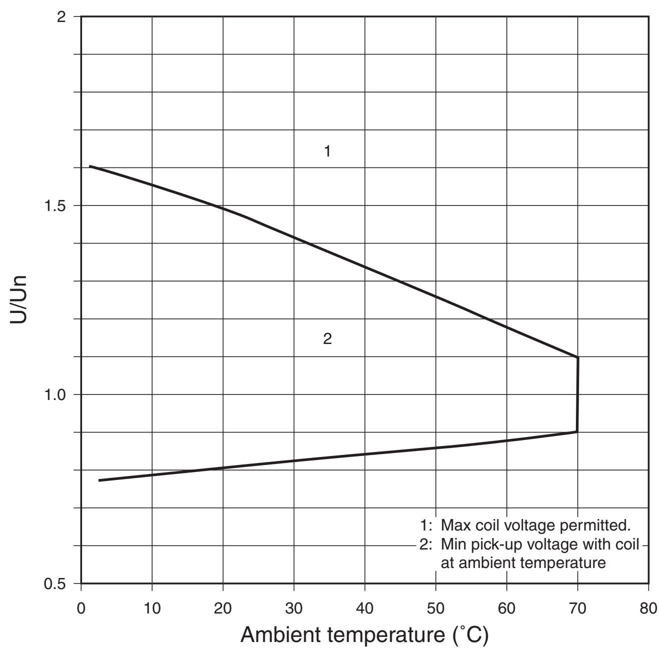
Switching capacity of DC resistive load



This graph can be used to estimate the number of contacts that can be used to switch DC resistive loads

Effect of temperature on coil voltages

MY2/4 Operating range (DC and AC type) vs ambient temperature



This graph shows the typical relationship between the maximum / minimum coil and pick-up voltage and ambient temperature

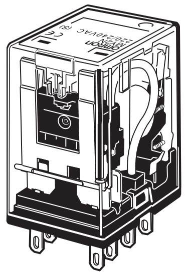
Electromechanical relays

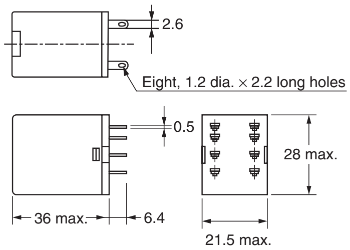
Dimensions

Note: All units are in millimeters unless otherwise indicated.

2-Pole Models

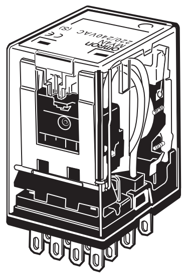
MY2N

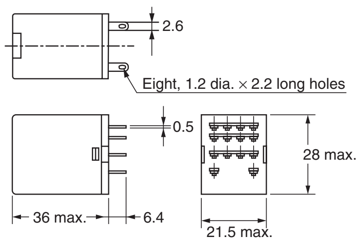




4-Pole Models

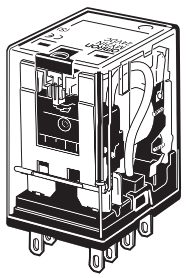
MY4N

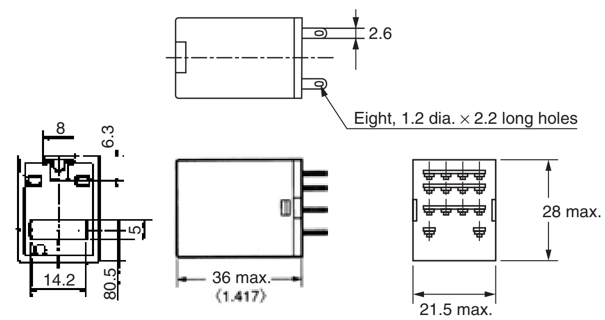




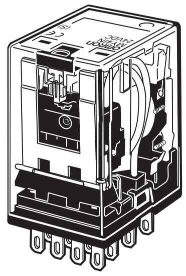
Models with Test Button

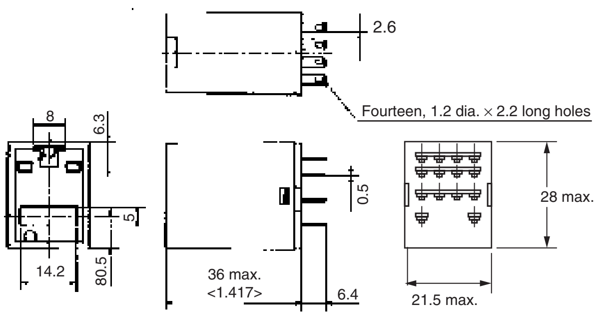
MY2IN





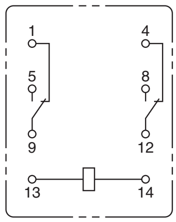
MY4IN



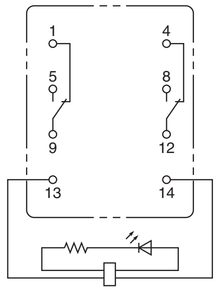


Terminal Arrangement/Internal Connections (Bottom View)

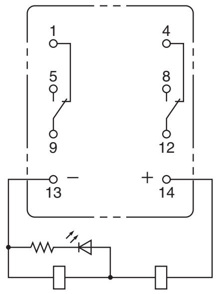
MY2



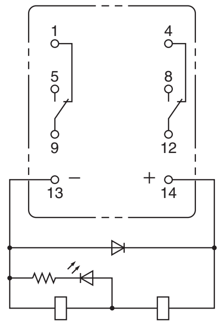
MY2N/MY2IN
(AC Models)



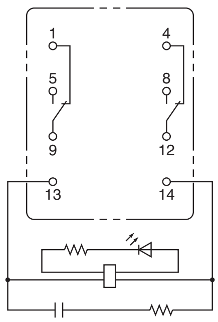
MY2N/MY2IN
(DC Models)



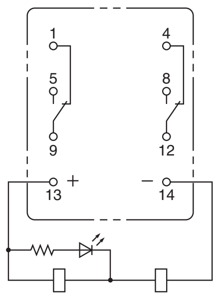
MY2N-D2/MY2IN-D2
(DC Models Only)



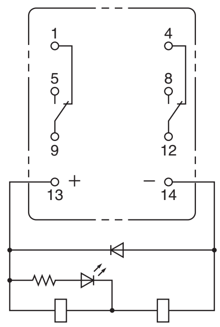
MY2N-CR/MY2IN-CR
(AC Models Only)



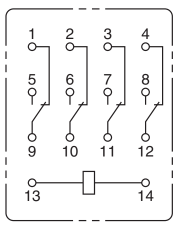
MY2N1/MY2IN1
(DC Models Only)



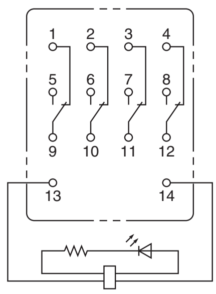
MY2N1-D2/MY2IN1-D2
(DC Models Only)



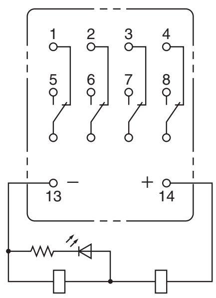
MY4(Z)



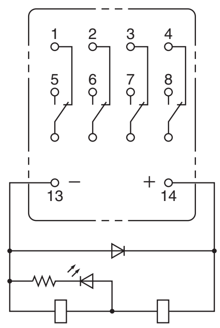
MY4(Z)N/MY4(Z)IN
(AC Models)



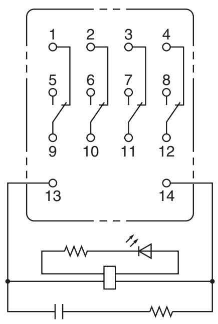
MY4(Z)N/MY4(Z)IN
(DC Models)



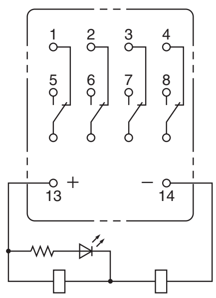
MY4(Z)N-D/MY4(Z)IN-D2
(DC Models Only)



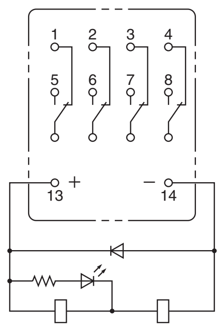
MY4(Z)N-CR/MY4(Z)IN-CR
(AC Models Only)



MY4(Z)N1/MY4(Z)IN1
(DC Models Only)



MY4(Z)N1-D2/MY4(Z)IN1-D2
(DC Models Only)

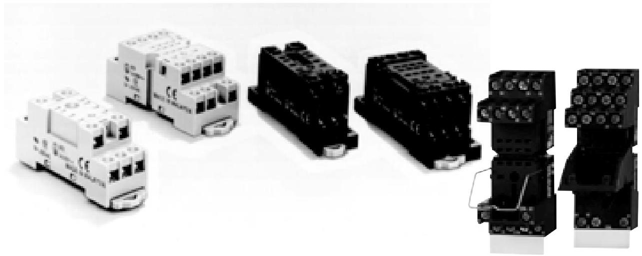


Note: The DC models have polarity.

Electromechanical relays

Sockets for MY

DIN-rail-mounted (DIN-rail) Socket
Conforms to VDE 0106, Part 100

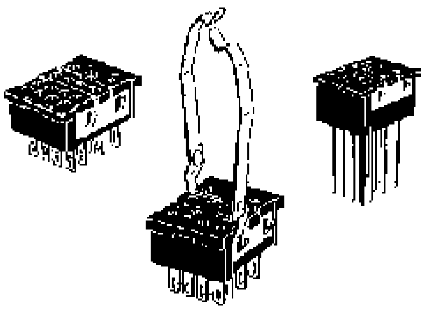


- Snap into position along continuous sections of any mounting DIN-rail.
- Facilitates sheet metal design by standardized mounting dimensions.
- Design with sufficient dielectric separation between terminals eliminates the need of any insulating sheet.

■ Safety Standards for Sockets

Model	Standards	File No.
PYF08A-E, PYF08A-N PYF14A-E, PYF14A-N	UL508	E87929
	CSA22.2	LR31928
PYF14-ESN, PYF14-ESS	UL508	E244189
	CSA22.2	LR225761

Back-connecting Sockets



■ Specifications

Item	Pole	Model	Carry current	Dielectric withstand voltage	Insulation resistance (see note 2)
Screwless Clamp Terminal Socket	2	PYF08S	10 A	2,000 VAC, 1 min	Less than 1,000 MΩ
	4	PYF14S	5 A		
DIN-rail-mounted Socket	2	PYF08A-E	7 A	2,000 VAC, 1 min	1,000 MΩ min.
		PYF08A-N (see note 3)	7 A (see note 4)		
	4	PYF14A-E	5 A		
		PYF14A-N (see note 3)	5 A (see note 4)		
	4	PYF14-ESN/-ESS	12 A	> 3 kV	> 5 MΩ
Back-connecting Socket	2	PY08(-Y1)	7 A	1,500 VAC, 1 min	100 MΩ min.
		PY08QN(-Y1)			
		PY08-02			
	4	PY14(-Y1)	3 A		
		PY14QN(-Y1)			
		PY14-02			

Note: 1. The values given above are initial values.

2. The values for insulation resistance were measured at 500 V at the same place as the dielectric strength.

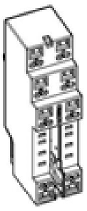
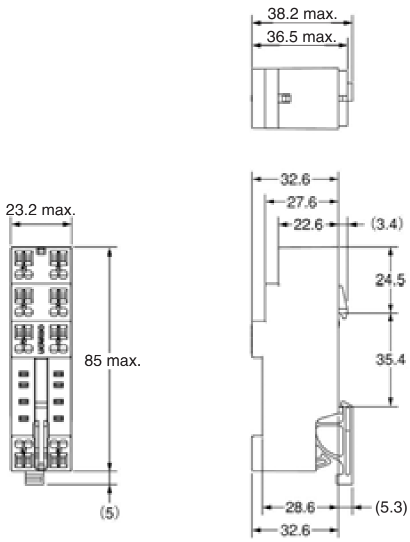
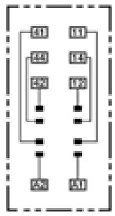
3. The maximum operating ambient temperature for the PYF08A-N and PYF14A-N is 55°C.

4. When using the PYF08A-N or PYF14A-N at an operating ambient temperature exceeding 40°C, reduce the current to 60%.

5. The MY2(S) can be used at 70°C with a carry current of 7 A.

■ Dimensions

Note: All units are in millimeters unless otherwise indicated.

<table>
<tr><th>Socket</th><th>Dimensions</th><th>Terminal arrangement/
Internal connections
(top view)</th><th>Mounting holes</th></tr>
<tr><td>PYF08S
</td><td>
</td><td></td><td>---</td></tr>
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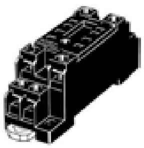
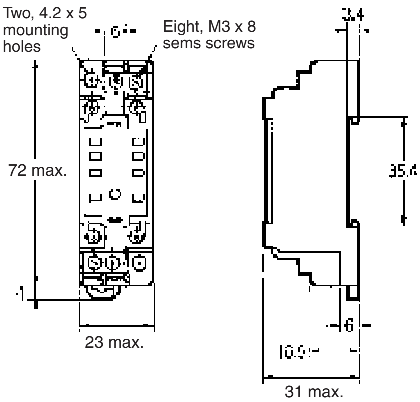
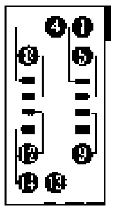
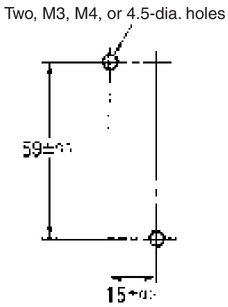
</td><td>
</td><td></td><td>

(TOP VIEW)

Note: DIN-rail mounting is also possible. Refer to page G-31-G-32 for supporting DIN-rails.</td></tr>
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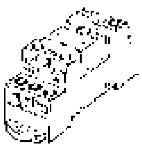
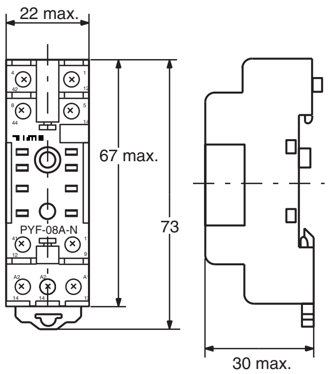
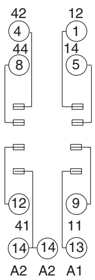
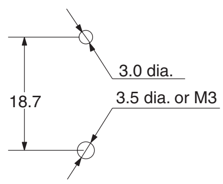
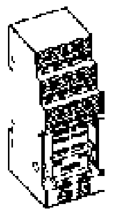
</td><td>
</td><td>
</td><td>

Note: DIN-rail mounting is also possible. Refer to page G-31-G-32 for supporting DIN-rails.</td></tr>
</table>

Electromechanical relays

<table>
<tr><th>Socket</th><th>Dimensions</th><th>Terminal arrangement/
Internal connections
(top view)</th><th>Mounting holes</th></tr>
<tr><td>PYF14S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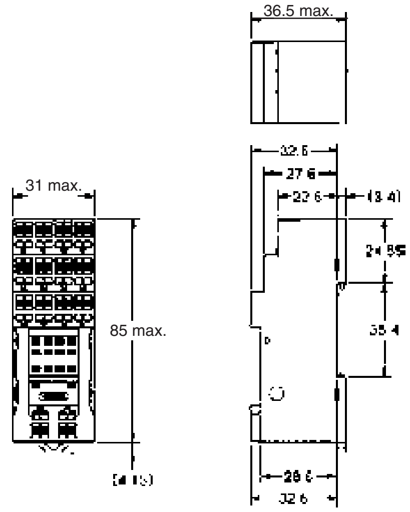

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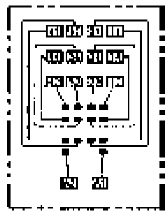
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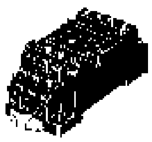
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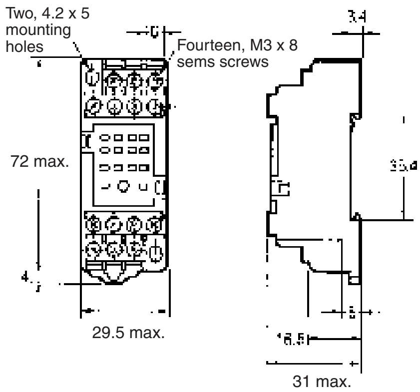

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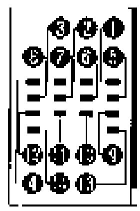
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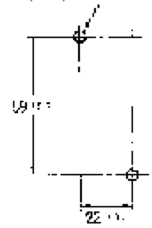
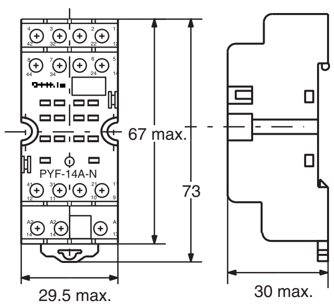


(TOP VIEW)

Note: DIN-rail mounting is also possible. Refer to page G-31-G-32 for supporting DIN-rails.</td></tr>
<tr><td>PYF14A-N


</td><td>


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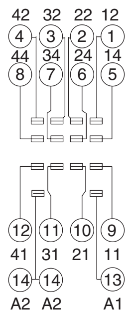

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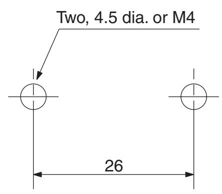
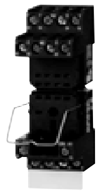
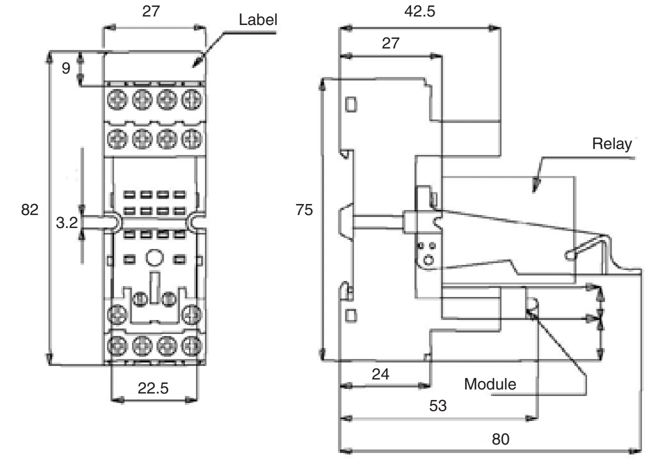
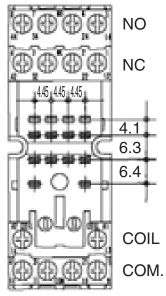
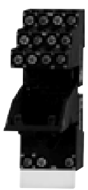
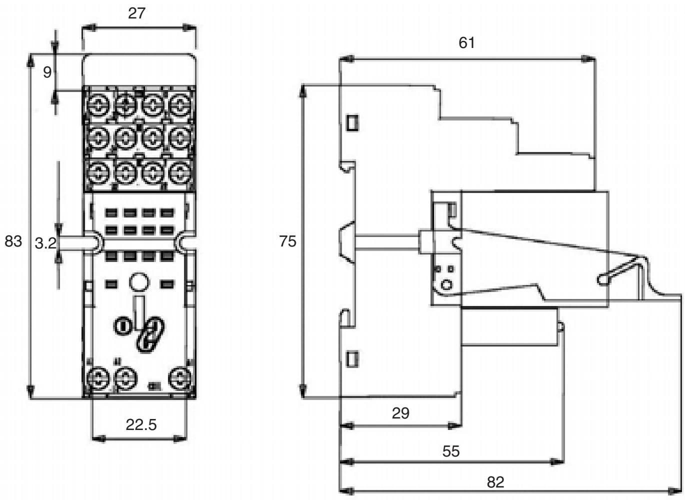
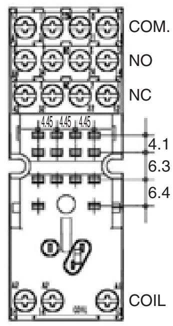
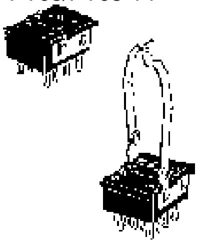
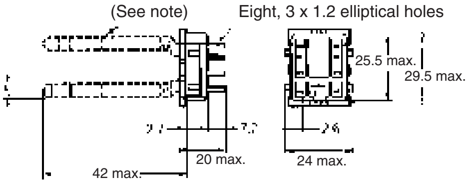
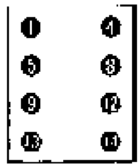
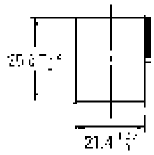
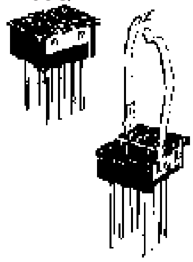
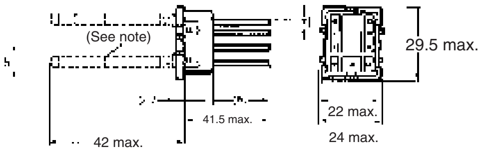
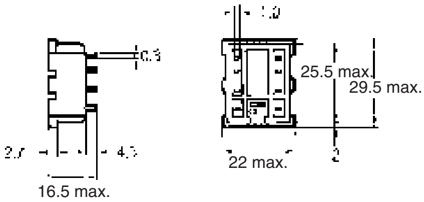
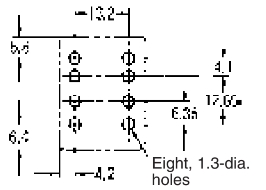
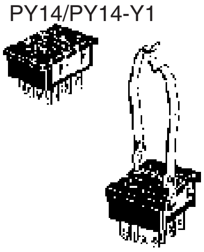
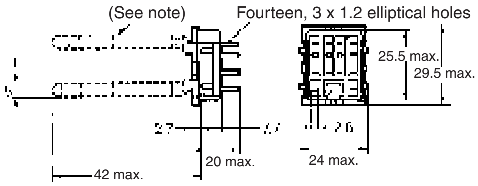
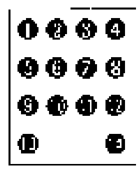
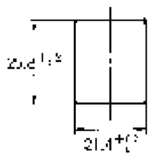
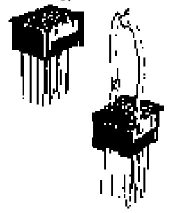
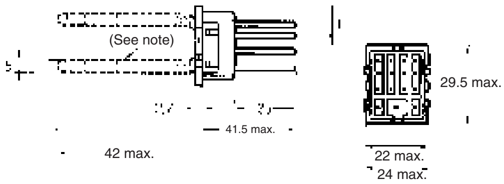
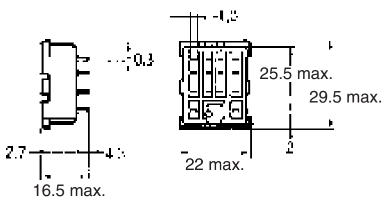
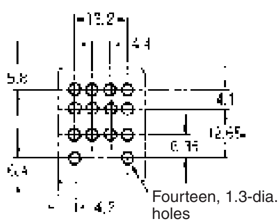


Note: DIN-rail mounting is also possible. Refer to page G-31-G-32 for supporting DIN-rails.</td></tr>
</table>

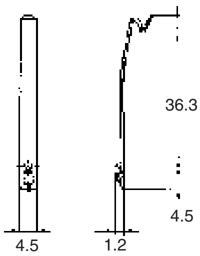
Socket	Dimensions	Terminal arrangement/ internal connections (top view)/ mounting holes
PYF14-ESN 		
PYF14-ESS 		

Socket	Dimensions	Terminal arrangement/ Internal connections (bottom view)	Mounting holes
PY08/PY08-Y1 	 **Note:** The PY08-Y1 includes sections indicated by dotted lines.		
PY08QN/ PY08QN-Y1 	 **Note:** The PY08QN-Y1 includes sections indicated by dotted lines.		
PY08-02 			
PY14/PY14-Y1 	 **Note:** The PY14-Y1 includes sections indicated by dotted lines.		
PY14QN/ PY14QN-Y1 	 **Note:** The PY14QN-Y1 includes sections indicated by dotted lines.		
PY14-02 			

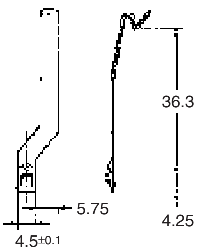
Note: Use a panel with plate thickness of 1 to 2 mm for mounting the Sockets.

Hold-down Clips

PYC-A1
(2 pcs per set)



PYC-E1
(2 pcs per set)

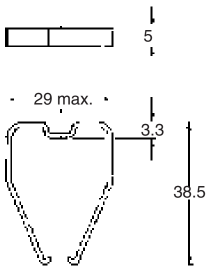


For sockets PYF14-ESN/-ESS

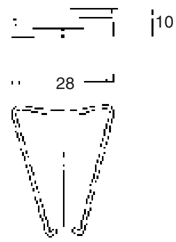
Model	Description
PYC-0	Metal spring clip (Used with Relay only)
PYC 35	Plastic holding clip (Used with Relay only)
PYC TR1	Thermoplastic writeable label

Note: For total dimensions with plastic clip please refer to drawings of the sockets.

PYC-P

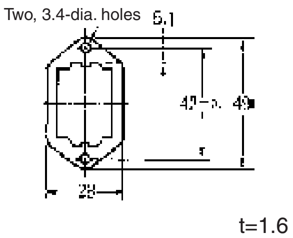


PYC-P2

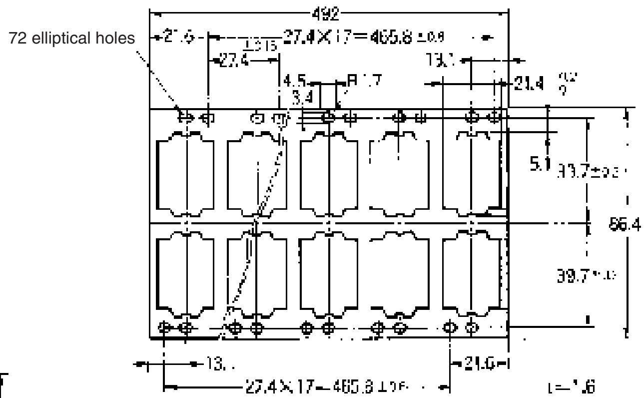


Mounting Plates for Back-connecting Sockets

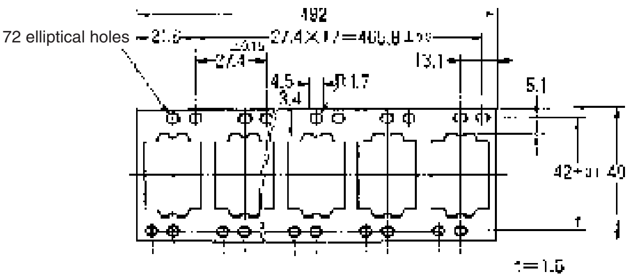
PYP-1



PYP-36



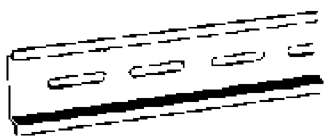
PYP-18

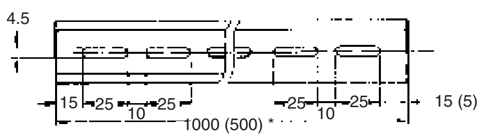


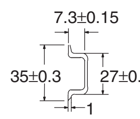
DIN-rails and Accessories

Supporting DIN-rails

PFP-50N/PFP-100N

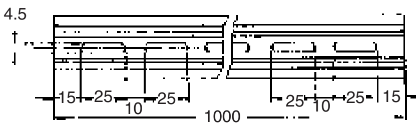


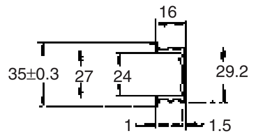




Note: The figure in the parentheses is for PFP-50N.

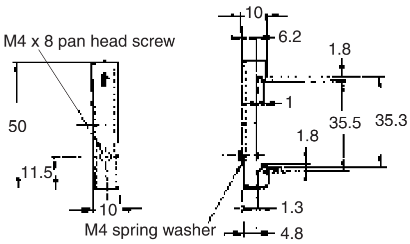
PFP-100N2





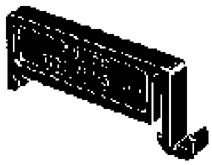
End Plate

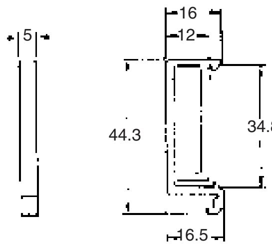
PFP-M



Spacer

PFP-S





■ Connections

Do not reverse polarity when connecting DC-operated Relays with built-in diodes or indicators or high-sensitivity DC-operated Relays.

■ Mounting

- Whenever possible, mount Relays so that it is not subject to vibration or shock in the same direction as that of contact movement.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

General-purpose Relay
LY

A Miniature Power Relay

- Equipped with arc barrier.
- Dielectric strength: 2,000 V.
- Built-in diode models added to the LY Series.
- Single-pole and double-pole models are applicable to operating coils with ratings of 100/110 VAC, 110/120 VAC, 200/220 VAC, 220/240 VAC, or 100/110 VDC).
- Three-pole and four-pole models are applicable to operating coils with ratings of 100/110 VAC, 200/220 VAC, or 100/110 VDC).

LR

Ordering Information

■ Open Relays

Type	Contact form	Plug-in/solder terminals	Plug-in/solder terminals with LED indicator	PCB terminals	Upper-mounting Plug-in/solder terminals
Standard	SPDT	LY1	LY1N	LY1-0	LY1F
	DPDT	LY2	LY2N	LY2-0	LY2F
	DPDT (bifurcated)	LY2Z	LY2ZN	LY2Z-0	LY2ZF
	3PDT	LY3	LY3N	LY3-0	LY3F
	4PDT	LY4	LY4N	LY4-0	LY4F
With built-in diode (DC only)	SPDT	LY1-D	LY1N-D2	---	---
	DPDT	LY2-D	LY2N-D2	---	---
	DPDT (bifurcated)	LY2Z-D	LY2ZN-D2	---	---
	3PDT	LY3-D	---	---	---
	4PDT	LY4-D	LY4N-D2	---	---
With built-in CR (AC only)	SPDT	---	---	---	---
	DPDT	LY2-CR	LY2N-CR	---	---
	DPDT (bifurcated)	LY2Z-CR	LY2ZN-CR	---	---

Note: 1. When ordering, add the rated coil voltage to the model number. Rated coil voltages are given in the coil ratings table.

Example: LY2, 6 VAC
Rated coil voltage

2. Relays with #187 quick connect terminals are also available with SPDT and DPDT contact. Ask your OMRON representative for details.
3. SEV models are standard Relays excluding DPDT (bifurcated) models.
4. VDE- or LR- qualifying Relays must be specified when ordering.

■ Accessories (Order Separately)

Sockets

Poles	Front-connecting Socket	Back-connecting Socket		
	DIN-rail/screw terminals	Plug-in/solder terminals	Wrapping terminals	PCB terminals
1 or 2	PTF08A-E, PTF08A	PT08	PT08QN	PT08-0
3	PTF11A	PT11	PT11QN	PT11-0
4	PTF14A-E, PTF14A	PT14	PT14QN	PT14-0

Note: 1. For PTF08-E and PTF14A-E, see “DIN-rail Mounted Socket.”

2. PTF□A (-E) Sockets have met UL and CSA standards: UL 508/CSA C22.2.

Mounting Plates for Sockets

Socket model	For 1 Socket	For 10 Sockets	For 12 Sockets	For 18 Sockets
PT08 PT08QN	PYP-1	---	---	PYP-18
PT11 PT11QN	PTP-1-3	---	PTP-12	---
PT14 PT14QN	PTP-1	PTP-10	---	---

Socket-Hold-down Clip Pairings

Relay type	Poles	Front-connecting Sockets		Back-connecting Sockets	
		Socket model	Clip model	Socket model	Clip model
Standard, bifurcated contacts operation indicator, built-in diode	1, 2	PTF08A-E, PTF08A	PYC-A1	PT08(QN), PT08-0	PYC-P
	3	PTF11A		PT11(QN), PT11-0	
	4	PTF14A-E, PTF14A		PT14(QN), PT14-0	
CR circuit	2	PTF08A-E, PTF08A	Y92H-3	PT08(QN), PT08-0	PYC-1

Specifications

■ Coil Ratings

Single- and Double-pole Relays

Rated voltage		Rated current		Coil resistance	Coil inductance (reference value)		Must operate voltage	Must release voltage	Max. voltage	Power consum. (approx.)
		50 Hz	60 Hz		Arm. OFF	Arm. ON	% of rated voltage			
AC	6 V	214.1 mA	183 mA	12.2 Ω	0.04 H	0.08 H	80% max.	30% min.	110%	1.0 to 1.2 VA (60 Hz)
	12 V	106.5 mA	91 mA	46 Ω	0.17 H	0.33 H				
	24 V	53.8 mA	46 mA	180 Ω	0.69 H	1.30 H				
	50 V	25.7 mA	22 mA	788 Ω	3.22 H	5.66 H				
	100/110 V	11.7/12.9 mA	10/11 mA	3,750 Ω	14.54 H	24.6 H				0.9 to 1 VA (60 Hz)
	110/120 V	9.9/10.8 mA	8.4/9.2 mA	4,430 Ω	19.20 H	32.1 H				
	200/220 V	6.2/6.8 mA	5.3/5.8 mA	12,950 Ω	54.75 H	94.07 H				
	220/240 V	4.8/5.3 mA	4.2/4.6 mA	18,790 Ω	83.50 H	136.40 H				
DC	6 V	150 mA		40 Ω	0.16 H	0.33 H		10% min.		0.9 W
	12 V	75 mA		160 Ω	0.73 H	1.37 H				
	24 V	36.9 mA		650 Ω	3.20 H	5.72 H				
	48 V	18.5 mA		2,600 Ω	10.6 H	21.0 H				
	100/110 V	9.1/10 mA		11,000 Ω	45.6 H	86.2 H				

Note: See notes on the bottom of next page.

Three-pole Relays

Rated voltage		Rated current		Coil resistance	Coil inductance (reference value)		Must operate voltage	Must release voltage	Max. voltage	Power consum. (approx)
		50 Hz	60 Hz		Arm. OFF	Arm. ON	% of rated voltage			
AC	6 V	310 mA	270 mA	6.7 Ω	0.03 H	0.05 H	80% max.	30% min.	110%	1.6 to 2.0 VA (60 Hz)
	12 V	159 mA	134 mA	24 Ω	0.12 H	0.21 H				
	24 V	80 mA	67 mA	100 Ω	0.44 H	0.79 H				
	50 V	38 mA	33 mA	410 Ω	2.24 H	3.87 H				
	100/110 V	14.1/16 mA	12.4/13.7 mA	2,300 Ω	10.5 H	18.5 H				
	200/220 V	9.0/10.0 mA	7.7/8.5 mA	8,650 Ω	34.8 H	59.5 H				
DC	6 V	234 mA		25.7 Ω	0.11 H	0.21 H		10% min.		1.4 W
	12 V	112 mA		107 Ω	0.45 H	0.98 H				
	24 V	58.6 mA		410 Ω	1.89 H	3.87 H				
	48 V	28.2 mA		1,700 Ω	8.53 H	13.9 H				
	100/110 V	12.7/13 mA		8,500 Ω	29.6 H	54.3 H				

Note: See notes under next table.

Four-pole Relays

Rated voltage		Rated current		Coil resistance	Coil inductance (reference value)		Must operate voltage	Must release voltage	Max. voltage	Power consum. (approx)
		50 Hz	60 Hz		Arm. OFF	Arm. ON	% of rated voltage			
AC	6 V	386 mA	330 mA	5 Ω	0.02 H	0.04 H	80% max.	30% min.	110%	1.95 to 2.5 VA (60 Hz)
	12 V	199 mA	170 mA	20 Ω	0.10 H	0.17 H				
	24 V	93.6 mA	80 mA	78 Ω	0.38 H	0.67 H				
	50 V	46.8 mA	40 mA	350 Ω	1.74 H	2.88 H				
	100/110 V	22.5/25.5 mA	19/21.8 mA	1,600 Ω	10.5 H	17.3 H				
	200/220 V	11.5/13.1 mA	9.8/11.2 mA	6,700 Ω	33.1 H	57.9 H				
DC	6 V	240 mA		25 Ω	0.09 H	0.21 H		10% min.		1.5 W
	12 V	120 mA		100 Ω	0.39 H	0.84 H				
	24 V	69 mA		350 Ω	1.41 H	2.91 H				
	48 V	30 mA		1,600 Ω	6.39 H	13.6 H				
	100/110 V	15/15.9 mA		6,900 Ω	32 H	63.7 H				

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for rated currents and ±15% for DC coil resistance.
2. Performance characteristic data are measured at a coil temperatures of 23°C.
3. AC coil resistance and impedance are provided as reference values (at 60 Hz).
4. Power consumption drop was measured for the above data. When driving transistors, check leakage current and connect a bleeder resistor if required.

■ Contact Ratings

Relay	Single contact				Bifurcated contacts	
	1-pole		2-, 3- or 4-pole		2-pole	
Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ=0.4, L/R=7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ=0.4, L/R=7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ=0.4, L/R=7 ms)
Rated load	110 VAC 15 A 24 VDC 15 A	110 VAC 10 A 24 VDC 7 A	110 VAC 10 A 24 VDC 10 A	110 VAC 7.5 A 24 VDC 5 A	110 VAC 5A 24 VDC 5 A	110 VAC 4 A 24 VDC 4A
Rated carry current	15 A		10 A		7 A	
Max. switching voltage	250 VAC 125 VDC		250 VAC 125 VDC		250 VAC 125 VDC	
Max. switching current	15 A		10 A		7 A	
Max. switching power	1,700 VA 360 W	1,100 VA 170 W	1,100 VA 240 W	825 VA 120 W	550 VA 120 W	440 VA 100 W
Failure rate (reference value)*	100 mA, 5 VDC		100 mA, 5 VDC		10 mA, 5 VDC	

***Note:** P level: λ_{60} = 0.1 x 10^{-6}/operation, reference value

■ Characteristics

Item	All except Relays with bifurcated contacts	Relays with bifurcated contacts
Contact resistance	50 mΩ max.	
Operate time	25 ms max.	
Release time	25 ms max.	
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)	
Insulation resistance	100 MΩ min. (at 500 VDC)	
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity 2,000 VAC, 50/60 Hz for 1 min between contacts of different polarity	
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude)	
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 200 m/s^2	
Endurance	Mechanical: AC: 50,000,000 operations min. (at 18,000 operations/hr) DC: 1,00,000,000 operations min. (at 18,000 operations/hr) Electrical: Single-, three-, and four-pole: 200,000 operations min. (at 1,800 operations/hr under rated load) Double-pole: 500,000 operations min. (at 1,800 operations/hr under rated load)	
Ambient temperature*	Operating: Single- and double-pole standard, bifurcated-contact Relays: –25°C to 55°C (with no icing) (–25°C to 70°C if carry current is 4 A or less) All other Relays: –25°C to 40°C (with no icing) (–25°C to 55°C if carry current is 4 A or less)	
Ambient humidity	Operating: 5% to 85%	
Weight	Single- and double-pole: approx. 40 g, three-pole: approx. 50 g, four-pole: approx. 70 g	

Note: 1. The values given above are initial values.

2. The upper limit of 40°C for some Relays is because of the relationship between diode junction temperature and the element used.

■ Endurance Under Real Loads (reference only)

LY1

Rated voltage	Load type	Conditions	Operating frequency	Electrical life
100 VAC	AC motor	400 W, 100 VAC single-phase with 35 A inrush current, 7 A current flow	ON for 10 s, OFF for 50 s	50,000 operations
	AC lamp	300 W, 100 VAC with 51 A inrush current, 3 A current flow	ON for 5 s, OFF for 55 s	100,000 operations
		500 W, 100 VAC with 78 A inrush current, 5 A current flow		25,000 operations
	Capacitor (2,000 µF)	24 VDC with 50 A inrush current, 1 A current flow	ON for 1 s, OFF for 6 s	100,000 operations
	AC solenoid	50 VA with 2.5-A inrush current, 0.25 A current flow	ON for 1 s, OFF for 2 s	1,500,000 operations
		100 VA with 5 A inrush current, 0.5 A current flow		800,000 operations

LY2

Rated voltage	Load type	Conditions	Operating frequency	Electrical life
100 VAC	AC motor	200 W, 100 VAC single-phase with 25 A inrush current, 5 A current flow	ON for 10 s, OFF for 50 s	200,000 operations
	AC lamp	300 W, 100 VAC with 51 A inrush current, 3 A current flow	ON for 5 s, OFF for 55 s	80,000 operations
	Capacitor (2,000 µF)	24 VDC with 50 A inrush current, 1 A current flow	ON for 1 s, OFF for 15 s	10,000 operations
		24 VDC with 20 A inrush current, 1 A current flow		150,000 operations
	AC solenoid	50 VA with 2.5 A inrush current, 0.25 A current flow	ON for 1 s, OFF for 2 s	1,000,000 operations
		100 VA with 5 A inrush current, 0.5 A current flow		500,000 operations

LY4

Rated voltage	Load type	Conditions	Operating frequency	Electrical life
100 VAC	AC motor	200 W, 200 VAC triple-phase with 5 A inrush current, 1 A current flow	ON for 10 s, OFF for 50 s	500,000 operations
		750 W, 200 VAC triple-phase with 18 A inrush current, 3.5 A current flow		70,000 operations
	AC lamp	300 W, 100 VAC with 51 A inrush current, 3 A current flow	ON for 5 s, OFF for 55 s	50,000 operations
	Capacitor (2,000 µF)	24 VDC with 50 A inrush current, 1 A current flow	ON for 1 s, OFF for 15 s	5,000 operations
		24 VDC with 20 A inrush current, 1 A current flow	ON for 1 s, OFF for 2 s	200,000 operations
	AC solenoid	50 VA with 2.5 A inrush current, 0.25 A current flow	ON for 1 s, OFF for 2 s	1,000,000 operations
		100 VA with 5-A inrush current, 0.5 A current flow		500,000 operations

■ Approved Standards

UL 508 Recognitions (File No. 41643)

No. of poles	Coil ratings	Contact ratings	Operations
1	6 to 240 VAC 6 to 125 VDC	15 A, 30 VDC (Resistive) 15 A, 240 VAC (General use) TV-5, 120 VAC 1/2 HP, 120 VAC	6×10^3 25×10^3
2		15 A, 28 VDC (Resistive) 15 A, 120 VAC (Resistive) 12 A, 240 VAC (General use) 1/2 HP, 120 VAC	6×10^3 25×10^3
3 and 4		10 A, 30 VDC (Resistive) 10 A, 240 VAC (General use) 1/3 HP, 240 VAC	6×10^3

CSA 22.2 No. 14 Listings (File No. LR31928)

No. of poles	Coil ratings	Contact ratings	Operations
1	6 to 240 VAC 6 to 125 VDC	15 A, 30 VDC (Resistive) 15 A, 120 VAC (General use) 1/2 HP, 120 VAC TV-5, 120 VAC	6×10^3 25×10^3
2		15 A, 30 VDC (Resistive) 15 A, 120 VAC (Resistive) 1/2 HP, 120 VAC TV-3, 120 VAC	6×10^3
3 and 4		10 A, 30 VDC (Resistive) 10 A, 240 VAC (General use)	

SEV Listings (File No. D3,31/137)

No. of poles	Coil ratings	Contact ratings	Operations
1	6 to 240 VAC 6 to 125 VDC	15 A, 24 VDC 15 A, 220 VAC	6×10^3
2 to 4		10 A, 24 VDC 10 A, 220 VAC	

TÜV (File No. R9251226) (IEC255)

No. of poles	Coil ratings	Contact ratings	Operations
1 to 4	6 to 125 VDC 6 to 240 VAC	LY1, LY1-FD 15 A, 110 VAC ($\cos\phi$=1) 10 A, 110 VAC ($\cos\phi$=0.4) LY2, LY2-FD, LY3, LY3-FD, LY4, LY4-FD 10 A, 110 VAC ($\cos\phi$=1) 7.5 A, 110 VAC ($\cos\phi$=0.4)	100×10^3

VDE Recognitions (No. 9903UG and 9947UG)

No. of poles	Coil ratings	Contact ratings	Operations
1	6, 12, 24, 50, 110, 220 VAC 6, 12, 24, 48, 110 VDC	10 A, 220 VAC ($\cos\phi$=1) 7 A, 220 VAC ($\cos\phi$=0.4) 10 A, 28 VDC (L/R=0 ms) 7 A, 28 VDC (L/R=7 ms)	200×10^3
2		7 A, 220 VAC ($\cos\phi$=1) 4 A, 220 VAC ($\cos\phi$=0.4) 7 A, 28 VDC (L/R=0 ms) 4 A, 28 VDC (L/R=7 ms)	

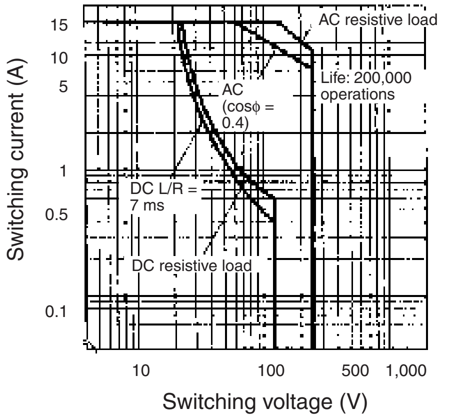
LR Recognitions (No. 563KOB-204523)

No. of poles	Coil ratings	Contact ratings
2, 4	6 to 240 VAC 6 to 110 VDC	7.5 A, 230 VAC (PF0.4) 5 A, 24 VDC (L/R=7 ms)

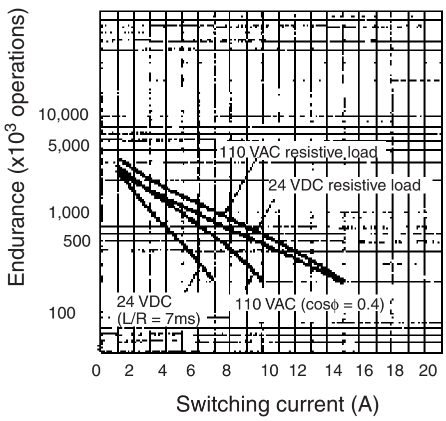
Engineering Data

LY1

Maximum Switching Power

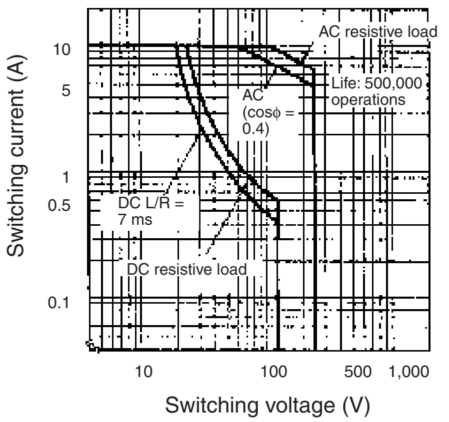


Endurance

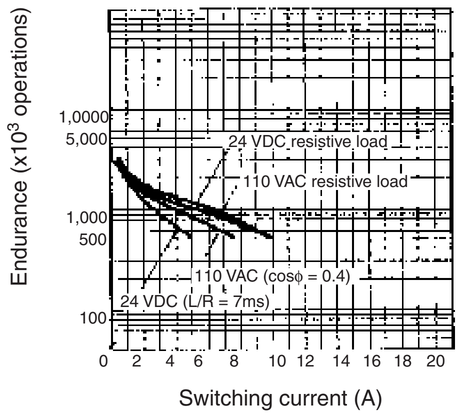


LY2

Maximum Switching Power

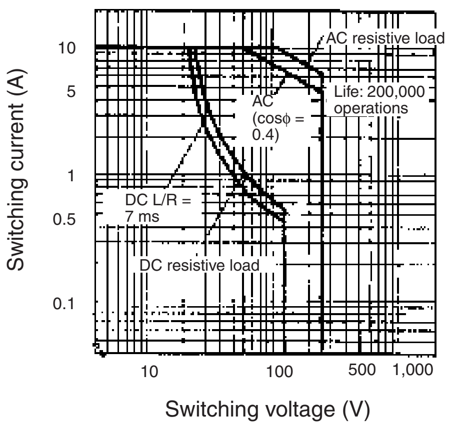


Endurance

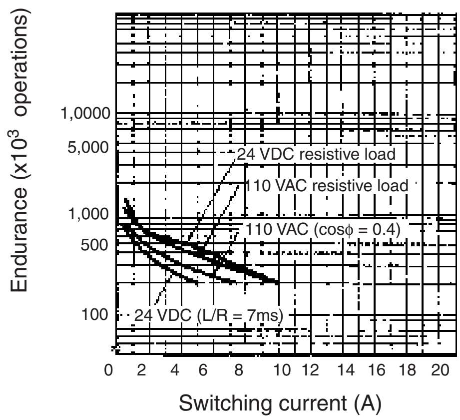


LY3 and LY4

Maximum Switching Power



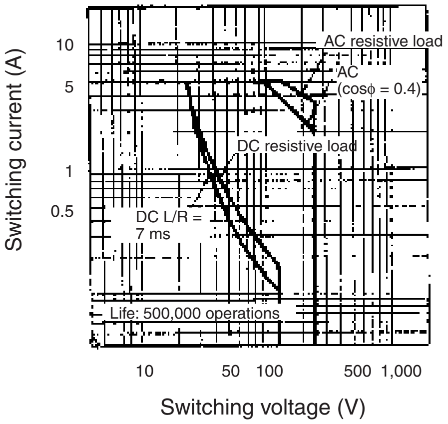
Endurance



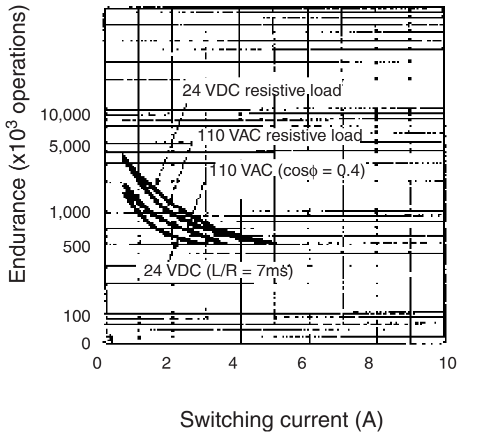
Electromechanical relays

LY2Z

Maximum Switching Power



Endurance

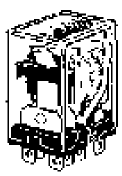


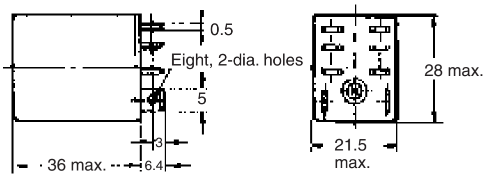
Dimensions

Note: All units are in millimeters unless otherwise indicated.

Relays with Solder/Plug-in Terminals

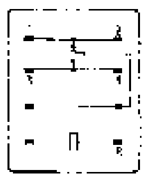
LY1
LY1N (-D2)
LY1-D



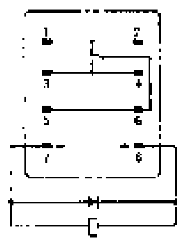


Terminal Arrangement/Internal Connections (Bottom View)

LY1

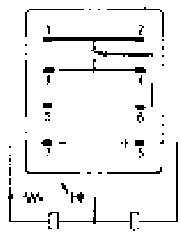


LY1-D

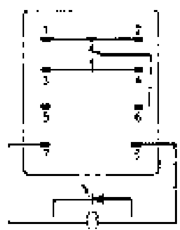


LY1N

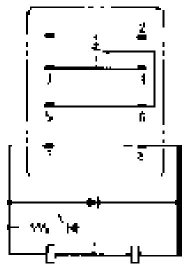
DC Model



AC Model



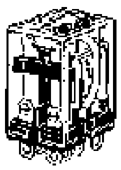
LY1N-D2

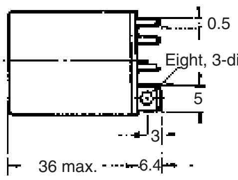


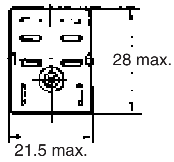
Note: The DC models have polarity.

LY2
LY2-D
LY2N
LY2N-D2

LY2Z
LY2Z-D
LY2ZN
LY2ZN-D2

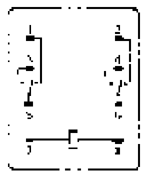




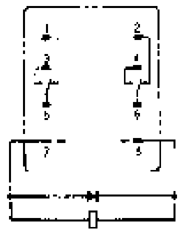


Terminal Arrangement/Internal Connections (Bottom View)

LY2(Z)

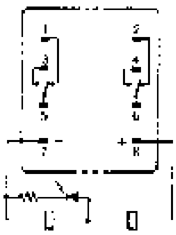


LY2(Z)-D

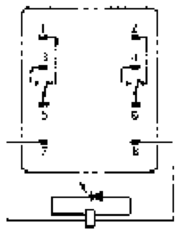


LY2(Z)N

DC Model



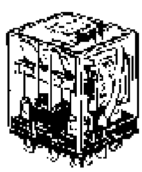
AC Model

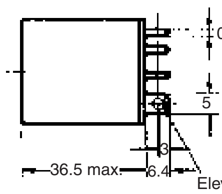


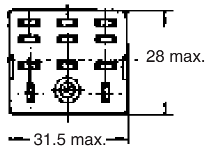
LY2(Z)N-D2

Note: The DC models have polarity.

LY3Z
LY3N
LY3-D

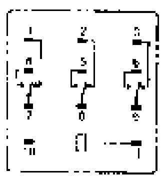




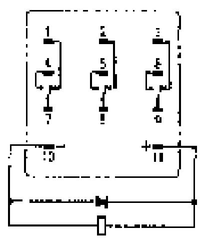


Terminal Arrangement/Internal Connections (Bottom View)

LY3

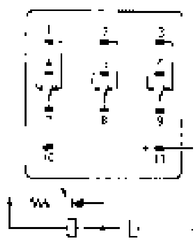


LY3-D

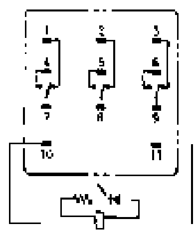


LY3N

DC Model

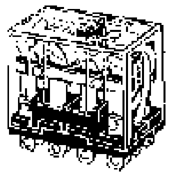


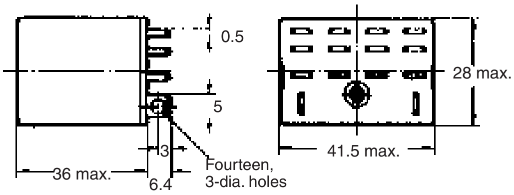
AC Model



Note: The DC models have polarity.

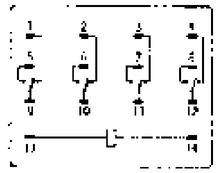
LY4 LY4N
LY4-D LY4N-D2



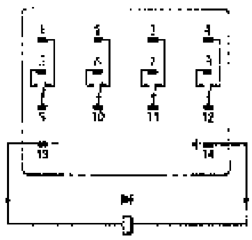


Terminal Arrangement/Internal Connections (Bottom View)

LY4

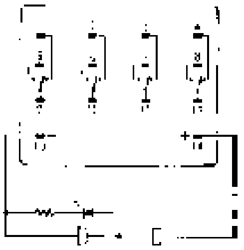


LY4-D

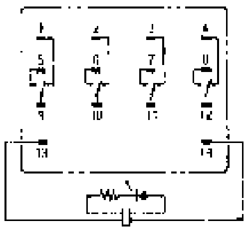


LY4N

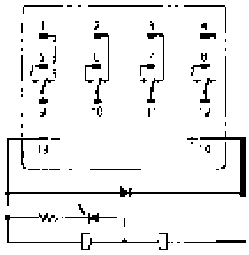
DC Model



AC Model

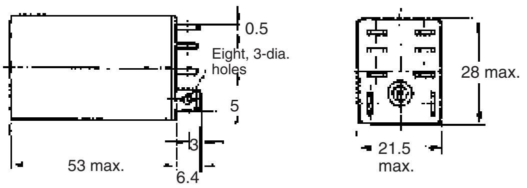


LY4N-D2



Note: The DC models have polarity.

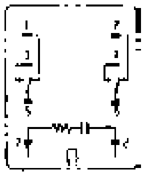
LY2-CR
LY2Z-CR
LY2N-CR
LY2ZN-CR



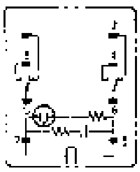
Model: LY2N-CR

Terminal Arrangement/Internal Connections (Bottom View)

LY2(Z)-CR



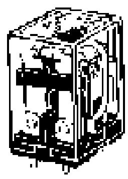
LY2(Z)N-CR

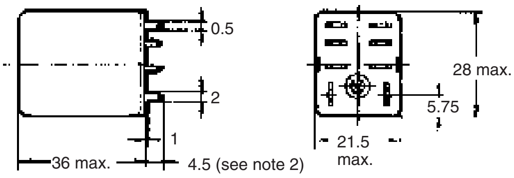


CR Element
C: 0.033 µF
R: 120 Ω

Relays with PCB Terminals

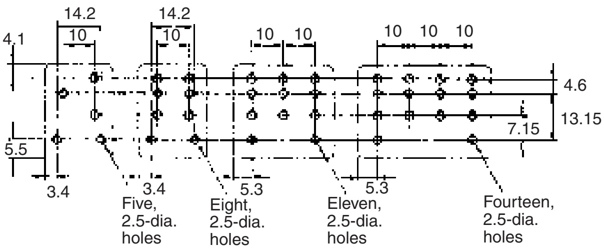
LY1-0 LY3-0
LY2-0 LY4-0





Note: 1. The above model is the LY2-0.
2. This figure is 6.4 for the LY1-0

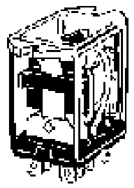
PC Board Holes (Bottom View)

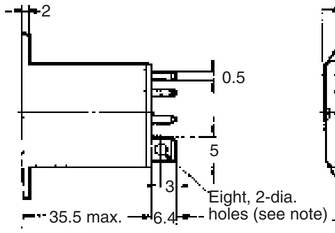


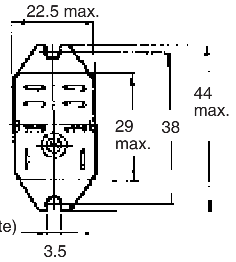
Note: 1. The tolerance for the above figures is 0.1 mm.
2. Besides the terminals, some part of the LY1-0 carries current. Due attention should be paid when mounting the LY1-0 to a double-sided PC board.

Upper-mounting Relays

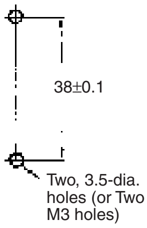
LY1F
LY2F





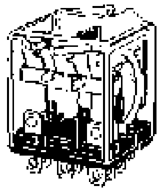


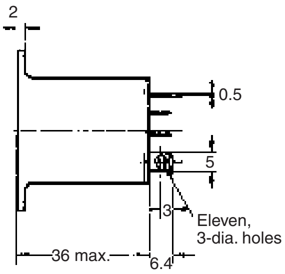
Mounting Holes

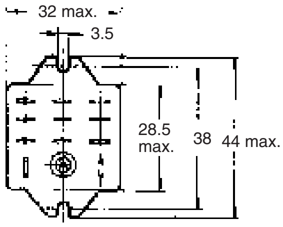


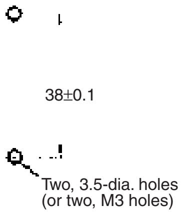
Note: 1. Eight 3-dia. holes should apply to the LY2F model.

LY3F

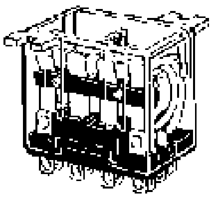


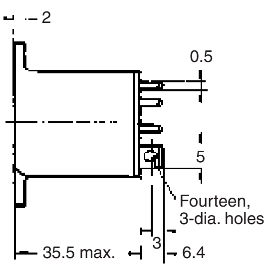


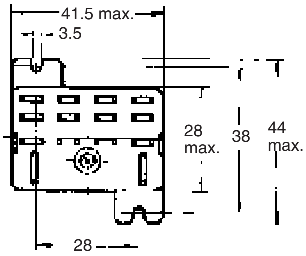




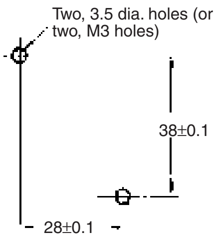
LY4F







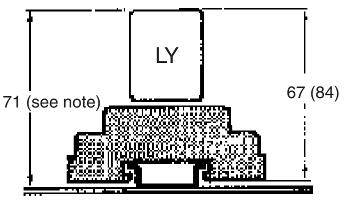
Mounting holes



Mounting Height with Socket

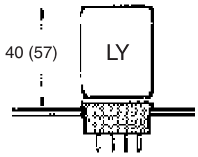
The following Socket heights should be maintained.

Front-connecting



PTF□A (-E)

Back-connecting

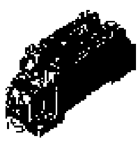


PT□

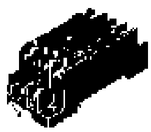
Note:
1. The PTF□A (-E) can be track-mounted or screw-mounted.
2. For the LY□-CR (CR circuit built-in type) model, this figure should be 88.

Sockets

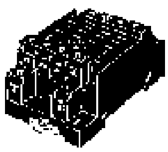
PTF08A-E



PTF11A

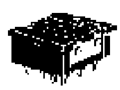


PTF14A-E



PT08

PT11

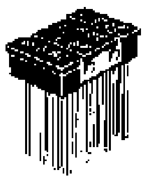


PT14

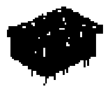
PT08QN

PT11QN

PT14QN

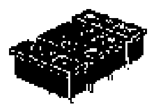


PT08-0



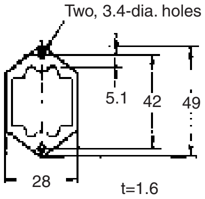
PT11-0

PT14-0

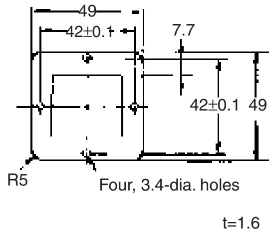


Mounting Plates for Back-connecting

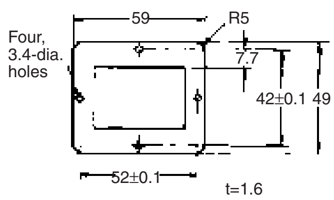
PYP-1



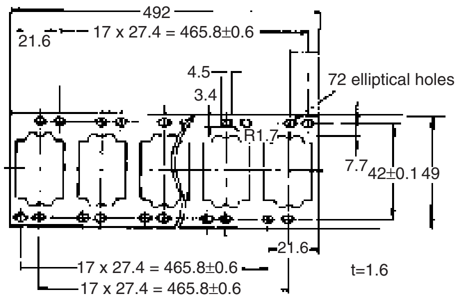
PTP-1-3



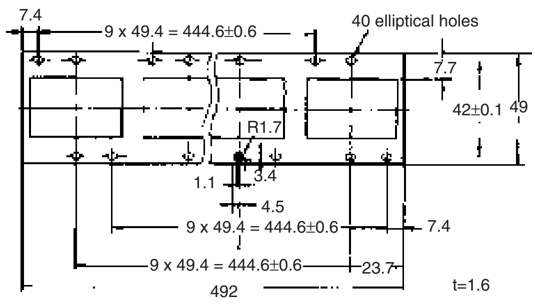
PTP-1



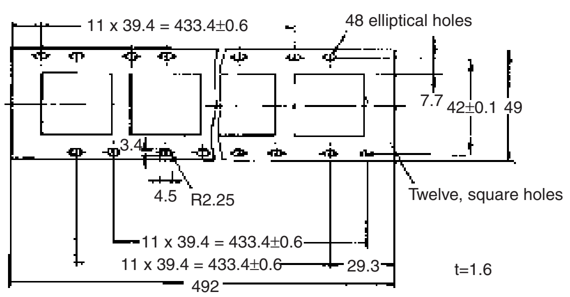
PYP-18



PTP-10

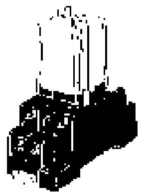
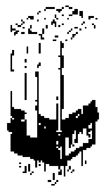
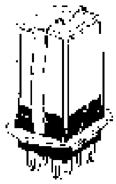
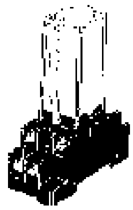
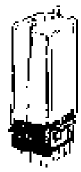


PTP-12



■ Hold-down Clips

Hold-down clips are used to hold Relays to Sockets and prevent them from coming loose due to vibration or shock.

Used with Socket		Used with Socket mounting plate	For CR circuit built-in Relay	
PYC-A1	PYC-P	PYC-S	Y92H-3	PYC-1
				

Precautions

Refer to CD for general precautions.

■ Connections

Do not reverse polarity when connecting DC-operated Relays with built-in diodes or indicators.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J002-E2-10

General-purpose Relay
MK-I/-S

Exceptionally Reliable General-purpose Relay Features Mechanical Indicator/Push Button

- Breaks relatively large load currents despite small size.
- Long life (minimum 100,000 electrical operations) assured by silver contacts.
- Built-in operation indicator (Mechanical, LED), push button, diode surge suppression, varistor surge suppression.
- Standard models are UL, CSA, SEV, DEMKO, NEMKO, SEMKO, TÜV (IEC), and VDE.
- Conforming to CENELEC standards.

Model Number Structure

■ Model Number Legend

Standard Models

MK □ □ □ - □ - □ □
1 2 3 4 5 6

1. **Contact Form**
   2: DPDT
   3: 3PDT
2. **Cover**
   P: Dust cover
3. **Internal Connection Construction**
   Blank: Standard
   2 or 5: Non-standard connection
   (Refer to *Terminal Arrangement/ Internal Connections)*
4. **Mechanical Indicator Push Button**
   S: Mechanical indicator and push button
   I: Mechanical indicator
5. **Approved Standards**
   Blank: UL, CSA, DEMKO, NEMKO SEMKO, SEV, TÜV
   VD: VDE
6. **Rated Voltage**
   (Refer to *Coil Ratings*)

Special Accessories

MK □ □ □ □ - □ - □ - □ □
1 2 3 4 5 6 7 8

1. **Contact Form**
   2: DPDT
   3: 3PDT
2. **Cover**
   P: Dust cover
3. **Classification**
   N: LED indicator
   D: Diode
   V: Varistor
   ND: LED indicator and diode
   NV: LED indicator and varistor
4. **Coil Polarity**
   Blank: Standard
   1: Reverse
   (Refer to *Terminal Arrangement/ Internal Connections)*
5. **Internal Connection Construction**
   Blank: Standard
   2 or 5: Non-standard connection
   (Refer to *Terminal Arrangement/ Internal Connections)*
6. **Mechanical Indicator Push Button**
   S: Mechanical indicator and push button
   I: Mechanical indicator
7. **Approved Standards**
   Blank: UL and CSA only
   VD: VDE (N and D models only)
8. **Rated Voltage**
   (Refer to *Coil Ratings*)

Ordering Information

■ List of Models

Type	Terminal	Contact form	Internal connection (see note 3)	With mechanical indicator	With mechanical indicator and pushbutton	Coil ratings	Approved standards
Standard	Plug-in	DPDT	Standard	MK2P-I	MK2P-S	AC (∿), DC (⎓)	UL, CSA, SEV, DEMKO, NEMKO, SEMKO, TÜV
			Non-standard	MK2P2-I	MK2P2-S		
		3PDT	Standard	MK3P-I	MK3P-S		
			Non-standard	MK3P2-I MK3P5-I	MK3P2-S MK3P5-S		
LED Indicator (see note 2)		DPDT	Standard	MK2PN□-I	MK2PN□-S	AC (∿), DC (⎓)	UL, CSA
			Non-standard	MK2PN□-2-I	MK2PN□-2-S		
		3PDT	Standard	MK3PN□-I	MK3PN□-S		
			Non-standard	MK3PN□-2-I MK3PN□-5-I	MK3PN□-2-S MK3PN□-5-S		
Diode (see note 2)		DPDT	Standard	MK2PD□-I	MK2PD□-S	DC (⎓)	UL, CSA
			Non-standard	MK2PD□-2-I	MK2PD□-2-S		
		3PDT	Standard	MK3PD□-I	MK3PD□-S		
			Non-standard	MK3PD□-2-I MK3PD□-5-I	MK3PD□-2-S MK3PD□-5-S		
Varistor		DPDT	Standard	MK2PV-I	MK2PV-S	AC (∿)	UL, CSA
			Non-standard	MK2PV-2-I	MK2PV-2-S		
		3PDT	Standard	MK3PV-I	MK3PV-S		
			Non-standard	MK3PV-2-I MK3PV-5-I	MK3PV-2-S MK3PV-5-S		
VDE approved		DPDT	Standard	MK2P-I-VD	MK2P-S-VD	AC (∿), DC (⎓)	UL, CSA, SEV, DEMKO, NEMKO, SEMKO, TÜV, VDE
			Non-standard	MK2P2-I-VD	MK2P2-S-VD		
		3PDT	Standard	MK3P-I-VD	MK3P-S-VD		
			Non-standard	MK3P2-I-VD MK3P5-I-VD	MK3P2-S-VD MK3P5-S-VD		
LED Indicator VDE approved		DPDT	Standard	MK2PN-I-VD	MK2PN-S-VD	AC (∿), DC (...)	UL, CSA, VDE
			Non-standard	MK2PN-2-I-VD	MK2PN-2-S-VD		
		3PDT	Standard	MK3PN-I-VD	MK3PN-S-VD		
			Non-standard	MK3PN-2-I-VD	MK3PN-2-S-VD		
				MK3PN-5-I-VD	MK3PN-5-S-VD		
Diode VDE approved		DPDT	Standard	MK2PD-I-VD	MK2PD-S-VD	DC (...)	UL, CSA, VDE
			Non-standard	MK2PD-2-I-VD	MK2PD-2-S-VD		
		3PDT	Standard	MK3PD-I-VD	MK3PD-S-VD		
			Non-standard	MK3PD-2-I-VD	MK3PD-2-S-VD		
				MK3PD-5-I-VD	MK3PD-5-S-VD		

Note: **1.** When ordering, add the rated voltage to the model number. Rated voltages are given in the coil ratings table in *Specifications*.

Example: MK3P5-S 230 VAC

Rated voltage

2. This DC coil comes in two types: standard coil polarity and reversed coil polarity. Refer to *Terminal Arrangement/Internal Connections.*

Example: MK2PN1-I 24 VDC

Reverse polarity

3. Refer to *Terminal Arrangement/Internal Connections* for non-standard internal connection.

4. The gold plating thickness depends on the request.

Example: MK3P-I AP3 24 VAC

Gold plating thickness: 3 µm

■ Accessories (Order Separately)

Item		Model
DIN-rail-mounted Socket	8-pin type	PF083A-E
	11-pin type	PF113A-E
Hold-down Clip		PFC-A1

Specifications

■ Coil Ratings

UL, CSA, DEMKO, NEMKO, SEMKO, SEV, TÜV

Rated voltage		Rated current		Coil resistance	Must operate voltage	Must release voltage	Max. voltage	Power consumption
		60 Hz	50 Hz					
AC (∿)	6 V	360 mA	404 mA	3.9 Ω	80% max. of rated voltage	30% min. of rated voltage	90% to110% of rated voltage	Approx. 2.3 VA (at 60 Hz) Approx. 2.7 VA (at 50 Hz)
	12 V	180 mA	202 mA	16.9 Ω				
	24 V	88.0 mA	98.0 mA	62.0 Ω				
	50 V	39.0 mA	46.3 mA	330 Ω				
	100 V	24.8 mA	28.4 mA	1,010 Ω				
	110 V	21.0 mA	24.7 mA	1,240 Ω				
	120 V	18.0 mA	20.2 mA	1,520 Ω				
	200 V	12.1 mA	14.2 mA	4,520 Ω				
	220 V	11.0 mA	12.9 mA	5,130 Ω				
	230 V	10.5 mA	12.3 mA	6,170 Ω				
	240 V	9.2 mA	10.3 mA	6,450 Ω				
DC (⎓)	6 V	255 mA		23.5 Ω		15% min. of rated voltage		Approx. 1.5 W
	12 V	126 mA		95 Ω				
	24 V	56 mA		430 Ω				
	48 V	29.5 mA		1,630 Ω				
	100 V	14.7 mA		6,800 Ω				
	110 V	15.1 mA		7,300 Ω				

VDE

Rated voltage		Rated current		Coil resistance	Must operate voltage	Must release voltage	Max. voltage	Power consumption
		50 Hz	60 Hz					
AC (∿)	6 V	380 mA	325 mA	4.4 Ω	80% max. of rated voltage	30% min. of rated voltage	90% to110% of rated voltage	Approx. 2.0 VA (at 60 Hz) Approx. 2.4 VA (at 50 Hz)
	12 V	175 mA	145 mA	19.0 Ω				
	24 V	91.0 mA	76.5 mA	70.7 Ω				
	50 V	42.0 mA	36.0 mA	330 Ω				
	100 V	24.0 mA	20.5 mA	1,150 Ω				
	110 V	21.5 mA	18.0 mA	1,400 Ω				
	120 V	20.0 mA	17.0 mA	1,600 Ω				
	200 V	11.2 mA	9.4 mA	5,110 Ω				
	220 V	10.2 mA	8.7 mA	5,800 Ω				
	230 V	9.6 mA	8.1 mA	6,990 Ω				
	240 V	9.4 mA	7.9 mA	7,400 Ω				
DC (⎓)	6 V	225 mA		26.7 Ω		15% min. of rated voltage		Approx. 1.3 W
	12 V	116 mA		107 Ω				
	24 V	56.0 mA		440 Ω				
	48 V	29.0 mA		1,660 Ω				
	100 V	13.1 mA		7,660 Ω				
	110 V	12.5 mA		8,720 Ω				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/-20% for AC rated current and ±15% for DC coil resistance.

2. Performance characteristic data are measured at a coil temperature of 23°C.

3. ∿ indicates AC and ⎓ indicates DC (IEC417 publications).

4. For 200 VDC applications, a 100-VDC Relay is supplied with a fixed 6.8 kΩ, 30 W resistor. Be sure to connect the resistor in series with the coil.

5. For models with the LED indicator built in, add an LED current of approximately 0 through 5 mA to the rated current.

■ Contact Ratings

Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4)
Contact mechanism	Single	
Contact material	Ag	
Rated load	10 A at 250 VAC 10A at 28 VDC	7 A at 250 VAC
Rated carry current	10 A	
Max. switching voltage	250 VAC, 250 VDC	
Max. switching current	10 A	
Max. switching power	2,500 VA, 280 W	1,750 VA

■ Characteristics

Contact resistance	50 mΩ max.
Operate time	AC: 20 ms max. DC: 30 ms max.
Release time	20 ms max.
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min between coil and contacts; 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity, terminals of the same polarity; 2,500 VAC, 50/60 Hz fro 1 min between current-carrying parts, non-current-carrying parts, and terminals of opposite polarity
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.5-mm single amplitude (1.0-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 100 m/s^2 (approx. 10G);
Endurance	Mechanical: 10,000,000 operations min. (at operating frequency of 18,000 operations/hour) Electrical: Refer to *Engineering Data*.
Error rate (reference value)	10 mA at 1 VDC
Ambient temperature	Operating: –10°C to 40°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 85 g

Note: The data shown are initial values.

■ Approved Standards

The following ratings apply to all models.

UL 508 (File No. E41515)/CSA 22.2 No.0/14 (File No. LR35535)

Coil ratings	Contact ratings	Operations
6 to 110 VDC 6 to 240 VAC	10 A, 28 VDC (resistive) 10 A, 250 VAC (resistive) 7 A, 250 VAC (general use)	100,000 cycles

SEV, DEMKO, NEMKO

Coil ratings	Contact ratings	Operations
6 to 110 V⎓ 6 to 240 V∿	10 A, 250 V∿ (NO) (cosϕ = 1) 5 A, 250 V∿ (NC) (cosϕ = 1) 10 A, 28 V⎓ (NO) 5 A, 28 V⎓ (NC) 7 A, 250 V∿ (cosϕ = 0.4)	100,000 cycles

SEMKO

Coil ratings	Contact ratings	Operations
6 to 110 V⎓ 6 to 240 V∿	10 A, 250 V∿ (NO) (cosϕ = 1) 5 A, 250 V∿ (NC) (cosϕ = 1)	100,000 cycles

TÜV (VDE 0435 Teil 201/05’90, IEC 255 Teil 1-00/’75, EN 60950/’88

(TÜV File No.: R9051410)

Coil ratings	Contact ratings	Conditions	Operations
6, 12, 24, 48, 100 110 V⎓ 6, 12, 24, 50, 100, 110 115, 120, 200, 220 230, 240 V∿	10 A, 250 V∿ (cosϕ = 1) 10 A, 28 V⎓ 7 A, 250 V∿ (cosϕ = 0.4)	IEC 255-1-00 Item 3.1.4 Pollution Degree 3, Overvoltage Category II Pick up class - class 2 Temperature class - class b	100,000 cycles

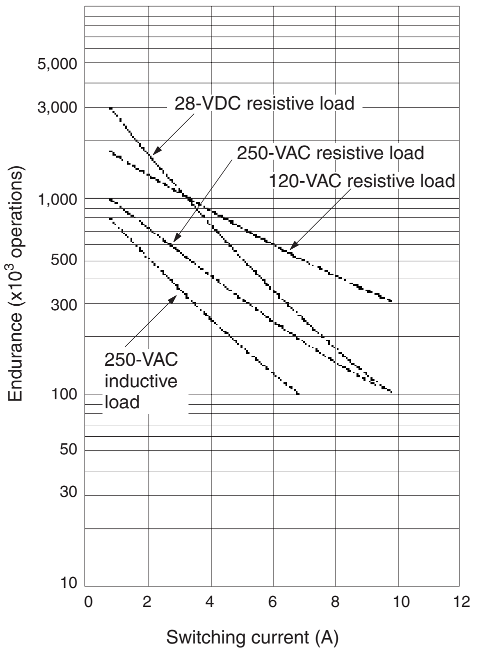
VDE (VDE 0435 Teil 201/05’83, IEC 255 Teil 1-00/’75)

(VDE File No.: NR 5340)

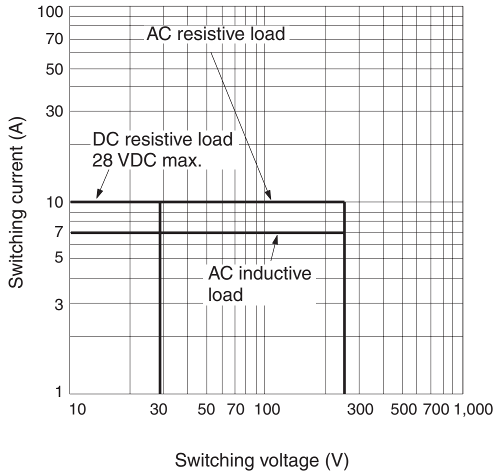
Coil ratings	Contact ratings	Conditions	Operations
6, 12, 24, 48, 100 110 V⎓ 6, 12, 24, 50, 100, 110 115, 120, 200, 220 230, 240 V∿	10 A, 250 V∿ (cosϕ = 1) 10 A, 28 V⎓ 7 A, 250 V∿ (cosϕ = 0.4)	C/250 - class 1, class C	100,000 cycles

Engineering Data

■ Electrical Endurance



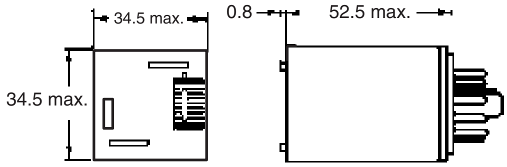
■ Maximum Switching Power



Dimensions

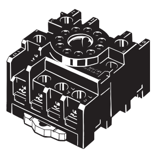
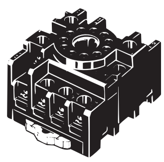
Note: All units are in millimeters unless otherwise indicated.

■ Relays



Sockets

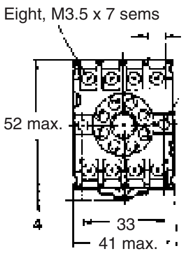
See below for Socket dimensions.

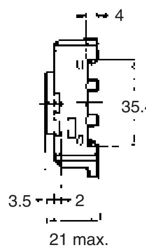
Socket	Surface-mounting Socket (for DIN-rail or screw mounting)	
	Finger-protection models	---
Maximum carry current	10 A	5 A
2 poles	PF083A-E	PF083A
3 poles	PF113A-E 	PF113A 

Note: Use the Surface-mounting Sockets (i.e., finger-protection models) with "-E" at the end of the model number. When using the PF083A and PF113A, be sure not to exceed the Socket's maximum carry current of 5 A. Using at a current exceeding 5 A may lead to burning. Round terminals cannot be used for finger-protection models. Use Y-shaped terminals.

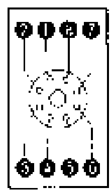
Electromechanical relays

PF083A-E (Conforming to EN 50022)

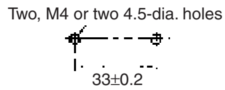




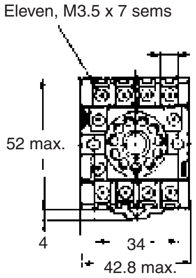
Terminal Arrangement

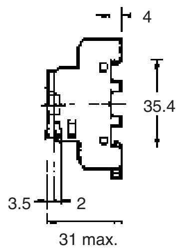


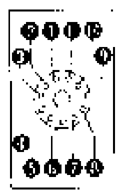
Mounting Holes

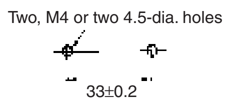


PF113A-E (Conforming to EN 50022)



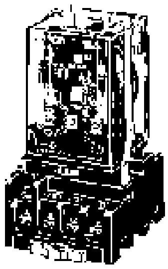






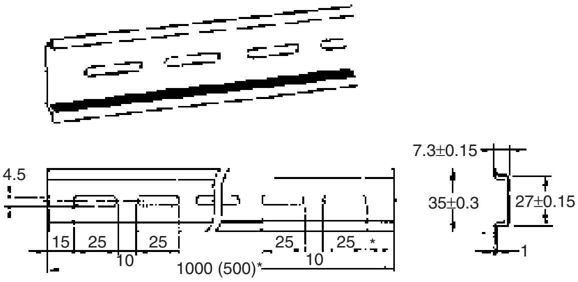
Hold-down Clips

PFC-A1



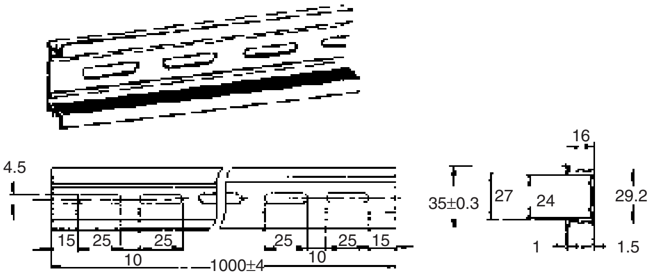
Mounting DIN-rails

PFP-100N, PFP-50N
(Conforming to EN 50022)



* This dimension applies to the PFP-50N Mounting Track.

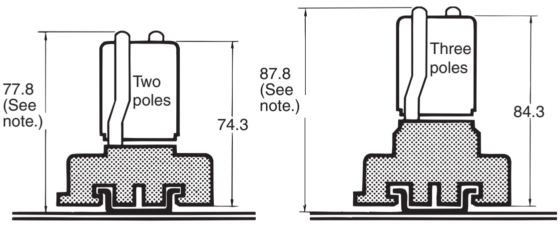
PFP-100N2
(Conforming to EN 50022)



* A total of twelve 25 x 4.5 elliptic holes is provided with six holes cut from each track end at a pitch of 10 mm.

Mounting Height with Sockets

Surface-mounting Sockets

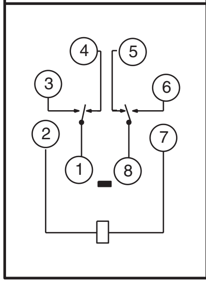
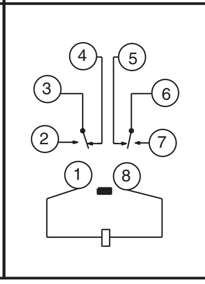
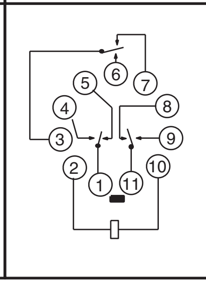
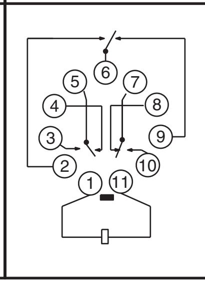
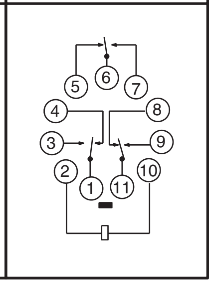


PF083A(-E) PF113A(-E)

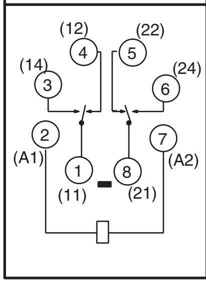
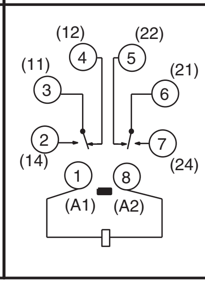
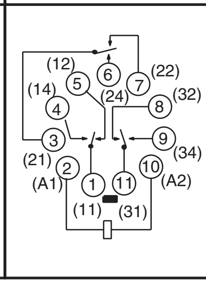
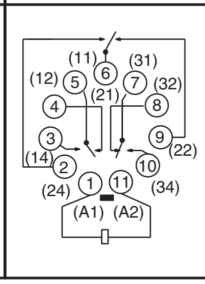
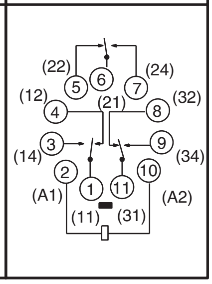
Note: PF083A(-E) and PF113A(-E) allow either DIN-rail or screw mounting.

Terminal Arrangement/Internal Connection (Bottom View)

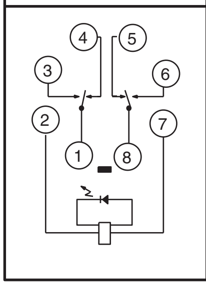
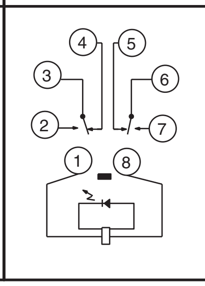
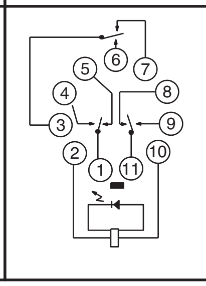
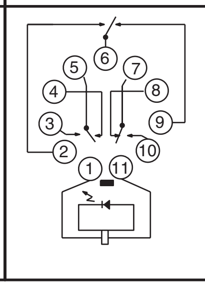
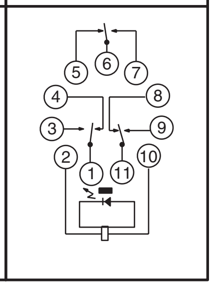
Standard
(AC/DC Coil)

MK2P-I, -S	MK2P2-I, -S	MK3P-I, -S	MK3P2-I, -S	MK3P5-I, -S
				

VDE-approved Type
(AC/DC Coil)
( ): Dual Numbering

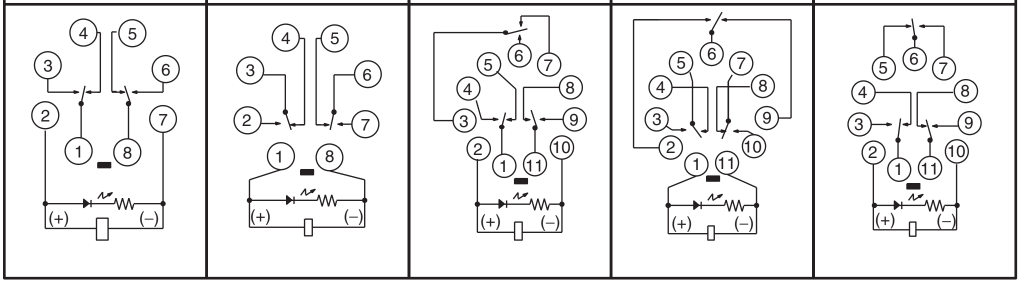
MK2P-I-VD, -S-VD	MK2P2-I-VD, -S-VD	MK3P-I-VD, -S-VD	MK3P2-I-VD, -S-VD	MK3P5-I-VD, -S-VD
				

LED Indicator Type
(AC Coil)

MK2PN-I, -S	MK2PN-2-I, -S	MK3PN-I, -S	MK3PN-2-I, -S	MK3PN-5-I, -S
				

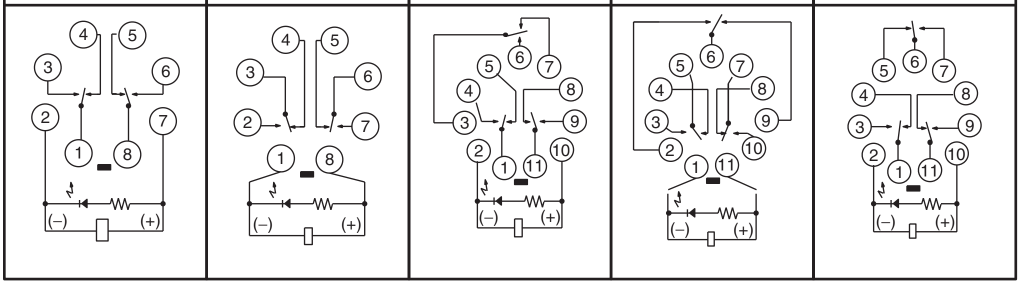
LED Indicator Type (DC Coil: Standard Polarity)

MK2PN-I, -S	MK2PN-2-I, -S	MK3PN-I, -S	MK3PN-2-I, -S	MK3PN-5-I, -S



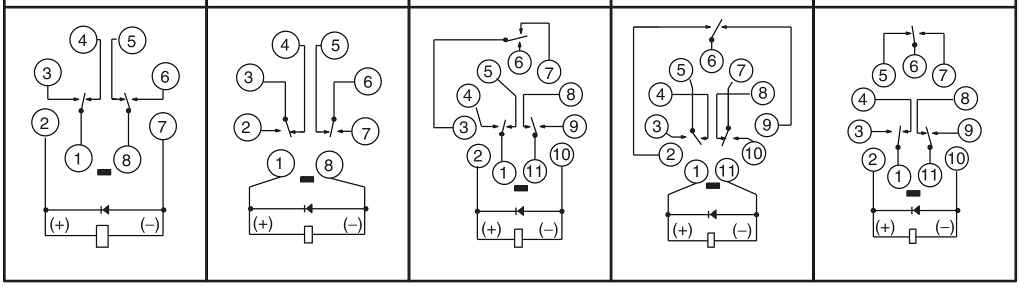
LED Indicator Type (DC Coil: Reverse Polarity)

MK2PN1-I, -S	MK2PN1-2-I, -S	MK3PN1-I, -S	MK3PN1-2-I, -S	MK3PN1-5-I, -S



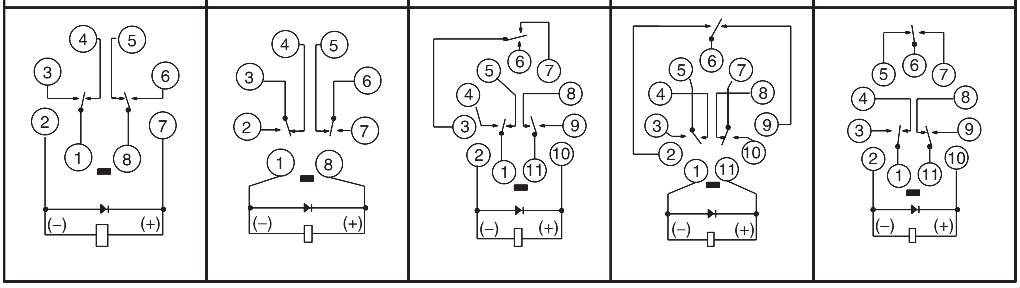
Diode Type (DC Coil: Standard Polarity)

MK2PD-I, -S	MK2PD-2-I, -S	MK3PD-I, -S	MK3PD-2-I, -S	MK3PD-5-I, -S



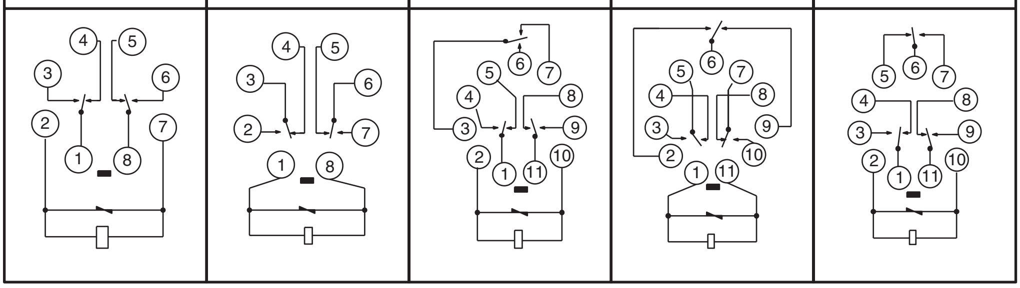
Diode Type (DC Coil: Reverse Polarity)

MK2PD1-I, -S	MK2PD1-2-I, -S	MK3PD1-I, -S	MK3PD1-2-I, -S	MK3PD1-5-I, -S

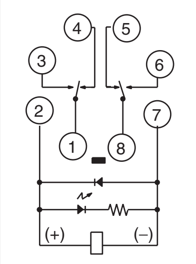
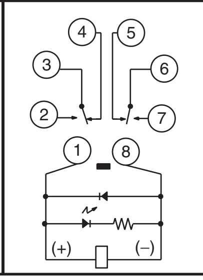
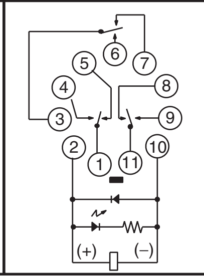
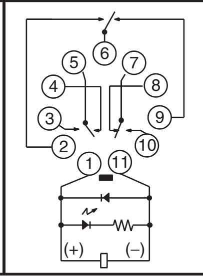
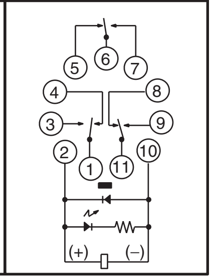


Varistor Type (AC Coil)

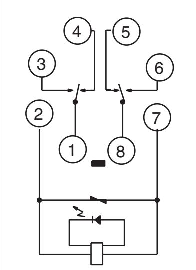
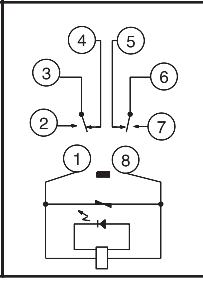
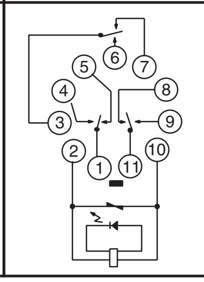
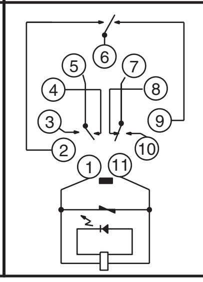
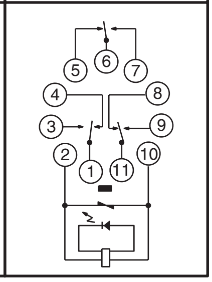
MK2PV-I, -S	MK2PV-2-I, -S	MK3PV-I, -S	MK3PV-2-I, -S	MK3PV-5-I, -S



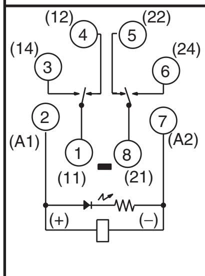
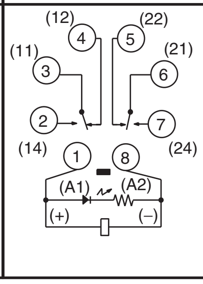
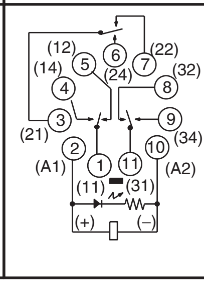
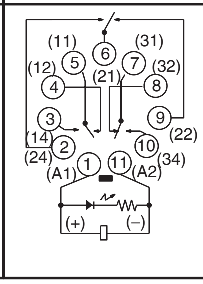
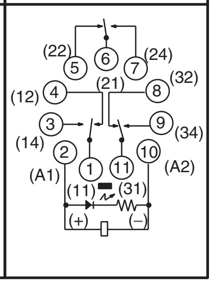
LED Indicator and Diode Type (DC Coil)

MK2PND-I, -S	MK2PND-2-I, -S	MK3PND-I, -S	MK3PND-2-I, -S	MK3PND-5-I, -S
				

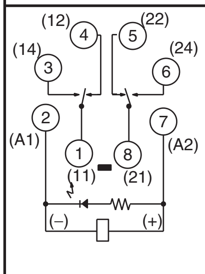
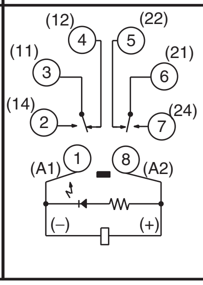
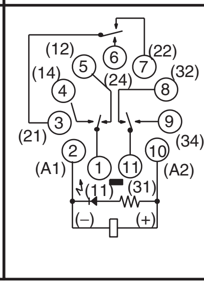
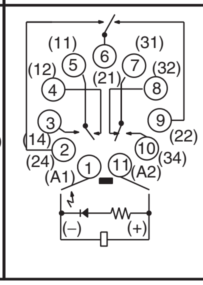
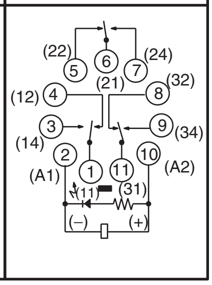
LED Indicator and Varistor Type (AC Coil)

MK2PNV-I, -S	MK2PNV-2-I, -S	MK3PNV-I, -S	MK3PNV-2-I, -S	MK3PNV-5-I, -S
				

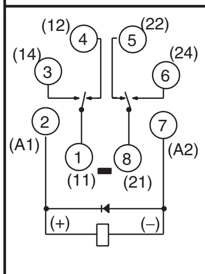
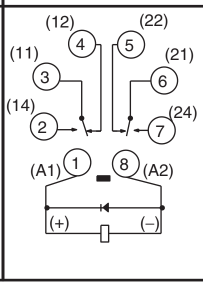
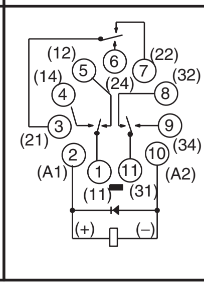
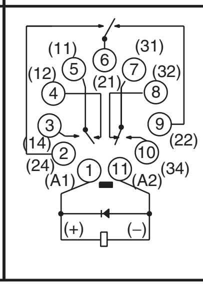
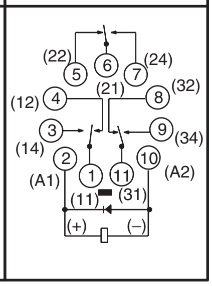
VDE Approved Type LED Indicator Type (DC Coil: Standard Polarity) ( ): Dual Numbering

MK2PN-I-VD, -3-VD	MK2PN-2-I-VD, -3-VD	MK3PN-I-VD, -S-VD	MK3PN-2-I-VD, -S-VD	MK3PN-5-I-VD, -S-VD
				

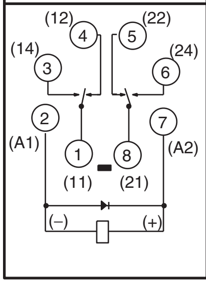
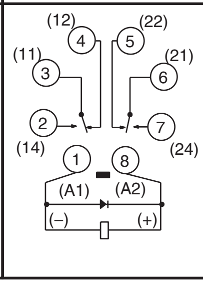
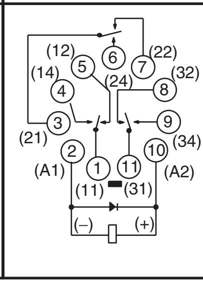
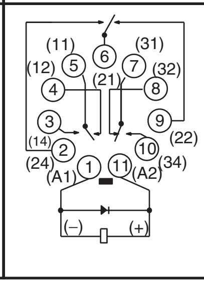
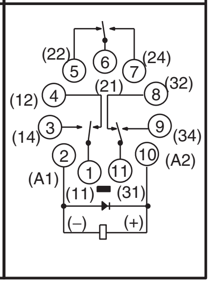
VDE Approved Type LED Indicator Type (DC Coil: Reverse Polarity)

MK2PN1-I-VD, -S-VD	MK2PN1-2-I-VD, -S-VD	MK3PN1-I-VD, -S-VD	MK3PN1-2-I-VD, -S-VD	MK3PN1-5-I-VD, -S-VD
				

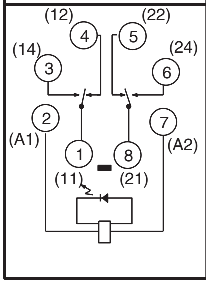
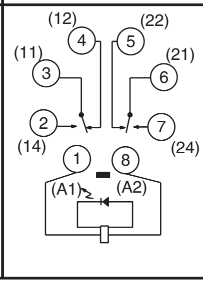
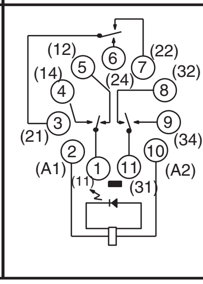
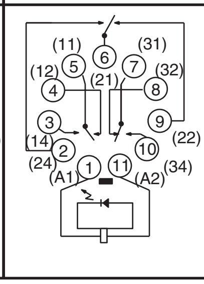
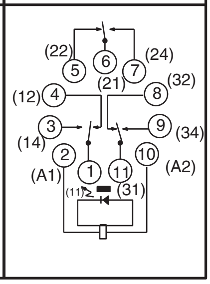
VDE Approved Type Diode Type (DC Coil: Standard Polarity)

MK2PD-I-VD, -S-VD	MK2PD-2-I-VD, -S-VD	MK3PD-I-VD, -S-VD	MK3PD-2-I-VD, -S-VD	MK3PD-5-I-VD, -S-VDS
				

VDE Approved Type
Diode Type
(DC Coil:
Reverse Polarity)

MK2PD1-I-VD, -S-VD	MK2PD1-2-I-VD, -S-VD	MK3PD1-I-VD, -S-VD	MK3PD1-2-I-VD, -S-VD	MK3PD1-5-I-VD, -S-VD
				

VDE Approved Type
LED Indicator Type
(AC Coil)

MK2PN-I-VD, -S-VD	MK2PN-2-I-VD, -S-VD	MK3PN-I-VD, -S-VD	MK3PN-2-I-VD, -S-VD	MK3PN-5-I-VD, -S-VD
				

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Power Relay
G7J

A High-capacity, High-dielectric-strength, Multi-pole Relay Used Like a Contactor

- Miniature hinge for maximum switching power for motor loads as well as resistive and inductive loads.
- No contact chattering for momentary voltage drops up to 50% of rated voltage.
- Withstanding more than 4 kV between contacts that are different in polarity and between the coil and contacts.
- Flame-resistant materials (UL94V-0-qualifying) used for all insulation material.
- Standard models approved by UL and CSA.

Model Number Structure

■ Model Number Legend

G7J - □ - □ - □
1 2 3

1. Contact Form
4A: 4PST-NO
3A1B: 3PST-NO/SPST-NC
2A2B: DPST-NO/DPST-NC

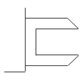
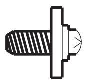
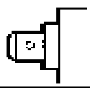
2. Terminal Shape
P: PCB terminals
B: Screw terminals
T: Quick-connect terminals (#250 terminal)

3. Contact Structure
Z: Bifurcated contact
None: Single contact

Note: For bifurcated contact type, output is 1NO (4PST-NO) or 1NC (3PST-NO/SPST-NC).

Ordering Information

■ List of Models

Mounting type	Contact form	PCB terminals 	Screw terminals 	Quick-connect terminals 
PCB mounting	4PST-NO	G7J-4A-P, G7J-4A-PZ	---	---
	3PST-NO/SPST-NC	G7J-3A1B-P, G7J-3A1B-PZ	---	---
	DPST-NO/DPST-NC	G7J-2A2B-P	---	---
W-bracket (see note)	4PST-NO	---	G7J-4A-B, G7J-4A-BZ	G7J-4A-T, G7J-4A-TZ
	3PST-NO/SPST-NC	---	G7J-3A1B-B, G7J-3A1B-BZ	G7J-3A1B-T, G7J-3A1B-TZ
	DPST-NO/DPST-NC	---	G7J-2A2B-B	G7J-2A2B-T

Note: These Relays need a W-bracket (sold separately) for mounting.
When ordering specify the voltage.
Example: G7J-4A-P 240 VAC
Rated coil voltage

PCB Terminals

Contact form	Rated voltage (V)	Model
4PST-NO	24, 50, 100 to 120, 200 to 240 VAC	G7J-4A-P
	12, 24, 48, 100 VDC	
3PST-NO/ SPST-NC	24, 50, 100 to 120, 200 to 240 VAC	G7J-3A1B-P
	12, 24, 48, 100 VDC	
DPST-NO/DPST-NC	24, 50, 100 to 120, 200 to 240 VAC	G7J-2A2B-P
	12, 24, 48, 100 VDC	

PCB Terminals (Bifurcated Contact)

Contact form	Rated voltage (V)	Model
4PST-NO	200 to 240 VAC 24 VDC	G7J-4A-PZ
3PST-NO/ SPST-NC	12, 24 VDC	G7J-3A1B-PZ

W-bracket Screw Terminals

Contact form	Rated voltage (V)	Model
4PST-NO	24, 50, 100 to 120, 200 to 240 VAC	G7J-4A-B
	12, 24, 48, 100 VDC	
3PST-NO/ SPST-NC	24, 50, 100 to 120, 200 to 240 VAC	G7J-3A1B-B
	12, 24, 48, 100 VDC	
DPST-NO/ DPST-NC	24, 50, 100 to 120, 200 to 240 VAC	G7J-2A2B-B
	12, 24, 48, 100 VDC	

■ Accessories (Order Separately)

Name	Model	Applicable Relay
W-bracket	R99-04 for G5F	G7J-4A-B G7J-3A1B-B G7J-2A2B-B G7J-4A-T G7J-3A1B-T G7J-2A2B-T

Screw Terminals (Bifurcated Contact)

Contact form	Rated voltage (V)	Model
3PST-NO/ SPST-NC	200 to 240 VAC	G7J-3A1B-BZ
	6, 12, 24, 48, 100 VDC	

Tab Terminals

Contact form	Rated voltage (V)	Model
4PST-NO	24, 50, 100 to 120, 200 to 240 VAC	G7J-4A-T
	12, 24, 48, 100 VDC	
3PST-NO/ SPST-NC	24, 50, 100 to 120, 200 to 240 VAC	G7J-3A1B-T
	12, 24, 48, 100 VDC	
DPST-NO/ DPST-NC	24, 50, 100 to 120, 200 to 240 VAC	G7J-2A2B-T
	12, 24, 48, 100 VDC	

Tab Terminals (Bifurcated Contact)

Contact form	Rated voltage (V)	Model
4PST-NO	200 to 240 VAC	G7J-4A-TZ

Consult your OMRON representative for details on models not mentioned in this document.

Application Examples

- Compressors for air conditioners and heater switching controllers.
- Switching controllers for power tools or motors.
- Lamp controls, motor drivers, and power supply switching controllers in copy machines, facsimile machines, and other office equipment.
- Power controllers for packers or food processing equipment.
- Power controllers for inverters.

Specifications

■ Coil Ratings

Rated voltage		Rated current	Coil resistance	Must-operate voltage	Must-release voltage	Max. voltage	Power consumption
AC	**24 VAC**	75 mA	---	75% max. of rated voltage	15% min. of rated voltage	110% of rated voltage	Approx. 1.8 to 2.6 VA
	50 VAC	36 mA	---				
	100 to 120 VAC	18 to 21.6 mA	---				
	200 to 240 VAC	9 to 10.8 mA	---				
DC	**6 VDC**	333 mA	18 Ω		10% min. of rated voltage		Approx. 2.0 W
	12 VDC	167 mA	72 Ω				
	24 VDC	83 mA	288 Ω				
	48 VDC	42 mA	1,150 Ω				
	100 VDC	20 mA	5,000 Ω				

Note: **1.** The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for AC rated current and ±15% for DC coil resistance. (The values given for AC rated current apply at 50 Hz or 60 Hz.)

2. Performance characteristic data are measured at a coil temperature of 23°C.

3. The maximum voltage is one that is applicable to the Relay coil at 23°C.

■ Contact Ratings

Item	Resistive load (cos ϕ = 1)	Inductive load (cosϕ = 0.4)	Resistive load
Contact mechanism	Double break		
Contact material	Ag alloy		
Rated load	NO: 25 A at 220 VAC (24 A at 230 VAC) NC: 8 A at 220 VAC (7.5 A at 230 VAC)		NO: 25 A at 30 VDC NC: 8 A at 30 VDC
Rated carry current	NO: 25 A (1 A) NC: 8 A (1 A)		
Max. switching voltage	250 VAC		125 VDC
Max. switching current	NO: 25 A (1 A) NC: 8 A (1 A)		

Note: The values in parentheses indicate values for a bifurcated contact.

■ Characteristics

Contact resistance (see note 2)	50 mΩ max.
Operate time (see note 3)	50 ms max.
Release time (see note 3)	50 ms max.
Max. operating frequency	Mechanical: 1,800 operations/hr Electrical: 1,800 operations/hr
Insulation resistance (see note 4)	1,000 MΩ min. (at 500 VDC)
Dielectric strength	4,000 VAC, 50/60 Hz for 1 min between coil and contacts 4,000 VAC, 50/60 Hz for 1 min between contacts of different polarity 2,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	10,000 V between coil and contact (with 1.2 x 50 µs impulse wave)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: NO: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) NC: 10 to 26 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: NO: 100 m/s^2 NC: 20 m/s^2
Endurance	Mechanical: 1,000,000 operations min. (at 1,800 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr) (see note 5)
Error rate (see note 6)	100 mA at 24 VDC (bifurcated contact: 24 VDC 10 mA)
Ambient temperature	Operating: –25°C to 60°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	PCB terminal: approx. 140 g Screw terminal: approx. 165 g Quick-connect terminal: approx. 140 g

Note: 1. The above values are all initial values.
2. The contact resistance was measured with 1 A at 5 VDC using the voltage drop method.
3. The operate and the release times were measured with the rated voltage imposed with any contact bounce ignored at an ambient temperature of 23°C.
4. The insulation resistance was measured with a 500-VDC megger applied to the same places as those used for checking the dielectric strength.
5. The electrical endurance was measured at an ambient temperature of 23°C.
6. This value was measured at a switching frequency of 60 operations per minute.

■ Approved Standards

The G7J satisfies the following international standards. Approval for some international markings and symbols are still pending, however, and information on them will be added when they are approved.

UL (File No. E41643)
CSA (File No. LR35535)

Coil ratings	Contact ratings		Number of test operations
24 to 265 VAC 6 to 110 VDC	NO contact	25 A 277 VAC, Resistive	30,000
		25 A 120 VAC, General Use	
		25 A 277 VAC, General Use	
		25 A 240 VAC, General Use	100,000
		1.5 kW 120 VAC, Tungsten	6,000
		1.5 hp 120 VAC	
		3 hp 240/265/277 VAC	
		3-phase 3 hp 240/265/277 VAC	30,000
		3-phase 5 hp 240/265/277 VAC	
		20FLA/120LRA 120 VAC	
		17FLA/102LRA 277 VAC	
		TV-10 120 VAC	25,000
		25 A 30 VDC, Resistive	30,000
		*1 A 277 VAC, General Use	6,000
	NC contact	8 A 277 VAC, Resistive	30,000
		8 A 120 VAC, General Use	
		8 A 277 VAC, General Use	
		8 A 30 VDC, Resistive	
		*1 A 277 VAC, General Use	6,000

Note: *These ratings are bifurcated contact ratings.

Reference

UL approval: UL508 for industrial control devices
UL1950 for information processing equipment including business machines

CSA approval: CSA C22.2 No. 14 for industrial control devices
CSA C22.2 No. 950 for information processing equipment including business machines

VDE (File No. 5381UG)

Model	Coil ratings	Contact ratings	
		NO contact	NC contact
G7J-4A-B(P) (T) (Z) G7J-2A2B(P) (T) G7J-3A1B-B(P) (T) (Z)	6, 12, 24, 48, 100 VDC 24, 50, 100 to 120, 200 to 240 VAC	25 A 240 VAC cosϕ = 0.4 25 A 240 VAC cosϕ = 1 25 A 30 VDC L/R ≥ 1 *1 A 240 VAC cosϕ = 0.4	8 A 240 VAC cosϕ = 0.4 8 A 240 VAC cosϕ = 1 8 A 30 VDC L/R ≥ 1 *1 A 240 VAC cosϕ = 0.4

Note: Add the suffix "-KM" to the model number when ordering.
*These ratings are bifurcated contact ratings.

Reference

VDE approval: EN60255-1-00: 1997
EN60255-23: 1996

KEMA (File No. 2001291.02)

Model	Coil ratings	Contact ratings NO contact
G7J-4A-B(P) (T) (Z) G7J-2A2B(P) (T)	200 to 240 VAC	Class AC1: 25 A at 220 VAC 11.5 A at 380 to 480 VAC Class AC3: 11.5 A at 220 VAC and 8.5 A at 380 to 480 VAC *Class AC1: 1 A at 220 VAC
G7J-3A1B-B(P) (T) (Z)	6, 12, 24, 48, 100 VDC 24, 50, 100 to 120, 200 to 240 VAC	

Note: Add the suffix "-KM" to the model number when ordering.

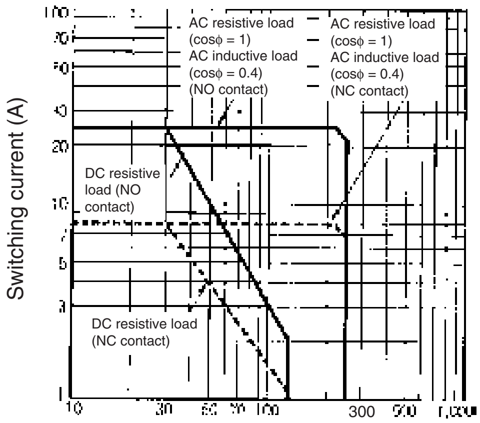
*This rating is the bifurcated contact rating.

Reference

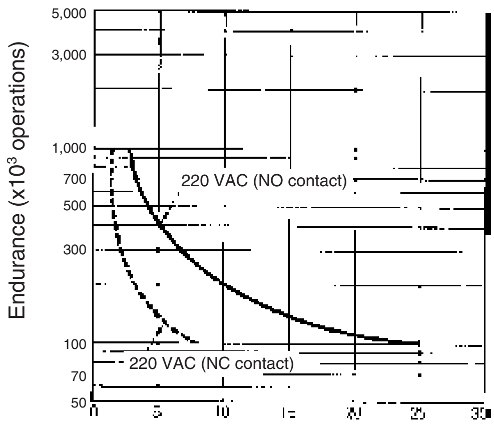
KEMA approval: EN60947-4-1 for contacts
IEC947-4-1 for contacts

Engineering Data

■ Maximum Switching Power

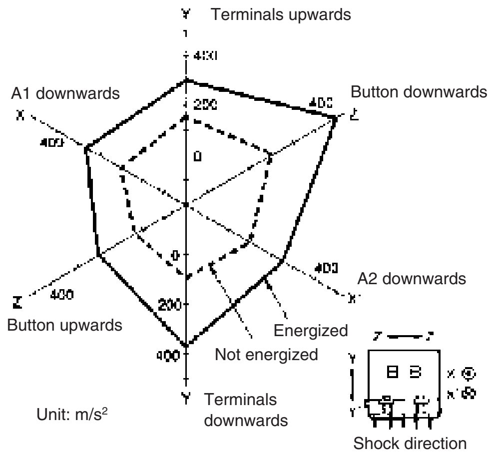


■ Endurance



■ Malfunctioning Shock

G7J-2A2B



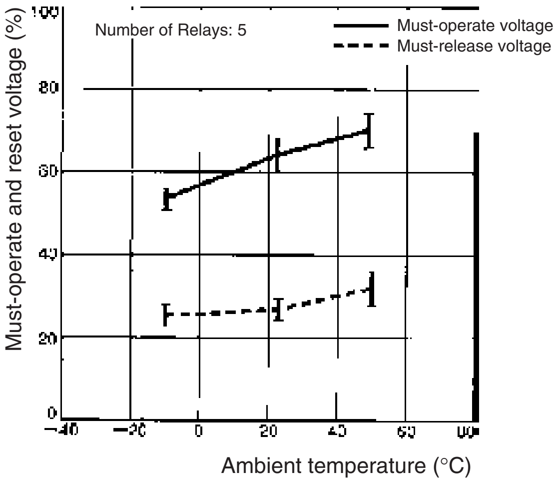
Number of samples: 5

Measurement conditions: Increase and decrease the specified shock gradually imposed in ±X, ±Y, and ±Z directions three times each with the Relay energized and not energized to check the shock values that cause the Relay to malfunction.

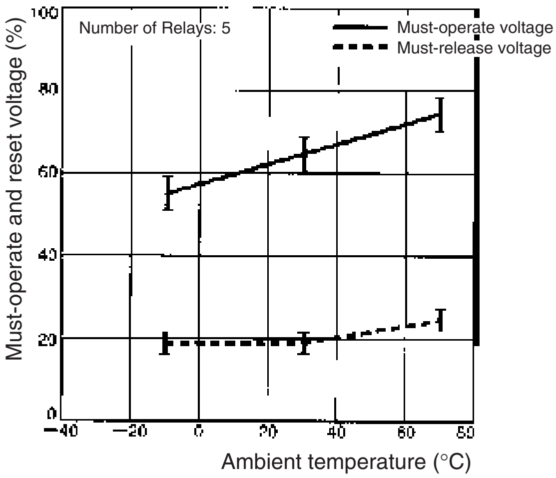
Criteria: There must not be any contact separation for 1 ms or greater with a shock of 100 m/s² imposed when the coil is energized or with a shock of 20 m/s² when the coil is not energized.

■ Ambient Temperature vs. Must-operate and Must-release Voltage

G7J 100 to 120 VAC

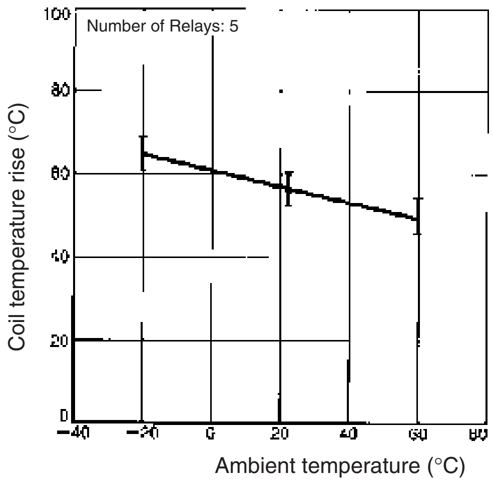


G7J 24 VDC

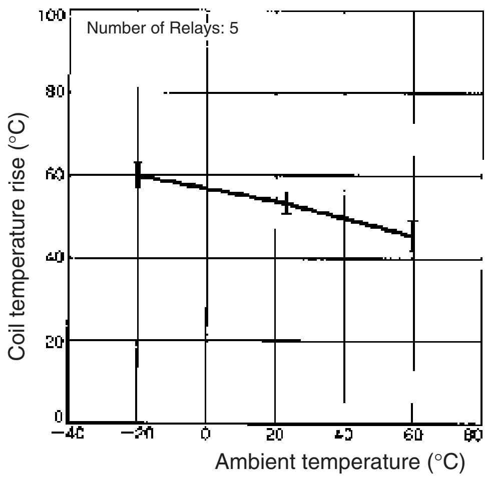


■ Ambient Temperature vs. Coil Temperature Rise

G7J-4A 100 to 120 VAC



G7J-4A 24 VDC



Motor Load

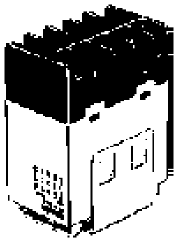
Item	G7J-4A-P, G7J-3A1B-P, G7J-4A-B, G7J-3A1B-B, G7J-4A-T, G7J-3A1B-T
Load	3ϕ, 220 VAC, 2.7 kW (with a inrush current of 78 A and a breaking current of 13 A)
Endurance	Electrical: 100,000 operations min.

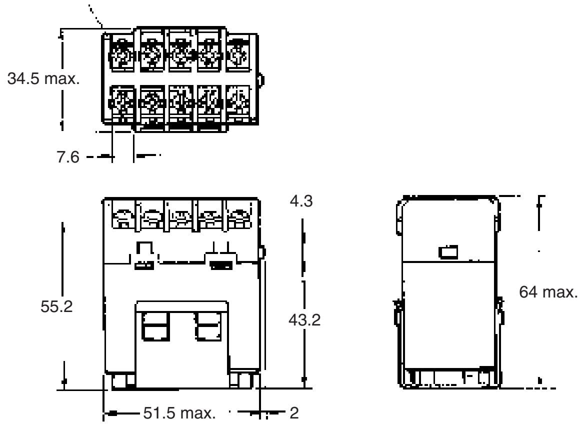
Dimensions

Note: All units are in millimeters unless otherwise indicated.

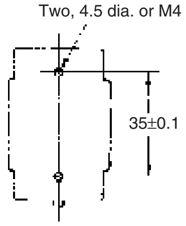
Screw Terminals with W-bracket

G7J-4A-B, G7J-4A-BZ, G7J-3A1B-B, G7J-3A1B-BZ, G7J-2A2B-B



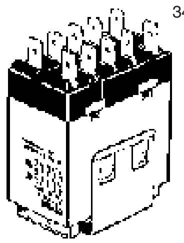


Mounting Holes

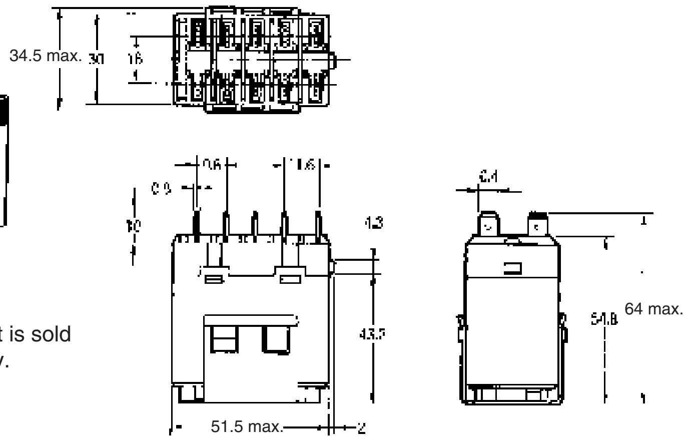


Quick-connect Terminals with W-bracket

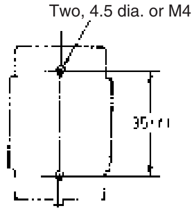
G7J-4A-T, G7J-4A-TZ, G7J-3A1B-T, G7J-3A1B-TZ, G7J-2A2B-T



Note: W-bracket is sold separately.

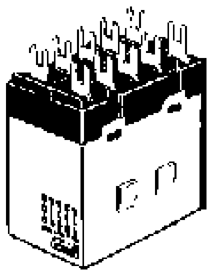


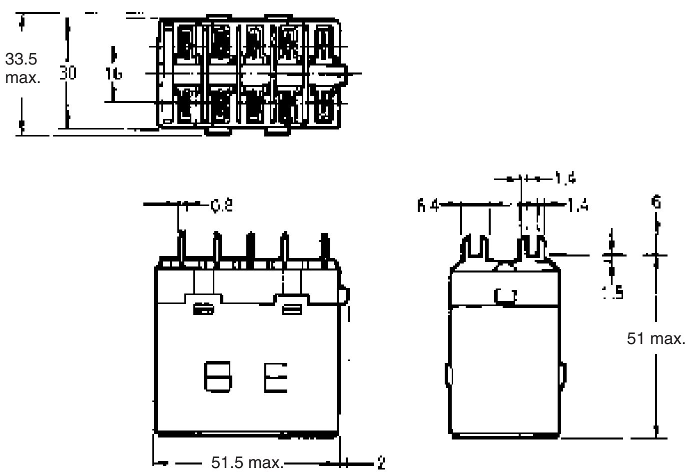
Mounting Holes



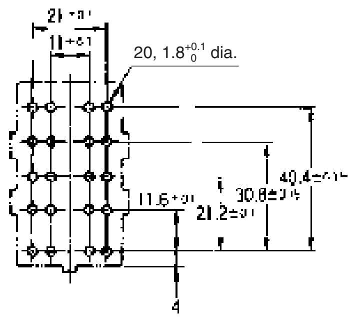
PCB Terminals with PCB Mounting

G7J-4A-P, G7J-4A-PZ, G7J-3A1B-P, G7J-3A1B-PZ, G7J-2A2B-P



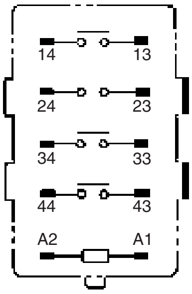


Mounting Dimensions

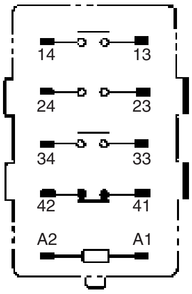


■ Terminal Arrangement/Internal Connections

G7J-4A-P(B) (T) (Z)

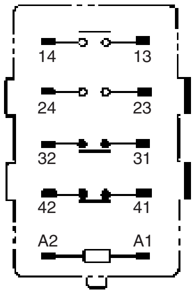


G7J-3A1B-P(B) (T) (Z)



The coil has no polarity.

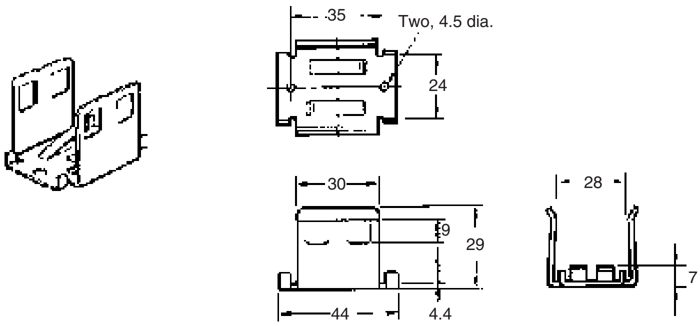
G7J-2A2B-P(B) (T)



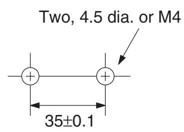
Note: Terminals 43 and 44 of the G7J-4A-P(B)(T)(Z) and contacts 41 and 42 of the G7J-3A1B-P(B)(T)(Z) are bifurcated contacts.

■ Accessories (Order Separately)

R99-04 W-bracket (for G5F)



Mounting Holes



Precautions

■ Correct Use

Installation

PCB Terminal-equipped Relays weigh approximately 140 g. Be sure that the PCB is strong enough to support them. We recommend dual-side through-hole PCBs to reduce solder cracking from heat stress.

Mount the G7J with its test button facing downwards. The Relay may malfunction due to shock if the test button faces upwards. Be careful not to press the test button by mistake because the contacts will go ON if the test button is pressed.

Be sure to use the test button for test purposes only.
The test button is used for Relay circuit tests, such as a circuit continuity test. Do not attempt to switch the load with the test button.

Micro Loads

The G7J is used for switching power loads, such as motor, transformer, solenoid, lamp, and heater loads. Do not use the G7J for switching minute loads, such as signals. Use a Relay with a bifurcated contact construction for switching micro loads, in which case, however, only SPST-NO or SPST-NC output is obtained.

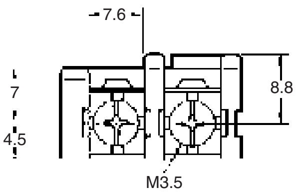
Soldering PCB Terminals

Be sure to solder the PCB terminals manually only. In the case of automatic soldering, some flux may stick to the test button and the G7J. As a result, the G7J may malfunction.

The G7J is not of enclosed construction. Therefore, do not wash the G7J with water or any detergent.

Connecting

Refer to the following diagram when connecting a wire with a screw terminal to the G7J.



Allow suitable slack on leads when wiring, and do not subject the terminals to excessive force.

Tightening torque: 0.98 N·m

Do not impose excessive external force on the G7J in the horizontal or vertical directions when inserting the G7J to the Faston receptacle or pulling the G7J out from the Faston receptacle. Do not attempt to insert or pull out more than one G7J Unit together.

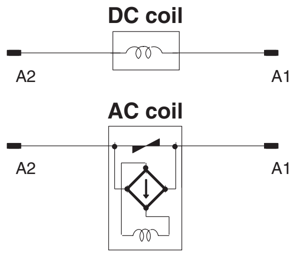
Do not solder the tab terminals.

Terminal	Receptacle	Housing
#250 terminal (6.35 mm in width)	AMP170333-1 (170327-1) AMP170334-1 (170328-1) AMP170335-1 (170329-1)	AMP172076-1: natural AMP172076-4: yellow AMP172076-5: green AMP172076-6: blue

Note: Numbers in parentheses are for air feed use.

Operating Coil

Internal Connections of Coils



If a transistor drives the G7J, check the leakage current, and connect a bleeder resistor if necessary.

The AC coil is provided with a built-in full-wave rectifier. If a triac, such as an SSR, drives the G7J, the G7J may not release. Be sure to perform a trial operation with the G7J and the triac before applying them to actual use.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

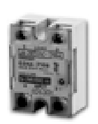
Solid state relays

Omron offers a comprehensive range of solid state relays (SSRs) that provides the perfect load switching for temperature control applications. These SSRs are a fast, reliable and cost-effective partner to our temperature controllers.

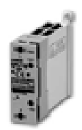
Combinations of temperature controller and SSR are available to handle almost any application, including heater bands for plastics extrusion processes, packaging machinery and heater elements in general manufacturing.

What switching capacity is required?

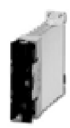
- **Up to 90 A power relay**
  - Number of phases?
    - Single-phase
      - Type and size?
        - Compact at pack style up to 90 A → **G3NA**

          Page H-5
        - Integrated heat sink, replaceable powercartridge up to 60 A → **G3PA**

          Page H-21
        - Integrated heat sink → **G3PB**

          Page H-37
    - Three-phase → **G3PB**

      Page H-37
- **Multi-channel power controller**
  - Up to 8 solid state relays → **G3ZA**

    Page H-45

Now there’s a clever way to regulate heater power

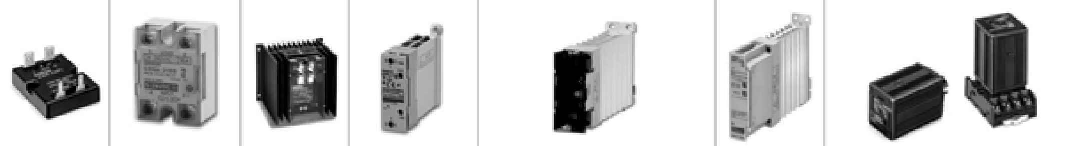
G3ZA – compact and easy to integrate!

The G3ZA can control up to 8 solid state relays (SSRs) via a single RS-485 2-wire link to your PLC or PC. There’s no need for conversion units or digital output cards – the G3ZA automatically converts the power control signal into a more manageable trigger signal for standard SSRs.

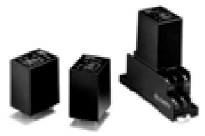
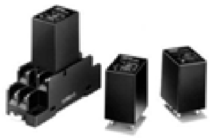
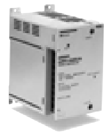
This multi-channel power controller uses a special trigger method and offset control to provide precise heater power regulation. It’s faster than standard SSR switching, and it’s less noisy and more cost-effective than phase angle control. Available in four versions, the compact G3ZA is easy to install, program and operate.

Table of contents

Selection table



	Mounting	Panel mounted							Socket mounted	
Selection criteria	Model	G3NE	G3NA	G3NH	G3PA	G3PB	G3PB	G3PC	G3B	G3BD
	Type of Load	Normal resistors Middle and long wave IR heater	Normal resistors Middle and long wave IR heater Transformers and inductors	Normal resistors Middle and long wave IR heater	Normal resistors Middle and long wave IR heater Transformers and inductors	Normal resistors	Normal resistors Middle and long wave IR heater	Normal resistors Middle and long wave IR heater	Normal resistors Middle and long wave IR heater Transformers and inductors	Normal resistors Middle and long wave IR heater
	1-phase control	■	■	■	■		■	■	■	■
	2-phase control					■				
	3-phase control					■				
	Function	Heater control	Heater control, motor	Heater control	Heater control				Panel-mounted interfaces	
	Relay compatible								MK compatible	MK compatible
	Max. current rating	20 A	50 A	150 A	60 A	45 A	45 A	20 A	5 A	3 A
Load voltage / current [VAC]	24 to 240		■		■					
	100 to 240	■		■			■	■	■	
	180 to 440			■						
	200 to 480		■		■	■	■			
	100 / 110									
	200 / 230									
Load voltage / current [VDC]	5 to 200		■							
	5 to 110									■
	4 to 48									
	5 to 24									
Input voltages (VDC or VAC)	5 VDC	■								
	12 VDC	■								
	24 VDC	■								
	5 to 24 VDC		■	■	■				■	■
	12 to 24 VDC				■	■	■	■		
	24 VAC				■					
	100 to 120 VAC		■	■						
	200 to 240 VAC		■	■						
Features	Built-in heat sink			■	■	■	■	■		
	Zero-cross	□	■	■	■	■	■	■		
	Built-in varistor	■	■	■		■				
	LED operation indicator		■	■	■	■	■	■	■	■
	Protective cover		■	■	■	■	■	■		
	3-phase loads via 3 single-phase SSRs		■	■	■	■				
	Replaceable power cartridge		■		■					
	Alarm output							■		
	Built-in failure detection				■			■		
	SSR open circuits detection							■		
	SSR short circuits detection							■		
Mounting	DIN-rail		■	■	■	■	■	■	■	■
	Screw	■	■		■	■	■	■	■	■
	Page	CD	H-5	CD	H-21	H-37		CD	CD	

Socket mounted						Power regulator	
							
G3F	G3FD	G3H	G3HD	G3R-I	G3R-O	G3PX	G3ZA
Normal resis-tors Middle and long wave IR heater Transformers and inductors	Normal resis-tors Middle and long wave IR heater	Normal resis-tors Middle and long wave IR heater Transformers and inductors	Normal resis-tors Middle and long wave IR heater	Normal resis-tors Middle and long wave IR heater Transformers and inductors	Normal resis-tors Middle and long wave IR heater Transformers and inductors	Normal resistors Middle and long wave IR heater Quarz heaters, short wave IR heater, elements made from siliconcarbide Normal resistive load With open delta connection	Depends on the SSR used Distributes loop / control output levels (mV%) to SSRs
■	■	■	■		■	■	Depends on the SSR used
							Depends on the SSR used
							Depends on the SSR used
Panel-mounted interfaces						Heater control	Intelligent power control
MY compatible	MY compatible	LY compatible	LY compatible	G2RS compatible / input unit	G2RS compatible		
5 A	3 A	3 A	3 A	100 mA	2 A	60 A	Depends on the SSR used
■		■			■		■
							■ 400 to 480
						■	
						■	
	■						
	■		■		■		
				■			
■		■					
■		■					
■		■					
■	■	■	■	■	■		
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■	■	■	■	■	■		■
■	■	■	■	■	■	■	■
CD		^CD		CD		CD	H-45

■ Standard □ Available ▭ No / not available

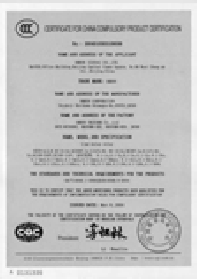
LEADING IN SERVICE

Focussed, progressive, distinctive. Be assured, choose Omron

At Omron we set high standards for ourselves. Our products are known all over the world for their unrivalled quality. But we offer more than just excellent quality. In an environment that places ever greater demands with regard to service, quality and costeffectiveness, other things are important too. Providing a top-quality service is what we do every day, including extra service as standard. This helps to ensure that we can provide tailor-made solutions for applications more effectively and more quickly.

More and more companies are choosing Omron as they seek to work in a partnership that is based on reliability and certainty.

Omron – the reassuring choice.



International standards and approvals

Our products carry all relevant international standards and approvals, including CCC (Chinese Compulsory Certification), which makes exporting your system much easier.

- Reliability, also for your customers
- Maximum flexibility
- Confidence

5-day repair service

More and more people are choosing Omron, as a high degree of reliability is a key feature of its products. You can always rely on Omron. Even if a product unexpectedly malfunctions, our repair team is ready to swing into action.

- Product repaired and returned to you within 5 days, including collection and delivery
- You can track the status of your repair on-line
- Repairs within warranty are completely free-of-charge

For more information please visit the Service & Support section at http://omron-industrial.com

EPLAN for Omron products

The majority of standard Omron products are provided in digital EPLAN format, which means that a few clicks of your mouse are all that is needed to design the right product into your switching panel.

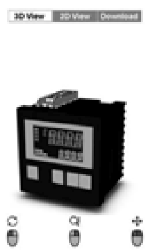
For more information please visit: http://omron-industrial.com/en/eplan/

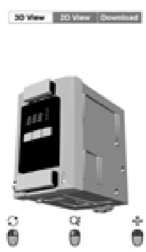
- Very easy to use
- Always the right product
- Reduced engineering time

Downloadable 2-D and 3-D CAD drawings

Designers of switching panels and machines can download clear 2-D and 3-D CAD drawings for all current products from http://omron-industrial.com/en/2D3D, which can easily be incorporated into your design.

- Large number of formats supported for greater flexibility
- Readily available
- Convenience that saves you time





Solid State Relays
G3NA

New Models with 75-A and 90-A Output Currents Join the Previous Models with 5- to 40-A Output Currents.

- AC Output Relays with 75-A and 90-A output currents have been added to the G3NA Series. The standard versions of these models provide certification for international standards (-UTU).
- All models feature the same compact dimensions to provide a uniform mounting pitch.
- Built-in varistor effectively absorbs external surges.
- Operation indicator enables monitoring operation.
- Protective cover for greater safety.
- Standard models certified by UL and CSA and -UTU models by VDE (TÜV).

Model Number Structure

■ Model Number Legend

G3NA-□□□□□-□
1 2 3 4 5 6 7

1. Basic Model Name
G3NA: Solid State Relay

2. Load Power Supply
Blank: AC output
D: DC output

3. Rated Load Power Supply Voltage
2: 200 VAC or 200 VDC
4: 400 VAC

4. Rated Load Current
05: 5 A
10: 10 A
20: 20 A
40: 40 A
50: 50 A
75: 75 A
90: 90 A

5. Terminal Type
B: Screw terminals

6. Zero Cross Function
Blank: Equipped with zero cross function (AC-output models only)

7. Certification
Blank: Standard models (certified by UL and CSA)
UTU: Certified by UL, CSA, and TÜV

Ordering Information

■ List of Models

Isolation	Zero cross function	Indicator	Applicable output load (see note 1.)	Rated input voltage	Model
Phototriac	Yes	Yes	5 A at 24 to 240 VAC (See note 2.)	5 to 24 VDC	G3NA-205B DC5-24
Photocoupler				100 to 120 VAC	G3NA-205B AC100-120
				200 to 240 VAC	G3NA-205B AC200-240
Phototriac			10 A at 24 to 240 VAC (See note 2.)	5 to 24 VDC	G3NA-210B DC5-24
Photocoupler				100 to 120 VAC	G3NA-210B AC100-120
				200 to 240 VAC	G3NA-210B AC200-240
Phototriac			20 A at 24 to 240 VAC (See note 2.)	5 to 24 VDC	G3NA-220B DC5-24
Photocoupler				100 to 120 VAC	G3NA-220B AC100-120
				200 to 240 VAC	G3NA-220B AC200-240
Phototriac			40 A at 24 to 240 VAC (See note 2.)	5 to 24 VDC	G3NA-240B DC5-24
Photocoupler				100 to 120 VAC	G3NA-240B AC100-120
				200 to 240 VAC	G3NA-240B AC200-240
Phototriac			75 A at 24 to 240 VAC (See note 2.)	5 to 24 VDC	G3NA-275B-UTU DC5-24
Photocoupler				100 to 240 VAC	G3NA-275B-UTU AC100-240
Phototriac			90 A at 24 to 240 VAC (See note 2.)	5 to 24 VDC	G3NA-290B-UTU DC5-24
Photocoupler				100 to 240 VAC	G3NA-290B-UTU AC100-240
	---		10 A at 5 to 200 VDC	5 to 24 VDC	G3NA-D210B DC5-24
				100 to 240 VAC	G3NA-D210B AC100-240
	Yes		10 A at 200 to 480 VAC	5 to 24 VDC	G3NA-410B DC5-24
				100 to 240 VAC	G3NA-410B AC100-240
			20 A at 200 to 480 VAC	5 to 24 VDC	G3NA-420B DC5-24
				100 to 240 VAC	G3NA-420B AC100-240
			40 A at 200 to 480 VAC	5 to 24 VDC	G3NA-440B DC5-24
				100 to 240 VAC	G3NA-440B AC100-240
			50 A at 200 to 480 VAC (See note 2.)	5 to 24 VDC	G3NA-450B DC5-24
			75 A at 200 to 480 VAC (See note 2.)	5 to 24 VDC	G3NA-475B-UTU DC5-24
				100 to 240 VAC	G3NA-475B-UTU AC100-240
			90 A at 200 to 480 VAC (See note 2.)	5 to 24 VDC	G3NA-490B-UTU DC5-24
				100 to 240 VAC	G3NA-490B-UTU AC100-240

*The standard models are certified by UL and CSA. To order a TÜV-certified model, add “-UTU” to the model number.

Note: 1. The applicable output load depends on the ambient temperature. Refer to *Load Current vs. Ambient Temperature* in *Engineering Data.*

2. Loss time increases under 75 VAC. (Refer to page H-18.) Confirm operation with the actual load.

■ Accessories (Order Separately)

One-touch Mounting Plates

Model
R99-12 FOR G3NA

Mounting Bracket

Model	Applicable SSR
R99-11	G3NA-240B, G3NA-440B

Heat Sinks

Slim Models Enabling DIN-rail Mounting

Model	Applicable SSR
Y92B-N50	G3NA-205B, G3NA-210B, G3NA-D210B, G3NA-410B, G3NA-210T(L)
Y92B-N100	G3NA-220B, G3NA-420B, G3NA-220T(L)
Y92B-N150	G3NA-240B, G3NA-440B
Y92B-P250	G3NA-450B
Y92B-P250NF (See note.)	G3NA-275B-UTU, G3NA-290B-UTU, G3NA-475B-UTU, G3NA-490B-UTU

Note: The Y92B-P250NF is scheduled for release on May 1, 2004.

Low-cost Models

Model	Applicable SSR
Y92B-A100	G3NA-205B, G3NA-210B, G3NA-D210B, G3NA-220B, G3NA-410B, G3NA-420B
Y92B-A150N	G3NA-240B, G3NA-440B
Y92B-A250	G3NA-440B

Specifications

■ Ratings

Input (at an Ambient Temperature of 25 °C)

Model	Rated voltage	Operating voltage	Impedance (See note 1.)	Voltage level	
				Must operate voltage	Must release voltage
G3NA-2□□B	5 to 24 VDC	4 to 32 VDC	7 mA max. (See note 2.)	4 VDC max.	1 VDC min.
	100 to 120 VAC	75 to 132 VAC	36 kΩ±20%	75 VAC max. (See note 3.)	20 VAC min. (See note 3.)
	200 to 240 VAC	150 to 264 VAC	72 kΩ±20%	150 VAC max. (See note 3.)	40 VAC min. (See note 3.)
G3NA-4□□B	5 to 24 VDC	4 to 32 VDC	5 mA max. (See note 2.)	4 VDC max.	1 VDC min.
G3NA-D210B	100 to 240 VAC	75 to 264 VAC	72 kΩ±20%	75 VAC max.	20 VAC min.
G3NA-275B-UTU **G3NA-290B-UTU** **G3NA-475B-UTU** **G3NA-490B-UTU**	5 to 24 VDC	4 to 32 VDC	15 mA max. (See note 2.)	4 VDC max.	1 VDC min.
	100 to 240 VAC	75 to 264 VAC	72 kΩ±20%	75 VAC max.	20 VAC min.

Note: 1. The input impedance is measured at the maximum value of the rated supply voltage (for example, with the model rated at 100 to 120 VAC, the input impedance is measured at 120 VAC).

2. With constant current input circuit system. The impedance for the G3NA-2□□B-UTU is 15 mA max.

3. Refer to *Temperature Characteristics (for Must Operate Voltage and Must Release Voltage)* in *Engineering Data* for further details.

Output

Model	Applicable load				
	Rated load voltage	Load voltage range	Load current (See note 1.)		Inrush current
			With heat sink (See note 2.)	Without heat sink	
G3NA-205B	24 to 240 VAC	19 to 264 VAC	0.1 to 5 A (at 40°C)	0.1 to 3 A (at 40°C)	60 A (60 Hz, 1 cycle)
G3NA-210B			0.1 to 10 A (at 40°C)	0.1 to 4 A (at 40°C)	150 A (60 Hz, 1 cycle)
G3NA-410B	200 to 480 VAC	180 to 528 VAC	0.2 to 10 A (at 40°C)	0.2 to 4 A (at 40°C)	
G3NA-220B	24 to 240 VAC	19 to 264 VAC	0.1 to 20 A (at 40°C)	0.1 to 4 A (at 40°C)	220 A (60 Hz, 1 cycle)
G3NA-420B	200 to 480 VAC	180 to 528 VAC	0.2 to 20 A (at 40°C)	0.2 to 4 A (at 40°C)	
G3NA-240B	24 to 240 VAC	19 to 264 VAC	0.1 to 40 A (at 40°C)	0.1 to 6 A (at 40°C)	440 A (60 Hz, 1 cycle)
G3NA-440B	200 to 480 VAC	180 to 528 VAC	0.2 to 40 A (at 40°C)	0.2 to 6 A (at 40°C)	
G3NA-450B	200 to 480 VAC	180 to 528 VAC	0.2 to 50 A (at 40°C)	0.2 to 6 A (at 40°C)	
G3NA-D210B	5 to 200 VDC	4 to 220 VDC	0.1 to 10 A (at 40°C)	0.1 to 4 A (at 40°C)	20 A (10 ms)
G3NA-275B-UTU	24 to 240 VAC	19 to 264 VAC	1 to 75 A (at 40°C)	1 to 7 A (at 40°C)	800 A (60 Hz, 1 cycle)
G3NA-475B-UTU	200 to 480 VAC	180 to 528 VAC	1 to 75 A (at 40°C)	1 to 7 A (at 40°C)	800 A (60 Hz, 1 cycle)
G3NA-290B-UTU	24 to 240 VAC	19 to 264 VAC	1 to 90 A (at 40°C)	1 to 7 A (at 40°C)	1,000 A (60 Hz, 1 cycle)
G3NA-490B-UTU	200 to 480 VAC	180 to 528 VAC	1 to 90 A (at 40°C)	1 to 7 A (at 40°C)	1,000 A (60 Hz, 1 cycle)

Note: 1. The load current varies depending on the ambient temperature. Refer to *Load Current vs. Ambient Temperature* under *Engineering Data*.

2. When an OMRON Heat Sink (refer to *Options*) or a heat sink of the specified size is used.

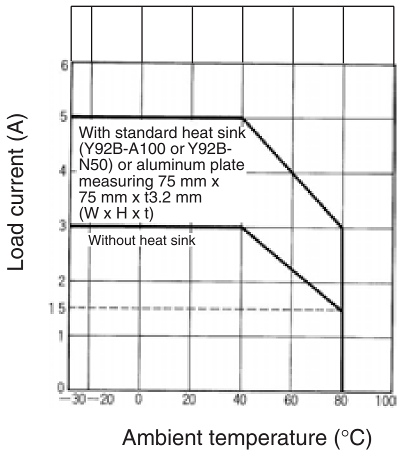
■ Characteristics

Item	G3NA-205B	G3NA-210B	G3NA-220B	G3NA-240B	G3NA-410B	G3NA-420B	G3NA-440B	G3NA-450B	G3NA-D210B	G3NA-275B-UTU	G3NA-290B-UTU	G3NA-475B-UTU	G3NA-490B-UTU
Operate time	1/2 of load power source cycle + 1 ms max. (DC input) 3/2 of load power source cycle + 1 ms max. (AC input)								1 ms max. (DC input) 30 ms max. (AC input)	1/2 of load power source cycle + 1 ms max. (DC input) 3/2 of load power source cycle + 1 ms max. (AC input)			
Release time	1/2 of load power source cycle + 1 ms max. (DC input) 3/2 of load power source cycle + 1 ms max. (AC input)								5 ms max. (DC input) 30 ms max. (AC input)	1/2 of load power source cycle + 1 ms max. (DC input) 3/2 of load power source cycle + 1 ms max. (AC input)			
Output ON voltage drop	1.6 V (RMS) max.				1.8 V (RMS) max.				1.5 V max.	1.6 V (RMS) max.		1.8 V (RMS) max.	
Leakage current	5 mA max. (at 100 VAC) 10 mA max. (at 200 VAC)				10 mA max. (at 200 VAC) 20 mA max. (at 400 VAC)				5 mA max. (at 200 VDC)	5 mA max. (at 100 VAC) 10 mA max. (at 200 VAC)		10 mA max. (at 200 VAC) 20 mA max. (at 400 VAC)	
Insulation resistance	100 MΩ min. (at 500 VDC)												
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min									4,000 VAC, 50/60 Hz for 1 min			
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)												
Shock resistance	Destruction: 1,000 m/s^2												
Ambient temperature	Operating: –30 °C to 80 °C (with no icing or condensation) Storage: –30 °C to 100 °C (with no icing or condensation)												
Ambient humidity	Operating: 45% to 85%												
Weight	Approx. 60 g			Approx. 70 g	Approx. 80 g				Approx. 70 g	Approx. 120 g			

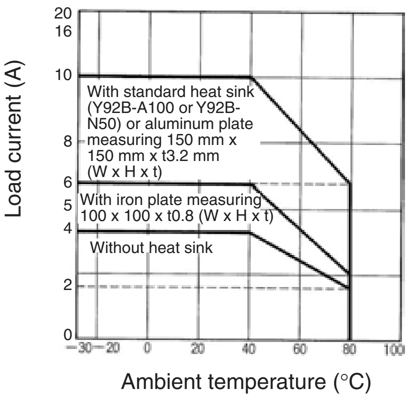
Engineering Data

Load Current vs. Ambient Temperature

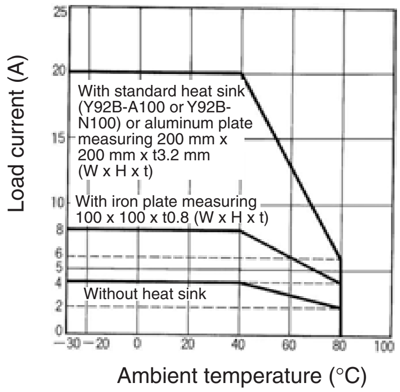
G3NA-205B



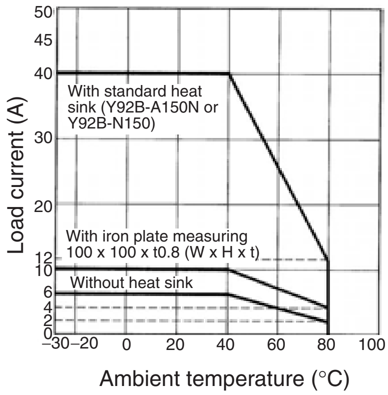
G3NA-210B/410B



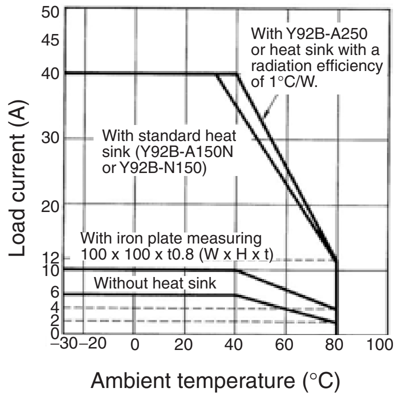
G3NA-220B/420B



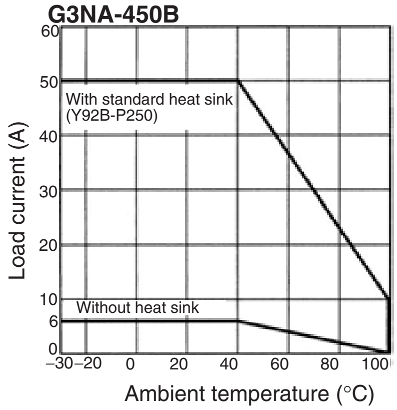
G3NA-240B



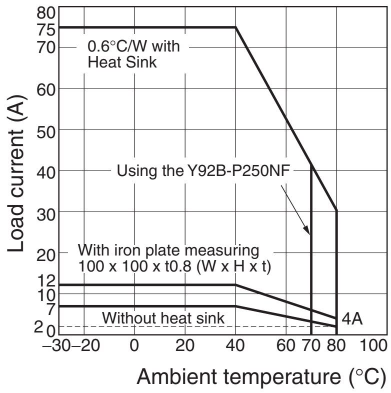
G3NA-440B



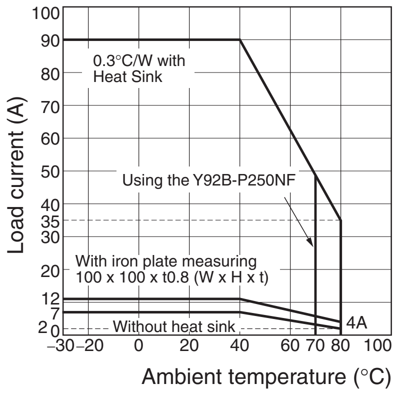
G3NA-450B



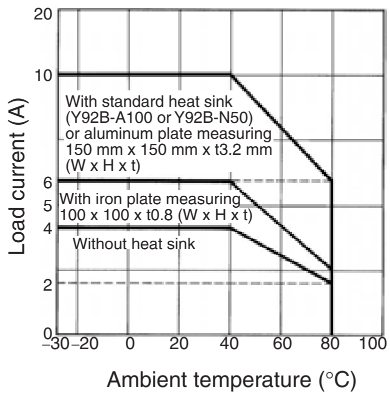
G3NA-275B-UTU
G3NA-475B-UTU



G3NA-290B-UTU
G3NA-490B-UTU



G3NA-D210B



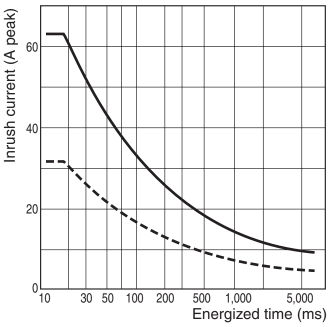
Note: The ambient operating temperature of the Y92B-P250NF is –30 to 70°C. Be sure the operating temperature is within this range.

Solid state relays

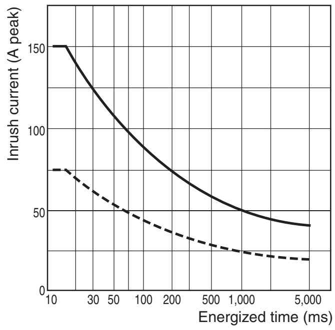
One Cycle Surge Current

The values shown by the solid line are for non-repetitive inrush currents.
Keep the inrush current below the values shown by the dotted line if it occurs repetitively.

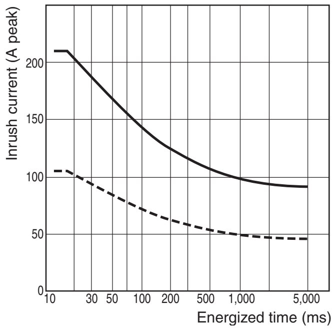
G3NA-205B



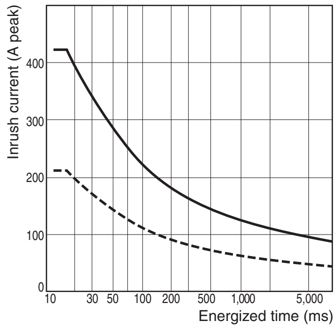
G3NA-210B
G3NA-410B



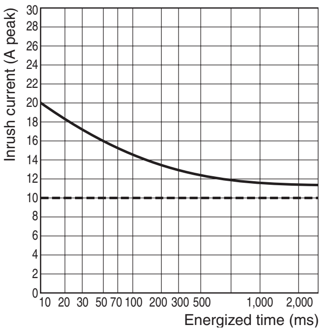
G3NA-220B
G3NA-420B



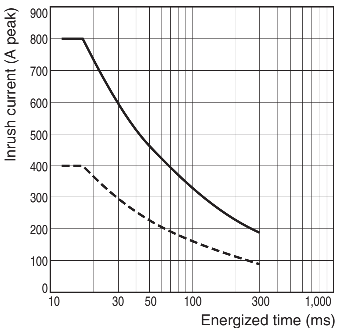
G3NA-240B
G3NA-440B/-450B



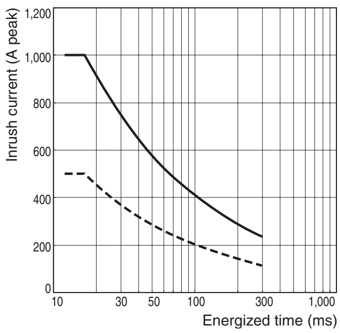
G3NA-D210B



G3NA-275B-UTU
G3NA-475B-UTU

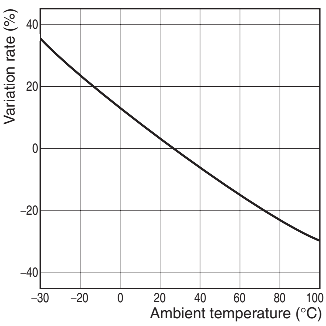


G3NA-290B-UTU
G3NA-490B-UTU



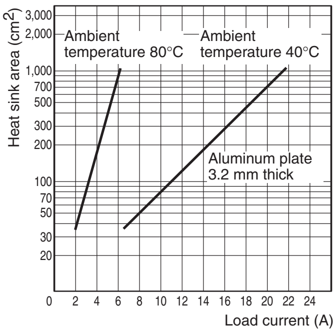
Temperature Characteristics (for Must Operate Voltage and Must Release Voltage)

G3NA-2□□B AC input



Heat Sink Area vs. Load Current

G3NA-220B



Note: The heat sink area refers to the combined area of the sides of the heat sink that radiate heat. For example, when a current of 18 A is allowed to flow through the SSR at 40°C, the graph shows that the heat sink area is about 450 cm^2. Therefore, if the heat sink is square, one side of the heat sink must be 15 cm ($\sqrt{450\ (cm^2)/2}$) or longer.

Thermal Resistance Rth (Back of Junction SSR) (Examples)

Model	Rth (°C/W)
G3NA-205B	3.22
G3NA-210B	2.62
G3NA-220B	1.99
G3NA-240B	0.45
G3NA-275B-UTU G3NA-475B-UTU G3NA-290B-UTU G3NA-490B-UTU	0.45
G3NA-D210B	2.62

Thermal Resistance Rth of Heat Sinks (Examples)

Model	Rth (°C/W)
Y92B-N50	2.8
Y92B-N100	1.63
Y92B-N150	1.38
Y92B-A100	1.63
Y92B-A150N	1.37
Y92B-A250	1.00
Y92B-P250NF	0.46

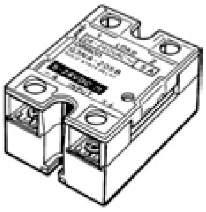
Note: When using a commercially available heat sink, use one with a thermal resistance equal to or less that the OMRON Heat Sink.

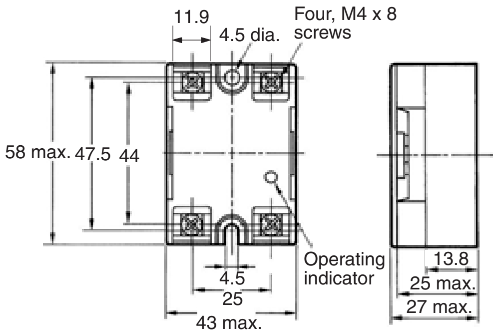
Dimensions

■ Relays

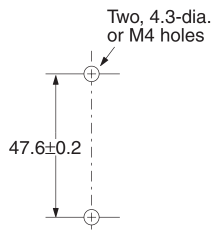
Note: All units are in millimeters unless otherwise indicated.

G3NA-205B, G3NA-210B, G3NA-220B, G3NA-410B, G3NA-420B

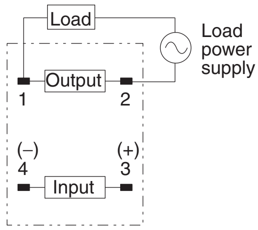




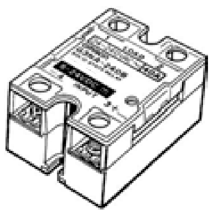
Mounting Holes

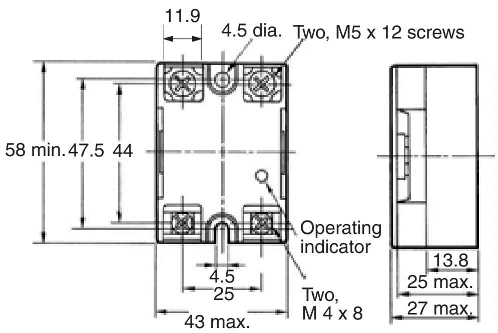


Terminal Arrangement/ Internal Connections (Top View)

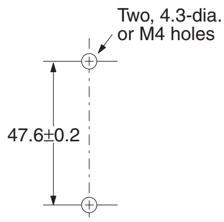


G3NA-240B, G3NA-440B

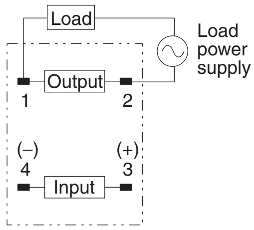




Mounting Holes

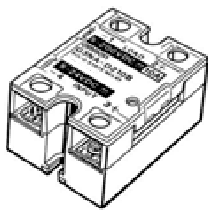


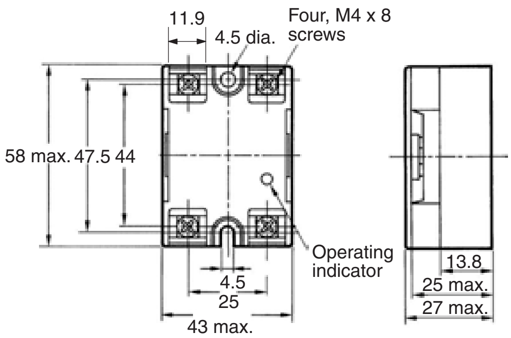
Terminal Arrangement/ Internal Connections (Top View)



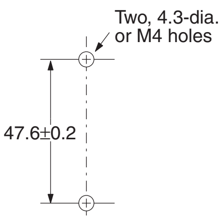
G3NA-D210B

Note: The load can be connected to either the positive or negative side.

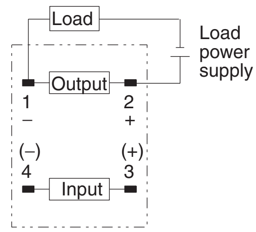




Mounting Holes

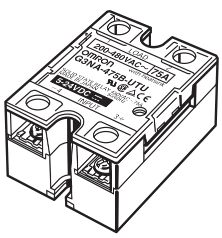


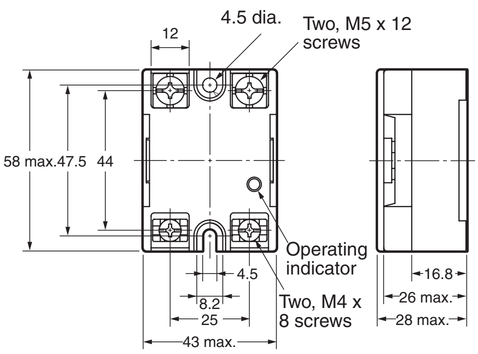
Terminal Arrangement/ Internal Connections (Top View)



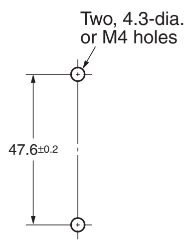
Note: When connecting the load, either the positive or negative side of the load terminals can be connected.

G3NA-275B-UTU, G3NA-475B-UTU, G3NA-290B-UTU, G3NA-490B-UTU

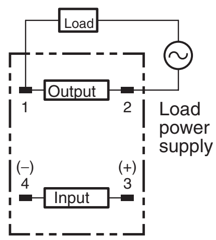




Mounting Holes



Terminal Arrangement/ Internal Connections (Top View)

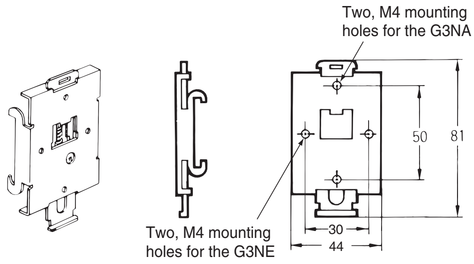


■ Options (Order Separately)

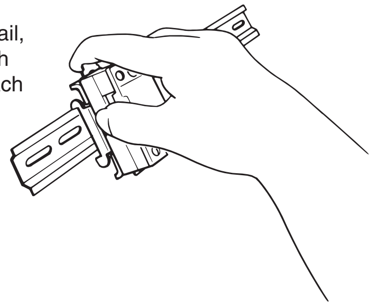
One-touch Mounting Plate

The One-touch Mounting Plate is used to mount the GN3A to a DIN-rail.

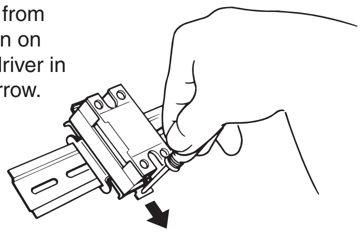
R99-12 FOR G3NA (for the G3NA and G3NE)



To mount the Relay to DIN- rail, first mount it to the One-touch Mounting Plate and then attach it to the DIN-rail as shown in the diagram.



To remove the Relay from the DIN-rail, pull down on the tab with a screwdriver in the direction of the arrow.

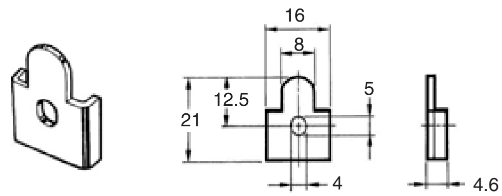


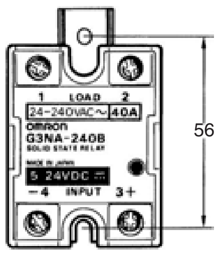
- When a Relay is mounted to DIN-rail, use it within the rating for a Relay without a heat sink.
- Use the following DIN-rails: PFP-100N or PFP-100N2.

Mounting Bracket

R99-11 (for the G3NA-240B, G3NA-440B)

Use Mounting Bracket R99-11 so that the G3NA-240B/-440B can be mounted with the same pitch as that of the G3N-240B.



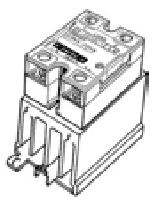


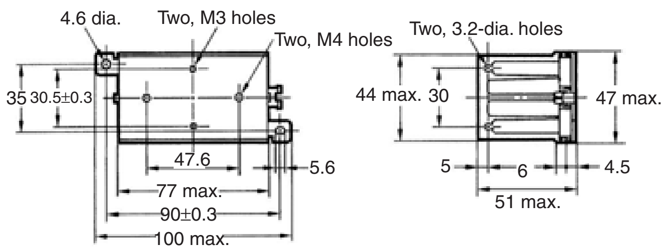
Heat Sinks

Y92B-N50 Heat Sink (for the G3NA-205B, G3NA-210B, G3NA-D210B, G3NA-410B, G3NE-210T(L))

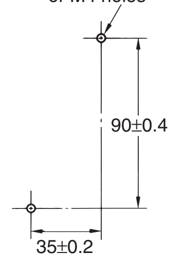
For surface mounting, a 30% derating of the load current is required (from the *Load Current vs. Ambient Temperature* graphs).

The orientation indicated by the external dimensions is not the correct mounting orientation. When opening mounting holes, refer to the mounting hole dimensions.





Mounting Holes

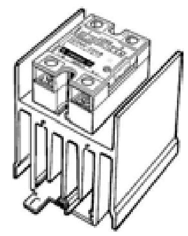


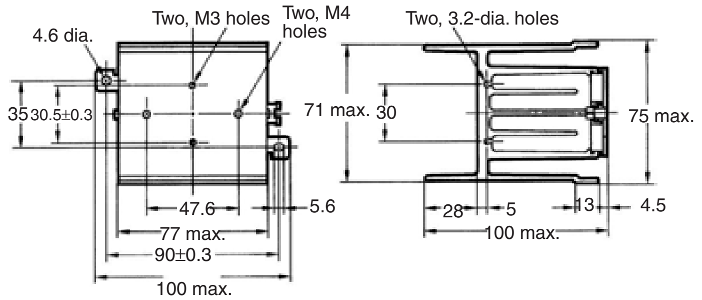
Weight: approx. 200 g

Y92B-N100 Heat Sink (for the G3NA-220B, G3NA-420B, G3NE-220T(L))

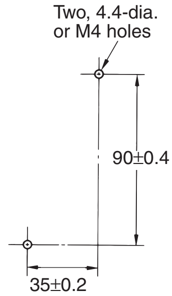
For surface mounting, a 30% derating of the load current is required (from the *Load Current vs. Ambient Temperature* graphs).

The orientation indicated by the external dimensions is not the correct mounting orientation. When opening mounting holes, refer to the mounting hole dimensions.





Mounting Holes

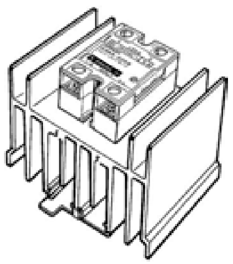


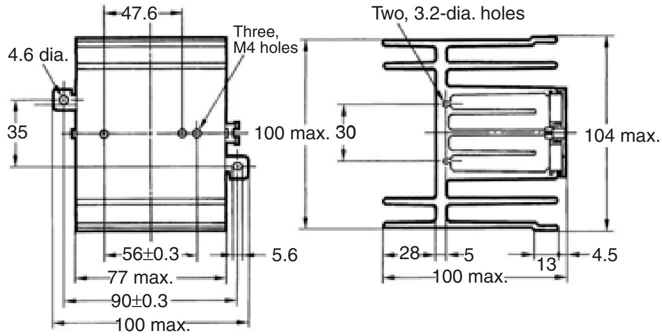
Weight: approx. 400 g

Y92B-N150 Heat Sink (for the G3NA-240B, G3NA-440B)

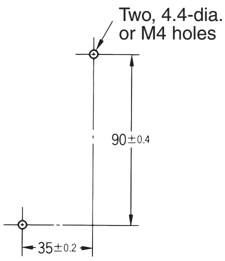
For surface mounting, a 30% derating of the load current is required (from the *Load Current vs. Ambient Temperature* graphs).

The orientation indicated by the external dimensions is not the correct mounting orientation. When opening mounting holes, refer to the mounting hole dimensions.





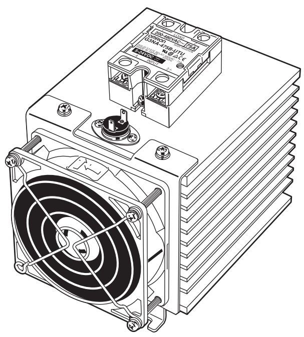
Mounting Holes

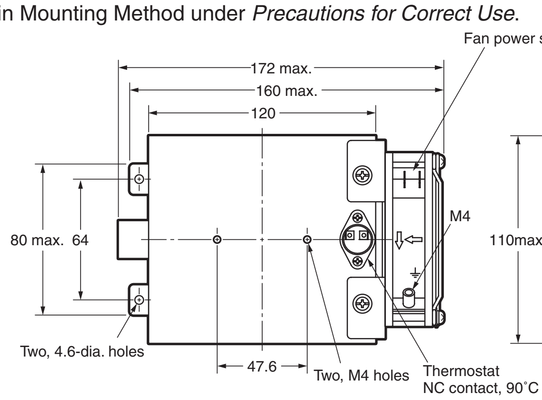


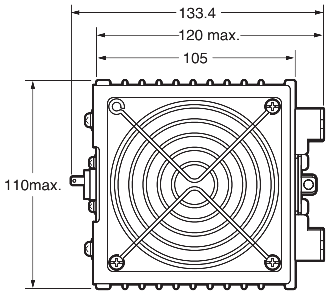
Weight: approx. 560 g

Y92B-P250NF Heat Sink (for the G3NA-275B-UTU, G3NA-475B-UTU, G3NA-290B-UTU, G3NA-490B-UTU)

(The Y92B-P250NF is scheduled for release on May 1, 2004.)
The orientation indicated by the external dimensions is not the correct mounting orientation. When opening mounting holes, refer to the mounting hole dimensions.
Observe the precautions given in Mounting Method under *Precautions for Correct Use*.

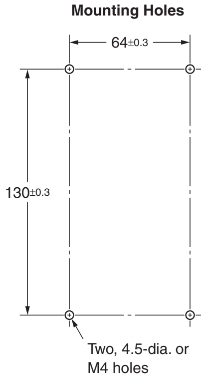




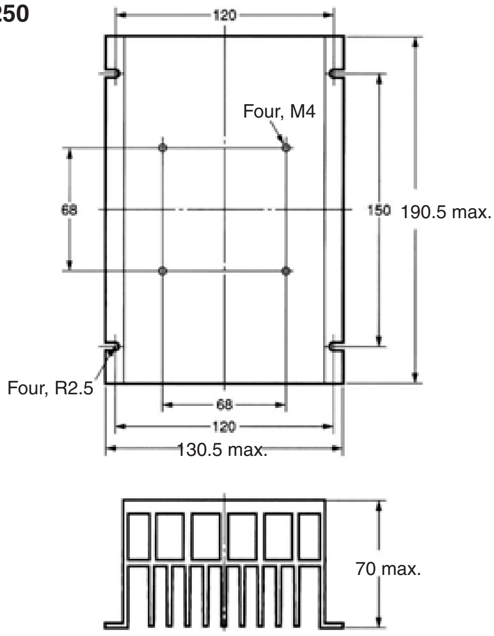


Weight: approx. 560 g

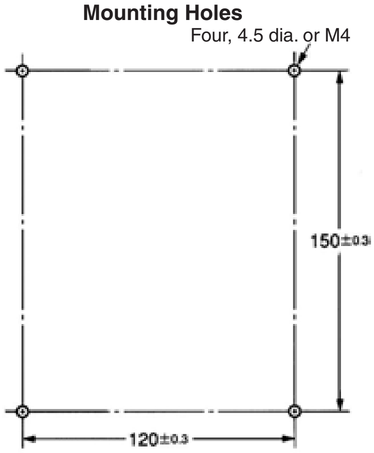
Mounting Holes



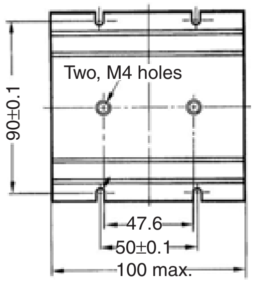
Y92B-P250



Mounting Holes

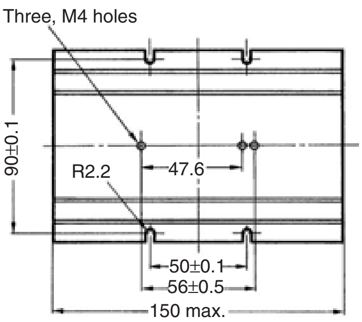


Y92B-A100 Heat Sink (for the G3NA-205B, G3NA-210B, G3NA-220B, G3NA-410B, G3NA-420B, G3NA-D210B)



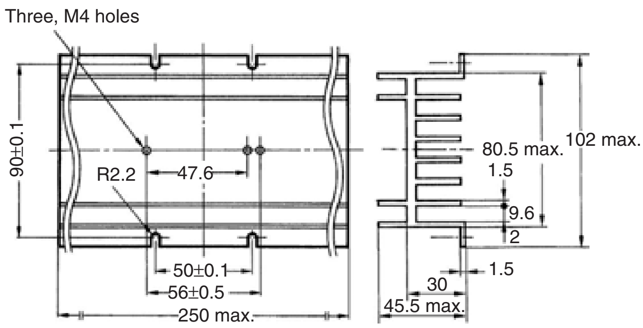
Weight: approx. 210 g

Y92B-A150N Heat Sink (for the G3NA-240B, G3NA-440B)



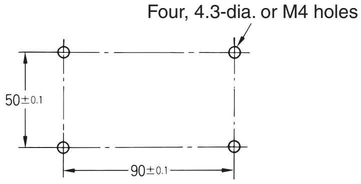
Weight: approx. 310 g

Y92B-A250 Heat Sink (for the G3NA-440B)



Weight: approx. 510 g

Mounting Holes
Y92B-A100
Y92B-A150
Y92B-A250



For surface mounting, a 30% derating of the load current is required (from the *Load Current vs. Ambient Temperature* graphs).

The orientation indicated by the external dimensions is not the correct mounting orientation. When opening mounting holes, refer to the mounting hole dimensions.

Safety Precautions

⚠ Caution

Touching the charged section may occasionally cause minor electric shock. Do not touch the G3NA terminal section (the charged section) when the power supply is ON. Be sure to attach the cover before use.

⚠ Caution

The G3NA and heat sink will be hot and may occasionally cause minor burns. Do not touch the G3NA or the heat sink either while the power supply is ON, or immediately after the power is turned OFF.

⚠ Caution

The internal snubber circuit is charged and may occasionally cause minor electric shock. Do not touch the G3NA's main circuit terminals immediately after the power is turned OFF.

⚠ Caution

Be sure to conduct wiring with the power supply turned OFF, and always attach the terminal cover after completing wiring. Touching the terminals when they are charged may occasionally result in minor electric shock.

⚠ Caution

Do not apply a short-circuit to the load side of the G3NA. The G3NA may rupture. To protect against short-circuit accidents, install a protective device, such as a quick-burning fuse, on the power supply line.

■ Precautions for Safe Use

Although OMRON continuously strives to improve the quality and reliability of our relays, the G3NA contains semiconductors, which are generally prone to occasional malfunction and failure. Maintaining safety is particularly difficult if a relay is used outside of its ratings. Always use the G3NA within the rated values. When using the G3NA, always design the system to ensure safety and prevent human accidents, fires, and social damage even in the event of G3NA failure, including system redundancy, measures to prevent fires from spreading, and designs to prevent malfunction.

1. G3NA malfunction or fire damage may occasionally occur. Do not apply excessive voltage or current to the G3NA terminals.

2. Heat Dissipation
- Do not obstruct the airflow to the G3NA or heat sink. Heat generated from an G3NA error may occasionally cause the output element to short, or cause fire damage.
- Be sure to prevent the ambient temperature from rising due to the heat radiation of the G3NA. If the G3NA is mounted inside a panel, install a fan so that the interior of the panel is fully ventilated.
- Mount the G3NA in the specified orientation. If the G3NA is mounted in any other orientation, abnormal heat generation may cause output elements to short or may cause burning.
- Do not use the G3NA if the heat sink fins are bent, e.g., as the result of dropping the G3NA. Heat dissipation characteristics will be reduced, possibly causing G3NA failure.
- Apply a thin layer of Toshiba Silicone's YG6260 or Sinetsu Silicone's G746, or a similar product to the heat sink before mounting
- If a material with high thermal resistance, such as wood, is used, heat generated by the G3NA may occasionally cause fire or burning. When installing the G3NA directly into a control panel so that the panel can be used as a heat sink, use a panel material with low thermal resistance, such as aluminum or steel.
- Use the specified heat sink or one with equivalent or better characteristics.

3. Wire the G3NA and tighten screws correctly, observing the following precautions
Heat generated by a terminal error may occasionally result in fire damage. Do not operate if the screws on the output terminal are loose.
- Abnormal heat generated by wires may occasionally result in fire damage. Use wires suitable for the load current.
- Abnormal heat generated by terminals may occasionally result in fire damage. Do not operate if the screws on the output terminal are loose.

Tightening Torque

Screw size	Tightening torque
M4	1.2 N·m
M5	2.0 N·m

- Abnormal heat generated by terminals may occasionally result in fire damage. When tightening terminal screws, be sure that no non-conductive foreign matter is caught in screw.
- For GN3A Relays of 40 A or higher, use crimp terminals of an appropriate size for the wire diameter for M5 terminals.
- Do not use any wires with damaged sheaths. These may cause electric shock or leakage.
- Do not place wiring in the same conduit or duct as high-voltage lines. Induction may cause malfunction or damage.
- Use wires of an appropriate length, otherwise malfunction and damage may result due to induction.
- Mount the DIN-rail securely. Otherwise, the DIN-rail may fall.
- Be sure that the G3NA clicks into place when mounting it to DIN-rail. The G3NA may fall if it is not mounted correctly.
- Do not mount the G3NA when your hands are oily or dirty, e.g., with metal powder. These may cause G3NA failure.
- Tighten the G3NA screws securely.
  Tightening torque: 0.78 to 0.98 N·m
- Tighten the heat sink screws securely.
  Tightening torque: 0.98 to 1.47 N·m

4. Preventing Overheating
When using the High-capacity Heat Sink (Y92B-P250NF), always use a thermostat or other method to protect from overheating in the event that the fan stops.

5. Do Not Touch Fan Blades
When the fan is operating, do not touch the fan blades with any part of your body or allow foreign matter to come into contact with the blades. Always attach the enclosed finger guard when using the G3NA.

6. Operating Conditions
- Only use the G3NA with loads that are within the rated values. Using the G3NA with loads outside the rated values may result in malfunction, damage, or burning.
- Use a power supply within the rated frequency range. Using a power supply outside the rated frequency range may result in malfunction, damage, or burning.

7. Do not transport the G3NA under the following conditions. Failure or malfunction may occur.
- Conditions under which the G3NA will be exposed to water
- High temperatures or high humidity
- Without proper packing

Operating and Storage Locations

Do not use or store the G3NA in the following locations. Doing so may result in damage, malfunction, or deterioration of performance characteristics.

- Do not use or store in locations subject to direct sunlight.
- Do not use in locations subject to ambient temperatures outside the range –20 to 60°C.
- Do not use in locations subject to relative humidity outside the range 45% to 85% or locations subject to condensation as the result of severe changes in temperature.
- Do not store in locations subject to ambient temperatures outside the range –30 to 70°C.
- Do not use or store in locations subject to corrosive or flammable gases.
- Do not use or store in locations subject to dust (especially iron dust) or salts.
- Do not use or store in locations subject to shock or vibration.
- Do not use or store in locations subject to exposure to water, oil, or chemicals.
- Do not use or store in locations subject to high temperatures or high humidity.
- Do not use or store in locations subject to salt damage.
- Do not use or store in locations subject to rain or water drops.

■ Precautions for Correct Use

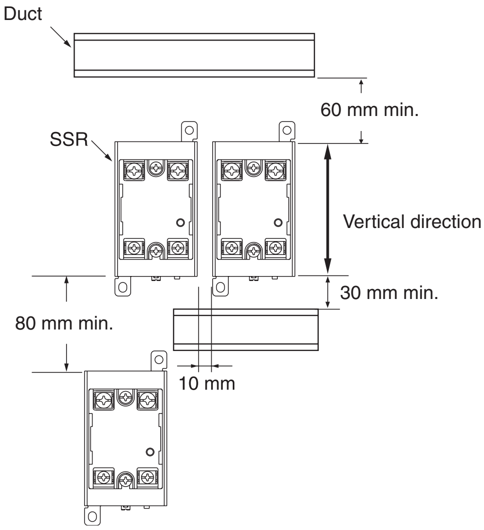
Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

Before Actual Operation

1. The G3NA in operation may cause an unexpected accident. Therefore it is necessary to test the G3NA under the variety of conditions that are possible. As for the characteristics of the G3NA, it is necessary to consider differences in characteristics between individual SSRs.
2. Unless otherwise specified, the ratings in this catalog are tested values in a temperature range between 15°C and 30°C, a relative humidity range between 25% and 85%, and an atmospheric pressure range between 88 and 106 kPa (standard test conditions according to JIS C5442). It will be necessary to provide the above conditions as well as the load conditions if the user wants to confirm the ratings of specific G3NAs.

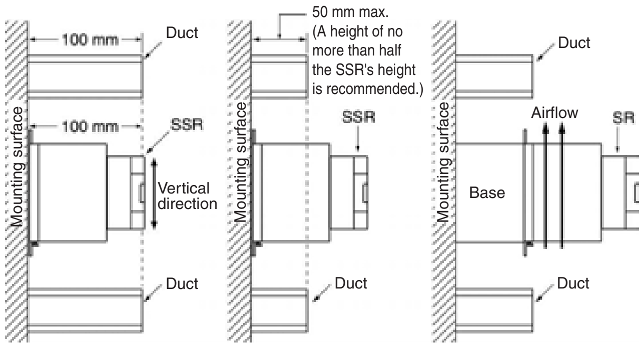
Mounting Method

SSR Mounting Pitch (Panel Mounting)



Relationship between SSRs and Duct Height

Incorrect Example | **Countermeasure 1** | **Countermeasure 2**

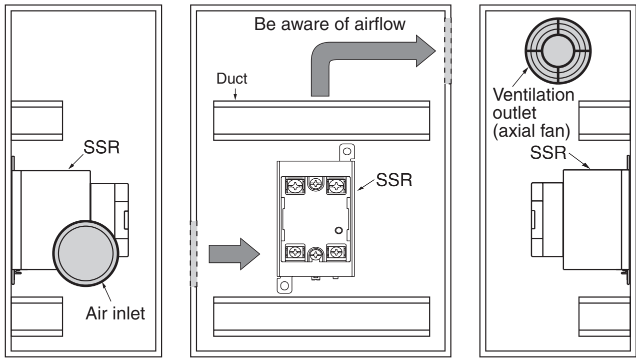


Do not surround the SSR with ducts, otherwise the heat radiation of the SSR will be adversely affected.

Use short ducts.

If the ducts cannot be shortened, place the SSR on a metal base so that it is not surrounded by the ducts.

Ventilation Outside the Control Panel



If the air inlet or air outlet has a filter, clean the filter regularly to prevent it from clogging to ensure an efficient flow of air.

Do not locate any objects around the air inlet or air outlet, otherwise the objects may obstruct the proper ventilation of the control panel.

A heat exchanger, if used, should be located in front of the SSRs to ensure the efficiency of the heat exchanger.

- Please reduce the ambient temperature of SSRs.
  The rated load current of an SSR is measured at an ambient temperature of 40°C.
- An SSR uses a semiconductor in the output element. This causes the temperature inside the control panel to increase due to heating resulting from the passage of electrical current through the load. To restrict heating, attach a fan to the ventilation outlet or air inlet of the control panel to ventilate the panel. This will reduce the ambient temperature of the SSRs and thus increase reliability. (Generally, each 10 °C reduction in temperature will double the expected life.)

Load current (A)	5 A	10 A	20 A	40 A	75 A	90 A
Required number of fans per SSR	0.08	0.16	0.31	0.62	1.2	1.44

Example: For 10 SSRs with load currents of 10 A,
0.16 x 10 = 1.6
Thus, 2 fans would be required.

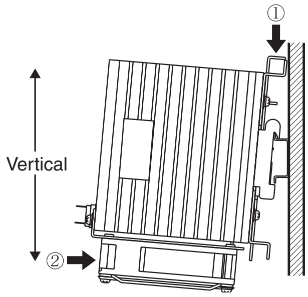
Size of fans: 92 mm^2, Air volume: 0.7 m^3/min,
Ambient temperature of control panel: 30 °C

If there are other instruments that generate heat in the control panel other than SSRs, additional ventilation will be required.

High-capacity Heat Sink (Y92B-P250NF)

DIN-rail Mounting

- Assembled DIN-rails are heavy. Mount the DIN-rails securely. Be sure that the Heat Sink is securely locked to the DIN-rail.
- Attach End Plates (PFP-M, order separately) to both ends of the Units on the DIN-rail to hold them in place.
- To mount a Heat Sink to a DIN-rail, press down at the point indicated by arrow 1 in the diagram and then press in the Heat Sink at the point indicated by arrow 2.



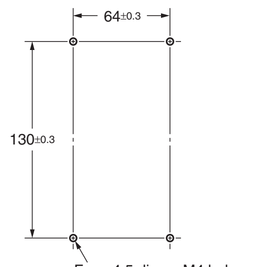
Applicable DIN-rail

Mounting is possible on TE35-15Fe (IEC 60715) DIN-rails. DIN-rails from the following manufacturers can be used.

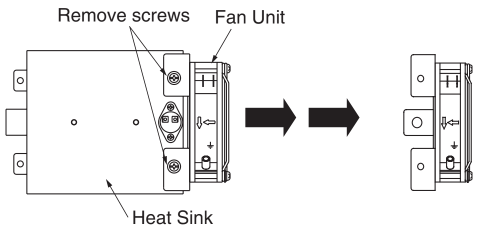
Manufacturer	Thickness: 1.5 mm	Thickness: 2.3 mm
Schneider	AM1-DE2000	---
WAGO	210-114 or 210-197	210-118
PHOENIX	N35/15	N35/15/15-2.3

Direct Mounting

- Prepare mounting holes as shown in the diagram.
  Tightening torque: 0.98 to 1.47 N·m



- When mounting a Heat Sink directly, first remove the Fan Unit, then mount the Heat Sink by itself before attaching the Fan Unit again. (Remove the two screws shown in the following diagram.)



- First, temporarily mount the Heat Sink with the bottom two screws and then attach the top two screws with the mounting bracket sandwiched between the Heat Sink and mounting surface. Finally, tighten all four screws.

Ratings and Characteristics of High-capacity Heat Sink (Y92B-P250NF)

Fan Ratings

Rated voltage	200 V
Operating voltage	85% to 110% of rated voltage
Frequency	50/60 Hz
Rated current (See note.)	0.085 A at 50 Hz 0.072 A at 60 Hz
Rated speed (See note.)	2,500 r/min at 50 Hz 2,850 r/min at 60 Hz

Note: Average values.

Thermostat Ratings

Operating temperature	Approx. 90°C
Contact ratings	3 A at 240 VAC, resistive load 3 A at 24 VDC, resistive load

Fan/Thermostat Characteristics

Insulation class (Fan)	VDE: E (120°C) UL: A (105°C) CSA: B (130°C)
Protection class	1
Insulation resistance	100 MΩ min. (at 500 VDC) between power supply connections and non-charged metal part
Dielectric strength	Fan: 2,000 VAC for 1 min Thermostat: 1,500 VAC for 1 min Between power supply connections and non-charged metal part
Ambient operating temperature	–30 to 70°C (with no icing)
Storage temperature	–40 to 85°C (with no icing)
Ambient operating humidity	25% to 85%

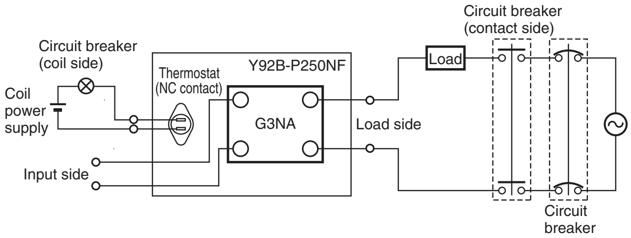
- Use a commercial power supply (50/60 Hz) for the Fan.
- Be sure to turn OFF the power supply and wait for the blades to stop before inspecting the Fan.
- High-precision ball bearings are used in the fan and these may be damaged if the Fan is dropped or otherwise subjected to shock. The life and characteristics of the Fan will be reduced if the bearings are damaged. Do not subject the Fan to shock.
- The life of the Fan depends on the ambient temperature, As a guideline, the Fan life is 40,000 hours for continuous usage at 40°C.
- Be sure there are no objects near the air vents that would restrict air flow and no loose objects, such as electrical lines.
- The Fan is an OMRON R87F-A4A-93HP (200 VAC) Fan. Use the same model of Fan for replacement.
- The tightening torque of the mounting screw when replacing the Fan is 0.38 to 0.50 N·m.
- Terminals equivalent to Faston #110 are used for the Fan power supply terminals.
- Refer to the following table for the OMRON Fan power supply plug cables (order separately).

Cable length	UL/CSA approved	Conforming to Electrical Appliance and Material Safety Law
1 m	R87F-PC	R87F-PCJT
2 m	R87F-PC-20	R87F-PCJT-20

- Connect the ground screw hole on the fan to **PE**.

Preventing Overheating with a High-capacity Heat Sink (Y92B-P250NF)

- When the High-capacity Heat Sink is used, high-capacity switching at 75 A or 90 A requires forced cooling with a fan. Connect the Fan to a power supply according to its ratings specifications.
- If the Fan stops due to a power supply error, due to foreign matter in the power supply connection, or due to aging, the Heat Sink will heat to high temperatures, possibly resulting in failure of the SSR or adverse affects on other devices. Implement an overheating prevention measure, such as turning OFF the load current, if the Heat Sink overheats.
- A thermostat is provided to detect overheating. The thermostat uses a NC contact, i.e., the circuit will be opened for overheating. This thermostat can be used to stop the operation of the SSR. Implement an overheating prevention measure by using this signal to output an alarm or perform another response applicable to the system. Also, confirm that there is no problem with the overall system.
- Do not connect the thermostat directly to the load power supply. Connect it to a contactor or other shutoff device connected above the SSR.
- Terminals equivalent to Faston #187 are used for the thermostat terminals.
- Do not place heat-dissipating silicon grease on the thermostat.
- Do not solder the thermostat terminals.
- The following diagram shows a protective circuit example.



Ventilating a High-capacity Heat Sink (Y92B-P250NF)

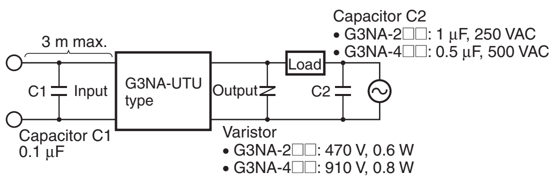
- Refer to *Ventilation Outside the Control Panel*.

Operating Conditions

- Do not apply currents exceeding the rated current otherwise, the temperature of the G3NA may rise excessively.
- As protection against accidents due to short-circuiting, be sure to install protective devices, such as fuses and no-fuse breakers, on the power supply side.
- Do not apply overvoltages to the input circuit or output circuit. Failure or burning may result.
- Do not drop the G3NA or otherwise subject it to abnormal shock. Malfunction or failure may result.
- Keep the cooling system running continuously during the ON/OFF operation of the SSR. This is to allow residual heat to dissipate while the SSR is OFF.

Noise Terminal Voltage According to EN55011

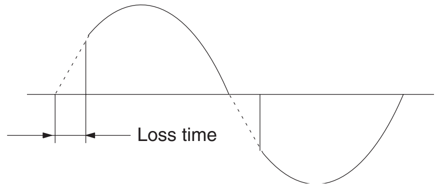
The G3NA-UTU complies with EN55011 standards when a capacitor is connected to the load power supply as shown in the following circuit diagram.



- Connect capacitor C1 to both sides of the input terminals for a G3NA with a DC input.
- Connect capacitor C2 to both sides of the load power supply output.
- Connect the varistor to both sides of the G3NA output terminals.
- Do not use an input line that is longer than 3 m.

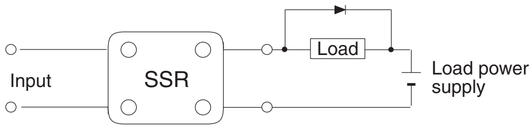
Loss Time

The loss time will increase when the G3NA is used at a low applied voltage or current. Be sure that this does not cause any problems.



Using DC Loads

For a DC or L load, a diode should be connected in parallel the load to absorb the counter electromotive force of the load.



Fuses

Connect a quick-break fuse in series with the load as a short-circuit protection measure. Use one of the fuses in the following table or one with equivalent or better characteristics.

Recommended Fuses

G3NA rated load current	Fuse model	Manufacturer	Applicable SSR
5 A	60LFF5	Kyosan Electric Manufacturing Company	G3NA-205B
8 A	60LFF8		G3NA-210B
10 A	60LFF10		
15 A	60LFF15		G3NA-220B
20 A	60LFF20 50SHA20		
25 A	60PFF25 50SHA25		G3NA-240B
30 A	60PFF30 50SHA30		
40 A	50SHA40		
45 A	50SHA45		
50 A	50SHA50		G3NA-275B-UTU
75 A	50SHA75		
80 A	50SHA80		G3NA-290B-UTU
100 A	50SHB100		

Reverse Connection

The output terminal side of the G3NA-D210B is connected to a built-in diode to protect the SSR from damage that may result from reverse connection. The SSR, however, cannot withstand one minute or more if the wires are connected in reverse. Therefore, pay the utmost attention not to make polarity mistakes on the load side.

Precautions on Operating and Storage Environments

1. Operating Ambient Temperature

The rated value for the ambient operating temperature of the G3NA is for when there is no heat build-up. For this reason, under conditions where heat dissipation is not good due to poor ventilation, and where heat may build up easily, the actual temperature of the G3NA may exceed the rated value resulting in malfunction or burning.

When using the G3NA, design the system to allow heat dissipation sufficient to stay below the *Load Current vs. Ambient Temperature* characteristic curve. Note also that the ambient temperature of the G3NA may increase as a result of environmental conditions (e.g., climate or air-conditioning) and operating conditions (e.g., mounting in an airtight panel).

2. Transportation

When transporting the G3NA, observe the following points. Not doing so may result in damage, malfunction, or deterioration of performance characteristics.

- Do not drop the G3NA or subject it to severe vibration or shock.
- Do not transport the G3NA if it is wet.
- Do not transport the G3NA under high temperatures or humidity.
- Do not transport the G3NA without packing it properly.

3. Vibration and Shock

Do not subject the G3NA to excessive vibration or shock. Otherwise the G3NA may malfunction and internal components may be deformed or damaged, resulting in failure of the G3NA to operate.

To prevent the G3NA from abnormal vibration, do not install the G3NA in locations or by means that will subject it to vibration from other devices, such as motors.

4. Solvents

Do not allow the G3NA or the resin portion of the Fan's thermostat to come in contact with solvents, such as thinners or gasoline. Doing so will dissolve the markings on the G3NA.

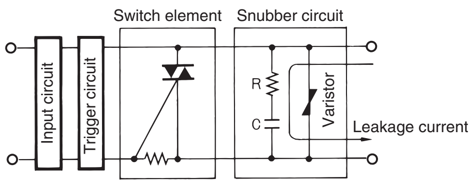
5. Oil

Do not allow the G3NA terminal cover to come in contact with oil. Doing so will cause the cover to crack and become cloudy.

Operation

1. Leakage Current

A leakage current flows through a snubber circuit in the G3NA even when there is no power input. Therefore, always turn OFF the power to the input or load and check that it is safe before replacing or wiring the G3NA.



2. Screw Tightening Torque

Tighten the G3NA terminal screws properly. If the screws are not tight, the G3NA will be damaged by heat generated when the power is ON. Perform wiring using the specified tightening torque.

3. Handling Relays

Do not mount the G3NA when your hands are oily or dirty, e.g., with metal powder. These may cause G3NA failure.

4. Do Not Drop

Be careful not to drop a Relay or Heat Sink onto any part of your body while working. Injury may result. This is particularly true for the High-capacity Heat Sink (Y92B-P250NF), which weighs 2.5 kg.

Warranty and Application Considerations

Read and Understand this Catalog
Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability.*

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J146-E2-01

In the interest of product improvement, specifications are subject to change without notice.

Solid State Relays

G3PA

Extremely Thin Relays Integrated with Heat Sinks

- Downsizing achieved through optimum design of heat sink.
- Mounting possible via screws or via DIN-rail.
- Close mounting possible for linking terminals.
  (Except for G3PA-260B-VD and G3PA-450B-VD-2.)
- Applicable with 3-phase loads.
- Replaceable power element cartridges.
- Comply with VDE 0160 (finger protection), with a dielectric strength of 4,000 V between input and load.
- Comply with VDE 0805, IEC 950.
- Certified by UL, CSA, and VDE (reinforced insulation).

Model Number Structure

■ Model Number Legend

G3PA-□□□□-□-□
1 2 3 4 5 6 7

1. **Basic Model Name**
   G3PA: Solid State Relay
2. **Rated Load Power Supply Voltage**
   2: 200 VAC
   4: 400 VAC
3. **Rated Load Current**
   10: 10 A
   20: 20 A
   30: 30 A
   40: 40 A
   50: 50 A
   60: 60 A
4. **Terminal Type**
   B: Screw terminals
5. **Zero Cross Function**
   Blank: Equipped with zero cross function
   L: Not equipped with zero cross function
6. **Certification**
   VD: Certified by UL, CSA, and VDE
7. **Special Specifications**
   Blank: Standard models
   2: 480 V models

Ordering Information

■ List of Models

Model	Isolation	Zero cross function	Indicator	Rated output load	Rated input voltage
G3PA-210B-VD	Phototriac coupler	Yes	Yes	10 A at 24 to 240 VAC	5 to 24 VDC
G3PA-220B-VD				20 A at 24 to 240 VAC	
G3PA-240B-VD				40 A at 24 to 240 VAC	
G3PA-260B-VD				60 A at 24 to 240 VAC	
G3PA-210BL-VD		No		10 A at 24 to 240 VAC	
G3PA-220BL-VD				20 A at 24 to 240 VAC	
G3PA-240BL-VD				40 A at 24 to 240 VAC	
G3PA-260BL-VD				60 A at 24 to 240 VAC	
G3PA-210B-VD		Yes		10 A at 24 to 240 VAC	24 VAC
G3PA-220B-VD				20 A at 24 to 240 VAC	
G3PA-240B-VD				40 A at 24 to 240 VAC	
G3PA-260B-VD				60 A at 24 to 240 VAC	
G3PA-420B-VD				20 A at 180 to 400 VAC	12 to 24 VDC
G3PA-430B-VD				30 A at 180 to 400 VAC	
G3PA-420B-VD-2				20 A at 200 to 480 VAC	
G3PA-430B-VD-2				30 A at 200 to 480 VAC	
G3PA-450B-VD-2				50 A at 200 to 480 VAC	

Note: When ordering, specify the rated input voltage.

Replacement Parts

Name	Carry current	Load voltage range	Model	Applicable SSR	VDE certification
Power Device Cartridge	10 A	19 to 264 VAC	G32A-A10-VD DC5-24	G3PA-210B-VD DC5-24	Yes
			G32A-A10L-VD DC5-24	G3PA-210BL-VD DC5-24	
			G32A-A10-VD AC24	G3PA-210B-VD AC24	
	20 A		G32A-A20-VD DC5-24	G3PA-220B-VD DC5-24	
			G32A-A20L-VD DC5-24	G3PA-220BL-VD DC5-24	
			G32A-A20-VD AC24	G3PA-220B-VD AC24	
	40 A		G32A-A40-VD DC5-24	G3PA-240B-VD DC5-24	
			G32A-A40L-VD DC5-24	G3PA-240BL-VD DC5-24	
			G32A-A40-VD AC24	G3PA-240B-VD AC24	
	60 A		G32A-A60-VD DC5-24	G3PA-260B-VD DC5-24	
			G32A-A60L-VD DC5-24	G3PA-260BL-VD DC5-24	
			G32A-A60-VD AC24	G3PA-260B-VD AC24	
	20 A	150 to 440 VAC	G32A-A420-VD DC12-24	G3PA-420B-VD DC12-24	
	30 A		G32A-A430-VD DC12-24	G3PA-430B-VD DC12-24	
	20 A	180 to 528 VAC	G32A-A420-VD-2 DC12-24	G3PA-420B-VD-2 DC12-24	
	30 A		G32A-A430-VD-2 DC12-24	G3PA-430B-VD-2 DC12-24	
	50 A		G32A-A450-VD-2 DC12-24	G3PA-450B-VD-2 DC12-24	

■ Other Units (Order Separately)

Units that Enable 2-line Switching of 3-phase Power

Name	Current flow	Model	Applicable SSR
Short-circuit Unit	10 A	G32A-D20	G3PA-210B-VD, G3PA-210BL-VD
	20 A		G3PA-220B-VD, G3PA-220BL-VD G3PA-420B-VD, G3PA-420B-VD-2
	30 A	G32A-D40	G3PA-430B-VD, G3PA-430B-VD-2
	40 A		G3PA-240B-VD, G3PA-240BL-VD

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input

Model	Rated voltage	Operating Voltage range	Input current impedance	Voltage level	
				Must operate voltage	Must release voltage
G3PA-210B-VD	5 to 24 VDC	4 to 30 VDC	7 mA max.	4 VDC max.	1 VDC min.
G3PA-220B-VD					
G3PA-240B-VD					
G3PA-260B-VD					
G3PA-210BL-VD	5 to 24 VDC	4 to 30 VDC	20 mA max.	4 VDC max.	1 VDC min.
G3PA-220BL-VD					
G3PA-240BL-VD					
G3PA-260BL-VD					
G3PA-210B-VD	24 VAC	19.2 to 26.4 VAC	1.4 kΩ±20%	19.2 VAC max.	4.8 VAC min.
G3PA-220B-VD					
G3PA-240B-VD					
G3PA-260B-VD					
G3PA-420B-VD	12 to 24 VDC	9.6 to 30 VDC	7 mA max.	9.2 VDC max.	1 VDC min.
G3PA-430B-VD					
G3PA-420B-VD-2					
G3PA-430B-VD-2					
G3PA-450B-VD-2					

Output

Model	Applicable load			
	Rated load voltage	Load voltage range	Load current	Inrush current
G3PA-210B(L)-VD	24 to 240 VAC (50/60 Hz)	19 to 264 VAC (50/60 Hz)	0.1 to 10 A	150 A (60 Hz, 1 cycle)
G3PA-220B(L)-VD			0.1 to 20 A	220 A (60 Hz, 1 cycle)
G3PA-240B(L)-VD			0.5 to 40 A	440 A (60 Hz, 1 cycle)
G3PA-260B(L)-VD			0.5 to 60 A	440 A (60 Hz, 1 cycle)
G3PA-420B-VD	180 to 400 VAC (50/60 Hz)	150 to 440 VAC (50/60 Hz)	0.5 to 20 A	220 A (60 Hz, 1 cycle)
G3PA-430B-VD			0.5 to 30 A	440 A (60 Hz, 1 cycle)
G3PA-420B-VD-2	200 to 480 VAC (50/60 Hz)	180 to 528 VAC (50/60 Hz)	0.5 to 20 A	220 A (60 Hz, 1 cycle)
G3PA-430B-VD-2			0.5 to 30 A	440 A (60 Hz, 1 cycle)
G3PA-450B-VD-2			0.5 to 50 A	440 A (60 Hz, 1 cycle)

Refer to *Engineering Data* for further details.

■ Characteristics

Item	G3PA-210B(L)-VD	G3PA-220B(L)-VD	G3PA-240B(L)-VD	G3PA-260B(L)-VD	G3PA-420B-VD	G3PA-420B-VD-2	G3PA-430B-VD	G3PA-430B-VD-2	G3PA-450B-VD-2
Operate time	1/2 of load power source cycle + 1 ms max. (DC Input, -B models) 1 1/2 of load power source cycle + 1 ms max. (AC Input) 1 ms max. (-BL models)								
Release time	1/2 of load power source cycle + 1 ms max. (DC Input) 1 1/2 of load power source cycle + 1 ms max. (AC Input)								
Output ON voltage drop	1.6 V (RMS) max.				1.8 V (RMS) max.				
Leakage current	5 mA max. (at 100 VAC) 10 mA max. (at 200 VAC)		10 mA max. (at 100 VAC) 20 mA max. (at 200 VAC)		20 mA max. (at 400 VAC)	20 mA max. (at 480 VAC)	20 mA max. (at 400 VAC)	20 mA max. (at 480 VAC)	
I^2t	260 A^2s		1,260 A^2s		260 A^2s	1,800 A^2s	1,800 A^2s		1,800 A^2s
Insulation resistance	100 MΩ min. (at 500 VDC)								
Dielectric strength	4,000 VAC, 50/60 Hz for 1 min								
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.375–mm single amplitude (Mounted to DIN-rail)								
Shock resistance	Destruction: 300 m/s^2 (mounted to DIN-rail)								
Ambient temperature	Operating: –30°C to 80°C (with no icing or condensation) Storage: –30°C to 100°C (with no icing or condensation)								
Certified standards	UL508, CSA C22.2 (No.14, No.950), EN60950 File No. 5915ÜG				UL508, CSA C22.2 (No.14), EN60947-4-3 File No. 6642ÜG	UL508, CSA C22.2 (No.14), EN60947-4-3 File No. 133127ÜG	UL508, CSA C22.2 (No.14), EN60947-4-3 File No. 6642ÜG	UL508, CSA C22.2 (No.14), EN60947-4-3 File No. 133127ÜG	
Ambient humidity	Operating: 45% to 85%								
Weight	Approx. 260 g	Approx. 340 g	Approx. 460 g	Approx. 900 g	Approx. 290 g	Approx. 290 g	Approx. 410 g	Approx. 410 g	Approx. 900 g

Operation

■ Replacement Parts

G32A-A Power Device Cartridge

The G32A-A Power Device Cartridge (a Triac Unit) can be replaced with a new one. When the temperature indicator has changed from pink to red, the triac circuitry may have malfunctioned possibly by an excessive flow of current, in which case, dismount the damaged cartridge for replacement.

The damaged cartridge can be replaced with a new one without disconnecting the wires from the G3PA.

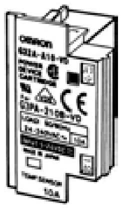
Improve the heat radiation efficiency of the G3PA before replacing the cartridge.

The G32A-A Power Device Cartridge can withstand an excessive current for a short period of time, such as may be caused accidentally by the short circuitry of the load, in which case the temperature indicator will not turn red.

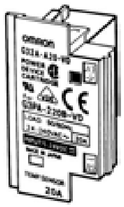
Be sure to turn OFF the power supply when replacing the Cartridge. Supplying power with the Cartridge removed may result in malfunction.

Appearance

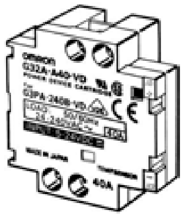
G32A-A10(L)-VD



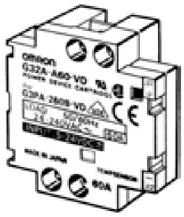
G32A-A20(L)-VD



G32A-A40(L)-VD

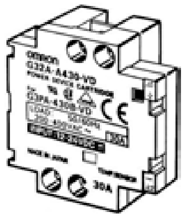


G32A-A60(L)-VD

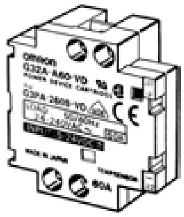


G32A-A420-VD(-2)

G32A-A430-VD(-2)



G32A-A450-VD-2



Replacing Power Device Cartridges

When replacing Power Device Cartridges, use the specified model. Using a Power Device Cartridge other than the specified one will result in faulty operation and destruction of the elements.

■ Replacement Procedure

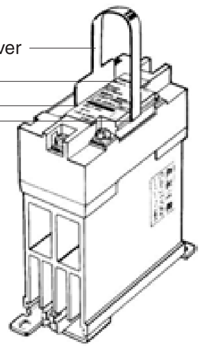
G32A-A10(L)-VD/G32A-A20(L)-VD/G32-A420-VD(-2)

Use the special tool (provided) to extract the cartridge for replacement with a new one.

Extraction

Follow the procedures below to dismount the Power Device Cartridge from the G3PA.

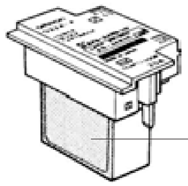
1. **Switch off the power.**
2. Remove the terminal cover.
3. Hook the indented part of the cartridge with the tool and pull up on the cartridge to remove it.



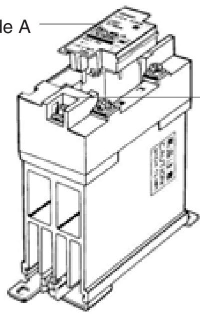
Mounting

Follow the procedures below to mount the Power Device Cartridge on the G3PA.

1. Apply silicone grease (provided with the G32A-A) to the entire surface of the heat sink.



2. Make sure that there is no dust or pieces of wire on the heat sink of the G32A-A or the G3PA.
3. Insert the cartridge into the opening of the G3PA so that the letters on the cartridge and those on the G3PA are in the same direction and side A and side B are even.



4. Attach the terminal cover.
5. Switch on the power and check the G3PA to be sure it works properly.

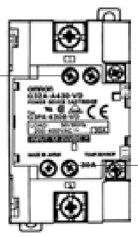
G32A-A40(L)-VD/G32A-A60(L)-VD/G32A-A430-VD(-2)/G32A-A450-VD-2

The G32A Power Device Cartridge is mounted and secured with screws to the G3PA Unit.

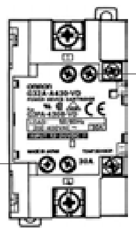
Extraction

Follow the procedures below to dismount the G32A-A Power Device Cartridge from the G3PA.

1. **Switch off the power.**
2. Remove the terminal cover.
3. Loosen the two centered screws on the sides to dismount the cartridge. The screws are connected to terminals 1 and 2.



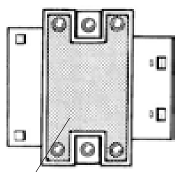
4. Loosen the screws on both the corners.



5. Hold the indented part of both the corners to dismount the cartridge.

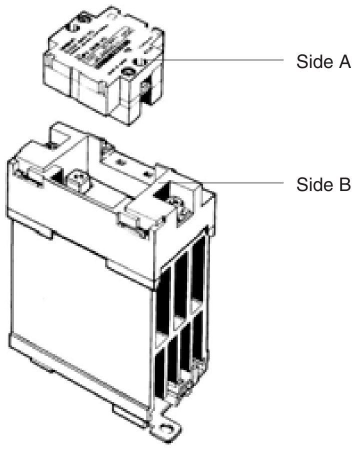
Mounting

1. Apply silicone grease to the entire surface of the heat sink.



2. Make sure that there is no dust or pieces of wire on the heat sink of the G32A-A or the G3PA.

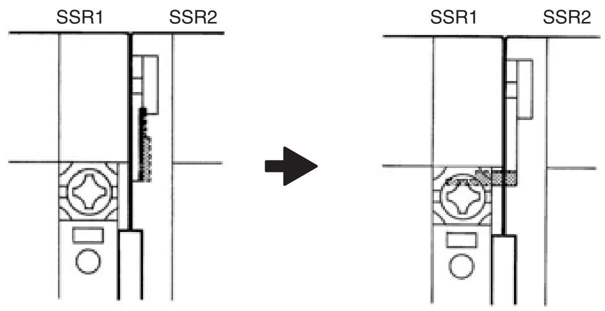
3. Insert the cartridge into the opening of the G3PA so that side A and side B are even.



4. Tighten the screws on both the corners with a tightening torque of 0.59 to 0.78 N·m.
5. Tighten the screws on both the sides with a tightening torque of 0.59 to 0.78 N·m.
6. Attach the terminal cover.
7. Switch on the power and check the G3PA to be sure it works properly.

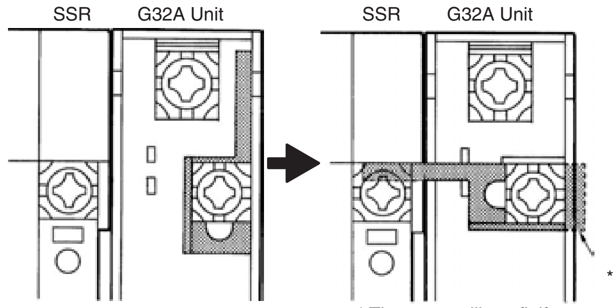
■ Linking Terminal Connection

• Connecting with linking terminal for G3PA-210B(L)-VD, -220B(L)-VD, -240B(L)-VD and G3PA-420B-VD(-2), G3PA-430B-VD(-2).



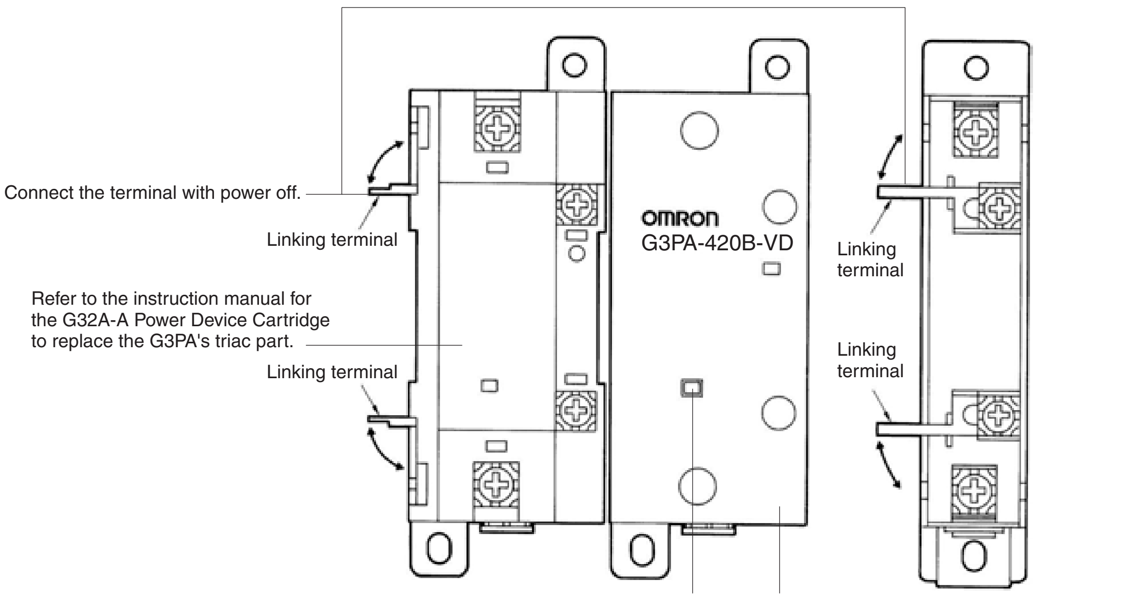
1. When SSRs are close mounted, loosen the M3.5 Sems screw and flip the linking terminal down.
2. Insert the linking terminal securely into the center of the screw and tighten the screw.

• Connecting with linking terminal for G32A.



* The cover will not fit if the terminal protrudes.

1. When SSR are close mounted, loosen the M3.5 Sems screw on the G32A and flip the linking terminal down.
2. Insert the linking terminal securely into the center of the screw and tighten the screw. Ensure that the linking terminal does not protrude.



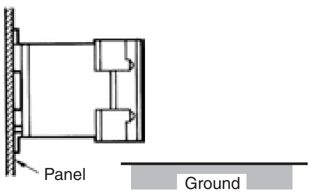
When the temperature indicator has turned from pink to red, the G32-A-A Power Device Cartridge may have malfunctioned, in which case the cartridge must be replaced with a new one.

Use the terminal cover to prevent accidents due to electric shock.

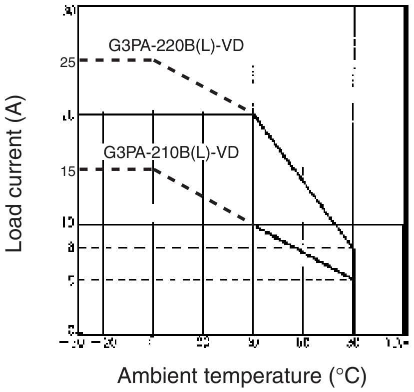
Engineering Data

Load Current vs. Ambient Temperature

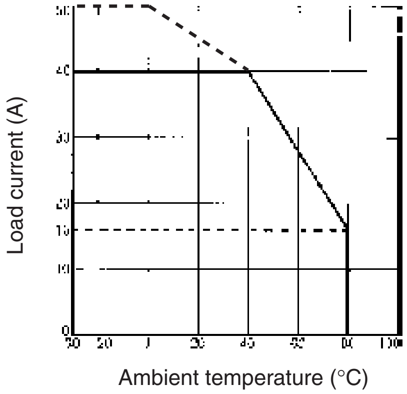
Vertical Mounting



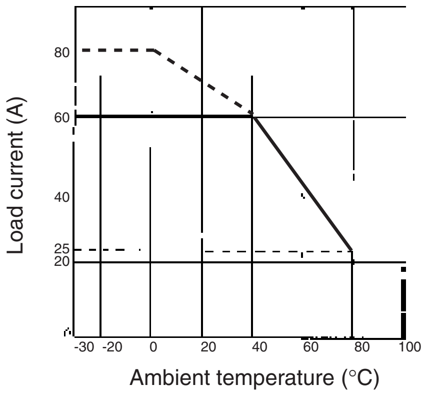
G3PA-210B(L)-VD, G3PA-220B(L)-VD



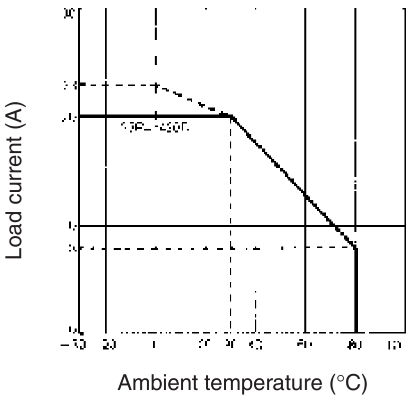
G3PA-240B(L)-VD



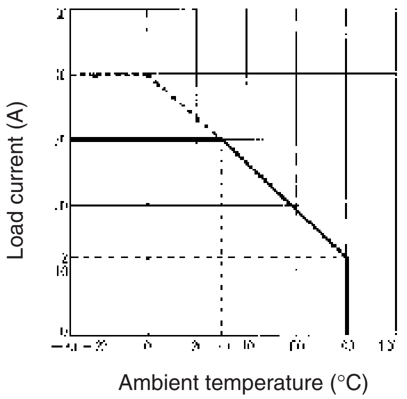
G3PA-260B(L)-VD



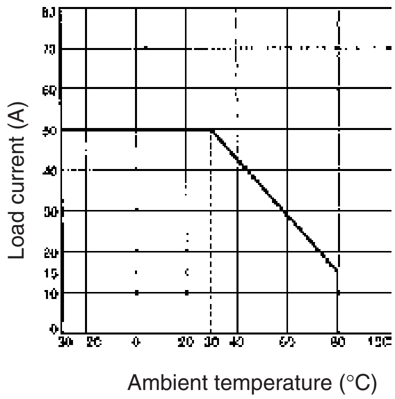
G3PA-420B-VD, G3PA-420B-VD-2



G3PA-430B-VD, G3PA-430B-VD-2



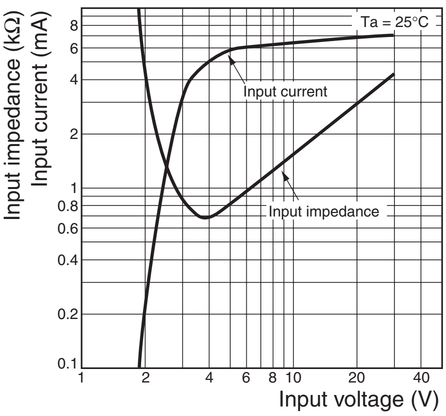
G3PA-450B-VD-2



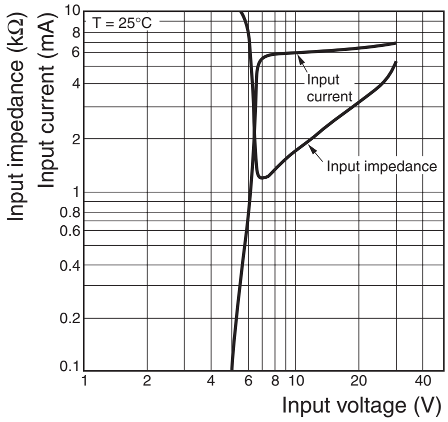
Note: Close mounting is possible for a maximum of three Units by reducing the load current by 20%.
(A minimum clearance of 10 mm must be provided when mounting four or more Units.)

Input Voltage vs. Input Current

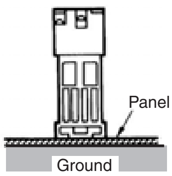
G3PA-2□0B-VD



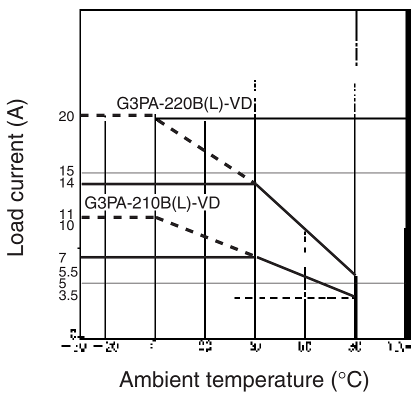
G3PA-4□0-VD, G3PA-4□-VD-2



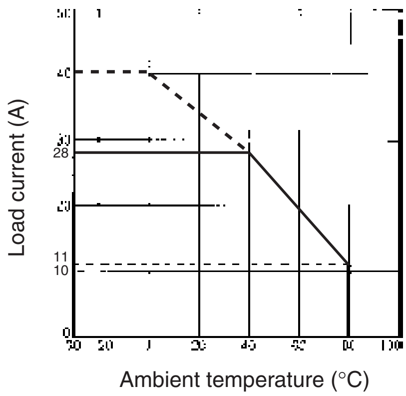
Horizontal Mounting



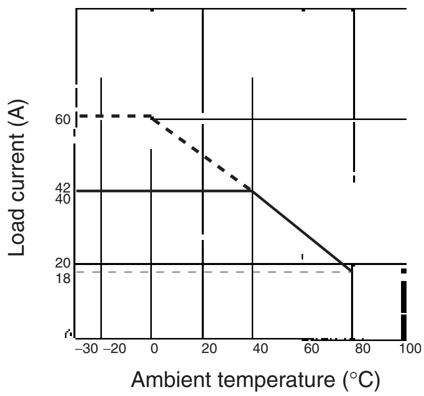
G3PA-210B(L)-VD, G3PA-220B(L)-VD



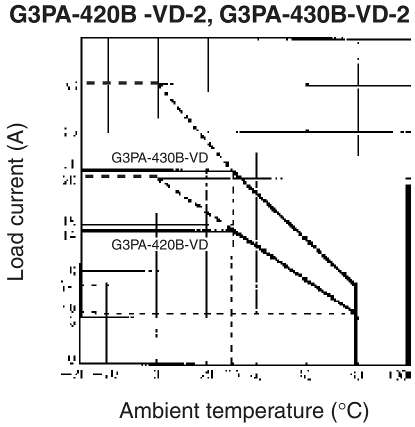
G3PA-240B(L)-VD



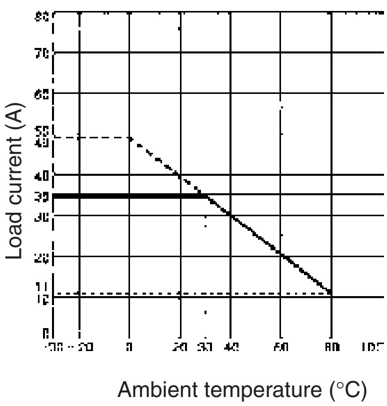
G3PA-260B(L)-VD



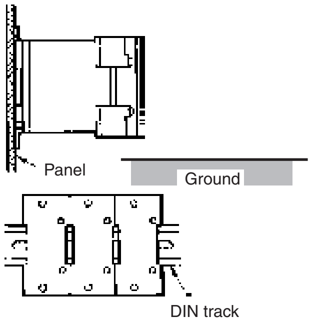
G3PA-420B-VD, G3PA-430B-VD
G3PA-420B -VD-2, G3PA-430B-VD-2



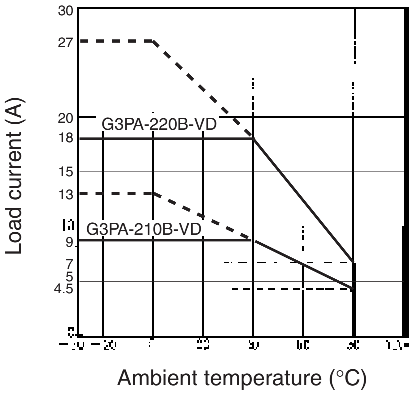
G3PA-450B-VD-2



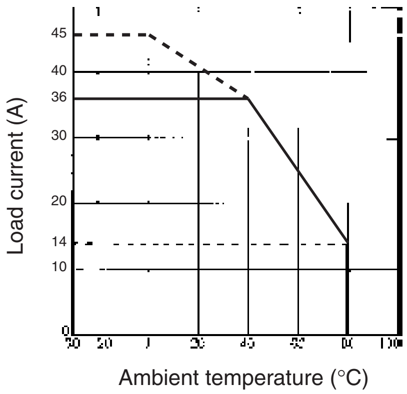
Close Mounting (Up to Three)



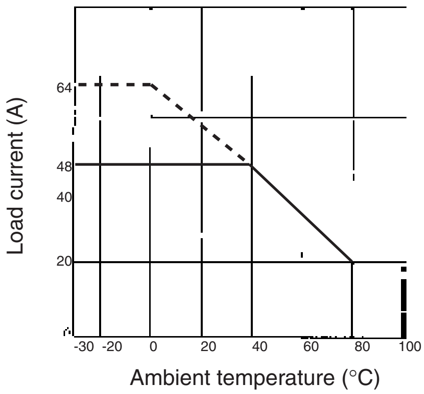
G3PA-210B(L)-VD, G3PA-220B(L)-VD



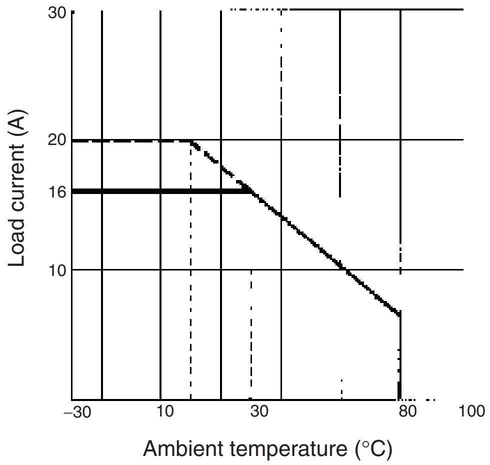
G3PA-240B(L)-VD



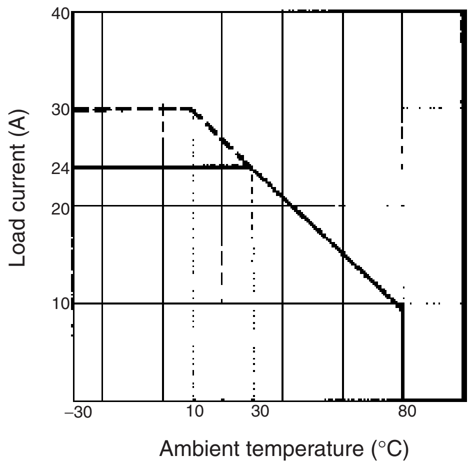
G3PA-260B(L)-VD



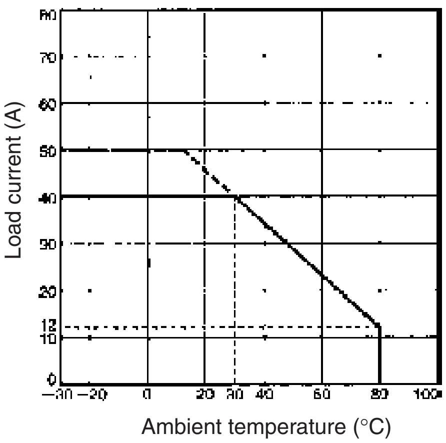
G3PA-420B-VD, G3PA-420B-VD-2



G3PA-430B-VD, G3PA-430B-VD-2



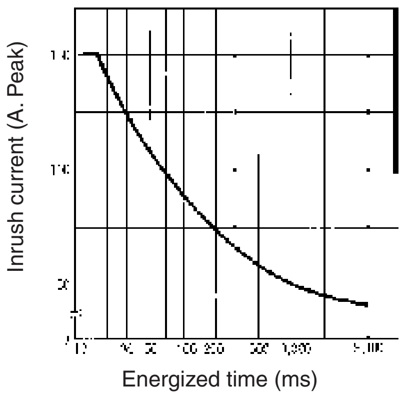
G3PA-450B-VD-2



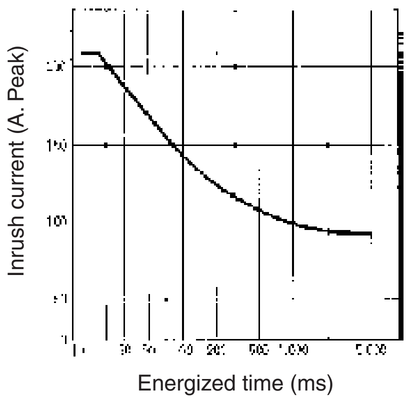
One Cycle Surge Current: Non-repetitive

Note: Keep the inrush current to half the rated value if it occurs repetitively.

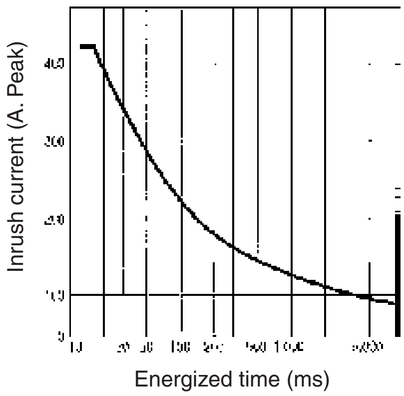
G3PA-210B(L)-VD



G3PA-220B(L)-VD, G3PA-420B-VD, G3PA-420B-VD-2



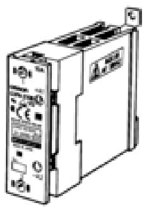
G3PA-240B(L)-VD/260B(L)-VD, G3PA-430B-VD, G3PA-430B-VD-2, G3PA-450B-VD-2



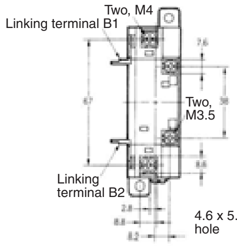
Dimensions

Note: All units are in millimeters unless otherwise indicated.

G3PA-210B(L)-VD



Without Terminal Cover



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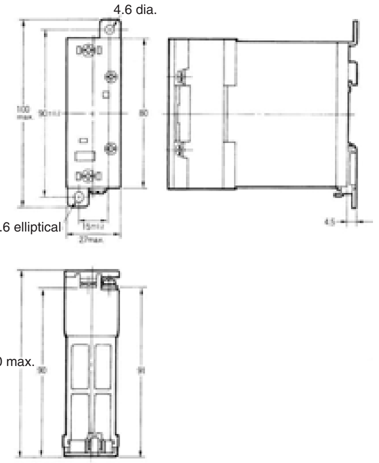
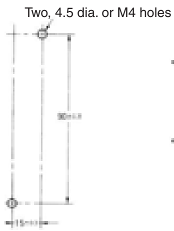
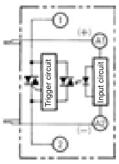


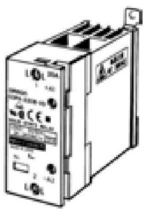
Mounting Holes



Terminal Arrangement/ Internal Connections



G3PA-220B(L)-VD



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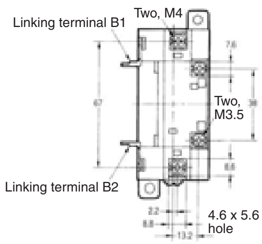
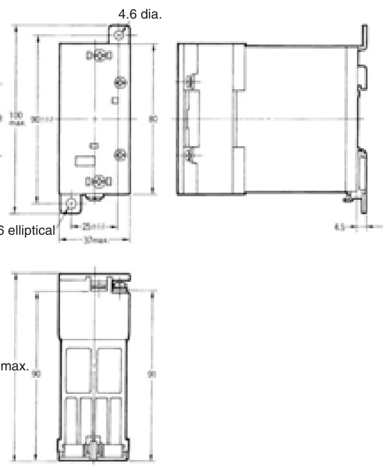
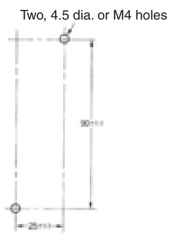


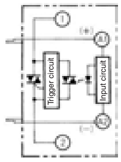
With Terminal Cover



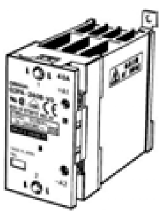
Mounting Holes



Terminal Arrangement/ Internal Connections



G3PA-240B(L)-VD



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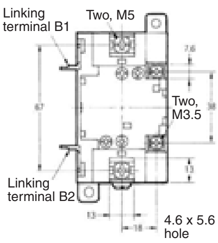
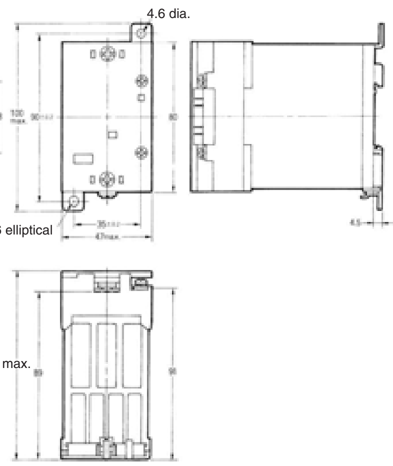
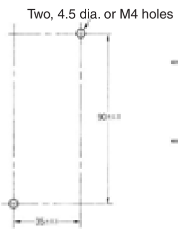


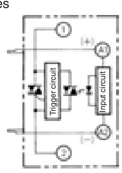
With Terminal Cover



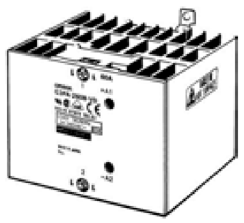
Mounting Holes



Terminal Arrangement/ Internal Connections



G3PA-260B(L)-VD
G3PA-450B-VD-2



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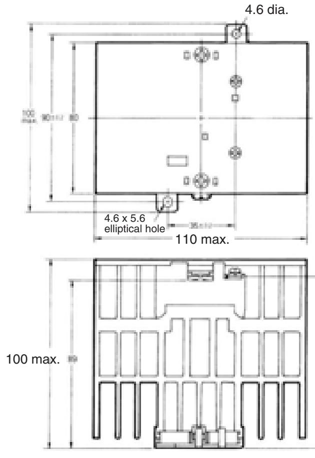

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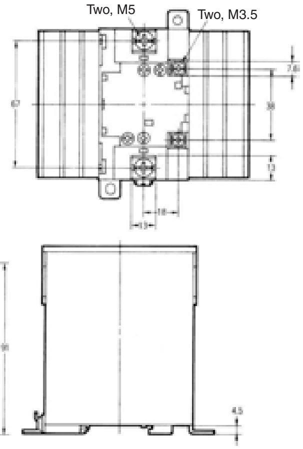
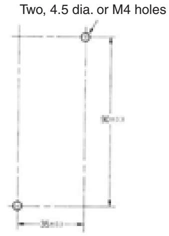
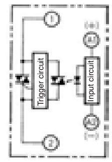


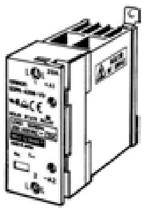
Mounting Holes



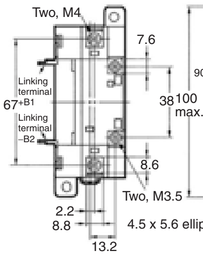
Terminal Arrangement/ Internal Connections



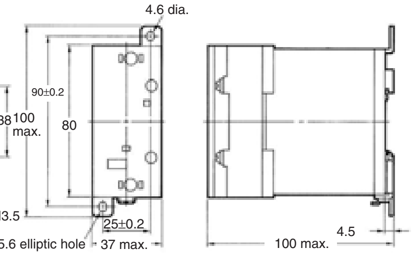
G3PA-420B-VD, G3PA-420B-VD-2

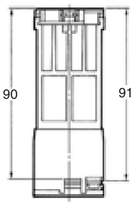


Without Terminal Cover



With Terminal Cover





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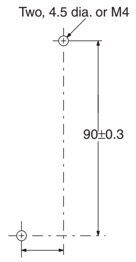
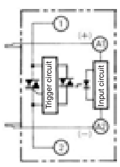
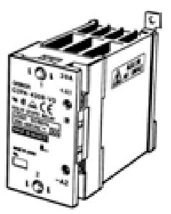


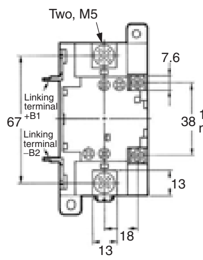
Terminal Arrangement/ Internal Connections



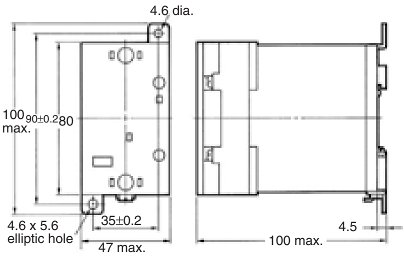
G3PA-430B-VD, G3PA-430B-VD-2

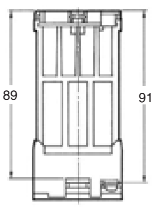


Without Terminal Cover

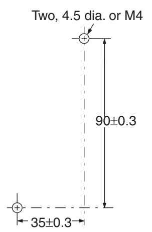


With Terminal Cover

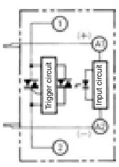




Mounting Holes



Terminal Arrangement/ Internal Connections



Safety Precautions

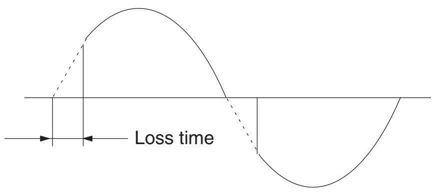
■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

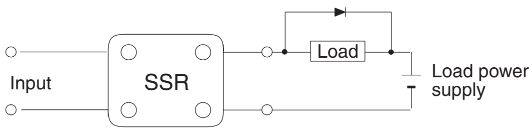
Load Connection

For an AC load, use a power supply rated at 50 or 60 Hz.
The maximum operating frequency is 10 Hz.
The G3PA-(VD) has a built-in varistor for overvoltage protection.

At a low applied voltage, such as 24 VAC, the load current is not fully supplied. When the Unit is switched ON, the voltage required to power the Unit deprives the output signal of the necessary voltage level and thus creates loss time. The lower the load voltage is, the greater the loss time is. This condition, however, will not create any serious problems.



For a DC or L load, a diode should be connected in parallel the load to absorb the counter electromotive force of the load.

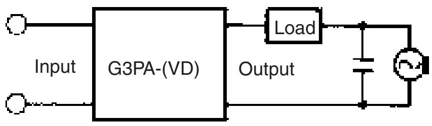


When attaching a heat sink to the G3PA-(VD), in order to facilitate heat dissipation, apply silicone grease or equivalent heat-conductive grease on the heat sink. (Toshiba Silicone, Shinetsu Silicone, etc.)

Tighten the mounting screws of the heat sink with a torque of 0.78 to 0.98 N·m.

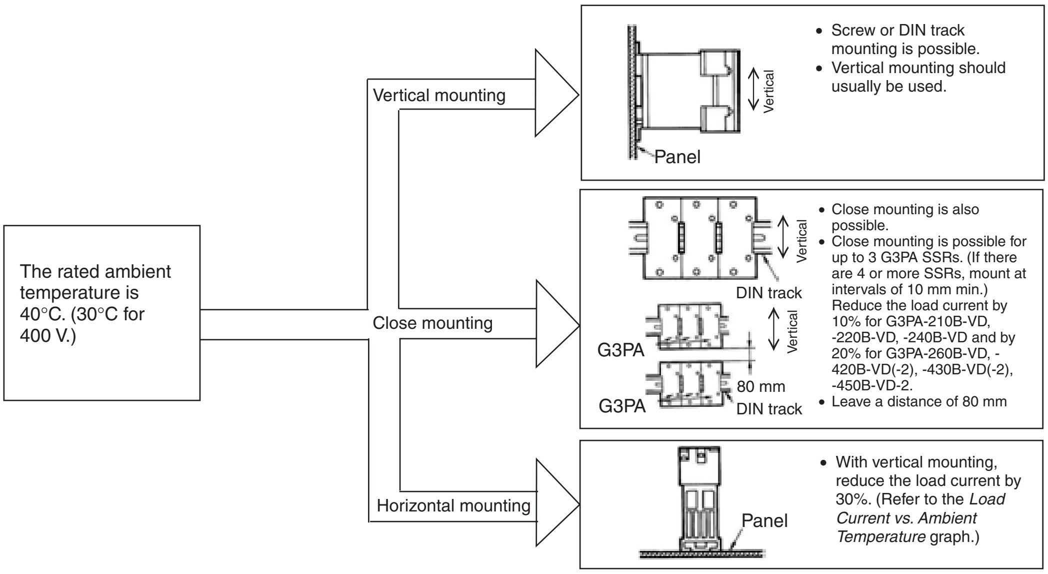
Noise Terminal Voltage according to EN55011

The G3PA-(VD) complies with EN55011 standards when a capacitor is connected to the load power supply as shown in the following circuit diagram.



Recommended Capacitor: 1 µF, 250 VAC

Mounting

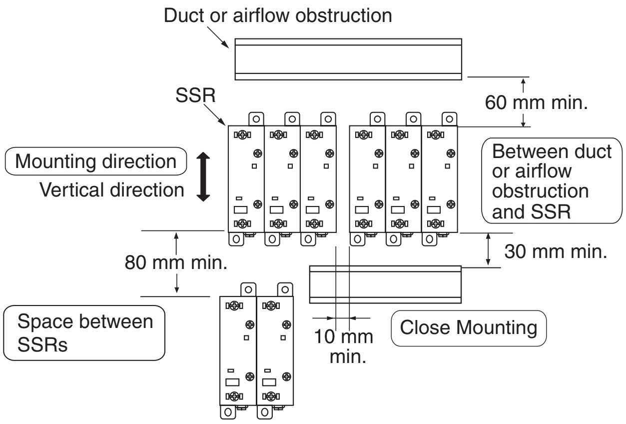


Note: Leave a distance of 60 mm min. between SSRs and ducts (especially above the SSR).

Close Mounting

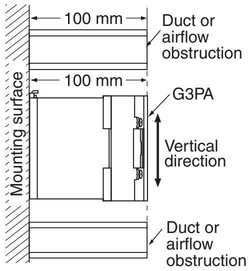
SSR Mounting Pitch

Panel Mounting (At a rated ambient temperature of 40°C).



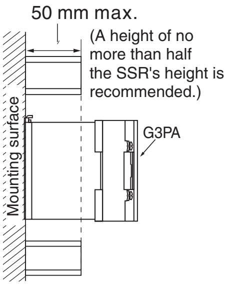
Relationship between SSRs and Ducts

Duct Height



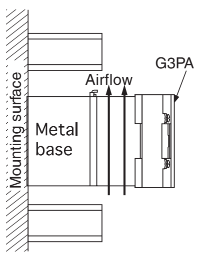
Do not surround the SSR with ducts, otherwise the heat radiation of the SSR will be adversely affected.

Countermeasure (1)



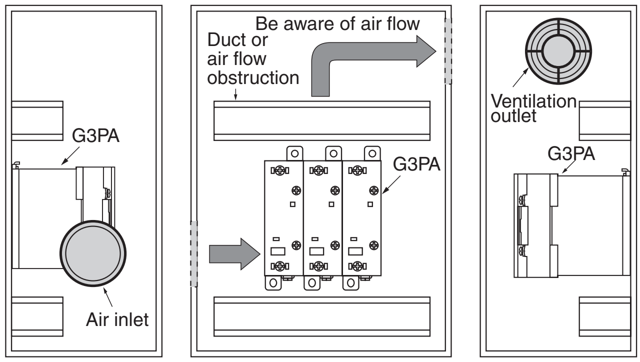
Use short ducts.

Countermeasure (2)



If the ducts cannot be shortened, place the SSR on a metal base so that it is not surrounded by the ducts.

Ventilation



If the air inlet or air outlet has a filter, clean the filter regularly to prevent it from clogging and ensure an efficient flow of air.

Do not locate any objects around the air inlet or air outlet, otherwise the objects may obstruct the proper ventilation of the control panel.

A heat exchanger, if used, should be located in front of the SSR Units to ensure the efficiency of the heat exchanger.

Please reduce the ambient temperature of SSRs.

The rated load current of an SSR is measured at an ambient temperature of 25 or 40 °C.

An SSR uses a semiconductor in the output element. This causes the temperature inside the control panel to increase due to heating resulting from the passage of electrical current through the load. To restrict heating, attach a fan to the ventilation outlet or air inlet of the control panel to ventilate the panel. This will reduce the ambient temperature of the SSRs and thus increase reliability. (Generally, each 10 °C reduction in temperature will double the expected life.)

Load current (A)	10 A	20 A	30 A	40 A	60 A
Required number of fans per SSR	0.16	0.31	0.47	0.62	0.93

Example: For 10 SSRs with load currents of 20 A,
0.31 x 10 = 3.1
Thus, 4 fans would be required.

Size of fans: 92 mm^2, Air volume: 0.7 m^3/min,
Ambient temperature of control panel: 30 °C

If there are other instruments that generate heat in the control panel other than SSRs, additional ventilation will be required.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K094-E2-06

Solid State Relays (Single-phase)
G3PB

Compact, Slim-profile SSR with Heat Sink, Offering Heater Control for 480-VAC Rated Loads

- Compact design achieved by optimizing heat sink shape.
- DIN-rail mounting possible in addition to screw mounting.
- Conforms to CE Marking, EN (VDE approval), CSA, and VDE standards.
  (UL pending)

Note: Refer to *Precautions* on page H-41.

Model Number Structure

■ Model Number Legend

G3PB-□□□-□□-□
1 2 3 4 5 6 7

1. **Basic Model Name**
   G3PB: Solid State Relay
2. **Rated Load Power Supply Voltage**
   5: 480 VAC
3. **Rated Load Current**
   15: 15 A
   25: 25 A
   35: 35 A
   45: 45 A
4. **Terminal Type**
   B: Screw terminals
5. **Number of Elements**
   Blank: Single-phase models
6. **Construction**
   Blank: DIN-rail mounting and built-in heat sink
7. **Certification**
   VD: Certified by CSA and VDE

Ordering Information

■ List of Models

Isolation method	Zero cross function	Operation indicator	Rated input voltage	Rated output load (See note.)	Model number
Phototriac coupler	Yes	Yes (yellow)	12 to 24 VDC	15 A, 200 to 480 VAC	G3PB-515B-VD 12 to 24 VDC
				25 A, 200 to 480 VAC	G3PB-525B-VD 12 to 24 VDC
				35 A, 200 to 480 VAC	G3PB-535B-VD 12 to 24 VDC
				45 A, 200 to 480 VAC	G3PB-545B-VD 12 to 24 VDC

Note: The applicable load current varies depending on the ambient temperature. For details, refer to *Load Current vs. Ambient Temperature* in Engineering Data.

■ Accessories (Order Separately)

Mounting DIN-rail	50 cm (1) x 7.3 mm (t)	PFP-50N
	1 m (1) x 7.3 mm (t)	PFP-100N
	1 m (1) x 16 mm (t)	PFP-100N2

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input

Item	Common
Rated voltage	12 to 24 VDC
Operating voltage range	9.6 to 30 VDC
Rated input current	7 mA max.
Must operate voltage	9.6 VDC max.
Must release voltage	1 VDC min.

Output

Item	G3PB-515B-VD	G3PB-525B-VD	G3PB-535B-VD	G3PB-545B-VD
Rated load voltage	200 to 480 VAC (50/60 Hz)			
Load voltage range	180 to 528 VAC (50/60 Hz)			
Applicable load current (See note.)	0.1 to 15 A (at 40°C)	0.1 to 25 A (at 40°C)	0.5 to 35 A (at 25°C)	0.5 to 45 A (at 25°C)
Inrush current resistance (peak value)	150 A (60 Hz, 1 cycle)	220 A (60 Hz, 1 cycle)	440 A (60 Hz, 1 cycle)	
Permissible I^2t (half 60-Hz wave)	128 A^2s	1,350 A^2s		6,600 A^2s
Applicable load (with Class-1 AC resistive load)	6 kW max. (at 400 VAC)	10 kW max. (at 400 VAC)	14 kW max. (at 400 VAC)	18 kW max. (at 400 VAC)

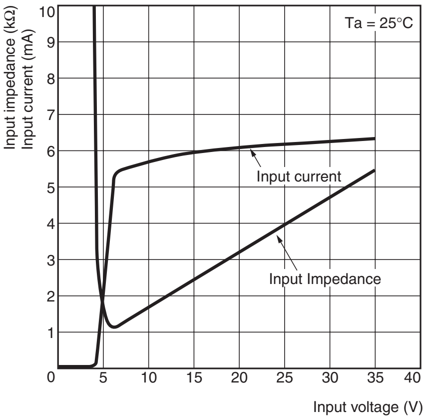
Note: The applicable load current varies depending on the ambient temperature. For details, refer to *Load Current vs. Ambient Temperature* in Engineering Data.

■ Characteristics

Item	G3PB-515B-VD	G3PB-525B-VD	G3PB-535B-VD	G3PB-545B-VD
Operate time	1/2 of load power source cycle + 1 ms max.			
Release time	1/2 of load power source cycle + 1 ms max.			
Output ON voltage drop	1.8 V (RMS) max.			
Leakage current	20 mA max. (at 480 VAC)			
Insulation resistance	100 MΩ min. (at 500 VDC)			
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min			
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.375-mm single amplitude (0.75-mm double amplitude) (Mounted to DIN-rail)			
Shock resistance	Destruction: 294 m/s² (DIN-rail mounting)			
Ambient temperature	Operating:-30°C to 80°C (with no icing or condensation) Storage: -30°C to 100°C (with no icing or condensation)			
Ambient humidity	Operating: 45% to 85%			
Certified standards	CSA22.2 No. 14 EN60947-4-3			
EMC	Emission EN55011 Group 1 Class B Immunity ESD IEC947-4-3, EN61000-4-2 4 kV contact discharge 8 kV air discharge Immunity Electromagnetic IEC947-4-3, EN61000-4-3 10 V/m (80 MHz to 1 GHz) Immunity EFT IEC947-4-3, EN61000-4-4 2 kV AC power-signal line Immunity Surge transient IEC947-4-3, EN61000-4-5 Normal mode ±1 kV, Common mode ±2 kV Immunity RF disturbance IEC947-4-3, EN61000-4-6 10 V (0.15 to 80 MHz) Immunity Dips IEC947-4-3, EN61000-4-11			
Weight	Approx. 240 g		Approx. 400 g	

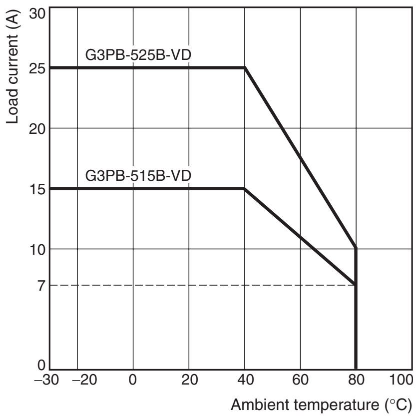
Engineering Data

Input Voltage vs. Input Impedance and Input Voltage vs. Input Current

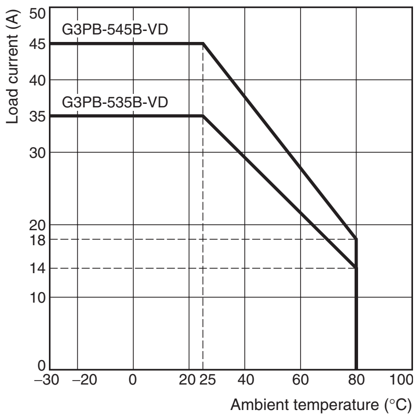


Load Current vs. Ambient Temperature

G3PB-515B-VD, G3PB-525B-VD



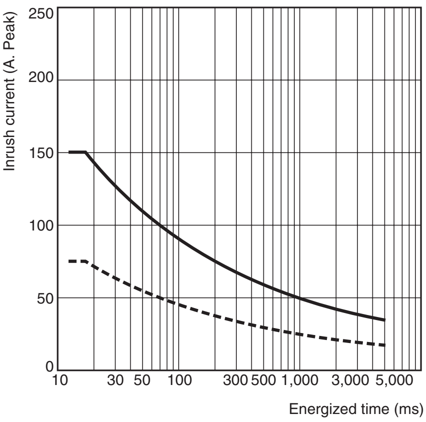
G3PB-535B-VD, G3PB-545B-VD



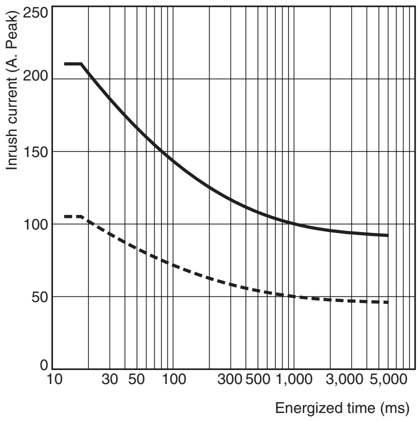
One Cycle Surge Current: Non-repetitive

Keep the inrush current to below the inrush current resistance value (i.e., below the broken line) if it occurs repetitively.

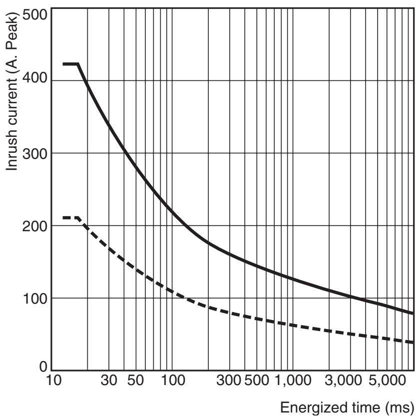
G3PB-515B-VD



G3PB-525B-VD

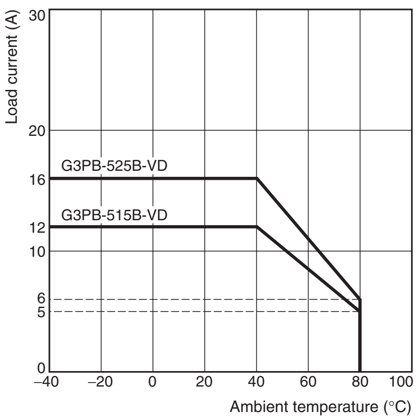


G3PB-535B-VD, G3PB-545B-VD

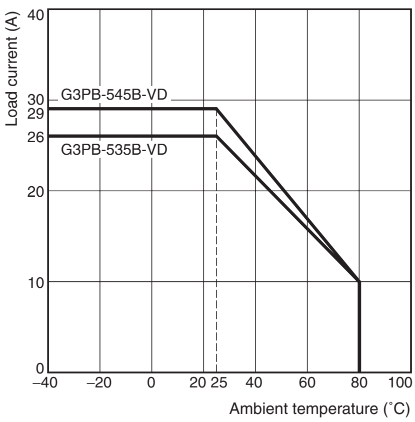


Close Mounting (8 Relays)

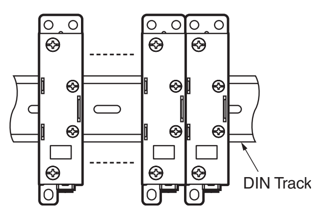
G3PB-515B-VD, G3PB-525B-VD



G3PB-535B-VD, G3PB-545B-VD



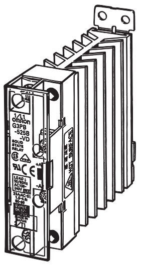
Close Mounting Example

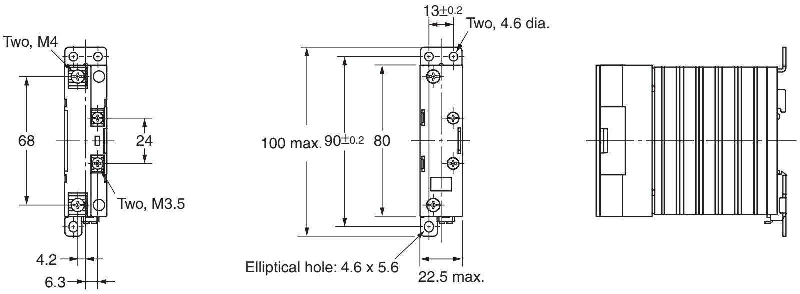


Dimensions

Note: All units are in millimeters unless otherwise indicated.

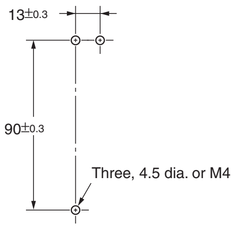
G3PB-515B-VD
G3PB-525B-VD

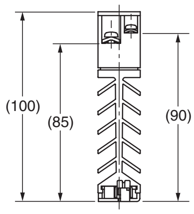




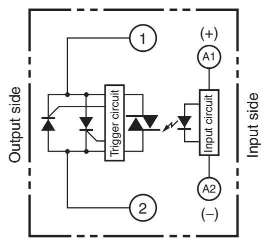
Note: Without terminal cover. **Note:** With terminal cover.

Mounting Holes

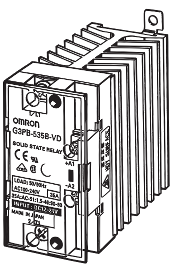


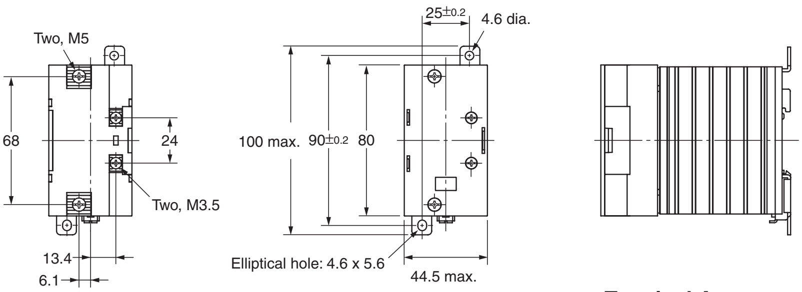


Terminal Arrangement/ Internal Circuit Diagram



G3PB-535B-VD
G3PB-545B-VD

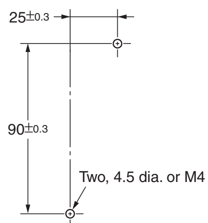


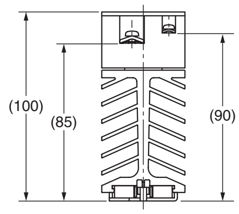


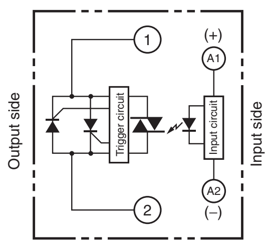
Note: Without terminal cover. **Note:** With terminal cover.

Terminal Arrangement/ Internal Circuit Diagram

Mounting Holes



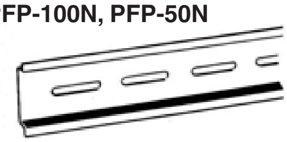


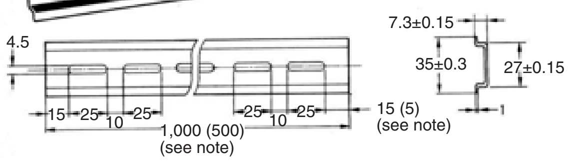


Accessories (Order Separately)

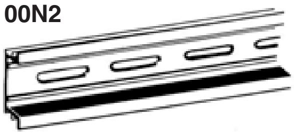
Mounting Tracks

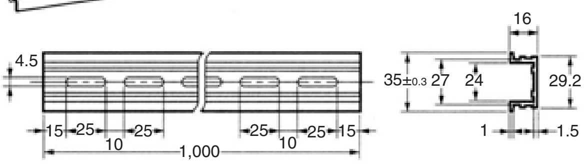
PFP-100N, PFP-50N





PFP-100N2





Note: Values in parentheses indicate dimensions for the PFP-50N.

Safety Precautions

⚠ CAUTION

Touching the charged section may occasionally cause minor electric shock. Do not touch the G3PB terminal section (the charged section) when the power supply is ON. Be sure to attach the cover before use.

The G3PB and heat sink will be hot and may occasionally cause minor burns. Do not touch the G3PB or the heat sink either while the power supply is ON, or immediately after the power is turned OFF.

The internal snubber circuit is charged and may occasionally cause minor electric shock. Do not touch the G3PB's main circuit terminals immediately after the power is turned OFF.

Be sure to conduct wiring with the power supply turned OFF, and always attach the terminal cover after completing wiring. Touching the terminals when they are charged may occasionally result in minor electric shock.

Do not apply a short-circuit to the load side of the G3PB. The G3PB may rupture. To protect against short-circuit accidents, install a protective device, such as a quick-burning fuse, on the power supply line.

■ Precautions for Safe Use

Although OMRON continuously strives to improve the quality and reliability of our relays, the G3PB contains semiconductors, which are generally prone to occasional malfunction and failure. Maintaining safety is particularly difficult if a relay is used outside of its ratings. Always use the G3PB within the rated values. When using the G3PB, always design the system to ensure safety and prevent human accidents, fires, and social damage even in the event of G3PB failure, including system redundancy, measures to prevent fires from spreading, and designs to prevent malfunction.

1. Do not apply voltage or current above the rated values to the G3PB terminals. Doing so may cause G3PB malfunction or fire damage.

2. Heat Dissipation

- Do not obstruct the airflow to the G3PB or heat sink. Heat generated from an G3PB error may occasionally cause the output element to short, or cause fire damage.
- Be sure to prevent the ambient temperature from rising due to the heat radiation of the G3PB. If the G3PB is mounted inside a panel, install a fan so that the interior of the panel is fully ventilated.
- Be sure to install the G3PB using the specified mounting direction. Otherwise, heat generated from a G3PB error may cause the output element to short or burn.
- Do not use the G3PB if heat dissipation fins have been bent as a result of, for example, dropping the G3PB. If used in this state, the SSR may be damaged due to the decreased heat dissipation capacity.
- When installing the G3PB directly into a control panel, use a panel material with low thermal resistance, such as aluminum or steel. If a material with high thermal resistance, such as wood, is used, heat generated by the G3PB may cause fire or burning.

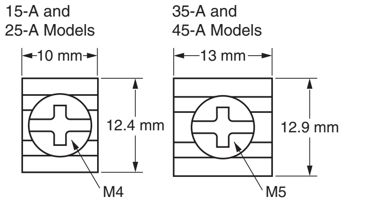
3. Perform wiring and tighten screws correctly, according to the following precautions. If wiring is incorrect or screws are not tightened sufficiently, the G3PB may be damaged by abnormal heat generated when the power is turned ON.

- Make sure that all lead wires are appropriate for the load current. Heat generated by a wiring error may result in burning.
- Do not operate if the screws on the output terminal are loose. Heat generated by a terminal error may result in fire damage.

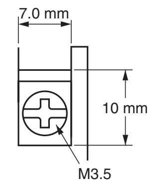
Wiring

- When using crimp terminals, refer to the terminal clearances shown below.

Output Terminal Section (Single-phase Models)



Input Terminal Section



- Output terminals are charged even when the Relay is turned OFF. Touching the terminals may result in electric shock. To isolate the Relay from the power supply, install an appropriate circuit breaker between the power supply and the Relay.

Tightening Torque

Section	Screw terminal diameter	Tightening torque
Input terminal	M3.5	0.59 to 1.18 N·m
Output terminal	M4	0.98 to 1.47 N·m
	M5	1.47 to 2.45 N·m

- Make sure that non-conducting materials are not caught when tightening the terminal screws. Otherwise, the heat generated from a terminal error may result in burning.
- Be sure to use M5 crimp terminals that are an appropriate size for the wire diameter when wiring G3PB with a load current of 35 A min.
- Do not use wires with a damaged sheath. Doing so may result in electric shock or a short circuit.
- Do not wire power lines or high-tension lines along with the lines of the G3PB in the same conduit or duct. Doing so may result in damage or malfunction due to induction.
- Use wires of an appropriate length. Wires of insufficient length may result in malfunction, failure, or burning due to induction.
- Mount the DIN-rail securely. Not doing so may cause the DIN-rail to fall.
- Make sure that the G3PB clicks securely into place when it is mounted to the DIN-rail. Not doing so may cause the G3PB to fall.
- Do not install the G3PB using hands that are dirty with oil or metal dust. Doing so may result in a malfunction.
- Tighten the heat sink screws securely to a tightening torque of 0.98 to 1.47 N·m.

4. Usage Conditions

- Select a load within the rated values. Not doing so may result in malfunction, failure, or burning.
- Use a power supply within the rated frequency range. Not doing so may result in malfunction, failure, or burning.

5. Do not transport the G3PB under the following conditions. Doing so may result in malfunction, failure, or deterioration of performance characteristics.

- When the G3PB is wet.
- During high temperatures or high humidity.
- When the G3PB is not packaged.

6. Operating and Storage Locations
Do not use or store the G3PB in the following locations. Doing so may result in damage, malfunction, or deterioration of performance characteristics.

- Do not use or store in locations subject to direct sunlight.
- Do not use in locations subject to ambient temperatures outside the range –30 to 80°C.
- Do not use in locations subject to relative humidity outside the range 45% to 85% or locations subject to condensation as the result of severe changes in temperature.
- Do not store in locations subject to ambient temperatures outside the range –30 to 100°C.
- Do not use or store in locations subject to corrosive or flammable gases.
- Do not use or store in locations subject to dust (especially iron dust) or salts.
- Do not use or store in locations subject to shock or vibration.
- Do not use or store in locations subject to exposure to water, oil, or chemicals, or in locations subject to rain or water drops.
- Do not use or store in locations subject to high temperatures or high humidity.
- Do not use or store in locations subject to static electricity or noise.
- Do not use or store in locations subject to strong electric or magnetic fields.
- Do not use or store in locations subject to radioactivity.

■ Precautions for Correct Use

Before Actual Operation

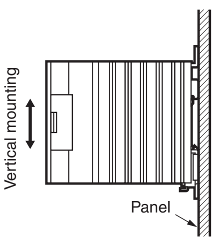
1. The G3PB in operation may cause an unexpected accident. Therefore it is necessary to test the G3PB under the variety of conditions that are possible. For example, the characteristics of the G3PB must always be considered in terms of the differences in characteristics between individual G3PBs.

2. Unless otherwise indicated, the rated values in this catalog have all been tested according to JIS C5442 standards in a temperature range between 15°C and 30°C, a relative humidity range between 25% and 85%, and an atmospheric pressure range between 88 and 106 kPa. To confirm the ratings of specific G3PBs, the same operating environment conditions must be provided in addition to the load conditions.

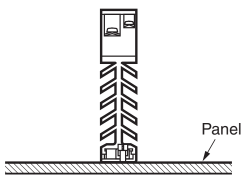
Mounting Method

Mount the DIN-rail-mounting G3PBs firmly to the DIN-rail and secure End Plates on both sides to prevent the G3PB falling due to its heavy weight. Also mount direct-mounting G3PBs securely in the panel.

Vertical Mounting



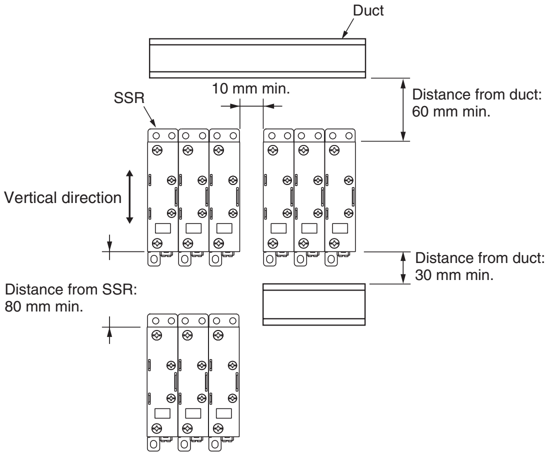
Horizontal Mounting



Note: Make sure that the load current is 50% of the rated load current when the G3PB is mounted horizontally. For details on close mounting, refer to the related information under performance characteristics.

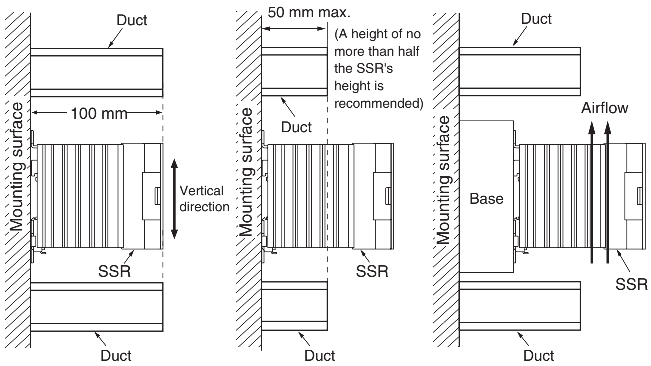
SSR Mounting Pitch

Panel Mounting



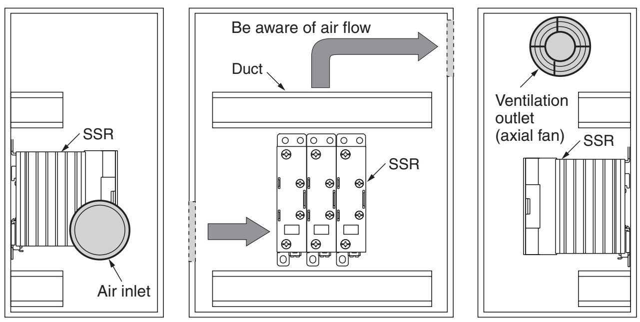
Relationship between SSRs and Ducts

Incorrect Example	Countermeasure 1	Countermeasure 2



Do not surround the SSR with ducts, otherwise the heat radiation of the SSR will be adversely affected.	Use short ducts.	If the ducts cannot be shortened, place the SSR on a metal base so that it is not surrounded by the ducts.

Ventilation Outside the Control Panel



If the air inlet or air outlet has a filter, clean the filter regularly to prevent it from clogging and ensure an efficient flow of air.

Do not locate any objects around the air inlet or air outlet, otherwise the objects may obstruct the proper ventilation of the control panel.

A heat exchanger, if used, should be located in front of the SSR Units to ensure the efficiency of the heat exchanger.

Please reduce the ambient temperature of SSRs.

The rated load current of an SSR is measured at an ambient temperature of 25°C or 40°C.

An SSR uses a semiconductor in the output element. This causes the temperature inside the control panel to increase due to heating resulting from the passage of electrical current through the load. To restrict heating, attach a fan to the ventilation outlet or air inlet of the control panel to ventilate the panel. This will reduce the ambient temperature of the SSRs and thus increase reliability. (Generally, each 10 °C reduction in temperature will double the expected life.)

Load current (A)	15 A	25 A	35 A	45 A
Required number of fans per SSR	0.23	0.39	0.54	0.70

Example: For 10 SSRs with load currents of 15 A,
$0.23 \times 10 = 2.3$
Thus, 3 fans would be required.

Size of fans: 92 mm^2, Air volume: 0.7 m^3/min,
Ambient temperature of control panel: 30°C

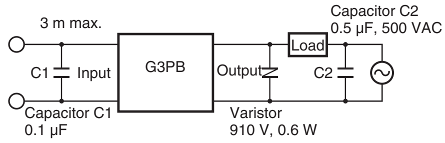
If there are other instruments that generate heat in the control panel other than SSRs, additional ventilation will be required.

Operating Conditions

- Do not apply currents exceeding the rated current otherwise, the temperature of the G3PB may rise excessively.
- Be sure to install protective devices on the power supply side, such as fuses and non-fuse breakers, as protection against accidents due to short-circuiting.
- Do not apply overvoltages to input or output circuits. Doing so may cause Relay failure or burning.

EMC Directive Compliance

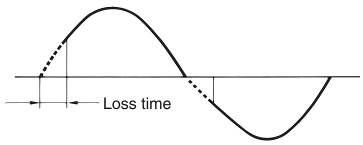
The G3PB complies with EMC Directives when capacitors and varistors are used, as shown in the following diagram.



- The capacitor C1 must be connected between the input terminals for G3PBs with DC inputs.
- The capacitor C2 must be connected to the load power supply outputs.
- C1 and C2 must not be electrolytic capacitors.
- The varistor must be connected between the output terminals of the G3PB.
- The input cable must be no longer than 3 m.

Loss Time

If the load power supply is used under a low voltage or current, the loss time will increase. Before operating the G3PB, make sure that this loss time will not cause problems.



Precautions on Operating and Storage Environments

1. Operating Ambient Temperature

The rated value for the ambient operating temperature of the G3PB is for when there is no heat build-up. For this reason, under conditions where heat dissipation is not good due to poor ventilation, and where heat may build up easily, the actual temperature of the G3PB may exceed the rated value resulting in malfunction or burning.

When using the G3PB, design the system to allow heat dissipation sufficient to stay below the Load Current vs. Ambient Temperature characteristic curve. Note also that the ambient temperature of the G3PB may increase as a result of environmental conditions (e.g., climate or air-conditioning) and operating conditions (e.g., mounting in an airtight panel).

2. Transportation

Do not drop the G3PB or subject the G3PB to abnormal vibration or shock during transport and installation. Doing so may result in malfunction, failure, or deterioration of performance characteristics.

3. Vibration and Shock

Do not subject the G3PB to excessive vibration or shock. Otherwise the SSR may malfunction and internal components may be damaged.

To prevent the G3PB from abnormal vibration, do not install the SSR in locations or by means that will subject it to vibration from other devices, such as motors.

4. Solvents

Do not allow the G3PB to come in contact with solvents, such as thinners or gasoline. Doing so will dissolve the markings on the G3PB.

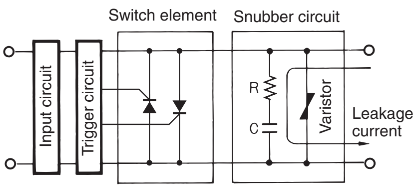
5. Oil

Do not allow the SSR terminal cover to come in contact with oil. Doing so will cause the cover to crack and become cloudy.

Operation

1. Leakage Current

A leakage current flows through a snubber circuit in the G3PB even when there is no power input. Therefore, always turn OFF the power to the input or load and check that it is safe before replacing or wiring the G3PB.



2. Screw Tightening Torque

Tighten the G3PB terminal screws to the rated torque. If the screws are not tightened sufficiently, the G3PB may be damaged by heat generated when the power is ON.

3. Installation

Do not install the G3PB using hands that are dirty with oil or metal dust. Doing so may result in a malfunction.

4. Do Not Drop

Be careful not to drop the product during installation, mounting, or otherwise handling the G3PB.

Warranty and Application Considerations

Read and Understand this Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability.*

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J152-E2-01A

In the interest of product improvement, specifications are subject to change without notice.

Multi-channel Power Controller
G3ZA

Optimum Cycle Control for High-precision Control with Low Noise

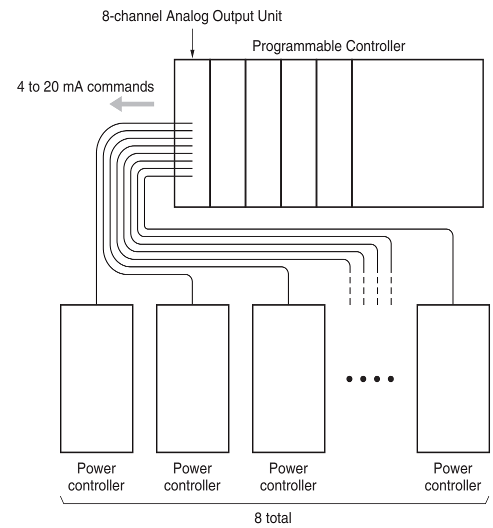
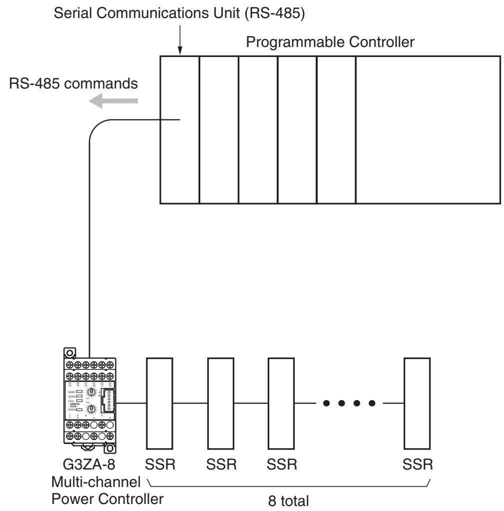
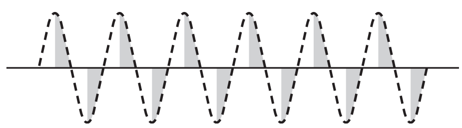
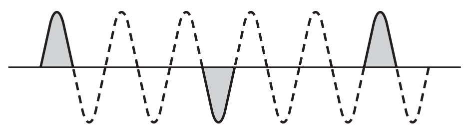
- Smaller than a Normal Power Controller.
- Enables low-noise power control in combination with zero-cross SSRs.
- One Controller can control up to 8 SSRs.
- RS-485 communications to set manipulated variables and heater burnout detection.
- CE Marking

Note: Refer to *Precautions* on page H-51 for safety information.

NEW

Features

Comparison between the G3ZA and Normal Power Controllers

Item	Normal Power Controllers	G3ZA
Connections		
Control method	**Phase Control** • Response is fast and high-precision temperature control is possible. • Harmonics and noise are problems. 	**Optimum Cycle Control (High-precision Zero Cross Control)** • Outputs are turned ON and OFF each half cycle. • Zero-cross control is performed. • Noise is suppressed while achieving high-speed response with high-precision temperature control. 

Solid state relays

Model Number Structure

Model Number Legend

G3ZA-□□□□□-□-□
1 2 3 4 5 6 7

No.	Meaning	Code	Specifications
1	No. of control points	4	4 channels
		8	8 channels
2	Control method	None	Optimum cycle control
3	Current transformer input	H	Yes
		A	None

No.	Meaning	Code	Specifications
4	Load power supply voltage	2	100 to 240 VAC
		4	400 to 480 VAC
5	Communications specifications	03	RS-485
6	Communications protocol	FLK	CompoWay/F
7	International standards	UTU	Approved by TÜV/UL/CSA.

Ordering Information

List of Models

Name	Number of control channels	Heater burnout detection	Load power supply voltage	Model
Multi-channel Power Controller	4	Supported	100 to 240 VAC	G3ZA-4H203-FLK-UTU
			400 to 480 VAC	G3ZA-4H403-FLK-UTU
	8	Not supported	100 to 240 VAC	G3ZA-8A203-FLK-UTU
			400 to 480 VAC	G3ZA-8A403-FLK-UTU

Note: When using the heater burnout detection function, CTs must be ordered separately.

Accessories (Order Separately)

Name	Hole diameter	Model
Current Transformer (CT)	5.8 dia.	E54-CT1
	12.0 dia.	E54-CT3

Name	Model
DIN-rail	PFP-100N
	PFP-50N
End Plates (stoppers)	PFP-M

Specifications

Ratings

Item / Load power supply voltage range	100 to 240 VAC	400 to 480 VAC
Power supply voltage	100 to 240 VAC (50/60 Hz)	
Operating voltage range	85 to 264 VAC	
Power consumption	16 VA max.	
Load power supply voltage	100 to 240 VAC	400 to 480 VAC
Load power supply voltage range	75 to 264 VAC	340 to 528 VAC
Manipulated variable input	0.0% to 100.0% (via RS-485 communications)	
Current transformer input (See note.)	Single-phase AC, 0 to 50 A (primary current of CT)	
Trigger output	One voltage output for each channel, 12 VDC ±15%, Max. load current: 21 mA (with built-in short-circuit protection circuit)	
Alarm output	NPN open collector, one output Max. applicable voltage: 30 VDC, Max. load current: 50 mA Residual voltage: 1.5 V max., Leakage current: 0.4 mA max.	
Indications	LED indicators	
Ambient operating temperature	–10 to 55°C (with no icing or condensation)	
Ambient operating humidity	25% to 85%	
Storage temperature	–25 to 65°C (with no icing or condensation)	
Elevation	2,000 m max.	
Accessories	Instruction Sheet	

Note: CT inputs are provided only on Models with heater burnout detection.

■ Performance

Current indication accuracy	±3 A (for Models with heater burnout detection)
Insulation resistance	100 MΩ min. (at 500 VDC) between primary and secondary
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between primary and secondary
Vibration resistance	Vibration frequency: 10 to 55 Hz, acceleration: 50 m/s^2 in X, Y, and Z directions
Shock resistance	300 m/s^2 three times each in six directions along three axes
Weight	Approx. 200 g (including terminal cover)
Degree of protection	IP20
Memory protection	EEPROM (non-volatile memory) (number of writes: 100,000)
Installation environment	Overvoltage category III, pollution degree 2 (according to IEC 60664-1)
Approved standards	UL508 (Listing), CSA22.2 No. 14 EN50178 EN61000-6-4 (EN55011: 1998, A1: 1999 Class A, Group 1) EN61000-6-2: 2001

■ Communications Specifications

Transmission line connections		Multipoint
Communications method		RS-485
	Max. transmission distance	500 m
	No. of nodes	31 (via multidrop connections)
Synchronization method		Stop-start synchronization
Communications baud rate		9.6, 19.2, 38.4 or 57.6 kbps, Default: 9.6 kbps
Transmission code		ASCII
Communications data length		7 or 8 bits, Default: 7
Communications stop bits		1 or 2 bits, Default: 2
Communications parity		Vertical parity: None, even, or odd, Default: Even
Flow control		None

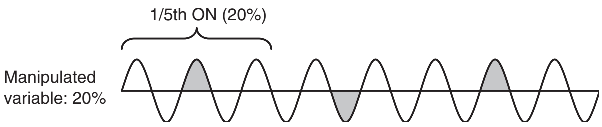
■ Current Transformer Specifications (Order Separately)

Item	Specification	
Model number	E54-CT1	E54-CT3
Max. continuous heater current	50 A	120 A (See note.)
Dielectric strength	1,000 VAC for 1 min	
Vibration resistance	98 m/s^2, 50 Hz	
Weight	Approx. 11.5 g	Approx. 50 g
Accessories	None	Connection terminals (2) Plugs (2)

Note: The maximum continuous current of the G3ZA is 50 A.

Optimum Cycle Control

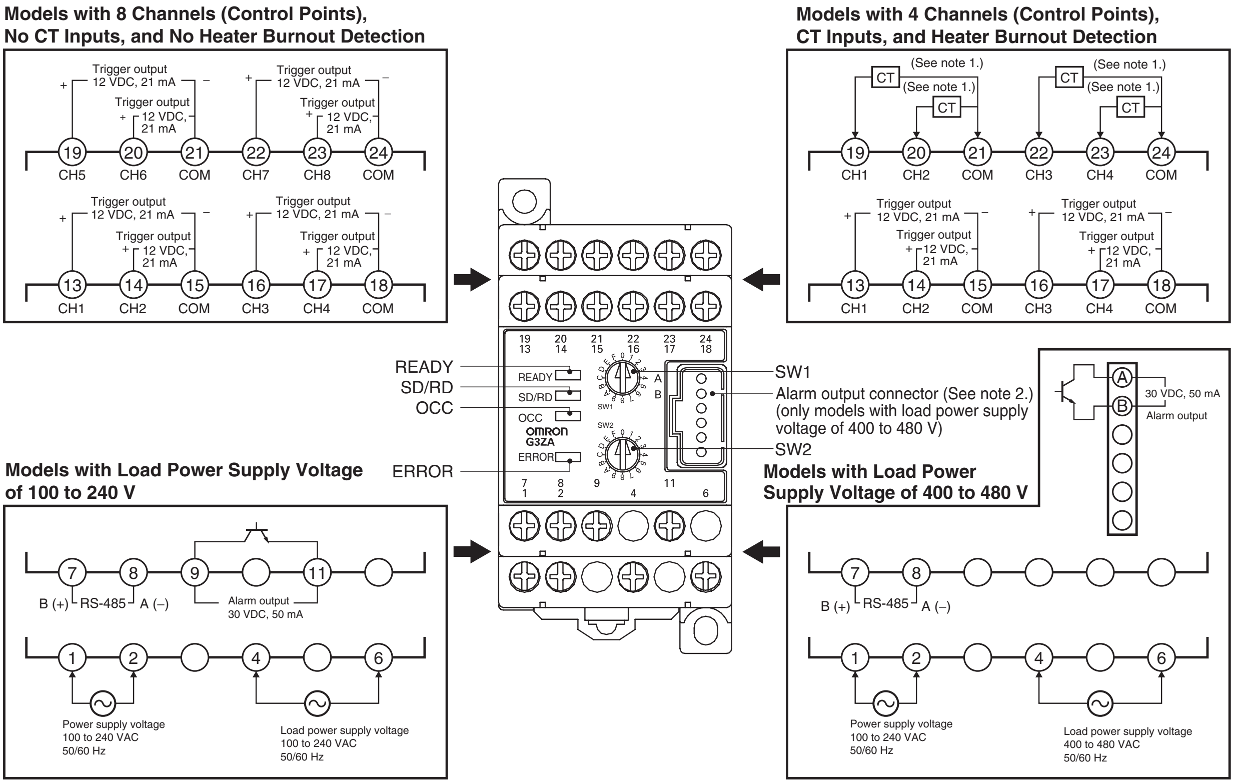
- Optimum cycle control is performed by driving SSRs according to load power detection and trigger signals. (Zero-cross SSRs are used.)
- Noise is suppressed while ensure high-speed response by turning outputs ON and OFF each half cycle to achieve high-precision temperature control.



Solid state relays

Connections

■ Terminal Arrangement

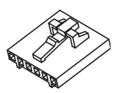


Note: Connect the power supply (100 to 240 VAC) for the G3ZA across terminals 1 and 2 and the load power supply for the SSR loads across terminals 4 and 6.

Note: Connect the power supply (100 to 240 VAC) for the G3ZA across terminals 1 and 2 and the load power supply for the SSR loads across terminals 4 and 6.

Note: 1. Applicable CTs: E54-CT1 and E54-CT3

2. Use C-Grid SL connectors from Molex Inc.



C-Grid SL Housing
Model: 51030-6303

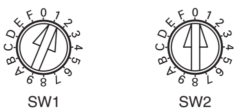
C-Grid SL Housing (press-fit)
Model: 52109-0660

Operation Indicators

Operation indicator	Meaning
READY (Green)	Lit while power is being supplied.
SD/RD (Orange)	Lit while communicating with the host.
OCC (Orange)	Lit while a control output is ON.
ERROR (Red)	Lights or flashes when an error is detected.

Setting Switches

- Always turn OFF the power supply before setting the switches. The switch settings are read only when the power supply is turned ON.
- Use a flat-blade screwdriver to set the switches and be sure not to leave a switch set between two settings.



Communications Unit Number

Set a communications unit number on SW1 so that the host system can identify the Controller.

SW1	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Unit No.	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15

▲ Default

Note: A unique unit number must be set for each node (Controller) on the same communications line. Do not set the same unit number for more than one node.

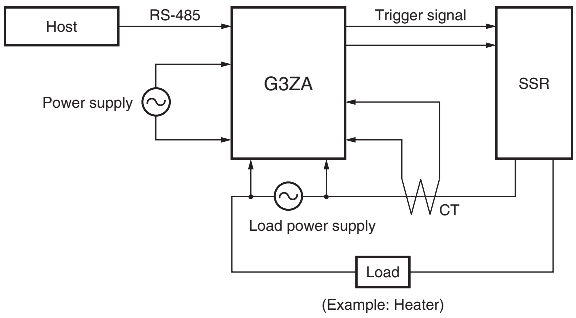
Communications Baud Rate

Set the baud rate for communicating with the host system on SW2.

SW2	0	1	2	3	4 to F
Baud rate	9.6	19.2	38.4	57.6	Do not set.

▲ Default

■ Connection Configuration



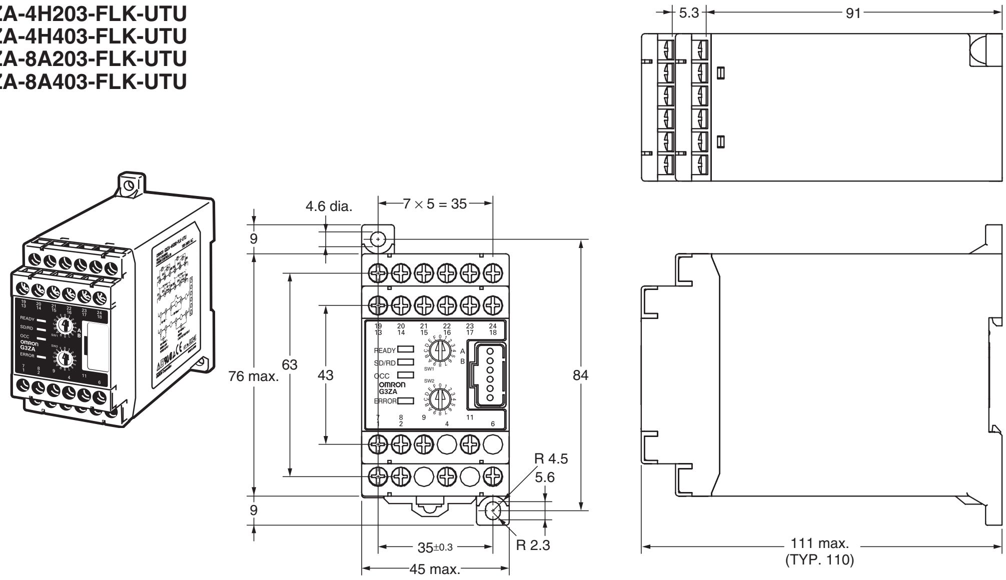
Note: Connect a power supply with the same phase as the SSRs to the load power supply terminals on the G3ZA.

Dimensions

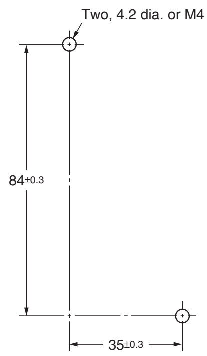
Note: All units are in millimeters unless otherwise indicated.

■ Multi-channel Power Controllers

G3ZA-4H203-FLK-UTU
G3ZA-4H403-FLK-UTU
G3ZA-8A203-FLK-UTU
G3ZA-8A403-FLK-UTU



Mounting Hole Dimensions (For Direct Mounting)

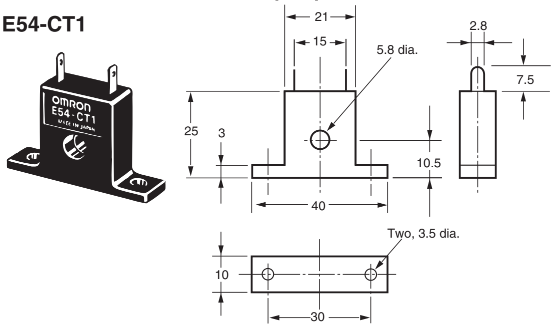


Solid state relays

■ Accessories (Order Separately)

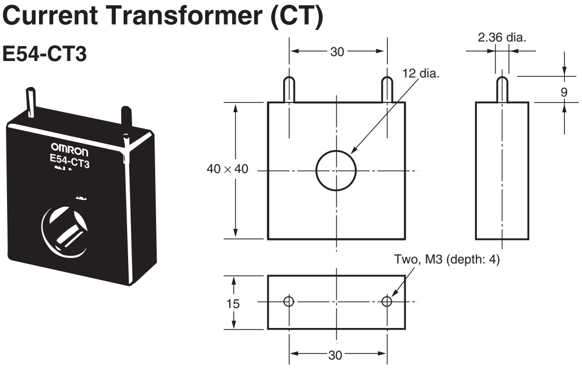
Current Transformer (CT)

E54-CT1



Current Transformer (CT)

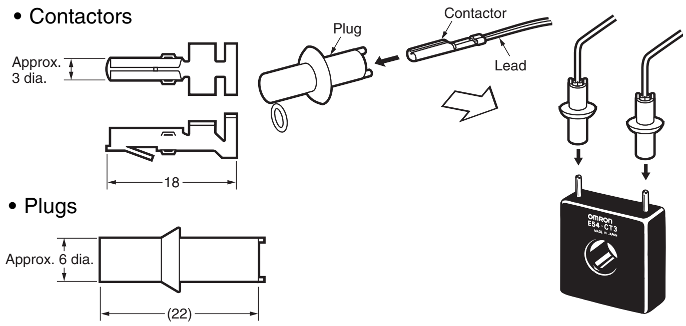
E54-CT3



E54-CT3 Accessories

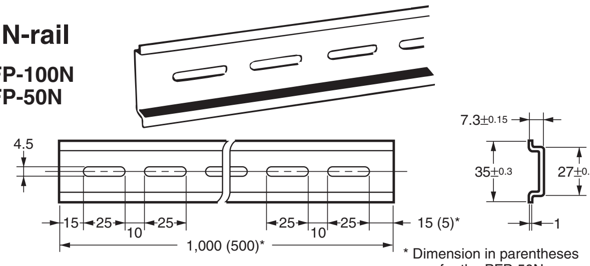
• Contactors

• Plugs



DIN-rail

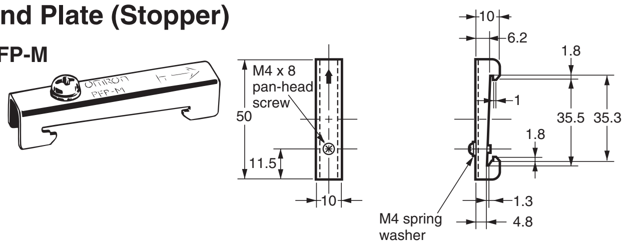
PFP-100N
PFP-50N



* Dimension in parentheses are for the PFP-50N.

End Plate (Stopper)

PFP-M



Precautions

⚠ WARNING

Do not touch the terminals and the wires while power is being supplied. Doing so may possibly result in electric shock. Make sure that the terminal cover is installed before using the product.

⚠ CAUTION

Do not allow pieces of metal, wire clippings, or fine metallic chips or filings from installation to enter the product. Doing so may occasionally result in electric shock, fire, or malfunction.

Do not use the product in locations of flammable or explosive gases. Doing so may occasionally result in minor or moderate explosion, causing minor or moderate injury, or property damage.

Do not attempt to disassemble, repair, or modify the product. Doing so may occasionally result in minor or moderate injury due to electric shock.

Perform correct setting of the product according to the application. Failure to do so may occasionally cause unexpected operation, resulting in minor or moderate injury, or damage to the equipment.

Ensure safety in the event of product failure by taking safety measures, such as installing a separate monitoring system to provide alarms for preventing excessive temperature rise. Product failure may occasionally prevent control operation, resulting in damage to the connected facilities and equipment.

Tighten the terminal screws securely using a tightening torque within the following ranges. Loose screws may occasionally cause fire, resulting in minor or moderate injury, or damage to the equipment.
Terminal screws: 0.40 to 0.56 N.m

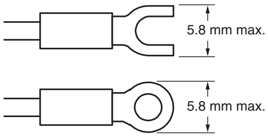
■ Precautions for Safe Use

1. Do not use the product in the following locations.
   - Locations subject to direct radiant heat from heating equipment
   - Locations where the product may come into contact with water or oil
   - Locations subject to direct sunlight
   - Locations where dust or corrosive gases (in particular, sulfuric or ammonia gas) are present
   - Locations subject to extreme temperature changes
   - Locations where icing or condensation may occur
   - Locations subject to excessive shocks or vibration
2. Use this product within the rated load and power supply.
3. Ensure that the rated voltage is achieved no longer than 2 s after turning the power ON.
4. Use/store within the rated temperature and humidity ranges.
5. Minimum mounting distance of G3ZA is 10 mm.
   When mounting the G3ZA near the SSRs, mount the G3ZA so as to not interfere with the heat dissipation of the SSR.
6. Use the specified size of insulated-type crimp terminals (M3, width: 5.8 mm max.) for wiring and attach insulative sleeves. To connect bare wires, use AWG22 (cross section: 0.326 mm^2) to AWG14 (cross section: 2.081 mm^2) to wire the power supply terminals and AWG22 (cross section: 0.326 mm^2) to AWG16 (cross section: 1.039 mm^2) for other terminals.
7. Be sure to confirm the correct terminal and polarity when wiring the terminal block and connectors.
8. Do not connect any conductors to unused terminals.
9. In order to prevent inductive noise, wire the lines connected to the product separately from power lines carrying high voltages or currents. Do not wire in parallel with or in the same cable as power lines. Other measures for reducing noise include running lines along separate ducts and using shield lines.
10. Attach a surge suppressor or noise filter to peripheral devices that generate noise (in particular, motors, transformers, solenoids, magnetic coils, or other devices that have an inductance component).
    Do not install the product near devices generating strong high-frequency fields or surges. When using a noise filter, check the voltage and current and install it as close to the product as possible.
11. For a safety disconnection of the power-line in the application, the equipment must be provided with disconnecting devices suitable for isolation.
    (e.g., circuit breakers defined in IEC60947-2, power switches defined in IEC60947-3, power plugs, etc.)
12. The G3ZA is for **single-phase loads only**. Connect only single-phase zero-cross SSRs.
    Do not connect three-phase SSRs, magnetic relays, or SSRs that do not have a zero-cross function.

■ Precautions for Correct Use

Wiring

Use M3 crimp terminals.

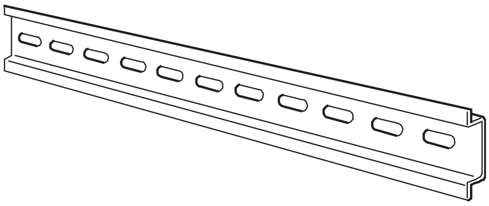


Use wires that withstand a minimum of 70 °C.

DIN-rail

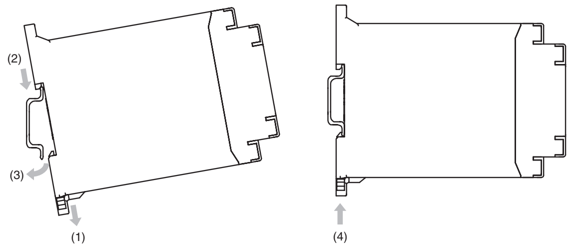
Secure the DIN-rail with screws in at least three locations.

DIN-rail: PFP-50N (50 cm)/PFP-100N (100 cm)



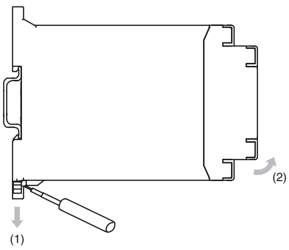
Mounting the G3ZA

Mount the G3ZA as shown in the diagram. First, pull down the DIN-rail mounting hook (1) and hook the top of the G3ZA on the DIN-rail (2). Then press the G3ZA onto the DIN-rail far enough so that it can be locked in place (3) and push the DIN-rail mounting hook up to lock the G3ZA in place (4).



Removing the G3ZA

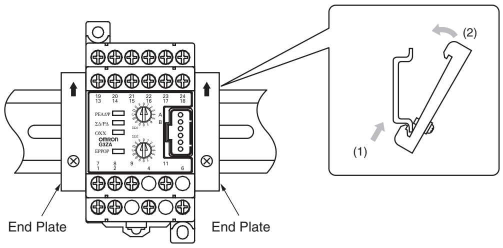
Use a flat-blade screwdriver to pull down the DIN-rail mounting hook (1) and then pull out on the bottom of the G3ZA (2).



Mounting End Plates

Be sure to mount an End Plate on each side of the G3ZA so that it does not slide on the DIN-rail.

To mount an End Plate, hook the bottom of the End Plate on the bottom of the DIN-rail (1), place the top of the End Plate on the DIN-rail (2), and then pull down on the End Plate. Tighten the screw on the End Plate to secure it.



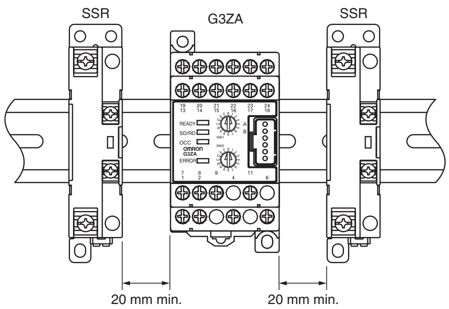
Note: Always mount one End Plate on each side of the G3ZA.

Installation Example

When installing the SSRs next to the G3ZA, provide sufficient space between the G3ZA and SSRs, as shown in the following diagram.

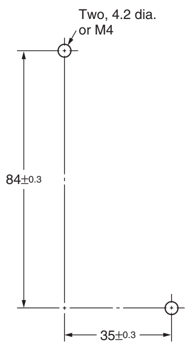
Reference example:
When applying 10 A to the G3PA-210B-VD (a manipulated variable of 100%), **separate the SSRs from the G3ZA by at least 20 mm**.

Do not touch the G3ZA while power is being supplied.



Mounting with Screws

Mounting Dimensions (Unit: mm)



Warranty and Application Considerations

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J147-E2-01A

In the interest of product improvement, specifications are subject to change without notice.

Low voltage switch gear

The J7 family of contactors, thermal overload relays, and motor protection circuit breakers is designed using state-of-the-art technology, and produced to a very high quality. These products are tough and reliable. The motor contactor range up to 37 kW can operate in temperatures from – 40° C to + 90° C! They offer impressive power-handling capabilities on very compact footprints.

Constructed according to European and International standards, these contactors, thermal overload relays and motor protection circuit breakers conform to EN / IEC and are approved by UL / CSA, enabling them to be used in any part of the world.

They are suitable for any industrial application and will appeal to panel builders, OEMs and engineers in the automotive, chemical and heavy power industries looking for the best choice in top-quality products from one supplier.

Which type of application is required?

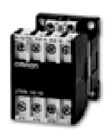
- **Control switching**
  - Mini contactor relays (10 A)
    - **J7KNA-AR**

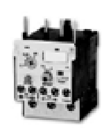
      Page I-7
- **Motor switching**
  - Current rating required?
    - Low up to 12 A / 5.5 kW
      - Mini motor contactors
        - **J7KNA**

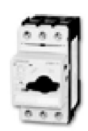
          Page I-13
    - High up to 210 A / 132 kW
      - Motor contactors
        - **J7KN**

          Page I-25
- **Motor protection**
  - Which kind of protection is needed?
    - Protection with fuse
      - Thermal overload relays (0.12 to 220 A)
        - **J7TKN**

          Page I-55
    - Fuseless
      - Motor protection circuit breakers (0.12 to 220 A)
        - **J7MN**

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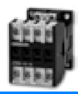
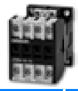
Low voltage switch gear

Table of contents

Selection table

	Category	Mini contactor relay		
Selection criteria				
	Model	J7KNA-AR-40	J7KNA-AR-31	J7KNA-AR-22
	Mounting	35 mm DIN-rail or base		
	Distinction number according to EN 50011	40E	31E	22E
	AC15 230 V [A]	3	3	3
	AC15 400 V [A]	2	2	2
	Thermal rated current Ie [A]	10	10	10
	Thermal overload relay			
Auxiliary contacts	Integrated auxiliary contacts	4 NO	3 NO + 1 NC	2 NO + 2 NC
	Additional auxiliary contacts block	J73-KN-A-11 (1 NO + 1 NC) J73-KN-A-02 (2 NC) J73-KN-A-40 (4 NO) J73-KN-A-22 (2 NO + 2 NC)		
AC power consumption of coils	Inrush [VA]	25	25	25
	Sealed [VA]	4 - 5	4 - 5	4 - 5
DC power consumption of coils	Inrush [W]	2.5	2.5	2.5
	Sealed [W]	2.5	2.5	2.5
Cable cross-section	Solid or stranded [mm^2]	0.75 – 2.5	0.75 – 2.5	0.75 – 2.5
	Flexible [mm^2]	0.75 – 2.5	0.75 – 2.5	0.75 – 2.5
	Cables per clamp	2	2	2
Auxiliary contact	I_{th}	10 A	10 A	10 A
	AC15 at 230 V	3 A	3 A	3 A
Features	Rated insulation voltage U_i	690 VAC	690 VAC	690 VAC
	AC operated	■	■	■
	DC operated	■	■	■
	4 pole version	□	□	□
	Short circuit protection	20 A	20 A	20 A

	Category	Mini motor contactor		Motor contactors						
Selection criteria										
	Model	J7KNA-09	J7KNA-12	J7KN-10	J7KN-14	J7KN-18	J7KN-22	J7KN-24	J7KN-32	J7KN-40
	Mounting	35 mm DIN-rail or base								
	AC1 up to 690 V [A]	20		25		32		50	65	80
	Motor AC3 up to 400 V [A]	9	12	10	14	18	22	24	32	40
	Motor AC3 380 - 415 V [kW]	4	5.5	4	5.5	7.5	11	11	15	18.5
	Motor AC3 660 - 690 V [kW]	4	5.5	5.5	7.5	10	10	15	18.5	18.5
	Thermal overload relay	J7TKN-A		J7TKN-B				J7TKN-C		
Auxiliary contacts	Integrated auxiliary contacts	1 NO / 1 NC	1 NO / 1 NC	1 NO / 1 NC	1 NO / 1 NC	1 NO / 1 NC	1 NO / 1 NC			
	Additional auxiliary contacts block	J73KN-AM-11 (1 NO + 1 NC) J73KN-AM-02 (2 NC) J73KN-AM-22 (2 NO + 2 NC)		J73KN-B-10 (1 NO) J73KN-B-01 (1 NC)				J73KN-B-10 (1 NO) J73KN-B-01 (1 NC) J73KN-C-11S (1 NO + 1 NC)		
AC power consumption of coils	Inrush [VA]	25	25	33 – 45	33 – 45	33 – 45	33 – 45	90 – 115	90 – 115	90 – 115
	Sealed [VA]	4 – 5	4 – 5	7 – 10	7 – 10	7 – 10	7 – 10	9 – 13	9 – 13	9 – 13
DC power consumption of coils	Inrush [W]	2.5	2.5	75	75	75	75	140	140	140
	Sealed [W]	2.5	2.5	2	2	2	2	2	2	2
Cable cross-section	Solid or stranded [mm^2]	0.75 – 2.5	0.75 – 2.5	0.75 – 6	0.75 – 6	0.75 – 6	0.75 – 6	1.5 – 25	1.5 – 25	1.5 – 25
	Flexible [mm^2]	0.75 – 2.5	0.75 – 2.5	1 – 4	1 – 4	1 – 4	1 – 4	2.5 – 16	2.5 – 16	2.5 – 16
	Cables per clamp	2	2	2	2	2	2	1	1	1
Auxiliary contact	I_{th}	10 A	10 A	16 A	16 A	16 A	16 A	16 A	16 A	16 A
	AC15 at 230 V	3 A	3 A	12 A	12 A	12 A	12 A	12 A	12 A	
Features	Rated insulation voltage U_i	690 VAC	690 VAC	690 VAC	690 VAC	690 VAC	690 VAC	690 VAC	690 VAC	690 VAC
	AC operated	■	■	■	■	■	■	■	■	■
	DC operated	■	■	■	■	■	■	■	■	■
	4 pole version	■								
	Short circuit protection	20 A	20 A	25 A	25 A	25 A	25 A			

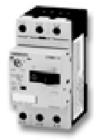
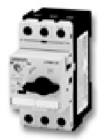


	Category	Motor contactors							
Selection criteria	Model	J7KN-50	J7KN-62	J7KN-74	J7KN-85	J7KN-110	J7KN-150	J7KN-175	J7KN-200
	Mounting	35 mm DIN-rail or base			Base				
	AC1 up to 690 V [A]	110	120	130	150	170	200	250	350
	Motor AC3 up to 400 V [kW]	50	22	74	85	110	150	175	200
	Motor AC3 380-415 V [kW]	22	30	37	45	55	75	90	110
	Motor AC3 660-690 V [kW]	30	37	45	55	55	75	110	132
	Thermal overload relay	J7TKN-D			J7TKN-E		J7TKN-F		
Auxiliary contacts	Integrated auxiliary contacts				2 NO + 2 NC	2 NO + 2 NC	1 NO / 1 NC	1 NO / 1 NC	2 NO + 2 NC
	Additional auxiliary contacts block	J73KN-B-10 (1 NO) J73KN-B-01 (1 NC) J73KN-C-11S (1 NO + 1 NC)							
AC power consump-tion of coils	Inrush [VA]	140 – 165	140 – 165	140 – 165	280 – 350	350 – 420	550	550	1100
	Sealed [VA]	13 – 18	13 – 18	13 – 18	16 – 23	23 – 29	130	130	66
DC power consump-tion of coils	Inrush [VA]	200	200	200	170	320	160	160	530
	Sealed [VA]	6	6	6	2	4	5	5	21
Cable cross-section	Solid or stranded [mm^2]	4 – 50	4 – 50	4 – 50	10 – 70	10 – 70	95	120	185
	Flexible [mm^2]	10 – 35	10 – 35	10 – 35	6 – 50	16 – 50	Screw	Screw	Screw
	Cables per clamp	1	1	1	1	1	1	1	1
Auxiliary contact	Ith	16 A	16 A		16 A	16 A	10 A	10 A	10 A
	AC15 at 230 V	12 A	12 A		12 A	12 A	3 A	3 A	3 A
Features	Maximum power (AC3-380 / 415 V)	690 VAC	690 VAC	690 VAC	690 VAC	690 VAC	690 VAC	690 VAC	690 VAC
	AC operated	■	■	■	■	■	■	■	■
	DC operated	■	■	■	■	■			
	4 pole version								
	Short circuit protection				25 A	25 A	10 A	10 A	10 A

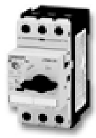
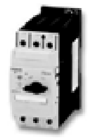
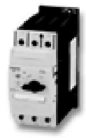
■ Standard □ Available ☐ No / not available

Low voltage switch gear

Selection table

	Category	Motor protection circuit breaker																							
Selection criteria																									
	Family	J7MN-12																				J7MN-25			
	Type	Switch type																				Rotary type			
	Current range	0.11 - 12 A																				0.16 - 25 A			
	Rated current [A]	0.16	0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12	0.16	0.2	0.25	0.32
	Suitable for motors 3 ~ 400 V [kW]			0.06	0.09		0.12	0.18		0.25	0.37	0.55	0.75		1.1	1.5		2.2	3	4	5.5			0.06	0.09
	Current thermal overload release [A]	0.11 – 0.16	0.14 – 0.2	0.18 – 0.25	0.22 – 0.32	0.28 – 0.4	0.35 – 0.5	0.45 – 0.63	0.55 – 0.8	0.7 – 1	0.9 – 1.25	1.1 – 1.6	1.4 – 2	1.8 – 2.5	2.2 – 3.2	2.8 – 4	3.5 – 5	4.5 – 6.3	5.5 – 8	7 – 10	9 – 12	0.11 – 0.16	0.14 – 0.2	0.18 – 0.25	0.22 – 0.32
	Setting range instantaneous short-circuit release [A]	2.1	2.6	3.3	4.2	5.2	6.5	8.2	10	13	16	21	26	33	42	52	65	82	104	130	156	2.1	2.6	3.3	4.2
	Short-circuit breaking capacity at 3 ~ 400V [kA]	100																	50			100			
	Model	J7MN-12-E16	J7MN-12-E2	J7MN-12-E25	J7MN-12-E32	J7MN-12-E4	J7MN-12-E5	J7MN-12-E63	J7MN-12-E8	J7MN-12-1	J7MN-12-1E25	J7MN-12-1E6	J7MN-12-2	J7MN-12-2E5	J7MN-12-3E2	J7MN-12-4	J7MN-12-5	J7MN-12-6E3	J7MN-12-8	J7MN-12-10	J7MN-12-12	J7MN-25-E16	J7MN-25-E2	J7MN-25-E25	J7MN-25-E32
Accessories	Transverse auxiliary contact block	J73MN-11F																							
	Auxiliary contact block for left hand side mounting	J73MN-11S																							
	Signalling switch for left hand side mounting																					J73MN-T-11S			
	Undervoltage release	J74MN-U-N1																							
	Shunt release	J74MN-S-N2																							
	Moulded plastic enclosures (IP55)	J74MN-PF12																				J74MN-PF25			
	Moulded plastic front plates (IP55)	J74MN-P12																				J74MN-P25			
	Holder for front plate																					J74MN-PH			
	Door-coupling rotary mechanisms (black and red / yellow)																					J74MN-DC-B			
	Emergency-stop door-coupling rotary mechanisms (red / yellow)																					J74MN-DC-RY			
	Three-phase busbar system up to 5 MPCB	J74MN-L3-1/2, J74MN-L3-1/3 J74MN-L3-1/4 J74MN-L3-1/5																							
	Line side terminal	J74MN-TC12																				J74MN-TC25			
	Shroud	J74MN-DS																							
	Adapter for mechanical fixing of MPCB and contactor	J74MN-HU																							
	Link module	J74KN-VD-12																				J74KN-VD-25			
	Terminal block	J74MN-TB25																							

Motor protection circuit breaker

J7MN-25																				J7MN-50					J7MN-100			
Rotary type																												
0.16 - 25 A																				32 - 50 A					45 - 100 A			
0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	22	25	25	32	40	45	50	63	75	90	100
	0.12	0.18		0.25	0.37	0.55	0.75		1.1	1.5		2.2	3	4	5.5	7.5			11	11	15	18.5	18.5	22	30	37	37	45
0.28 – 0.4	0.35 – 0.5	0.45 – 0.63	0.55 – 0.8	0.7 – 1	0.9 – 1.25	1.1 – 1.6	1.4 – 2	1.8 – 2.5	2.2 – 3.2	2.8 – 4	3.5 – 5	4.5 – 6.3	5.5 – 8	7 – 10	9 – 12.5	11 – 16	14 – 20	17 – 22	20 – 25	18 – 25	22 – 32	28 – 40	36 – 45	40 – 50	45 – 63	57 – 75	70 – 90	80 – 100
5.2	6.5	8.2	10	13	16	21	26	33	42	52	65	82	104	130	163	208	260	286	325	325	416	520	585	650	819	975	1170	1235
100																50									100			
J7MN-25-E4	J7MN-25-E5	J7MN-25-E63	J7MN-25-E8	J7MN-25-1	J7MN-25-1E25	J7MN-25-1E6	J7MN-25-2	J7MN-25-2E5	J7MN-25-3E2	J7MN-25-4	J7MN-25-5	J7MN-25-6E3	J7MN-25-8	J7MN-25-10	J7MN-25-12E5	J7MN-25-16	J7MN-25-20	J7MN-25-22	J7MN-25-25	J7MN-50-25	J7MN-50-32	J7MN-50-40	J7MN-50-45	J7MN-50-50	J7MN-100-63	J7MN-100-75	J7MN-100-90	J7MN-100-100
J73MN-11F																												
J73MN-11S																												
J73MN-T-11S																												
J74MN-U-N1																												
J74MN-S-N2																												
J74MN-PF25																												
J74MN-P25																												
J74MN-PH																												
J74MN-DC-B																												
J74MN-DC-RY																												
J74MN-L3-1/2 J74MN-L3-1/3 J74MN-L3-1/4 J74MN-L3-1/5																												
J74MN-TC25																												
J74MN-DS																												
J74MN-HU																												
J74KN-VD-25																												
J74MN-TB25																												

■ Standard □ Available ☐ No / not available

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- Large number of formats supported for greater flexibility
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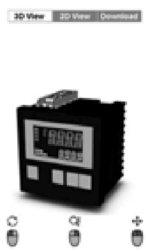
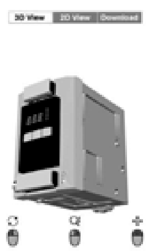




Mini Contactor Relays 4-pole
J7KNA-AR

Main contactor

- AC & DC operated
- 4-, 6- and 8-pole versions in different configurations
- Mirror contacts
- Screw fixing and snap fitting (35 mm DIN-rail)
- Rated current = 10A (I_{th})
- Suitable for electronic devices (DIN 19240)
- Finger proof (BGV A2)

Accessories

- 2- and 4-pole additional auxiliary contacts in different configurations

Approved Standards

Standard	Guide No (US,C)
UL	NKCR, NKCR7
ICE 947-5-1	see Appendix on CD; page xx
VDE 0660	
EN 60947-5-1	

Ordering Information

■ Model Number Legend

1. Mini Contactor Relays

J7KNA-□□-□□-□□□□□
1 2 3 4

1) Mini Contactor
2) AR: Contactor Relay
3) Combination of NO / NC contacts
   22: 2 NO 2 NC
   31: 3 NO 1NC
   40: 4 NO 0NC
4) Coil voltage (AC operated)
   24: AC24V 50/60Hz
   48: AC48V 50Hz
   110: AC110-115V 50Hz,AC120-125V 60Hz
   230: AC220-230V 50Hz,AC240V 60Hz
   240: AC230-240V 50Hz
   400: AC380-400V 50Hz,AC440V 60Hz
   415: AC400-415V 50Hz
   550: AC525-550V 50Hz,AC600V 60Hz
   Coil voltage (DC operated)
   24D: DC24V
   48D: DC48V
   60D: DC60V
   110D: DC110V
   125D: DC125V
   24VS: DC24V with diode
   48VS: DC48V with diode
   110VS: DC110V with diode
   125VS: DC125V with diode

2. Aux. Contact Modules for Mini Motor Contactor Relays

J73KN-□□-□□-□
1 2 3 4

1) Auxiliary Contact Modules
2) A: for mini contactor relays
3) Combination of NO/NC contacts
   11: 1 NO 1 NC
   02: 0 NO 2 NC
   22: 2 NO 2 NC
   40: 4 NO 0 NC

Low voltage switch gear

■ System overview

Mini Contactor Relays 4-pole

AC Operated

	Contacts NO	 NC	Distinc. Number acc. to DIN EN 50011	Ratings AC15 230V A	 400V A	Thermal Rated Current I_{th} A	**Type** Coil voltage 1) 24 24V 50/60Hz 230 220-230V 50Hz	Pack pcs.	Weight kg/pc.
	4-pole, With Screw Terminals								
	4	-	40E	3	2	10	**J7KNA-AR-40 24**	10	0,16
							J7KNA-AR-40 230		
	3	1	31E	3	2	10	**J7KNA-AR-31 24**	10	0,16
							J7KNA-AR-31 230		
	2	2	22E	3	2	10	**J7KNA-AR-22 24**	10	0,16
							J7KNA-AR-22 230		

1) Other coil voltages see page I-10

DC Solenoid Operated

	Contacts NO	 NC	Distinc. Number acc. to DIN EN 50011	Ratings AC15 230V A	 400V A	Thermal Rated Current I_{th} A	**Type** Coil voltage 24V DC 2,5W	Pack pcs.	Weight kg/pc.
	4-pole, With Screw Terminals								
	4	-	40E	3	2	10	**J7KNA-AR-40 24D (-VS)1)**	10	0,19
	3	1	31E	3	2	10	**J7KNA-AR-31 24D (-VS)1)**	10	0,19
	2	2	22E	3	2	10	**J7KNA-AR-22 24D (-VS)1)**	10	0,19

1) with built-in coil suppressor (diode + zener diode)

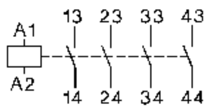
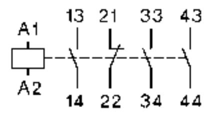
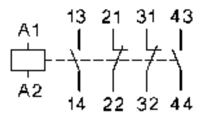
Auxiliary Contact Blocks for Contactor Relays J7KNA-AR

	Contacts NO	 NC		Ratings AC15 230V A	 400V A	Thermal Rated Current I_{th} A	**Type**	Pack pcs.	Weight kg/pc.
	1	1		3	2	10	**J73KN-A-11**	10	0,04
	-	2		3	2	10	**J73KN-A-02**	10	0,04
	4	-		3	2	10	**J73KN-A-40**	10	0,04
	2	2		3	2	10	**J73KN-A-22**	10	0,04

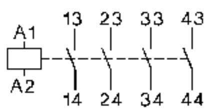
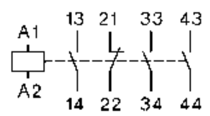
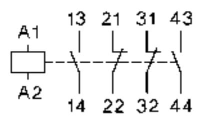
■ System overview

Mini Contactor Relays 4-pole

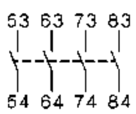
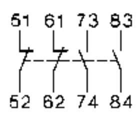
AC Operated

Wiring Diagrams	Distinc. Number acc. to DIN EN 50011	Auxiliary Contact Blocks Type	NO	NC	Contactor Relay with Auxiliary Contact Block Distinc. Number according to DIN EN 50011	NO	NC	Contacts suitable for Electronic Circuits according to DIN 19240 for rated voltage 24V DC (test ratings 17V DC, 5mA) Mirror contacts
4-pole, With Screw Terminals								
	40E	**J73KN-A-11**	1	1	51E	5	1	Preferable combinations with distinctive letter „E“ according to DIN EN 50011
		J73KN-A-02	0	2	42E	4	2	
		J73KN-A-40	4	0	80E	8	0	
		J73KN-A-22	2	2	62E	6	2	
	31E	**J73KN-A-11**	1	1	42Y	4	2	
		J73KN-A-02	0	2	33Y	3	3	
		J73KN-A-40	4	0	71Y	7	1	
		J73KN-A-22	2	2	53Y	5	3	
	22E	**J73KN-A-11**	1	1	33Y	3	3	
		J73KN-A-02	0	2	24Y	2	4	
		J73KN-A-40	4	0	62Y	6	2	
		J73KN-A-22	2	2	44Y	4	4	

DC Solenoid Operated

Wiring Diagrams	Distinc. Number acc. to DIN EN 50011	Auxiliary Contact Blocks Type	NO	NC	Contactor Relay with Auxiliary Contact Block Distinc. Number according to DIN EN 50011	NO	NC	
4-pole, With Screw Terminals								
	40E	**J73KN-A-11**	1	1	51E	5	1	Preferable combinations with distinctive letter „E“ according to DIN EN 50011
		J73KN-A-02	0	2	42E	4	2	
		J73KN-A-40	4	0	80E	8	0	
		J73KN-A-22	2	2	62E	6	2	
	31E	**J73KN-A-11**	1	1	42Y	4	2	
		J73KN-A-02	0	2	33Y	3	3	
		J73KN-A-40	4	0	71Y	7	1	
		J73KN-A-22	2	2	53Y	5	3	
	22E	**J73KN-A-11**	1	1	33Y	3	3	
		J73KN-A-02	0	2	24Y	2	4	
		J73KN-A-40	4	0	62Y	6	2	
		J73KN-A-22	2	2	44Y	4	4	

Auxiliary Contact Blocks for Contactor Relays J7KNA-AR

Wiring diagrams				Contacts suitable for Electronic Circuits according to DIN 19240 for rated voltage 24V DC (test ratings 17V DC, 5mA) Mirror contacts
J73KN-A-11	**J73KN-A-02**	**J73KN-A-40**	**J73KN-A-22**	
				

Low voltage switch gear

Specifications

■ Coil Voltages

Suffix to contactor type e.g. **J7KNA-AR-40-24**	Voltage Marking at the coil for 50Hz V	 for 60Hz V	Rated Control Voltage U_s range for 50Hz min V.	 max V.	 60Hz min V.	 max V.
12	12	12	11	12	12	12
24	**24**	**24**	**22**	**24**	**24**	**24**
42	42	42	38.5	42	42	42
48	48-50	48	48	50	48	50
60	60	60	52	66	54	60
90	90-95	100-105	90	95	100	105
95	95-100	105-110	95	100	105	110
100	100	110-115	100	105	110	115
105	105-110	115-120	105	110	115	120
110	110-115	120-125	110	115	120	125
200	200	210-220	195	205	210	220

Suffix to contactor type e.g. **J7KNA-AR-40- 230**	Voltage Marking at the coil for 50Hz V	 for 60Hz V	Rated Control Voltage U_s range for 50Hz min V.	 max V.	 60Hz min V.	 max V.
210	205-215	220-230	205	215	220	230
220	210-220	230-240	210	220	230	240
230	**220-230**	**240**	**220**	**230**	**240**	**250**
240	230-240		230	240	250	260
400	380-400	440	380	400	415	440
500	475-500	520-545	475	500	520	545
550	525-550	600	525	550	570	600

Standard voltages in bold type letters. Coil not exchangeable

■ Engineering data and Characteristics

Mini Contactor Relays

Data according to IEC 947-5-1, VDE 0660, EN 60947-5-1

Auxiliary Contacts		Type	AC J7KNA-AR...	DC J7KNA-AR...D	DC + Diode J7KNA-AR...VS	J73KN-A...
Rated insulation voltage U_i		V AC	690[*1]	690[*1]	690[*1]	690[*1]
Thermal rated current I_{th} to 690V						
Ambient temperature	40°C	A	10	10	10	10
	60°C	A	6	6	6	6
Power loss per pole	at I_{th}	W	0.5	0.5	0.5	0.5
Utilization category AC15						
Rated operational current I_e	220-240V	A	3	3	3	3
	380-415V	A	2	2	2	2
	440V	A	1.6	1.6	1.6	1.6
	500V	A	1.2	1.2	1.2	1.2
	660-690V	A	0.6	0.6	0.6	0.6
Utilization category DC13						
Rated operational current I_e	60V	A	2	2	2	2
	110V	A	0.4	0.4	0.4	0.4
	220V	A	0.1	0.1	0.1	0.1
Maximum ambient temperature						
Operation	open	°C	-40 to +60 (+90)[*2]			
	enclosed	°C	-40 to +40			
Storage		°C	-40 to +90			
Short circuit protection short-circuit current 1kA, contact welding not accepted						
max. fuse size	gL (gG)	A	20	20	20	20
Power consumption of coils						
AC operated	inrush	VA	25	-	-	-
	sealed	VA	4 - 5	-	-	-
		W	1.2	-	-	-
DC operated	inrush	W	-	2.5	2.5	-
	sealed	W	-	2.5	2.5	-
Operation range of coils in multiples of control voltage U_s			0.85 - 1.1	0.8 - 1.1	0.8 - 1.1	-
Switching time at control voltage U_s ±10%[*3,*4]						
AC operated	make time	ms	15 - 25	-	-	-
	release time	ms	8 - 25	-	-	-
	arc duration	ms	10 -15	-	-	-
DC operated	make time	ms	-	15 - 19	15 - 19	-
	release time	ms	-	8 - 25	8 - 25	-
	arc duration	ms	-	10 -15	10 -15	-
Cable cross-section						
all connectors	solid	mm²	0.75 - 2.5	0.75 - 2.5	0.75 - 2.5	0.75 - 2.5
	flexible	mm²	0.75 - 2.5	0.75 - 2.5	0.75 - 2.5	0.75 - 2.5
	flexible with multicore cable end	mm²	0.5 - 1.5	0.5 - 1.5	0.5 - 1.5	0.5 - 2.5
Clamps per pole			2	2	2	2
	solid or stranded	AWG	18 - 14	18 - 14	18 - 14	18 - 14

*1) Suitable at 690V for: earthed-neutral systems, overvoltage category I to IV, pollution degree 3 (standard-industry): U_{imp} = 8kV. Data for other conditions on request.
*2) With reduced control voltage range 0.9 up to 1.0 x U_s and with reduced thermal rated current I_{th} to I_e/AC15
*3) Summary switching time = release time + arc duration
*4) Release time of NC make time of NO increase when suppressor units for voltage peak protection are used (Varistor, RC-units, Diode units).

Mini Contactor Relays for North America

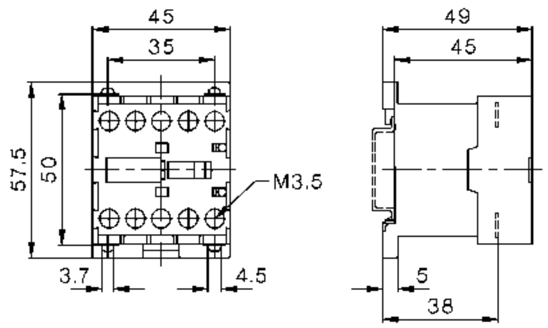
Data according to UL508

Main Contacts (cULus)		Type	J7KNA-AR...	J73KN-A...
Rated operational current "General Use"		A	10	10
Rated operational power of three-phase motors	115V	hp	-	-
at 60Hz (3ph)	200V	hp	-	-
	230V	hp	-	-
	460V	hp	-	-
	575V	hp	-	-
Rated operational power of of AC motors	115V	hp	-	-
at 60Hz (1ph)	200V	hp	-	-
	230V	hp	-	-
Fuses		A	-	-
Suitable for use on a capability of delivering not more than	rms	A	-	-
		V	-	-
Rated voltage		V AC	600	600
Auxiliary Contacts (cULus)	heavy pilot duty	AC	A600	A600
	standard pilot duty	DC	Q600	Q600

■ Dimensions

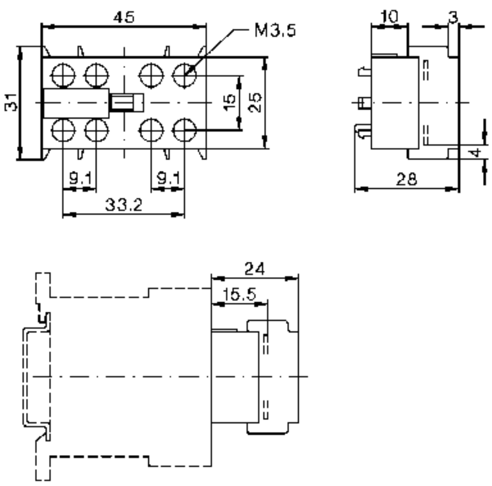
AC and DC operated
with screw terminals

J7KNA-AR...



Auxiliary Contact Blocks

J73KN-A...



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J04E-EN-01 In the interest of product improvement, specifications are subject to change without notice.

Mini Motor Contactor
J7KNA

Main contactor

- AC & DC operated
- Integrated auxiliary contacts
- Screw fixing and snap fitting (35 mm DIN-rail)
- Range from 4 to 5.5 kW (AC 3, 380/415V)
- 4 -main pole version (4 kW AC and DC coil)
- Auxiliary contacts suitable for electronic devices (DIN 19240)
- Finger proof (BGV A2)

Accessories

- 2 and 4 pole additional auxiliary contacts in different configurations
- Mechanical interlock (in reversing contactor combination only)
- RC Suppressors
- Link modules for fuseless Load Feeders
- Insulated wiring systems (parallel, Star-delta combinations)

Approved Standards

Standard	Guide No (US,C)
UL	NLDX, NLDX7
ICE 947-5-1	
VDE 0660	
EN 60947-5-1	

Ordering Information

■ Model Number Legend

1. Mini Motor Contactors

J7KNA-□□-□□ □□□□□
1 2 3 4

1) Mini Contactor
2) Rated Motor Current (AC3 400V)
   09: 9A
   12: 12A
3) Integrated auxiliary contact
   10: 1 NC 0 NC
   01: 0 NO 1NC
   4: 4 main pole type (no aux contact)
4) W: Reversing Contactor
5) Coil voltage (AC operated)[1)]
   24: AC24V 50/60Hz
   48: AC48V 50Hz
   60: AC60V 50Hz
   110: AC110-115V 50Hz, AC120-125V 60Hz
   180: AC180-210V 50Hz, AC200-240V 60Hz
   230: AC220-230V 50Hz, AC240V 60Hz
   240: AC230V-240V 50Hz
   400: AC380-400V 50Hz, AC440V 60Hz
   415: AC400-415V 50Hz

   Coil voltage (DC operated)
   24D: DC24V
   48D: DC48V
   60D: DC60V
   110D: DC110V
   24VS: DC24V with diode
   48VS: DC48V with diode
   110VS: DC110V with diode
   125VS: DC125V with diode

2. Aux. Contact Modules for Mini Motor Contactors

J73KN-□□-□□
1 2 3

1) Auxiliary Contact Modules
2) A: for mini motor contactor (DIN EN 50005)
   AM: for mini motor contactor (DIN EN 50012)
3) Combination of NO/NC contacts
   11: 1 NO 1 NC
   02: 0 NO 2 NC
   22: 2 NO 2 NC
   40: 4 NO 0 NC
4) for Reversing Contactors
   v: left side
   x: right side

3. Insulated wiring systems for motor contactors

J75-WK-□□
1 2 3

1) Additional reference for LVSG
2) Wiring system
3) Combination of 2 contactors parallel or reverse, type:
   11 = J7KNA 09 -..12
   Star-Delta contactors, type:
   12 = J7KNA 09 -..12

1) RC-suppressor unit go to see *page I-27*, section 6 or see *page I-34*, suppressor units

Low voltage switch gear

■ System overview

Mini Motor Contactors

AC Operated

	Ratings AC2, AC3 380V 400V 415V kW	500V kW	660V 690V kW	Rated Current AC3 400V A	AC1 690V A	Aux. Contacts NO	NC	Accept Overload Relay see see *page I-56*	Type Coil Voltage*1 **24** 24V 50/60Hz **230** 220-230V 50Hz	Pack pcs.	Weight kg/pc.
	3-pole, With Screw Terminals										
	4	4	4	9	20	1	-	**J7TKN-A**	**J7KNA-09-10-□□□□□**	10	0.16
	5.5	5.5	5.5	12	20	1	-	**J7TKN-A**	**J7KNA-12-10-□□□□□**	10	0.16
	4	4	4	9	20	-	1	**J7TKN-A**	**J7KNA-09-01-□□□□□**	10	0.16
	5.5	5.5	5.5	12	20	-	1	**J7TKN-A**	**J7KNA-12-01-□□□□□**	10	0.16
	4-pole, With Screw Terminals										
	4	4	4	9	20	-	-	**J7TKN-A**	**J7KNA-09-4-□□□□□**	10	0.19

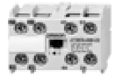
*1) Other coil voltages see see *page I-17*

DC Solenoid Operated

	Ratings AC2, AC3 380V 400V 415V kW	500V kW	660V 690V kW	Rated Current AC3 400V A	AC1 690V A	Aux. Contacts NO	NC	Accept Overload Relay see see *page I-56*	Type Coil voltage 24V DC 2,5W	Pack pcs.	Weight kg/pc.
	3-pole, With Screw Terminals										
	4	4	4	9	20	1	-	**J7TKN-A**	**J7KNA-09-10-□□□D(-VS)**[*1]	10	0.19
	5.5	5.5	5.5	12	20	1	-	**J7TKN-A**	**J7KNA-12-10-□□□D(-VS)**[*1]	10	0.19
	4	4	4	9	20	-	1	**J7TKN-A**	**J7KNA-09-01-□□□D(-VS)**[*1]	10	0.19
	5.5	5.5	5.5	12	20	-	1	**J7TKN-A**	**J7KNA-12-01-□□□D(-VS)**[*1]	10	0.19

*1) with built-in coil suppressor (diode + zener diode)

Auxiliary contact blocks with screw terminals for contactors J7KNA-09... and J7KNA-12...

	Contacts NO	NC	Rated Current AC15 230V A	400V A	Thermal Rated Current A	Type	Pack pcs.	Weight kg/pc.
	1	1	3	2	10	**J73KN-AM-11**	10	0.04
	-	2	3	2	10	**J73KN-AM-02**	10	0.04
	2	2	3	2	10	**J73KN-AM-22**	10	0.04

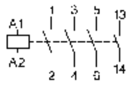
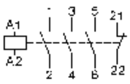
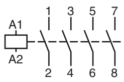
Link modules for electric connection between MPCB and contactors

	Description	**Version for contactors**	**For MPCB**	**Type**	**Pack pcs**	**Weight approx. kg/pc**
	link module (electrical and mechanical connection) see *page I-70*	J7KNA 09-...12	J7MN 12 / J7MN 25	**J74MN-VK1 12-25**	1	0.015

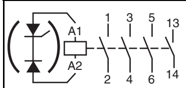
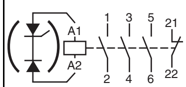
■ System overview

Mini Motor Contactors

AC Operated

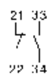
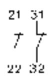
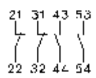
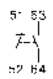
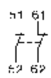
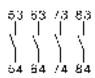
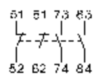
Wiring Diagrams	Distinc. Number according to DIN EN 50012	Auxiliary Contact Blocks Type	NO	NC	Contactor with Auxiliary Contact Block Distinc. Number according to DIN EN 50012	NO	NC	Contacts suitable for Electronic Circuits according to DIN 19240 for rated voltage 24V DC (test ratings 17V DC, 5mA) Mirror contacts
3-pole, With Screw Terminals								
	10	**J73KN-AM-11**	1	1	21	2	1	Prefered combinations according to DIN EN 50012
		J73KN-AM-02	0	2	12	1	2	
		J73KN-AM-22	2	2	32	3	2	
	01	**J73KN-A-11**	1	1	-	1	2	Contacts according to DIN EN 50005
		J73KN-A-02	0	2	-	0	3	
		J73KN-A-40	4	0	-	4	1	
		J73KN-A-22	2	2	-	2	3	
4-pole, With Screw Terminals								
	00	**J73KN-A-11**	1	1	-	1	1	Contacts according to DIN EN 50005
		J73KN-A-02	0	2	-	0	2	
		J73KN-A-40	4	0	-	4	0	
		J73KN-A-22	2	2	-	2	2	

DC Solenoid Operated

Wiring Diagrams	Distinc. Number according to DIN EN 50012	Auxiliary Contact Blocks Type	NO	NC	Contactor with Auxiliary Contact Block Distinc. Number according to DIN EN 50012	NO	NC	Contacts suitable for Electronic Circuits according to DIN 19240 for rated voltage 24V DC (test ratings 17V DC, 5mA) Mirror contacts
3-pole, With Screw Terminals								
	10	**J73KN-AM-11**	1	1	21	2	1	Prefered combinations according to DIN EN 50012
		J73KN-AM-02	0	2	12	1	2	
		J73KN-AM-22	2	2	32	3	2	
	01	**J73KN-A-11**	1	1	-	1	2	Contacts according to DIN EN 50005
		J73KN-A-02	0	2	-	0	3	
		J73KN-A-40	4	0	-	4	1	
		J73KN-A-22	2	2	-	2	3	

( ) = VS-Version

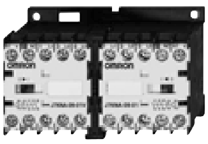
Auxiliary contact blocks with screw terminals for contactors J7KNA-09... and J7KNA-12...

Wiring Diagrams **J73KN-AM-11**	**J73KN-AM-02**	**J73KN-AM-22**	**J73KN-A-11**	**J73KN-A-02**	**J73KN-A-40**	**J73KN-A-22**	Contacts suitable for Electronic Circuits according to DIN 19240 for rated voltage 24V DC (test ratings 17V DC, 5mA) Mirror contacts
							

■ System overview

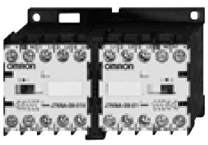
Mini Reversing Contactors, Mechanical Interlocked

AC Operated

	Ratings			Rated Current		Aux. Contacts			Type	Pack	Weight
	AC2, AC3			AC3	AC1						
	380V 400V 415V kW	500V kW	660V 690V kW	400V A	690V A	NO	NC	Accept Overload Relay see see *page I-56*	Coil Voltage*1 **24** 24V 50/60Hz **230** 220-230V 50Hz	pcs.	kg/pc.
	**3-pole, With Screw Terminals**										
	4	4	4	9	20	-	1	**J7TKN-A**	**J7KNA-09-01-W-□□□□□**	1	0.32
	5.5	5.5	5.5	12	20	-	1	**J7TKN-A**	**J7KNA-12-01-W-□□□□□**	1	0.32

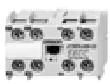
*1) Other coil voltages see see *page I-17*

DC Solenoid Operated

	Ratings			Rated Current		Aux. Contacts			Type	Pack	Weight
	AC2, AC3			AC3	AC1						
	380V 400V 415V kW	500V kW	660V 690V kW	400V A	690V A	NO	NC	Accept Overload Relay see see *page I-56*	Coil voltage 24V DC 2,5W	pcs.	kg/pc.
	**3-pole, With Screw Terminals**										
	4	4	4	9	20	-	1	**J7TKN-A**	**J7KNA-09-01-W-□□□D(-VS)***1	1	0.38
	5.5	5.5	5.5	12	20	-	1	**J7TKN-A**	**J7KNA-12-01-W-□□□D(-VS)***1	1	0.38

*1) with built-in coil suppressor (diode + zener diode)

Auxiliary contact blocks with screw terminals for contactors J7KNA-09-01-W...(D) and J7KNA-12-01-W...(D)

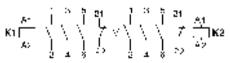
	Contacts		Rated Current		Thermal Rated Current	Type	Pack	Weight
			AC15					
	NO	NC	230V A	400V A	**A**		pcs.	kg/pc.
	**1**	1	3	2	10	**J73KN-AM-11V**	10	0.04
	1	1	3	2	10	**J73KN-AM-11X**	10	0.04

Insulated wiring systems for contactors J7KNA-09-01-...(D) and J7KNA-12-01-...(D)

	Description	**Version (A)**	**For contactors**	**Type**	**Pack pcs**
	For reversing (without mechanical interlock) or parallel contactors (4 parts)	16	J7KNA 09-...12	**J75-WK11**	1
	For star-delta combination (5 parts)	16	J7KNA 09-...12	**J75-WK12**	1

■ System overview

Mini Motor Contactors
AC/DC solenoid operated

Wiring Diagrams	Distinc. Number according to DIN EN 50012	Auxiliary Contact Blocks suitable for left hand side Contactor K1 Type	NO	NC	right hand side Contactor K2 Type	NO	NC	Contacts suitable for Electronic Circuits according to DIN 19240 for rated voltage 24V DC (test ratings 17V DC, 5mA) Mirror contacts
3-pole, With Screw Terminals								
	01	**J73KN-AM-11V**	1	1	**J73KN-AM-11X**	1	1	

Auxiliary contact blocks with screw terminals for contactors J7KNA-09-01-W...(D) and J7KNA-12-01-W...(D)

Wiring Diagrams **J73KN-AM-11V**	**J73KN-AM-11X**					Contacts suitable for Electronic Circuits according to DIN 19240 for rated voltage 24V DC (test ratings 17V DC, 5mA) Mirror contacts
						

Specifications

■ Coil Voltages

Suffix to contactor type e.g. **J7KNA-09-10-24**	Voltage Marking at the coil for 50Hz V	for 60Hz V	Rated Control Voltage U_s range for 50Hz min V.	max V.	60Hz min V.	max V.
24	**24**	**24**	**22**	**24**	**24**	**24**
48	48	48	48	50	48	52
100	100	110-115	100	105	110	115
110	110-115	120-125	110	115	120	125
200	200	210-220	195	205	210	220
230	**220-230**	**240**	**220**	**230**	**240**	**250**
400	380-400	440	380	400	415	440
550	525-550	600	525	550	570	600

Standard voltages in bold type letters. Coil not exchangeable

RC Suppressor units: please see page I-27, section 6 or page I-34, Suppressor Units.

Low voltage switch gear

■ Engineering data and Characteristics

Mini Motor Contactors

Data according to IEC 947-4-1, VDE 0660, EN 60947-4-1

Main Contacts		Type	J7KNA-09-...	J7KNA-12-...
Rated insulation voltage U_i		V AC	690 *1)	690 *1)
Making capacity I_{eff}	at U_e = 690V AC	A	165	165
Breaking capacity I_{eff}	400V AC	A	100	100
cosφ = 0,65	500V AC	A	90	90
	690V AC	A	80	80
Utilization category AC1				
Switching of resistive load				
Rated operational current I_e (=I_{th}) at 40°C, open		A	20	20
Rated operational power of three-phase resistive loads	230V	kW	7.9	7.9
50-60Hz, cosφ = 1	240V	kW	8.3	8.3
	400V	kW	13.8	13.8
	415V	kW	14.3	14.3
Rated operational current I_e (=I_{the}) at 60°C, enclosed		A	16	16
Rated operational power of three-phase resistive loads	230V	kW	6.3	6.3
50-60Hz, cosφ = 1	240V	kW	6.7	6.7
	400V	kW	11	11
	415V	kW	11.5	11.5
Minimum cross-section of conductor at load with I_e (=I_{th})		mm²	2.5	2.5
Utilization category AC2 and AC3				
Switching of three-phase motors				
Rated operational current I_e	220V	A	12	15
open and enclosed	230V	A	11.5	14.5
	240V	A	11	14
	380-400V	A	9	12
	415-440V	A	8	11
	500V	A	7	9
	660-690V	A	5	6.5
Rated operational power of three-phase motors	220-240V	kW	3	4
50-60Hz	380-440V	kW	4	5.5
	500-690V	kW	4	5.5
Utilization category AC4				
Switching of squirrel cage motors, inching				
Rated operational current I_e	220V	A	12	15
open and enclosed	230V	A	11.5	14.5
	240V	A	11	14
	380-400V	A	9	12
	415-440V	A	8	11
	500V	A	7	9
	660-690V	A	5	6.5
Rated operational power of three-phase motors	220-240V	kW	3	4
50-60Hz	380-440V	kW	4	5.5
	500-690V	kW	4	5.5

Mini Motor Contactors

Data according to IEC 947-4-1, VDE 0660, EN 60947-4-1

Main Contacts		Type	J7KNA-09-...	J7KNA-12-...
Utilization category DC1				
Switching of resistive load	1 pole 24V	A	20	20
Time constant L/R 1ms	60V	A	20	20
Rated operational current I_e	110V	A	5	5
	220V	A	0.6	0.6
	3 poles in series 24V	A	20	20
	60V	A	20	20
	110V	A	20	20
	220V	A	16	16
Utilization category DC3 and DC5				
Switching of shunt motors	1 pole 24V	A	20	20
and series motors	60V	A	5	5
Time constant L/R 15ms	110V	A	1	1
Rated operational current I_e	220V	A	0.15	0.15
	3 poles in series 24V	A	20	20
	60V	A	20	20
	110V	A	20	20
	220V	A	2	2
Maximum ambient temperature				
Operation	open	°C	-40 to +60 (+90)*2	
	enclosed	°C	-40 to +40	
with thermal overload relay	open	°C	-25 to +60	
	enclosed	°C	-25 to +40	
Storage		°C	-50 to +90	
Short circuit protection				
for contactors without thermal overload relay				
Coordination-type "1" according to IEC 947-4-1 Contact welding without hazard of persons max. fuse size	gL (gG)	A	40	40
Coordination-type “2” according to IEC 947-4-1 Light contact welding accepted max. fuse size	gL (gG)	A	25	25
Contact welding not accepted max. fuse size	gL (gG)	A	10	10
For contactors with thermal overload relay the device with the smaller admissible backup fuse (contactor or thermal overload relay) determines the fuse size.				
Cable cross-sections				
for contactors without thermal overload relay				
main connector	solid or stranded	mm²	0.5 - 2.5	0.5 - 2.5
	flexible	mm²	0.5 - 2.5	0.5 - 2.5
	flexible with multicore cable end	mm²	0.5 - 1.5	0.5 - 1.5
Cables per clamp			2	2
	solid or stranded	AWG	18 - 14	18 - 14

Low voltage switch gear

Mini Motor Contactors

Data according to IEC 947-4-1, VDE 0660, EN 60947-4-1

Main Contacts		Type	J7KNA-09-...	J7KNA-12-...
Frequency of operations z	without load	1/h	10000	10000
Contactors without thermal overload relay	AC3, I_e	1/h	600	700
	AC4, I_e	1/h	120	150
	DC3, I_e	1/h	600	700
Mechanical life AC operated	S x	10^6	5	5
DC operated	S x	10^6	15	15
Short time current	10s-current	A	96	120
Power loss per pole	at I_e/AC3 400V	W	0.15	0.25
Resistance to shock according to IEC 68-2-27				
Shock time 20ms sine-wave				
AC operated	NO	g	5	5
	NC	g	5	5
DC operated	NO	g	8	8
	NC	g	6	6

*1) Suitable at 690V for: earthed-neutral systems, overvoltage category I to IV, pollution degree 3 (standard-industry): U_{imp} = 8kV. Data for other conditions on request.
*2) With reduced control voltage range 0.9 up to 1.0 x U_s and with reduced rated current I_e/AC1according to I_e/AC3

Mini Motor Contactors

Data according to IEC 947-5-1, VDE 0660, EN 60947-5-1

Auxiliary Contacts		Type	J7KNA-09... J7KNA-12...	J7KNA-09...D(VS)*1 J7KNA-12...D(VS)	J73KN-A...
Rated insulation voltage U_i		V AC	690*2	690*1	690*1
Thermal rated current I_{th} to 690V					
Ambient temperature	40°C	A	10	10	10
	60°C	A	6	6	6
Power loss per pole	at I_{th}	W	0.5	0.5	0.5
Utilization category AC15					
Rated operational current I_e	220-240V	A	3	3	3
	380-415V	A	2	2	2
	440V	A	1.6	1.6	1.6
	500V	A	1.2	1.2	1.2
	660-690V	A	0.6	0.6	0.6
Utilization category DC13					
Rated operational current I_e	60V	A	2	2	2
	110V	A	0.4	0.4	0.4
	220V	A	0.1	0.1	0.1
Maximum ambient temperature					
Operation	open	°C	-40 to +60 (+90)*3		
	enclosed	°C	-40 to +40		
Storage		°C	-40 to +90		
Short circuit protection short-circuit current 1kA, contact welding not accepted					
max. fuse size	gL (gG)	A	20	20	20
For contactors with thermal overload relay the device with the smaller admissible control fuse (contactor or thermal overload relay) determines the fuse size.					
Power consumption of coils					
AC operated	inrush	VA	25	-	-
	sealed	VA	4 - 5	-	-
		W	1.2	-	-
DC operated	inrush	W	-	2.5	-
	sealed	W	-	2.5	-
Operation range of coils in multiples of control voltage U_s			0.85 - 1.1	0.8 - 1.1	-
Switching time at control voltage U_s ±10%*4,*5					
AC operated	make time	ms	15 - 25	-	-
	release time	ms	8 - 25	-	-
	arc duration	ms	10 -15	-	-
DC operated	make time	ms	-	15 - 19	-
	release time	ms	-	8 - 25 (35)*1	-
	arc duration	ms	-	10 -15	-

Low voltage switch gear

Mini Motor Contactors

Data according to IEC 947-5-1, VDE 0660, EN 60947-5-1

Auxiliary Contacts		Type	J7KNA-09... J7KNA-12...	J7KNA-09...D(VS)*1 J7KNA-12...D(VS)	J73KN-A...
Cable cross-section					
all connectors	solid	mm²	0.75 - 2.5	0.75 - 2.5	0.75 - 2.5
	flexible	mm²	0.75 - 2.5	0.75 - 2.5	0.75 - 2.5
	flexible with multicore cable end	mm²	0.5 - 1.5	0.5 - 1.5	0.5 - 2.5
Clamps per pole			2	2	2
	solid or stranded	AWG	18 - 14	18 - 14	18 - 14

*1) version „VS“
*2) Suitable at 690V for: earthed-neutral systems, overvoltage category I to IV, pollution degree 3 (standard-industry): U_{imp} = 8kV.
Data for other conditions on request.
*3) With reduced control voltage range 0.9 up to 1.0 x U_s and with reduced thermal rated current I_{th} to I_e/AC15
*4) Summary switching time = release time + arc duration
*5) Release time of NC make time of NO increase when suppressor units for voltage peak protection are used
(Varistor, RC-units, Diode units).

Mini Contactors for North America

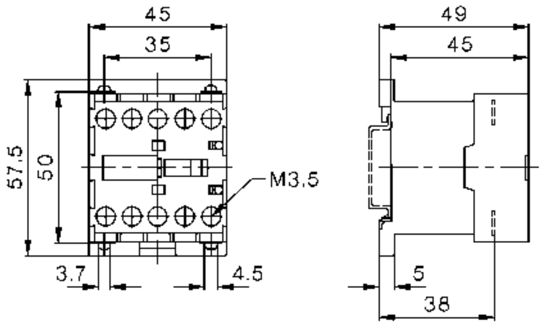
Data according to UL508

Main Contacts (cULus)		Type	J7KNA-09...	J7KNA-12...	J73KN-A...
Rated operational current "General Use"		A	15	20	10
Rated operational power of three-phase motors	115V	hp	1½	2	-
at 60Hz (3ph)	200V	hp	3	3	-
	230V	hp	3	3	-
	460V	hp	5	7½	-
	575V	hp	7½	10	-
Rated operational power of of AC motors	115V	hp	½	¾	-
at 60Hz (1ph)	200V	hp	1	1½	-
	230V	hp	1½	2	-
Fuses		A	30	30	-
Suitable for use on a capability of delivering not more than (SCCR)	rms	A	5000	5000	-
		V	600	600	-
Rated voltage		V AC	600	600	600
Auxiliary Contacts (cULus)	heavy pilot duty	AC	A600	A600	A600
	standard pilot duty	DC	Q600	Q600	Q600

Dimensions

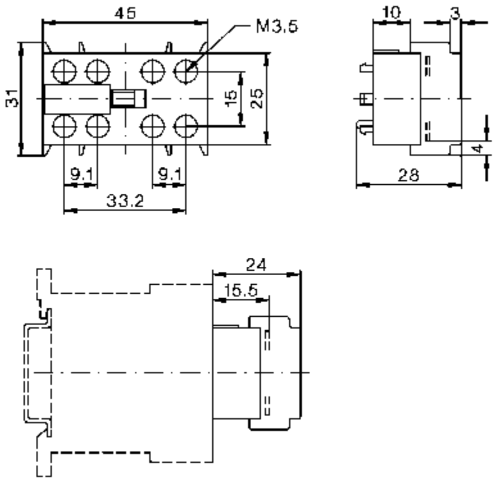
AC and DC operated
with screw terminals

J7KNA-09...
J7KNA-12...



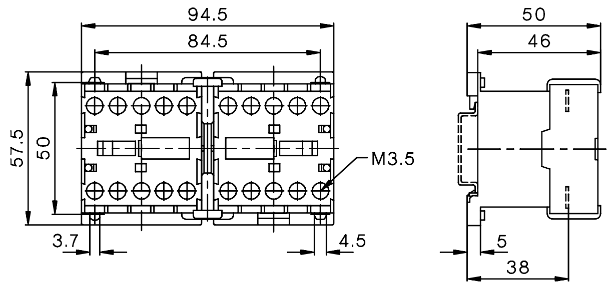
Auxiliary Contact Blocks

J73KN-A...

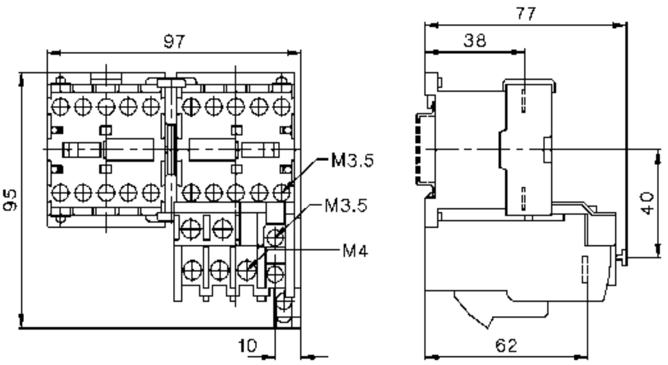


Reversing Contactors

J7KNA-09-01-W...
J7KNA-12-01-W...



J7KNA-09-01-W... + J7TKN-A
J7KNA-12-01-W...+ J7TKN-A



Low voltage switch gear

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J05E-EN-01

Motor Contactor
J7KN

Main contactor

- AC & DC operated
- Integrated auxiliary contacts
- Screw fixing and snap fitting (35 mm DIN-rail) up to 37 kW
- Range from 4 to 110 kW (AC 3, 380/415 V)
- Finger proof (BGV A2)
- System contactors for Fuseless Load Feeders with integrated link module

Accessories

- front mounted single pole additional auxiliary contacts (1 NO or 1 NC)
- Side mounted additional auxiliary contacts (1 NO/1 NC)
- Mechanical interlock
- Suppressors (RC and varistor)
- Pneumatic timer modules
- Link modules MPCB - Motor contactor

Approved Standards

Standard	Guide No (US,C)
UL	NLDX, NLDX7
ICE 947-4-1	see Appendix on CD; See “Precautions” CD.
VDE 0660	
EN 60947-4-1	

Ordering Information

■ Model Number Legend

1. Motor Contactors

J7KN□-□□□-□□-□□□□
1 2 3 4 5

1) Motor Contactor
2) G: DC solenoid motor contactor
3) Rated Motor Current (AC3 400V)
   10: 10A
   14: 14A
   18: 18A
   22: 22A
   24: 24A
   32: 32A
   40: 40A
   50: 50A
   62: 62A
   74: 74A
   85: 85A
   110: 110A
   151: 150A
   176: 175A
   200: 200A
4) Integrated auxiliary contact
   10: 1NO 0NC
   01: 0NO 1NC
   21: 2NO 1NC
   22: 2NO 2NC
   : 0NO 0NC
   4: 4 main poles
5) Coil voltage (AC operated)
   24: AC24V 50/60Hz
   48: AC48V 50Hz
   90: AC100V 50/60 Hz
   110: AC110V 50Hz, AC110-120V 60Hz
   180: AC180-210V 50Hz, AC200-240V 60Hz
   230: AC220-240V 50Hz, AC240V 60Hz
   400: AC380-415V 50Hz, AC415-440V 60Hz
   500: AC500-550V 50Hz, AC550-600V 60Hz

   Coil voltage(DC operated)
   24D: DC24V
   48D: DC48V
   110D: DC110V
   125D: DC125V

   Coil voltage(DC solenoid operated - G-type)
   24D: DC24V
   48D: DC48V
   60D: DC60V
   110D: DC110V
   125D: DC125V
   220D: DC200V

   Coil voltage(AC & DC operated) for J7KN 151 & J7KN 176 only
   24: 24V 50/60Hz, 24VDC
   48: 48V 50/60Hz, 48VDC
   110: 110-120V 50/60Hz, 110VDC
   230: 220-240V 50/60Hz, 220VDC
   400: 380-415V 50/60Hz

2. Sytem Contactors for Fuseless Load Feeders with integrated Link Module

J7KN-□□□-□□-□□□-VK3
1 2 3 4 5

1) Additional reference for LVSG
2) Rated Motor Current (AC 3 400 V)
   10: 10 A
   14: 14 A
   18: 18 A
   22: 22 A
3) Integrated Auxiliary Contact
   10: 1NO 0NC
   01: 0NO 1NC
4) Coil voltage (AC operated)
   24: AC24V 50/60Hz
   48: AC48V 50Hz
   110: AC110V 50Hz, AC110-120V 60Hz
   180: AC180-210V 50Hz, AC200-240V 60Hz
   230: AC220-240V 50Hz, AC240V 60Hz
   400: AC380-415V 50Hz, AC415-440V 60Hz
   500: AC500-550V 50Hz, AC550-600V 60Hz
5) Attached link module VK 3

3. Aux. Contact Modules for Motor Contactors

J73KN-□-□□-□
1 2 3 4

1) Auxiliary Contact Modules
2) B: for motor contactor (4-37kW)
   C: for motor contactor (11-37kW)
   D: for motor contactor (75-90kW)
   E: for motor contactor (110kW)
3) Combination of NO/NC contacts
   10: 1NO 0NC
   01: 0NO 1NC
   11: 1NO 1NC
   22: 2NO 2NC
4) S: side mounting for motor contactor (11-37kW and 75-90 kW)
   : front mounting for motor contactor (4-37kW)
   A: 6A version
   F: front mounting for motor contactor (75-90kW)
   U: EM and LB version

4. Accessories for Motor Contactors (Pneumatic Timers)

J74KN-□-□□ □□□ □□
1 2 3 4 5

1) Accessories for Motor Contactors
2) B: Motor Contactor (4-18.5kW)
3) TP: Pneumatic Timer
4) 40: 40 sec
   180: 180 sec
5) DA: ON-delayed
   IA: OFF-delayed

5. Accessories for Motor Contactors (Mechanical Interlock)

J74KN-□-□□
1 2 3

1) Accessories for Motor Contactors
2) B: Motor Contactor (4-18.5kW)
   C: Motor Contactor (11-37kW)
   D: Motor Contactor (45-55kW)
   E: Motor Contactor (75-90kW)
3) ML: Mechanical Interlock

6. Accessories for Motor Contactors (RC Suppressor units)

J74KN-□-□□ □□□
1 2 3 4

1) Accessories for Motor Contactors
2) A: for Mini Motor Contactor and Motor Contactor (4-18.5kW) (between DIN-rail and Contactor)
   B: for Mini Motor Contactor and Motor Contactor (4-55kW)
   C: for Motor Contactor (4-37kW) to snap on the contactor
   D: for Mini Motor Contactor (4-5.5kW)
3) RC: RC-surge suppressors
4) 48: 24 - 48 VAC/DC (A+B type)
   230: 110 - 230 VAC/DC (A+B type)
   400: 250 - 415 VAC/DC (A+B type)
   24: 12 - 48 VAC/DC (C+D type)
   110: 48 - 127 VAC/DC (C+D type)
   230: 110 - 250 VAC/DC (C+D type)

7. Accessories for Motor Contactors (4-37 kW) (Varistor units)

J74KN-□-□□ □□□
1 2 3 4

1) Accessories for Motor Contactors
2) A: for Motor Contactor (4-11kW) to snap on to coil terminals
   B: for Motor Contactor (4-37kW) to snap on to contactor
3) VG: Varistor Suppressors
4) 230: 110-230VAC/DC
   400: 250-415VAC/DC

8. Accessories for Motor Contactors (Additional Terminals and Terminal Covers)

J7KN-□□□□□□□
1 2

1) Accessories for Motor Contactors
2) LG-9030: for Motor Contactors (22-37 kW) Additional Terminal for Single Pole
   LG-11224: for Motor Contactors (75-90 kW) Additional Terminal for Single Pole
   LG-10404: for Motor Contactors (75-90 kW) Terminal Cover for 3 terminals
   Marking Systems for contactors J7KNA - J7KN 74 and aux. contact blocks J73KN-B
   P487-1: Marking plate, 2-section without marking, divisible
   P245-1: Marking plate, 4-section without marking, divisible

9. Insulated wiring systems for motor contactors

Parallel or reverse contactors
Star-Delta contactors

J75-WK-□□
1 2 3

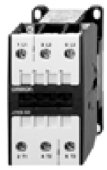
1) Additional reference for LVSG
2) Wiring system
3) Combination of 2 contactors, type:
   21 = J7KN 10 - ..22
   41 = J7KN 24 - ..40

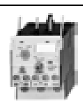
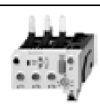
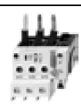
   Star - delta combination of 3 contactors, type:
   22 = J7KN 10 - ..22

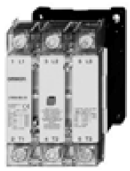
■ List of Models

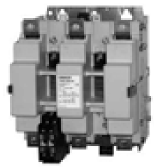
Contactors 3-pole

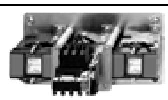
- Up to 210A AC3
- Up to 350A AC1
- DIN-rail mounting up to AC3 74A
- International Approvals
- Data according to IEC 947 / EN 60947



Ratings										
AC3 400V Motor	**10A**	**14A**	**18A**	**22A**	**24A**	**32A**	**40A**	**50A**	**62A**	**74A**
380-400V	**4kW**	**5,5kW**	**7,5kW**	**11kW**	**11kW**	**15kW**	**18,5kW**	**22kW**	**30kW**	**37kW**
660-690V	5,5kW	7,5kW	10kW	10kW	15kW	18,5kW	18,5kW	30kW	37kW	45kW
AC1 690V at 40°C	25A	25A	32A	32A	50A	65A	80A	110A	120A	130A
Type	**J7KN-10-10**	**J7KN-14-10**	**J7KN-18-10**	**J7KN-22-10**	**J7KN-24**	**J7KN-32**	**J7KN-40**	**J7KN-50**	**J7KN-62**	**J7KN-74**
Auxiliary contacts	1NO	1NO	1NO	1NO	-	-	-	-	-	-
Type	**J7KN-10-01**	**J7KN-14-01**	**J7KN-18-01**	**J7KN-22-01**	-	-	-	-	-	-
Auxiliary contacts	1NC	1NC	1NC	1NC	-	-	-	-	-	-
Cable cross-section										
Solid mm²	0,75 - 6				1,5 - 25			4 - 50		
Flexible mm²	1 - 4				2,5 - 16			10 - 35		
Cables per clamp	2				1 + 1			1 + 1		
Auxiliary contact										
I_{th} 40°C A	16				-			-		
AC15 230V A	12				-			-		
400V A	4				-			-		
Power consumption of coils										
Inrush VA	33 - 45				90 - 115			140 - 165		
Hold VA	7 - 10				9 - 13			13 - 18		
Operation range of coils	0,85 - 1,1				0,85 - 1,1			0,85 - 1,1		
Mounting	35mm DIN-rail or base									
Additional aux. contact blocks										
Front mounting contact configuration			1NO					1NC		
	maximal 4 J73KN-B..									
Additional aux. contact blocks										
Side mounting contact configuration							1NO+1NC			
Overload Relay (thermal)										
Single phase protection Temperature compensation Trip and alarm contacts										
Type	J7TKN-B				J7TKN-C			J7TKN-D		
	Setting Ranges				Setting Ranges			Setting Ranges		
	0,12 - 0,18A		4 - 6A		28 - 42A			20 - 28A		
	0,18 - 0,27A		6 - 9A					28 - 42A		
	0,27 - 0,4A		8 - 11A					40 - 52A		
	0,4 - 0,6A		10 - 14A					52 - 65A		
	0,6 - 0,9A		13 - 18A					60 - 74A		
	0,8 - 1,2A		17 - 24A							
	1,2 - 1,8A		23 - 32A							
	1,8 - 2,7A									
	2,7 - 4A									

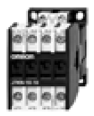
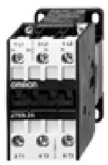
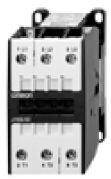
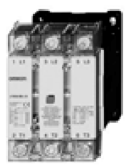
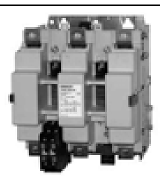


Ratings					
AC3 400V Motor	**85A**	**110A**	**150A**	**175A**	**210A**
380-400V	**45kW**	**55kW**	**75kW**	**90kW**	**110kW**
660-690V	55kW	55kW	75kW	110kW	132kW
AC1 690V at 40°C	150A	170A	230A	250A	350A
Type	**J7KN-85-22**	**J7KN-110-22**	**J7KN-151**	**J7KN-176**	**J7KN-200-22**
Auxiliary contacts	2NO+2NC	2NO+2NC	-	-	2NO+2NC
Type	-	-	-	-	-
Auxiliary contacts	-	-	-	-	-
Cable cross-section					
Solid mm^2	10 - 70	10 - 70	busbar	busbar	busbar
Flexible mm^2	16 - 50	16 - 50	18x4	18x4	22x4
Cables per clamp	1	1	1	1	1
Auxiliary contact					
I_{th} 40°C A	16		10		
AC15 230V A	12		3		
400V A	6		2		
Power consumption of coils					
Inrush VA	350 - 420		350	350	1100
hold VA	23 - 29		5	5	66
Operation range of coils	0,85 - 1,1		0,85 - 1,1		
Mounting	base				
Additional aux. contact blocks					
Front mounting contact configuration			2NO + 2NC	2NO + 2NC	
Additional aux. contact blocks					
Side mounting contact configuration			1NO + 1NC	1NO + 1NC	
Overload Relay (thermal)					
Single phase protection Temperature compensation Trip and alarm contacts					
Type	J7TKN-E		J7TKN-F		
	Setting Ranges		Setting Ranges		
	60 - 90A		100 - 150A		
	80 - 120A		140 - 220A		
Busbar Sets					
			J74TK-SU-176		J74TK-SU-200

Low voltage switch gear

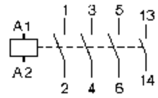
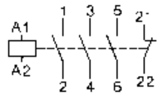
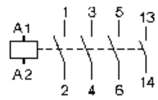
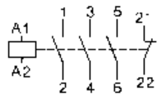
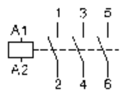
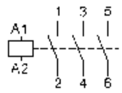
Contactors 3-pole
AC Operated

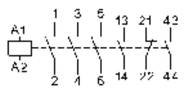
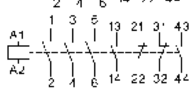
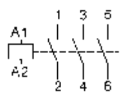
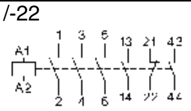
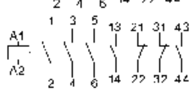
	Ratings			Rated Current	Aux. Contacts			Type		Pack	Weight
	AC2, AC3			AC1	Built-in		Additional				
	380V 400V 415V kW	500V kW	660V 690V kW	690V A	NO	NC	see *page I-33* Type	**24** **110** **230**	Coil Voltage[*1] 24V 50/60Hz 110V 50Hz 220-240V 50Hz	pcs.	kg/pc.
	**4**	5.5	5.5	25	1	-	max. 4 J73KN-B	**J7KN-10-10□□□**		1	0.23
	4	5.5	5.5	25	-	1		**J7KN-10-01□□□**		1	0.23
	5.5	7.5	7.5	25	1	-		**J7KN-14-10□□□**		1	0.23
	5.5	7.5	7.5	25	-	1		**J7KN-14-01□□□**		1	0.23
	7.5	10	10	32	1	-		**J7KN-18-10□□□**		1	0.23
	7.5	10	10	32	-	1		**J7KN-18-01□□□**		1	0.23
	11	10	10	32	1	-		**J7KN-22-10□□□**		1	0.23
	11	10	10	32	-	1		**J7KN-22-01□□□**		1	0.23
	**4**	5.5	5.5	25	-	-	-	**-**		-	-
	4	5.5	5.5	25							
	5.5	7.5	7.5	25							
	5.5	7.5	7.5	25							
	7.5	10	10	32							
	7.5	10	10	32							
	11	10	10	32							
	11	10	10	32							
	**11**	15	15	50	-	-	max. 4 J73KN-B + 2 J73KN-C-11S	**J7KN-24□□□**		1	0.48
	15	18.5	18.5	65	-	-		**J7KN-32□□□**		1	0.48
	18.5	18.5	18.5	80	.	-		**J7KN-40□□□**		1	0.48
	**22**	30	30	110	-	-	max. 4 J73KN-B + 2 J73KN-C11S	**J7KN-50□□□**		1	0.85
	30	37	37	120	-	-		**J7KN-62□□□**		1	0.85
	37	45	45	130	-	-		**J7KN-74□□□**		1	0.85
	Ratings			Rated Current	Aux. Contacts			**Type**		Pack	Weight
	AC2, AC3			AC1	Built-in						
	380V 415V kW	500V kW	660V 690V kW	690V A	NO	NC		**230** **400**	Coil Voltage[*1] 220-230V 50Hz 380-400V 50Hz	pcs.	kg/pc.
	**45**	55	55	150	2	2		**J7KN-85-22□□□**		1	1.8
	55	75	55	170	2	2		**J7KN-110-22□□□**		1	1.9
	**75**	75	75	230	-	-	max. 3 1 x J73KN-D22F or 1 x J73KN-D11F and 2 x J73KN-D11S	**J7KN-151□□□**[*2]		1	4
	90	90	90	250	-	-		**J7KN-176□□□**[*2]		1	4
	**110**	132	132	350	2	2		**J7KN-200-22□□□**		1	7.3

[*1] Coil voltage range and other coil voltages see *page I-36*
[*2] AC and DC in one coil

Contactors 3-pole

DC Operated

Aux. Contacts see *page I-33* Built-in NO	Built-in NC	Additional Type	Type	Coil voltage: **24** 24V DC, **48** 48V DC, **60** 60V DC, **110** 110V DC, **125** 125V DC, **220** 220V DC	Weight kg/pc.	Accept Overload Relay *page I-56* Type	Busbar Set for Overload Relay *page I-57* Type	Wiring Diagram — Coil Circuits see *page I-35* — Terminal Markings
1	-	max. 3 J73KN-B[*1]	**J7KN-10-10□□□D**		0.25	J7TKN-B	-	-10 
-	1		**J7KN-10-01□□□D**		0.25		-	
1	-		**J7KN-14-10□□□D**		0.25		-	
-	1		**J7KN-14-01□□□D**		0.25		-	
1	-		**J7KN-18-10□□□D**		0.25		-	-01 
-	1		**J7KN-18-01□□□D**		0.25		-	
1	-		**J7KN-22-10□□□D**		0.25		-	
-	1		**J7KN-22-01□□□D**		0.25		-	
1	-	max. 4 J73KN-B	**J7KNG-10-10□□□D**		0.53	J7TKN-B	-	-10 
-	1		**J7KNG-10-01□□□D**		0.53		-	
1	-		**J7KNG-14-10□□□D**		0.53		-	
-	1		**J7KNG-14-01□□□D**		0.53		-	
1	-		**J7KNG-18-10□□□D**		0.53		-	-01 
-	1		**J7KNG-18-01□□□D**		0.53		-	
1	-		**J7KNG-22-10□□□D**		0.53		-	
-	1		**J7KNG-22-01□□□D**		0.53		-	
-	-	max. 3 J73KN-B[*1] + 2 J73KN-C-11S	**J7KN-24□□□D**		0.55	J7TKN-B J7TKN-C	-	-00 
-	-						-	
-	-		**J7KN-32□□□D**		0.55		-	
-	-						-	
-	-		**J7KN-40□□□D**		0.55		-	
-	-						-	
-	-	max. 3 J73KN-B[*1] + 2 J73KN-C-11S	**J7KN-50□□□D**		0.9	J7TKN-D		-00 
-	-		**J7KN-62□□□D**		0.9			
-	-		**J7KN-74□□□D**		0.9			

Aux. Contacts Built-in NO	Built-in NC		Type	Coil voltage: **110** 110V DC, **220** 220V DC	Weight kg/pc.	Accept Overload Relay *page I-56* Type	Busbar Set for Overload Relay *page I-57* Type	
2	1	-	**J7KN-85-21□□□D**		1.8	J7TKN-E		-21/-22  
2	1	-	**J7KN-110-21□□□D**		1.9			
-	-	max. 3 1 x J73KN-D22 or 1 x J73KN-D11 and 2 x J73KN-D11S	**J7KN-151-□□□**[*2]		4	J7TKN-F	J73TK-SU-176	-00 
			J7KN-176-□□□[*2]		4	J7TKN-F		
2	1		**J7KN-200-21□□□D**		7.3	J7TKN-F	J73TK-SU-200	-21/-22  

[*1] Only 3 additional Aux. Contacts are possible! (See also the wiring diagrammms coil circuit DC operated *page I-35*)
[*2] AC and DC in one coil

System Contactors for Fuseless Load Feeders with integrated Link Module (see *page I-72*)

AC Operated

	Ratings AC2, AC3 **380V 400V 415V kW**	500V kW	660V 690V kW	Rated Current AC1 690V A	Aux. Contacts Built-in NO	NC	Additional see *page I-33* Type	**Type** Coil Voltage[*1] **24** 24V 50/60Hz, **110** 110V 50Hz, **230** 220-240V 50Hz	Pack pcs.	Weight kg/pc.
	**4**	5.5	5.5	25	1	-	max. 4 J73KN-B	**J7KN-10-10 □□□-VK3**	1	0.25
	5.5	7.5	7.5	25	1	-		**J7KN-14-10 □□□-VK3**	1	0.25
	7.5	10	10	32	1	-		**J7KN-18-10 □□□-VK3**	1	0.25
	11	10	10	32	1	-		**J7KN-22-10 □□□-VK3**	1	0.25

[*1] Coil voltage range and other coil voltages see *page I-36*

Contactors 4-pole

AC Operated

	Ratings AC2, AC3 **380V 400V 415V kW**	AC1 400V kW	Rated Current AC1 690V A	Aux. Contacts see *page I-33* Built-in NO	NC	Additional see below Type	**Type** Coil Voltage[*1] **24** 24V 50/60Hz, **110** 110V 50Hz, **230** 220-240V 50Hz	Pack pcs.	Weight kg/pc.
	**4**	17.5	25	-	-	max. 4 J73KN-B	**J7KN-10-4 □□□**	1	0.22
	5.5	17.5	25	-	-		**J7KN-14-4 □□□**	1	0.22
	7.5	22	32	-	-		**J7KN-18-4 □□□**	1	0.22
	11	22	32	-	-		**J7KN-22-4 □□□**	1	0.22
	**75**	159	230	-	-	max. 3 J73KN-D-11F J73KN-D-22F J73KN-D-11S	**J7KN-151-4 □□□**	1	4.7
	90	173	250	-	-		**J7KN-176-4 □□□**	1	4.7

[*1] Coil voltage range and other coil voltages see *page I-36*

DC Operated

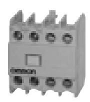
	Ratings AC2, AC3 **380V 400V 415V kW**	AC1 400V kW	Rated Current AC1 690V A	Aux. Contacts see *page I-33* Built-in NO	NC	Additional see below Type	**Type** Coil Voltage[*1] **24** 24V 50/60Hz, **110** 110V 50Hz, **230** 220-240V 50Hz	Pack pcs.	Weight kg/pc.
	**4**	17.5	25	-	-	max. 4 J73KN-B	**J7KNG-10-4 □□□D**	1	-
	5.5	17.5	25	-	-		**J7KNG-14-4 □□□D**	1	-
	7.5	22	32	-	-		**J7KNG-18-4 □□□D**	1	-
	11	22	32	-	-		**J7KNG-22-4 □□□D**	1	-

[*1] Coil voltage range and other coil voltages see *page I-36*

Auxiliary Contact Blocks for contactors J7KN-10... to -74... type J73KN for low level switching*1

Front mounting	Rated Operational Current			Contacts				Type	Pack	Weight
	AC15 230V	AC15 400V	AC1 690V			EM	LB			
	A	A	A	NO	NC				pcs.	kg/pc.
	3	2	10	1	-	-	-	**J73KN-B-10**	10	0.02
	3	2	10	-	1	-	-	**J73KN-B-01**	10	0.02
	3	2	10	-	-	1	-	**J73KN-B-10U**	10	0.02
	3	2	10	-	-	-	1	**J73KN-B-01U**	10	0.02
	6	4	25	1	-	-	-	**J73KN-B-10A**	10	0.02
	6	4	25	-	1	-	-	**J73KN-B-01A**	10	0.02

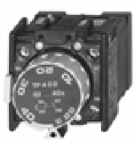
Auxiliary Contact Blocks for contactors J7KN-151... to 176... type J73KN for low level switching

	Rated Operational Current				Contacts		Type	Pack	Weight
	AC15 230V	AC15 400V	AC1 690V						
	A	A	A	Mounting	NO	NC		pcs.	kg/pc.
	3	2	10	front	1	1	**J73KN-D-11F**	1	0.08
	3	2	10		2	2	**J73KN-D-22F**	1	0.08
	3	2	10	side	1	1	**J73KN-D-11S**	1	0.12

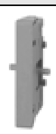
Auxiliary Contact Blocks
for contactors J7KN-24... to KN-110 and J7KN-200... type J73KN for low level switching

	Rated Operational Current				Contacts		Type	Pack	Weight
	AC15 230V	AC15 400V	AC1 690V						
	A	A	A	Mounting	NO	NC		pcs.	kg/pc.
	3	2	10	max. 2 side mounting (J7KN-24-74)	1	1	**J73KN-C-11S**	10	0.02
	3	2	10	max. 2 front mounting (J7KN-200)	2	2	**J73KN-E-22**	1	0.12

Pneumatic Timer for contactors J7KN-10... to -40...

	Function	Time range	Contacts				Type	Pack	Weight
		s	NO	NC	NO	NC		pcs.	kg/pc.
	On-delay	0.1 - 40	1	1	-	-	**J74KN-B-TP40DA**	1	0.09
	On-delay	10 - 180	1	1	-	-	**J74KN-B-TP180DA**	1	0.09
	Off-delay	0.1 - 40	-	-	1	1	**J74KN-B-TP40IA**	1	0.09
	Off-delay	10 - 180	-	-	1	1	**J74KN-B-TP180IA**	1	0.09

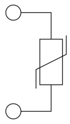
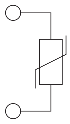
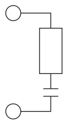
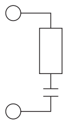
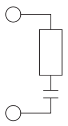
Mechanical Interlocks

	Interlocks contactor with contactor			Mounting	Type	Pack	Weight
	Type	+	Type			pcs.	kg/pc.
	J7KN10 - J7KN40	+	J7KN10 - J7KN40	horizontal	**J74KN-B-ML**	1	0.006
	J7KN24 - J7KN74	+	J7KN24 - J7KN74	horizontal	**J74KN-C-ML**	1	0.010
	J7KN85 - J7KN110	+	J7KN85 - J7KN110	horizontal	**J74KN-D-ML**	1	0.076
	J7KN151 - J7KN176	+	J7KN151 - J7KN176	horizontal	**J74KN-E-ML**	1	0.076

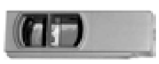
1. suitable according to DIN 19240 (test ratings 17V DC, 5mA) Technical data see *page I-49*

Low voltage switch gear

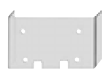
Suppressor Units

			Suitable for Contactors	Suitable for Coil Voltages		Type	Pack pcs.	Weight kg/pc.
		Varistor snap on coil terminals	J7KNA J7KN10-J7KN22	110 - 230 V 250 - 415 V	AC/DC AC/DC	**J74KN-A-VG230** **J74KN-A-VG400**	10 10	0.01 0.01
		Varistor snap on top of contactor	J7KN10-J7KN74	110 - 230 V 250 - 415 V	AC/DC AC/DC	**J74KN-B-VG230** **J74KN-B-VG400**	10 10	0.02 0.02
		RC-Unit snap on contactor	J7KNA	12 - 48 V 48 - 127 V 110 - 230 V	AC/DC AC/DC AC/DC	**J74KN-D-RC24** **J74KN-D-RC110** **J74KN-D-RC230**	10 10 10	0.02 0.036 0.036
		RC-Unit snap on contactor	J7KN10-J7KN74	12 - 48 V 48 - 127 V 110 - 230 V	AC/DC AC/DC AC/DC	**J74KN-C-RC24** **J74KN-C-RC110** **J74KN-C-RC230**	10 10 10	0.02 0.036 0.036
		RC-Unit to fix via fixing band or adhesive strip with contactor	J7KN85-J7KN110	12 - 24 V 110- 250 V 250 - 415 V	AC/DC AC/DC AC/DC	**J74KN-B-RC48** **J74KN-B-RC230** **J74KN-B-RC400**	5 5 5	0.04 0.04 0.04

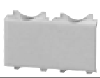
Additional Terminals Single Pole

	For Contactors	Cable Cross-sections to clamp mm²			Type	Pack	Weight
		solid or stranded	flexible	flex. with multi-core cable end		pcs.	kg/pc.
	J7KN50 - KN74 J7KN151 - KN176	4 - 35 16 - 120	6 - 25 ---	4 - 25 16 - 95	**J74KN-LG-9030** **J74KN-LG-11224**	1	0.052

Terminal Covers for terminal protection according DIN 57106, BVG-A2

	For Contactors	Specification	Type	Pack pcs.	Weight kg/pc.
	J7KN151 - KN176	one unit	**J74KN-LG-10404**	1	0.12

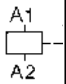
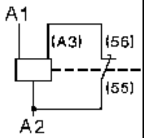
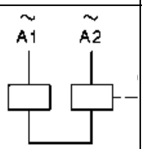
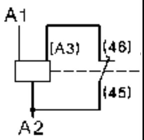
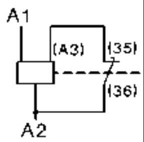
Marking Systems for contactors J7KNA to J7KN74 and aux. contact blocks J73KN-B

	Description	Specification	Type	Pack pcs.	Weight kg/pc.
	Marking Plate	2-section without marking, divisible	**J74KN-P487-1**	100	0.025
	Marking Plate	4-section without marking, divisible	**J74KN-P245-1**	100	0.050

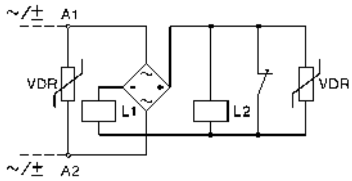
Insulated wiring systems for motor contactors

	Description	Version (A)	For contactors	Type	Pack pcs
	For reversing or parallel contactors (2 parts)	25	J7KN 10 - 22	**J75-WK-21**	1
		40	J7KN 24 - 40	**J75-WK-41**	1
	For star-delta combination (3 parts)	25	J7KN 10 - 22	**J75-WK-22**	1

■ Wiring Diagrams Coil Circuit

AC operated	DC operated with double winding coil*1
J7KN-10... to J7KN-110... 	J7KN-10...D to J7KN-22...D 
J7KN-200... 	J7KN-24...D to J7KN-74...D 
	J7KN-110...D 

*1) Only 3 additional Aux. Contacts are possible!
(See also *page I-31*)

AC and DC operated
J7KN-151... to J7KN-176... 

Low voltage switch gear

Specifications

■ Coil Voltages

Type-suffix for contactor types J7KN-10... to J7KN-74...

Suffix to contactor type e.g.	Voltage Marking at the coil		Rated Control Voltage U_s range for 50Hz		60Hz	
J7KN-10-10-24	for 50Hz V	for 60Hz V	min V	max V	min V	max V
24	**24**	**24**	**22**	**24**	**24**	**27**
48	48	48	44	48	48	52
110	**110**	**110-120**	**100**	**110**	**110**	**122**
180	180-210	200-240	180	210	200	240
230	**220-240**	**240**	**220**	**240**	**240**	**264**
400	**380-415**	**415-440**	**380**	**415**	**415**	**460**
500	500-550	550-600	500	550	550	600

Standard voltages in bold type letter

Type-suffix for contactor types J7KN-85... to J7KN-110...

Suffix to contactor type e.g.	Voltage Marking at the coil		Rated Control Voltage U_s range for 50Hz		60Hz	
J7KN-85-22-24	for 50Hz V	for 60Hz V	min V	max V	min V	max V
20	**20**	**24**	**20**	**22**	**24**	**26**
24	**24**		**24**	**27**	**29**	**32**
48	48	60	47	52	56	62
90	90	110-120	90	100	108	120
110	**110-120**		**110**	**122**	**132**	**146**
180	180-200	208-240	180	200	208	240
230	**220-240**	**277**	**220**	**240**	**264**	**288**
400	**380-415**	**460-480**	**380**	**415**	**455**	**498**
500	500-550	600-660	500	550	600	660

Standard voltages in bold type letter

Type-suffix for contactor types J7KN-151... to J7KN-200...

Suffix to contactor type e.g.	Voltage Marking at the coil		Rated Control Voltage U_s range for 50Hz		60Hz	
J7KN-151-230	for 50 Hz V	for 60 Hz V	min V	max V	min V	max V
24	24		24	24	-	-
48	48		48	48	-	-
110	110	110	110	110	110	110
230	**220-230**	**220**	**220**	**230**	**220**	**220**
400	**380-400**		**380**	**400**	**-**	**-**

Standard voltages in bold type letter

■ Engineering data and characteristics

Approximate Values for three-phase Motors

Motor Full Load Currents

Approximate values of motor F.L.C. and minimum „slow blow“ respectively „gL“ short-circuit fuse

Motor rating					220-230V Motor			240V Motor			**380-400V Motor**			415V Motor			500V Motor			660-690V Motor		
Range according to BS for 415V					Value of fusing at motor start			Value of fusing at motor start			Value of fusing at motor start			Value of fusing at motor start			Value of fusing at motor start			Value of fusing at motor start		
kW	PS~hp	hp	cos	%	F.L.C. A	D.O.L. A	YD A	F.L.C. A	D.O.L. A	YD A	F.L.C. A	D.O.L. A	YD A	F.L.C. A	D.O.L. A	YD A	F.L.C. A	D.O.L. A	YD A	F.L.C. A	D.O.L. A	YD A
0.06	0.08	-	0.7	59	0.38	1	1	0.35	1	1	**0.22**	1	1	-	-	-	0.16	1	1	-	-	-
0.09	0.12	-	0.7	60	0.55	2	2	0.5	2	2	**0.33**	1	1	-	-	-	0.24	1	1	-	-	-
0.12	0.16	-	0.7	61	0.76	2	2	0.68	2	2	**0.42**	2	2	-	-	-	0.33	1	1	-	-	-
0.18	0.24	-	0.7	61	1.1	2	2	1	2	2	**0.64**	2	2	-	-	-	0.46	1	1	-	-	-
0.25	0.34	-	0.7	62	1.4	4	2	1.38	4	2	**0.88**	2	2	-	-	-	0.59	2	2	-	-	-
0.37	0.5	-	0.72	64	2.1	4	4	1.93	4	4	**1.22**	4	2	-	-	-	0.85	2	2	0.7	2	2
0.55	0.75	-	0.75	69	2.7	4	4	2.3	4	4	**1.5**	4	2	-	-	-	1.2	4	2	0.9	2	2
0.75	1	1	0.8	74	3.3	6	4	3.1	6	4	**2**	4	4	2	4	4	1.48	4	2	1.1	2	2
1.1	1.5	1.5	0.83	77	4.9	10	6	4.1	6	6	**2.6**	4	4	2.5	4	4	2.1	4	4	1.5	4	2
1.5	2	2	0.83	78	6.2	10	10	5.6	10	10	**3.5**	6	4	3.5	6	4	2.6	4	4	2	4	4
2.2	3	3	0.83	81	8.7	16	10	7.9	16	10	**5**	10	6	5	10	6	3.8	6	6	2.9	6	4
2.5	3.4	-	0.83	81	9.8	16	16	8.9	16	10	**5.7**	10	10	-	-	-	4.3	6	6	-	-	-
3	4	4	0.84	81	11.6	20	16	10.6	20	16	**6.6**	16	10	6.5	16	10	5.1	10	10	3.5	6	4
3.7	5	5	0.84	82	14.2	25	20	13	25	16	**8.2**	16	10	7.5	16	10	6.2	16	10	-	-	-
4	5.5	-	0.84	82	15.3	25	20	14	25	20	**8.5**	16	10	-	-	-	6.5	16	10	4.9	10	6
5.5	7.5	7.5	0.85	83	20.6	35	25	18.9	35	25	**11.5**	20	16	11	20	16	8.9	16	10	6.7	16	10
7.5	10	10	0.86	85	27.4	35	35	24.8	35	35	**15.5**	25	20	14	25	16	11.9	20	16	9	16	10
8	11	-	0.86	85	28.8	50	35	26.4	35	35	**16.7**	25	20	-	-	-	12.7	20	16	-	-	-
11	15	15	0.86	87	39.2	63	50	35.3	50	50	**22**	35	25	21	35	25	16.7	25	20	13	25	16
12.5	17	-	0.86	87	43.8	63	50	40.2	63	50	**25**	35	35	-	-	-	19	35	25	-	-	-
15	20	20	0.86	87	52.6	80	63	48.2	80	63	**30**	50	35	28	35	35	22.5	35	25	17.5	25	20
18.5	25	25	0.86	88	64.9	100	80	58.7	80	63	**37**	63	50	35	50	50	28.5	50	35	21	35	25
20	27	-	0.86	88	69.3	100	80	63.4	80	80	**40**	63	50	-	-	-	30.6	50	35	-	-	-
22	30	30	0.87	89	75.2	100	80	68	100	80	**44**	63	50	40	63	50	33	50	50	25	35	35
25	34	-	0.87	89	84.4	125	100	77.2	100	100	**50**	80	63	-	-	-	38	63	50	-	-	-
30	40	40	0.87	90	101	125	125	92.7	125	100	**60**	80	63	55	80	63	44	63	50	33	50	35
37	50	50	0.87	90	124	160	160	114	160	125	**72**	100	80	66	100	80	54	80	63	42	63	50
40	54	-	0.87	90	134	160	160	123	160	160	**79**	100	100	-	-	-	60	80	63	-	-	-
45	60	60	0.88	91	150	200	160	136	200	160	**85**	125	100	80	100	100	64.5	100	80	49	63	63
51	70	-	0.88	91	168	200	200	154	200	200	**97**	125	100	-	-	-	73.7	100	80	-	-	-
55	75	-	0.88	91	181	250	200	166	200	200	**105**	160	125	-	-	-	79	125	100	60	80	63
59	80	80	0.88	91	194	250	250	178	250	200	**112**	160	125	105	160	125	85.3	125	100	-	-	-
75	100	100	0.88	91	245	315	250	226	315	250	**140**	200	160	135	200	160	106	160	125	82	125	100
90	125	125	0.88	92	292	400	315	268	315	315	**170**	250	200	165	200	200	128	160	160	98	125	125
110	150	150	0.88	92	358	500	400	327	400	400	**205**	250	250	200	250	250	156	200	200	118	160	125
129	175	175	0.88	92	420	500	500	384	500	400	**242**	315	250	230	315	250	184	250	200	-	-	-
132	180	-	0.88	92	425	500	500	393	500	500	**245**	315	250	-	-	-	186	250	200	140	200	160
147	200	200	0.88	93	472	630	630	432	630	500	**273**	315	315	260	315	315	207	250	250	-	-	-
160	220	-	0.88	93	502	630	630	471	630	630	**295**	400	315	-	-	-	220	315	250	170	200	200
184	250	250	0.88	93	590	800	630	541	630	630	**340**	400	400	325	400	400	259	315	315	-	-	-
200	270	-	0.88	93	626	800	800	589	800	630	**370**	500	400	-	-	-	278	315	315	215	250	250
220	300	300	0.88	93	700	1000	800	647	800	800	**408**	500	500	385	500	400	310	400	400	-	-	-
250	340	-	0.88	93	803	1000	1000	736	1000	800	**460**	630	500	-	-	-	353	500	400	268	315	315
257	350	350	0.88	93	826	1000	1000	756	1000	800	**475**	630	630	450	630	500	363	500	400	-	-	-
295	400	400	0.88	93	948	1250	1000	868	1000	1000	**546**	800	630	500	630	630	416	500	500	-	-	-
315	430	-	0.88	93	990	1250	1250	927	1250	1000	**580**	800	630	-	-	-	445	630	500	337	400	400
355	483	-	0.89	95	-	-	-	-	-	-	**636**	800	800	-	-	-	483	630	630	366	500	400
400	545	-	0.89	96	-	-	-	-	-	-	**710**	1000	800	-	-	-	538	630	630	410	500	500

The motor F.L.C. be valid for standard internal and surface cooled three-pole motors with 1500 min^{-1}. The fuses values be valid for the motor F.L.C. shown in the table and D.O.L.-start: starting current max. 6x motor F.L.C., starting time max. 5s; star-delta-start: starting current max. 2x motor F.L.C., starting time max. 15s. For motors with higher F.L.C., higher starting current and / or longer starting time, larger short-circuit fuses are required.

The maximum admissible value is dependent on the switchgear respectively thermal overload relay.

Approximate values of motor F.L.C. according to CSA and UL

Motor rating	Motor F.L.C. at 110-120V			Motor F.L.C. at 220-240V[*1]			Motor F.L.C. at 440-480V			Motor F.L.C. at 550-600V		
	1-phase	2-phase	3-phase	1-phase	2-phase	3-phase	1-phase	2-phase	3-phase	1-phase	2-phase	3-phase
hp	A	A	A	A	A	A	A	A	A	A	A	A
½	9.8	4.0	4.4	4.9	2.0	2.2	2.5	1.0	1.1	2.0	0.8	0.9
¾	13.8	4.8	6.4	6.9	2.4	3.2	3.5	1.2	1.6	2.8	1.0	1.3
1	16.0	6.4	8.4	8.0	3.2	4.2	4.0	1.6	2.1	3.2	1.3	1.7
1½	20.0	9.0	12.0	10.0	4.5	6.0	5.0	2.3	3.0	4.0	1.8	2.4
2	24.0	11.8	13.6	12.0	5.9	6.8	6.0	3.0	3.4	4.8	2.4	2.7
3	34.0	16.6	19.2	17.0	8.3	9.6	8.5	4.2	4.8	6.8	3.3	3.9
5	56.0	26.4	30.4	28.0	13.2	15.2	14.0	6.6	7.6	11.2	5.3	6.1
7½	80.0	38.0	44.0	40.0	19.0	22.0	21.0	9.0	11.0	16.0	8.0	9.0
10	100.0	48.0	56.0	50.0	24.0	28.0	26.0	12.0	14.0	20.0	10.0	11.0
15	135.0	72.0	84.0	68.0	36.0	42.0	34.0	18.0	21.0	27.0	14.0	17.0
20	-	94.0	108.0	88.0	47.0	54.0	44.0	23.0	27.0	35.0	19.0	22.0
25	-	118.0	136.0	110.0	59.0	68.0	55.0	29.0	34.0	44.0	24.0	27.0
30	-	138.0	160.0	136.0	69.0	80.0	68.0	35.0	40.0	54.0	28.0	32.0
40	-	180.0	208.0	176.0	90.0	104.0	88.0	45.0	52.0	70.0	36.0	41.0
50	-	226.0	260.0	216.0	113.0	130.0	108.0	56.0	65.0	86.0	45.0	52.0
60	-	-	-	-	133.0	145.0	-	67.0	77.0	-	53.0	62.0
75	-	-	-	-	166.0	192.0	-	83.0	96.0	-	66.0	77.0
100	-	-	-	-	218.0	248.0	-	109.0	124.0	-	87.0	99.0
125	-	-	-	-	-	312.0	-	135.0	156.0	-	108.0	125.0
150	-	-	-	-	-	360.0	-	156.0	180.0	-	125.0	144.0
200	-	-	-	-	-	480.0	-	208.0	240.0	-	167.0	192.0
250	-	-	-	-	-	602.0	-	-	302.0	-	-	242.0
300	-	-	-	-	-	-	-	-	361.0	-	-	289.0
350	-	-	-	-	-	-	-	-	414.0	-	-	336.0
400	-	-	-	-	-	-	-	-	477.0	-	-	382.0
500	-	-	-	-	-	-	-	-	590.0	-	-	472.0

[*1] Determine the motor current for 200V and 208V by increasing the values for 220-240V at 200V about 15% and for 208V about 10%.

Contactors

Data according to IEC 947-4-1, EN 60947-4-1, VDE 0660

Main Contacts		Type	J7KN-10	J7KN-14	J7KN-18	J7KN-22	J7KN-24	J7KN-32	J7KN-40	J7KN-50	J7KN-62	J7KN-74
Rated insulation voltage U_i *1		V AC	690	690	690	690	690	690	690	690	690	690
Making capacity I_{eff}	at U_e = 690V AC	A	200	200	200	200	400	500	500	700	900	900
Breaking capacity I_{eff}	400V AC	A	180	180	200	200	380	400	400	600	800	800
J7KN-10 to J7KN-22 cosφ = 0,65	500V AC	A	150	150	180	180	300	370	370	500	700	700
J7KN-24 to J7KN-72 cosφ = 0,35	690V AC	A	100	100	150	150	260	340	340	400	500	500
	1000V AC	A	-	-	-	-	-	-	-	-	-	
Utilization category AC1 **Switching of resistive load**												
Rated operational current I_e (=I_{th}) at 40°C, open		**A**	**25**	**25**	**32**	**32**	**50**	**65**	**80**	**110**	**120**	**130**
Rated operational power of three-phase resistive loads 50-60Hz, cosφ = 1	220V	kW	9,5	9,5	12,2	12,2	19,0	24,7	30,4	41,9	45,7	49,5
	230V	kW	9,9	9,9	12,7	12,7	19,9	25,9	31,8	43,8	47,7	51,7
	240V	kW	10,4	10,4	13,3	13,3	20,8	27,0	33,2	45,7	49,8	54,0
	380V	kW	16,4	16,4	21,0	21,0	32,9	42,7	52,6	72,3	78,9	85,5
	400V	kW	17,3	17,3	22,1	22,1	34,6	45,0	55,4	76,1	83,0	90,0
	415V	kW	17,9	17,9	23,0	23,0	35,9	46,7	57,4	79,0	86,2	93,3
	440V	kW	19,0	19,0	24,4	24,4	38,1	49,5	60,9	83,7	91,3	99,0
	500V	kW	21,6	21,6	27,7	27,7	43,3	56,2	69,2	95,2	103,8	112,5
	660V	kW	28,5	28,5	36,5	36,5	57,1	74,2	91,3	125,6	137,0	148,4
	690V	kW	29,8	29,8	38,2	38,2	59,7	77,6	95,5	131,3	143,2	155,2
	1000V	kW	-	-	-	-	-	-	-	-	-	-
Rated operational current I_e (=I_{the}) at 60°C, enclosed		A	25	25	32	32	40	55	65	90	100	110
Rated operational power of three-phase resistive loads 50-60Hz, cosφ = 1	220V	kW	9,5	9,5	12,2	12,2	15,2	20,9	24,7	34,3	38,1	41,9
	230V	kW	9,9	9,9	12,7	12,7	15,9	21,9	25,9	35,8	39,8	43,8
	240V	kW	10,4	10,4	13,3	13,3	16,6	22,8	27,0	37,4	41,5	45,7
	380V	kW	16,4	16,4	21,0	21,0	26,3	36,2	42,7	59,2	65,7	72,3
	400V	kW	17,3	17,3	22,1	22,1	27,7	38,1	45,0	62,3	69,2	76,1
	415V	kW	17,9	17,9	23,0	23,0	28,7	39,5	46,7	64,6	71,8	79,0
	440V	kW	19,0	19,0	24,4	24,4	30,4	41,9	49,5	68,5	76,1	83,7
	500V	kW	21,6	21,6	27,7	27,7	34,6	47,6	56,2	77,9	86,5	95,2
	660V	kW	28,5	28,5	36,5	36,5	45,7	62,8	74,2	102,8	114,2	125,6
	690V	kW	29,8	29,8	38,2	38,2	47,7	65,7	77,6	107,4	119,4	131,3
	1000V	kW	-	-	-	-	-	-	-	-	-	-
Minimum cross-section of conductor at load with I_e (=I_{th})		mm²	4	4	6	6	10	16	25	35	50	50
Utilization category AC2 and AC3 **Switching of three-phase motors**												
Rated operational current I_e open and enclosed	220V	A	12	15	18	22	24	30	40	50	63	74
	230V	A	11,5	14,5	18	22	24	30	40	50	62	74
	240V	A	11	14	18	22	24	32	40	50	62	74
	380-400V	**A**	**10**	**14**	**18**	**22**	**24**	**32**	**40**	**50**	**62**	**74**
	415V	A	9	14	18	22	23	30	40	50	62	74
	440V	A	9	14	18	22	23	30	40	50	62	74
	500V	A	7	9	9	9	17,5	21	21	33	42	42
	660-690V	A	6,5	8,5	8,5	8,5	17	20	20	31	40	40
	1000V	A	-	-	-		-	-	-	-	-	-
Rated operational power of three-phase motors 50-60Hz	220-230V	kW	3	4	5	6	6	8,5	11	12,5	18,5	22
	240V	kW	3	4	5	7	7	9	11,5	13,5	19	23
	380-400V	**kW**	**4**	**5,5**	**7,5**	**11**	**11**	**15**	**18,5**	**22**	**30**	**37**
	415V	kW	4,5	6	8,5	12	12	16	20	24	33	40
	440V	kW	4,5	6	8,5	12	12	16	20	24	33	40
	500V	kW	5,5	7,5	10	10	15	18,5	18,5	30	37	45
	660-690V	kW	5,5	7,5	10	10	15	18,5	18,5	30	37	45
	1000V	kW	-	-	-		-	-	-	-	-	-
Utilization category AC4 **Switching of squirrel cage motors, inching**												
Rated operational current I_e (=I_{th}) open and enclosed	220V	A	12	15	18	18	24	30	40	50	63	63
	230V	A	11,5	14,5	18	18	24	30	40	50	62	62
	240V	A	11	14	18	18	24	32	40	50	62	62
	380-400V	**A**	**10**	**14**	**18**	**18**	**24**	**32**	**40**	**50**	**62**	**62**
	415V	A	9	14	18	18	23	30	37	45	60	60
	440V	A	9	14	18	18	23	30	37	45	55	55
	500V	A	9	12	16	16	17,5	21	21	33	42	42
	660V	A	7	9	9	9	17	20	20	31	40	40
	690V	A	6,5	8,5	8,5	8,5	17	20	20	31	40	40
	1000V	A	-	-	-		-	-	-	-	-	-

Low voltage switch gear

Main Contacts		Type	J7KN-10	J7KN-14	J7KN-18	J7KN-22	J7KN-24	J7KN-32	J7KN-40	J7KN-50	J7KN-62	J7KN-74
Utilization category AC4 Switching of squirrel cage motors, inching												
Rated operational power of three-phase motors 50-60Hz	220-230V	kW	3	4	5	5	6	8,5	11	12,5	18,5	18,5
	240V	kW	3	4	5	5	7	9	11,5	13,5	19	19
	380-400V	**kW**	**4**	**5,5**	**7,5**	**7,5**	**11**	**15**	**18,5**	**22**	**30**	**30**
	415V	kW	4,5	6	8,5	8,5	12	16	20	24	33	33
	440V	kW	4,5	6	8,5	8,5	12	16	20	24	33	33
	500V	kW	5,5	7,5	10	10	15	18,5	18,5	30	37	37
	660-690V	kW	5,5	7,5	10	10	15	18,5	18,5	30	37	37
	1000V	kW	-	-	-		-	-	-	-	-	-
Utilization category AC 5a Switching of gas discharge lamps												
Rated operational current I_e per pole at 220/230V												
Fluorescent lamps,												
uncompensated and serial compensated		A	20	20	25	25	40	52	64	88	96	104
parallel compensated		A	7	9	9	9	18	22	22	30	40	45
dual-connection		A	22,5	22,5	28	28	45	58	72	98	108	117
Metal halide lamps[*2],												
uncompensated		A	12	15	19	19	30	39	48	66	72	78
parallel compensated		A	7	9	9	9	18	22	22	30	40	45
Mercury-vapour lamps[*3],												
uncompensated		A	22,5	25	28	28	45	58	72	99	108	117
parallel compensated		A	7	9	9	9	18	22	22	30	40	45
Mixed light lamps[*4]		A	20	20	25	25	40	52	64	88	96	104
Utilization category AC 5b Switching of incandescent lamps[*5]												
Rated operational current I_e per pole at 220/230V		A	12,5	12,5	12,5	12,5	25	31	31	43	56	56
Utilization category AC 6a Transformer primary switching												
at inrush		n	30	30	30	30	30	30	30	30	30	30
Rated operational current I_e	400V	A	4,5	5,5	7,5	7,5	10,5	13,5	13,5	20	27	33
Rated operational power dependent on inrush n	220-230V	kVA	1,8	2,2	3	3	4,2	5,4	5,4	8	10,7	13
	240V	kVA	1,9	2,3	3,1	3,1	4,3	5,6	5,6	8,3	11,2	13,5
	380-400V	kVA	3,1	3,8	5,2	5,2	7,3	9,3	9,3	13,5	18,5	22,5
For different inrush-factors x use the following formula: Px=Pn*(n/x)	415-440V	kVA	3,4	4,2	5,7	5,7	8	10,2	10,2	15	20,5	25
	500V	kVA	3,9	4,8	6,5	6,5	9	11,5	11,5	17	23	28
	660-690V	kVA	5,4	6,5	9	9	12,5	16	16	24	32	39
Utilization category AC 6b Switching of three-phase capacitor banks												
Maximum inrush current (peak value) as multiple k of the capacitor rated current		k	35	25	20	20	25	25	25	25	25	20
Rated operational current I_e	500V	A	8	12	15,5	15,5	23	32	32	45	60	70
Rated operational power (sin 1)	220-230V	kVAr	3	4,5	6	6	8,5	12	12	17	24	28
	240V	kVAr	3,5	5	6,5	6,5	9,5	13	13	18,5	25	29
	380-400V	kVAr	5	7,5	10	10	15	20	20	29	39	46
For different multiples x use the following formula: Px=Pk*(k/x)	415-440V	kVAr	5,5	8	11	11	16	22	22	32	43	50
	500V	kVAr	7	10	13	13	20	26	26	39	50	58
	660-690V	kVAr	7	10	13	13	20	26	26	40	50	58
Switching of detuned capacitors												
Rated operational current I_e	690V	A	8	13	18	20	28	36	42	48	72	105 [1)]
Rated operational power	220-230V	kVAr	2,9	5	7	7,5	11	14	16	20	28	33
	240V	kVAr	3,1	5,4	7	8	11	14	17	20	28	36
	380-400V	kVAr	5	9	12,5	13	20	25	27,5	33,3	50	75 [1)]
	415-440V	kVAr	5,5	9,5	13	14	22	27	30	36	53	75 [1)]
	500V	kVAr	6	11	15	17	25	30	36	40	60	75
	660-690V	kVAr	8	15	20	22	33	41	48	55	82	100
Utilization category DC1 Switching of resistive load												
Time constant L/R 1ms												
Rated operational current I_e	1 pole24V	A	20	25	32	32	50	65	80	110	120	130
	60V	A	20	25	32	32	50	65	80	110	120	130
	110V	A	6	6	6	6	10	10	10	12	12	12
	220V	A	0,8	0,8	0,8	0,8	1,4	1,4	1,4	1,4	1,4	1,4
	3 poles in series 24V	A	20	25	32	32	50	65	80	110	120	130
	60V	A	20	25	32	32	50	65	80	110	120	130
	110V	A	20	25	32	32	50	65	80	110	120	130
	220V	A	16	20	20	20	30	35	35	63	80	80

Main Contacts Type	J7KN-10	J7KN-14	J7KN-18	J7KN-22	J7KN-24	J7KN-32	J7KN-40	J7KN-50	J7KN-62	J7KN-74
Utilization category DC3 and DC5 Switching of shunt motors and series motors										
Time constant L/R 15ms										
Rated operational current I_e 1 pole 24V A	20	25	32	32	50	65	80	110	120	130
60V A	6	6	6	6	30	30	30	60	60	60
110V A	1,2	1,2	1,2	1,2	1,8	1,8	1,8	1,8	1,8	1,8
220V A	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,25	0,25	0,25
3 poles in series 24V A	20	25	32	32	50	65	80	110	120	130
60V A	20	25	32	32	40	40	40	80	80	80
110V A	20	20	20	20	40	40	40	80	80	80
220V A	2,5	2,5	2,5	2,5	4	4	4	5	5	5
Maximum ambient temperature										
Operation open °C	-40 to +60 (+90)*6									
enclosed °C	-40 to +40									
with thermal overload relay open °C	-25 to +60									
enclosed °C	-25 to +40									
Storage °C	-50 to +90									
Short circuit protection for contactors without thermal overload relay										
Coordination-type "1" according to IEC 947-4-1 Contact welding without hazard of persons										
max. fuse size gL (gG) A	63	63	63	63	80	80	80	160	160	160
Coordination-type "2" according to IEC 947-4-1 Light contact welding accepted										
max. fuse size gL (gG) A	25	35	35	35	50	50	50	100	125	125
Contact welding not accepted										
max. fuse size gL (gG) A	16	16	16	16	25	35	35	50	63	63
For contactors with thermal overload relay the device with the smaller admissible backup fuse (contactor or thermal overload relay) determines the fuse size.										
Cable cross-sections for contactors without thermal overload relay										
main connector solid or stranded mm²	0,75 - 6				1,5 - 25			4 - 50		
flexible mm²	1 - 4				2,5 - 16			10 - 35		
flexible with multicore cable end mm²	0,75 - 4				1,5 - 16			6 - 35		
Cables per clamp	2				1			1		
solid or stranded mm²	6+(1-6) / 4+(0,75-4)				16+(2,5-6) / 10+(4-10)			50+4 / 35+6 / 25+(6-16)		
	2,5+(0,75-2,5) / 1,5+(0,75-1,5)				6+(4-6) / 4+(2,5-4)			16+(6-16) / 10+(6-16)		
flexible mm²	6+(1,5-6) / 4+(1-4)				16+(2,5-6) / 10+(4-10)			50+(4-10) / 35+(4-16)		
	2,5+(0,75-2,5) / 1,5+(0,75-1,5)				6+(4-6) / 4+(2,5-4)			25+(4-25) / 16+(4-16)		
Cables per clamp	2				2			2		
main connector solid AWG	18 - 10				16 - 10			12 - 10		
flexible AWG	18 - 10				14 - 4			10 - 0		
Cables per clamp	2				1			1		
solid AWG	10+(16-10) / 12+(18-12)				10+(16-10) / 12+(18-12)			10+(12-10) / 12+12		
	14+(18-14) / 16+(18-16)				14+(18-14) / 16+(18-16)					
flexible AWG	10+(14-10) / 12+(18-12)				4+(18-12) / 6+(18-8)			1+(12-10) / 2+(8-12)		
	14+(18-14) / 16+(18-16)				8+(18-8) / 10+(18-12)			3+(12-8) / 4+(10-6)		
Cables per clamp	2				2			2		
Frequency of operations z Contactors without thermal overload relay										
without load 1/h	10000	10000	10000	10000	7000	7000	7000	7000	7000	7000
AC3, I_e 1/h	600	600	600	600	600	600	600	400	400	400
AC4, I_e 1/h	120	120	120	120	120	120	120	120	120	120
DC3, I_e 1/h	600	600	600	600	600	600	600	400	400	400
Mechanical life										
AC operated S x 10^6	10	10	10	10	10	10	10	10	10	10
DC operated S x 10^6	10	10	10	10	10	10	10	10	10	10
DC solenoid operated S x 10^6	50	50	50	50	-	-	-	-	-	-
Short time current 10s-current A	96	120	144	176	184	240	296	360	504	592
Power loss per pole at I_e/AC3 400V W	0,21	0,35	0,5	0,75	0,7	1,3	2	2,2	3,9	5,5
Resistance to shock acc. to IEC 68-2-27										
Shock time 20ms sine-wave NO g	10	10	10	10	8	8	8	8	8	8
NC g	6	6	6	6	-	-	-	-	-	-

*1 Suitable at 690V for: earthed-neutral systems, overvoltage I to IV, pollution degree 3 (standard-industry): U_{imp} = 8kV. Data for other conditions on request.
*2 Metal halide lamps and sodium-vapour lamps (high- and low-pressure lamps)
*3 High-pressure lamps
*4 Blended lamps, containing a mercury high-pressure unit and a tungsten helix in a flourescent glass bulb (daylight lamps)
*5 Current inrush approx. 16 x I_e
*6 With reduced control voltage range 0,9 up to 1,0 x U_s and with reduced rated current I_e/AC1 according to I_e/AC3

Main Contacts		Type	J7KN-85	J7KN-110	J7KN-151	J7KN-176	J7KN-200
Rated insulation voltage U_i *1		V AC	750	750	690	690	690
Making capacity I_{eff}	at U_e = 690V AC	A	1100	1200	1500	1800	1700
Breaking capacity I_{eff}	400V AC	A	950	1100	1200	1400	1600
J7KN-10 to J7KN-22 cosφ = 0,65	500V AC	A	850	1000	1200	1400	1600
J7KN-24 to J7KN-72 cosφ = 0,35	690V AC	A	600	600	700	800	1200
	1000V AC	A	-	-	-	-	-
Utilization category AC1 Switching of resistive load							
Rated operational current I_e (=I_{th}) at 40°C, open		A	150	170	230	250	350
Rated operational power of three-phase resistive loads 50-60Hz, cosφ = 1	220V	kW	57	64	87	95	133
	230V	kW	59	67	91	99	139
	240V	kW	62	70	95	103	145
	380V	kW	98	111	151	164	230
	400V	kW	103	117	159	173	242
	415V	kW	107	122	165	179	251
	440V	kW	114	129	175	190	266
	500V	kW	130	147	199	216	303
	660V	kW	171	194	262	285	400
	690V	kW	179	203	274	298	418
	1000V	kW	-	-	398	433	-
Rated operational current I_e (=I_{the}) at 60°C, enclosed		A	100	125	180	200	280
Rated operational power of three-phase resistive loads 50-60Hz, cosφ = 1	220V	kW	38	47	68	76	106
	230V	kW	40	49	71	79	111
	240V	kW	41	52	74	83	116
	380V	kW	65	82	118	131	184
	400V	kW	69	86	124	138	193
	415V	kW	71	89	129	143	201
	440V	kW	71	95	137	152	213
	500V	kW	86	108	155	173	242
	660V	kW	114	142	205	228	320
	690V	kW	119	149	215	239	334
	1000V	kW	-	-	-	-	-
Minimum cross-section of conductor at load with I_e (=I_{th})		mm²	50	70	95	120	185
Utilization category AC2 and AC3 Switching of three-phase motors							
Rated operational current I_e open and enclosed	220V	A	85	110	150	175	210
	230V	A	85	110	150	175	210
	240V	A	85	110	150	175	210
	380-400V	A	85	110	150	175	210
	415V	A	85	110	150	175	210
	440V	A	85	110	150	175	210
	500V	A	60	60	150	175	210
	660-690V	A	57,5	57,5	120	140	150
	1000V	A	-	-	60	70	-
Rated operational power of three-phase motors 50-60Hz	220-230V	kW	25	33	40	50	60
	240V	kW	27	35	45	55	65
	380-400V	kW	45	55	75	90	110
	415V	kW	49	63	80	95	115
	440V	kW	49	63	85	100	125
	500V	kW	55	75	90	100	132
	660-690V	kW	55	55	110	132	132
	1000V	kW	-	-	75	90	-
Utilization category AC4 Switching of squirrel cage motors, inching							
Rated operational current I_e (=I_{th}) open and enclosed	220V	A	85	98	55	63	85
	230V	A	85	98	55	63	85
	240V	A	85	98	55	63	85
	380-400V	A	85	85	55	63	85
	415V	A	85	85	55	63	85
	440V	A	85	85	55	63	85
	500V	A	85	85	-	-	-
	660V	A	60	60	-	-	-
	690V	A	57,5	57,5	-	-	-
	1000V	A	-	-	-	-	-

Main Contacts		Type	J7KN-85	J7KN-110	J7KN-151	J7KN-176	J7KN-200
Rated operational power of three-phase motors 50-60Hz	220-230V	kW	25	30	15	18,5	25
	240V	kW	27	32	15,5	19	26
	380-400V	kW	45	45	25	30	45
	415V	kW	49	49	25	33	45
	440V	kW	49	49	30	34	48
	500V	kW	55	55	25	30	55
	660-690V	kW	55	55	25	30	55
	1000V	kW	-	-	-	-	-
Utilization category AC 5a Switching of gas discharge lamps							
Rated operational current I_e per pole at 220/230V							
Fluorescent lamps,							
uncompensated and serial compensated		A	100	120	120	140	180
parallel compensated		A	55	70	85	100	120
dual-connection		A	112	144	120	140	180
Metal halide lamps[*2],							
uncompensated		A	85	90	95	110	140
parallel compensated		A	55	70	75	85	110
Mercury-vapour lamps[*3],							
uncompensated		A	112	144	120	140	180
parallel compensated		A	55	70	75	85	110
Mixed light lamps[*4]		A	100	120	100	120	160
Utilization category AC5b Switching of incandescent lamps[*5]							
Rated operational current I_e per pole at 220/230V		A	69	75	100	120	160
Utilization category AC6a Transformer primary switching							
at inrush		n	30	30	30	30	30
Rated operational current I_e	400V	A	38	50	65	80	90
Rated operational power dependent on inrush n	220-230V	kVA	15	20	25	30	34
	240V	kVA	15,5	20,5	27	33	37
	380-400V	kVA	26	34	45	55	60
For different inrush-factors x use the following formula: Px=Pn*(n/x)	415-440V	kVA	29	38	46	57	63
	500V	kVA	33	43	55	69	75
	660-690V		45	60	56	69	100
Utilization category AC6b Switching of three-phase capacitor banks							
Maximum inrush current (peak value) as multiple k of the capacitor rated current		k	20	20	20	20	15
Rated operational current I_e	500V	A	87	100	120	155	195
Rated operational power (sin 1)	220-230V	kVAr	33	38	45	60	75
	240V	kVAr	36	42	52	62	78
	380-400V	kVAr	57	65	80	100	130
For different multiples x use the following formula: Px=Pk*(k/x)	415-440V	kVAr	60	70	95	110	135
	500V	kVAr	70	80	100	130	170
	660-690V	kVAr	70	80	100	130	170
Switching of detuned capacitors							
Rated operational current I_e	690V	A	98	105	115	140	200
Rated operational power	220-230V	kVAr	35	40	43	53	76
	240V	kVAr	39	43	45	55	80
	380-400V	kVAr	68	75	75	90	130
	415-440V	kVAr	71	77	80	100	140
	500V	kVAr	85	90	95	120	170
	660-690V	kVAr	110	120	125	150	200
Utilization category DC1 Switching of resistive load							
Time constant L/R 1ms							
Rated operational current I_e	1 pole 24V	A	150	170	-	-	-
	60V	A	150	170	-	-	-
	110V	A	20	25	-	-	-
	220V	A	2	2,5	-	-	-
	3 poles in series 24V	A	150	170	-	-	-
	60V	A	150	170	-	-	-
	110V	A	150	170	-	-	-
	220V	A	100	160	-	-	-

Low voltage switch gear

Main Contacts	Type	J7KN-85	J7KN-110	J7KN-151	J7KN-176	J7KN-200
Utilization category DC3 and DC5 **Switching of shunt motors and series motors**						
Time constant L/R 15ms						
Rated operational current I_e	1 pole24V A	150	170	-	-	-
	60V A	85	110	-	-	-
	110V A	2	2,5	-	-	-
	220V A	0,5	0,5	-	-	-
	3 poles in series 24V A	150	170	-	-	-
	60V A	100	110	-	-	-
	110V A	100	110	-	-	-
	220V A	7	8	-	-	-
Maximum ambient temperature						
Operation	open °C	-40 to +60 (+90)[*6]		-25 to +55 (+70)[*7]		
	enclosed °C	-40 to +40		-25 to +40		
with thermal overload relay	open °C	-25 to +60		-25 to +55		
enclosed	°C	-25 to +40		-25 to +40		
Storage	°C	-50 to +90		-55 to +80		
Short circuit protection for contactors without thermal overload relay						
Coordination-type "1" according to IEC 947-4-1 Contact welding without hazard of persons						
max. fuse size	gL (gG) A	250	250	250	315	400
Coordination-type "2" according to IEC 947-4-1 Light contact welding accepted						
max. fuse size	gL (gG) A	160	200	200	250	315
Contact welding not accepted						
max. fuse size	gL (gG) A	100	125	160	200	250
For contactors with thermal overload relay the device with the smaller admissible backup fuse (contactor or thermal overload relay) determines the fuse size.						
Cable cross-sections for contactors without thermal overload relay						
main connector	solid or stranded mm²	10 - 70[*8]	10 - 70[*8]	95	120	185
	flexible mm²	6 - 50[*8]	16 - 50[*8]	screw	screw	screw
	flexible with multicore cable end mm²	10 - 35	10 - 35	M8	M8	M8
Cables per clamp						
	solid or stranded mm²					
	flexible mm²					
Cables per clamp						
main connector	solid AWG	10	10			
	flexible AWG	6 - 0	6 - 0			
Cables per clamp		1	1			
	solid AWG					
	flexible AWG					
Cables per clamp						
Frequency of operations z Contactors without thermal overload relay						
	without load 1/h	3000	3000	1200	1200	1200
	AC3, I_e 1/h	300	300	-	-	-
	AC4, I_e 1/h	120	120	-	-	-
	DC3, I_e 1/h	300	300	-	-	-
Mechanical life						
AC operated	S x 10^6	5	5	10	10	8
DC operated	S x 10^6	5	5	10	10	8
Short time current	10s-current A	680	880	1200	1400	1800
Power loss per pole	at I_e/AC3 400V W	4,3	6,0	8	11	8
Resistance to shock acc. to IEC 68-2-27						
Shock time 20ms sine-wave	NO g	7	7	-	-	-
	NC g	5	5	-	-	-

[*1] Suitable at 690V for: earthed-neutral systems, overvoltage I to IV, pollution degree 3 (standard-industry): U_{imp} = 8kV. Data for other conditions on request.
[*2] Metal halide lamps and sodium-vapour lamps (high- and low-pressure lamps)
[*3] High-pressure lamps
[*4] Blended lamps, containing a mercury high-pressure unit and a tungsten helix in a flourescent glass bulb (daylight lamps)
[*5] Current inrush approx. 16 x I_e
[*6] With reduced control voltage range 0,9 up to 1,0 x U_s and with reduced rated current I_e/AC1 according to I_e/AC3
[*7] With reduced control voltage range 1,0 x U_s and with reduced rated current I_e/AC1 according to I_e/AC3
[*8] Maximum cable cross-section with prepared conductor

Contactors

Data according to IEC 947-4-1, EN 60947-4-1, VDE 0660

Auxiliary Contacts	Type	J7KN-10	J7KN-14	J7KN-18	J7KN-22	J7KN-24	J7KN-32	J7KN-40	J7KN-50	J7KN-62	J7KN-74
Rated insulation voltage U_i[*1]	V~	690	690	690	690	-	-	-	-	-	-
Thermal rated current I_{th} to 690V											
Ambient temperature	40°C A	16	16	16	16	-	-	-	-	-	-
	60°C A	12	12	12	12	-	-	-	-	-	-
Utilization category AC15											
Rated operational current I_e	220-240V A	12	12	12	12	-	-	-	-	-	-
	380-415V A	4	4	4	4	-	-	-	-	-	-
	440V A	4	4	4	4	-	-	-	-	-	-
	500V A	3	3	3	3	-	-	-	-	-	-
	660-690V A	1	1	1	1	-	-	-	-	-	-
Utilization category DC13											
Rated operational current I_e	60V A	8	8	8	8	-	-	-	-	-	-
	110V A	1	1	1	1	-	-	-	-	-	-
	220V A	0,1	0,1	0,1	0,1	-	-	-	-	-	-
Short circuit protection											
short-circuit current 1kA, contact welding not accepted											
max. fuse size	gL (gG) A	25	25	25	25	-	-	-	-	-	-
For contactors with thermal overload relay the device with the smaller admissible control fuse (contactor or thermal overload relay) determines the fuse.											
Control Circuit **Power consumption of coils**											
AC operated	inrush VA	33-45				90-115			140-165		
	sealed VA	7-10				9-13			13-18		
	W	2,6-3				2,7-4			5,4-7		
DC operated	inrush W	75				140			200		
	sealed W	2				2			6		
DC solenoid operated	inrush W	3				-			-		
(J7KNG-types)	sealed W	3				-			-		
Operation range of coils											
in multiples of control voltage U_s	AC operated	0,85-1,1				0,85-1,1			0,85-1,1		
	DC operated	0,8-1,1				0,8-1,1			0,8-1,1		
Switching time at control voltage U_s ±10%[*2,*3]											
AC operated	make time ms	8-16				10-25			12-28		
	release time ms	5-13				8-15			8-15		
	arc duration ms	10-15				10-15			10-15		
DC operated	make time ms	8-12				10-20			12-23		
	release time ms	8-13				10-15			10-18		
	arc duration ms	10-15				10-15			10-15		
DC solenoid operated	make time ms	65-85				-			-		
	release time ms	20-30[*4]				-			-		
	arc duration ms	10-15				-			-		
Cable cross-section											
Auxiliary connector	solid mm²	0,75-6				-			-		
	flexible mm²	1-4				-			-		
flexible with multicore cable end	mm²	0,75-4				-			-		
Magnet coil	solid mm²	0,75-2,5				0,75-2,5			0,75-2,5		
	flexible mm²	0,5-2,5				0,5-2,5			0,5-2,5		
	flexible with multicore cable end mm²	0,5-1,5				0,5-1,5			0,5-1,5		
Clamps per pole		2				2			2		
Auxiliary connector	solid AWG	18 - 10				-			-		
	flexible AWG	18 - 10				-			-		
Magnet coil	solid AWG	14 - 12				14 - 12			14 - 12		
	flexible AWG	18 - 12				18 - 12			18 - 12		
Clamps per pole		2				2			2		

[*1] Suitable for: earthed-neutral systems, overvoltage category I to IV, pollution degree 3 (standard-industry): U_{imp} = 8kV. Data for other conditions on request

[*2] Total breaking time = release time + arc duration

[*3] Values for delay of the release time of the making contact and the make time of the break contact will be increased, if magnet coils are protected against voltage peaks (varistor, RC-unit, diode-unit)

[*4] with integrated suppressor

Low voltage switch gear

Auxiliary Contacts	Type	J7KN-85	J7KN-110	J7KN-151	J7KN-176	J7KN-200
Rated insulation voltage U_i [*1]	V~	690	690	690	690	690
Thermal rated current I_{th} to 690V						
Ambient temperature 40°C	A	16	16	10	10	10
60°C	A	12	12	-	-	-
Utilization category AC15						
Rated operational current I_e 220-240V	A	12	12	3	3	3
380-415V	A	6	6	2	2	2
440V	A	6	6	1,5	1,5	1,5
500V	A	4	4	1,5	1,5	1,5
660-690V	A	2	2	1	1	1
Utilization category DC13						
Rated operational current I_e 60V	A	8	8	-	-	-
110V	A	1	1	0,5	0,5	1
220V	A	0,1	0,1	0,2	0,2	0,5
Short circuit protection						
short-circuit current 1kA, contact welding not accepted						
max. fuse size gL (gG)	A	25	25	10	10	10
For contactors with thermal overload relay the device with the smaller admissible control fuse (contactor or thermal overload relay) determines the fuse.						
Control Circuit **Power consumption of coils**						
AC operated inrush	VA	280-350	350-420	350	350	1100
sealed	VA	16 -23	23 -29	5	5	66
	W	4-6	6-7,3	-	-	-
DC operated inrush	W	170	320	350	350	530
sealed	W	2	4	5	5	21
Operation range of coils						
in multiples of control voltage U_s AC operated		0,85-1,1		0,85-1,1	0,85-1,1	0,85-1,1
DC operated		0,8-1,1		0,85-1,1	0,85-1,1	0,85-1,1
Switching time at control voltage U_s ±10% [*2,*3]						
AC operated make time	ms	13-30		30-60	30-60	30-40
release time	ms	8-15		30-80	30-80	15-45
arc duration	ms	10-15			-	-
DC operated make time	ms	20-30		-	-	-
release time	ms	10-18		-	-	-
arc duration	ms	10-15		-	-	-
Cable cross-section						
Auxiliary connector solid	mm²	0,75-2,5		-		0,75-2,5
flexible	mm²	0,75-2,5		-		0,75-2,5
flexible with multicore cable end	mm²	0,5-1,5		-		
Magnet coil solid	mm²	0,75-2,5		1-2,5		
flexible	mm²	0,5-2,5		1-2,5		
flexible with multicore cable end	mm²	0,5-1,5		-		
Clamps per pole		14 - 12		16 - 12		
Auxiliary connector solid	AWG	18 - 12		-		16 - 12
flexible	AWG	14 - 12		-		16 - 12
Magnet coil solid	AWG	18 - 12		16 - 12		
flexible	AWG	2		2		
Clamps per pole		0,75-2,5		0,75-2,5		

[*1] Suitable for: earthed-neutral systems, overvoltage category I to IV, pollution degree 3 (standard-industry): U_{imp} = 8kV. Data for other conditions on request

[*2] Total breaking time = release time + arc duration

[*3] Values for delay of the release time of the making contact and the make time of the break contact will be increased, if magnet coils are protected against voltage peaks (varistor, RC-unit, diode-unit)

Contactors for North America

Data according to UL508

Main Contacts (cULus)	Type	J7KN-10	J7KN-14	J7KN-18	J7KN-22	J7KN-24	J7KN-32	J7KN-40	J7KN-50	J7KN-62	J7KN-74
Rated operational current "General Use"	A	25	25	30	30	50	65	80	110	120	130
Rated operational power	110-120V hp	1½	2	2	3	5	5	7½	10	10	10
of three-phase motors	200V hp	3	3	5	5	7½	10	10	15	20	25
at 60Hz (3ph)	220-240V hp	3	3	7½	7½	10	10	15	20	25	30
	277V hp	3	5	7½	7½	7½	10	15	20	25	30
	380-415V hp	5	5	10	10	10	15	20	25	30	40
	440-480V hp	5	7½	10	15	15	20	25	30	40	50
	550-600V hp	7½	10	15	20	20	25	30	40	50	50
Rated operational power	110-120V hp	½	¾	1	1½	1½	2	3	3	5	7½
of AC motors	200V hp	1	1,5	2	3	3	5	7½	7½	10	15
at 60Hz (1ph)	220-240V hp	1½	2	3	3	5	5	7½	10	15	15
	277V hp	2	3	3	5	5	7½	10	10	15	15
	380-415V hp	3	3	5	5	5	7½	10	15	20	20
	440-480V hp	3	5	5	7½	7½	10	15	20	25	25
	550-600V hp	3	5	7½	10	10	15	20	25	30	30
Rated operational power of	110-120V hp	-	-	-	-	2	3	-	3	5	-
three-phase motors at 60Hz (3ph)	200V hp	-	-	-	-	3	5	-	7½	10	-
for elevators	220-240V hp	-	-	-	-	5	7½	-	7½	10	-
Demands according to ANSI A17.5											
(500.000 operations)	440-480V hp	-	-	-	-	10	15	-	20	25	-
	550-600V hp	-	-	-	-	10	20	-	25	30	-
Rated operationalcurrent	600V A	-	-	-	-	15	22	-	27	37	-
Fuses	A	30	40	50	50	90	125	175	175	225	250
Suitable for use on a capability											
of delivering not more than	rms A	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
(SCCR)	V	600	600	600	600	600	600	600	600	600	600
Auxiliary Contacts (cULus)		A600	A600	A600	A600	-	-	-	-	-	-

Main Contacts (cULus)	Type	J7KN-85	J7KN-110	J7KN-151	J7KN-176	J7KN-200
Rated operational current "General Use"	A	125	125	180	220	-
Rated operational power	110-120V hp	15	-	-	-	-
of three-phase motors	200V hp	-	30	40	50	-
at 60Hz (3ph)	220-240V hp	35	40	50	60	-
	277V hp	-	-	-	-	-
	380-415V hp	-	-	-	-	-
	440-480V hp	65	75	100	125	-
	550-600V hp	85	100	125	150	-
Rated operational power	110-120V hp	8	10	15	25	-
of AC motors	200V hp	-	20	-	-	-
at 60Hz (1ph)	220-240V hp	20	20	25	30	-
	277V hp	-	-	-	-	-
	380-415V hp	-	-	-	-	-
	440-480V hp	-	50	-	-	-
	550-600V hp	-	60	-	-	-
Rated operational power of	110-120V hp	-	-	-	-	-
three-phase motors at 60Hz (3ph)	200V hp	-	-	-	-	-
for elevators	220-240V hp	-	-	-	-	-
Demands according to ANSI A17.5						
(500.000 operations)	440-480V hp	-	-	-	-	-
	550-600V hp	-	-	-	-	-
Rated operationalcurrent	600V A	-	62	-	-	-
Fuses	A	-	300	300	500	-
Suitable for use on a capability						
of delivering not more than	rms A	10000	10000	10000	10000	-
(SCCR)	V	600	600	600	600	-
Auxiliary Contacts (cULus)		A600	A600	-	-	-

Contactors

Data according to IEC 947-4-1, EN 60947-4-1, VDE 0660

Contact Life

For selection of the suitable contactor-type according to supply voltage, power rating and application (utilization category AC1, AC3 or AC4) use contact life characteristic diagram.

For the most common supply voltages four scales of power ratings P_n are provided for each utilization category.

Select contactor-type according to utilization category **AC3** (breaking current $I_a = I_e$) using the **motor rating** scales to the right, according to utilization category **AC4** (breaking current $I_a = 6 \times I_e$) using the **motor rating** scales to the left.[*1]

Select contactor-type according to utilization category **AC1** (breaking current $I_a = I_e$/AC1) using the **breaking current** scale.[*1]

1. Pay attention to the approved rated values of the selected contactor according to the national approvals

For contactors frequently used under AC3/AC4-mixed service conditions calculate contact life with the formula:

$$M = \frac{AC3}{1 + \frac{\%AC4}{100} x \left(\frac{AC3}{AC4} - 1\right)}$$

M = Contact life (switching cycles) for AC3/AC4-mixed operations

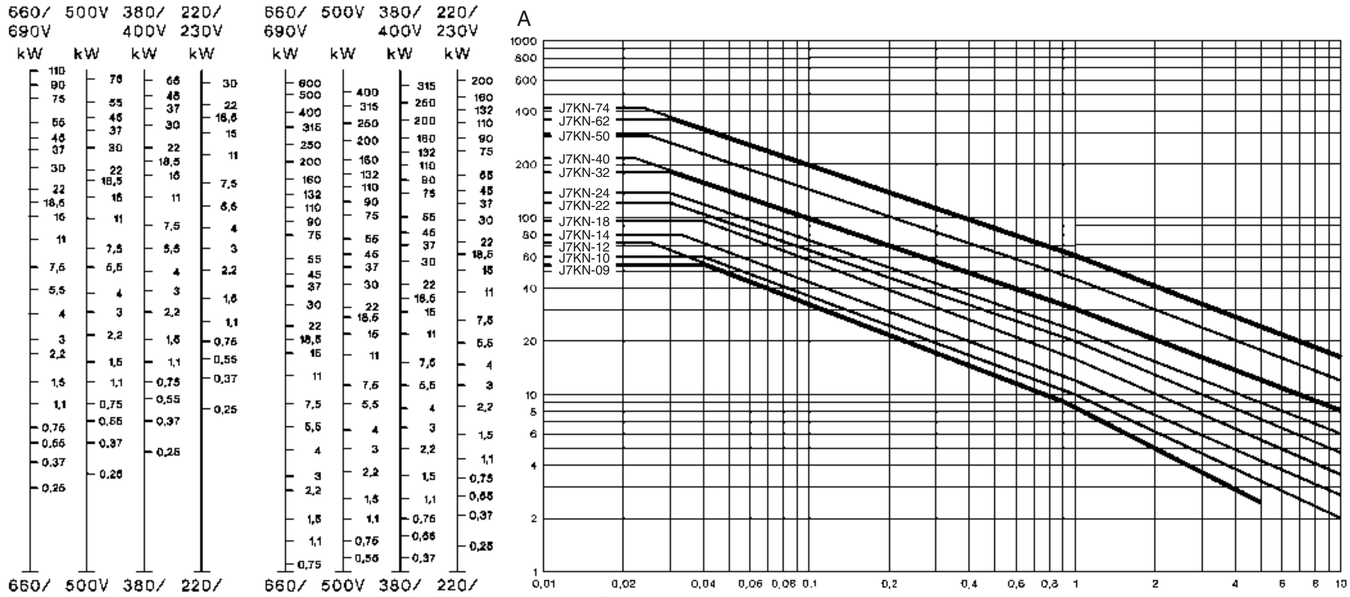
AC3 = Contact life (switching cycles) for AC3 operations (normal switching conditions). Breaking current I_a = rated motor current I_n.

AC4 = Contact life (switching cycles) for AC4 operations (inching).

Breaking current I_a= multiples of rated motor current I_n.

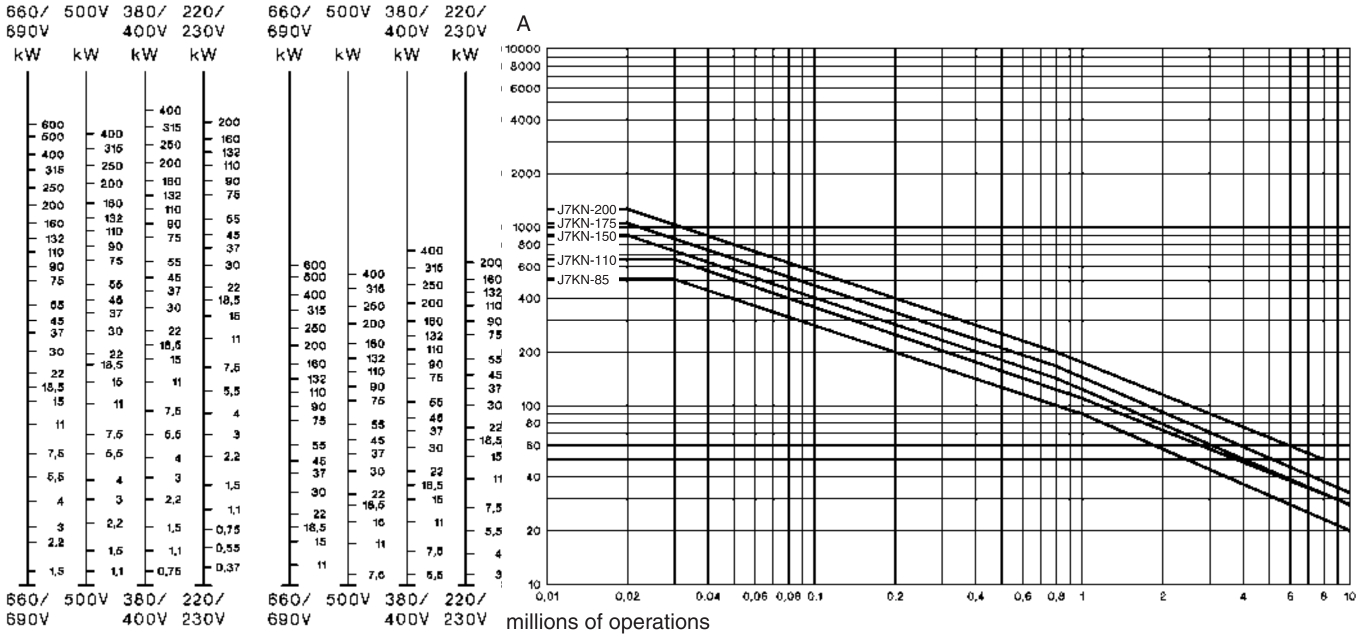
%AC4 = Percents of AC4-operations related to the total cycles.

Motor Rating P_n/AC4 | Motor Rating P_n/AC3 | Breaking Current I_a (=I_e/AC1)



millions of operations

Motor Rating P_n/AC4 | Motor Rating P_n/AC3 | Breaking Current I_a (=I_e/AC1)



millions of operations

Contactors

Utilization Categories

For easier choice of devices and in order to make the comparison of different products simplier are utilization categories for contactors and motor-starters according to IEC 947-4-1 and VDE 0660 Part 102 ,for control circuit devices and switching elements according to IEC 947-5-1 and VDE 0660 Part 200 determind. The table offers different utilization categories, typical applications and assorted test conditions.

Type of current	Category	Typical applications	Rated operational current	Test conditions for the number of on-load operating cycles						Test conditions for making and breaking capacities					
				Make			Break			Make			Break		
				I/Ie	U/Ue	cos	Ic/Ie	Ur/Ue	cos	I/Ie	U/Ue	cos	Ic/Ie	Ur/Ue	cos
Alternating Current	AC1	Non-inductive or slightly inductive loadsresistance furnaces	all values	1	1	0.95	1	1	0.95	1.5	1.05	0.8	1.5	1.05	0.8
	AC2	Slip-ring motors: starting, switching off	all values	2.5	1	0.65	2.5	1	0.65	4	1.05	0.65	4	1.05	0.65
	AC3	Squirrel-cage motors: starting, switching off motors during running	17A< Ie 17A	6	1	0.65	1	0.17	0.65	10	1.05	0.45	8	1.05	0.45
			Ie 100A	6	1	0.35	1	0.17	0.35	10	1.05	0.45	8	1.05	0.45
			Ie> 100A	6	1	0.35	1	0.17	0.35	10	1.05	0.35	8	1.05	0.35
	AC4	Squirrel-cage motors: starting, plugging, inching	17A< Ie 17A	6	1	0.65	6	1	0.65	12	1.05	0.45	10	1.05	0.45
			Ie 100A	6	1	0.35	6	1	0.35	12	1.05	0.45	10	1.05	0.45
			Ie> 100A	6	1	0.35	6	1	0.35	12	1.05	0.35	10	1.05	0.35
	AC5a	Switching of electric discharge lamp controls	all values	-	-	-	-	-	-	3	1.05	0.45	3	1.05	0.45
	AC5b	Switching of incandescent lamps	all values	-	-	-	-	-	-	1.5	1.05	1)	4	1.05	1)
	AC6a	Switching of transformers	Ie 100A	-	-	-	-	-	-	4.5	1.05	0.45	3.6	1.05	0.45
			Ie> 100A	-	-	-	-	-	-	4.5	1.05	0.35	3.6	1.05	0.35
	AC6b	Switching of capacitor banks	-	-	-	-	-	-	-	2)			2)		
	AC7a	Slightly inductive loads in household appliances and similar applications	all values	-	-	-	-	-	-	1.5	1.05	0.8	1.5	1.05	0.8
	AC7b	Motor loadsfor household applications	Ie 100A	-	-	-	-	-	-	8	1.05	0.45	6	1.05	0.45
			Ie> 100A	-	-	-	-	-	-	8	1.05	0.35	6	1.05	0.35
	AC8a	Hermetic refrigerant compressor motor control with manualresetting of overload releases	Ie 100A	-	-	-	-	-	-	6	1.05	0.45	6	1.05	0.45
			Ie> 100A	-	-	-	-	-	-	6	1.05	0.35	6	1.05	0.35
	AC8b	Hermetic refrigerant compressor motor control with automatic resetting of overload releases	Ie 100A	-	-	-	-	-	-	6	1.05	0.45	6	1.05	0.45
			Ie> 100A	-	-	-	-	-	-	6	1.05	0.35	6	1.05	0.35
	AC12	Control of resistive loads and solid state loads with isolation by opto couplers	all values	-	-	-	-	-	-	1	1	0.9	1	1	0.9
	AC13	Control of solid state loads with transformer isolation	all values	-	-	-	-	-	-	10	1.1	0.65	1.1	1.1	0.65
	AC14	Control of small electromagnetic loads (<=72VA)	-	-	-	-	-	-	-	6	1.1	0.7	6	1.1	0.7
	AC15	Control of electromagnetic load (>72VA)	-	10	1	0.7	1	1	0.4	10	1.1	0.3	10	1.1	0.3
				Make		L/R	Break		L/R	Make		L/R	Break		L/R
				I/Ie	U/Ue	[ms]	Ic/Ie	Ur/Ue	[ms]	I/Ie	U/Ue	[ms]	Ic/Ie	Ur/Ue	[ms]
Direct Current	DC1	Non-inductive or slightly inductive loads resistance furnaces	all values	1	1	1	1	1	1	1.5	1.05	1	1.5	1.05	1
	DC3	Shunt-motors: starting, plugging, inching dynamic braking of d.c. motors	all values	2.5	1	2	2.5	1	2	4	1.05	2.5	4	1.05	2.5
	DC5	Series-motors: starting, plugging, inching dynamic braking of d.c. motors	all values	2.5	1	7.5	2.5	1	7.5	4	1.05	15	4	1.05	15
	DC6	Switching of incandescent lamps	all values	-	-	-	-	-	-	1.5	1.05	1)	4	1.05	1)
	DC12	Control of resistive loads and solid state loads with isolation by opto couplers	all values	-	-	-	-	-	-	1	1	1	1	1	1
	DC13	Control of electromagnets	all values	1	1	300	1	1	300	1.1	1.1	300	1.1	1.1	300
	DC14	Control of electromagnetic loads having economy resistors in circuit	all values	-	-	-	-	-	-	10	1.1	15	10	1.1	15

U_e Rated operational voltage, U Voltage before make, U_r Recovery voltage, I_e Rated operational current, I Current make, I_c Current broken

1) Test with incandescent lamps

2) Test conditions according to standard

Accessories

Data according to IEC 947-5-1, EN 60947-5-1, VDE 0660

Auxiliary Contacts		Type	J73KN-B	J73KN-C	J73KN-D	J74KN-B-TP...
Rated insulation voltage U_i[*1]		V~	690	690	690	690
Thermal rated current I_{th} to 690V						
Ambient temperature	40°C	A	10	10	10	10
	60°C	A	6	6		-
Frequency of operations z		1/h	3000	3000	3000	1200
Mechanical life		S x 10^6	10	10	10	1
Power loss per pole at I_e/AC1		W	0,5	0,5	-	-
Utilization category AC15						
Rated operational current I_e	220-240V	A	3	3	3	4
	380-400V	A	2	2	2	3
	440V	A	1,6	1,6	1,5	2
	500V	A	1,2	1,2	1,5	2
	660-690V	A	0,6	0,6	1	2
Utilization category DC13						
Rated operational current I_e	60V	A	2	2	-	2,5
	110V	A	0,4	0,4	1	1,5
	220V	A	0,1	0,1	0,5	0,2
Short circuit protection						
short-circuit current 1kA, contact welding not accepted max. fuse size	gL (gG)	A	20	20	10	10
For contactors with thermal overload relay or auxiliary contacts the device with the smaller admissible control fuse (contactor or thermal overload relay) determines the fuse size.						
Cable cross-sections						
	solid or stranded	mm²	0,75-2,5	0,75-2,5	0,75-2,5	1-2,5
	flexible	mm²	0,75-2,5	0,75-2,5	0,75-2,5	0,75-2,5
	flexible with multicore cable end	mm²	0,5-1,5	0,5-1,5	-	0,75-2,5
Cables per clamp			2	2	2	2

[*1] Suitable for: earthed-neutral systems, overvoltage category I to IV, pollution degree 3 (standard-industry): U_{imp} = 8kV. Data for other conditions on request

Data according to CSA, UL and CUL

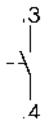
Auxiliary Contacts		Type	J73KN-B	J73KN-C	J73KN-D	J74KN-B-TP...
Rated operational current „General Use“		A	10	10	10	10
Rated operational voltage	max.	V AC	600	600	600	600
Auxiliary Contacts			A600	A600	A600	A600

Contactors and Accessories

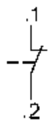
Wiring diagrams

Auxiliary contact blocks

J73KN-B-10

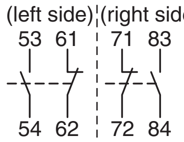


J73KN-B-01

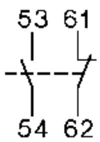


J73KN-C-11S[*1]

(left side) (right side)



J73KN-D-11



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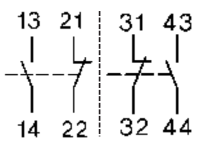
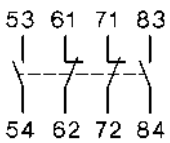


J73KN-D-22

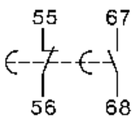


[*1] Correct terminal marking is given by mounting

Pneumatic timer

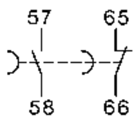
on-delayed

J74KN-B-TP...DA



off-delayed

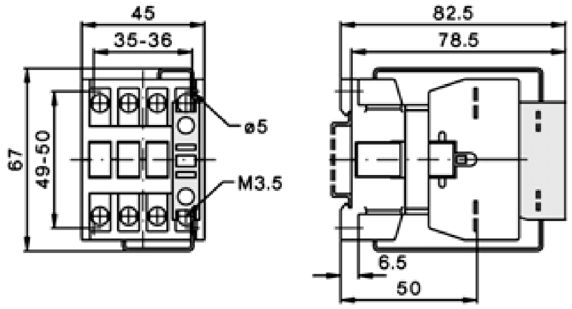
J74KN-B-TP...IA



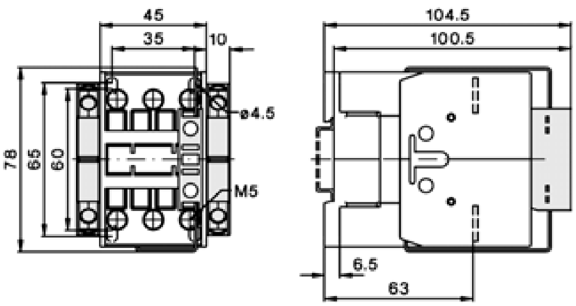
Dimensions

AC operated

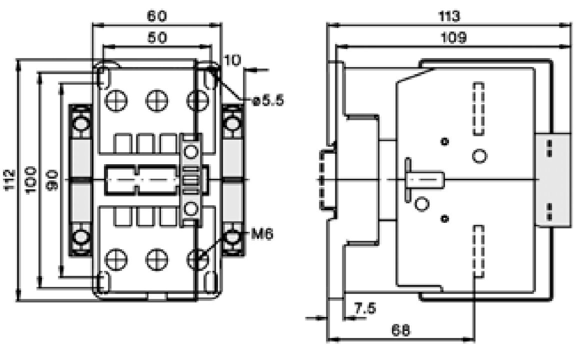
J7KN-10...
J7KN-10-4
J7KN-14...
J7KN-14-4...
J7KN-18...
J7KN-18-4...
J7KN-22...
J7KN-22-4...



J7KN-24...
J7KN-32...
J7KN-40...

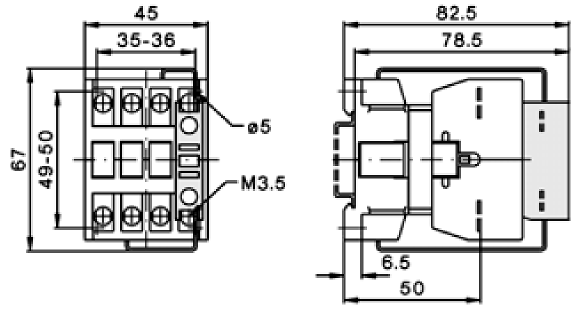


J7KN-50...
J7KN-62...
J7KN-74...

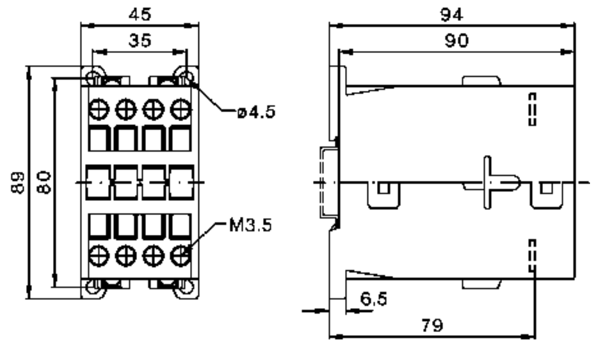


DC operated

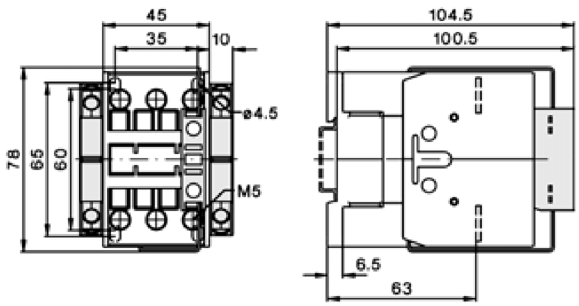
J7KN-10...D
J7KN-14...D
J7KN-18...D
J7KN-22...D



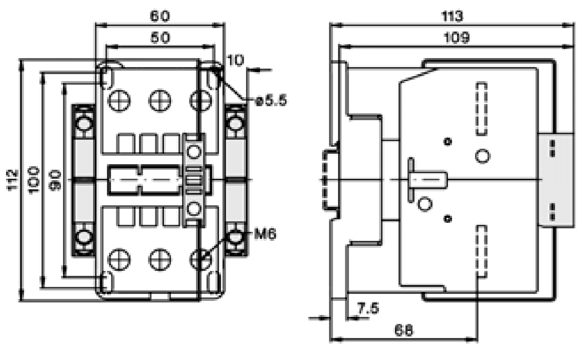
J7KNG-10...
J7KNG-14...
J7KNG-18...
J7KNG-22...



J7KN-24...D
J7KN-32...D
J7KN-40...D

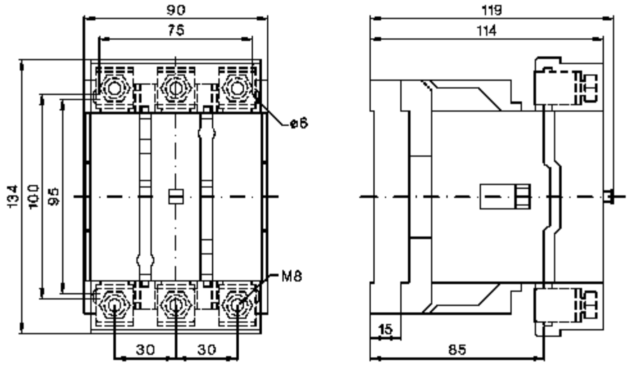


J7KN-50...D
J7KN-62...D
J7KN-74...D

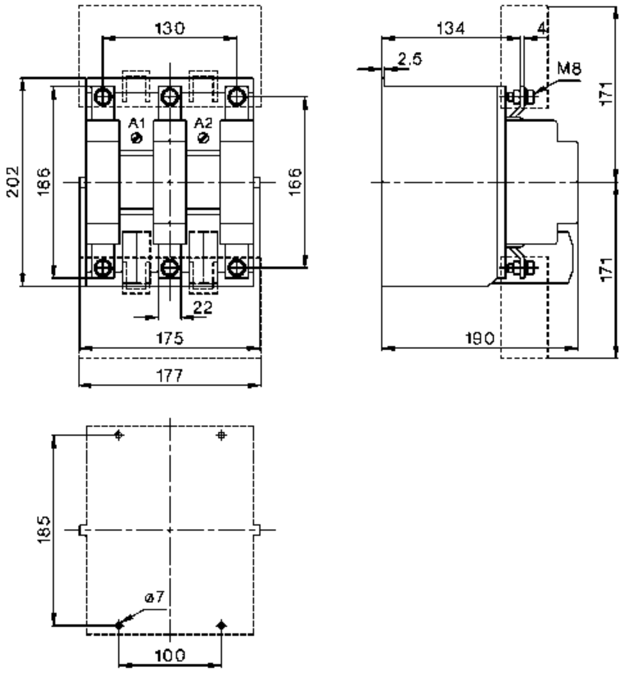


AC and DC operated

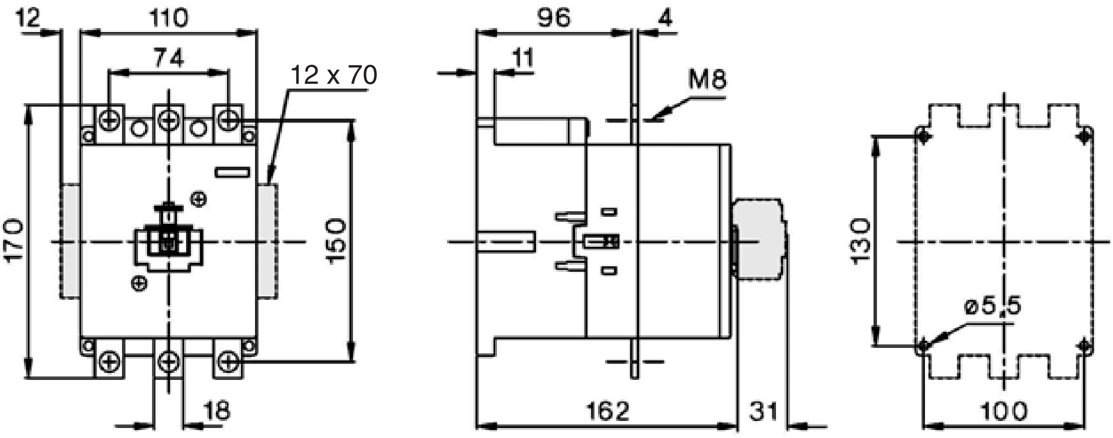
J7KN-85...
J7KN-110...



J7KN-200...

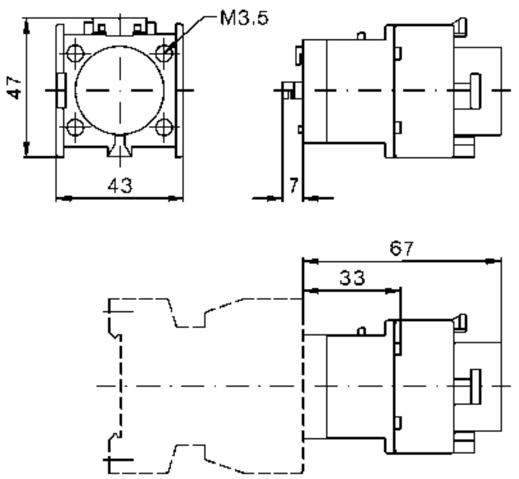


J7KN-151...
J7KN-176...



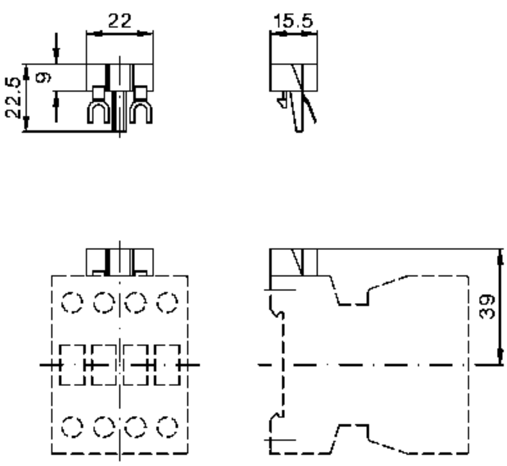
Pneumatic timer

J74KN-B-TP...

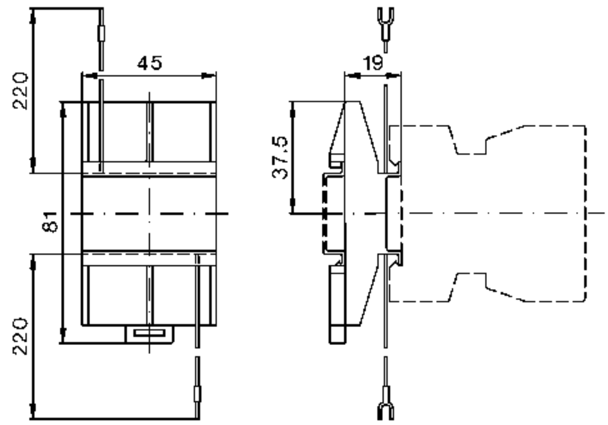


Auxiliary contact blocks

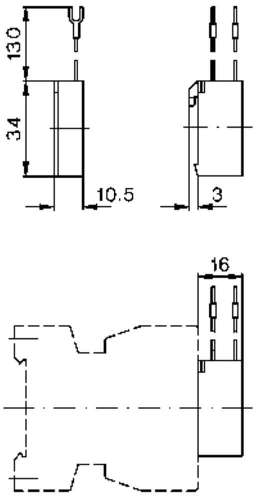
J74KN-A-VG



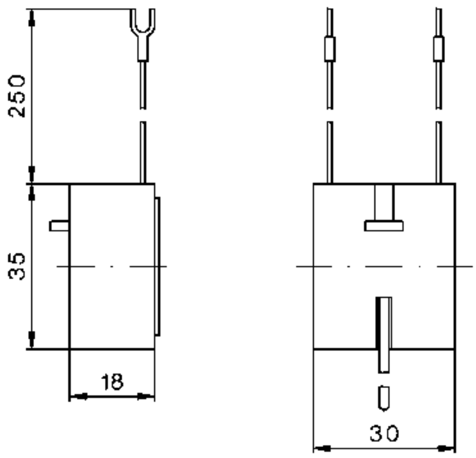
J74KN-A-RC



J74KN-B-VG

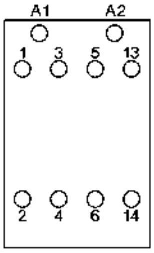
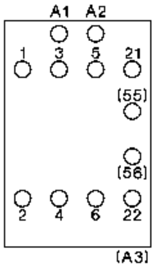
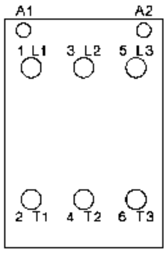
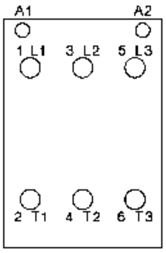
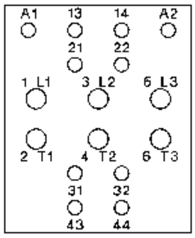


J74KN-B-RC

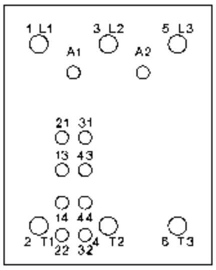


Position of Terminals

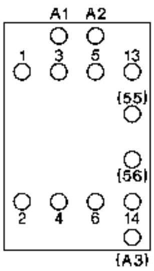
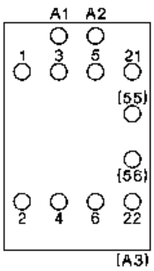
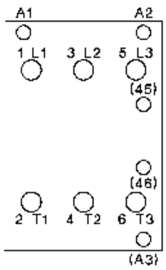
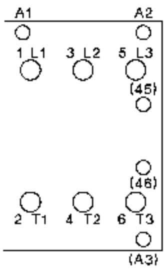
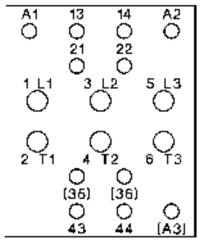
AC operated

J7KN-10-10 to J7KN-22-10	J7KN-10-01 to J7KN-22-01	J7KN-24 J7KN-32 J7KN-40	J7KN-50 J7KN-62 J7KN-74	J7KN-85-22 J7KN-110-22
				

J7KN-200-22

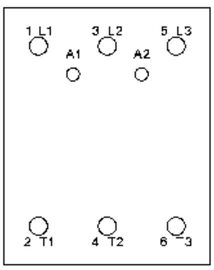


DC operated with double winding coil

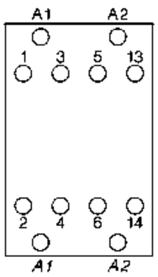
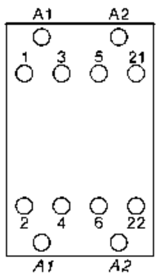
J7KN-10-10...D J7KN-14-10...D J7KN-18-10...D J7KN-22-10...D	J7KN-10-01...D J7KN-14-01...D J7KN-18-01...D J7KN-22-01...D	J7KN-24...D J7KN-32...D J7KN-40...D	J7KN-50...D J7KN-62...D J7KN-74...D	J7KN-85-21...D J7KN-110-21...D
				

AC and DC operated

J7KN-151
J7KN-176



DC operated

J7KNG-10-10 J7KNG-14-10 J7KNG-18-10 J7KNG-22-10	J7KNG-10-01 J7KNG-14-01 J7KNG-18-01 J7KNG-22-01
	

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J06E-EN-01 In the interest of product improvement, specifications are subject to change without notice.

Thermal Overload Relay
J7TKN

Thermal Overload Relay

- Direct and separate mounting
- Single phasing sensivity according to IEC 947-4-1
- Finger proof (BGV A2)

Accessories

- Busbar sets
- Set for single mounting

Approved Standards

Standard	Guide No (US,C)
UL	NKCR, NKCR7
ICE 947-4-1	
VDE 0660	
EN 60947-4-1	

Ordering Information

■ Model Number Legend

1. Thermal Overload Relay

J7TKN-□-□□□
1 2 3

1) Thermal Overload Relay
2) A: for mini motor contactor and motor contactor (4-11 kW)
B: for motor contactor (4-15 kW)
C: for motor contactor (18.5 kW)
D: for motor contactor (22-37 kW)
E: for motor contactor (45-55 kW)
F: for motor contactor (75-110 kW)
3) Setting range

E18:	0.12-0.18 A	18:	13-18 A
E27:	0.18-0.27 A	23:	17-23 A
E4:	0.27-0.4 A	24:	17-24 A
E6:	0.4-0.6 A	30:	23-30 A
E9:	0.6-0.9 A	32:	23-32 A
1E2:	0.8-1.2 A	42:	28-42 A
1E8:	1.2-1.8 A	52:	40-52 A
2E7:	1.8-2.7 A	65:	52-65 A
4:	2.7-4 A	74:	60-74 A
6:	4-6 A	90:	60-90 A
9:	6-9 A	120:	80-120 A
11:	8-11 A	150:	100-150 A
14:	10-14 A	210:	140-220 A

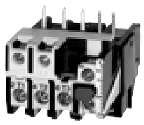
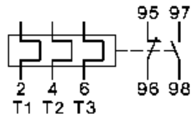
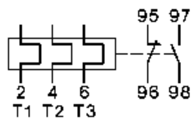
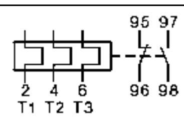
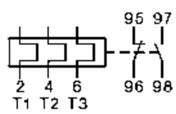
2. Accessories for Thermal Overload Relay

J74TK-□□-□□□
1 2 3

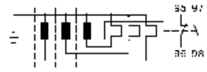
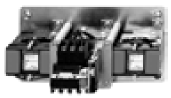
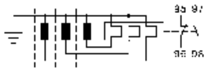
1) Accessories for Thermal Overload Relay
2) SM: Single mounting for J7TKN-B Types (4-32 kW)
SU: Busbar sets
M: Single Mounting for J7TKN-A Types (4-11 kw)
3) 176: for J7TKN-F Types (75-90 kW)
200: for J7TKN-F Types (110 kW)

■ System overview

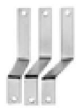
Thermal Overload Relays for plug-in mounting

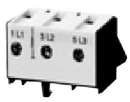
	Setting Range D.O.L. (A)	Star Delta (A)		Type	Pack pcs.	Weight kg/pc.
For contactors J7KNA-09..., J7KNA-12...						
	0.12 - **0.18**	-	 manual reset	**J7TKN-A-E18**	1	0.10
	0.18 - **0.27**	-		**J7TKN-A-E27**	1	0.10
	0.27 - **0.4**	-		**J7TKN-A-E4**	1	0.10
	0.4 - **0.6**	-		**J7TKN-A-E6**	1	0.10
	0.6 - **0.9**	-		**J7TKN-A-E9**	1	0.10
	0.8 - **1.2**	-		**J7TKN-A-1E2**	1	0.10
	1.2 - **1.8**	-		**J7TKN-A-1E8**	1	0.10
	1.8 - **2.7**	-		**J7TKN-A-2E7**	1	0.10
	2.7 - **4**	-		**J7TKN-A-4**	1	0.10
	4 - **6**	7 - 10.5		**J7TKN-A-6**	1	0.10
	6 - **9**	10.5 - 15.5		**J7TKN-A-9**	1	0.10
	8 - **11**	14 - 19		**J7TKN-A-11**	1	0.10
	10 - **14**	18 - 24		**J7TKN-A-14**	1	0.10
	13 - **18**	23 - 31		**J7TKN-A-18**	1	0.10
	17 - **23**	30 - 40		**J7TKN-A-23**	1	0.10
	22 - **30**	38 - 52		**J7TKN-A-30**	1	0.10
For contactors J7KN-10... to J7KN-40...						
	0.12 - **0.18**	-	 manual and auto reset	**J7TKN-B-E18**	1	0.14
	0.18 - **0.27**	-		**J7TKN-B-E27**	1	0.14
	0.27 - **0.4**	-		**J7TKN-B-E4**	1	0.14
	0.4 - **0.6**	-		**J7TKN-B-E6**	1	0.14
	0.6 - **0.9**	-		**J7TKN-B-E9**	1	0.14
	0.8 - **1.2**	-		**J7TKN-B-1E2**	1	0.14
	1.2 - **1.8**	-		**J7TKN-B-1E8**	1	0.14
	1.8 - **2.7**	-		**J7TKN-B-2E7**	1	0.14
	2.7 - **4**	-		**J7TKN-B-4**	1	0.14
	4 - **6**	7 - 10.5		**J7TKN-B-6**	1	0.14
	6 - **9**	10.5 - 15.5		**J7TKN-B-9**	1	0.14
	8 - **11**	14 - 19		**J7TKN-B-11**	1	0.14
	10 - **14**	18 - 24		**J7TKN-B-14**	1	0.14
	13 - **18**	23 - 31		**J7TKN-B-18**	1	0.14
	17 - **24**	30 - 41		**J7TKN-B-24**	1	0.14
	23 - **32**	40 - 55		**J7TKN-B-32**	1	0.14
For contactors J7KN-24... to J7KN-40...						
	28 - **42**	48 - 73	 manual and auto reset	**J7TKN-C-42**	1	0.30
For contactors J7KN-50...-J7KN-74...						
	40 - **52**	70 - 90	 manual and auto reset	**J7TKN-D-52**	1	0.40
	52 - **65**	90 - 112		**J7TKN-D-65**	1	0.40
	60 - **74**	104 - 128		**J7TKN-D-74**	1	0.40

Thermal Overload relays for separate mounting

	Setting Range **D.O.L.** (A)	**Star Delta** (A)		**Type**	Pack pcs.	Weight kg/pc.
For contactors J7KN-85... to J7KN-151...						
	60 - **90**	104 - 156	 manual reset	**J7TKN-E-90**	1	0.90
	80 - **120**	140 - 207		**J7TKN-E-120**	1	0.90
For contactors J7KN-176... to J7KN-200...						
	100 - **150**	175 - 260	 manual reset	**J7TKN-F-150**	1	1.5
	140 - **220**	240 - 380 busbar sets see accessories		**J7TKN-F-210**	1	1.5

Accessories

	for overload relays	for contactors	**Type**	Pack pcs.	Weight kg/pc.
Busbar Sets					
	J7TKN-F-150	J7KN-151, J7KN-176	**J74TK-SU-176**	1	0.6
	J7TKN-F-210	J7KN-200	**J74TK-SU-200**	1	0.7
	busbars must be installed by users				

	for overload relay	Cable Cross-section to clamp (mm²) solid or stranded	flexible	flex. with multicore cable end	**Type**	Pack pcs.	Weight kg/pc.
Sets for single mounting							
	J7TKN-A	0.75 - 6	0.75 - 4	0.5 - 4	**J74TK-M**	1	0.035
	J7TKN-B	0.75 - 6	0.75 - 4	0.5 - 4	**J74TK-SM**	1	0.035

Specifications

■ Engineering data and Characteristics

Thermal Overload Relays, tripping times for selection to motors of protection degree EEx e

Relays With Standard Tripping Characteristic

Setting Range		Tripping time depending on the multiple of the current setting from cold condition (tolerance ±20% of the tripping time)					
		I_A/I_N	I_A/I_N	I_A/I_N	I_A/I_N	I_A/I_N	I_A/I_N
A	**A**	3	4	5	6	7,2	8
J7TKN-A-...		s	s	s	s	s	s
0,12	- **0,18**	18,5	10,4	7,2	5,5	4,3	**3,6**
0,18	- **0,27**	16,7	9,8	6,5	5	4,1	**3,5**
0,27	- **0,4**	19,4	12,1	8,2	5,9	4,9	**4,2**
0,4	- **0,6**	18,7	11,2	8	6	4,9	4,1
0,6	- **0,9**	19,7	11,6	8,1	6,1	4,9	**4,2**
0,8	- **1,2**	22,9	13,6	10	7,3	6	**5,2**
1,2	- **1,8**	22,2	13,2	9,2	7,6	5,8	**5,3**
1,8	- **2,7**	23	13,7	9,3	7,6	5,7	**5,1**
2,7	- **4**	24	14,4	9,9	7,8	5,9	5,1
4	- **6**	24,7	13,8	9,9	7,3	5,6	4,8
6	- **9**	22	13,4	8	5,7	4,1	3,5
8	- **11**	17,4	9,2	5,9	4,1	2,9	2,3
10	- **14**	26,4	12,9	7,6	5,2	3,5	2,8
13	- **18**	14,7	7,7	4,8	3,2	2,3	1,7
17	- **23**	16,2	8,4	5	3,6	2,4	1,8
22	- **30**	16,8	8,5	5	3,6	2,3	1,9
J7TKN-C-42		s	s	s	s	s	s
28	- **42**	25,2	13,3	8	5,5	4	3,1
J7TKN-D-...		s	s	s	s	s	s
40	- **52**	18,3	9,2	5,6	3,9	2,8	2,2
52	- **65**	17,8	8,7	5,2	3,4	2,5	1,9
60	- **74**	19,5	13,5	11	10	9,5	8,5
J7TKN-E-...		s	s	s	s	s	s
60	- **90**	19,5	13,5	11	10	9,5	8,5
80	- **120**	18	11	10	9	8,5	8
J7TKN-F-...		s	s	s	s	s	s
100	- **150**	34	26	24	20,5	19	**18**
140	- **210**	30	24	21	18,5	17	**16**

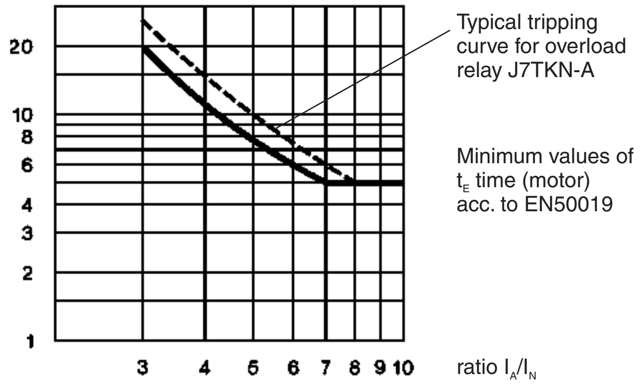
When selecting a standard overload, refer to the tripping curve. Determine the values of the starting current ratio $\mathbf{I_A/I_N}$ and the time $\mathbf{t_E}$ which is marked on the label of the motor. The overload must trip within the $\mathbf{t_E}$ time, which means that the tripping curve from cold condition must be (20% due to tolerance) below the coordination point $\mathbf{I_A/I_N}$ and the time $\mathbf{t_E}$.

$\mathbf{I_A}$= Starting current of motor

$\mathbf{I_N}$ = Rated current of motor

$\mathbf{t_E}$ = t_E-time of motor

All tripping times of overload relays J7TKN-A are shorter than the minimum values of the t_E time for motors of protection degree EEx e acc. to EN 50019 and therefore are suitable for all motors of protection degree EEx e. For these overload relays the selection on basis of tripping curves is thereby not necessary.



Labels of tripping curves for each setting range, sized 148x105mm (self-adhesive) are available on request.

Specify type and setting range.

Fuses for J7TKN-A; J7TKN-B; J7TKN-C; J7TKN-D; J7TKN-E; J7TKN-F

Type	Setting Range DOL	Setting Range Star Delta	Max. Fuse Size According to Coordination-type "2"*1 quick	"2"*1 slow, gL(gG)	"1"*1 slow, gL(gG)	aM	Fuse UL	Fuse UL (SCCR) Short Circuit Current Rating
	A	A	A	A	A	A	A	kA
J7TKN-A	0.12 - **0.18**	-	0.5*2	0.5*2	25	-	15	5
J7TKN-B	0.18 - **0.27**	-	1.0*2	1.0*2	25	-	15	5
	0.27 - **0.4**	-	2	2	25	-	15	5
	0.4 - **0.6**	-	2	2	25	-	15	5
	0.6 - **0.9**	-	4	4	25	-	15	5
	0.8 - **1.2**	-	4	4	25	2	15	5
	1.2 - **1.8**	-	6	6	25	2	15	5
	1.8 - **2.7**	-	10	10	25	4	15	5
	2.7 - **4**	-	16	10	25	4	15	5
	4 - **6**	7 - 10.5	20	16	25	6	15	5
	6 - **9**	10.5 - 15.5	35	25	35	10	25	5
	8 - **11**	14 - 19	35	25	35	16	30	5
	10 - **14**	18 - 24	50	35	63	16	40	5
	13 - **18**	23 - 31	50	35	63	20	50	5
	17 - **24**	30 - 41	63	50	63	25	60	5
	23 - **32**	40 - 55	80	63	80	35	70	5
J7TKN-C	28 - **42**	48 - 73	100	80	150	50	110	5
J7TKN-D	40 - **52**	70 - 90	160	100	150	63	200	5
	52 - **65**	90 - 112	160	125	150	80	250	10
	60 - **74**	104 - 128	160	125	150	80	250	10
J7TKN-E	60 - **90**	104 - 156	For short circuit protecting overload relays with current transformer use fuse according to the 7contactor of the combination.				300	10
	80 - **120**	140 - 207					-	-
J7TKN-F	all ranges						-	-

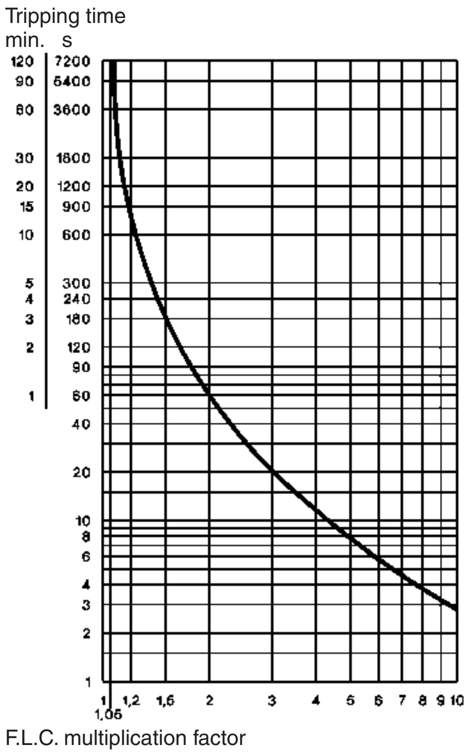
*1) Coordination-type according to IEC 947-4-1:
„2“: Light contact welding accepted. Thermal overload relay must not be damaged.
„1“: Welding of contactor and damage of the thermal overload relay allowed.

*2) Miniature fuse

Tripping Characteristics for J7TKN-A, J7TKN-B, J7TKN-C, J7TKN-D

Detailed tripping times for each range see table page I-58

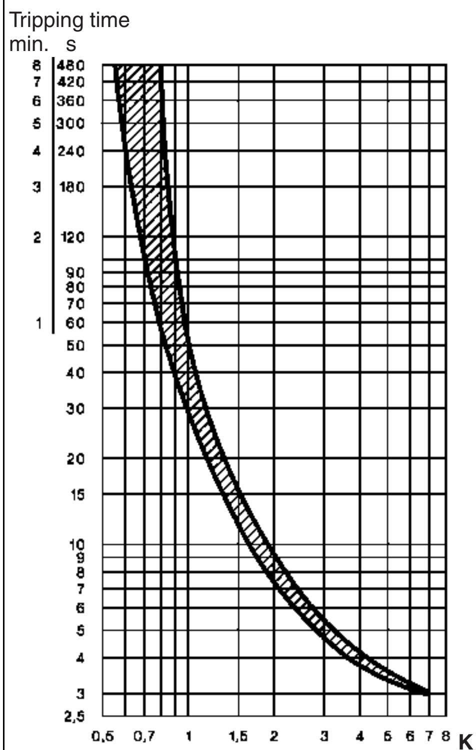
with three-phase load



Average value of typical tolerance curves from cold condition

Proceeding from service conditions the times decrease to 20-30% of the characteristic values

with two-pole load



Typical tolerance curve from cold condition

Proceeding from service conditions the times decrease to 70-80% of the characteristic values

K = I_{max}/I_e

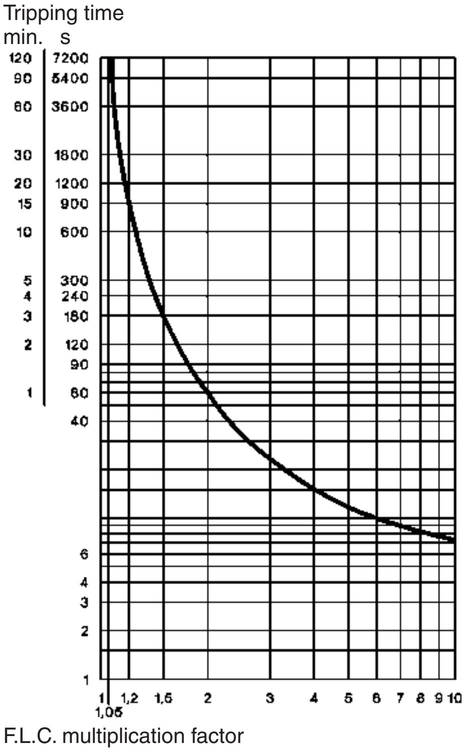
I_{max} = max. phase current
I_e = max. scale value

Low voltage switch gear

Tripping Characteristics for J7TKN-E

Detailed tripping times for each range see table page I-58

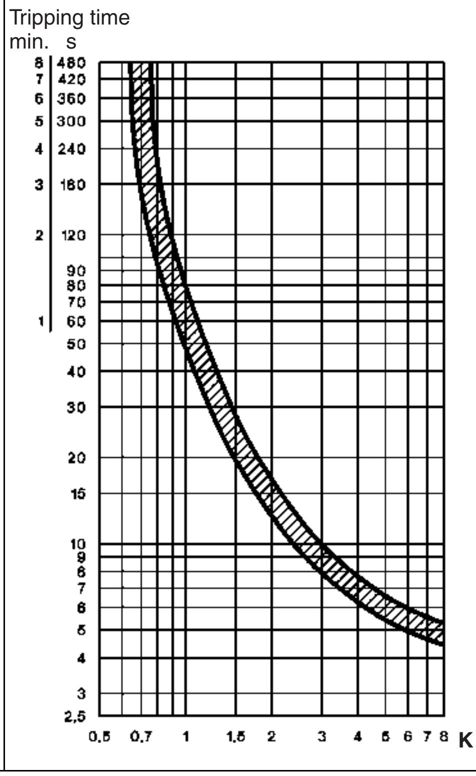
with three-phase load



Average value of typical tolerance curves from cold condition

Proceeding from service conditions the times decrease to 20-30% of the characteristic values

with two-pole load



Typical tolerance curve from cold condition

Proceeding from service conditions the times decrease to 70-80% of the characteristic values

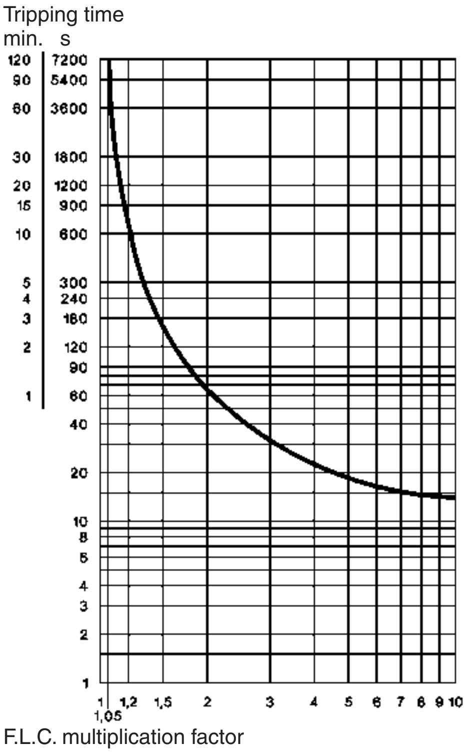
K $= I_{max}/I_e$

I_{max} = max. phase current
I_e = max. scale value

Tripping Characteristics for J7TKN-F

Detailed tripping times for each range see table page I-58

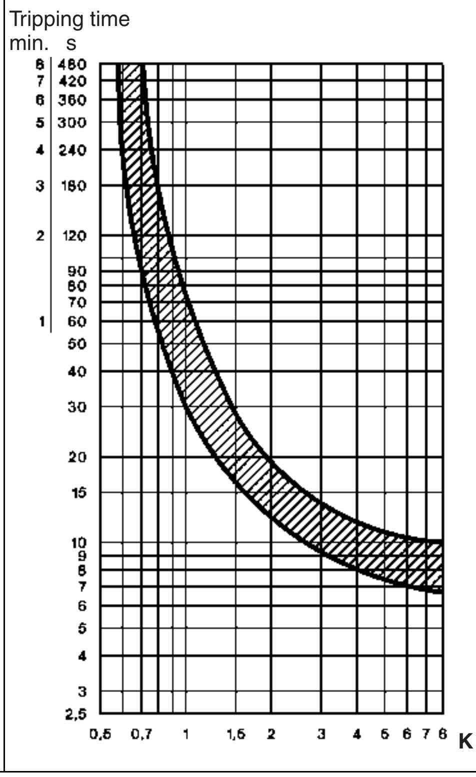
with three-phase load



Average value of typical tolerance curves from cold condition

Proceeding from service conditions the times decrease to 20-30% of the characteristic values

with two-pole load



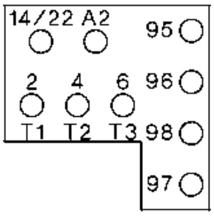
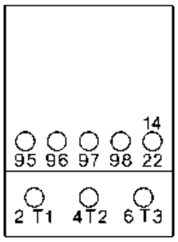
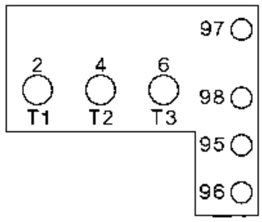
Typical tolerance curve from cold condition

Proceeding from service conditions the times decrease to 70-80% of the characteristic values

K $= I_{max}/I_e$

I_{max} = max. phase current
I_e = max. scale value

Position of Terminals

J7TKN-A	J7TKN-B	J7TKN-C; J7TKN-D
		

Thermal Overload Relays

Data according to IEC 947-4-1, IEC 947-5-1, VDE 0660, EN 60947-4-1, EN 60947-5-1

Type			J7TKN-A	J7TKN-B	J7TKN-C	J7TKN-D	J7TKN-E	J7TKN-F
Rated insulation voltage U_i[*1]		V~	690	690	690	690	750	690
Permissible ambient temperature								
operation	open	°C	-25 to +60					
storage		°C	-50 to +70					
Trip class according to IEC 947-4-1			10A	10A	10A	10A	20	20
Cable cross-section								
main connector	solid or stranded	mm²	0.75-6 + 0.75-2.5[*2]	0.75-6	0,75-10	4-35[*2]	[*3]	[*4]
	flexible	mm²	0.75-4 + 0.5-2.5[*2]	1-4	0,75-6	6-25[*2]		
	flexible with multicore cable end	mm²	0.5-2.5 + 0.5-1.5	0.75-4	0.75-6	4-25		
Cables per clamp	number		1+1	2	2	1		
auxiliary connector	solid	mm²	0.75-2.5[*2]					
	flexible	mm²	0.5-2.5[*2]					
	flexible with multicore cable end	mm²	0.5-1.5					
Cables per clamp	number		2					
Auxiliary contacts								
Rated insulation voltage U_i[*1]								
same potential		V~	690	690	690	690	690	690
different potential		V~	440	440	250	250	440	440
Utilization category AC15								
Rated operational current I_e	24V	A	5	3	4[*5]	4[*5]	5	5
	230V	A	3	2	2.5	2.5	3	3
	400V	A	2	1	1.5	1.5	2	2
	690V	A	0.6	0.5	0.6	0.6	0.6	0.6
Utilization category DC13								
Rated operational current I_e	24V	A	1.2	1	1.2	1.2	1.2	1.2
	110V	A	0.15	0.15	0.15	0.15	0.15	0.15
	220V	A	0.1	0.1	0.1	0.1	0.1	0.1
Short circuit protection (without welding 1kA)								
highest fuse rating	gL (gG)	A	6	4	6	6	6	6
Setting range		A	to 23	all	28-42	52-65	all	-
Power loss per current path (max.)								
minimum setting value		W	1.1	1.1	1.3	2.9	1.1	-
maximum setting value		W	2.3	2.3	3.3	4.5	2.5	-

*1) Suitable for: earthed-neutral systems, overvoltage category I to III, pollution degree 3 (standard-industry: U_{imp} = 4kV (at 440V), 6kV (at 690V). Data for other conditions on request.
*2) Maximum cable cross-section with prepared conductor
*3) Without terminals, suitable for bushing one connector 70 mm² (stranded) per phase
*4) Busbar sets see accessories page I-57
*5) Switching capacity of the start contact: AC15 300VA, max. 1.5A, DC13 (max. 220V) 30W, max. 1.5A

Low voltage switch gear

Data according to cULus

Type		J7TKN-A	J7TKN-B	J7TKN-C	J7TKN-D	J7TKN-E
Rated insulation voltage	V~	600	600	600	600	600
Rated current	A	23	32	42	74	85
Auxiliary contacts						
Rated voltage						
same potential	V AC	600	600	600	600	600
different potential	V~	150	150	150	150	150
Switching capacity AC	VA	500	500	600	600	600
of aux. contacts	A	4	2	4	4	4

Temperature Compensation

In case of higher ambient temperature use the following formula:
(Ambient temperature - 20) x 0.125 = correction factor in % of the full load motor current

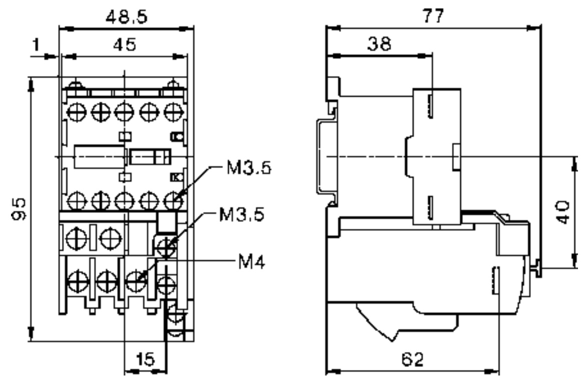
Example:
Ambient temperature 70°C, full load motor current 7A

(70 - 20) x 0.125 = 6.25%

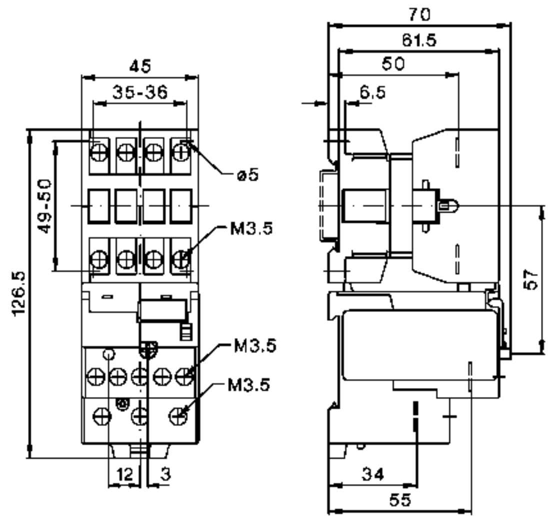
Setting value: 7A + 6,25% = 7.44A

■ Dimensions

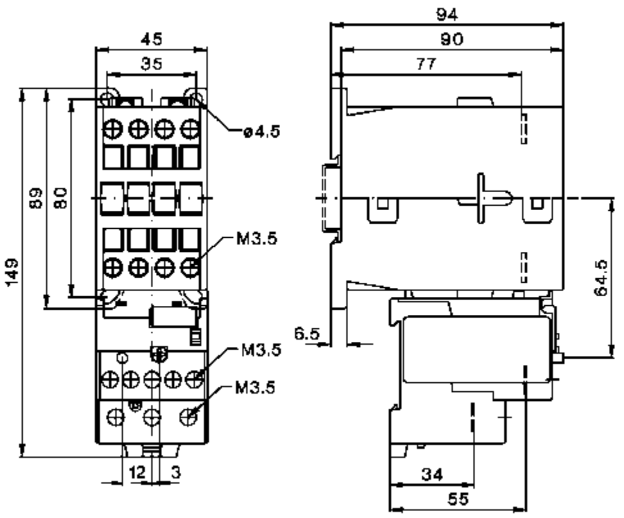
J7KNA-09 + J7TKN-A
J7KNA-12



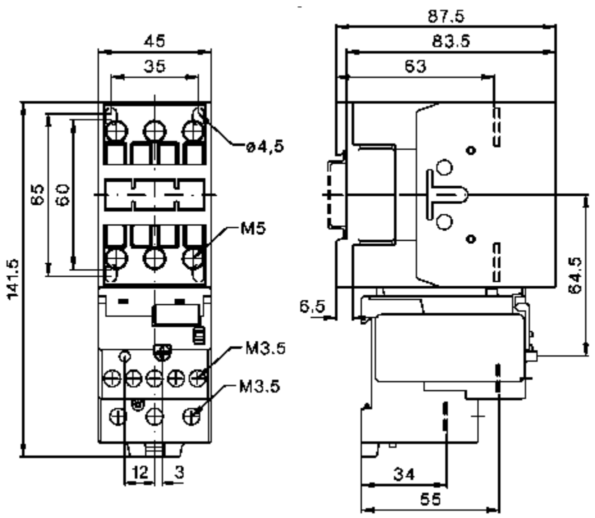
J7KN-10 + J7TKN-B
J7KN-14
J7KN-18
J7KN-22



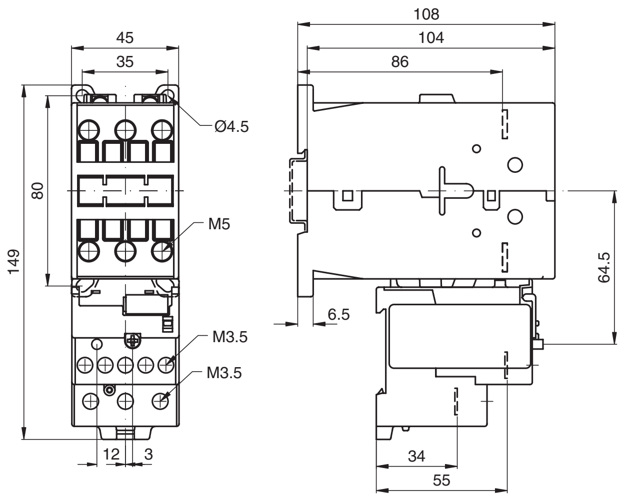
J7KNG-10 D+ J7TKN-B
J7KNG-14 D
J7KNG-18 D
J7KNG-22 D



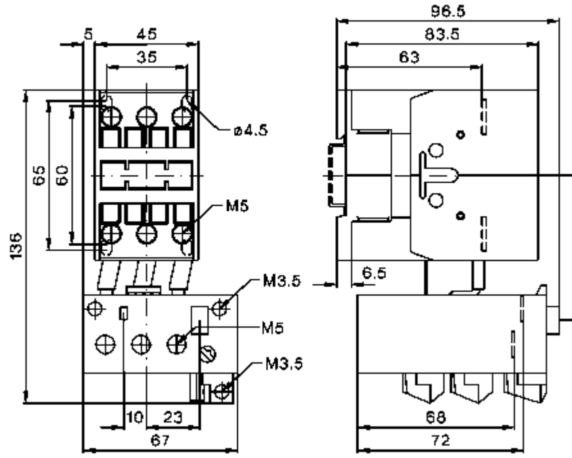
J7KN-24 + J7TKN-B
J7KN-32
J7KN-40



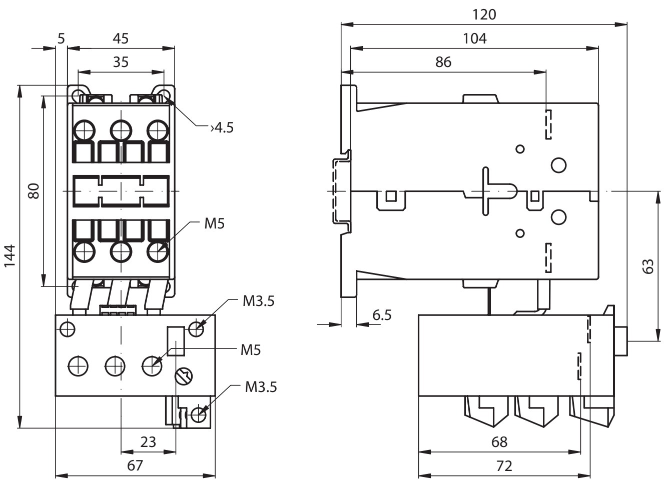
J7KNG-24 + J7TKN-B
J7KNG-32



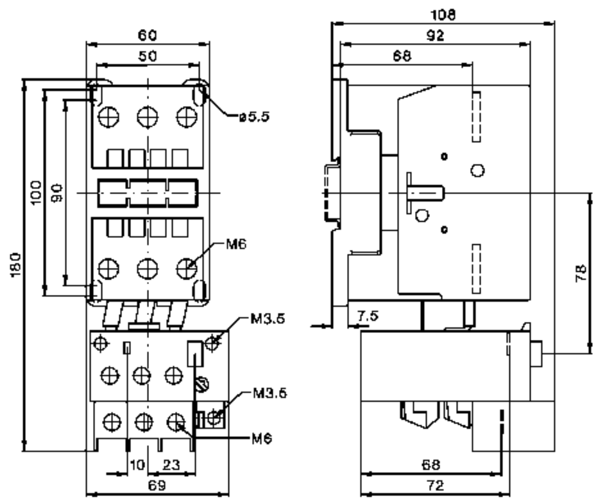
J7KN-24 + J7TKN-C
J7KN-32
J7KN-40



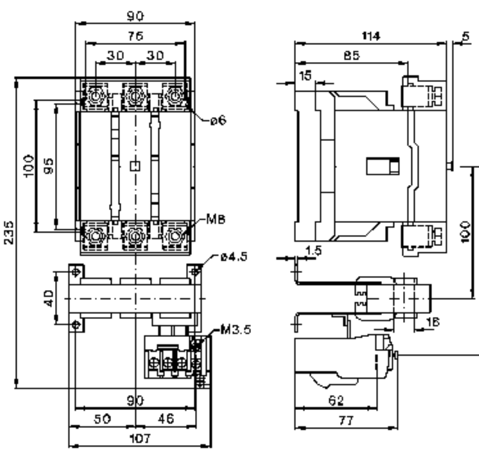
J7KNG-40 + J7TKN-C



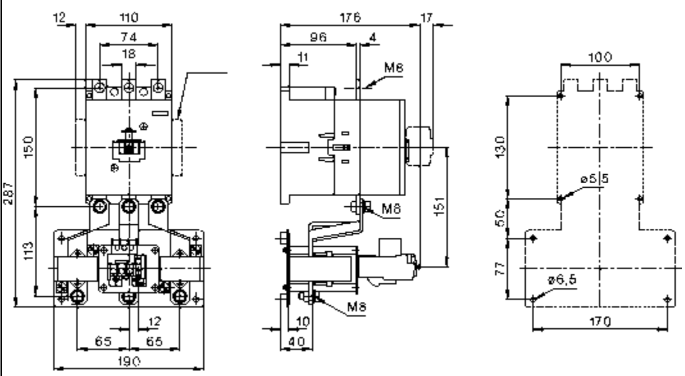
J7KN-50 + J7TKN-D
J7KN-62
J7KN-74



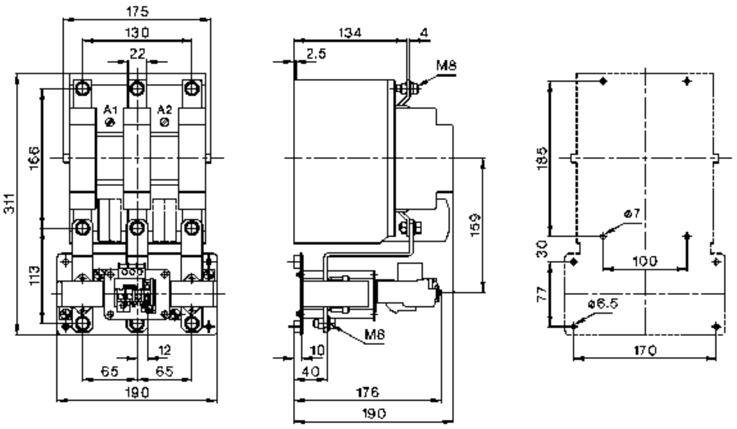
J7KN-85 + J7TKN-E
J7KN-110



J7KN-151 + J7TKN-F
J7KN-176



J7KN-200 + J7TKN-210



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J07E-EN-01

Motor Protection Circuit Breaker (MPCB)
J7MN

MPCB system (motor protection CLASS 10)

- Rotary and switch types
- Rated operational current = 12 A, 25 A, 50 A and 100 A
- Switching capacity up to 12.5 A = 100 kA/400 V
- Fixed short-circuit release = 13 x I_u
- Overload release adjustable 0.7 - 1 x I_u
- Single phasing sensivity

Auxiliary contact modules

- ON/OFF indication for MPCB front mounting and side mounting
- Trip indication for MPCB side mounting

Accessories

- Undervoltage release
- Shunt release
- Three phase busbar system up to 5 MPCB
- Moulded plastic enclosures (IP55) rotary mechanism (black/ grey and red/yellow)
- Moulded plastic front plates (IP55)
- Door coupling rotary mechanisms (black and red/yellow)

Insulated Link modules between Motor Contactor and MPCB for Fuseless Load Feeders

- Available as separate components
- For both 12 A or 25 A MPCB versions as one Type
- For mini motor contactors up to 5.5 kW
- For motor contactors up to 45 kW
- Up to 11 kW combined electrical and mechanical connection
- From 11 kW to 45 kW electrical connection only
- According to coordination 1

Approved Standards

Standard	Guide No (US,C)
UL	Permissible ratings of devices approved for North America see Appendix on CD-ROM
ICE 947-5-1	
VDE 0660	
EN 60947-5-1	

Ordering Information

■ Model Number Legend

1. Motor Protection Circuit Breaker (MPCB)

J7MN-□□-□□□
1 2 3

1) Motor Protection Circuit Breaker (MPCB)
2) Type
   12: Switch type (0.16 - 12 A)
   25: Rotary type (0.16 - 25 A)
   50: Rotary type (25 - 40 A)
   100: Rotary type (63 - 100 A)
3) Setting range (examples)
   E16: 0.11 - 0.16 A
   E2: 0.14 - 0.2 A
   16: 10 - 16 A
   ...

2. Aux. Contacts for MPCB

J73MN-□□□
1 2 3

1) Aux. Contact for MPCB
2) 11: 1 NO 1 NC
3) S: side mounting
   F: front mounting

J73MN-□-□□ □
1 2 3 4

1) Aux. Contact for MPCB
2) T: Trip indicating contact
3) 11: 1 NO 1 NC
4) S: side mounting

3. Accessories for MPCB

J74MN-□-□□
1 2 3

1) Accessories for MPCB
2) S: Shunt release
   U: Under voltage release
3) N1: 230 V 50 Hz / 240 V 60 Hz
   N2: 210 - 240 V 50/60 Hz
   N3: 110 V 50 Hz / 120 V 60 Hz
   N4: 400 V 50/60 Hz

J74MN-□□ □□ □ □□
1 2 3 4 5

1) Accessories for MPCB
2) PF: Enclosure IP55
   P: Module plastic front plate
   PH: Holder for front plate
3) 12: Switch type 105 mm
   25: Rotary type 105 mm
4) S: small version 85 mm
5 RY: red/yellow handle

J74MN-□□-□□
1 2 3

1) Accessories for MPCB
2) DC: Door coupling rotary mechanism
3) B: black / grey
   RY: red / yellow

J74MN-□□ □□□
1 2 3

1) Accessories for MPCB
2) TB: Terminal block for UL/cUL type E
3) 25: for rotary type up to 25A
   100: for rotary type up to 100A

4. Busbars

J75-CPM-□-□□-□□
1 2 3 4 5

1) Additional reference for LVSG
2) Busbar systems
3) Number of units (2, 3, 4 or 5)
4) Modular spacing
   45 = without side mounting auxiliary contacts
   54 = with side mounting auxiliary contacts
5) Nominal current per phase
   6 = 64 A
   12 = 120 A

5. Line Side Terminals

J75-BTC-□□-□□
1 2 3 4

1) Additional reference for LVSG
2) Line side terminals
3) Nominal current per phase
   25 = 64 A
   50 = 120 A
4) Standards
   IC = conformity to IEC 947-1 and UL 508
   EC = conformity to UL 508E together with busbars
   E = conformity to UL 508E without busbars

6. Shrouds

J75-TA-□□
1 2 3

1) Additional reference for LVSG
2) Shrouds
3) Size
   63 = 64 A system
   120 = 120 A system

7. Accessories for MPCB (For Fuse-less Load Feeders)

a) Link modules for electrical and mechanical connection

J74MN-□□□ 12-25
1 2

1) Additional reference for LVSG
2) VK1: electromechanical connector for mini contactor (4-5.5kW)
   VK3: electromechanical connector for motor contactor (4-11kW)

b) Link modules for electrical connection

J74MN-□□-□□□
1 2 3

1) Additional reference for LVSG
2) VD: link module J7MN + J7KN
3) 50: J7MN-50 + J7KN24-...40
   100: J7MN-100 + J7KN50-...74

c) DIN-rail adapters

J74MN-HU-□□
1 2 3

1) Additional reference for LVSG
2) HU: DIN-rail adapter
3) : for J7MN-12-25
   50: for J7MN-50
   100: for J7MN-100

■ System overview

Motor Protection Circuit Breaker (MPCB)

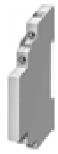
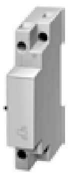
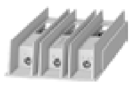
	Rated current	Suitable for motors[*1]	Current setting range		Short-circuit breaking capacity	**Type**	Pack	Weight approx.
	In A	3~400V kW	Thermal overload release A	Instantaneous short-circuit release A	at 3~400V kA		pcs.	kg/pcs.
Circuit-Breakers J7MN-12								
	0.16	-	0.11 – 0.16	2.1	100	**J7MN-12-E16**	1	0.21
	0.2	-	0.14 – 0.2	2.6	100	**J7MN-12-E2**	1	0.21
	0.25	0.06	0.18 – 0.25	3.3	100	**J7MN-12-E25**	1	0.21
	0.32	0.09	0.22 – 0.32	4.2	100	**J7MN-12-E32**	1	0.21
	0.4	-	0.28 – 0.4	5.2	100	**J7MN-12-E4**	1	0.21
	0.5	0.12	0.35 – 0.5	6.5	100	**J7MN-12-E5**	1	0.21
	0.63	0.18	0.45 – 0.63	8.2	100	**J7MN-12-E63**	1	0.21
	0.8	-	0.55 – 0.8	10	100	**J7MN-12-E8**	1	0.21
	1	0.25	0.7 – 1	13	100	**J7MN-12-1**	1	0.21
	1.25	0.37	0.9 – 1.25	16	100	**J7MN-12-1E25**	1	0.21
	1.6	0.55	1.1 – 1.6	21	100	**J7MN-12-1E6**	1	0.21
	2	0.75	1.4 – 2	26	100	**J7MN-12-2**	1	0.21
	2.5	-	1.8 – 2.5	33	100	**J7MN-12-2E5**	1	0.21
	3.2	1.1	2.2 – 3.2	42	100	**J7MN-12-3E2**	1	0.21
	4	1.5	2.8 – 4	52	100	**J7MN-12-4**	1	0.21
	5	-	3.5 – 5	65	100	**J7MN-12-5**	1	0.21
	6.3	2.2	4.5 – 6.3	82	100	**J7MN-12-6E3**	1	0.21
	8	3	5.5 – 8	104	50	**J7MN-12-8**	1	0.21
	10	4	7 – 10	130	50	**J7MN-12-10**	1	0.21
	12	5.5	9 – 12	156	50	**J7MN-12-12**	1	0.21

*1) Recommended values for standard motors
*2) max. motor current 95A

	Rated current In A	Suitable for motors[*1] 3~400V kW	Current setting range: Thermal overload release A	Current setting range: Instantaneous short-circuit release A	Short-circuit breaking capacity at 3~400V kA	**Type**	Pack pcs.	Weight approx. kg/pcs.
Circuit-Breakers J7MN-25								
	0.16	-	0.11 – 0.16	2.1	100	**J7MN-25-E16**	1	0.32
	0.2	-	0.14 – 0.2	2.6	100	**J7MN-25-E2**	1	0.32
	0.25	0.06	0.18 – 0.25	3.3	100	**J7MN-25-E25**	1	0.32
	0.32	0.09	0.22 – 0.32	4.2	100	**J7MN-25-E32**	1	0.32
	0.4	-	0.28 – 0.4	5.2	100	**J7MN-25-E4**	1	0.32
	0.5	0.12	0.35 – 0.5	6.5	100	**J7MN-25-E5**	1	0.32
	0.63	0.18	0.45 – 0.63	8.2	100	**J7MN-25-E63**	1	0.32
	0.8	-	0.55 – 0.8	10	100	**J7MN-25-E8**	1	0.32
	1	0.25	0.7 – 1	13	100	**J7MN-25-1**	1	0.32
	1.25	0.37	0.9 – 1.25	16	100	**J7MN-25-1E25**	1	0.32
	1.6	0.55	1.1 – 1.6	21	100	**J7MN-25-1E6**	1	0.32
	2	0.75	1.4 – 2	26	100	**J7MN-25-2**	1	0.32
	2.5	-	1.8 – 2.5	33	100	**J7MN-25-2E5**	1	0.32
	3.2	1.1	2.2 – 3.2	42	100	**J7MN-25-3E2**	1	0.32
	4	1.5	2.8 – 4	52	100	**J7MN-25-4**	1	0.32
	5	-	3.5 – 5	65	100	**J7MN-25-5**	1	0.32
	6.3	2.2	4.5 – 6.3	82	100	**J7MN-25-6E3**	1	0.32
	8	3	5.5 – 8	104	100	**J7MN-25-8**	1	0.32
	10	4	7 – 10	130	100	**J7MN-25-10**	1	0.32
	12.5	5.5	9 – 12.5	163	100	**J7MN-25-12E5**	1	0.32
	16	7.5	11 – 16	208	50	**J7MN-25-16**	1	0.32
	20	-	14 – 20	260	50	**J7MN-25-20**	1	0.32
	22	-	17 – 22	286	50	**J7MN-25-22**	1	0.32
	25	11	20 – 25	325	50	**J7MN-25-25**	1	0.32
Circuit-Breakers J7MN-50								
	25	11	18 – 25	325	50	**J7MN-50-25**	1	0.96
	32	15	22 – 32	416	50	**J7MN-50-32**	1	0.96
	40	18.5	28 – 40	520	50	**J7MN-50-40**	1	0.96
	45	–	36 – 45	585	50	**J7MN-50-45**	1	0.96
	50	22	40 – 50	650	50	**J7MN-50-50**	1	0.96
Circuit-Breakers J7MN-100								
	63	30	45 – 63	819	50	**J7MN-100-63**	1	2.1
	75	37	57 – 75	975	50	**J7MN-100-75**	1	2.1
	90	–	70 – 90	1170	50	**J7MN-100-90**	1	2.1
	100	45	80 – 100[*2]	1235	50	**J7MN-100-100**	1	2.1

*1) Recommended values for standard motors
*2) max. motor current 95A

Accessories

	Description	Version	for circuit breaker	**Type**	Pack pcs.	Weight approx. kg/pcs.
Transverse auxiliary contact block						
	Contact block	1NO + 1NC	all	**J73MN-11F**	10	0.02
Auxiliary contact block for left hand side mounting (max 1pc. per circuit breaker)						
	Contact block	1NO + 1NC 9 mm	all	**J73MN-11S**	10	0.03
Signalling switch for left hand side mounting (max 1pc. per circuit breaker)						
	Signalling switch	1NO + 1NC each Individual tripped and short-circuit signalling	J7MN-25 J7MN-50	**J73MN-T-11S**	1	0.07
Auxiliary releases for right hand side mounting (max 1pc. per circuit breaker)						
	**Undervoltage release** Trips the circuit-breaker when the voltage is interrupted. Prevents the motor from being restarted accidentally when the voltage is restored, suitable for EMERGENCY STOP acc. to VDE 0113	AC 50 Hz / AC 60 Hz 110 V / 120 V 230 V / 240 V 400 V / 400 V	 all all all	 **J74MN-U-N3** **J74MN-U-N1** **J74MN-U-N4**	 1 1 1	 0.12 0.12 0.12
	**Shunt release** Trips the circuit-breaker when the release coil energized.	50/60 Hz / 50/60 Hz, DC 100% ON / 5 sec ON 210-240 V / 190-330 V	all	**J74MN-S-N2**	1	0.11
Terminal block						
	with increased creepage distances and clearances acc. to cULus Type „E“					
	Terminal block	up to 600 V acc. to UL 489 not for transverse aux. contact block	J7MN-25 J7MN-100	**J74MN-TB25** **J74MN-TB100**	1 1	0.12 0.15

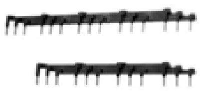
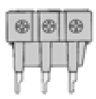
Enclosures and Front Plates

	Description	Version	for circuit breaker	**Type**	Pack pcs.	Weight approx. kg/pcs.
Front Plates						
	**Moulded plastic front plate** with actuator diaphragm and holder for circuit breaker	for actuation of circuit-breakers in any enclosure protection degree IP55	J7MN-12	**J74MN-P12**	1	0.08
	**Moulded plastic front plate** with rotary operating mechanism lockable	for actuation of circuit-breakers in any enclosure protection degree IP55	J7MN-25 J7MN-50	**J74MN-P25**	1	0.08
	Holder for front plate J74MN-P25	Holder is mounted on front plate, circuit-breaker (with accessories) is snapped on	J7MN-25	**J74MN-PH**	1	0.12
Enclosures						
	**Moulded plastic enclose** with actuator diaphragm knockouts for J7MN-12 sealable	protection degree IP55 with N- and PE- terminal 72 mm (+ aux. contact + release) 54 mm (+ lateral contact block)	J7MN-12	**J74MN-PF12** **J74MN-PF12S**	1 1	0.27 0.23

	Description	Version	for circuit breaker	Type	Pack pcs.	Weight approx. kg/pcs.
	**Moulded plastic enclose** with rotary operating mechanism knockouts for J7MN-25 lockable	protection degree IP55 with N- and PE- terminal 72 mm (+ aux. contact + release)	J7MN-25	**J74MN-PF25** **J74MN-PF25RY**[*1]	1	0.30
		54 mm (+ lateral contact block)		**J74MN-PF25S** **J74MN-PF25SRY**[*1]	1	0.26
Door-coupling mechanisms						
	The door-coupling rotary operating mechanisms consist of a knob, a coupling driver and a extension shaft (5 mm x 5 mm). The door-coupling rotary operating mechanisms are designed for degree of protection IP 65. The door locking device prevents accidental opening of the cubicle door in the ON position of the circuit-breaker. The OFF position can be locked with up to 3 padlocks.					
	Door-coupling rotary mechanism black	extension shaft 330 mm with supporting bracket	J7MN-25 to J7MN-50	**J74MN-DC-B**	1	0.3
	Emergency-Stop Door-coupling rotary	extension shaft 330 mm with supporting bracket	J7MN-25 to J7MN-50	**J74MN-DC-RY**[*1]	1	0.3

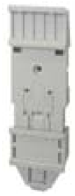
[*1] RY = mechanism red/yellow

Insulated 3-Phase Busbar System

	Description	**Version**	**For Units (contactors or MPCB)**	**Type**	**Pack pcs**
	3-phase busbars modular spacing = 45 mm In = 64 A[*1]	for 2 units	J7KN 10-...40 J7MN 12 J7MN 25	**J75-CPM-2-45-6**	1
		for 3 units		**J75-CPM-3-45-6**	1
		for 4 units		**J75-CPM-4-45-6**	1
		for 5 units[*2]		**J75-CPM-5-45-6**	1
	3-phase busbars modular spacing = 54 mm In = 64 A[*1]	for 2 units	J7KN 24-...40 + J73 KN□□ J7MN 12 + J73 MN□□ J7MN 25 + J73 MN□□	**J75-CPM-2-54-6**	1
		for 3 units		**J75-CPM-3-54-6**	1
		for 4 units		**J75-CPM-4-54-6**	1
		for 5 units[*2]		**J75-CPM-5-54-6**	1
	3-phase busbars modular spacing = 54 mm In = 120 A[*1]	for 2 units	J7KN 50 J7MN 50	**J75-CPM-2-54-12**	1
		for 3 units		**J75-CPM-3-54-12**	1
				J75-CPM-4-54-12	1
	3-phase busbars modular spacing = 54 mm In = 120 A[*1]	for 2 units	J7KN 50 + J73 KN□□ J7MN 50 + J73 MN□□	**J75-CPM-2-63-12**	1
		for 3 units		**J75-CPM-3-63-12**	1
		for 4 units[*2]		**J75-CPM-4-63-12**	1
	Shrouds for unused terminals on the busbar system	for 64 A version for 120 A version		**J75-TA-63** **J75-TA-120**	10
	Line side terminals to be used with busbar systems J75-CPM-...6 In = 64 A[*1]	IEC 60947 EN 60947 according to UL 508		**J75-BTC-25-IC**	1
		IEC 60947 EN 60947 according to UL 508E		**J75-BTC-25-EC**	1
	Line side terminals to be used with busbar sys-tems J75-CPM-...12			**J75-BTC-50-E**	1

[*1] The sum of all added currents per module must not exeed the above mentioned nominal currents!
[*2] For more than 5 units (64 A) and 4 units (120 A) the system can be extended accordingly by installing an additional busbar

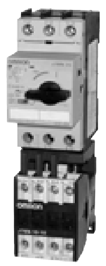
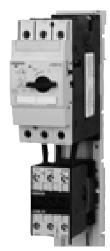
Mounting Parts for Fuseless Load Feeders (see *page I-72*)

	Description	Version	for circuit breaker	**Type**	Pack pcs.	Weight approx. kg/pcs.
DIN-rail adapters						
	**Adapter** for mechanical fixing of circuit-breaker and contactor	35 mm-DIN-rail (DIN EN50022) or screw mounting	J7MN-12-...25 J7MN-50 J7MN-100	**J74MN-HU** **J74MN-HU-50** **J74MN-HU-100**	1 1 1	0.05 0.20 0.25
Link modules						
	for electrical and mechanical connection between circuit-breaker and contactor					
	Link module	J7KNA 09 - J7KNA 12 J7KN 10 - J7KN 22	J7MN 12-25 J7MN 12-25	**J74MN-VK1 12-25** **J74MN-VK3 12-25**	1 1	0.015 0.02
	for electrical connection between circuit-breaker and contactor					
	Link module	J7KN-24 - J7KN-40 J7KN-50 - J7KN-74	J7MN-50 J7MN-100	**J74MN-VD-50** **J74MN-VD-100**	10 10	- -

Low voltage switch gear

■ Components for Fuseless Load Feeders, DIN-rail Mounting

Type of coordination „1“ 3 x 415 V 10 kA (other conditions on request)

	Motor 3~400V kW	Setting range A	MPCB Type	Contactor 220-230V 50Hz*1 Type	Link module Type	DIN-rail adapter Type
			*page I-68*	*page I-13*	*page I-13*	
	–	0.11 – 0.16	J7MN-25-E16	J7KNA-09-10-230	J74MN-VK1 12-25	–
	–	0.14 – 0.20	J7MN-25-E2	J7KNA-09-10-230	J74MN-VK1 12-25	–
	0.06	0.18 – 0.25	J7MN-25-E25	J7KNA-09-10-230	J74MN-VK1 12-25	–
	0.09	0.22 – 0.32	J7MN-25-E32	J7KNA-09-10-230	J74MN-VK1 12-25	–
	–	0.28 – 0.40	J7MN-25-E4	J7KNA-09-10-230	J74MN-VK1 12-25	–
	0.12	0.35 – 0.50	J7MN-25-E5	J7KNA-09-10-230	J74MN-VK1 12-25	–
	0.18	0.45 – 0.63	J7MN-25-E63	J7KNA-09-10-230	J74MN-VK1 12-25	–
	–	0.55 – 0.80	J7MN-25-E8	J7KNA-09-10-230	J74MN-VK1 12-25	–
	0.25	0.70 – 1.00	J7MN-25-1	J7KNA-09-10-230	J74MN-VK1 12-25	–
	0.37	0.90 – 1.25	J7MN-25-1E25	J7KNA-09-10-230	J74MN-VK1 12-25	–
	0.55	1.10 – 1.60	J7MN-25-1E6	J7KNA-09-10-230	J74MN-VK1 12-25	–
	0.75	1.40 – 2.00	J7MN-25-2	J7KNA-09-10-230	J74MN-VK1 12-25	–
	–	1.80 – 2.50	J7MN-25-2E5	J7KNA-09-10-230	J74MN-VK1 12-25	–
	1.10	2.20 – 3.20	J7MN-25-3E2	J7KNA-09-10-230	J74MN-VK1 12-25	–
	1.50	2.80 – 4.00	J7MN-25-4	J7KNA-09-10-230	J74MN-VK1 12-25	–
	–	3.50 – 5.00	J7MN-25-5	J7KNA-09-10-230	J74MN-VK1 12-25	–
	2.20	4.50 – 6.30	J7MN-25-6E3	J7KNA-09-10-230	J74MN-VK1 12-25	–
	3.00	5.50 – 8.00	J7MN-25-8	J7KNA-09-10-230	J74MN-VK1 12-25	–
	4.00	7.00 – 10.00	J7MN-25-10	J7KNA-09-10-230	J74MN-VK1 12-25	–
	5.50	9.00 – 12.50	J7MN-25-12E5	J7KNA-12-10-230	J74MN-VK1 12-25	–
			*page I-68*	*page I-30*		
	–	0.11 – 0.16	J7MN-25-E16	J7KN-10-10-230-VK3	–	–
	–	0.14 – 0.20	J7MN-25-E2	J7KN-10-10-230-VK3	–	–
	0.06	0.18 – 0.25	J7MN-25-E25	J7KN-10-10-230-VK3	–	–
	0.09	0.22 – 0.32	J7MN-25-E32	J7KN-10-10-230-VK3	–	–
	–	0.28 – 0.40	J7MN-25-E4	J7KN-10-10-230-VK3	–	–
	0.12	0.35 – 0.50	J7MN-25-E5	J7KN-10-10-230-VK3	–	–
	0.18	0.45 – 0.63	J7MN-25-E63	J7KN-10-10-230-VK3	–	–
	–	0.55 – 0.80	J7MN-25-E8	J7KN-10-10-230-VK3	–	–
	0.25	0.70 – 1.00	J7MN-25-1	J7KN-10-10-230-VK3	–	–
	0.37	0.90 – 1.25	J7MN-25-1E25	J7KN-10-10-230-VK3	–	–
	0.55	1.10 – 1.60	J7MN-25-1E6	J7KN-10-10-230-VK3	–	–
	0.75	1.40 – 2.00	J7MN-25-2	J7KN-10-10-230-VK3	–	–
	–	1.80 – 2.50	J7MN-25-2E5	J7KN-10-10-230-VK3	–	–
	1.10	2.20 – 3.20	J7MN-25-3E2	J7KN-10-10-230-VK3	–	–
	1.50	2.80 – 4.00	J7MN-25-4	J7KN-10-10-230-VK3	–	–
	–	3.50 – 5.00	J7MN-25-5	J7KN-10-10-230-VK3	–	–
	2.20	4.50 – 6.30	J7MN-25-6E3	J7KN-10-10-230-VK3	–	–
	3.00	5.50 – 8.00	J7MN-25-8	J7KN-10-10-230-VK3	–	–
	4.00	7.00 – 10.00	J7MN-25-10	J7KN-10-10-230-VK3	–	–
	6.00	9.00 – 12.50	J7MN-25-12E5	J7KN-14-10-230-VK3	–	–
	8.00	11.00 – 16.00	J7MN-25-16	J7KN-18-10-230-VK3	–	–
	–	14.00 – 20.00	J7MN-25-20	J7KN-22-10-230-VK3	–	–
	–	17.00 – 22.00	J7MN-25-22	J7KN-22-10-230-VK3	–	–
	11.00	20.00 – 25.00	J7MN-25-25	J7KN-22-10-230-VK3	–	–
			*page I-68*	*page I-30*	*page I-71*	*page I-71*
	11.00	18.00 – 25.00	J7MN-50-25	J7KN-24-230	J74MN-VD-50	J74MN-HU-50
	15.00	22.00 – 32.00	J7MN-50-32	J7KN-32-230	J74MN-VD-50	J74MN-HU-50
	19.00	28.00 – 40.00	J7MN-50-40	J7KN-40-230	J74MN-VD-50	J74MN-HU-50
	–	36.00 – 45.00	J7MN-50-45	J7KN-50-230	J74MN-VD-100	J74MN-HU-100
	22.00	40.00 – 50.00	J7MN-50-50	J7KN-50-230	J74MN-VD-100	J74MN-HU-100
	30.00	45.00 – 63.00	J7MN-100-63	J7KN-62-230	J74MN-VD-100	J74MN-HU-100
	37.00	57.00 – 75.00	J7MN-100-75	J7KN-74-230	J74MN-VD-100	J74MN-HU-100
	–	70.00 – 90.00	J7MN-100-90	J7KN-85-22-230	–	–
	45.00	80.00 – 100.00	J7MN-100-100	J7KN-110-22-230	–	–

*1 other voltages, see *page I-36*

Specifications

■ Engineering data and Characteristics

Technical Data according to IEC/EN 60947-1, 60947-2, 60947-4-1 and VDE 0660

This table shows the rated ultimate short-circuit breaking capacity I_{cu} and the rated service short-circuit breaking capacity I_{cs} of the J7MN circuit-breakers with different operational voltages as a function of the rated current In of the circuit-breakers.

The circuit-breakers can be fed at the top or bottom supply terminals without any reduction of the rated data.

If the short-circuit current exceeds the rated short-circuit breaking capacity of the circuit-breaker specified in the tables at the installation point, a back-up fuse is to be used.

The maximum rated current for the back-up fuse is specified in the tables. These fuses are only suitable for the short-circuit-currents as indicated on the fuses.

Circuit-breaker	Rated current In	up to AC 240V[*1]			up to AC 400V[*1)] up to AC 415V[*2]			up to AC 440V[*1)] up to AC 460V[*2)]			up to AC 500V[*1)] up to AC 525V[*2)]			up to AC 690V[*1)]		
Type	A	I_{cu} kA	I_{cs} kA	max. fuse (gL/gG) A	I_{cu} kA	I_{cs} kA	max. fuse (gL/gG) A	I_{cu} kA	I_{cs} kA	max. fuse (gL/gG) A	I_{cu} kA	I_{cs} kA	max. fuse (gL/gG) A	I_{cu} kA	I_{cs} kA	max. fuse (gL/gG) A
J7MN-12	0.16 to 0.8	100	100	--	100	100	--	100	100	--	100	100	--	100	100	--
	1	100	100	--	100	100	--	100	100	--	100	100	--	100	100	--
	1.25	100	100	--	100	100	--	100	100	--	100	100	--	2	2	20
	1.6	100	100	--	100	100	--	100	100	--	100	100	--	2	2	20
	2	100	100	--	100	100	--	100	100	--	10	10	35	2	2	35
	2.5	100	100	--	100	100	--	100	100	--	10	10	35	2	2	35
	3.2	100	100	--	100	100	--	10	10	40	3	3	40	2	2	40
	4	100	100	--	100	100	--	10	10	40	3	3	40	2	2	40
	5	100	100	--	100	100	--	10	10	50	3	3	50	2	2	50
	6.3	100	100	--	100	100	--	10	10	50	3	3	50	2	2	50
	8	100	100	--	50	12.5	80[*3]	10	10	63	3	3	63	2	2	63
	10	100	100	--	50	12.5	80[*3)]	10	10	63	3	3	63	2	2	63
	12	100	100	--	50	12.5	80[*3)]	10	10	80	3	3	80	2	2	80
J7MN-25	0.16 to 1.25	100	100	--	100	100	--	100	100	--	100	100	--	100	100	--
	1.6	100	100	--	100	100	--	100	100	--	100	100	--	100	100	--
	2	100	100	--	100	100	--	100	100	--	100	100	--	8	8	25
	2.5	100	100	--	100	100	--	100	100	--	100	100	--	8	8	25
	3.2	100	100	--	100	100	--	100	100	--	100	100	--	8	8	32
	4	100	100	--	100	100	--	100	100	--	100	100	--	6	3	32
	5	100	100	--	100	100	--	100	100	--	100	100	--	6	3	32
	6.3	100	100	--	100	100	--	100	100	--	100	100	--	6	3	50
	8	100	100	--	100	100	--	50	25	63[*3]	42	21	63	6	3	50
	10	100	100	--	100	100	--	50	25	80[*3]	42	21	63	6	3	50
	12.5	100	100	--	100	100	--	50	25	80[*3]	42	21	80	6	3	63
	16	100	100	--	50	25	100[*3)]	20	10	80	10	5	80	4	2	63
	20	100	100	--	50	25	125[*3)]	20	10	80	10	5	80	4	2	63
	22	100	100	--	50	25	125[*3)]	20	10	100	10	5	80	4	2	63
	25	100	100	--	50	25	125[*3)]	20	10	100	10	5	80	4	2	63
J7MN-50	25	100	100	--	50	25	125[*3)]	30	15	100	12	6	80	5	3	63
	32	100	100	--	50	25	125[*3)]	30	15	125	10	5	100	4	2	63
	40	100	100	--	50	25	160[*3)]	30	15	125	10	5	100	4	2	63
	45	100	100	--	50	25	160[*3)]	30	15	125	10	5	100	4	2	63
	50	100	100	--	50	25	160[*3)]	30	15	125	10	5	100	4	2	80
J7MN-100	63	100	100	--	50	25	160[*3)]	40	20	160	12	6	125	6	3	80
	75	100	100	--	50	25	160[*3)]	40	20	160	8	4	125	5	3	100
	90	100	100	--	50	25	160[*3)]	40	20	160	8	4	125	5	3	125
	100	100	100	--	50	25	160[*3)]	40	20	160	8	4	125	5	3	125

*1 10% overvoltage
*2 5% overvoltage
*3 Back-up fuse required if short-circuit current at installation point > 50 kA
-- No back-up fuse required.

Technical Data according to IEC/EN 60947-1, 60947-2, 60947-4-1 and VDE 0660

Main Circuit

Type			J7MN-12	J7MN-25	J7MN-50	J7MN-100
Number of poles			3	3	3	3
Max. rated current Inmax (=max. rated operational current Ie)		A	12	25	50	100
Permissible ambient temperature						
Storage/transport		°C	-50 to +80			
Operation		°C	-20 to +70*1			
Permissible rated current at temperature inside cubicle of:	+60 °C	%	100			
	+70 °C	%	87			
Circuit-breaker inside enclosure						
Permissible rated current at temperature inside enclosure of:	+60 °C	%	100			
	+70 °C	%	87			
Rated operational voltage Ue		V	690*2			
Rated frequency		Hz	50/60			
Rated insulation voltage Ui		V	690			
Rated impulse withstand voltage Uimp		kV	6			
Utilization category						
IEC 60 947-2 (circuit-breaker)			A			
IEC 60 947-4-1 (motor starter)			AC-3			
Class	acc. to IEC 60 947-4-1		10			
DC short-circuit breaking capacity (time constant t = 5 ms)						
1 conducting path DC 150 V		kA	10			
2 conducting paths in series DC 300 V		kA	10			
3 conducting paths in series DC 450 V		kA	10			
Power loss Pv per circuit-breaker dependent on rated current In (upper setting range)	In -> to 1.25 A	W	5	-	-	-
	In -> 1.6 to 6.3 A	W	6	-	-	-
	In -> 8 to 12 A	W	7	-	-	-
R per conducting path = P/(I² × 3)	In -> 1 to 6.3 A	W	-	6	-	-
	In -> 8 to 16 A	W	-	7	-	-
	In -> 20 to 25 A	W	-	8	-	-
	In -> to 25 A	W	-	-	12	-
	In -> 32 A	W	-	-	15	-
	In -> 40 to 50 A	W	-	-	20	-
	In -> to 63 A	W	-	-	-	20
	In -> 75 to 90 A	W	-	-	-	30
	In -> to 100 A	W	-	-	-	38
Shock resistance	acc. to IEC 68 Part 2-27	g	25	25	25	25
Degree of protection	acc. to IEC 60 529		IP 20	IP 20	IP 20*3	IP 20*3)
Shock hazard protection	acc. to DIN VDE 0106 Part 100		safe against finger touch			
Temperature compensation	acc. to IEC 60 947-4-1	°C	-20 to +60			
Phase failure sensitivity	acc. to IEC 60 947-4-1		yes			
Explosion protection	acc. to EC Directive 94191 EC		yes*4			
Isolator characteristics	acc. to IEC 60 947-3		yes			
Main and EM. STOP switch characteristics	acc. to IEC 60 204-1 (VDE 0113)		yes*5			
Safe isolation between main and auxiliary circuits	acc. to DIN VDE 0106 Part 101					
	up to 400 V + 10 %		yes			
	up to 415 V+ 5 %		yes			
Mechanical endurance	operating cycles		100 000	100 000	50 000	50 000
Electrical endurance			100 000	100 000	25 000	25 000
Max. operating frequency per hour (motor starts)		1/h	15	15	15	15
Permissible mounting position			any. acc. to IEC 60 447 start command “I” right-hand side or top			

*1 Over +60°C current reduction
*2 500 V with moulded-plastic enclosure
*3 Terminal compartment IP00
*4 KEMA-test certification on request
*5 With appropriate accessories

Technical Data according to IEC/EN 60947-1, 60947-2, 60947-4-1 and VDE 0660

Conductor cross-sections for main Circuit

Type		J7MN-12	J7MN-25	J7MN-50	J7MN-100
Terminal type		Screw-type	Screw-type	Box terminal	Box terminal
Terminal screw		Pozidriv size 2	Pozidriv size 2	Pozidriv size 2	Allen screw 4 mm
Tightening torque	Nm	0.8 to 1.2	2 to 2.5	3 to 4.5	4 to 6
Conductor cross-sections					
solid	mm²	2 x (0.5 to 1.5)	2 x (1 to 2.5)	2 x (0.75 to 16)	2 x (2.5 to 16)
	mm²	2 x (0.75 to 2.5)	2 x (2.5 to 6)	–	–
	mm²	1 x (0.5 to 4)			
finely stranded with end ferrule	mm²	2 x (0.5 to 1.5)	2 x (1 to 2.5)	2 x (0.75 to 16)	2 x (2.5 to 35)
	mm²	2 x (0.75 to 2.5)	2 x (2.5 to 6)	1 x (0.75 to 25)	1 x (2.5 to 50)
	mm²		1 x (1 to 10)		
stranded	mm²	2 x (0.5 to 1.5)	2 x (1 to 2.5)	2 x (0.75 to 25)	2 x (10 to 50)
	mm²	2 x (0.75 to 2.5)	2 x (2.5 to 6)	1 x (0.75 to 35)	1 x (10 to 70)
	mm²	1 x (0.5 to 4)	1 x (1 to 10)		
AWG-wires, solid or stranded	AWG	2 x (18 to 14)	2 x (14 to 10)	2 x (18 to 3)	2 x (10 to 1/0)
	AWG	–	–	1 x (18 to 2)	1 x (10 to 2/0)
conductor bar (number x width x thick)	mm	–	–	2 x (6 x 9 x 0.8)	2 x (6 x 9 x 0.8)
	mm	–	–	–	18 x 10
	mm²	–	–	–	up to 2 x 70

Technical Data according to IEC/EN 60947-1, 60947-2, 60947-4-1 and VDE 0660

Auxiliary switches

Switching capacity				Control voltage			
Front transverse auxiliary switch with 1 NO + 1 NC							
Rated operational voltage Ue		AC	V	24	230		
Rated operational current Ie/AC-15			A	2	0.5		
Rated operational current Ie/AC-12 Ith			A	2.5	2.5		
Rated operational voltage Ue		DC L/R 200 ms	V	24	48	60	
Rated operational current Ie/DC-13			A	1	0.3	0.15	
Lateral auxiliary switch and signalling switch							
Rated operational voltage Ue		AC	V	24	230	400	690
Rated operational current Ie/AC-15			A	6	6	3	1
Rated operational current Ie/AC-12 Ith			A	10	10	10	10
Rated operational voltage Ue		DC L/R 200 ms	V	24	110	220	440
Rated operational current Ie/DC-13			A	2	0.5	0.25	0.1
Undervoltage release	Power consumption	during pick-up	VA/W	20.2/13			
		uninterrupted duty	VA/W	7.2/2.4			
	Response voltage	trip	V	0.7 to 0.35 × Us			
		pick-up	V	0.85 to 1.1 × Us			
	Max. opening time		ms	20			
Shunt release	Power consumption during pick-up		AC VA/W	20.2/13			
			DC W	13 to 80			
	Response voltage acc. to IEC 60 947-1, trip		V	0.7 to 1.1 × Us			
	Max. opening time		ms	20			
Short-circuit protection for auxiliary and control circuits							
	Fuse	gL/gG	A	10			
	Miniature circuit breaker C-characteristic		A	6*1			
Conductor cross-sections for auxiliary and control circuits				Screw-type Pozidriv size 2			
	solid		mm²	2 x (0.5 to 1.5) / 2 x (0.75 to 2.5)			
	finely stranded with ferrule		mm²	2 x (0.5 to 1.5) / 2 x (0.75 to 2.5)			
	stranded		mm²	2 x (0.5 to 1.5) / 2 x (0.75 to 2.5)			
	AWG-wires, solid or stranded		AWG	2 x (18 to 14)			

*1 Prospective short-circuit current < 0.4 kA.

Description

J7MN circuit-breakers are compact, current-limiting circuit-breakers which are optimised for load feeders. The circuit-breakers are used for switching and protecting three-phase induction motors of up to 18,5 kW at AC 400 V and for loads with rated currents of up to 40 A.

Construction

The circuit-breakers are available in three sizes:

J7MN-12 overall width 45 mm. Max. rated current 12 A. Suitable for 3-phase induction motors of up to 5.5 kW at voltages of 400 V AC.

J7MN-25 overall width 45 mm. Max. rated current 25 A. Suitable for 3-phase induction motors of up to 11 kW at voltages of 400 V AC.

J7MN-50 overall width 55 mm. Max. rated current 40 A. Suitable for 3-phase induction motors of up to 18,5 kW at voltages of 400 V AC.

J7MN-100 overall width 70 mm. Max. rated current 100 A. Suitable for 3-phase induction motors of up to 45 kW at voltages of 400 V AC.

Releases

Circuit-breakers J7MN are equipped with bimetallic-based, inverse-time delayed overload releases and with instantaneous overcurrent releases (electromagnetic short-circuit releases).

The overload releases can be set in accordance with the load current. The overcurrent releases are permanently set to a value 13 times the rated current and thus enable trouble-free start-up of motors.

The scale cover can be sealed to prevent unauthorized adjustments to the set current.

Operating mechanisms

Circuit-breakers J7MN-12 are actuated via a switch operating mechanism and circuit-breakers J7MN-25, J7MN-50 and J7MN-100 via a rotary operating mechanism. If the circuit-breaker trips, the rotary operating mechanism switches to the tripped position to indicate this. Before the circuit-breaker is reclosed, the rotary operating mechanism must be reset to the 0 position by hand, in order to prevent the former from closing by mistake before the fault has been cleared.

In the case of circuit-breakers with rotary operating mechanisms, there is an electrical signal via a signalling switch to indicate that the circuit-breaker has tripped.

All operating mechanisms can be locked in the 0 position with a padlock (shackle diameter 3.5 to 4.5 mm).

The J7MN circuit-breakers fulfil the isolation characteristics specified in IEC 60 947-2.

Operating conditions

Circuit-breakers J7MN are suitable for use in any climate. They are designed for operation in enclosed rooms under normal conditions (e. g. no dust, corrosive vapours or harmful gases). Suitable enclosures must be provided for installation in dusty or damp rooms.

Circuit-breakers J7MN can also be fed from below. The standards in accordance with which the circuit-breakers are constructed, the permissible ambient temperatures, the maximum making and breaking capacities, the tripping currents and other boundary conditions can be found in the technical data and tripping characteristics.

Since the operational currents, starting currents and current peaks vary as a result of the inrush current, even in the case of motors with identical output ratings, the values specified for these output ratings in the selection tables are intended as a guide only. The specific rated and start-up data of the motor to be protected is always paramount to the choice of the most suitable circuit-breaker.

In order to prevent premature tripping due to phase failure sensitivity, the circuit-breakers should always be connected in such a way that current flows through all three main conducting paths.

Short-circuit protection

The short-circuit releases of J7MN circuit-breakers disconnect the faulty load feeder from the system in the event of a short circuit and thus prevent any further damage.

Circuit-breakers with a short-circuit breaking capacity of 50 kA or 100 kA at a voltage of 400 V AC are practically short-circuit-proof at this voltage, as higher short-circuit currents are not usually encountered at the installation point.

Back-up fuses are only necessary if the short-circuit current at the installation point exceeds the rated ultimate short-circuit breaking capacity of the circuit-breakers.

Motor protection

The tripping characteristics of J7MN circuit-breakers are designed mainly to protect three-phase induction motors. The circuit-breakers are therefore also referred to as motor circuit-breakers. The current of the motor to be protected is set with the aid of the scale.

Circuit-breakers with thermal overload releases are normally designed in accordance with release Class 10.

Line protection

J7MN circuit-breakers for motor protection are also suitable for line protection. In order to prevent premature tripping due to phase failure sensitivity, the three conducting paths must always be uniformly loaded. The conducting paths must be connected in series in the case of single-phase loads.

The J7MN circuit-breakers meet the isolation conditions of IEC 60 947-3 as well as the additional test conditions for circuit-breakers with isolation characteristics specified in IEC 60 947-2. Taking IEC 60 204-1 into consideration, they can thus be implemented as main and EMERGENCY STOP switches.

Door-coupling rotary operating mechanism do not fulfil the isolation characteristics specified in IEC 60 947-2. Door-coupling rotary operating mechanism according isolation characteristics specified in IEC 60 947-2 on request.

Characteristics

The time/current characteristic, the current limiting characteristics and the I²t characteristics were determined in accordance with DIN VDE 0660 and IEC 60 947.

The tripping characteristic of the inverse-time delayed overload releases (thermal overload releases or 'a' releases) for DC and AC with a frequency of 0 to 400 Hz also apply to the time/current characteristic.

The characteristics apply to the cold state. At operating temperature, the tripping times of the thermal releases are reduced to approximately 25 %.

Under normal operating conditions, all three poles of the device must be loaded. The three main conducting paths must be connected in series in order to protect single-phase or DC loads.

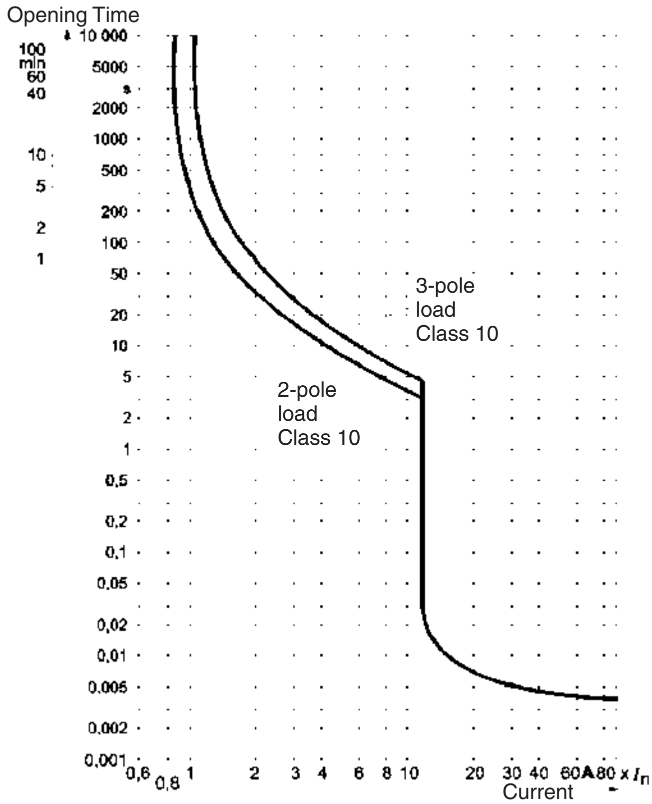
With 3-pole loading, the maximum deviation in the tripping time for 3 times the setting current and upwards is ± 20 % and thus in accordance with DIN VDE 0165.

The tripping characteristics for the instantaneous, electromagnetic overcurrent releases (short-circuit releases or 'n' releases) are based on the rated current I_n, which is also the maximum value of the setting range for circuit-breakers with adjustable overload releases. If the current is set to a lower value, the tripping current of the 'n' release is increased by a corresponding factor.

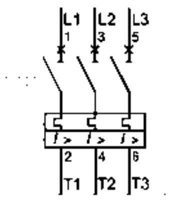
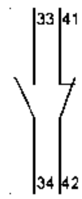
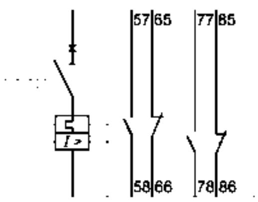
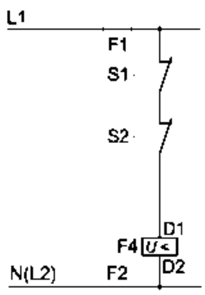
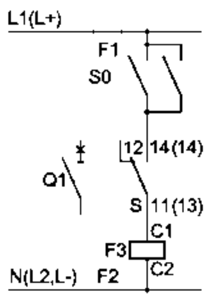
The characteristics of the electromagnetic overcurrent releases apply to frequencies of 50/60 Hz. Appropriate correction factors must be used for lower frequencies up to 16 2/3 Hz, for higher frequencies up to 400 Hz and for DC.

The characteristic shown here is a schematic representation of circuit-breakers for all ranges.

Time/current characteristics, current limiting characteristics and I²t characteristics are available on request.



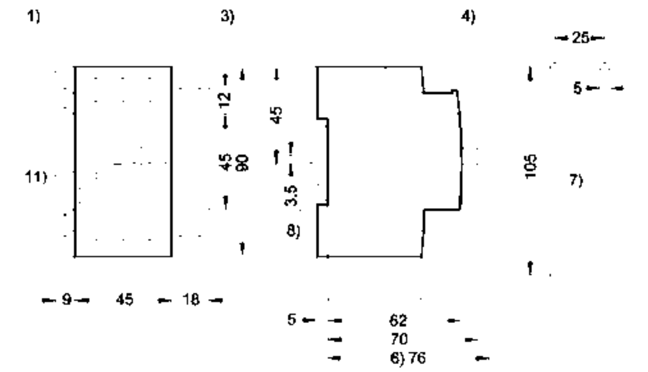
■ Wiring diagrams

Circuit-breaker **J7MN** 	Transverse auxiliary contact block **J73MN-11F** 	Lateral auxiliary contact block **J73MN-11S** 
Signalling switch **J73MN-T-11S** 	Undervoltage release **J74MN-U** 	Shunt release **J74MN-S** 

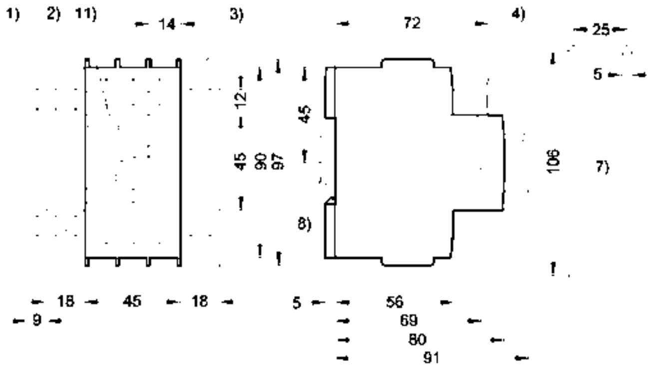
Low voltage switch gear

■ Dimensions

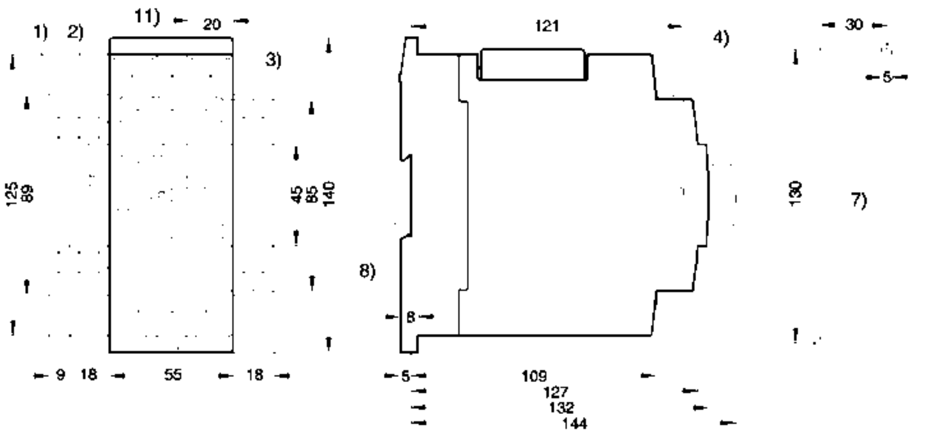
Circuit-breaker **J7MN-12**



Circuit-breaker **J7MN-25**

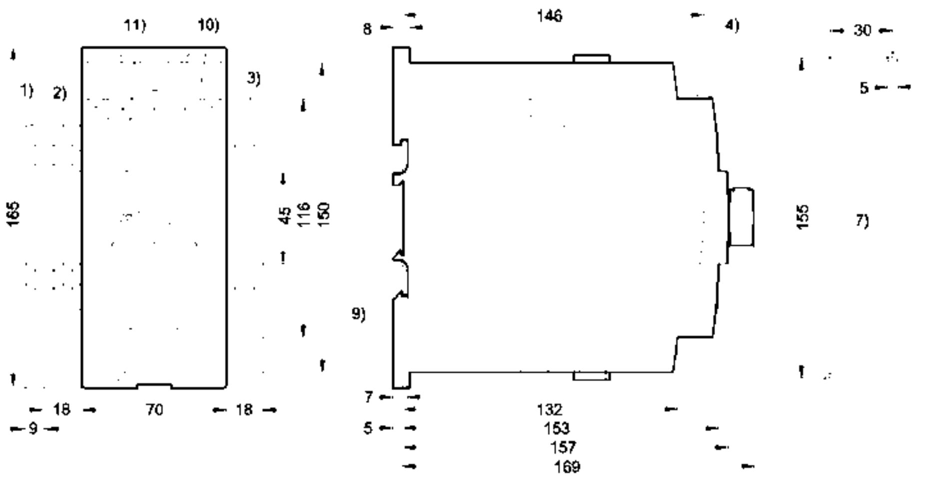


Circuit-breaker **J7MN-50**



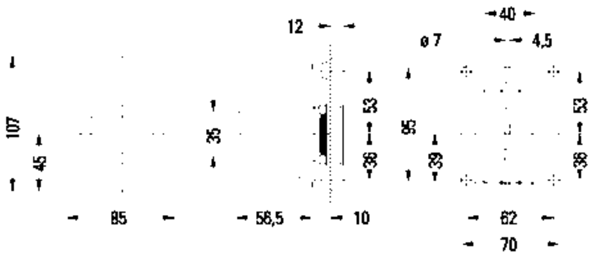
1) Lateral aux. contact
2) Signalling contact
3) Auxiliary release
4) Transverse aux. contact
7) Mounting holes
8) 35mm DIN-rail
9) 35mm DIN-rail 15mm high or 75mm DIN-rail
10) 4mm hexagon socket screw
11) Lockable in 0-position with shackle diameter max.5mm

Circuit-breaker **J7MN-100**

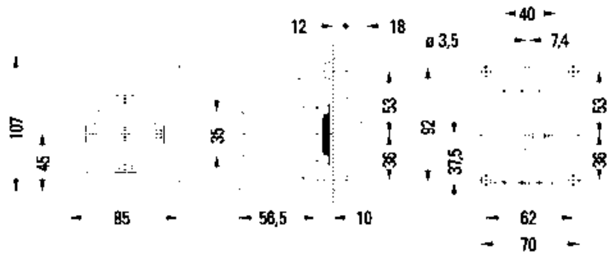


1) Lateral aux. contact
2) Signalling contact
3) Auxiliary release
4) Transverse aux. contact
7) Mounting holes
8) 35mm DIN-rail
9) 35mm DIN-rail 15mm high or 75mm DIN-rail
10) 4mm hexagon socket screw
11) Lockable in 0-position with shackle diameter max.5mm

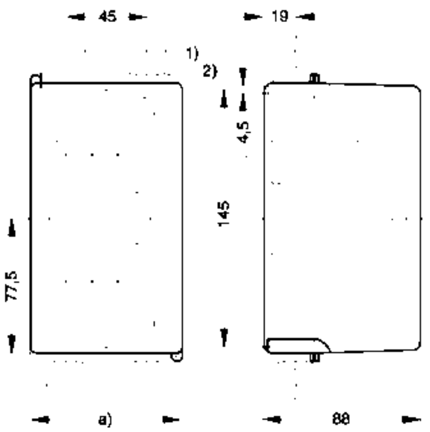
Moulded plastic front plate **J74MN-P12**



Moulded plastic front plate **J74MN-P25**

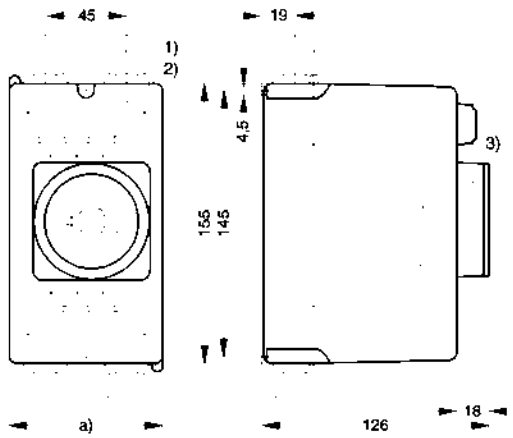


Moulded plastic enclosure **J74MN-PF12(S)**



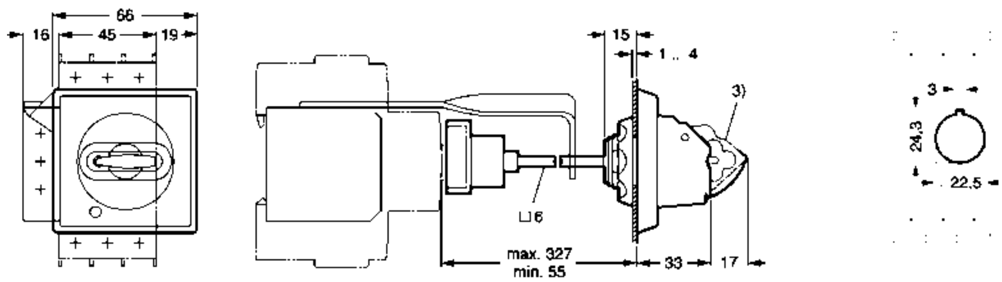
Dim. a
J74MN-PF12 105 mm
J74MN-PF12S 85 mm

Moulded plastic enclosure **J74MN-PF25(S)(RY)**



Dim. a
J74MN-PF25 105 mm
J74MN-PF25S 85 mm

Door-coupling rotary operating mechanism **J74MN-DC**



1) Max. for shackle diameter for padlock 8 mm

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J08E-EN-01 In the interest of product improvement, specifications are subject to change without notice.

Monitoring products

A complete new monitoring product range in 22.5 mm housing

The smart way to protect your system!

The K8 series offers a complete range of first-class quality monitoring products, all in compact 22.5 mm wide DIN-rail housing. The K8 series includes single-phase relays that monitor current or voltage variations, three-phase relays that monitor phase-sequence, phase asymmetry, phase-loss or voltage variations, and a conductive level controller.

With innovative features, these relays provide timely warnings of system errors. This series of just eight models offers you a flexible one-stop-shopping solution for your monitoring requirements.

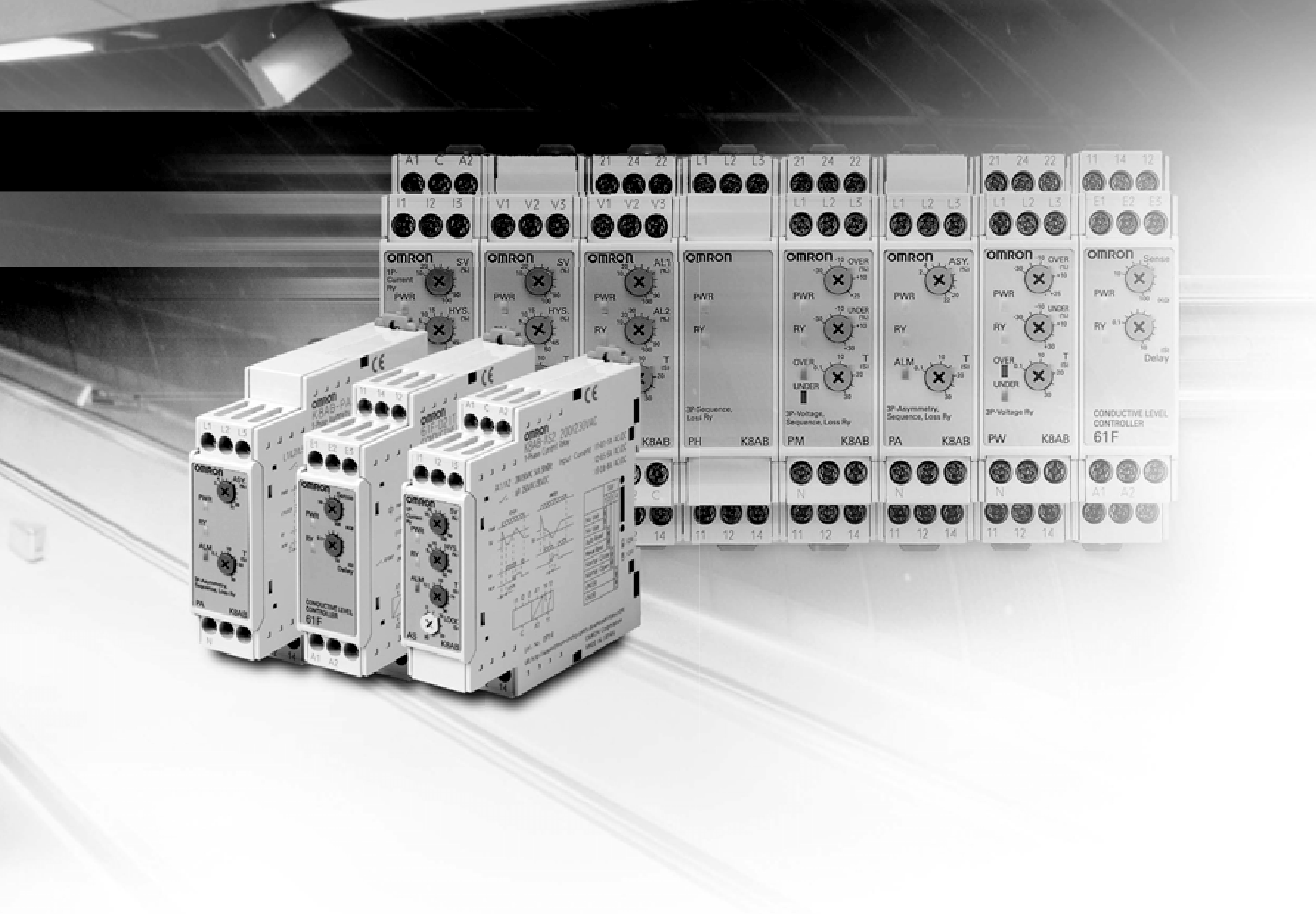
Typical applications include monitoring generator voltages, providing chain breakage protection for conveyors, checking battery voltage, protecting pumps against idle running, monitoring phase sequence or phase loss on escalators, and monitoring liquid levels in tanks.

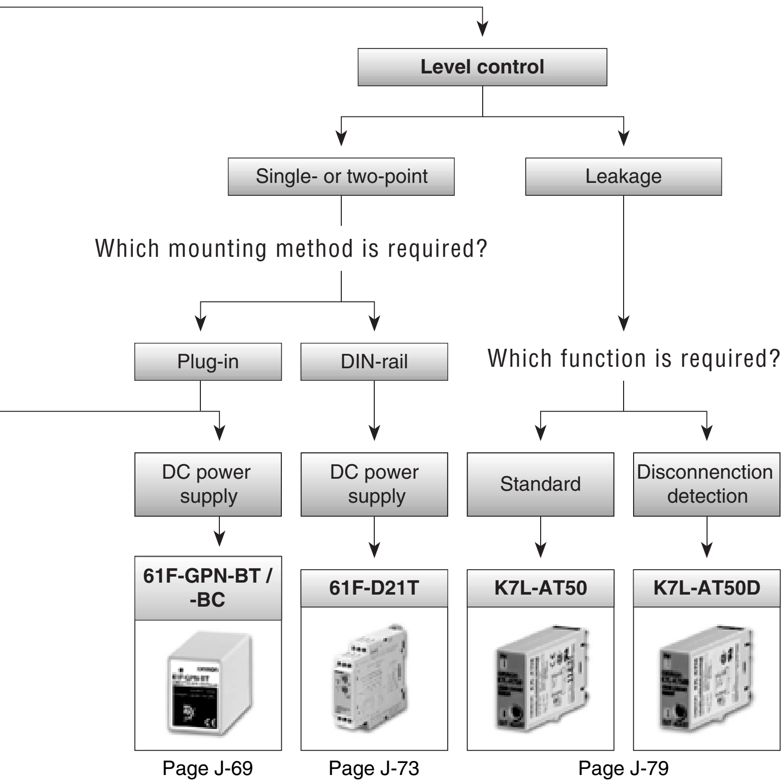
What type of monitoring is required?

- Single-phase control
  - Current
  - Voltage
- Three-phase control
  - Voltage

What type of control is required?

- Single-phase control
  - Current
    - Over / under → K8AB-AS  Page J-5
  - Voltage
    - Over / under → K8AB-VS  Page J-13
    - Window → K8AB-VW  Page J-21
- Three-phase control
  - Voltage
    - Sequence / phase-loss → K8AB-PH  Page J-29
    - Multi-function → K8AB-PM  Page J-35
    - Sequence / phase-loss / asymmetry → K8AB-PA  Page J-43
    - Window → K8AB-PW  Page J-51
- AC power supply → 61F-GP-N8  Page J-59





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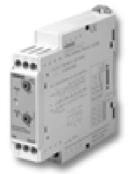
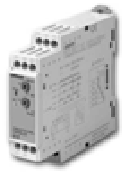
Selection table

	Category	1-phase control			3-phase control		
							
Selection criteria	Model	K8AB-AS	K8AB-VS	K8AB-VW	K8AB-PH	K8AB-PM	K8AB-PA
	Specialty	Ideal for current monitoring for industrial heaters and motors.	Ideal for voltage monitoring for industrial facilities and equipment.	Ideal for voltage monitoring for industrial facilities and equipment.	Ideal for phase-sequence and phase-loss monitoring for industrial facilities and equipment.	Ideal for monitoring 3-phase power supplies for industrial facilities and equipment.	Ideal for 3-phase voltage asymmetry monitoring for industrial facilities and equipment.
	Sensing range (configurable)	20 mA to 10 A, current transformer: 100 / 200 A	60 mV to 600 V	60 mV to 600 V	Same as supply voltage	Same as supply voltage	Same as supply voltage
Supply voltage AC	24 VAC	■	■	■			
	100 VAC						
	110 VAC						
	115 VAC	■	■	■			
	120 VAC						
	200 VAC						
	220 VAC						
	230 VAC	■	■	■			
	240 VAC						
	200 - 500 VAC				■		
	200 - 240 VAC					■ (-PM1, 3-wire)	■ (-PA1, 3-wire)
	115 - 138 VAC					■ (-PM1, 4-wire)	■ (-PA1, 4-wire)
	380 - 480 VAC					■ (-PM2, 3-wire)	■ (-PA2, 3-wire)
	220 - 277 VAC					■ (-PM2, 4-wire)	■ (-PA2, 4-wire)
Supply voltage DC	24 VDC	■	■	■			
	12 .. 24 VDC						
Control output	Transistor NPN						
	Transistor PNP						
	Relay	■ (1 SPDT)	■ (1 SPDT)	■ (2 SPDT)	■ (1 SPDT)	■ (2 SPDT)	■ (1 SPDT)
Features	LED operation indicator	■	■	■	■	■	■
	Adjustable sensitivity						
	Electrode types						
	Page	J-5	J-13	J-21	J-29	J-35	J-43

	Category	3-phase control	Conductive level controllers				Leakage controllers	
								
Selection criteria	Model	K8AB-PW	61F-GP-N8	61F-GPN-BT	61F-GPN-BC	61F-D21T	K7L-AT50	K7L-AT50D
	Specialty	Ideal for monitoring 3-phase power supplies for industrial facilities and equipment.	Single or two-point	AC sine wave between electrodes for stable detection with no electrolysis	AC sine wave between electrodes for stable detection with no electrolysis	Ideal for level control for industrial facilities and equipment	Sensor amplifier, AC sine wave between electrodes for stable detection with no electrolysis	Sensor amplifier with disconnection detection function
	Sensing range (configurable)	Same as supply voltage	4 to 50 kΩ	0 to 100 kΩ	1 to 100 kΩ	10 to 100 kΩ	0 to 50 MΩ	1 to 50 MΩ
Supply voltage AC	24 VAC		□			■		
	100 VAC		□					
	110 VAC		□					
	115 VAC					■		
	120 VAC		□					
	200 VAC		□					
	220 VAC		□					
	230 VAC		□			■		
	240 VAC		□					
	200 - 500 VAC							
	200 - 240 VAC	■ (-PW1, 3-wire)						
	115 - 138 VAC	■ (-PW1, 4-wire)						
	380 - 480 VAC	■ (-PW2, 3-wire)						
	220 - 277 VAC	■ (-PW2, 4-wire)						
Supply voltage DC	24 VDC			■	■			
	12 .. 24 VDC						□	□
Control output	Transistor NPN				■		■	■
	Transistor PNP						■	■
	Relay	■ (2 SPDT)	■	■	■	■		
Features	LED operation indicator	■	■	■	■	■	■	■
	Adjustable sensitivity			■	■		■	■
	Electrode types		Electrode holder: PS-□S, PS-31, BF-1 and BS-1				Liquid leakage sensor band F03-	
	Page	J-51	J-59	J-69		J-73	J-79	

■ Standard □ Available ☐ No / not available

Monitoring products

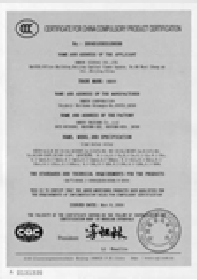
LEADING IN SERVICE

Focussed, progressive, distinctive. Be assured, choose Omron

At Omron we set high standards for ourselves. Our products are known all over the world for their unrivalled quality. But we offer more than just excellent quality. In an environment that places ever greater demands with regard to service, quality and costeffectiveness, other things are important too. Providing a top-quality service is what we do every day, including extra service as standard. This helps to ensure that we can provide tailor-made solutions for applications more effectively and more quickly.

More and more companies are choosing Omron as they seek to work in a partnership that is based on reliability and certainty.

Omron – the reassuring choice.



International standards and approvals

Our products carry all relevant international standards and approvals, including CCC (Chinese Compulsory Certification), which makes exporting your system much easier.

- Reliability, also for your customers
- Maximum flexibility
- Confidence

5-day repair service

More and more people are choosing Omron, as a high degree of reliability is a key feature of its products. You can always rely on Omron. Even if a product unexpectedly malfunctions, our repair team is ready to swing into action.

- Product repaired and returned to you within 5 days, including collection and delivery
- You can track the status of your repair on-line
- Repairs within warranty are completely free-of-charge

For more information please visit the Service & Support section at http://omron-industrial.com

EPLAN for Omron products

The majority of standard Omron products are provided in digital EPLAN format, which means that a few clicks of your mouse are all that is needed to design the right product into your switching panel.

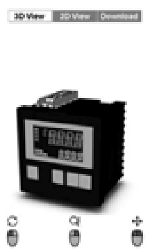
For more information please visit: http://omron-industrial.com/en/eplan/

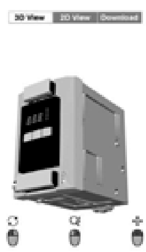
- Very easy to use
- Always the right product
- Reduced engineering time

Downloadable 2-D and 3-D CAD drawings

Designers of switching panels and machines can download clear 2-D and 3-D CAD drawings for all current products from http://omron-industrial.com/en/2D3D, which can easily be incorporated into your design.

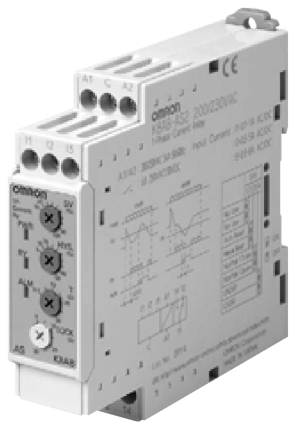
- Large number of formats supported for greater flexibility
- Readily available
- Convenience that saves you time





Single-phase Current Relay

K8AB-AS



Ideal for current monitoring for industrial heaters and motors.

- Monitor for overcurrents or undercurrents.
- Manual resetting and automatically resetting supported by one Relay.
- Startup lock and operating time can be set separately.
- One SPDT output relay, 6 A at 250 VAC (resistive load).
- Switch the output relay between normally ON and normally OFF operation.
- Process control signal (4 to 20 mA) and commercial CT input (0 to 1 A or 0 to 5 A) supported.
- Relay warning status easily monitoring using LED indicator.
- Easy wiring with ferrules
  2 × 2.5 mm^2 solid or 2 × 1.5 mm^2 standard ferrules.
- CE mark compliance certified by third party.
  UL certification pending.

Model Number Structure

■ Model Number Legend

K8AB-□□▭
1 2 3 4

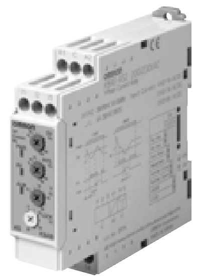
1. **Basic Model**
   K8AB: Measuring and Monitoring Relays
2. **Functions**
   AS: Single-phase Current Relay (One-sided operation)
3. **Measuring Current**
   1: 2 to 20 mA AC/DC, 10 to 100 mA AC/DC, 50 to 500 mA AC/DC
   2: 0.1 to 1 A AC/DC, 0.5 to 5 A AC/DC, 0.8 to 8 A AC/DC
   3: 10 to 100 A AC, 20 to 200 A AC (See note.)

Note: The K8AB-AS3 is specially designed to be used in combination with the OMRON K8AC-CT200L Current Transformer (CT). (Direct input is not possible.)

4. **Supply Voltage**
   24 VDC: 24 VDC
   24 VAC: 24 VAC
   100-115 VAC: 100 to 115 VAC
   200-230 VAC: 200 to 230 VAC

Ordering Information

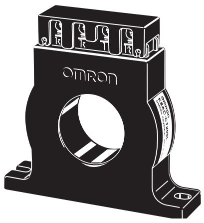
■ List of Models

Single-phase Current Relay	Measuring current	Supply voltage	Model
	2 to 20 mA AC/DC, 10 to 100 mA AC/DC, 50 to 500 mA AC/DC	24 VDC	**K8AB-AS1 24 VDC**
		24 VAC	**K8AB-AS1 24 VAC**
		100-115 VAC	**K8AB-AS1 100-115 VAC**
		200-230 VAC	**K8AB-AS1 200-230 VAC**
	0.1 to 1 A AC/DC, 0.5 to 5 A AC/DC, 0.8 to 8 A AC/DC	24 VDC	**K8AB-AS2 24 VDC**
		24 VAC	**K8AB-AS2 24 VAC**
		100-115 VAC	**K8AB-AS2 100-115 VAC**
		200-230 VAC	**K8AB-AS2 200-230 VAC**
	10 to 100 A AC, 20 to 200 A AC (See note.)	24 VDC	**K8AB-AS3 24 VDC**
		24 VAC	**K8AB-AS3 24 VAC**
		100-115 VAC	**K8AB-AS3 100-115 VAC**
		200-230 VAC	**K8AB-AS3 200-230 VAC**

Note: The K8AB-AS3 is designed to be used in combination with the OMRON K8AC-CT200L Current Transformer (CT). (Direct input is not possible.)

■ Accessory (Order Separately)

OMRON CT

Current Transformer	Input range	Applicable Relay	Model
	10 to 100 A AC, 20 to 200 A AC	K8AB-AS3	**K8AC-CT200L**

Other CTs

CT current on secondary side	Applicable Relay
0 to 1 A AC, 0 to 5 A AC	K8AB-AS2

Ratings and Specifications

■ Ratings

Operating power	**Non-isolated power supply**	24 VDC (1 W)
	Isolated power supply	24 VAC (3 VA), 100 to 115 VAC (4 VA), 200 to 230 VAC (5 VA)
Operate (SV)	**Operating value setting range**	10% to 100% of maximum rated input value
	Operating value	100% operation at set value
Reset (HYS.)	**Hysteresis**	5% to 50% of operating value
	Resetting method	Manual reset/automatic reset (switchable) Manual reset: Turn OFF operating power for 1 s or longer.
Operating time (T)		0.1 to 30 s (Value when input rapidly changes from 0% to 120%.)
Operating power ON lock (LOCK)		0 to 30 s (Value when input rapidly changes from 0% to 120%; lock timer starts when input reaches approximately 30% of set value.)
Setting accuracy		±10% of full scale
Time error		±10% of set value (Minimum error: 50 ms)
Input frequency	**K8AB-AS1/AS2**	DC input, 45 to 65 Hz
	K8AB-AS3	45 to 65 Hz
Continuous input	**K8AB-AS1/AS2**	Continuous input: 115% of maximum input, 10 s max.: 125% of maximum input
	K8AB-AS3	Continuous input: 240 A, 30 s max.: 400 A, 1 s max.: 1,200 A
Input impedance		5 Ω max.
Indicators		Power (PWR): Green LED, Relay output (RY): Yellow LED, Alarm outputs (ALM): Red LED
Output relays		One SPDT relay (6 A at 250 VAC, resistive load)

■ Specifications

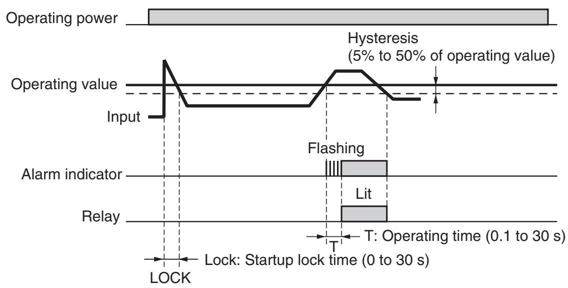
Ambient operating temperature		–20 to 60°C (with no condensation or icing)
Storage temperature		–40 to 70°C (with no condensation or icing)
Ambient operating humidity		25% to 85%
Storage humidity		25% to 85%
Altitude		2,000 m max.
Operating voltage range		85% to 110% of rated operating voltage
Rated power supply frequency		50/60 Hz ±5 Hz (AC power supply)
Output relays	**Resistive load**	6 A at 250 VAC (cos ϕ = 1) 6 A at 30 VDC (L/R = 0 ms)
	Inductive load	1 A at 250 VAC (cos ϕ = 0.4) 1 A at 30 VDC (L/R = 7 ms)
	Minimum load	10 mA at 5 VDC
	Maximum contact voltage	250 VAC
	Maximum contact current	6 A AC
	Maximum switching capacity	1,500 VA
	Mechanical life	10,000,000 operations
	Electrical life	Make: 50,000 times, Break: 30,000 times
Terminal screw tightening torque		1.2 N·m
Crimp terminals		Two solid wires of 2.5 mm^2, two crimp terminals of 1.5 mm^2 with insulation sleeves, can be tightened together
Insulation resistance		20 MΩ (at 500 V) between charged terminals and exposed uncharged parts 20 MΩ (at 500 V) between any charged terminals (i.e., between input, output, and power supply terminals)

Degree of protection	Terminal section: IP20, Rear case: IP40
Case color	Munsell 5Y8/1 (ivory)
Case material	ABS resin (self-extinguishing resin) UL94-V0
Weight	200 g
Mounting	Mounted to DIN-rail or via M4 screws
Dimensions	22.5 (W) × 90 (H) × 100 (D) mm
Installation environment	Overvoltage Category III, Pollution Degree 2
Application standards	EN60255-5/-6
Safety standards	EN60664-1
EMC	EMI: EN61326 Industrial applications Electromagnetic interference wave CISPR11 Group 1, Class A: CISPR16-1/-2 Terminal interference wave voltage CISPR11 Group 1, Class A: CISPR16-1/-2 EMS: EN61326 Industrial applications Electrostatic discharge EN61000-4-2: 8 kV (in air) Radiating radio-frequency electromagnetic field EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Burst EN61000-4-4: 1 kV (I/O signal line), 2 kV (power line) Surge EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted RF EN61000-4-6: 3 V (0.15 to 80 MHz) Power frequency magnetic field immunity EN61000-4-8: 30 A/m Voltage dip/short interruptions EN61000-4-11: 0.5 cycle, 0.180° each, polarity 100% (rated voltage)

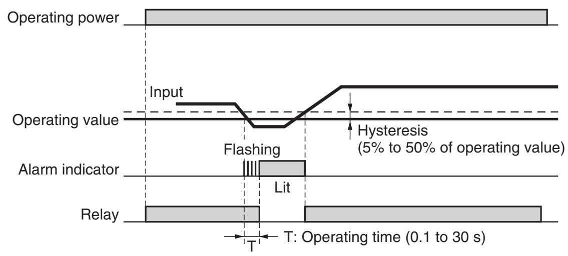
Connections

■ Wiring Diagram

Overcurrent Operation Diagram (Output: Normally Open)



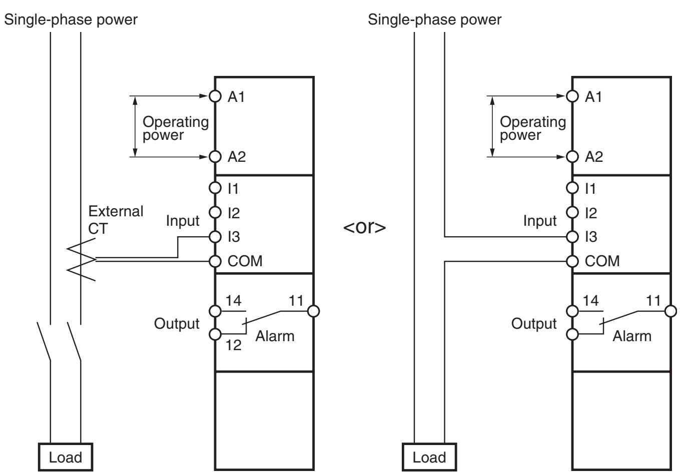
Undercurrent Operation Diagram (Output: Normally Closed)



Measuring Ranges and Connections

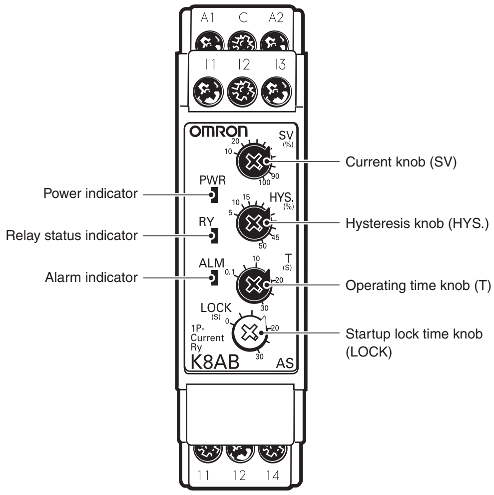
Model	Measuring range	Connection
K8AB-AS1	2 to 20 mA AC/DC	I1-COM
	10 to 100 mA AC/DC	I2-COM
	50 to 500 mA AC/DC	I3-COM
K8AB-AS2	0.1 to 1 A AC/DC	I1-COM
	0.5 to 5 A AC/DC	I2-COM
	0.8 to 8 A AC/DC	I3-COM
K8AB-AS3	10 to 100 A AC/DC (See note.)	I2-COM
	20 to 200 A AC/DC (See note.)	I3-COM

Note: The K8AB-AS3 is designed to be used in combination with the OMRON K8AC-CT200L Current Transformer (CT). (Direct input is not possible with this model.)



Nomenclature

■ Front



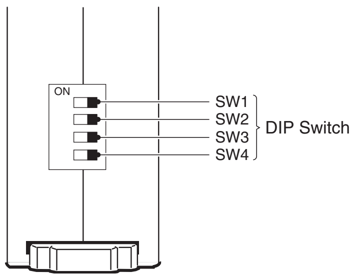
Indicators

Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied.
Relay status indicator (RY: Yellow)	Lit when relay is operating.
Alarm indicator (ALM: Red)	Lit when there is an overcurrent or undercurrent. The indicator flashes to indicate the error status after the input has exceeded the threshold value while the operating time is being clocked.

Setting Knobs

Item	Usage
Current knob (SV)	Used to set the current to 10% to 100% of maximum rated input current.
Hysteresis knob (HYS.)	Used to set the rest value to 5% to 50% of the operating value.
Operating time knob (T)	Used to set the operating time to 0.1 to 30 s.
Startup lock time knob (LOCK)	Used to set the startup lock time to 0 to 30 s.

■ Function Selection DIP Switch

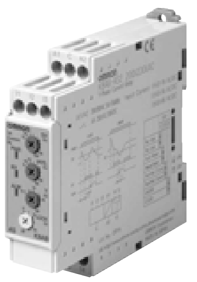


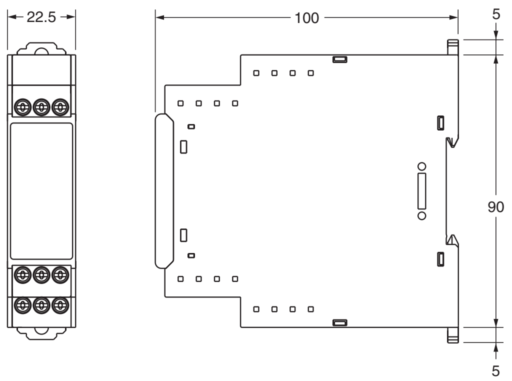
DIP Switch Functions

	Function			Default
SW1	Not used.	OFF	Not used.	OFF
		ON		
SW2	Resetting method	OFF	Manual reset	OFF
		ON	Automatic reset	
SW3	Relay drive method	OFF	Normally open (normally OFF)	OFF
		ON	Normally closed (normally ON)	
SW4	Operating mode	OFF	Overcurrent monitoring	OFF
		ON	Undercurrent monitoring	

Dimensions

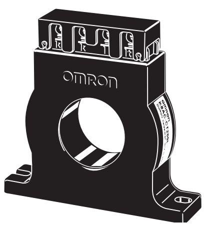
K8AB-AS

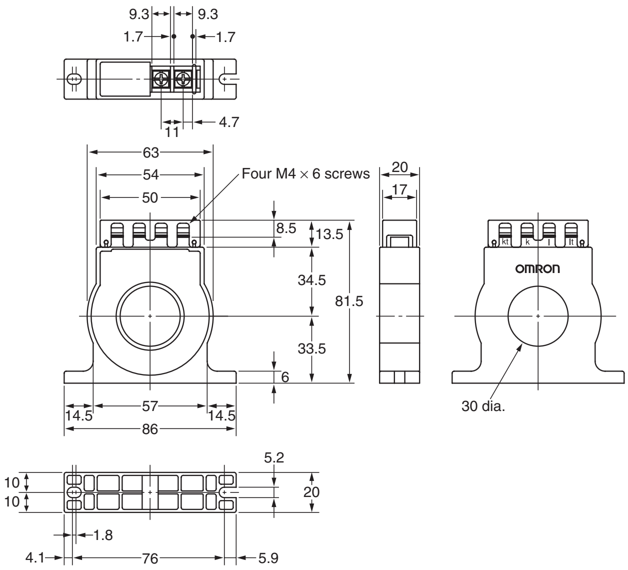




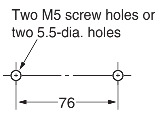
OMRON CT

K8AC-CT200L





Mounting Hole Dimensions



Safety Precautions

■ Precautions for Safe Use

Make sure to follow the instructions below to ensure safety.

1. Do not use or keep this product in the following environments.
   - Outdoors, or places subject to direct sunlight or wearing weather.
   - Places where dust, iron powder, or corrosive gases (in particular, sulfuric or ammonia gas) exist.
   - Places subject to static electricity or inductive noise.
   - Places where water or oil come in contact with the product.
2. Make sure to install this product in the correct direction.
3. There is a remote risk of electric shock. Do not touch terminals while electricity is being supplied.
4. Make sure to thoroughly understand all instructions in the Instructions Manual before handling this product.
5. Make sure to confirm terminal makings and polarity for correct wiring.
6. Tighten terminal screws firmly using the following torque. Recommended torque: 0.54 N·m
7. Operating ambient temperature and humidity for this product must be within the indicated rating when using this product.
8. There is a remote risk of explosion. Do not use this product where flammable or explosive gas exists.
9. Make sure that no weight rests on the product after installation.
10. To enable an operator to turn off this product easily, install switches or circuit breakers that conform to relevant requirements of IEC60947-1 and IEC60947-3, and label them appropriately.
11. For DC input, use a SELV power-supply capable of overcurrent protection. Specifically, a SELV power-supply has a double or reinforced insulation for input and output, and output voltage of 30 Vr.m.s with 42.4 V at peak or DC60V maximum. Recommended power-supply: Model S8VS-06024□. (Omron product)

■ Precautions for Correct Use

For Proper Use

1. Do not use the product in the following locations.
   - Places subject to radiant heat from heat generating devices.
   - Places subject to vibrations or physical shocks.
2. Make sure to use setting values appropriate for the controlled object. Failure to do so can cause unintended operation, and may result in accident or corruption of the product.
3. Do not use thinner or similar solvent for cleaning. Use commercial alcohol.
4. When discarding, properly dispose of the product as industrial waste.
5. Only use this product within a board whose structure allows no possibility for fire to escape.

About Installation

1. When wiring, use only recommended crimp terminals.
2. Do not block areas around the product for proper dissipation of heat. (If you do not secure space for heat dissipation, life cycle of the product will be compromised.)
3. To avoid electrical shocks, make sure that power is not supplied to the product while wiring.
4. To avoid electrical shocks, make sure that power is not supplied to the product when performing DIP switch settings.

Noise Countermeasures

1. Do not install the product near devices generating strong high frequency waves or surges.
2. When using a noise filter, check the voltage and current and install it as close to the product as possible.
3. In order to prevent inductive noise, wire the lines connected to the product separately from power lines carrying high voltages or currents. Do not wire in parallel with or on the same cable as power lines.
   Other measures for reducing noise include running lines along separate ducts and using shield lines.

To avoid faulty operations, malfunctions, or failure, observe the following operating instructions.

1. When turning on the power, make sure to realize rated voltage within 1 second from the time of first supply of electricity.
2. Make sure to use power supply for operations, inputs, and transformer with the appropriate capacity and rated burden.
3. Maintenance and handling of this product may only be performed by qualified personnel.
4. Distortion ratio of input wave forms must be 30% or less. Use of this product with circuits that have large distortion in wave forms may result in unwanted operations.
5. Using this product for thyristor controls or inverters will result in errors.
6. When setting the volume, adjust the control from the minimum side to the maximum side.

Warranty and Application Considerations

Read and Understand this Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability.*

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

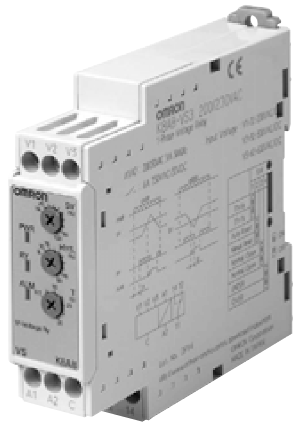
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. N142-E2-01

In the interest of product improvement, specifications are subject to change without notice.

Single-phase Voltage Relay
K8AB-VS

Ideal for voltage monitoring for industrial facilities and equipment.



- Monitor for overvoltages or undervoltages.
- Manual resetting and automatically resetting supported by one Relay.
- One SPDT output relay, 6 A at 250 VAC (resistive load).
- Switch the output relay between normally ON and normally OFF operation.
- Process control signal (0 to 10 V) and current splitter input supported.
- Relay warning status easily monitoring using LED indicator.
- Input frequency of 40 to 500 Hz supported.
- Easy wiring with ferrules
  2 × 2.5 mm^2 solid or 2 × 1.5 mm^2 standard ferrules.
- CE mark compliance certified by third party.
  UL certification.

Model Number Structure

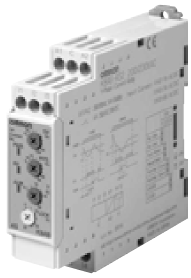
■ Model Number Legend

K8AB-□□□□□□
1 2 3 4

1. **Basic Model**
   K8AB: Measuring and Monitoring Relays
2. **Functions**
   VS: Single-phase Voltage Relay (One-sided operation)
3. **Measuring Current**
   1: 6 to 60 mV AC/DC, 10 to 100 mV AC/DC, 30 to 300 mV AC/DC
   2: 1 to 10 V AC/DC, 3 to 30 V AC/DC, 15 to 150 V AC/DC
   3: 20 to 200 V AC/DC, 30 to 300 V AC/DC, 60 to 600 V AC/DC
4. **Supply Voltage**
   24 VDC: 24 VDC
   24 VAC: 24 VAC
   100-115 VAC: 100 to 115 VAC
   200-230 VAC: 200 to 230 VAC

Ordering Information

■ List of Models

Single-phase Voltage Relay	Measuring voltage (See note.)	Supply voltage	Model
	6 to 60 mV AC/DC, 10 to 100 mV AC/DC, 30 to 300 mV AC/DC	24 VDC	**K8AB-VS1 24 VDC**
		24 VAC	**K8AB-VS1 24 VAC**
		100-115 VAC	**K8AB-VS1 100-115 VAC**
		200-230 VAC	**K8AB-VS1 200-230 VAC**
	1 to 10 V AC/DC, 3 to 30 V AC/DC, 15 to 150 V AC/DC	24 VDC	**K8AB-VS2 24 VDC**
		24 VAC	**K8AB-VS2 24 VAC**
		100-115 VAC	**K8AB-VS2 100-115 VAC**
		200-230 VAC	**K8AB-VS2 200-230 VAC**
	20 to 200 V AC/DC, 30 to 300 V AC/DC, 60 to 600 V AC/DC	24 VDC	**K8AB-VS3 24 VDC**
		24 VAC	**K8AB-VS3 24 VAC**
		100-115 VAC	**K8AB-VS3 100-115 VAC**
		200-230 VAC	**K8AB-VS3 200-230 VAC**

Note: The rated input depends on the connected terminals. Select the terminals suitable for the inputs, and connect the inputs to V1-COM, V2-COM, and V3-COM.

Ratings and Specifications

■ Ratings

Operating power	**Non-isolated power supply**	24 VDC (1 W)
	Isolated power supply	24 VAC (4 VA), 100 to 115 VAC (4 VA), 200 to 230 VAC (5 VA)
Operate (SV)	**Operating value setting range**	10% to 100% of maximum rated input value
	Operating value	100% operation at set value
Reset (HYS.)	**Hysteresis**	5% to 50% of operating value
	Resetting method	Manual reset/automatic reset (switchable) Manual reset: Turn OFF operating power for 1 s or longer.
Operating time (T)		0.1 to 30 s (Value when input rapidly changes from 0% to 120%.)
Power ON lock (LOCK)		1 s or 5 s error ±0.5 s (Value when input rapidly changes from 0% to 100%. The operating time is the shortest at this point.)
Setting accuracy		±10% of full scale
Time error		±10% of set value (Minimum error: 50 ms)
Input frequency		40 to 500 Hz
Input impedance		K8AB-VS1: 9 kΩ min. K8AB-VS2: 100 kΩ min. K8AB-VS3: 1 MΩ min.
Indicators		LED Power (PWR): Green LED, Relay output (RY): Yellow LED, Alarm output (ALM): Red LED
Output relays		One SPDT relay (6 A at 250 VAC, resistive load)

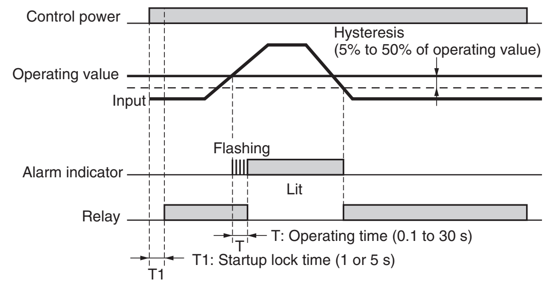
■ Specifications

Ambient operating temperature		–20 to 60°C (with no condensation or icing)
Storage temperature		–40 to 70°C (with no condensation or icing)
Ambient operating humidity		25% to 85%
Storage humidity		25% to 85%
Altitude		2,000 m max.
Operating voltage range		85% to 110% of rated operating voltage
Rated power supply frequency		50/60 Hz ±5 Hz (AC power supply)
Output relays	**Resistive load**	6 A at 250 VAC (cos ϕ = 1) 6 A at 30 VDC (L/R = 0 ms)
	Inductive load	1 A at 250 VAC (cos ϕ = 0.4) 1 A at 30 VDC (L/R = 7 ms)
	Minimum load	10 mA at 5 VDC
	Maximum contact voltage	250 VAC
	Maximum contact current	6 A AC
	Maximum switching capacity	1,500 VA
	Mechanical life	10,000,000 operations
	Electrical life	Make: 50,000 times, Break: 30,000 times
Terminal screw tightening torque		1.2 N·m
Crimp terminals		Two solid wires of 2.5 mm^2, two crimp terminals of 1.5 mm^2 with insulation sleeves, can be tightened together
Insulation resistance		20 MΩ (at 500 V) between charged terminals and exposed uncharged parts 20 MΩ (at 500 V) between any charged terminals (i.e., between input, output, and power supply terminals)
Degree of protection		Terminal section: IP20, Rear case: IP40
Case color		Munsell 5Y8/1 (ivory)
Case material		ABS resin (self-extinguishing resin) UL94-V0
Weight		200 g
Mounting		Mounted to DIN-rail or via M4 screws
Dimensions		22.5 (W) x 90 (H) x 100 (D) mm
Installation environment		Overvoltage Category III, Pollution Degree 2
Application standards		EN60255-5/-6
Safety standards		EN60664-1
EMC		EMI: EN61326 Industrial applications Electromagnetic interference wave CISPR11 Group 1, Class A: CISPR16-1/-2 Terminal interference wave voltage CISPR11 Group 1, Class A: CISPR16-1/-2 EMS: EN61326 Industrial applications Electrostatic discharge EN61000-4-2: 8 kV (in air) Radiating radio-frequency electromagnetic field EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Burst EN61000-4-4: 1 kV (I/O signal line), 2 kV (power line) Surge EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted RF EN61000-4-6: 3 V (0.15 to 80 MHz) Power frequency magnetic field immunity EN61000-4-8: 30 A/m Voltage dip/short interruptions EN61000-4-11: 0.5 cycle, 0.180° each, polarity 100% (rated voltage)

Connections

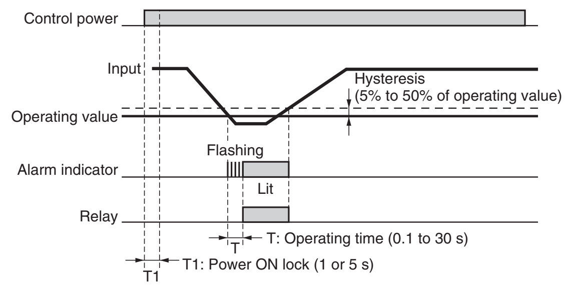
■ Wiring Diagram

Overcurrent Operation Diagram (Output: Normally Closed)

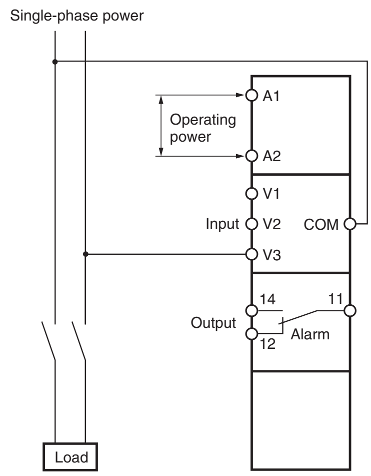


Note: The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.

Undercurrent Operation Diagram (Output: Normally Open)



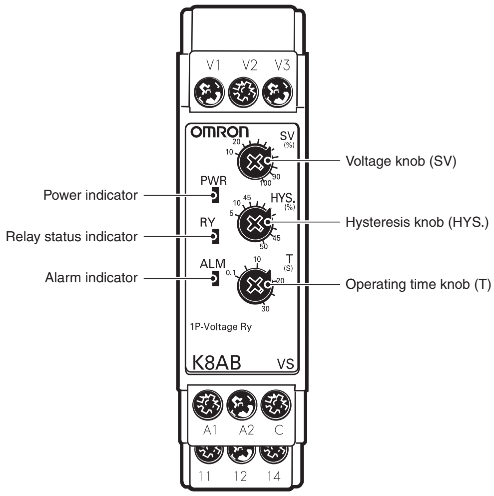
Note: The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.



Model	Measuring range	Connection
K8AB-VS1	6 to 60 mV AC/DC	V1-COM
	10 to 100 mV AC/DC	V2-COM
	30 to 300 mV AC/DC	V3-COM
K8AB-VS2	1 to 10 V AC/DC	V1-COM
	3 to 30 V AC/DC	V2-COM
	15 to 150 V AC/DC	V3-COM
K8AB-VS3	20 to 200 V AC/DC	V1-COM
	30 to 300 V AC/DC	V2-COM
	60 to 600 V AC/DC	V3-COM

Nomenclature

■ Front



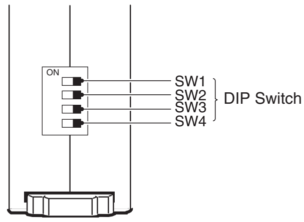
Indicators

Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied.
Relay status indicator (RY: Yellow)	Lit when relay is operating.
Alarm indicator (ALM: Red)	Lit when there is an overvoltage or undervoltage. The indicator flashes to indicate the error status after the input has exceeded the threshold value while the operating time is being clocked.

Setting Knobs

Item	Usage
Current knob (SV)	Used to set the current to 10% to 100% of maximum rated input current.
Hysteresis knob (HYS.)	Used to set the rest value to 5% to 50% of the operating value.
Operating time knob (T)	Used to set the operating time to 0.1 to 30 s.

■ Function Selection DIP Switch

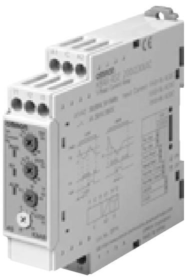


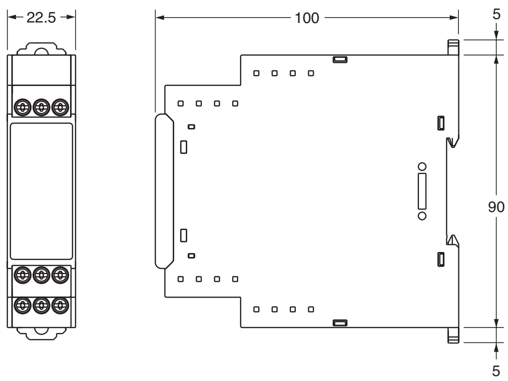
DIP Switch Functions

	Function			Default
SW1	Power ON lock time	OFF	1 s	OFF
		ON	5 s	
SW2	Resetting method	OFF	Manual reset	OFF
		ON	Automatic reset	
SW3	Relay drive method	OFF	Normally open (normally OFF)	OFF
		ON	Normally closed (normally ON)	
SW4	Operating mode	OFF	Overvoltage monitoring	OFF

Dimensions

K8AB-VS





Safety Precautions

■ Precautions for Safe Use

Make sure to follow the instructions below to ensure safety.

1. Do not use or keep this product in the following environments.
   - Outdoors, or places subject to direct sunlight or wearing weather.
   - Places where dust, iron powder, or corrosive gases (in particular, sulfuric or ammonia gas) exist.
   - Places subject to static electricity or inductive noise.
   - Places where water or oil come in contact with the product.
2. Make sure to install this product in the correct direction.
3. There is a remote risk of electric shock. Do not touch terminals while electricity is being supplied.
4. Make sure to thoroughly understand all instructions in the Instructions Manual before handling this product.
5. Make sure to confirm terminal makings and polarity for correct wiring.
6. Tighten terminal screws firmly using the following torque. Recommended torque: 0.54 N·m
7. Operating ambient temperature and humidity for this product must be within the indicated rating when using this product.
8. There is a remote risk of explosion. Do not use this product where flammable or explosive gas exists.
9. Make sure that no weight rests on the product after installation.
10. To enable an operator to turn off this product easily, install switches or circuit breakers that conform to relevant requirements of IEC60947-1 and IEC60947-3, and label them appropriately.
11. For DC input, use a SELV power-supply capable of overcurrent protection. Specifically, a SELV power-supply has a double or reinforced insulation for input and output, and output voltage of 30 Vr.m.s with 42.4 V at peak or DC60V maximum. Recommended power-supply: Model S8VS-06024□. (Omron product)

■ Precautions for Correct Use

For Proper Use

1. Do not use the product in the following locations.
   - Places subject to radiant heat from heat generating devices.
   - Places subject to vibrations or physical shocks.
2. Make sure to use setting values appropriate for the controlled object. Failure to do so can cause unintended operation, and may result in accident or corruption of the product.
3. Do not use thinner or similar solvent for cleaning. Use commercial alcohol.
4. When discarding, properly dispose of the product as industrial waste.
5. Only use this product within a board whose structure allows no possibility for fire to escape.

About Installation

1. When wiring, use only recommended crimp terminals.
2. Do not block areas around the product for proper dissipation of heat. (If you do not secure space for heat dissipation, life cycle of the product will be compromised.)
3. To avoid electrical shocks, make sure that power is not supplied to the product while wiring.
4. To avoid electrical shocks, make sure that power is not supplied to the product when performing DIP switch settings.

Noise Countermeasures

1. Do not install the product near devices generating strong high frequency waves or surges.
2. When using a noise filter, check the voltage and current and install it as close to the product as possible.
3. In order to prevent inductive noise, wire the lines connected to the product separately from power lines carrying high voltages or currents. Do not wire in parallel with or on the same cable as power lines.
   Other measures for reducing noise include running lines along separate ducts and using shield lines.

To avoid faulty operations, malfunctions, or failure, observe the following operating instructions.

1. When turning on the power, make sure to realize rated voltage within 1 second from the time of first supply of electricity.
2. Make sure to use power supply for operations, inputs, and transformer with the appropriate capacity and rated burden.
3. Maintenance and handling of this product may only be performed by qualified personnel.
4. Distortion ratio of input wave forms must be 30% or less. Use of this product with circuits that have large distortion in wave forms may result in unwanted operations.
5. Using this product for thyristor controls or inverters will result in errors.
6. When setting the volume, adjust the control from the minimum side to the maximum side.

Warranty and Application Considerations

Read and Understand this Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability.*

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

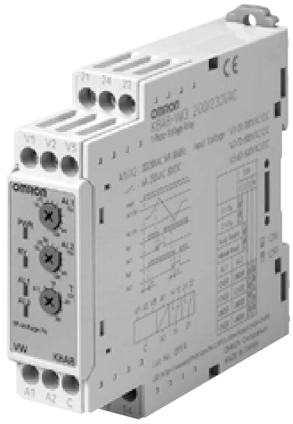
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. N143-E2-01

Single-phase Voltage Relay

K8AB-VW

Ideal for voltage monitoring for industrial facilities and equipment.



- Monitor for overvoltages and undervoltages simultaneously. Separate settings and outputs supported for overvoltages and undervoltages.
- Manual resetting and automatically resetting supported by one Relay.
- Pre-alarm Mode (H/HH and L/LL operating modes)
- Two SPDT output relays, 6 A at 250 VAC (resistive load).
- Process control signal (0 to 10 V) and current splitter input supported.
- Relay warning status easily monitoring using LED indicator.
- Input frequency of 40 to 500 Hz supported.
- Easy wiring with ferrules
  2×2.5 mm^2 solid or 2×1.5 mm^2 standard ferrules.
- CE mark compliance certified by third party.
  UL certification.

Model Number Structure

■ Model Number Legend

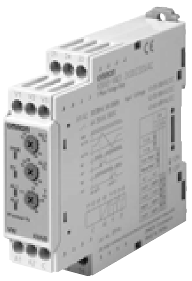
K8AB-□□□

1 2 3 4

1. **Basic Model**
   K8AB: Measuring and Monitoring Relays
2. **Functions**
   VW: Single-phase Voltage Relay (Simultaneous upper and lower limit monitoring)
3. **Measuring Current**
   1: 6 to 60 mV AC/DC, 10 to 100 mV AC/DC, 30 to 300 mV AC/DC
   2: 1 to 10 V AC/DC, 3 to 30 V AC/DC, 15 to 150 V AC/DC
   3: 20 to 200 V AC/DC, 30 to 300 V AC/DC, 60 to 600 V AC/DC
4. **Supply Voltage**
   24 VDC: 24 VDC
   24 VAC: 24 VAC
   100-115 VAC: 100 to 115 VAC
   200-230 VAC: 200 to 230 VAC

Ordering Information

■ List of Models

Single-phase Voltage Relay	Measuring voltage (See note.)	Supply voltage	Model
	6 to 60 mV AC/DC, 10 to 100 mV AC/DC, 30 to 300 mV AC/DC	24 VDC	**K8AB-VW1 24 VDC**
		24 VAC	**K8AB-VW1 24 VAC**
		100-115 VAC	**K8AB-VW1 100-115 VAC**
		200-230 VAC	**K8AB-VW1 200-230 VAC**
	1 to 10 V AC/DC, 3 to 30 V AC/DC, 15 to 150 V AC/DC	24 VDC	**K8AB-VW2 24 VDC**
		24 VAC	**K8AB-VW2 24 VAC**
		100-115 VAC	**K8AB-VW2 100-115 VAC**
		200-230 VAC	**K8AB-VW2 200-230 VAC**
	20 to 200 V AC/DC, 30 to 300 V AC/DC, 60 to 600 V AC/DC	24 VDC	**K8AB-VW3 24 VDC**
		24 VAC	**K8AB-VW3 24 VAC**
		100-115 VAC	**K8AB-VW3 100-115 VAC**
		200-230 VAC	**K8AB-VW3 200-230 VAC**

Note: The rated input depends on the connected terminals. Select the terminals suitable for the inputs, and connect the inputs to V1-COM, V2-COM, and V3-COM.

Ratings and Specifications

■ Ratings

Operating power	**Non-isolated power supply**	24 VDC (1 W)
	Isolated power supply	24 VAC (4 VA), 100 to 115 VAC (4 VA), 200 to 230 VAC (5 VA)
Operation (AL1 and AL2)	**Operating value setting range**	10% to 100% of maximum rated input value
	Operating value	100% operation at set value
Reset (HYS.)	**Hysteresis**	5% of operating value (fixed)
	Resetting method	Manual reset/automatic reset (switchable) Manual reset: Turn OFF operating power for 1 s or longer.
Operating time (T)		0.1 to 30 s (Value when input rapidly changes from 0% to 120%.)
Power ON lock (LOCK)		1 s or 5 s error ±0.5 s (Value when input rapidly changes from 0% to 100%. The operating time is the shortest at this point.)
Setting accuracy		±10% of full scale
Time error		±10% of set value (Minimum error: 50 ms)
Input frequency		40 to 500 Hz
Input impedance		K8AB-VW1: 9 kΩ min. K8AB-VW2: 100 kΩ min. K8AB-VW3: 1 MΩ min.
Indicators		Power (PWR): Green LED, Relay output (RY): Yellow LED, Alarm outputs (ALM1/2): Red LED
Output relays		Two SPDT relays (6 A at 250 VAC, resistive load), Normally closed operation (normally ON) (separate outputs possible for overvoltages and undervoltages)

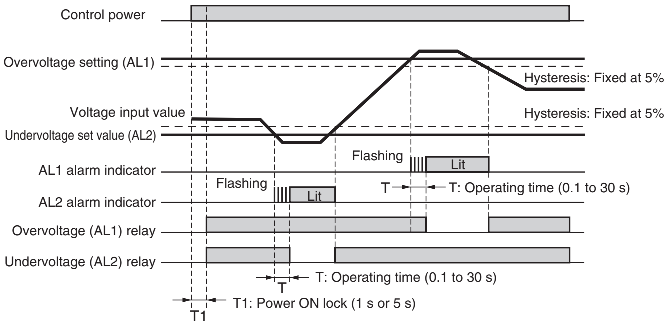
■ Specifications

Ambient operating temperature		–20 to 60°C (with no condensation or icing)
Storage temperature		–40 to 70°C (with no condensation or icing)
Ambient operating humidity		25% to 85%
Storage humidity		25% to 85%
Altitude		2,000 m max.
Operating voltage range		85% to 110% of rated operating voltage
Rated power supply frequency		50/60 Hz ±5 Hz (AC power supply)
Output relays	**Resistive load**	6 A at 250 VAC (cos ϕ = 1) 6 A at 30 VDC (L/R = 0 ms)
	Inductive load	1 A at 250 VAC (cos ϕ = 0.4) 1 A at 30 VDC (L/R = 7 ms)
	Minimum load	10 mA at 5 VDC
	Maximum contact voltage	250 VAC
	Maximum contact current	6 A AC
	Maximum switching capacity	1,500 VA
	Mechanical life	10,000,000 operations
	Electrical life	Make: 50,000 times, Break: 30,000 times
Terminal screw tightening torque		1.2 N·m
Crimp terminals		Two solid wires of 2.5 mm^2, two crimp terminals of 1.5 mm^2 with insulation sleeves, can be tightened together
Insulation resistance		20 MΩ (at 500 V) between charged terminals and exposed uncharged parts 20 MΩ (at 500 V) between any charged terminals (i.e., between input, output, and power supply terminals)
Degree of protection		Terminal section: IP20, Rear case: IP40
Case color		Munsell 5Y8/1 (ivory)
Case material		ABS resin (self-extinguishing resin) UL94-V0
Weight		200 g
Mounting		Mounted to DIN-rail or via M4 screws
Dimensions		22.5 (W) x 90 (H) x 100 (D) mm
Installation environment		Overvoltage Category III, Pollution Degree 2
Application standards		EN60255-5/-6
Safety standards		EN60664-1
EMC		EMI: EN61326 Industrial applications Electromagnetic interference wave CISPR11 Group 1, Class A: CISPR16-1/-2 Terminal interference wave voltage CISPR11 Group 1, Class A: CISPR16-1/-2 EMS: EN61326 Industrial applications Electrostatic discharge EN61000-4-2: 8 kV (in air) Radiating radio-frequency electromagnetic field EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Burst EN61000-4-4: 1 kV (I/O signal line), 2 kV (power line) Surge EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted RF EN61000-4-6: 3 V (0.15 to 80 MHz) Power frequency magnetic field immunity EN61000-4-8: 30 A/m Voltage dip/short interruptions EN61000-4-11: 0.5 cycle, 0.180° each, polarity 100% (rated voltage)

Connections

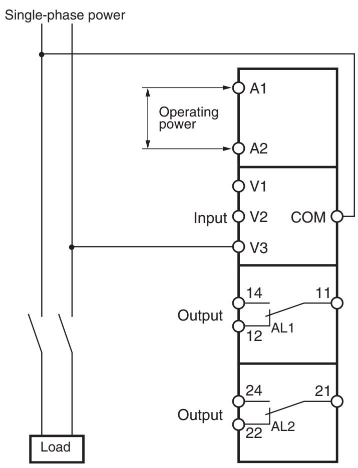
■ Wiring Diagram

Overvoltage and Undervoltage Operation Diagram

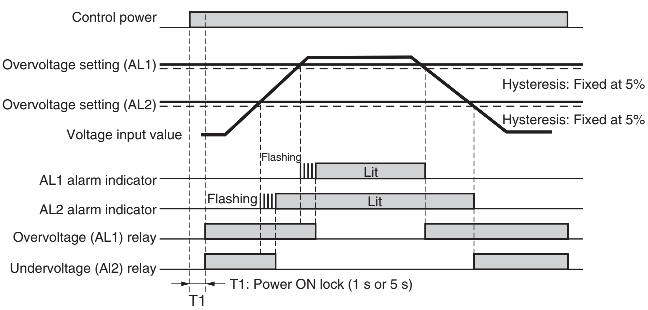


Note: 1. The K8AB-VW output relay is normally operative.

2. The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.



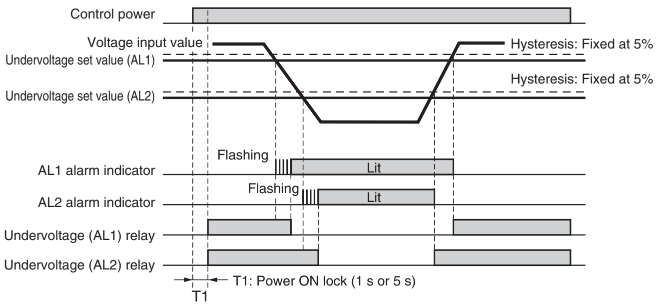
Overvoltage and Undervoltage Operation Diagram (Overvoltage Pre-alarm Mode)



Note: 1. The K8AB-VW output relay is normally operative.

2. The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.

Overvoltage and Undervoltage Operation Diagram (Undervoltage Pre-alarm Mode)



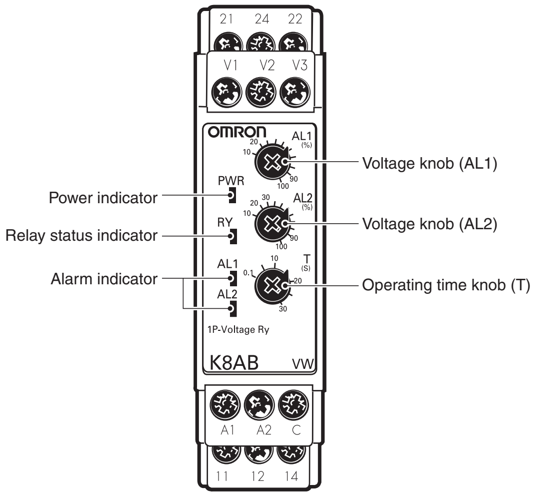
Note: 1. The K8AB-VW output relay is normally operative.

2. The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.

Model	Measuring range	Connection
K8AB-VW1	6 to 60 mV AC/DC	V1-COM
	10 to 100 mV AC/DC	V2-COM
	30 to 300 mV AC/DC	V3-COM
K8AB-VW2	1 to 10 V AC/DC	V1-COM
	3 to 30 V AC/DC	V2-COM
	15 to 150 V AC/DC	V3-COM
K8AB-VW3	20 to 200 V AC/DC	V1-COM
	30 to 300 V AC/DC	V2-COM
	60 to 600 V AC/DC	V3-COM

Nomenclature

■ Front



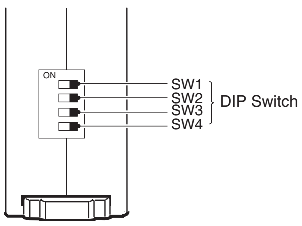
Indicators

Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied.
Relay status indicator (RY: Yellow)	Lit when relay operates (Not light when both AL1 and AL2 are in error status) (Normally lit)
Alarm indicators (AL1 and AL2: Red)	Lit when there is an overvoltage or undervoltage. The indicator flashes to indicate the error status after the input has exceeded the threshold value while the operating time is being clocked.

Setting Knobs

Item	Usage
Voltage knob (AL1)	Used to set the voltage to 10% to 100% of maximum rated input voltage.
Voltage knob (AL2)	Used to set the voltage to 10% to 100% of maximum rated input voltage.
Operating time knob (T)	Used to set the operating time to 0.1 to 30 s.

■ Function Selection DIP Switch



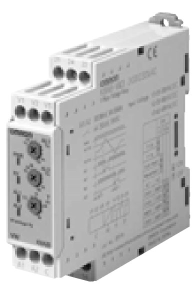
DIP Switch Functions

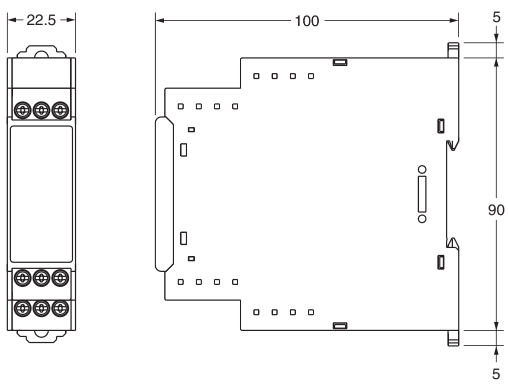
	Function			Default
SW1	Operating power ON lock time	OFF	1 s	OFF
		ON	5 s	
SW2	Resetting method	OFF	Manual reset	OFF
		ON	Automatic reset	

SW3	SW4	Function		Default SW3	Default SW4
OFF	OFF	Operating mode	AL1: Overvoltage, AL2: Undervoltage	OFF	OFF
ON	OFF		AL1: Overvoltage, AL2: Overvoltage		
OFF	ON		AL1: Undervoltage, AL2: Undervoltage		
ON	ON		AL1: Overvoltage, AL2: Undervoltage		

Dimensions

K8AB-VW





Safety Precautions

■ Precautions for Safe Use

Make sure to follow the instructions below to ensure safety.

1. Do not use or keep this product in the following environments.
   - Outdoors, or places subject to direct sunlight or wearing weather.
   - Places where dust, iron powder, or corrosive gases (in particular, sulfuric or ammonia gas) exist.
   - Places subject to static electricity or inductive noise.
   - Places where water or oil come in contact with the product.
2. Make sure to install this product in the correct direction.
3. There is a remote risk of electric shock. Do not touch terminals while electricity is being supplied.
4. Make sure to thoroughly understand all instructions in the Instructions Manual before handling this product.
5. Make sure to confirm terminal makings and polarity for correct wiring.
6. Tighten terminal screws firmly using the following torque. Recommended torque: 0.54 N·m
7. Operating ambient temperature and humidity for this product must be within the indicated rating when using this product.
8. There is a remote risk of explosion. Do not use this product where flammable or explosive gas exists.
9. Make sure that no weight rests on the product after installation.
10. To enable an operator to turn off this product easily, install switches or circuit breakers that conform to relevant requirements of IEC60947-1 and IEC60947-3, and label them appropriately.
11. For DC input, use a SELV power-supply capable of overcurrent protection. Specifically, a SELV power-supply has a double or reinforced insulation for input and output, and output voltage of 30 Vr.m.s with 42.4 V at peak or DC60V maximum.
    Recommended power-supply: Model S8VS-06024□. (Omron product)

■ Precautions for Correct Use

For Proper Use

1. Do not use the product in the following locations.
   - Places subject to radiant heat from heat generating devices.
   - Places subject to vibrations or physical shocks.
2. Make sure to use setting values appropriate for the controlled object. Failure to do so can cause unintended operation, and may result in accident or corruption of the product.
3. Do not use thinner or similar solvent for cleaning. Use commercial alcohol.
4. When discarding, properly dispose of the product as industrial waste.
5. Only use this product within a board whose structure allows no possibility for fire to escape.

About Installation

1. When wiring, use only recommended crimp terminals.
2. Do not block areas around the product for proper dissipation of heat. (If you do not secure space for heat dissipation, life cycle of the product will be compromised.)
3. To avoid electrical shocks, make sure that power is not supplied to the product while wiring.
4. To avoid electrical shocks, make sure that power is not supplied to the product when performing DIP switch settings.

Noise Countermeasures

1. Do not install the product near devices generating strong high frequency waves or surges.
2. When using a noise filter, check the voltage and current and install it as close to the product as possible.
3. In order to prevent inductive noise, wire the lines connected to the product separately from power lines carrying high voltages or currents. Do not wire in parallel with or on the same cable as power lines.
   Other measures for reducing noise include running lines along separate ducts and using shield lines.

To avoid faulty operations, malfunctions, or failure, observe the following operating instructions.

1. When turning on the power, make sure to realize rated voltage within 1 second from the time of first supply of electricity.
2. Make sure to use power supply for operations, inputs, and transformer with the appropriate capacity and rated burden.
3. Maintenance and handling of this product may only be performed by qualified personnel.
4. Distortion ratio of input wave forms must be 30% or less. Use of this product with circuits that have large distortion in wave forms may result in unwanted operations.
5. Using this product for thyristor controls or inverters will result in errors.
6. When setting the volume, adjust the control from the minimum side to the maximum side.

Warranty and Application Considerations

Read and Understand this Catalog
Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability.*

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. N144-E2-01

Phase-sequence Phase-loss Relay
K8AB-PH

Ideal for phase sequence and phase loss monitoring for industrial facilities and equipment.

- Simultaneously monitor phase sequence and phase loss for three-phase 3-wire power supplies.
- One SPDT output relay, 6 A at 250 VAC (resistive load).
- Relay warning status easily monitoring using LED indicator.
- Easy wiring with ferrules
  2 × 2.5 mm^2 solid or 2 × 1.5 mm^2 standard ferrules.
- CE mark compliance certified by third party.
  UL certification.

CE

Model Number Structure

■ Model Number Legend

K8AB-□□
1 2 3

1. **Basic Model**
   K8AB: Measuring and Monitoring Relays
2. **Functions**
   PH: Phase-sequence Phase-loss Relay
3. **Rated Input Voltage**
   1: 200 to 500 VAC

Ordering Information

■ List of Models

Phase-sequence Phase-loss Relay	Rated input voltage (See note.)	Model
	200 to 500 VAC	**K8AB-PH1**

Note: The power supply is shared with the rated input voltage.

Ratings and Specifications

■ Ratings

Rated input voltage	**Non-isolated**	200 to 500 VAC (15 VA)
Phase sequence, phase loss operating time		0.1 s max. (value when rated operating voltage changes quickly from 0% to 100%) (Relays are normally ON and turn OFF for phase sequence or loss phase errors.)
Resetting method		Automatic reset
Input frequency		45 to 65 Hz
Input impedance		100 kΩ min.
Indicators		Power (PWR): Green LED, Relay output (RY): Yellow LED
Output relays		One SPDT relay (6 A at 250 VAC, resistive load)

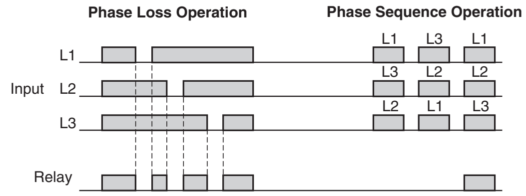
■ Specifications

Ambient operating temperature		–20 to 60°C (with no condensation or icing)
Storage temperature		–40 to 70°C (with no condensation or icing)
Ambient operating humidity		25% to 85%
Storage humidity		25% to 85%
Altitude		2,000 m max.
Voltage fluctuation range		85% to 110% of rated input voltage
Input frequency		50/60 Hz ±5 Hz (AC power supply)
Output relays	**Resistive load**	6 A at 250 VAC (cos ϕ = 1) 6 A at 30 VDC (L/R = 0 ms)
	Inductive load	1 A at 250 VAC (cos ϕ = 0.4) 1 A at 30 VDC (L/R = 7 ms)
	Minimum load	10 mA at 5 VDC
	Maximum contact voltage	250 VAC
	Maximum contact current	6 A AC
	Maximum switching capacity	1,500 VA
	Mechanical life	10,000,000 operations
	Electrical life	Make: 50,000 times, Break: 30,000 times
Terminal screw tightening torque		1.2 N·m
Crimp terminals		Two solid wires of 2.5 mm^2, two crimp terminals of 1.5 mm^2 with insulation sleeves, can be tightened together
Insulation resistance		20 MΩ (at 500 V) between charged terminals and exposed uncharged parts 20 MΩ (at 500 V) between any charged terminals (i.e., between input, output, and power supply terminals)
Degree of protection		Terminal section: IP20, Rear case: IP40
Case color		Munsell 5Y8/1 (ivory)
Case material		ABS resin (self-extinguishing resin) UL94-V0
Weight		200 g
Mounting		Mounted to DIN-rail or via M4 screws
Dimensions		22.5 (W) x 90 (H) x 100 (D) mm
Installation environment		Overvoltage Category III, Pollution Degree 2
Application standards		EN60255-5/-6
Safety standards		EN60664-1
EMC		EMI: EN61326 Industrial applications Electromagnetic interference wave CISPR11 Group 1, Class A: CISPR16-1/-2 Terminal interference wave voltage CISPR11 Group 1, Class A: CISPR16-1/-2 EMS: EN61326 Industrial applications Electrostatic discharge EN61000-4-2: 8 kV (in air) Radiating radio-frequency electromagnetic field EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Burst EN61000-4-4: 1 kV (I/O signal line), 2 kV (power line) Surge EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted RF EN61000-4-6: 3 V (0.15 to 80 MHz) Power frequency magnetic field immunity EN61000-4-8: 30 A/m Voltage dip/short interruptions EN61000-4-11: 0.5 cycle, 0.180° each, polarity 100% (rated voltage)

Connections

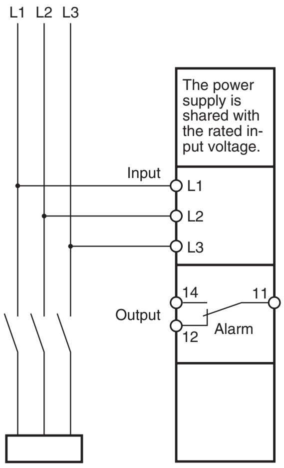
■ Wiring Diagram

Phase Sequence and Phase Loss Operation Diagram



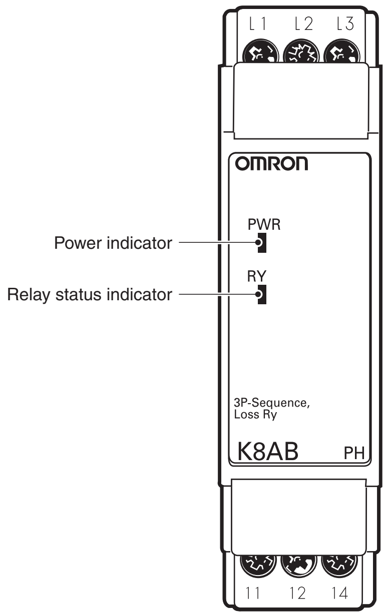
Note: 1. Motor load phase loss cannot be detected. To detect motor load phase loss, use the K8AB-PM or K8AB-PA.

2. The K8AB-PH output relay is normally operative.



Nomenclature

■ Front

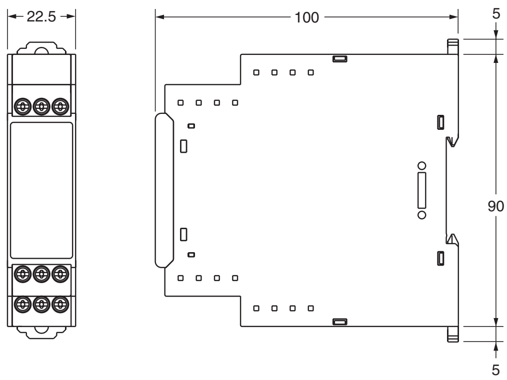


Indicators

Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied.
Relay status indicator (RY: Yellow)	Lit when relay is operating (normally lit).

Dimensions

K8AB-PH



Safety Precautions

■ Precautions for Safe Use

Make sure to follow the instructions below to ensure safety.

1. Do not use or keep this product in the following environments.
   - Outdoors, or places subject to direct sunlight or wearing weather.
   - Places where dust, iron powder, or corrosive gases (in particular, sulfuric or ammonia gas) exist.
   - Places subject to static electricity or inductive noise.
   - Places where water or oil come in contact with the product.
2. Make sure to install this product in the correct direction.
3. There is a remote risk of electric shock. Do not touch terminals while electricity is being supplied.
4. Make sure to thoroughly understand all instructions in the Instructions Manual before handling this product.
5. Make sure to confirm terminal makings and polarity for correct wiring.
6. Tighten terminal screws firmly using the following torque. Recommended torque: 0.54 N·m
7. Operating ambient temperature and humidity for this product must be within the indicated rating when using this product.
8. There is a remote risk of explosion. Do not use this product where flammable or explosive gas exists.
9. Make sure that no weight rests on the product after installation.
10. To enable an operator to turn off this product easily, install switches or circuit breakers that conform to relevant requirements of IEC60947-1 and IEC60947-3, and label them appropriately.

■ Precautions for Correct Use

For Proper Use

1. Do not use the product in the following locations.
   - Places subject to radiant heat from heat generating devices.
   - Places subject to vibrations or physical shocks.
2. Make sure to use setting values appropriate for the controlled object. Failure to do so can cause unintended operation, and may result in accident or corruption of the product.
3. Do not use thinner or similar solvent for cleaning. Use commercial alcohol.
4. When discarding, properly dispose of the product as industrial waste.
5. Only use this product within a board whose structure allows no possibility for fire to escape.

About Installation

1. When wiring, use only recommended crimp terminals.
2. Do not block areas around the product for proper dissipation of heat. (If you do not secure space for heat dissipation, life cycle of the product will be compromised.)
3. To avoid electrical shocks, make sure that power is not supplied to the product while wiring.
4. To avoid electrical shocks, make sure that power is not supplied to the product when performing DIP switch settings.

Noise Countermeasures

1. Do not install the product near devices generating strong high frequency waves or surges.
2. When using a noise filter, check the voltage and current and install it as close to the product as possible.
3. In order to prevent inductive noise, wire the lines connected to the product separately from power lines carrying high voltages or currents. Do not wire in parallel with or on the same cable as power lines.
   Other measures for reducing noise include running lines along separate ducts and using shield lines.

To avoid faulty operations, malfunctions, or failure, observe the following operating instructions.

1. When turning on the power, make sure to realize rated voltage within 1 second from the time of first supply of electricity.
2. Make sure to use power supply for operations, inputs, and transformer with the appropriate capacity and rated burden.
3. Maintenance and handling of this product may only be performed by qualified personnel.
4. Distortion ratio of input wave forms must be 30% or less. Use of this product with circuits that have large distortion in wave forms may result in unwanted operations.
5. Using this product for thyristor controls or inverters will result in errors.
6. When setting the volume, adjust the control from the minimum side to the maximum side.

Warranty and Application Considerations

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LIMITATIONS OF LIABILITY

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ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

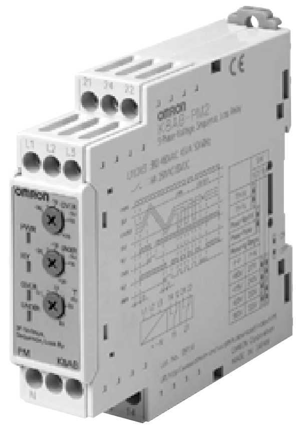
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. N145-E2-01

In the interest of product improvement, specifications are subject to change without notice.

Three-phase Phase-sequence Phase-loss Relay
K8AB-PM

Ideal for monitoring 3-phase power supplies for industrial facilities and equipment.



- Monitor overvoltages, undervoltages, phase sequence, and phase loss for three-phase 3-wire or 4-wire power supplies with just one Unit.
  Switch setting for 3-phase 3-wire or 3-phase 4-wire power supply.
- Two SPDT output relays, 6 A at 250 VAC (resistive load). Separate outputs possible for overvoltages and undervoltages.
- World-wide power specifications supported by one Unit (switchable).
- Relay warning status easily monitoring using LED indicator.
- Easy wiring with ferrules
  2 × 2.5 mm^2 solid or 2 × 1.5 mm^2 standard ferrules.
- CE mark compliance certified by third party.
  UL certification.

Model Number Structure

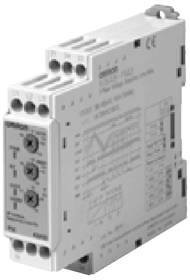
■ Model Number Legend

K8AB-□□
1 2 3

1. **Basic Model**
   K8AB: Measuring and Monitoring Relays
2. **Functions**
   PM: Three-phase Phase-sequence Phase-loss Relay (Simultaneous upper and lower monitoring)
3. **Rated Input Voltage**
   1: 115, 127, 133, 138, 200, 220, 230, 240 VAC
   2: 220, 230, 240, 277, 380, 400, 415, 480 VAC

Ordering Information

■ List of Models

Three-phase Phase-sequence Phase-loss Relay	Rated input (See note 2.)		Model
	3-phase 3-wire mode	200, 220, 230, 240 VAC	**K8AB-PM1**
	3-phase 4-wire mode	115, 127, 133, 138 VAC	
	3-phase 3-wire mode	380, 400, 415, 480 VAC	**K8AB-PM2**
	3-phase 4-wire mode	220, 230, 240, 277 VAC	

Note: 1. Three-phase 3-wire or 4-wire and the input range are switched using a switch.
2. The power supply is shared with the rated input voltage.

Ratings and Specifications

■ Ratings

Rated input voltage	**K8AB-PM1**	Three-phase, three-wire mode: 200, 220, 230, 240 VAC Three-phase, four-wire mode: 115, 127, 133, 138 VAC
	K8AB-PM2	Three-phase, three-wire mode: 380, 400, 415, 480 VAC Three-phase, four-wire mode: 220, 230, 240, 277 VAC
Operation (overvoltage or undervoltage)	**Operating value setting range**	Overvoltage = –30% to 25% of maximum rated input voltage Undervoltage = –30% to 25% of maximum rated input voltage Note: The rated input voltage is switched with a switch.
	Operating value	100% operation at set value
Reset (HYS.)	**Hysteresis**	5% of operating value (fixed)
	Resetting method	Automatic reset
Operating time (T)	**Overvoltage/undervoltage**	0.1 to 30 s (Value when input rapidly changes from 0% to 120%.)
	Phase sequence, phase loss	0.1 max. (Value when input rapidly changes from 0% to 100%.)
Power ON lock (LOCK)		1 s or 5 s error ±0.5 s (Value when input rapidly changes from 0% to 100%. The operating time is the shortest at this point.)
Setting accuracy		±10% of full scale
Time error		±10% of set value (Minimum error: 50 ms)
Input frequency		45 to 65 Hz
Input impedance		100 kΩ min.
Indicators		Power (PWR): Green LED, Relay output (RY): Yellow LED, Alarm outputs (ALM1/2): Red LED
Output relays		Two SPDT relays (6 A at 250 VAC, resistive load), Normally closed operation (normally ON) (separate outputs possible for overvoltages and undervoltages)

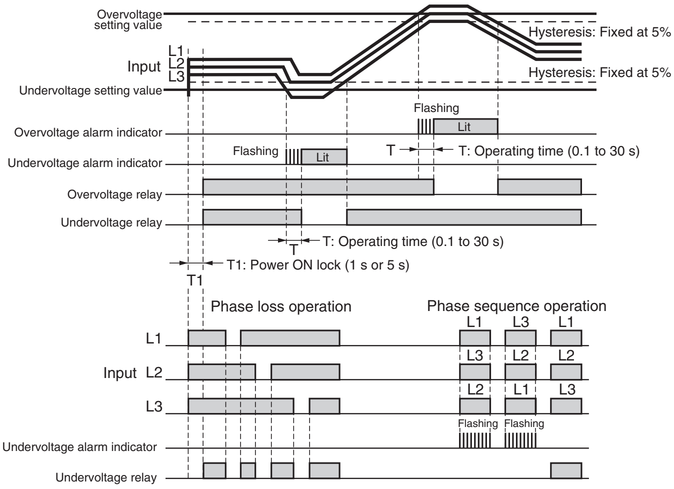
■ Specifications

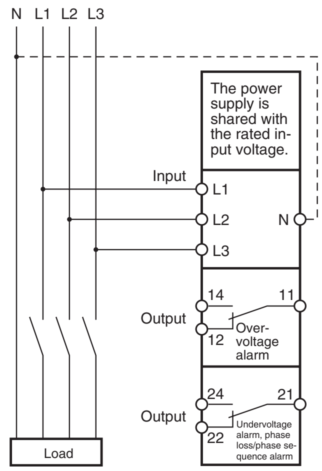
Ambient operating temperature		–20 to 60°C (with no condensation or icing)
Storage temperature		–40 to 70°C (with no condensation or icing)
Ambient operating humidity		25% to 85%
Storage humidity		25% to 85%
Altitude		2,000 m max.
Voltage fluctuation range		85% to 110% of rated input voltage
Input frequency		50/60 Hz ±5 Hz (AC power supply)
Output relays	**Resistive load**	6 A at 250 VAC (cos ϕ = 1) 6 A at 30 VDC (L/R = 0 ms)
	Inductive load	1 A at 250 VAC (cos ϕ = 0.4) 1 A at 30 VDC (L/R = 7 ms)
	Minimum load	10 mA at 5 VDC
	Maximum contact voltage	250 VAC
	Maximum contact current	6 A AC
	Maximum switching capacity	1,500 VA
	Mechanical life	10,000,000 operations
	Electrical life	Make: 50,000 times, Break: 30,000 times
Terminal screw tightening torque		1.2 N·m
Crimp terminals		Two solid wires of 2.5 mm^2, two crimp terminals of 1.5 mm^2 with insulation sleeves, can be tightened together
Insulation resistance		20 MΩ (at 500 V) between charged terminals and exposed uncharged parts 20 MΩ (at 500 V) between any charged terminals (i.e., between input, output, and power supply terminals)
Degree of protection		Terminal section: IP20, Rear case: IP40
Case color		Munsell 5Y8/1 (ivory)
Case material		ABS resin (self-extinguishing resin) UL94-V0
Weight		200 g
Mounting		Mounted to DIN-rail or via M4 screws
Dimensions		22.5 (W) x 90 (H) x 100 (D) mm
Installation environment		Overvoltage Category III, Pollution Degree 2
Application standards		EN60255-5/-6
Safety standards		EN60664-1
EMC		EMI: EN61326 Industrial applications Electromagnetic interference wave CISPR11 Group 1, Class A: CISPR16-1/-2 Terminal interference wave voltage CISPR11 Group 1, Class A: CISPR16-1/-2 EMS: EN61326 Industrial applications Electrostatic discharge EN61000-4-2: 8 kV (in air) Radiating radio-frequency electromagnetic field EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Burst EN61000-4-4: 1 kV (I/O signal line), 2 kV (power line) Surge EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted RF EN61000-4-6: 3 V (0.15 to 80 MHz) Power frequency magnetic field immunity EN61000-4-8: 30 A/m Voltage dip/short interruptions EN61000-4-11: 0.5 cycle, 0.180° each, polarity 100% (rated voltage)

Connections

■ Wiring Diagram

Overvoltage/Undervoltage and Phase Sequence/Phase Loss Operation Diagram



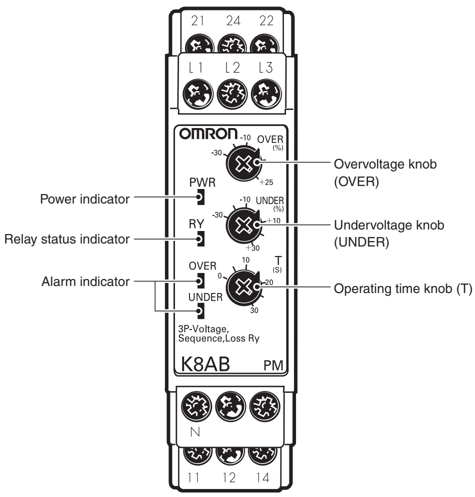


Note: 1. The K8AB-PM output relay is normally operative.

2. The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.

Nomenclature

■ Front



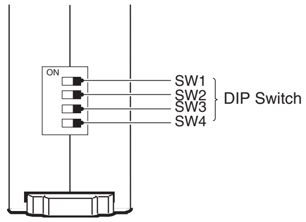
Indicators

Item		Meaning
Power indicator (PWR: Green)		Lit when power is being supplied.
Relay status indicator (RY: Yellow)		Lit when relay is operating (normally lit).
Alarm indicator (ALM: Red)	Overvoltage: Red	Lit for overvoltage. The indicator flashes to indicate the error status after the overvoltage has exceeded the threshold value while the operating time is being clocked.
	Undervoltage: Red	• Lit for an undervoltage or phase loss. The indicator flashes to indicate the error status after the undervoltage has exceeded the threshold value while the operating time is being clocked. • Lit for phase sequence error.

Setting Knobs

Item	Usage
Overvoltage knob (OVER)	Used to set the voltage to –30% to 25% of the rated input voltage.
Undervoltage knob (UNDER)	Used to set the voltage to –30% to 25% of the rated input voltage.
Operating time knob (T)	Used to set the operating time to 0.1 to 30 s.

■ Function Selection DIP Switch



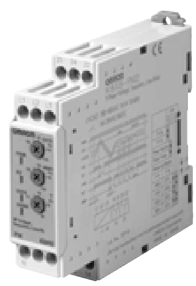
DIP Switch Functions

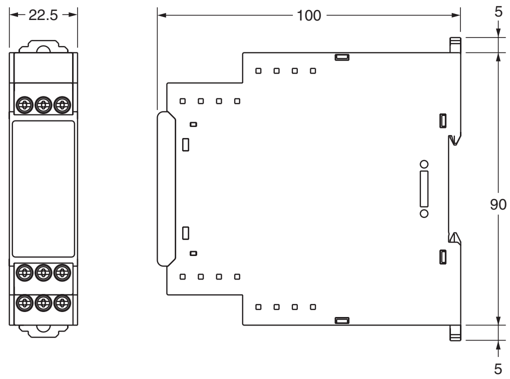
	Function			Default
SW1	Power ON lock time	OFF	1 s	OFF
		ON	5 s	
SW2	Monitoring mode selector	OFF	3-phase 3-wire power monitoring mode	OFF
		ON	3-phase 4-wire power monitoring mode	

SW3	SW4	Function			Default	
			3-phase 3-wire mode	3-phase 4-wire mode	SW3	SW4
OFF	OFF	Rated input voltage switch (K8AB-PM1)	200 VAC	115 VAC	OFF	OFF
ON	OFF		220 VAC	127 VAC		
OFF	ON		230 VAC	133 VAC		
ON	ON		240 VAC	138 VAC		
OFF	OFF	Rated input voltage switch (K8AB-PM2)	380 VAC	220 VAC	OFF	OFF
ON	OFF		400 VAC	230 VAC		
OFF	ON		415 VAC	240 VAC		
ON	ON		480 VAC	277 VAC		

Dimensions

K8AB-PM





Safety Precautions

■ Precautions for Safe Use

Make sure to follow the instructions below to ensure safety.

1. Do not use or keep this product in the following environments.
   - Outdoors, or places subject to direct sunlight or wearing weather.
   - Places where dust, iron powder, or corrosive gases (in particular, sulfuric or ammonia gas) exist.
   - Places subject to static electricity or inductive noise.
   - Places where water or oil come in contact with the product.
2. Make sure to install this product in the correct direction.
3. There is a remote risk of electric shock. Do not touch terminals while electricity is being supplied.
4. Make sure to thoroughly understand all instructions in the Instructions Manual before handling this product.
5. Make sure to confirm terminal makings and polarity for correct wiring.
6. Tighten terminal screws firmly using the following torque. Recommended torque: 0.54 N·m
7. Operating ambient temperature and humidity for this product must be within the indicated rating when using this product.
8. There is a remote risk of explosion. Do not use this product where flammable or explosive gas exists.
9. Make sure that no weight rests on the product after installation.
10. To enable an operator to turn off this product easily, install switches or circuit breakers that conform to relevant requirements of IEC60947-1 and IEC60947-3, and label them appropriately.

■ Precautions for Correct Use

For Proper Use

1. Do not use the product in the following locations.
   - Places subject to radiant heat from heat generating devices.
   - Places subject to vibrations or physical shocks.
2. Make sure to use setting values appropriate for the controlled object. Failure to do so can cause unintended operation, and may result in accident or corruption of the product.
3. Do not use thinner or similar solvent for cleaning. Use commercial alcohol.
4. When discarding, properly dispose of the product as industrial waste.
5. Only use this product within a board whose structure allows no possibility for fire to escape.

About Installation

1. When wiring, use only recommended crimp terminals.
2. Do not block areas around the product for proper dissipation of heat. (If you do not secure space for heat dissipation, life cycle of the product will be compromised.)
3. To avoid electrical shocks, make sure that power is not supplied to the product while wiring.
4. To avoid electrical shocks, make sure that power is not supplied to the product when performing DIP switch settings.

Noise Countermeasures

1. Do not install the product near devices generating strong high frequency waves or surges.
2. When using a noise filter, check the voltage and current and install it as close to the product as possible.
3. In order to prevent inductive noise, wire the lines connected to the product separately from power lines carrying high voltages or currents. Do not wire in parallel with or on the same cable as power lines.
   Other measures for reducing noise include running lines along separate ducts and using shield lines.

To avoid faulty operations, malfunctions, or failure, observe the following operating instructions.

1. When turning on the power, make sure to realize rated voltage within 1 second from the time of first supply of electricity.
2. Make sure to use power supply for operations, inputs, and transformer with the appropriate capacity and rated burden.
3. Maintenance and handling of this product may only be performed by qualified personnel.
4. Distortion ratio of input wave forms must be 30% or less. Use of this product with circuits that have large distortion in wave forms may result in unwanted operations.
5. Using this product for thyristor controls or inverters will result in errors.
6. When setting the volume, adjust the control from the minimum side to the maximum side.

Warranty and Application Considerations

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Warranty and Limitations of Liability

WARRANTY

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OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability.*

CHANGE IN SPECIFICATIONS

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DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

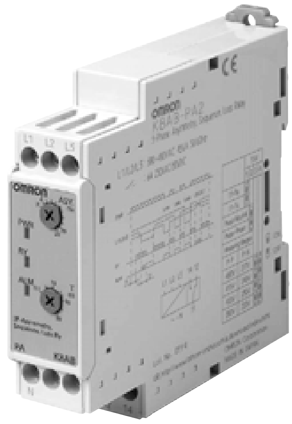
Cat. No. N146-E2-01

In the interest of product improvement, specifications are subject to change without notice.

Three-phase Asymmetry and Phase-sequence Phase-loss Relay
K8AB-PA

Ideal for 3-phase voltage asymmetry monitoring for industrial facilities and equipment.

- Monitor voltage asymmetry, phase sequence, and phase loss for three-phase 3-wire or 4-wire power supplies with just one Unit.
  Switch setting for 3-phase 3-wire or 3-phase 4-wire power supply.
- One SPDT output relay, 6 A at 250 VAC (resistive load).
- World-wide power specifications supported by one Unit (switchable).
- Relay warning status easily monitoring using LED indicator.
- Easy wiring with ferrules
  2×2.5 mm^2 solid or 2×1.5 mm^2 standard ferrules.
- CE mark compliance certified by third party.
  UL certification.



CE

Model Number Structure

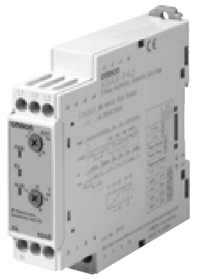
■ Model Number Legend

K8AB-□□
1 2 3

1. **Basic Model**
   K8AB: Measuring and Monitoring Relays
2. **Functions**
   PA: Three-phase Asymmetry and Phase-sequence Phase-loss Relay.
3. **Rated Input Voltage**
   1: AC 115, 127, 133, 138, 200, 220, 230, 240
   2: AC 220, 230, 240, 277, 380, 400, 415, 480

Ordering Information

■ List of Models

Three-phase Asymmetry and Phase-sequence Phase-loss Relay	Rated input (See note 2.)		Model
	3-phase 3-wire mode	AC 200, 220, 230, 240	**K8AB-PA1**
	3-phase 4-wire mode	AC 115, 127, 133, 138	
	3-phase 3-wire mode	AC 380, 400, 415, 480	**K8AB-PA2**
	3-phase 4-wire mode	AC 220, 230, 240, 277	

Note: 1. Three-phase 3-wire or 4-wire and the input range are switched using a switch.
2. The power supply is shared with the rated input voltage.

Ratings and Specifications

■ Ratings

Rated input voltage	**K8AB-PA1**	Three-phase, three-wire mode: 200, 220, 230, 240 VAC Three-phase, four-wire mode: 115, 127, 133, 138 VAC
	K8AB-PA2	Three-phase, three-wire mode: 380, 400, 415, 480 VAC Three-phase, four-wire mode: 220, 230, 240, 277 VAC
Asymmetry operation (ASY.)	**Operating value setting range**	Asymmetry rate: 2% to 22%
	Operating value	100% operation at set value Asymmetry operating value = Rated input voltage x Asymmetry set value [%] The asymmetry operation will function when the difference between the highest and lowest voltage phases equals or exceeds the asymmetry operating value.
Reset (HYS.)	**Hysteresis**	5% of operating value (fixed)
	Resetting method	Automatic reset
Operating time (T)	**Asymmetry**	0.1 s to 30 s (Value when input rapidly changes from 0% to 120%.)
	Phase sequence, phase loss	0.1 s max. (Value when input rapidly changes from 0% to 100%.)
Power ON lock (LOCK)		1 s or 5 s (Value when input rapidly changes from 0% to 100%. The operating time is the shortest at this point.)
Setting accuracy		±10% of full scale
Time error		±10% of set value (Minimum error: 50 ms)
Input frequency		45 to 65 Hz
Input impedance		100 kΩ min.
Indicators		Power (PWR): Green LED, Relay output (RY): Yellow LED, Alarm outputs (ALM1/2): Red LED
Output relays		One SPDT relay (6 A at 250 VAC, resistive load) , normally closed operation (normally ON)

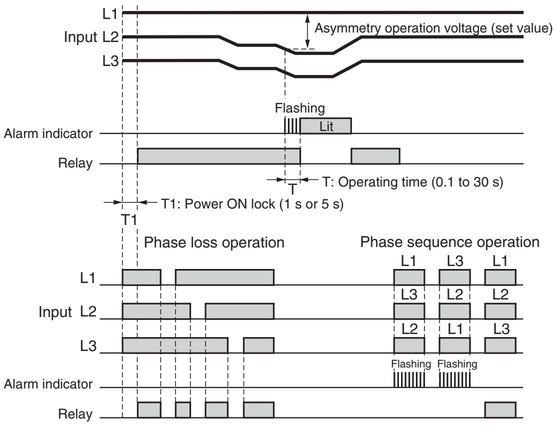
■ Specifications

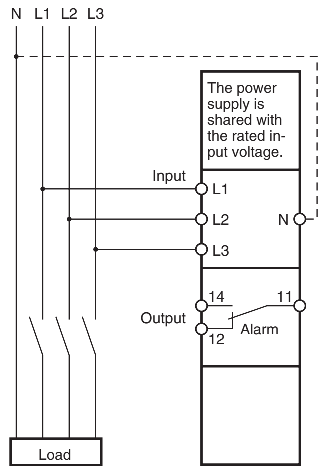
Ambient operating temperature		–20 to 60°C (with no condensation or icing)
Storage temperature		–40 to 70°C (with no condensation or icing)
Ambient operating humidity		25% to 85%
Storage humidity		25% to 85%
Altitude		2,000 m max.
Voltage fluctuation range		85% to 110% of rated input voltage
Input frequency		50/60 Hz ±5 Hz (AC power supply)
Output relays	**Resistive load**	6 A at 250 VAC (cos ϕ = 1) 6 A at 30 VDC (L/R = 0 ms)
	Inductive load	1 A at 250 VAC (cos ϕ = 0.4) 1 A at 30 VDC (L/R = 7 ms)
	Minimum load	10 mA at 5 VDC
	Maximum contact voltage	250 VAC
	Maximum contact current	6 A AC
	Maximum switching capacity	1,500 VA
	Mechanical life	10,000,000 operations
	Electrical life	Make: 50,000 times, Break: 30,000 times
Terminal screw tightening torque		1.2 N·m
Crimp terminals		Two solid wires of 2.5 mm^2, two crimp terminals of 1.5 mm^2 with insulation sleeves, can be tightened together
Insulation resistance		20 MΩ (at 500 V) between charged terminals and exposed uncharged parts 20 MΩ (at 500 V) between any charged terminals (i.e., between input, output, and power supply terminals)
Degree of protection		Terminal section: IP20, Rear case: IP40
Case color		Munsell 5Y8/1 (ivory)
Case material		ABS resin (self-extinguishing resin) UL94-V0
Weight		200 g
Mounting		Mounted to DIN-rail or via M4 screws
Dimensions		22.5 (W) x 90 (H) x 100 (D) mm
Installation environment		Overvoltage Category III, Pollution Degree 2
Application standards		EN60255-5/-6
Safety standards		EN60664-1
EMC		EMI: EN61326 Industrial applications Electromagnetic interference wave CISPR11 Group 1, Class A: CISPR16-1/-2 Terminal interference wave voltage CISPR11 Group 1, Class A: CISPR16-1/-2 EMS: EN61326 Industrial applications Electrostatic discharge EN61000-4-2: 8 kV (in air) Radiating radio-frequency electromagnetic field EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Burst EN61000-4-4: 1 kV (I/O signal line), 2 kV (power line) Surge EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted RF EN61000-4-6: 3 V (0.15 to 80 MHz) Power frequency magnetic field immunity EN61000-4-8: 30 A/m Voltage dip/short interruptions EN61000-4-11: 0.5 cycle, 0.180° each, polarity 100% (rated voltage)

Connections

■ Wiring Diagram

Voltage Asymmetry and Phase Sequence/Phase Loss Operation Diagram





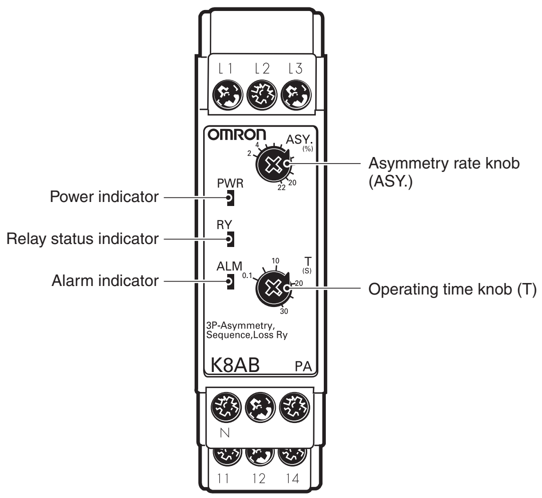
Note: 1. The K8AB-PA output relay is normally operative.
2. The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.

Calculating the Asymmetry Operating Voltage

Asymmetry operation condition = (Highest voltage – Lowest voltage) > Asymmetry operating voltage
Asymmetry operating voltage = Rated input voltage (V) × Asymmetry set value (%)
Note: The rated input voltage is selected and set with the DIP switch.

Nomenclature

■ Front



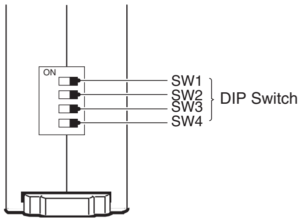
Indicators

Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied.
Relay status indicator (RY: Yellow)	Lit when relay is operating (normally lit).
Alarm indicator (ALM: Red)	Asymmetry voltage error indicator The indicator flashes to indicate the error status after the input has exceeded the threshold value while the operating time is being clocked.

Setting Knobs

Item	Usage
Asymmetry rate knob (SV)	Used to set the asymmetry rate to 2% to 22%.
Operating time knob (T)	Used to set the operating time to 0.1 to 30 s.

■ Bottom



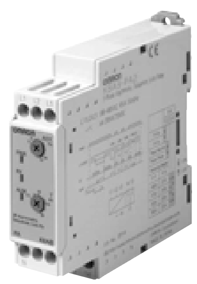
DIP Switch Functions

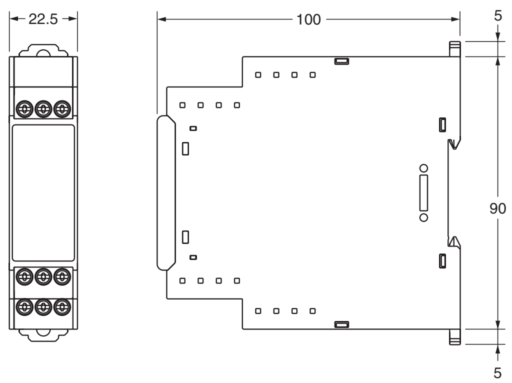
	Function			Default
SW1	Power ON lock time	OFF	1 s	OFF
		ON	5 s	
SW2	Monitoring mode selector	OFF	3-phase 3-wire power monitoring mode	OFF
		ON	3-phase 4-wire power monitoring mode	

SW3	**SW4**	**Function**			**Default**	
			3-phase 3-wire mode	**3-phase 4-wire mode**	**SW3**	**SW4**
OFF	OFF	Rated input voltage switch (K8AB-PA1)	200 VAC	115 VAC	OFF	OFF
ON	OFF		220 VAC	127 VAC		
OFF	ON		230 VAC	133 VAC		
ON	ON		240 VAC	138 VAC		
OFF	OFF	Rated input voltage switch (K8AB-PA2)	380 VAC	220 VAC	OFF	OFF
ON	OFF		400 VAC	230 VAC		
OFF	ON		415 VAC	240 VAC		
ON	ON		480 VAC	277 VAC		

Dimensions

K8AB-PA





Safety Precautions

■ Precautions for Safe Use

Make sure to follow the instructions below to ensure safety.

1. Do not use or keep this product in the following environments.
   - Outdoors, or places subject to direct sunlight or wearing weather.
   - Places where dust, iron powder, or corrosive gases (in particular, sulfuric or ammonia gas) exist.
   - Places subject to static electricity or inductive noise.
   - Places where water or oil come in contact with the product.
2. Make sure to install this product in the correct direction.
3. There is a remote risk of electric shock. Do not touch terminals while electricity is being supplied.
4. Make sure to thoroughly understand all instructions in the Instructions Manual before handling this product.
5. Make sure to confirm terminal makings and polarity for correct wiring.
6. Tighten terminal screws firmly using the following torque. Recommended torque: 0.54 N·m
7. Operating ambient temperature and humidity for this product must be within the indicated rating when using this product.
8. There is a remote risk of explosion. Do not use this product where flammable or explosive gas exists.
9. Make sure that no weight rests on the product after installation.
10. To enable an operator to turn off this product easily, install switches or circuit breakers that conform to relevant requirements of IEC60947-1 and IEC60947-3, and label them appropriately.

■ Precautions for Correct Use

For Proper Use

1. Do not use the product in the following locations.
   - Places subject to radiant heat from heat generating devices.
   - Places subject to vibrations or physical shocks.
2. Make sure to use setting values appropriate for the controlled object. Failure to do so can cause unintended operation, and may result in accident or corruption of the product.
3. Do not use thinner or similar solvent for cleaning. Use commercial alcohol.
4. When discarding, properly dispose of the product as industrial waste.
5. Only use this product within a board whose structure allows no possibility for fire to escape.

About Installation

1. When wiring, use only recommended crimp terminals.
2. Do not block areas around the product for proper dissipation of heat. (If you do not secure space for heat dissipation, life cycle of the product will be compromised.)
3. To avoid electrical shocks, make sure that power is not supplied to the product while wiring.
4. To avoid electrical shocks, make sure that power is not supplied to the product when performing DIP switch settings.

Noise Countermeasures

1. Do not install the product near devices generating strong high frequency waves or surges.
2. When using a noise filter, check the voltage and current and install it as close to the product as possible.
3. In order to prevent inductive noise, wire the lines connected to the product separately from power lines carrying high voltages or currents. Do not wire in parallel with or on the same cable as power lines.
   Other measures for reducing noise include running lines along separate ducts and using shield lines.

To avoid faulty operations, malfunctions, or failure, observe the following operating instructions.

1. When turning on the power, make sure to realize rated voltage within 1 second from the time of first supply of electricity.
2. Make sure to use power supply for operations, inputs, and transformer with the appropriate capacity and rated burden.
3. Maintenance and handling of this product may only be performed by qualified personnel.
4. Distortion ratio of input wave forms must be 30% or less. Use of this product with circuits that have large distortion in wave forms may result in unwanted operations.
5. Using this product for thyristor controls or inverters will result in errors.
6. When setting the volume, adjust the control from the minimum side to the maximum side.

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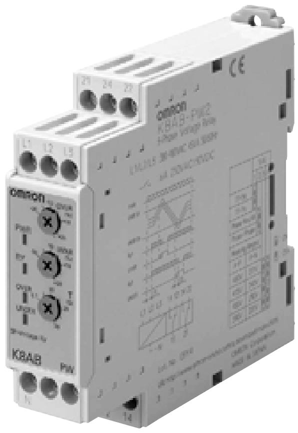
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. N147-E2-01

In the interest of product improvement, specifications are subject to change without notice.

Three-phase Voltage Relay
K8AB-PW

Ideal for monitoring 3-phase power supplies for industrial facilities and equipment.



- Monitor overvoltages and undervoltages for three-phase 3-wire or 4-wire power supplies.
  Switch setting for 3-phase 3-wire or 3-phase 4-wire power supply.
- Two SPDT output relays, 6 A at 250 VAC (resistive load).
  Separate outputs possible for overvoltages and undervoltages.
- World-wide power specifications supported by one Unit (switchable).
- Relay warning status easily monitoring using LED indicator.
- Easy wiring with ferrules
  2×2.5 mm^2 solid or 2×1.5 mm^2 standard ferrules.
- CE mark compliance certified by third party.
  UL certification.

Model Number Structure

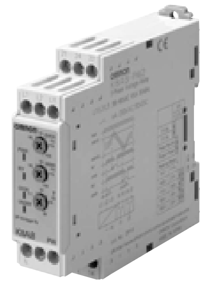
■ Model Number Legend

K8AB-□□
1 2 3

1. **Basic Model**
   K8AB: Measuring and Monitoring Relays
2. **Functions**
   PW: Three-phase Voltage Relay (Simultaneous upper and lower monitoring)
3. **Rated Input Voltage**
   1: 115, 127, 133, 138, 200, 220, 230, 240 VAC
   2: 220, 230, 240, 277, 380, 400, 415, 480 VAC

Ordering Information

■ List of Models

Three-phase Voltage Relay	Rated input (See note 2.)		Model
	3-phase 3-wire mode	200, 220, 230, 240 VAC	**K8AB-PW1**
	3-phase 4-wire mode	115, 127, 133, 138 VAC	
	3-phase 3-wire mode	380, 400, 415, 480 VAC	**K8AB-PW2**
	3-phase 4-wire mode	220, 230, 240, 277 VAC	

Note: 1. Three-phase 3-wire or 4-wire and the input range are switched using a switch.
2. The power supply is shared with the rated input voltage.

Ratings and Specifications

■ Ratings

Rated input voltage	**K8AB-PW1**	Three-phase, three-wire mode: 200, 220, 230, 240 VAC Three-phase, four-wire mode: 115, 127, 133, 138 VAC
	K8AB-PW2	Three-phase, three-wire mode: 380, 400, 415, 480 VAC Three-phase, four-wire mode: 220, 230, 240, 277 VAC
Operation (overvoltage and undervoltage)	**Operating value setting range**	Overvoltage = –30% to 25% of maximum rated input voltage Undervoltage = –30% to 25% of maximum rated input voltage Note: The rated input voltage is switched with a switch.
	Operating value	100% operation at set value
Reset (HYS.)	**Hysteresis**	5% of operating value (fixed)
	Resetting method	Automatic reset
Operating time (T)	**Overvoltage/ undervoltage**	0.1 to 30 s (Value when input rapidly changes from 0% to 120%.)
Power ON lock (LOCK)		1 s or 5 s (Value when input rapidly changes from 0% to 100%. The operating time is the shortest at this point.)
Setting accuracy		±10% of full scale
Time error		±10% of set value (Minimum error: 50 ms)
Input frequency		45 to 65 Hz
Input impedance		100 kΩ min.
Indicators		Power (PWR): Green LED, Relay output (RY): Yellow LED, Alarm outputs (ALM1/2): Red LED
Output relays		Two SPDT relays (6 A at 250 VAC, resistive load) Normally closed operation (normally ON) (separate outputs possible for overvoltages and undervoltages)

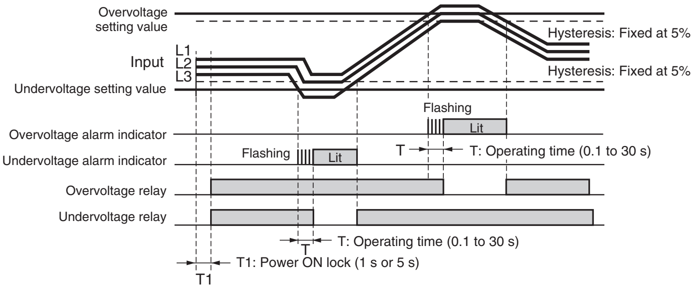
■ Specifications

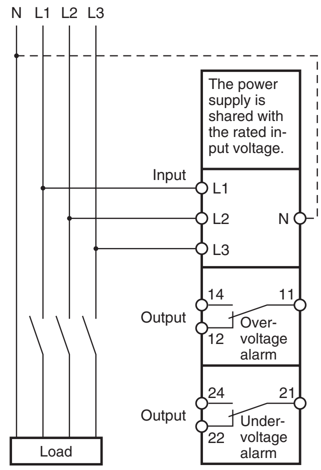
Ambient operating temperature		–20 to 60°C (with no condensation or icing)
Storage temperature		–40 to 70°C (with no condensation or icing)
Ambient operating humidity		25% to 85%
Storage humidity		25% to 85%
Altitude		2,000 m max.
Voltage fluctuation range		85% to 110% of rated input voltage
Input frequency		50/60 Hz ±5 Hz (AC power supply)
Output relays	**Resistive load**	6 A at 250 VAC (cos ϕ = 1) 6 A at 30 VDC (L/R = 0 ms)
	Inductive load	1 A at 250 VAC (cos ϕ = 0.4) 1 A at 30 VDC (L/R = 7 ms)
	Minimum load	10 mA at 5 VDC
	Maximum contact voltage	250 VAC
	Maximum contact current	6 A AC
	Maximum switching capacity	1,500 VA
	Mechanical life	10,000,000 operations
	Electrical life	Make: 50,000 times, Break: 30,000 times
Terminal screw tightening torque		1.2 N·m
Crimp terminals		Two solid wires of 2.5 mm^2, two crimp terminals of 1.5 mm^2 with insulation sleeves, can be tightened together
Insulation resistance		20 MΩ (at 500 V) between charged terminals and exposed uncharged parts 20 MΩ (at 500 V) between any charged terminals (i.e., between input, output, and power supply terminals)
Degree of protection		Terminal section: IP20, Rear case: IP40
Case color		Munsell 5Y8/1 (ivory)
Case material		ABS resin (self-extinguishing resin) UL94-V0
Weight		200 g
Mounting		Mounted to DIN-rail or via M4 screws
Dimensions		22.5 (W) x 90 (H) x 100 (D) mm
Installation environment		Overvoltage Category III, Pollution Degree 2
Application standards		EN60255-5/-6
Safety standards		EN60664-1
EMC		EMI: EN61326 Industrial applications Electromagnetic interference wave CISPR11 Group 1, Class A: CISPR16-1/-2 Terminal interference wave voltage CISPR11 Group 1, Class A: CISPR16-1/-2 EMS: EN61326 Industrial applications Electrostatic discharge EN61000-4-2: 8 kV (in air) Radiating radio-frequency electromagnetic field EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Burst EN61000-4-4: 1 kV (I/O signal line), 2 kV (power line) Surge EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted RF EN61000-4-6: 3 V (0.15 to 80 MHz) Power frequency magnetic field immunity EN61000-4-8: 30 A/m Voltage dip/short interruptions EN61000-4-11: 0.5 cycle, 0.180° each, polarity 100% (rated voltage)

Connections

■ Wiring Diagram

Overvoltage and Undervoltage Operation Diagram



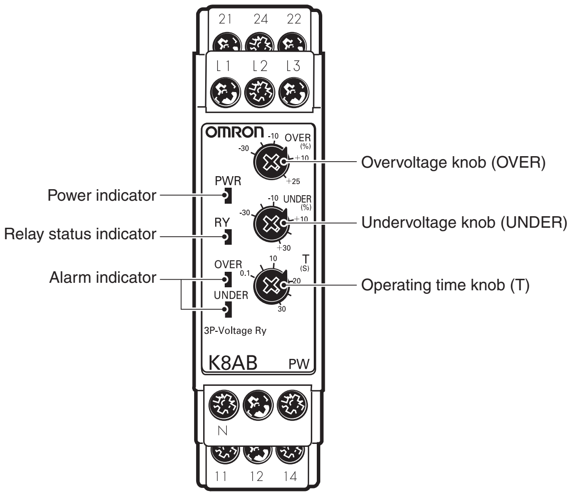


Note: 1. The K8AB-PW output relay is normally operative.

2. The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.

Nomenclature

■ Front



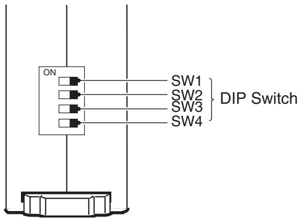
Indicators

Item		Meaning
Power indicator (PWR: Green)		Lit when power is being supplied.
Relay status indicator (RY: Yellow)		Lit when relay is operating (normally lit).
Alarm indicator (ALM: Red)	Overvoltage: Red	The indicator flashes to indicate the error status after the overvoltage has exceeded the threshold value while the operating time is being clocked.
	Undervoltage: Red	The indicator flashes to indicate the error status after the undervoltage has exceeded the threshold value while the operating time is being clocked.

Setting Knobs

Item	Usage
Overvoltage knob (OVER)	Used to set the voltage to –30% to 25% of the rated input voltage.
Undervoltage knob (UNDER)	Used to set the voltage to –30% to 25% of the rated input voltage.
Operating time knob (T)	Used to set the operating time to 0.1 to 30 s.

■ Bottom



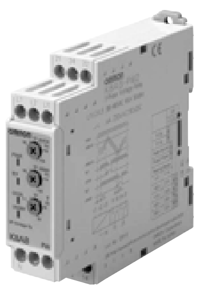
DIP Switch Functions

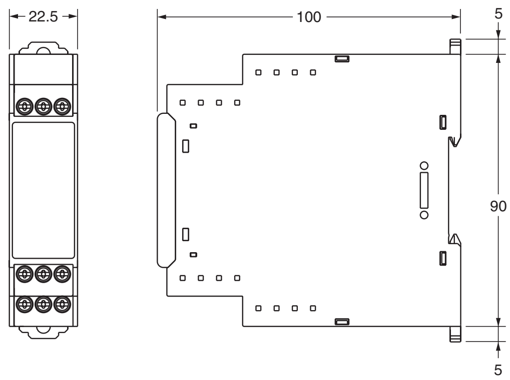
	Function			Default
SW1	Power ON lock time	OFF	1 s	OFF
		ON	5 s	
SW2	Monitoring mode selector	OFF	3-phase 3-wire power monitoring mode	OFF
		ON	3-phase 4-wire power monitoring mode	

SW3	**SW4**	**Function**			**Default**	
			3-phase 3-wire mode	**3-phase 4-wire mode**	**SW3**	**SW4**
OFF	OFF	Rated input voltage switch (K8AB-PW1)	200 VAC	115 VAC	OFF	OFF
ON	OFF		220 VAC	127 VAC		
OFF	ON		230 VAC	133 VAC		
ON	ON		240 VAC	138 VAC		
OFF	OFF	Rated input voltage switch (K8AB-PW2)	380 VAC	220 VAC	OFF	OFF
ON	OFF		400 VAC	230 VAC		
OFF	ON		415 VAC	240 VAC		
ON	ON		480 VAC	277 VAC		

Dimensions

K8AB-PW





Safety Precautions

■ Precautions for Safe Use

Make sure to follow the instructions below to ensure safety.

1. Do not use or keep this product in the following environments.
   - Outdoors, or places subject to direct sunlight or wearing weather.
   - Places where dust, iron powder, or corrosive gases (in particular, sulfuric or ammonia gas) exist.
   - Places subject to static electricity or inductive noise.
   - Places where water or oil come in contact with the product.

2. Make sure to install this product in the correct direction.
3. There is a remote risk of electric shock. Do not touch terminals while electricity is being supplied.
4. Make sure to thoroughly understand all instructions in the Instructions Manual before handling this product.
5. Make sure to confirm terminal makings and polarity for correct wiring.
6. Tighten terminal screws firmly using the following torque. Recommended torque: 0.54 N·m
7. Operating ambient temperature and humidity for this product must be within the indicated rating when using this product.
8. There is a remote risk of explosion. Do not use this product where flammable or explosive gas exists.
9. Make sure that no weight rests on the product after installation.
10. To enable an operator to turn off this product easily, install switches or circuit breakers that conform to relevant requirements of IEC60947-1 and IEC60947-3, and label them appropriately.

■ Precautions for Correct Use

For Proper Use

1. Do not use the product in the following locations.
   - Places subject to radiant heat from heat generating devices.
   - Places subject to vibrations or physical shocks.

2. Make sure to use setting values appropriate for the controlled object. Failure to do so can cause unintended operation, and may result in accident or corruption of the product.
3. Do not use thinner or similar solvent for cleaning. Use commercial alcohol.
4. When discarding, properly dispose of the product as industrial waste.
5. Only use this product within a board whose structure allows no possibility for fire to escape.

About Installation

1. When wiring, use only recommended crimp terminals.
2. Do not block areas around the product for proper dissipation of heat. (If you do not secure space for heat dissipation, life cycle of the product will be compromised.)
3. To avoid electrical shocks, make sure that power is not supplied to the product while wiring.
4. To avoid electrical shocks, make sure that power is not supplied to the product when performing DIP switch settings.

Noise Countermeasures

1. Do not install the product near devices generating strong high frequency waves or surges.
2. When using a noise filter, check the voltage and current and install it as close to the product as possible.
3. In order to prevent inductive noise, wire the lines connected to the product separately from power lines carrying high voltages or currents. Do not wire in parallel with or on the same cable as power lines.
Other measures for reducing noise include running lines along separate ducts and using shield lines.

To avoid faulty operations, malfunctions, or failure, observe the following operating instructions.

1. When turning on the power, make sure to realize rated voltage within 1 second from the time of first supply of electricity.
2. Make sure to use power supply for operations, inputs, and transformer with the appropriate capacity and rated burden.
3. Maintenance and handling of this product may only be performed by qualified personnel.
4. Distortion ratio of input wave forms must be 30% or less. Use of this product with circuits that have large distortion in wave forms may result in unwanted operations.
5. Using this product for thyristor controls or inverters will result in errors.
6. When setting the volume, adjust the control from the minimum side to the maximum side.

Warranty and Application Considerations

Read and Understand this Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability.*

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

Conductive Level Controller

61F-GP-N8

Compact Plug-in Level Controllers for Single or Two-point Level Control of Conductive Materials (Liquids and Solids)

- Wide range of models: long-distance, high and low-sensitivity, and two-wired types available.
- 24/100/110/120/200/220/230/240 VAC operation possible.
- Easy installation on DIN-rail.
- Low-voltage (AC) electrodes.
- Red LED operation indicator provided.
- Conforms to EMC and LVD Directives.
- UL/CSA approved.

Model Number Structure

■ Model Number Legend

61F-GP-N8□
1 2 3

1. **Plug-in Type**
2. **Compact 8-pin Type**
3. **Applications**
   None: General-purpose type
   L: Long-distance type
   H: High-sensitivity type (reverse acting)
   HY: High-sensitivity type (standard acting)
   D: Low-sensitivity type
   R: Two-wired type

Ordering Information

■ List of Models

Application		Model number
General-purpose type		61F-GP-N8
Long-distance type	2 km	61F-GP-N8L 2KM
	4 km	61F-GP-N8L 4KM
High-sensitivity type		61F-GP-N8H
Low-sensitivity type		61F-GP-N8D
Two-wired type		61F-GP-N8R

Monitoring products

■ Accessories (Order Separately)

Selection Guide for Electrode Holders and Separators

Electrode Holders

Applications		For city water and other general-use electrodes. Easy-to-replace separate versions facilitate maintenance of electrodes.	When mounting space is limited. Special 3-pole holder of small size and light weight. Ideal for soft drink vendors, etc., where only limited space is available.	For low specific liquids. Used for sewage, sea water, etc., having a low specific resistance. In sewage use, electrode holders must be installed 10 to 20 cm apart from one another. For acids, alkalis and sea water, electrode holders may be as much as 1 meter apart to operate properly.	When resistance to high pressure is required. Ideal for use in tanks where temperature or pressure inside the tank is high, e.g. 250°C
Mounting style		Flange	Screw	Flange	Screw
Insulator material		Phenol resin	Phenol resin	Ceramics	PTFE
Max. temperature		70°C		150°C (without water drips or vapor on the surface of the electrode holder)	250°C (without water drips or vapor on the surface of the electrode holder)
No. of electrodes	**1**	---	---	BF-1	BS-1
	3	PS-3S	PS-31	---	---

Electrode Separators

No. of electrodes	Model
1	F03-14 1P
3	F03-14 3P

Selection Guide for Electrodes, Connecting, and Lock Nuts

Applicable liquids	Material	Models for individual electrode assembly components					
		Electrode (1m long)		Connecting nut		Lock nut	
		Model	Indication mark	Model	Inscription	Model	Inscription
Purified city water, industrial water, sewage	**Equivalent to SUS 304 (AISI-304)**	F03-01 SUS201	1 line	F03-02 SUS201	---	F03-03 SUS201	---
Purified city water, industrial water, sewage, dilute alkaline solution	**SUS316 (AISI-316)**	F03-01 SUS316	2 lines	F03-02 SUS316	6	F03-03 SUS316	316

Specifications

■ Ratings and Characteristics

Model/Items	General-purpose Controller 61F-GP-N8	Long-distance Controllers 61F-GP-N8L 2KM (for 2 km) 61F-GP-N8L 4KM (for 4 km)	High-sensitivity Controllers 61F-GP-N8H 61F-GP-N8HY (see note 1)	Low-sensitivity Controller 61F-GP-N8D	Two-wired Controller 61F-GP-N8R
Controlling materials and operating conditions	For control of ordinary purified water or sewage water	For control of ordinary purified water in cases where the distance between sewage pumps and water tanks or between receiver tanks and supply tanks is long or where remote control is required.	For control of liquids with high specific resistance such as distilled water	For control of liquids with low specific resistance such as salt water, sewage water, acid chemicals, alkali chemicals	For control of ordinary purified water or sewage water used in combination with two-wired-type electrode holder (incorporating a resistor of 6.8 kΩ)
Supply voltage	24, 100, 110, 120, 200, 220, 230 or 240 VAC; 50/60 Hz				
Operating voltage range	85% to 110% of rated voltage				
Interelectrode voltage	8 VAC		24 VAC	8 VAC	
Interelectrode current	Approx. 1 mA AC max.		Approx. 0.4 mA AC max.	Approx. 1 mA AC max.	
Power consumption	Approx. 3.5 VA max.				
Interelectrode operate resistance	Approx. 0 to 4 kΩ	Approx. 0 to 1.3 kΩ (for 2 km) Approx. 0 to 0.5 kΩ (for 4 km)	Approx. 15 kΩ to 70 kΩ (see note 3)	Approx. 0 to 1.3 kΩ	Approx. 0 to 2 kΩ
Interelectrode release resistance	Approx. 15 k to ∞ Ω	Approx. 4 k to ∞ Ω (for 2 km) Approx. 2.5 k to ∞ Ω (for 4 km)	Approx. 300 k to ∞ Ω	Approx. 4 k to ∞ Ω	Approx. 15 k to ∞ Ω
Response time	Operate: 80 ms max. Release: 160 ms max.				
Cable length (see note 2)	1 km max.	2 km max. 4 km max.	50 m max.	1 km max.	800 m max.
Control output	1 A, 250 VAC (Inductive load: cosϕ = 0.4) 3 A, 250 VAC (Resistive load)				
Ambient temperature	Operating: –10°C to 55°C				
Ambient humidity	Operating: 45% to 85% RH				
Insulation resistance (see note 3)	100 MΩ max. (at 500 VDC)				
Dielectric strength (see note 4)	2000 VAC, 50/60 Hz for 1 min.				
Life expectancy	Electrical: 100,000 operations min. Mechanical: 5,000,000 operations min.				

Note: 1. The relay in the 61F-GP-N8H de-energizes when there is water present across the electrodes, whereas the relay in the 61F-GP-N8HY energizes when there is water present across the electrodes.

2. The length when using completely-insulated, 600-V, 3-conductor (0.75 mm^2) cabtyre cables. Usable cable lengths will become shorter as the cable diameter or number of conductors becomes larger.

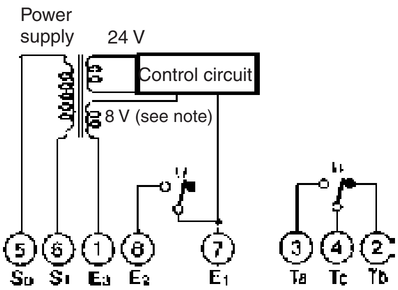
3. The insulation resistance and dielectric strength indicate values between power terminals and electrode terminals, between power terminals and contact terminals, and between electrode terminals and contact terminals.

4. Possible to use with 10 kΩ or less, however, this may cause reset failure.

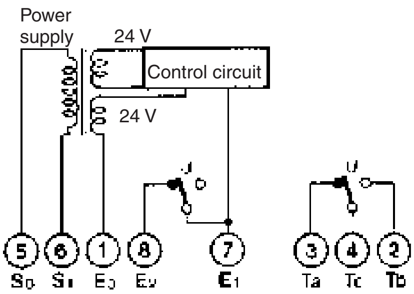
Connections

■ Internal Circuit Diagrams

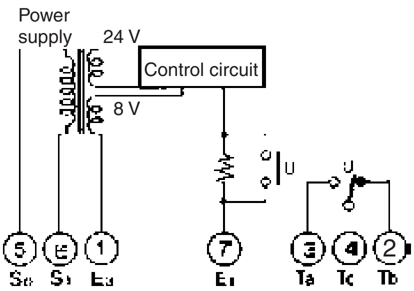
61F-GP-N8/-N8L/-N8D/-N8HY



61F-GP-N8H



61F-GP-N8R



Note: 24 V for the 61F-GP-N8HY.

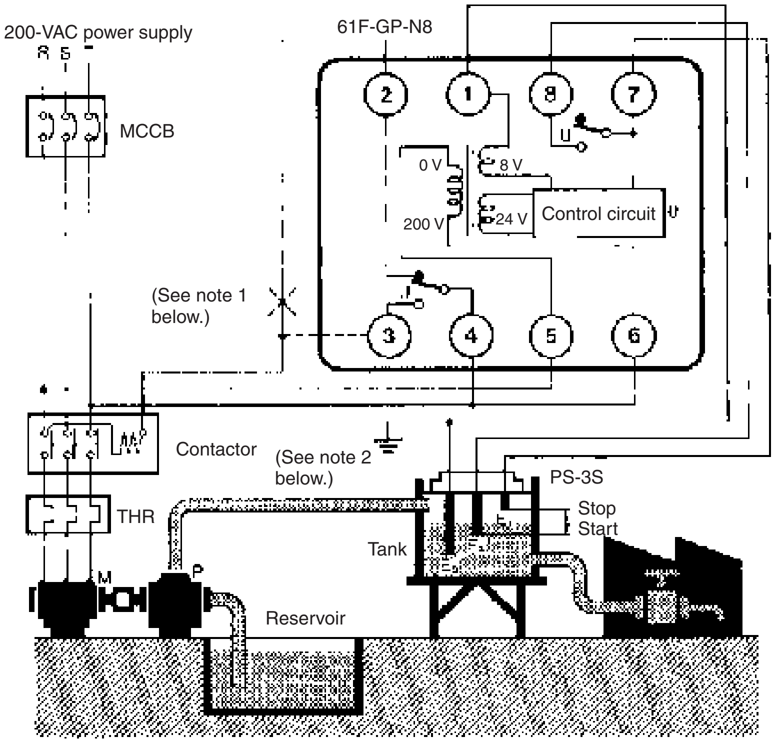
■ Automatic Water Supply and Drainage Control

1. Water Supply

- Connect electromagnetic switch coil terminal A to terminal 2.
- The pump stops when the water level reaches E1 and starts when the water level drops below E2.

2. Drainage

- Connect the electromagnetic switch coil terminal A to terminal 3.
- The pump starts when the water level reaches E1 and stops when the water level drops below E2.



Note: 1. The diagram shows the connections for water supply. When draining, change the connection from terminal 2 to terminal 3.

2. The earth terminal must be earthed.

Operation

The Conductive Level Controller consists of a plug-in controller connected to a set of stainless steel probes. These are cut to length and inserted vertically into the liquid. A low voltage is applied between these probes and the earth probe (or tank, if it is electrically conductive). The water provides a current between the earth probe and the high-level probe. The output relay in the Controller is energized when the water level reaches the high-level probe and de-energized when the water level falls below it.

For two-point control a low-level probe is used as well. In this case the relay does not de-energize until the water level falls below the low-level probe. Using the low-level probe allows a wide differential between switching a pump on and off, and can avoid excessive pump operation during tank emptying or filling. If this differential is not required, the low-level probe need not be connected.

Surge Suppressor Unit (61F-03B/04B)

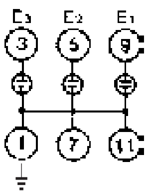
A high-capacity protective device is available which protects 61F-series Floatless Level Controllers against faults arising from electrical surges (such as indirect strokes of lightning) when the Controllers are employed in elevated water tanks or in high-altitude locations.

Specifications

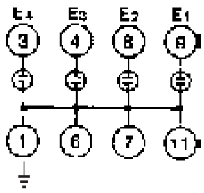
Discharge start voltage	90 V ±20 VDC
Impulse withstand voltage	200,000 V (1 x 40 µs)
Impulse withstand current	6,000 A (1 x 40 µs)

Internal Connections

61F-03B

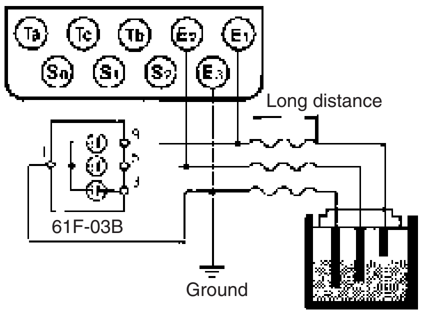


61F-04B

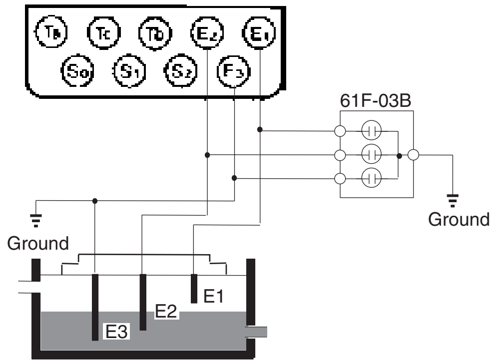


Precautions

1. Mount the Surge Suppressor Unit as close to the Controller as possible.
2. When grounding the Surge Suppressor Unit in the vicinity of the Controller, connect the ground side of the Surge Suppressor Unit to electrode E3.



3. When connecting the Surge Suppressor Unit, wire as shown in the following example (with three electrodes).

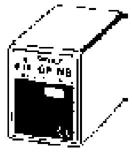


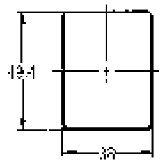
Connection Sockets

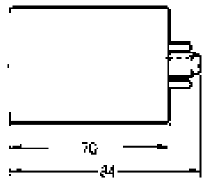
PF113A-E DIN-rail-mounted Socket
PL11 Back-connecting Socket

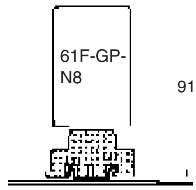
Dimensions

Note: All units are in millimeters unless otherwise indicated.



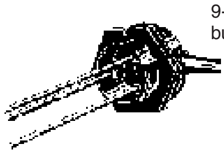


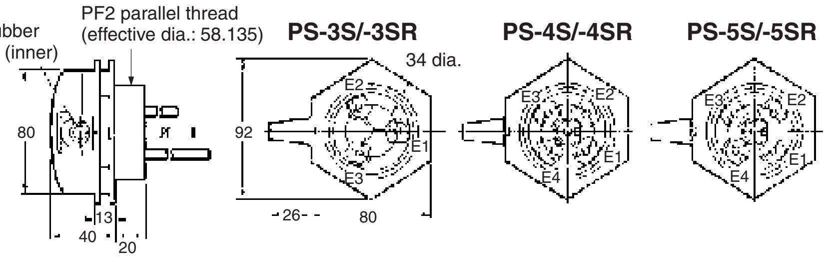




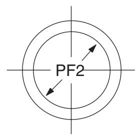
Electrode Holders

PS-□S



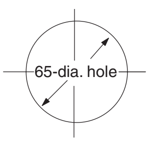


Mounting Holes



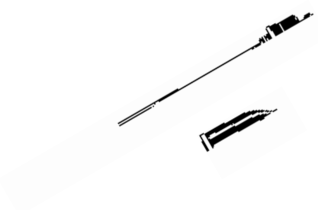
Used with coupling

Screw Holes

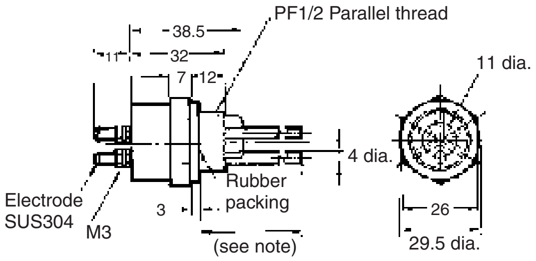


Used with mounting bracket

PS-31



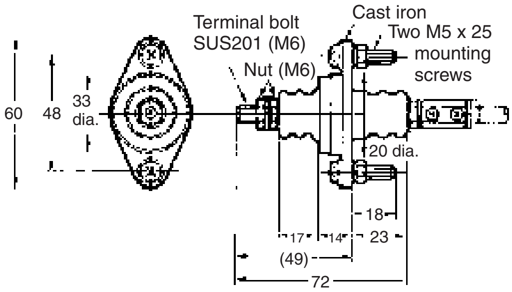
Dust preventive rubber cap (optional)

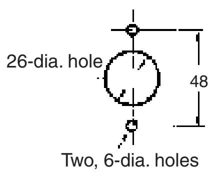


Mounting Holes

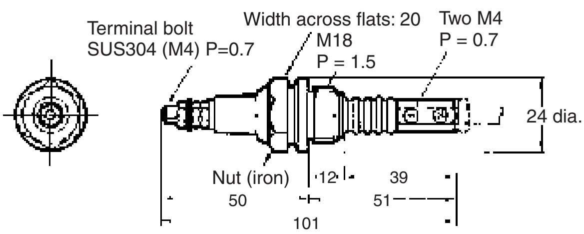
Note: Standard holder construction includes three integral 300-mm-long electrodes. However, a model having 1,000-mm-long electrodes is available on request.

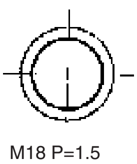
BF-1





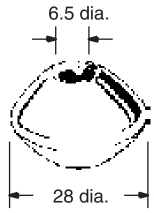
BS-1



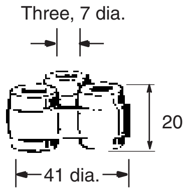


Electrode Separators

F03-14 1P (for Single Pole)



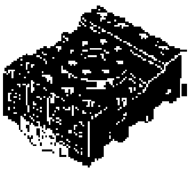
F03-14 3P (for Three Poles)

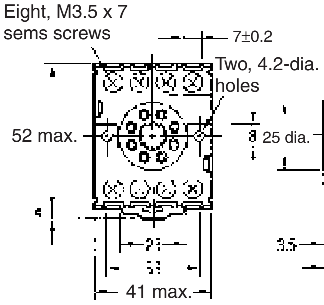


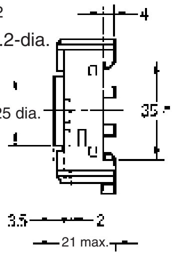
Connecting Sockets

DIN-rail Mounted Socket

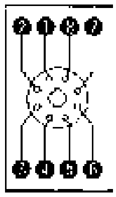
PF083A-E



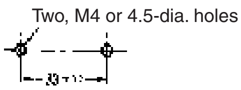




Terminal Arrangement/ Internal Connections (Top View)

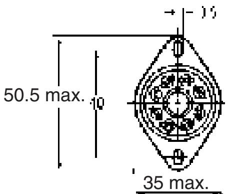


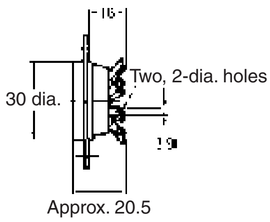
Mounting Holes



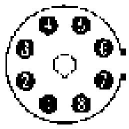
Back Connecting Socket

PL08

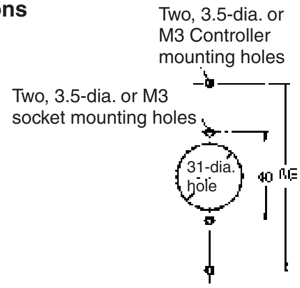




Terminal arrangement/ Internal Connections (Bottom View)



Mounting Holes

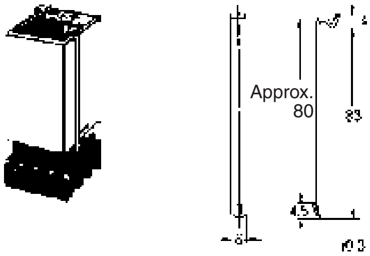


Monitoring products

Holding Brackets

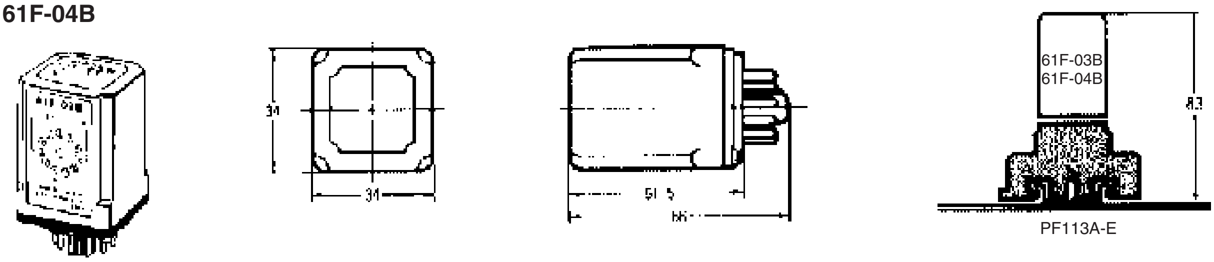
To mount the 61F-GP-N8 Conductive Level Controller on the PF083A DIN-rail Mounted Socket, use the PFC-N8 Mounting Brackets attached to the Socket as an accessory.

PFC-N8



Surge Suppressor Unit

61F-03B
61F-04B



PF113A-E

Application Examples

- Level control in tanks, reservoirs, sewage plants, underground wells, mixing plants etc.
- Level control for element protection in pipes, channels, and irrigation systems.
- Flow detection in pipes, channels, and irrigation systems.
- Ice bank control in cold drink dispensers, ice makers, water chillers, bulk milk tanks, etc.
- Dispensing of liquids by volume.
- Indication of liquid buildup due to filter blockages.
- Pollution/foul water detection for rivers, drains, etc.
- Alarm control warning of abnormal or dangerously high or low levels.

■ Application

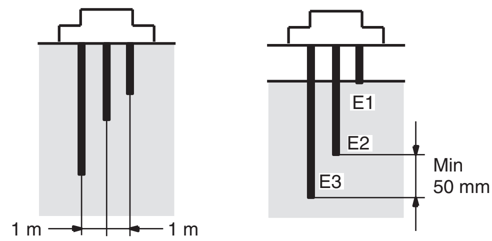
When using electrodes in sea water or sewage, provide a sufficient interval (normally 1 m) between the electrodes. If the sufficient interval cannot be provided, employ a low-sensitivity-type Floatless Level Controller.

When taping one of the electrodes to prevent it from contacting the other electrodes in water, do not tape the electrode entirely but leave at least 100 mm of its end uncovered.

When the required length of the electrode is more than 1 m, use a separator at each joint of two electrodes so as to prevent the electrodes from contacting one another.

Note: Avoid use of the separators in dust-containing liquids.

Usually, electrodes are used in a set of three: long, medium, and short. Connect the short electrode to E1, the medium electrode to E2, and the long electrode to E3. Make E3 at least 50 mm longer than E2.



Electrodes are in actual contact with the liquid. Standard electrodes are made of stainless steel and usable in purified water, sea water, sewage, acid (except acetic acid, sulfuric acid, etc.) and alkaline liquids, although they may corrode depending upon the temperature and working conditions.

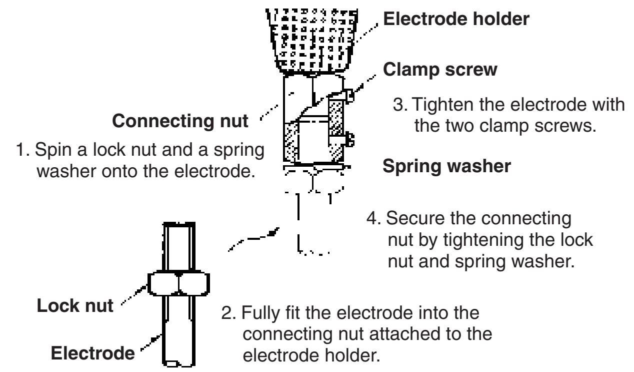
Note that the 61F-GP-N8 Conductive Level Controller is capable of controlling liquids with specific resistances of up to 30 kΩ-cm when the Controller employs a PS-3S electrode holder with the electrode(s) submerged to a depth of 30 mm max.

Kind of water	Specific resistance	Applicable type
City water	5 to 10 kΩ-cm	Standard type
Well water	2 to 5 kΩ-cm	Standard type
Industrial water	5 to 15 kΩ-cm	Standard type
Rainwater	15 to 25 kΩ-cm	Standard type
Sea water	0.03 kΩ-cm	Low-sensitivity type
Sewage	0.5 to 2 kΩ-cm	Low-sensitivity type
Distilled water	100 kΩ-cm or less	High-sensitivity type
	Over 100 kΩ-cm	Consult OMRON

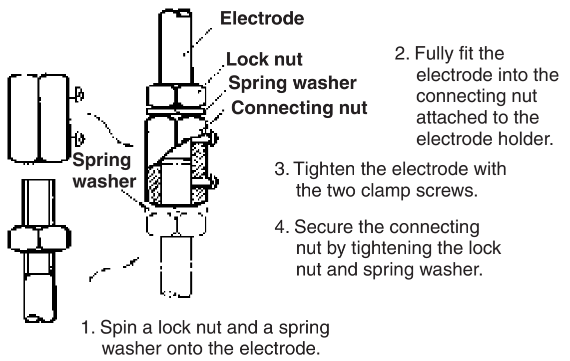
Precautions

■ How to Mount Electrodes

Connecting Electrodes to Electrode Holders



Connecting One Electrode to Another



Monitoring products

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. F043-E2-02

Conductive Level Controller
61F-GPN-BT/-BC

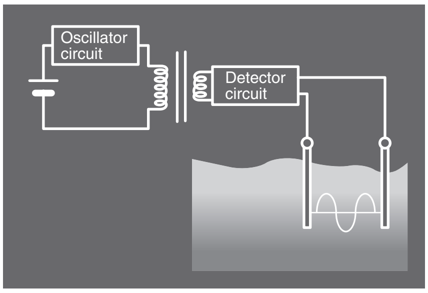
Battery (24 VDC) allows use in locations without AC power supply. AC sine-wave voltage between electrodes enables stable detection with no electric corrosion.

- Outputs can be set to self-hold at ON or OFF using special circuits.
- Adjustable sensitivity, with an operating resistance range of 0 to 100 kΩ, allows use for a wide variety of liquids.
- Relay contact chattering conventionally caused by waves eliminated using open collector output, reducing contact wear.
- Bears CE marking and is a UL recognized component.

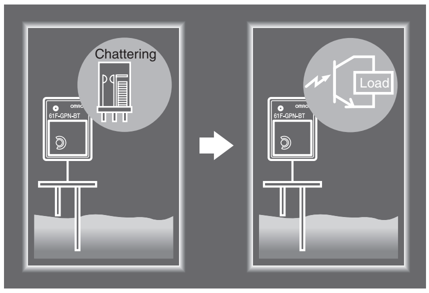
Features

The 61F can now run on DC power to allow energy savings, greater safety, and use in emergency situations.

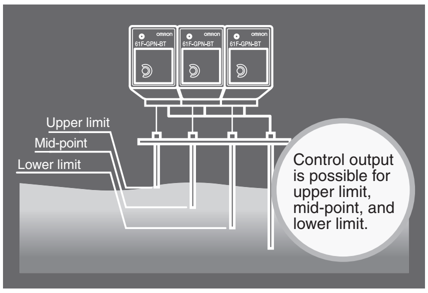
Combines DC Power Supply with AC Sensing Method
AC sine-wave signals are sent to electrodes using a built-in DC-AC converter, preventing electric corrosion and ensuring safety.



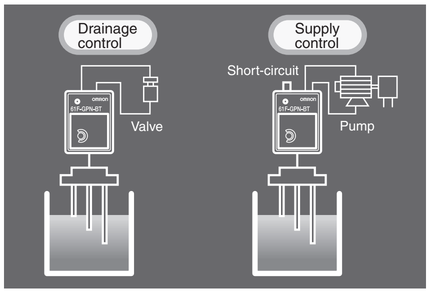
Open Collector Output
Signals can be used as direct input for a PLC. PNP output is also possible using the connection method.



Supports Multi-channel Sensing
Power supply circuits and detection circuits are isolated, allowing more than one Controller to be used in the same tank.



Same Wiring for Supply and Drainage
Supply control and drainage control can be performed with the same wiring (short terminals 7 and 8 for supply control). This makes it easy to perform wiring and confirm connection.



Ordering Information

Product name	Model number	
Conductive Level Controller	61F-GPN-BT	61F-GPN-BC
	Open collector (NPN)	Relay contact (SPST-NO)
Front Socket	PF113A-E	
Electrode Holder	(See note.)	

Note: A variety of Holders are available to suit different types of application. For details, refer to *61F Floatless Level Controller (F030-E1-8)*.

Specifications

■ Ratings

	61F-GPN-BT	61F-GPN-BC
Rated voltage	24 VDC	
Allowable voltage range	85% to 110% of the rated voltage	
Interelectrode voltage	5 VAC max.	
Operation resistance (See note 1.)	Variable (0 to 100 kΩ)	
Error	For scale of 0: +10 kΩ; For scale of 100: ±10 kΩ	
Release resistance	200% max. of the operation resistance	
Switching between supply and drainage	Terminals 7 and 8 open: Automatic drainage operation Terminals 7 and 8 shorted: Automatic supply operation	
Output specifications	Open collector (NPN) 30 VDC, 100 mA max.	SPST-NO 5 A, 240 VAC (Resistive load) 2 A, 240 VAC (Inductive load: cosϕ=0.4)
Life expectancy	---	Electrical: 100,000 operations min. Mechanical: 20,000,000 operations min.
Wiring distance (See note 2.)	100 m max.	

Note: 1. The 61F may not operate at resistance settings close to zero. Adjust the sensitivity to match actual usage conditions.

2. The figure for wiring distance above is for when 600-V 3-core cabtyre cable with a cross-sectional area of 0.75 mm^2 is used.

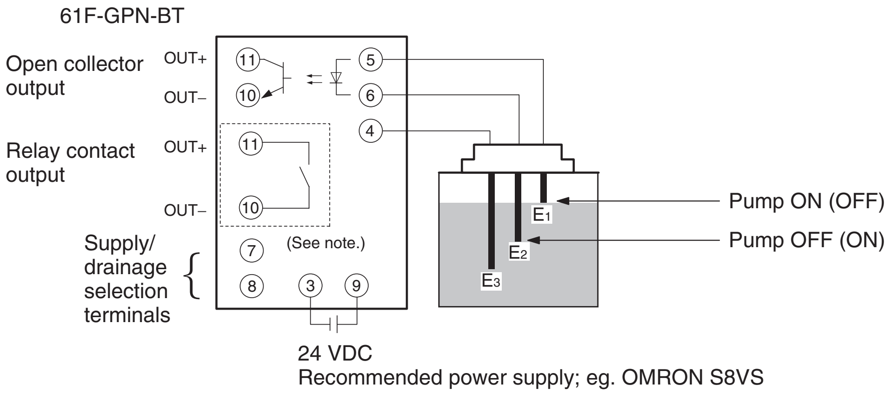
■ Characteristics

Ambient operating temperature	–10 to 55°C
Ambient operating humidity	25% to 85%
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength (See note.)	2,000 VAC, 50/60 Hz for 1 minute
Power consumption	2 W max.
Response time	Operating: 1.5 s max. Releasing: 3.0 s max.

Note: The dielectric strength is measured between power terminals and electrode terminals, power terminals and output terminals, and between electrode terminals and output terminals.

Connections

■ Automatic Drainage Operation



Note: The part within the dotted-line box is for the 61F-GPN-BC (relay-output type) only.

■ Automatic Water Supply Operation

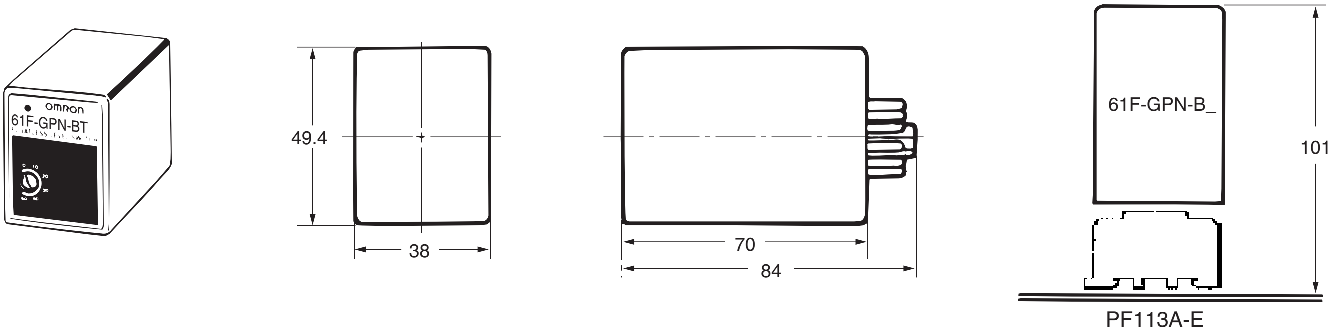
Short terminals 7 and 8 for automatic water supply operation. (Operation shown in parentheses in the diagram above.)

■ Reading Signals for the Liquid Level Only (No Control)

Only E1 and E3 are used. Output will turn ON when the liquid level reaches E1 if terminals 7 and 8 are open, and will turn OFF if terminals 7 and 8 are closed. Also, to take signals for liquid level at several points, use terminal 4 as a common for all of the Controllers and use terminal 5 of each Controller as an electrode.

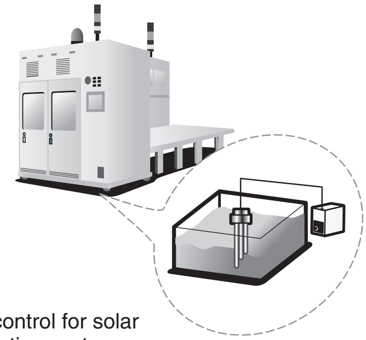
Note: If terminals 7 and 8 are shorted, operation of the 61F relay is "de-energizing" (i.e., energized normally and de-energized when liquid is present across the electrodes). Therefore, if the power supply connected across terminals 3 and 9 is interrupted, the output from terminals 10 and 11 will turn OFF, enabling detection of power interruptions.

Dimensions



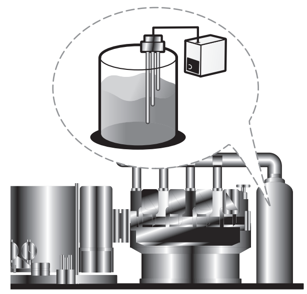
Application Examples

Drainage control for semiconductor wafer cleaning installations.

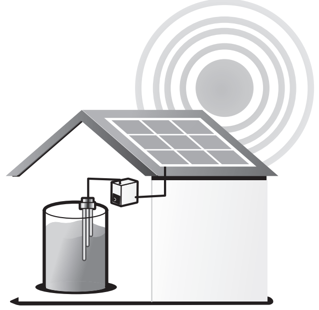


Meet safety standards by using DC power supply for all devices in a panel.

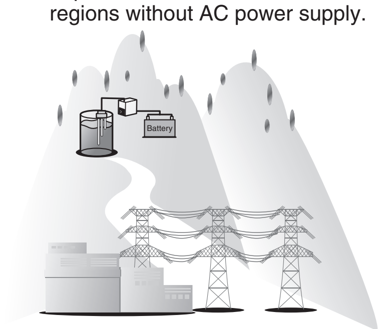
Liquid level control for waste-heat recovery boilers in co-generation systems.



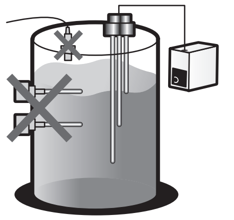
Liquid level control for solar power generation systems.



Liquid level control for remote regions without AC power supply.



Cut costs by using the 61F in situations where ultrasonic/electrostatic capacity level controllers were used because only DC power supply was available.



Number of controllers required:

2
1

Precautions

General Precautions

Before using the Controller under conditions not described in the relevant documents or applying the Controller to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the Controller are sufficient for the systems, machines, and equipment and be sure to provide the systems, machines, and equipment with double safety-mechanisms.

Safety Precautions

In order to ensure safe operation, be sure to observe the following points.

- Use a power supply voltage within the specified range.
- Do not use the Controller in locations subject to flammable gases or objects.
- Insert the Socket until it securely clicks into place.
- Do not short the load connected to the output terminals.
- Do not connect the power supply in reverse.

Correct Use

Mounting

Mount to a panel of thickness 1 to 5 mm.

Do not mount the Controller in the following places.

- Locations subject to strong vibrations or shocks.
- Locations outside the specified temperature and humidity ranges, or locations prone to condensation. (The Controller detects high impedances. Do not use in locations subject to high humidity levels.)
- Locations subject to dust.
- Locations subject to corrosive gases (in particular, sulphurized gas or ammonia gas).
- Outdoors, or in locations subject to direct sunlight.
- Near devices that generate strong, high-frequency noise (e.g., high-frequency welders, machines).

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

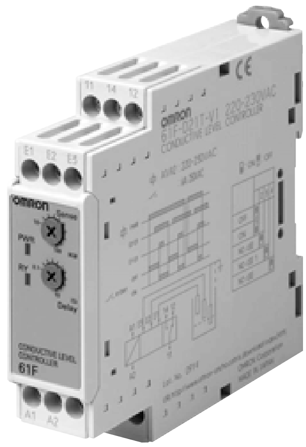
Cat. No. F053-E2-02

Conductive Level Controller

61F-D21T-V1

Ideal for level control for industrial facilities and equipment.

- Outputs can be set to self-hold at ON or OFF using self-holding circuits.
- Sensitivity adjustment of operating resistance from 10 to 100 kΩ for application to a wide range of liquids.
- Delay timer to prevent relay contact chattering caused by waves.
- CE marking, cUL application pending.
- Easy wiring with ferrules
  2 × 2.5 mm^2 solid or 2 × 1.5 mm^2 standard ferrules.
- CE mark compliance certified by third party.
  UL certification pending.



CE

Model Number Structure

■ Model Number Legend

61F-□□
1 2 3

1. Basic Model

61F:	Conductive Level Controller

2. Functions

D21T-V1:	Automatic liquid supply operation/ Automatic liquid drainage operation

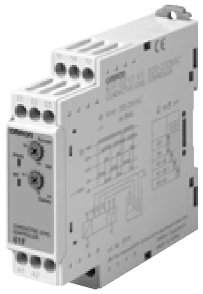
3. Supply Voltage

24 VAC:	24 VAC
115 VAC:	115 VAC
220-230 VAC:	220 to 230 VAC

Monitoring products

Ordering Information

■ List of Models

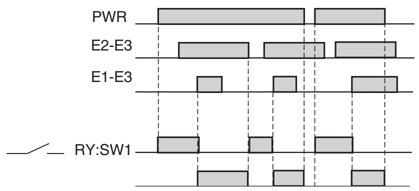
Conductive Level Controller	Supply voltage	Model
	24 VAC	**61F-D21T-V1 24 VAC**
	115 VAC	**61F-D21T-V1 115 AC**
	220 to 230 VAC	**61F-D21T-V1 220 to 230 VAC**

Specifications

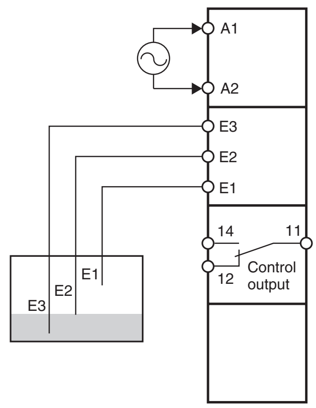
Rated voltage	24 VAC, 115 VAC, 220 to 230 VAC
Operating voltage range	85% to 110% of rated voltage
Voltage between electrodes	6 VAC p-p (approx. 20 Hz)
Power consumption	5 VA max.
Operating resistance	10 kΩ to 100 kΩ (variable)
Reset resistance	250 kΩ max.
Response time	Approx. 0.1 to 10 s (variable)
Cable length	100 m max. with completely insulated (600 V) cabtire cable with 3 conductors (0.75 mm^2)
Control output	6 A at 250 VAC for resistive load at 20°C, 1 A at 250 VAC for inductive load cosϕ = 0.4 at 20°C
Indicators	Green LED: Power, Yellow LED: Control output
Ambient temperature	Operating: –20 to 60°C, Storage: –30 to 70°C (with no condensation or icing)
Ambient humidity	Operating: 25% to 85%, Storage: 25% to 85%
Elevation	2,000 m max.
Insulation resistance	100 MΩ min. (at 500 VDC) between power supply section, electrode section, and contact section
Dielectric strength	2,000 VAC 50/60 Hz for 1 min between power source section, electrode section, and contact section
Vibration resistance	Vibration of 10 to 55 Hz and acceleration of 50 m/s^2 for 5 min. 10 times each in X, Y, and Z directions
Shock resistance	100 m/s^2 3 times each in 6 directions on 3 axes
Installation environment	Overvoltage Category II, Pollution Degree 2
Safety standards	EN61010-1
EMC	EN61326 Industrial applications

Connections

■ Operation Diagram

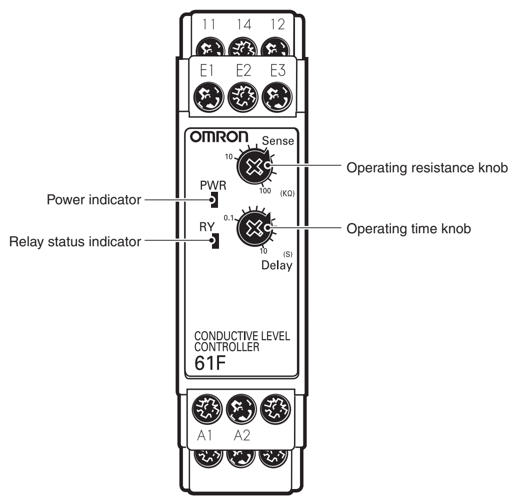


■ Wiring Diagram



Nomenclature

■ Front



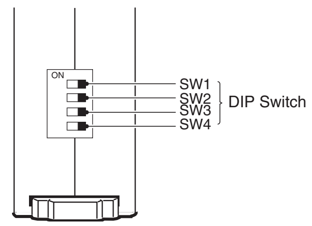
Indicators

Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied.
Relay status indicator (RY: Yellow)	Lit when relay is operating.

Setting Knobs

Item	Usage
Operating resistance knob	Used to set the operating resistance to 10 to 100 kΩ.
Operating time knob	Use to set the operating time to 0.1 to 10 s.

■ Bottoms



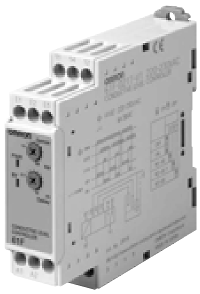
DIP Switch Functions

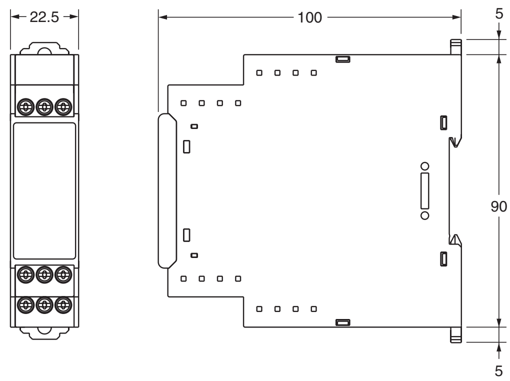
	Function			Default
SW1	Supply/ drainage selection	OFF	Automatic liquid supply operation	OFF
		ON	Automatic liquid drainage operation	
SW2	Not used.	OFF	Not used.	OFF
		ON	Not used.	
SW3	Not used.	OFF	Not used.	OFF
		ON	Not used.	
SW4	Not used.	OFF	Not used.	OFF
		ON	Not used.	

Monitoring products

Dimensions

61F-D21T-V1





Safety Precautions

■ Precautions for Safe Use

- There is a remote risk of electrical shocks. Do not touch terminals while electricity is being supplied.
- There is a remote risk of electrical shocks, fire, or failure occurring. Do not disassemble, repair, or modify the product.
- When attaching the product to the DIN-rail, attach it firmly with screws. When the screws are not tightened firmly, the product or wiring may become disconnected due to vibrations or shocks.
- When attaching the product to the DIN-rail, ensure that the product has been attached firmly.
- If the thickness of a mounting panel is not adequate, or a mistake has been made during installation, the product may become disconnected.
- Ensure that terminal screws have been tightened firmly.
  Recommended torque: 0.49 N·m
  Proof torque: 0.59 N·m
- When using the product, ensure that the wiring is correct before turning ON the power. Incorrect wiring may result in electrical shocks, injuries, accidents, failure, or malfunctions.
- Use a power supply voltage that is within the range of the specifications.
- Use a control source and power supply or power lines that provide inputs with appropriate specifications.
  Failure to do so may result in failures, burning, or electrical shocks.
- Do not install near heat-generating devices (coils, or devices that use coils).
- Be sure to confirm terminal numbers for correct wiring.
- Ensure that wiring is correct. Double-check materials such as connection charts and circuit diagrams.
- Properly ground the grounding terminal. Ensure that the common electrode terminal has been properly grounded.
  Doing so can alleviate effects from noise to a certain extent.
- If electrodes make contact with liquid, purchase and use a separator to prevent such contact.
- Keep an appropriate distance from devices that generate high-frequency noise (e.g., high-frequency welders, electronic sewing machines).

Do not keep, install, or use this product in the following environments.

- Outdoors, or places subject to direct sunlight or severe weather conditions.
- Places where temperature and humidity exceed the allowable range of the product specifications.
- Places where there are extreme changes in temperature and humidity, or icing or condensation may occur.
- Places subject to static electricity or inductive noise.
- Places subject to electrical fields.
- Places where vibrations or physical shocks are strong.
- Places where flammable gases exist.
- Places where corrosive gases (in particular, sulfuric or ammonia gas) exist.
- Places with large amounts of dust or iron powder.
- Places where water or oil come in contact with the product.
- Places subject to salt-water splashes.

■ Precautions for Correct Use

For Proper Use

1. Do not use the product in the following locations.
   - Places subject to radiant heat from heat generating devices.
   - Places subject to vibrations or physical shocks.
2. Make sure to use setting values appropriate for the controlled object. Failure to do so can cause unintended operation, and may result in accident or corruption of the product.
3. Do not use thinner or similar solvent for cleaning. Use commercial alcohol.
4. When discarding, properly dispose of the product as industrial waste.
5. Only use this product within a board whose structure allows no possibility for fire to escape.

About Installation

1. When wiring, use only recommended crimp terminals.
2. Do not block areas around the product for proper dissipation of heat. (If you do not secure space for heat dissipation, life cycle of the product will be compromised.)
3. To avoid electrical shocks, make sure that power is not supplied to the product while wiring.
4. To avoid electrical shocks, make sure that power is not supplied to the product when performing DIP switch settings.

Noise Countermeasures

1. Do not install the product near devices generating strong high frequency waves or surges.
2. When using a noise filter, check the voltage and current and install it as close to the product as possible.
3. In order to prevent inductive noise, wire the lines connected to the product separately from power lines carrying high voltages or currents. Do not wire in parallel with or on the same cable as power lines.
   Other measures for reducing noise include running lines along separate ducts and using shield lines.

To avoid faulty operations, malfunctions, or failure, observe the following operating instructions.

1. Make sure to use power supply for operations, inputs, and transformer with the appropriate capacity and rated burden.
2. Maintenance and handling of this product may only be performed by qualified personnel.
3. Using this product for thyristor controls or inverters will result in errors.

Warranty and Application Considerations

Read and Understand this Catalog
Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability.*

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. N149-E2-01

In the interest of product improvement, specifications are subject to change without notice.

Liquid Leakage Sensor Amplifier
K7L-AT50

Ultra-miniature Sensor Amplifier Reliably Detects a Wide Variety of Liquids Ranging from Water to Liquid Chemicals with Low Conductivity.

- Detects liquids with impedance as high as 50 MΩ using inter-electrode resistance detection. Detection of IPA and pure water is possible.
- Four selectable sensing ranges ensure detection suited to the characteristics of the liquid.
- Incorporates a noise canceller circuit connected to a 3-conductor cable, ensuring a high level of noise immunity and reliable operation (patent pending).
- The power supply block and Sensing Band are isolated, allowing the installation of more than one device in the same place.

Ordering Information

Product name		Model	Characteristics
Liquid Leakage Sensor Amplifier		K7L-AT50	---
Sensors	**Sensing Band**	F03-16PE	Standard model
		F03-15	Greater durability and condensation resistance. (See note 1.)
		F03-16PT	Greater temperature and chemical resistance. (See note 1.)
		F03-16SF	Greater flexibility and superior workability. (See note 1.)
		F03-16SFC	Greater flexibility and enables visual confirmation when the inner color appears.
	Point Sensor	F03-16PS	Easier to wipe off than the band type.
		F03-16PS-F	Electrodes have fluororplastic coating to resist chemicals.
Mounting Brackets and Stickers	**Sensing Band Stickers**	F03-25	Used for F03-15 or F03-16SF(C).
		F03-26PES	Used for F03-16PE (adhesive tape).
		F03-26PEN	Used for F03-16PE (screws).
		F03-26PTN	Used for F03-16PT (screws).
	Point Sensor Mounting Brackets	F03-26PS	Used for F03-16PS.
Terminal Blocks		F03-20	---
DIN-rail-mounted Socket		P2RF-08-E	---
		P2RF-08	---

Note: 1. Compared with the standard model, F03-16PE.
2. One F03-20 Terminal Block is included as an accessory with the K7L-AT50.
3. The minimum order for the F03-25, F03-26PES, or F03-26PEN Sensing Band Stickers is one set (contains 30 Stickers).
4. The minimum order for F03-20 Terminal Blocks, F03-26PTN Sensing Band Stickers, or F03-26PS Point Sensor Mounting Brackets is one set (contains 10 Terminal Blocks, Stickers, or Mounting Brackets).

■ Available Sensing Band Lengths

	1 m	2 m	5 m	10 m	15 m	20 m	25 m	30 m	40 m	50 m	60 m	70 m	75 m	80 m	90 m	100 m
F03-16PE	OK	OK	OK	OK	OK	OK	OK			OK						
F03-15	OK	OK	OK	OK	OK	OK	OK			OK			OK			OK
F03-16PT	OK	OK	OK	OK	OK	OK										
F03-16SF(C)			OK	OK	OK	OK		OK	OK	OK	OK	OK		OK	OK	OK

Note: 1. To place an order for 1 m of the F03-16PE for example, specify F03-16PE-1M.
2. If you cannot find the length you need, please order the nearest larger length, then cut it to the required size.

Specifications

■ Ratings

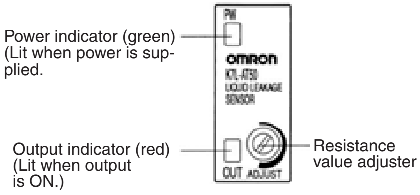
Rated power supply voltage	12 to 24 VDC (Allowable voltage fluctuation range: 10 to 30 VDC)
Operate resistance	0 Ω to 50 MΩ, variable Range 0: 0 to 250 kΩ Range 1: 0 to 600 kΩ Range 2: 0 to 5 MΩ Range 3: 0 to 50 MΩ **Note:** The range is set using the DIP switch on the side of the Sensor Amplifier. (Refer to *DIP Switch Settings*.) Set the corresponding pin of the DIP switch in the up position. (For range 0, set all 3 pins in the down position.) The adjuster (ADJUST) on the top of the Sensor Amplifier sets the resistance value for detection within the set range. It is factory-set to the upper limit. (Normally, the K7L can be used with the adjuster at this setting.) With any range, resistance values can be set from 0 Ω.
Release resistance	105% min. of operate resistance
Output configuration	NPN open-collector transistor output with 100 mA at 30 VDC max. **Note:** If the rightmost pin of the DIP switch on the side of the Sensor Amplifier is set to the down position, the output turns ON when liquid is detected; if it is set to the up position, the output turns OFF when liquid is detected.
Wiring distance	Connecting cable: 50 m max. Sensing Band length: 10 m max. **Note:** These values are possible on condition that a completely insulated 3-conductor VCT cable with a thickness of 0.75 mm^2 and a dielectric strength of 600 V is used together with a Liquid Sensing Band specified by OMRON. (A 0.2-mm^2 cable can also be used.)
Accessories	F03-20 Terminal Block (for connecting the connecting cable and Sensing Band) Screwdriver for ADJUST setting. (Purchase the Sensing Band, Sensing Band Stickers, connecting cable, and Socket separately.)

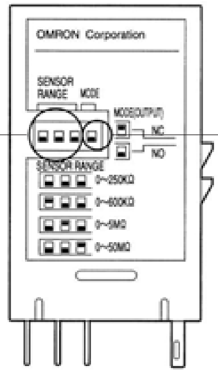
Note: UL File No. E138234
CSA File No. LR95291-21
CE EMA: ESD EN50082-2, EN61000-4-2
REM Filed EN50082-2, ENV5140
Conducted Immunity EN50082-2, ENV50141
Fast Transient/Burst EN50082-2, EN61000-4-4
EMI: Radiated/Conducted EN50081-2, EN55011

■ Characteristics

Ambient temperature	Operating: –10 to 55°C
Ambient humidity	Operating: 45% to 85%
Insulation resistance	10 MΩ at 100 VDC between case and current-carrying parts
Dielectric strength	1,000 VAC at 50/60 Hz for 1 min between case and current-carrying parts
Power consumption	1 W max.
Response time	Operate: 800 ms max. Release: 800 ms max.
Weight	Approx. 14 g

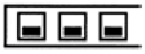
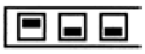
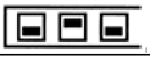
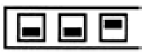
Nomenclature

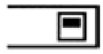
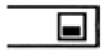




■ DIP Switch Settings

Setting Sensing Range

DIP switch	Range number	Sensing range
	Range 0	0 to 250 kΩ
	Range 1	0 to 600 kΩ
	Range 2	0 to 5 MΩ
	Range 3	0 to 50 MΩ

DIP switch	Output mode
	Output OFF when liquid leakage detected.
	Output ON when liquid leakage detected.

- Set the sensing range according to the impedance of the liquid to be detected. (If the sensing range DIP switch pins are set in a way not shown above, the actual range used will be the largest one by default.) For the setting method, refer to the label on the side of the Sensor Amplifier.
- It is possible to set the resistance value within the set sensing range using the resistance value adjuster. At time of delivery, it is set to the largest possible value and this setting can be used for normal use.
- The resistance value adjuster is a precision component. Do not apply a torque to the resistance value adjuster in excess of the specified one. Doing so may cause the resistance value adjuster to be damaged.
  Applicable torque:
  - Rotational torque: 9.81 m N·m max.
  - Detent strength: 29.4 m N·m min.

Operation

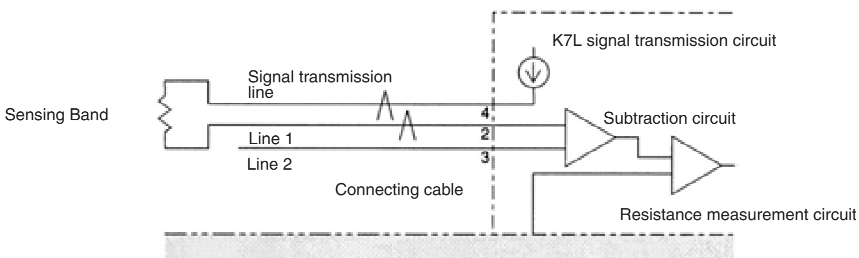
■ Countermeasures Against Noise

Noise Canceller Function for Highly Sensitive Impedance Detection

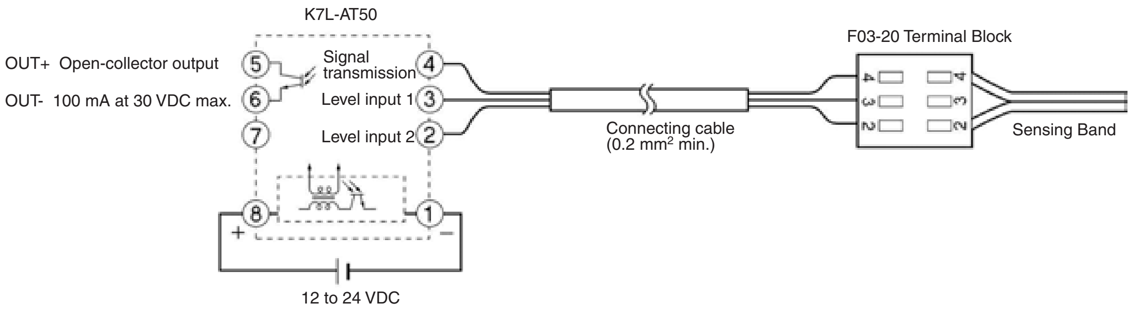
The K7L Liquid Leakage Sensor Amplifier detects liquids with impedance as high as 50 MΩ and connects to the Sensing Band through a cable that can be extended up to 50 meters. Countermeasures against external noise are especially important for the Sensing Band and connecting cable because they pick up external noise like an antenna. The K7L incorporates the noise canceller function described below.

Connected with 3-conductor Cable that Offsets Inductive Noise (Patent Pending)

A VCT cable with three conductors (lines) is used. Line 1 is connected to the Sensing Band and line 2 is left open. Lines 1 and 2 are almost in the same position and thus will experience the same noise level. The K7L obtains the difference between these signals. This means that the noise signals in lines 1 and 2 are offset against each other and a reading for the signal, without inductive noise, can be made.

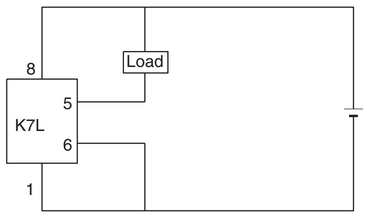


■ Connections

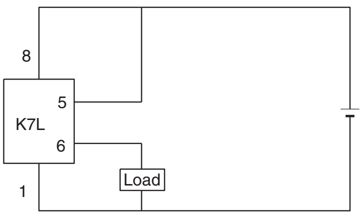


■ Connection Examples

NPN Output



PNP Output



Liquid Leakage Sensor Amplifier with Disconnection Detection Function

K7L-AT50D/ -AT50D-S

Detect Disconnections between the Sensor Amplifier and a Terminator Connected to the End of the Sensing Band.

- Constantly monitors for disconnections between the Sensor Amplifier and the Sensing Band.
- Failure to detect liquid leakage due to disconnection in the Sensing Band prevented.
- Notification of disconnection detection made using LED indicator and transistor output.
- After a disconnection is detected, the operating status is held to avoid instability due to further contact of the disconnected part.
- This model retains all the characteristics of the K7L-AT50 (detection sensitivity, sensing ranges, and AC detection method).
- Meets UL/CSA standards. (See information on standards on page J-83.)

Ordering Information

Name	Model number
Liquid Leakage Sensor Amplifier with Disconnection Detection Function Set	K7L-AT50D
Liquid Leakage Sensor Amplifier with Disconnection Detection Function Sensor Amplifier Only	K7L-AT50D-S
Terminator (2P)	F03-20T

Note: The Sockets, Terminal Blocks, Stickers, and Sensing Bands are the same as for the K7L-AT50.

Specifications

■ Ratings

Rated power supply voltage	12 to 24 VDC (Allowable voltage fluctuation range: 10 to 30 VDC)
Operate resistance	0 Ω to 50 MΩ, variable Range 0: 0 to 250 kΩ Range 1: 0 to 600 kΩ Range 2: 0 to 5 MΩ Range 3: 0 to 50 MΩ **Note:** The range is set using the DIP switch on the side of the Sensor Amplifier. (Refer to *DIP Switch Settings*.) Set the corresponding pin of the DIP switch in the up position. (For range 0, set all 3 pins in the down position.) The adjuster (ADJUST) on the top of the Sensor Amplifier sets the resistance value for detection within the set range. It is factory-set to the upper limit. (Normally, use with the adjuster set to the upper limit.) With any range, resistance values can be set from 0 Ω.
Disconnection detection function	Detection signal: 10 VDC max., 200 ms Detection time: 10 s max. Release: Released by resetting the power supply.
Release resistance	105% min. of operate resistance
Output configuration	NPN open-collector transistor output with 100 mA at 30 VDC max. for both liquid leakage detection and disconnection detection. **Note:** If the rightmost pin of the DIP switch on the side of the Sensor Amplifier is set to the down position, the output turns ON when liquid/disconnection is detected; if it is set to the up position, the output turns OFF when liquid/disconnection is detected.
Wiring distance	Connecting cable: 50 m max. Sensing Band length: 10 m max. **Note:** These values are possible on condition that a completely insulated 3-conductor VCT cable with a thickness of 0.75 mm^2 and a dielectric strength of 600 V is used together with a Liquid Sensing Band specified by OMRON. (A 0.2-mm^2 cable can also be used.)
Accessories	F03-20 Terminal Block (for connecting the connecting cable and Sensing Band) Screwdriver for ADJUST setting. F03-20T Terminator (provided with K7L-AT50D only) (Purchase the Sensing Band, Sensing Band Stickers, connecting cable, and Socket separately. The Terminal Block is 3P; the Terminator is 2P.)

Note: UL File No. E138234
CSA File No. LR95291-21

■ Characteristics

The characteristics are the same as for the K7L-AT50. Refer to page J-80 for details.

Nomenclature

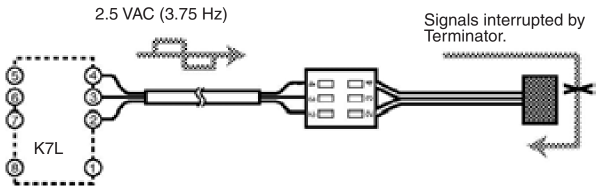
The nomenclature and DIP switch settings are the same as for the K7L-AT50. Refer to page J-81 for details.

Operation

■ Disconnection Detection Function

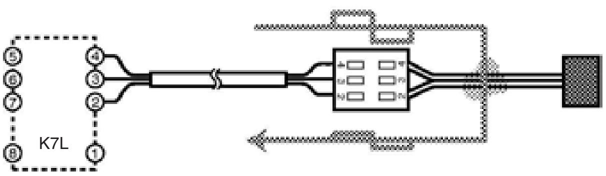
Operation While Monitoring for Liquid Leakage

- Short-wave signals (2.5 VAC, 3.75 Hz) for liquid leakage detection are output from terminal 4 of the K7L.
- When there is no liquid leakage, the liquid leakage detection signals that are output are interrupted by the Terminator and the core of the Sensing Band will form an open loop.



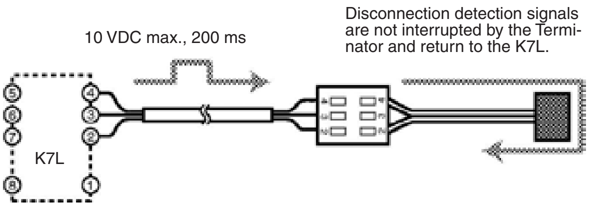
Operation at Liquid Leakage Detection

- When liquid leakage occurs within the sensing range, the liquid leakage detection signals output from terminal 4 are input to terminal 2 through the leaked liquid.
- The voltage of the input signals will vary with the resistance of the leaked liquid. This voltage is compared with the detection level set at the K7L.
- As a result of the comparison, if the K7L determines that liquid leakage has occurred, the K7L's output LED will light, and the liquid detection output will either turn ON or OFF.



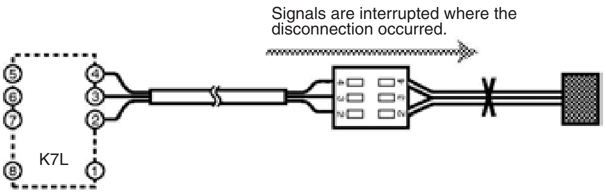
Operation While Monitoring for Disconnection

- Output of disconnection detection signals starts within 2 s of power being supplied to the K7L and is repeated at 7-s intervals.
- Disconnection signals are DC signals of 10 V max. that are output for approximately 200 ms. During this time, the K7L is in disconnection monitoring mode, i.e. it monitors for disconnections only and the liquid leakage detection signals are stopped.
- If there is no disconnection, the disconnection detection signals (10 VDC) that are output pass through the Terminator and return to the K7L. The K7L takes this as normal, i.e., there is no disconnection.



Operation at Disconnection Detection

- If there is a disconnection, the signals will be interrupted at the place where the disconnection occurred, and will not return to the K7L.
- If the signals do not return when the K7L is in disconnection monitoring mode, it will determine that a disconnection has occurred. The output indicator will flash, and the disconnection output will turn ON/OFF depending on the position of the DIP switch (right).

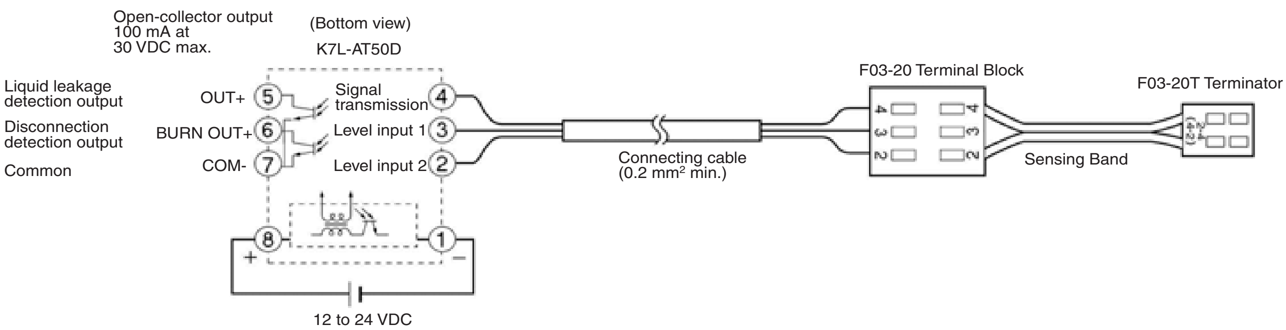


Note: 1. Disconnection detection is only performed between terminals 2 and 4. Therefore, be sure to connect the Sensing Band between terminals 2 and 4.

2. The K7L will switch from liquid leakage detection to disconnection detection if either of the following conditions occur while liquid leakage is detected.
- Disconnection occurs between the K7L and the place where liquid is leaked.
- While liquid leakage is detected, disconnection occurs between the place where liquid is leaked and the Terminator (F03-20T) and, subsequently, the leaked liquid is removed (e.g., wiped up or dried).

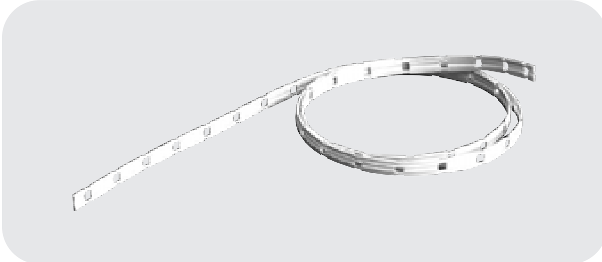
3. During disconnection detection, liquid leakage will not be detected. Once disconnection has been detected, reset the power supply to stop disconnection detection.

■ Block Diagram for External Connections



Sensing Band
F03-16PE

- SUS316 used for core and polyethylene used for sheath to ensure high resistance to both acidic and alkaline liquids.
- Sensing Band Stickers that use the same material as the Sensing Band's insulating resin are available in 2 types: adhesive-tape type and screw type.



Ordering Information

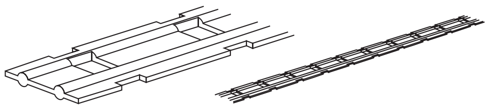
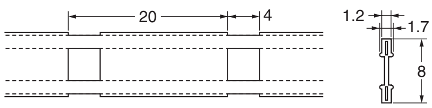
Name	Model number	Remarks
Liquid Leakage Sensing Band	**F03-16PE**	---
Sensing Band Stickers	**F03-26PES** **F03-26PEN**	30 Stickers per set 30 Stickers per set

Specifications

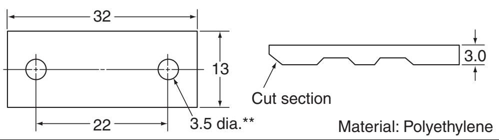
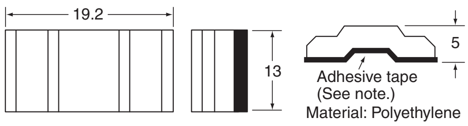
Sheath	Polyethylene
Core	SUS316 stainless steel
Ambient operating temperature	–15 to 55°C
Weight	Approx. 16 g (1 m)

Dimensions (Unit: mm)

■ Sensing Band

Appearance	
Structure	 Materials: Electrodes: SUS316 stainless steel, Sheath: Polyethylene

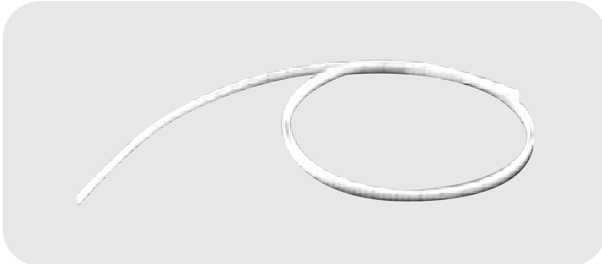
■ Sensing Band Stickers

	F03-26PEN (screws)	F03-26PES (adhesive tape)
Appearance		
Structure		

Note: The shape of the adhesive tape shown above is for securing the F03-16PE.

Sensing Band
F03-16PT

- Compared to the F03-16PE (polyethylene), the F03-16PT has higher resistance to both high temperatures and chemicals.
- Small holes enable the detection of leakage even when installed upside down.



Ordering Information

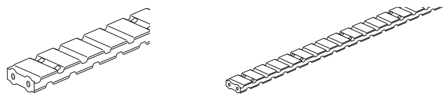
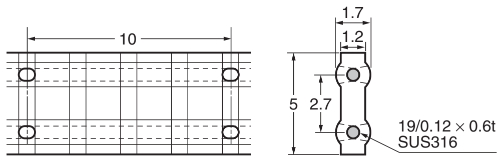
Name	Model number	Remarks
Fluoroplastic Sensing Band	**F03-16PT**	---
Fluoroplastic Sensing Band Stickers	**F03-26PTN**	10 Stickers per set

Specifications

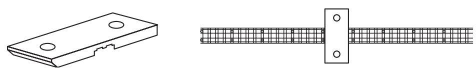
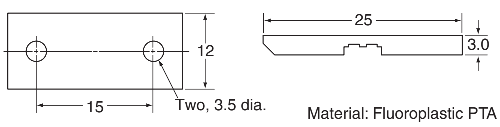
Sheath	PTFE fluoroplastic
Core	SUS316 stainless steel
Ambient operating temperature	–50 to 200°C
Weight	Approx. 16 g (1 m)

Dimensions (Unit: mm)

■ Sensing Band

Appearance	
Structure	 Materials: Electrodes: SUS316 stainless steel, Sheath: Fluoroplastic

■ Sensing Band Stickers

	F03-26PTN (screws)
Appearance	
Structure	 Material: Fluoroplastic PTA

Note: The shape of the adhesive tape shown above is for securing the F03-16PE.

Sensing Band

F03-15

- Ideal for harsh electrical room environments that are dusty and humid.
- For installation in locations requiring insulated materials.

Ordering Information

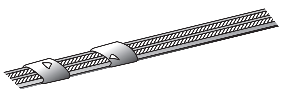
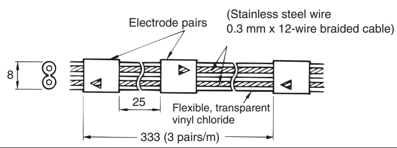
Name	Model number	Remarks
Liquid Leakage Sensing Band	**F03-15**	---
Sensing Band Stickers	**F03-25**	30 Stickers per bag

Specifications

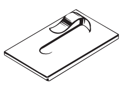
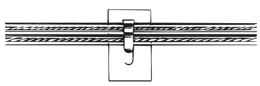
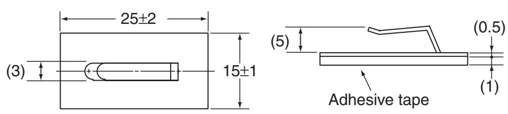
Sheath	Flexible, transparent vinyl chloride
Core	SUS304 stainless steel
Ambient operating temperature	–15 to 50°C
Weight	Approx. 48 g (1 m)

Dimensions (Unit: mm)

■ Sensing Band

Appearance	
Structure	

■ Sensing Band Stickers

	F03-25
Appearance	 
Structure	 Material: SUS304

Monitoring products

Sensing Band

F03-16SF

- Greater flexibility and superior workability compared with the F03-16PE.
- The sheath becomes transparent to reveal the red inner sheath if liquid leakage occurs, thereby enabling visual confirmation. After drying, the Sensing Band color will return to white (F03-16SFC only).

Ordering Information

Name	Model number	Remarks
Sensing Band	**F03-16SF**	Without color indication
	F03-16SFC	With color indication
Stickers	**F03-25**	30 Stickers per bag

Specifications

Sheath	Special plastic fiber braided cable with water-absorbent and water-repellent characteristics
Core	Tin-plated, copper stranded wire
Ambient operating temperature	–15 to 60°C
Fire retardancy	Not fire retardant
Weight	Approx. 20 g (1 m)

Length of cable

(1) Connection with K7L-AT50 (IV Cable + Sensing Band)

Sensing Band / IV Cable	10m	50m	100m	150m
0m	❍ Range 3	❍ Range 2	❍ Range 2	❍ Range 1
10m	❍ Range 3	❍ Range 2	❍ Range 2	❍ Range 1
50m	❍ Range 2	❍ Range 2	❍ Range 2	❍ Range 1
100m	❍ Range 2	❍ Range 2	❍ Range 2	❍ Range 1
150m	❍ Range 2	❍ Range 2	❍ Range 2	❍ Range 1
150m	❍ Range 2	❍ Range 2	❍ Range 2	❍ Range 1

❍···Set value that can be used.

(2) Connection with K7L-AT50D (IV Cable + Sensing Band)

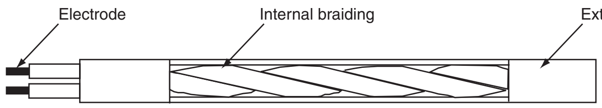
Sensing Band / IV Cable	10m	50m	100m	150m
0m	❍ Range 3	❍ Range 2	❍ Range 2	❍ Range 1
10m	❍ Range 3	❍ Range 2	❍ Range 2	❍ Range 1
50m	❍ Range 3	❍ Range 2	❍ Range 2	❍ Range 1
100m	❍ Range 3	❍ Range 2	❍ Range 2	❍ Range 1
150m	❍ Range 3	❍ Range 2	❍ Range 2	❍ Range 1
150m	❍ Range 3	❍ Range 2	❍ Range 2	❍ Range 1

❍···Set value that can be used.

Dimensions (Unit: mm)

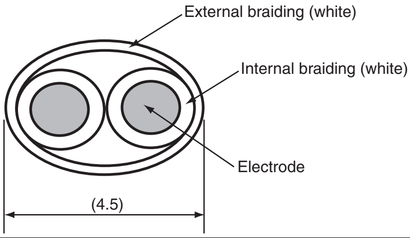
F03-16SF / **F03-16SFC**

Appearance

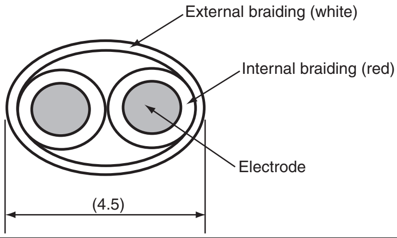


Structure

F03-16SF

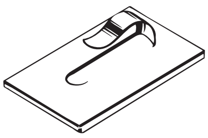


F03-16SFC

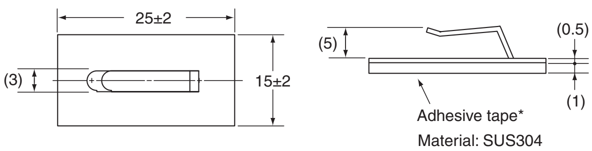


F03-25

Appearance



Structure



Monitoring products

Chemical Resistivity for F03-16PE/-16PT

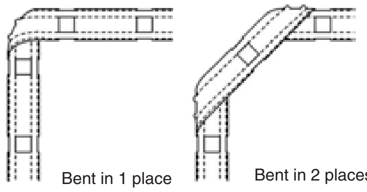
Material	Sheath		Core	Material	Sheath		Core
	Polyethylene	Fluoroplastic	SUS316		Polyethylene	Fluoroplastic	SUS316
Water	A	A	A	Toluene	C	B	B
Acetone	C	A	A	Phenol	B	B	A
Ammonia	A	A	A	Butanol	B	A	---
Ethanol	B	A	A	Fluorine	A	A	C
Hydrochloric acid	A	A	C	Hexane	C	A	---
Hydrogen peroxide solution	A	A	A	Benzene	C	A	A
Xylene	B	A	A	Methanol	B	A	A
Cyclohexane	C	A	---	Sulfuric acid	C	A	B
Trichloroethylene	C	A	A	Phosphoric acid	A	B	B

Note: 1. A: Not affected at all or only very slightly affected.
B: Slightly affected but, depending on the conditions, sufficient for use.
C: Affected but may still be used. (Replace the Sensing Band immediately after detection.)
2. In order to prevent secondary fire damage, consider the effect of the atmosphere of the environment and the solution to be detected on the Sensing Band.
3. If the Sensing Band changes shape or color when a liquid is detected, replace the Sensing Band.

■ Connecting the Sensing Band

Bending the Sensing Band

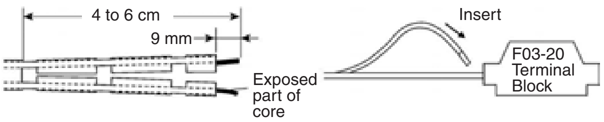
To change the direction of the Sensing Band, bend the Sensing Band in one or two places where the core is not exposed.



Note: Bend the Sensing Band approximately 4 cm (i.e., twice the distance between places where the core is exposed) away from places where a Sticker is attached. If the Sensing Band is bent at places further away than this, the Sensing Band may come away from the surface.

Stripping and Connecting Terminals

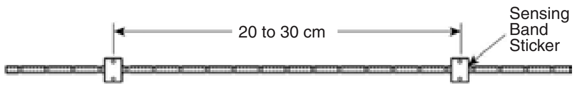
1. Cut into the Sensing Band approximately 4 to 6 cm in from the end as shown in the diagram below.
2. Strip away approximately the last 9 mm of the sheath to expose the core (SUS line).
3. To connect to the Terminal Block, push down the top of the terminal with a screwdriver and insert the core from the side. (Refer to *Dimensions* on page J-85.) More Sensing Bands can be connected simply by wiring in an arch shape.



Note: Check that the wiring is secure before using the K7L in applications.

Interval Between Stickers

When securing the Sensing Band with Stickers, attach the Stickers at intervals of 20 to 30 cm in places where the core is not exposed.



Note: 1. When using the F03-26PES (adhesive-tape model), be sure to wipe all moisture, oil, and dust from the surface to which the Sticker is to be attached. Failure to do so may result in insufficient adhesion, and the Sticker may peel away from the surface.
2. When using the F03-26PEN (screw model), before installing the Sensing Band, it is necessary to perform stud welding. For details on the pitch of the studs, refer to the information on the dimensions of Sensing Band Stickers.

Liquid Leakage Sensing Band Precautions

Refer to the following installation methods and install the Sensing Band securely using the proper method for the location and environment.

1. Post or Beam Mounting
   Use fasteners, such as concrete anchors, to secure the Sensing Band every 500 to 1,000 mm to ensure that it does not come loose. If the surface of the post or beam is very uneven, apply two-sided tape to the mounting surface first and then secure the Sensing Band to the tape with the fastener.
2. Conduit Installation
   For vertical conduits, wrap the Sensing Band around the conduit at a pitch 2 to 3 times the diameter of the conduit. For horizontal conduits, secure the Sensing Band at appropriate intervals along the bottom of the conduit using an insulated adhesive strap, such as Insulock, to ensure that the Sensing Band does not come loose.
3. Dike and Catch Basin installation
   Use the specified stickers (sold separately) to secure the Sensing Band at appropriate intervals to keep it flat in the dike or catch basin.
4. Floor Installation
   Estimate the leakage detection area and use stickers to secure the Sensing Band at appropriate intervals on the floor and around equipment. Cover the Sensing Band with plastic or metal molding to protect it from contact with other objects and from being stepped on by workers. Leave a 50- to 100-mm gap in the molding at approximately 500-mm intervals where it touches the floor to allow liquids to pass through.
5. Do not install the Sensing Band in locations where condensation is likely to occur.
6. Mount the Sensing Band as close as possible to the mounting surface. Make sure that any gaps are no more than 2 mm in horizontal installations, such as the floor, and no more than 1 mm with vertical installations, such as posts and beams.
7. Attach an insulated protector, such as plastic molding, securely to the Sensing Band to protect it from contact with power cables carrying over 300 V.
8. Normally leaking materials detected by the Sensing Band will evaporate and the Sensing Band will return to its original state. The Sensing Band may not return to its original state and will have to be replaced, however, if the leaking material contained conductive impurities. Follow the appropriate replacement procedures.
9. The Sensing Band is not designed to be used as electrical wiring and must not be used for any purpose other than leak detection.
10. Do not apply petroleum-based products, such as wax, to the Sensing Band. Otherwise, liquids may be repelled and detection may fail.

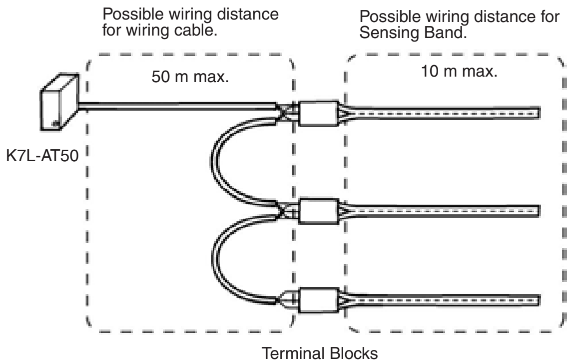
FAQs

Some questions that are frequently asked about the K7L are given below. Use this information when selecting a model.

Can one K7L Amplifier be used for detection in more than one place?

Yes.

By using Terminal Blocks to connect Sensing Bands in parallel, detection can be performed in more than place with only one K7L Amplifier.



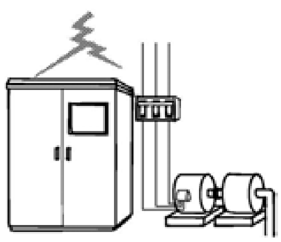
Note: 1. When wiring, be sure not to exceed the maximum possible wiring distances for both the connecting cable and the Sensing Band. Exceeding these distances may lead to faulty operation. Connect one Sensing Band to each Terminal Block.

2. Not applicable to K7L-AT50D.

Can the K7L Amplifier be used as a replacement for the 61F-GPN-V50 Water Leakage Detector?

Yes.

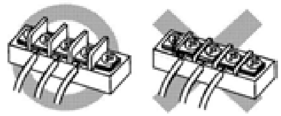
Because the surge withstand capability is different, however, do not use in locations where it will be exposed to impulses and surges, such as outdoor roofs or in pump panels. Also, items such as the power supply voltage and the connection sockets are different. Check these items before application.



Can a different terminal block (e.g. a commercially available terminal block or a terminal block constructed by the user) be used instead of the one provided?

Yes.

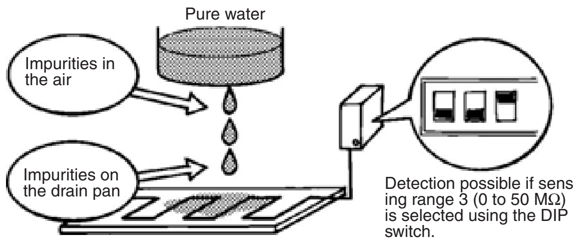
When using another terminal block, however, be sure to check that all the terminals are mutually isolated, and that there is no danger of ground faults in connecting cables or Sensing Bands.



Can the K7L Amplifier detect pure water?

Yes.

Even pure water, which has a resistance exceeding 10 MΩ·cm, can nearly always be detected if the K7L is used at its maximum sensitivity. This is because impurities are mixed with the water when it is leaked and the resistance drops.



Can the K7L Amplifier detect oil?

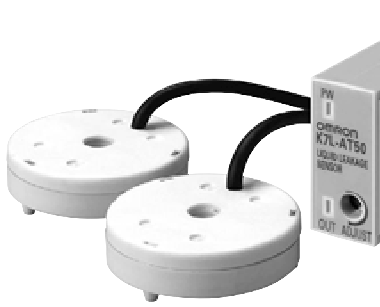
In most cases, no.

If, however, it contains impurities such as metal powder, as is the case with cutting oil and used engine oil, detection may be possible (actual instances of detection have been observed). The user should confirm whether the required kind of detection is possible before application.

Liquid Leakage Point Sensor
F03-16PS

A New Liquid Leakage Point Sensor Has Been Added to the K7L Series. Fluoroplastic Coating on the Bottom Electrode Ensures Chemical Resistance.

- Can be used in conjunction with Sensing Bands.
- Stud screw mounting requires no tools for installation.
- No tools means the Sensor can be wiped clean quickly and easily.
- The optional Mounting Bracket enables faster installation than three-screw mounting.
- Connect multiple Sensors to one K7L-AT50 Amplifier for significant cost savings.



Ordering Information

Sensors

Product name	Main material	Cable material	Electrode material	Model
Liquid Leakage Point Sensor	Polyethylene	Outer sheath: PVC Inner sheath: Fluoroplastic	SUS304	F03-16PS
			SUS304 and fluoroplastic coating	F03-16PS-F
Mounting Brackets (See note 1.)		---	---	F03-26PS
Terminal Block (See note 2.)	Nylon 6.6	---	---	F03-20

Note: 1. Use a commercially available bonding agent for PVC. One bag contains 10 Brackets.
2. One bag contains 10 Blocks.

Amplifier

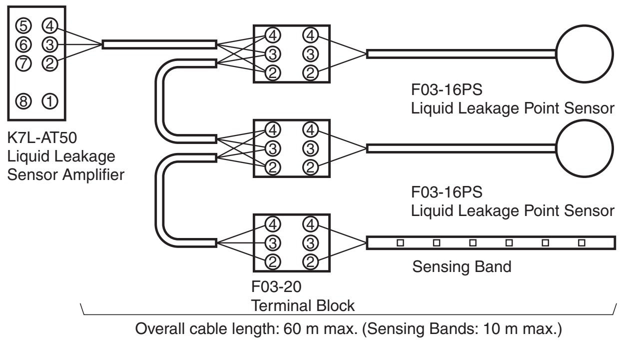
Product name	Model
Liquid Leakage Sensor Amplifier	K7L-AT50

Specifications

Ambient temperature	–10 to 60°C
Nut tightening torque	0.3 N·m max.
Weight	Approx. 30 g
Max. No. connected per Amplifier	Any number up to an overall cable length of 60 m.

Wiring Diagram

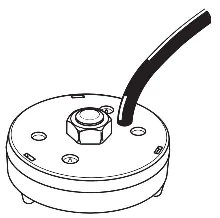
Any number of Sensors can be connected in parallel up to an overall cable length of 60 m. Leakage areas cannot be specified with the K7L-AT50.



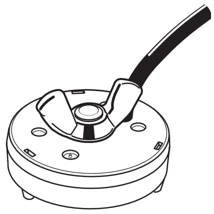
Mounting Methods

Stud Screw Mounting

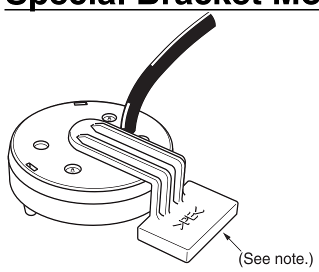
Securing the Sensor with a Nut



Securing the Sensor with a Wing Nut



Special Bracket Mounting



Note: Use a commercially available bonding agent for PVC.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

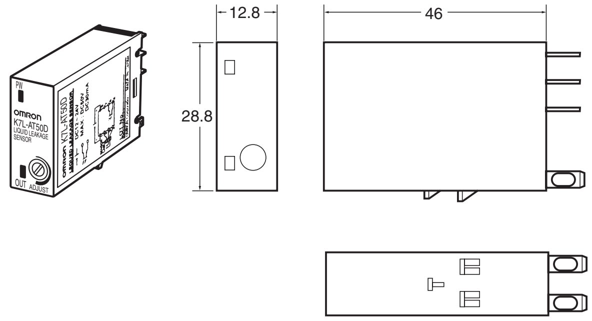
Cat. No. F049-E2-06

In the interest of product improvement, specifications are subject to change without notice.

Dimensions (Unit: mm)

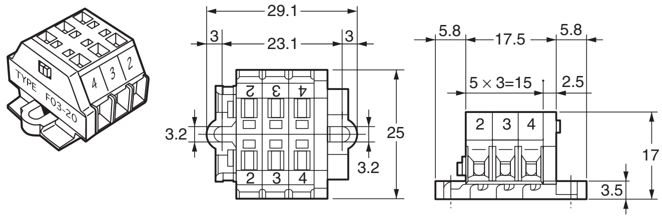
Liquid Leakage Sensor Amplifier

K7L-AT50/-AT50D



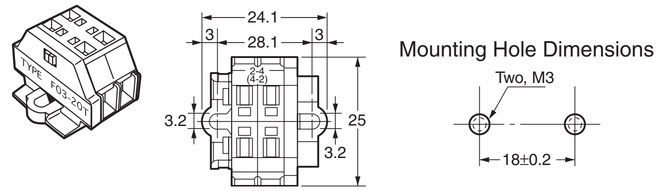
Terminal Block (See note 1.)

F03-20



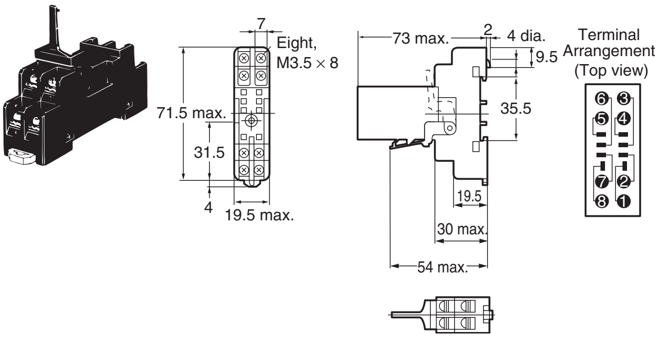
Terminator (See note 1.)

F03-20



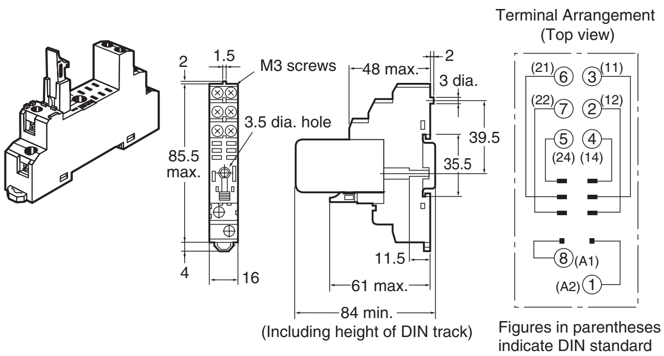
DIN-rail-mounted Sockets (See note 2.)

P2RF-08 (Round terminals can be used.)



DIN-rail-mounted Sockets (See note 2.)

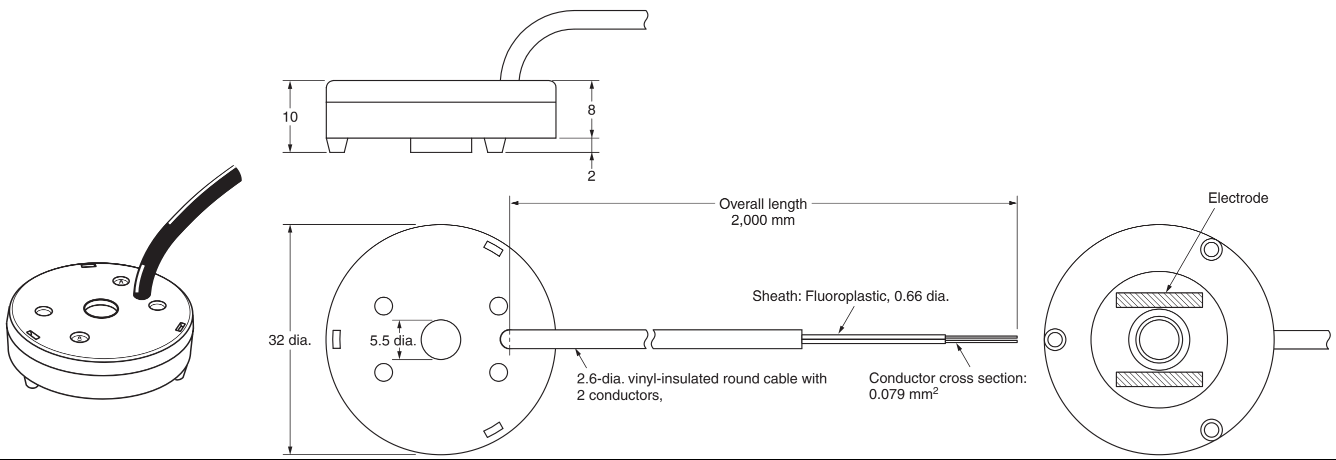
P2RF-08-E



Figures in parentheses indicate DIN standard numbers.

Liquid Leakage Point Sensor

F03-16PS
F03-16PS-F

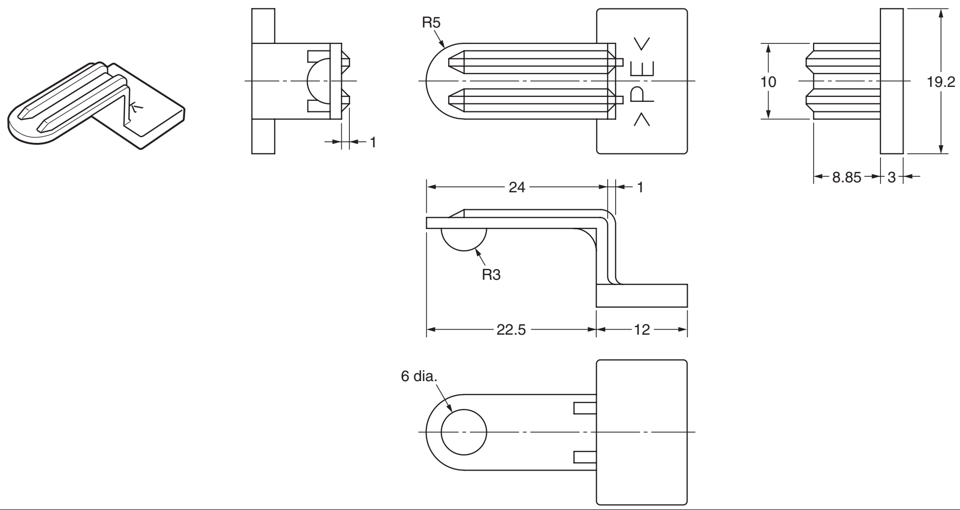


Note: 1. The Terminal Block is made of nylon 66. Mount the Terminal Block in locations not subject to liquid chemicals using M3 screws.

2. Secure the Sockets with M3 screws at a torque of 0.78 to 1.18 N·m.

Point Sensor Mounting Bracket

F03-26PS



Safety Precautions

■ Precautions for Safe Use

Observe the following points to ensure safe operation.

- Be sure to use a power supply voltage within the specified range. Not doing so may result in burning or malfunction.
- Do not use the product in locations subject to flammable gases or combustible objects. Doing so may result in fire.
- Insert the connection points into Sockets until the connection is locked securely. Not doing so may result in burning or malfunction.
- Do not short-circuit loads connected to output terminals. Doing so may result in burning.
- Be sure to connect the power supply with the correct polarity. Not doing so may result in malfunction.

■ Precautions for Correct Use

Installation

Attach to a panel of thickness 1 to 5 mm.

Do not install in the following locations.

- Locations subject to shock or vibration
- Locations where the temperature or humidity lies outside the specified range, or where condensation is likely to occur (To detect liquids with high impedances, do not use in locations with high humidity.)
- Locations subject to dust
- Locations subject to corrosive gases (particularly sulfide and ammonia gases)
- Outdoors or locations subject to direct sunlight
- Near devices that generate strong high-frequency noise (e.g., high-frequency welding devices etc.)

■ Application Precautions

You must allow sufficient leeway in ratings and performance, and provide proper fail-safe or other safety measures when using these products in any of the following applications. Be sure also to consult with your OMRON representative before actually attempting any of these applications.

- Applications under conditions or environments not specified in user documentation
- Applications for nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, or safety equipment
- Applications that may have a serious influence on lives and property and thus require particularly attention to safety

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To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Limit switches

Omron designs and manufactures an extensive range of high-quality limit switches that bring easier, more effective switching solutions to machines and systems.

Models are available with a variety of roller lever heads, as well as various types of plunger heads. Better seals, higher resistance to shock and stronger covers make these switches the perfect solution for any industrial application, even in extreme environmental conditions.

These general purpose limit switches are ideal for use in applications across the industry including lifts, garages, production lines, safety doors, machine tools, automotive, security, domestic goods and vending machines.

- More contacts for increased functionality
- Compact, space-saving design without compromising on safety performance
- Robust construction for operating in the harshest of conditions
- Cost-effective, high-performance switches meeting the highest safety standards
- UL / CSA, TÜV, BIA, SUVA approvals
- Designed for global use

Which type of switch is needed?

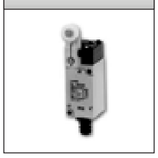
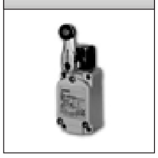
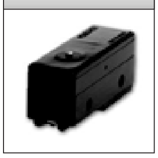
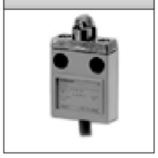
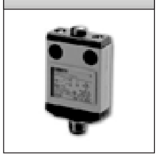
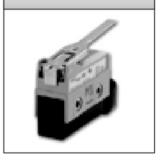
- **General purpose basic switch** — What type of actuator?
  - Plunger, lever
    - IP00
      - **X**  Page K-129
  - Plunger, lever, spring
    - IP56
      - **HL 5000**  Page K-5
    - IP67
      - **WL**  Page K-15
    - IP00/IP62
      - **Z**  Page K-137
- **Miniature switch** — What type of actuator?
  - Plunger, lever
    - IP67
      - **D4C**  Page K-57
      - **D4CC**  CD
- **Enclosed switch** — What type of actuator?
  - Plunger, lever
    - IP67
      - **D4E-_N**  Page K-79
      - **D4MC**  Page K-93

Table of contents

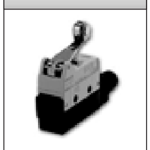
Special purpose basic switch for control of independent circuits

What type of actuator?

Plunger, lever

IP00

SHL



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ZC-_55

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DZ

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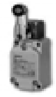
Limit switches

Selection table

		Category	Standard switches			Miniature switches		Enclosed switches	
									
		Model	D4A-N	HL-5000	WL	D4C	D4CC	D4E-N	D4MC
Selection criteria		Category	General purpose switches		Special purpose switches				
	Degree of protection	IEC	IP67	IP65	IP67	IP67		IP67	IP67
		JIS	Immersion-proof	Jet-proof	Immersion-proof	Immersion-proof			
	Rated current [A]	5 VDC							
		12 to 24 VDC							
		30 VDC		5		4	1	1	6
		125 / 250 VDC							
		24 VAC							
		115 VAC							0.5
		125 VAC	10	5	10	5	1	5	10
		100 to 240 VAC							
		250 VAC	10	5	10	5			10
		480 VAC	10		10				3
		500 VAC			10				
Features		Weather resistant models	■		W				
		Microload type				0.1 A		0.1 A	0.1 A
		Operation indicator	■		0.1 A	■	■		
Actuators		Adjustable rod lever		■	■				
		Adjustable roller lever		■					
		Bevel plunger				■	■		
		Center roller lever	■				■		
		Coil spring	■	■					
		Cone-shaped actuator							
		Cross roller plunger				■	■		
		Flexible rod	■						
		Fork lever lock							
		Hemisperic actuator			■				
		Hinge lever							■
		Hinge roller lever							■
		Hinge cross roller lever							
		Horizontal plunger	■						
		Horizontal roller plunger	■		■				
		Horizontal ball plunger	■		■				
		Leaf spring			■				
		Long hinge lever							
		Low force hinge lever							
		Low force wire hinge lever							
		One-way action hinge roller lever							
		One-way action short hinge roller lever							■
		One-way action roller lever						■	
		Panel mount plunger				■			■
		Panel mount pin plunger				■	■		
		Panel mount roller plunger				■	■		■
		Panel mount cross roller plunger				■	■		■
		Pin plunger				■	■	■	
		Plastic rod	■				■		
		Reverse hinge lever							
		Reverse hinge roller lever							
		Reverse short hinge roller lever							
		Rod spring lever							
		Roller leaf spring							
		Roller lever						■	
		Roller lever		■		■		■	
		Roller lever	■						
		Roller plunger	■			■	■	■	
		Sealed cross roller plunger				■	■	■	
		Sealed plunger		■		■	■	■	
		Sealed plunger roller		■		■	■	■	
		Short hinge cross roller lever			■				
		Short hinge lever							■
		Short hinge roller lever							
		Short spring plunger							
		Side plunger	■						
		Side roller plunger horizontal	■		■				
		Side roller plunger vertical	■		■				
		Slim spring plunger			■				
		Spring plunger							
		Top ball plunger							
		Top plunger	■		■				
		Top roller plunger	■		■				
		Unidirectional short hinge roller lever							
		Variable rod lever		■					
		Variable roller lever		■					
		Wobble stick			■				

Enclosed switches			General purpose Z-size			Special application			
SHL55	ZC-55	ZE	DZ	X - 10	Z - 1..	D5A	D5B	D5C	D5F
Special purpose switches				General purpose switches		Special purpose switches			
IP67 Immersion-proof		IP65 / IP60 Jet- / dust-proof	IP00	IP00	IP00 / IP62 (drip-proof)	IP67			
							1 mA		
						Solid State output: 100 mA at 5-24 DC, contact output: 10 mA at 12 VDC		200 mA	100 mA
5	6	15					30 mA		
				10 / 3A		Solid State output: 100 mA at 5-24 DC	1 mA at 5 VDC, 30 mA at 30 DC		
						Contact output: 10 mA			
0.4	0.5	10	0.5						
10	10	15	10		15				
						Contact output: 10 mA at 24 AC and 12 DC		200 mA	
10	10	15	10		15				
2		10	2		0.1				
SHL	ZC	Z	DZ			D5			
					0.1 A				
0.1 A						10 mA	10 mA		0.1 A
						■			
								■	
							■		
		■							
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							■		

Limit switches

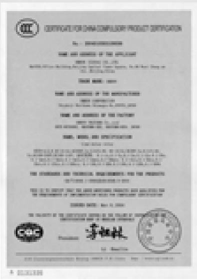
LEADING IN SERVICE

Focussed, progressive, distinctive. Be assured, choose Omron

At Omron we set high standards for ourselves. Our products are known all over the world for their unrivalled quality. But we offer more than just excellent quality. In an environment that places ever greater demands with regard to service, quality and costeffectiveness, other things are important too. Providing a top-quality service is what we do every day, including extra service as standard. This helps to ensure that we can provide tailor-made solutions for applications more effectively and more quickly.

More and more companies are choosing Omron as they seek to work in a partnership that is based on reliability and certainty.

Omron – the reassuring choice.



International standards and approvals

Our products carry all relevant international standards and approvals, including CCC (Chinese Compulsory Certification), which makes exporting your system much easier.

- Reliability, also for your customers
- Maximum flexibility
- Confidence

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More and more people are choosing Omron, as a high degree of reliability is a key feature of its products. You can always rely on Omron. Even if a product unexpectedly malfunctions, our repair team is ready to swing into action.

- Product repaired and returned to you within 5 days, including collection and delivery
- You can track the status of your repair on-line
- Repairs within warranty are completely free-of-charge

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The majority of standard Omron products are provided in digital EPLAN format, which means that a few clicks of your mouse are all that is needed to design the right product into your switching panel.

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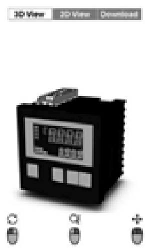
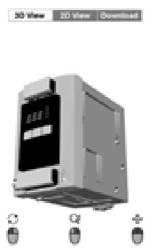
- Very easy to use
- Always the right product
- Reduced engineering time

Downloadable 2-D and 3-D CAD drawings

Designers of switching panels and machines can download clear 2-D and 3-D CAD drawings for all current products from http://omron-industrial.com/en/2D3D, which can easily be incorporated into your design.

- Large number of formats supported for greater flexibility
- Readily available
- Convenience that saves you time

General-purpose Limit Switch
HL-5000

Economical, Miniature Limit Switch Boasting Rigid Construction

- Highly rigid construction (head and cover snugly fit in box).
- Dustproof and drip-proof construction.
- Smooth operation with greater OT.
- Easy-to-wire conduit opening design.
- Models with grounding terminals conform to the CE marking.
- Approved by CCC (Chinese standard).

Model Number Structure

■ Model Number Legend

HL-5□□
1 2

1. Actuators
000: Roller lever
030: Adjustable roller lever
050: Adjustable rod lever
100: Sealed plunger
200: Sealed roller plunger
300: Coil spring

2. Ground Terminal Specifications
Blank: Without ground terminal
G: With ground terminal/M5 tapping on the rear side

Ordering Information

■ List of Models

Actuator	Roller lever	Adjustable roller lever	Adjustable rod lever	Sealed plunger	Sealed roller plunger	Coil spring
Model	HL-5000	HL-5030	HL-5050	HL-5100	HL-5200	HL-5300

Note: HL-5000 Limit Switches are offered with a choice of ground terminal/M5 tapping on the rear side conforming to various standards. When placing an order, add the code to the model number to indicate if ground terminal/M5 tapping on the rear side is required.
-G: with ground terminal/M5 tapping on the rear side.

Individual Parts (Head/Actuator)

Actuator type	Switch model number	Assembled head (head and lever)	Head (individual)	Lever (individual)
Roller lever	HL-5000	HL-1HPH100 (HL5 0031A)	HL-1HPH01 (HL5 0028A)	HL-1HPA100 (HL5 0025G)
Adjustable roller lever	HL-5030	HL-1HPH300 (HL5 0034F)	HL-1HPH01 (HL5 0028A)	HL-1HPA300 (HL5 0026E)
Adjustable rod lever	HL-5050	HL-1HPH500 (HL5 0037M)	HL-1HPH01 (HL5 0028A)	HL-1HPA500 (HL5 0027C)
Sealed plunger	HL-5100	HL-2HPH100 (HL5 0044C)	---	---
Sealed roller plunger	HL-5200	HL-2HPH200 (HL5 0041R)	---	---
Coil spring	HL-5300	HL-3HPH100 (HL5 0042G)	---	---
Remote control	HL-5500	HL-5HPH100 (HL5 0043E)	---	---

Specifications

■ Approved Standards

Agency	Standard	File No.
CCC (CQC)	GB14048.5	2003010303077624

Note: Ask your OMRON representative for information on approved models.

■ Approved Standard Ratings

CCC (GB14048.5)

Applicable category and ratings
AC-15 3 A/250 VAC

■ General Ratings

Rated voltage	Non-inductive load				Inductive load			
	Resistive load		Lamp load		Inductive load		Motor load	
	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	5 A		1.5 A	0.7 A	3 A		2 A	1 A
250 VAC	5 A		1 A	0.5 A	3 A		1.5 A	0.8 A
12 VDC	5 A		3 A		4 A		3 A	
24 VDC	5 A		3 A		4 A		3 A	
125 VDC	0.4 A	0.2 A	---		---		---	
250 VDC	0.4 A	0.2 A	---		---		---	

Inrush current	NC	24 A max.
	NO	12 A max.

Note: 1. The above figures are for steady-state currents.
2. Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
3. Lamp load has an inrush current of 10 times the steady-state current.
4. Motor load has an inrush current of 6 times the steady-state current.

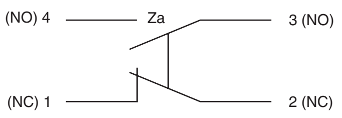
■ Characteristics

Degree of protection	IP65
Durability (see note 3)	Mechanical: 10,000,000 operations min. (under rated conditions) Electrical: See the following *Electrical Durability.*
Operating speed	5 mm/s to 0.5 m/s
Operating frequency	Mechanical: 120 operations/min Electrical: 30 operations/min
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	25 mΩ max. (initial value)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between terminals of the same polarity 1,500 VAC, 50/60 Hz for 1 min between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal part
Rated frequency	50/60 Hz
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note 4)
Shock resistance	Destruction: 1,000 m/s^2 min. Malfunction: 300 m/s^2 min. (see note 4)
Ambient temperature	Operating: –5°C to 65°C (with no icing)
Ambient humidity	Operating: 95% max.
Weight	Approx. 130 to 190 g

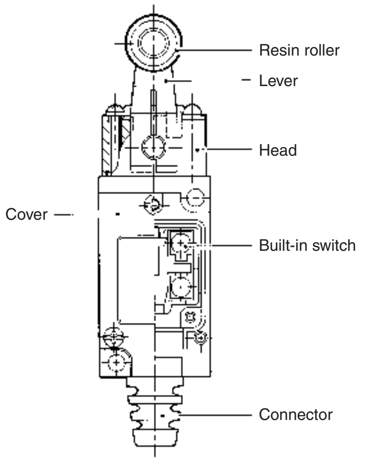
Note: 1. The above figures are initial values.
2. The above characteristics may vary depending on the model. For further details, contact your OMRON sales representative.
3. The values are calculated at an operating temperature of 5°C to 35°C, and an operating humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.
4. These values do not apply to the coil spring model.

Connections

■ Contact Form

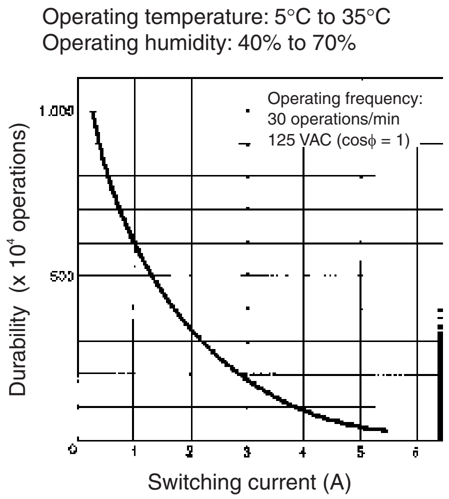


Nomenclature



Engineering Data

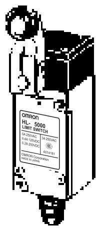
■ Electrical Durability (cosϕ=1)

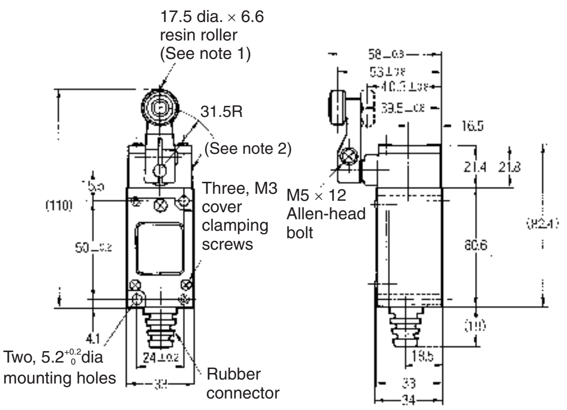


Dimensions

Note: 1. All units are in millimeters unless otherwise indicated.
2. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

Roller Lever
HL-5000

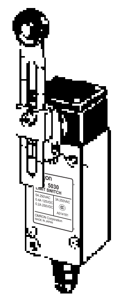


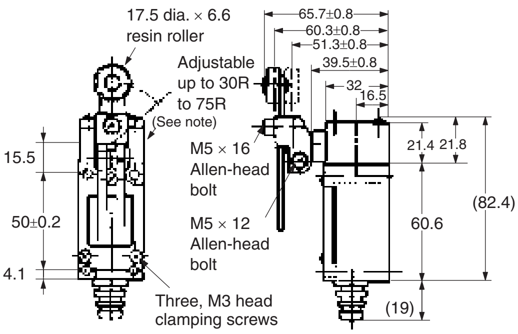


Note: 1. The head can be mounted anywhere in 360°.
2. The head can be mounted in any of the four directions.

Model	HL-5000
OF max.	7.35 N
RF min.	0.98 N
PT max.	20°
OT min.	50°
MD max.	12°
OP	---

Adjustable Roller Lever
HL-5030



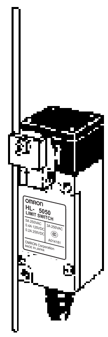


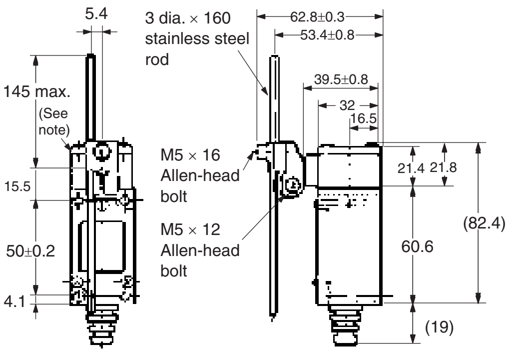
Note: The head can be mounted in any of the four directions. Dimensions not shown are the same as HL-5000.

Model	HL-5030 (see note)
OF max.	7.35 N
RF min.	0.98 N
PT max.	20°
OT min.	50°
MD max.	12°
OP	---

Note: Measured with the types of the 31.5-mm arm or rod length.

Adjustable Rod Lever
HL-5050



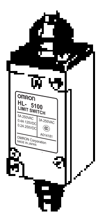


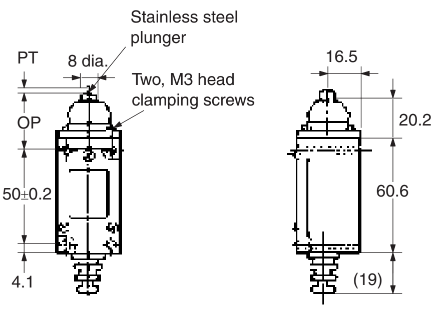
Note: The head can be mounted in any of the four

Model	HL-5050 (see note)
OF max.	7.35 N
RF min.	0.98 N
PT max.	20°
OT min.	50°
MD max.	12°
OP	---

Note: Measured with the types of the 31.5-mm arm or rod length.

Sealed Plunger
HL-5100

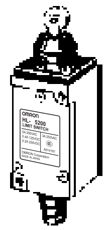


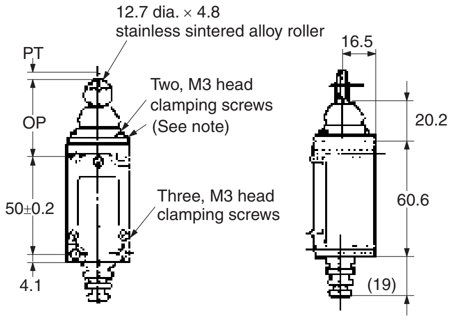


Note: Dimensions not shown are the same as HL-5000.

Model	HL-5100
OF max.	8.83 N
RF min.	1.47 N
PT max.	1.5 mm
OT min.	4 mm
MD max.	1 mm
OP	30±0.8 mm

Sealed Roller Plunger
HL-5200

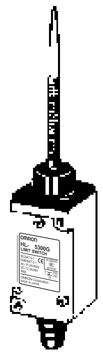


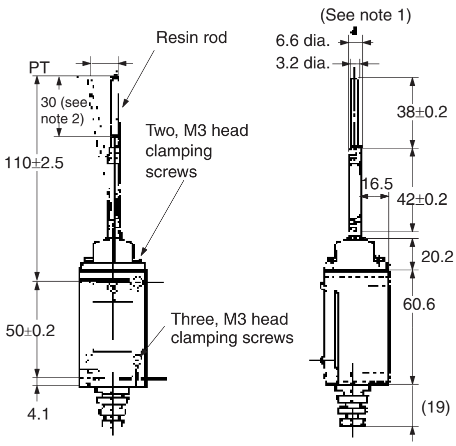


Note: The head can be mounted in either of the two directions. Dimensions not shown are the same as HL-5000.

Model	HL-5200
OF max.	8.83 N
RF min.	1.47 N
PT max.	1.5 mm
OT min.	4 mm
MD max.	1 mm
OP	40±0.8 mm

Coil Spring
HL-5300





Note:
1. The coil spring may be operated from any directions except axial directions (↓).
2. The operating range of the dog or cam is the top third (i.e. from the tip of the rod) of the whole actuator.
3. Dimensions not shown are the same as HL-5000.

Model	HL-5300
OF max.	1.47 N
RF min.	---
PT max.	30 mm
OT min.	---
MD max.	---
OP	---

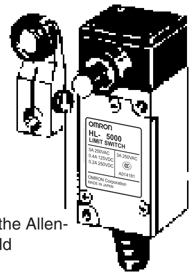
Note: OF and RF measured at the arm length of 75 mm for HL-5030, and 145 mm for HL-5050 (reference values).

Model	HL-5030	HL-5050
OF	3.09 N	1.60 N
RF	0.41 N	0.22 N

Installation

Actuator Position Change (HL-5000, HL-5030, HL-5050)

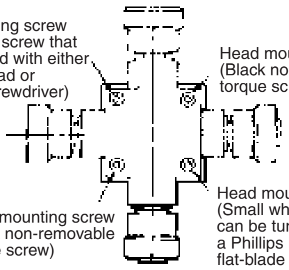
To change the angle of the actuator, loosen the Allen-head bolt on the side of the actuator lever. Then the actuator can be set at any angle.



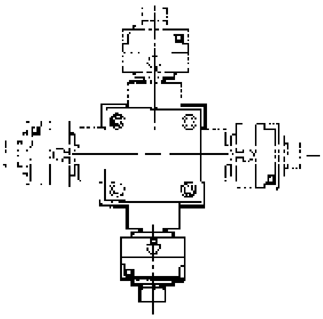
Head Direction Change (HL-5000, HL-5030, HL-5050, HL5200)

To change the head direction, loosen the two mounting screws. Then the head can be changed at 90° increments in one of four directions.

HL-5000
HL-5030

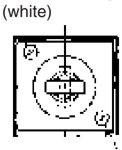


HL-5050



The head of the HL-5200 can be mounted in two directions only. Refer to the following illustration.

HL-5200



Limit switches

Precautions

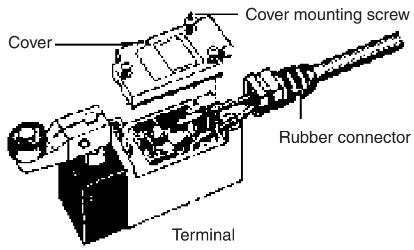
Refer to the *“Precautions for All Switches” on CD.*

■ Correct Use

Wiring

Wiring Procedure

1. Loosen the cover mounting screws and remove the cover.
2. Disconnect the rubber connector from the box conduit and press-fit a solderless terminal. The following solderless terminals are available.
3. After inserting the solderless terminal into the Switch, tighten the terminal screws securely.
4. After wiring the Limit Switch, insert the rubber connector into the groove of the box securely.
5. Tighten the three mounting screws evenly. The optimum tightening torque for each screw is 0.49 to 0.59 N·m.



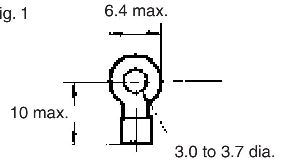
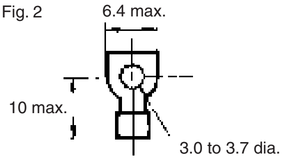
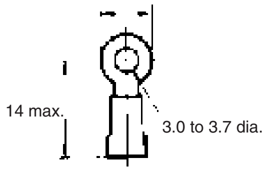
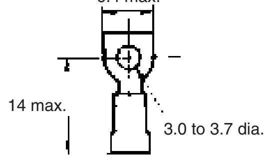
Applicable Lead Wires

Wire name	Applicable wire		
	Number of conductors	Conductor size	External size
Vinyl cabtire cord (VCTF)	2 3 4	0.75 mm^2	Round, 6 to 9 dia. Flat, 9.4 max.
Vinyl cabtire cable (VCT)	2	0.75 mm^2	
600-V vinyl-insulated sheath cable	2	1 dia./1.2 dia./1.6 dia.	

Note: Do not use wires containing silicone, otherwise a contact failure may result.

Applicable Solderless Terminal

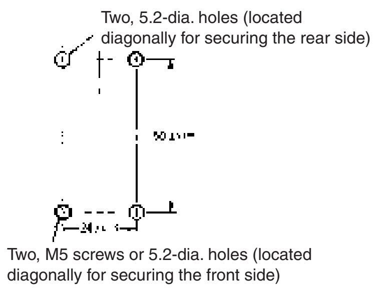
The following solderless terminals are available. Do not use fork or any other type of terminals, otherwise an accidental disconnection resulting in a ground fault may result.

Bare terminal		Terminal with insulated grip	
Fig. 1 	Fig. 2 	Fig. 3 	Fig. 4 

Mounting

To mount the Limit Switch securely, be sure to use two M5 Allen-head bolts and washers. The tightening torque applied to each bolt is 4.90 to 5.88 N·m. To mount the Limit Switch more securely, use two M5 screw holes on the rear panel and rear holes for positioning if the model is the HL-5□□□G-Series Limit Switches.

Mounting holes



Only the HL-5□□□G has M5 x 0.8 screw holes on the rear side.

Others

Do not use the Limit Switch outdoors, otherwise the Limit Switch will become damaged by rust or ozone.

The Limit Switch is not suitable in places exposed to the spray of rainwater, seawater, or oily water. Consult your OMRON representative for models resisting rainwater, seawater, and oily water.

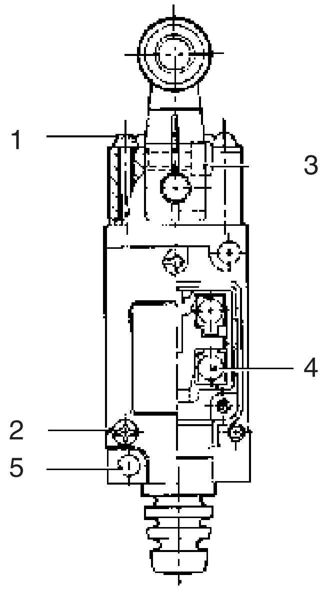
If high-sealing performance is required along with shielded wiring or conduit wiring, use the D4C or WL.

Tightening Torque

A loose screw may result in a malfunction. Be sure to tighten each screw to the proper tightening torque as shown below.

No.	Type	Optimum tightening torque
1	Head mounting screw	0.49 to 0.59 N·m
2	Cover mounting screw	0.49 to 0.59 N·m
3	Allen-head bolt	4.90 to 5.88 N·m
4	Terminal screw (M3 screw)	0.49 to 0.59 N·m
5	Switch mounting screw (M5 Allen-head bolt)	4.90 to 5.88 N·m

Note: If the head direction has been changed, check the torque of each screw and make sure that the screws are free of foreign substances, and that each screw is tightened to the proper torque.



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. C004-E2-11

Two-circuit Limit Switch
WL

Wide Selection of Two-circuit Limit Switches

- A wide selection of models are available, including the overtravel models with greater OT, lamp-equipped models for checking operation, low-temperature and heat-resistant models, and microload models.
- Microload models are added to the product lineup.
- Meets EN/IEC standards (only Switches with ground terminals).
- Switches with ground terminals have the CE marking.

Model Number Structure

■ Model Number Legend

General-purpose Models/Environment-resistant Models

WL□□-□□□□□□□□
1 2 3 4 5 6 7 8 9 10

1. Electrical Rating

Blank:	Standard
01:	Micro

2. Actuator and Head Specifications

Symbol	Actuator type	Switches without levers
CA2	Roller lever: Standard model (R38)	WLRCA2
CA2-7	Roller lever: Standard, standard model (R50)	WLRCA2
CA2-8	Roller lever: Standard, standard model (R63)	WLRCA2
H2	Roller lever: Overtravel, general-purpose model, 80°	WLRH2
G2	Roller lever: Overtravel, high-sensitivity, 80°	WLRG2
CA2-2N	Roller lever: Overtravel, 90°	WLRCA2-2N
GCA2	Roller lever: High-precision	WLRGCA2
CA12	Adjustable roller lever: Standard	WLRCA2
H12	Adjustable roller lever: Overtravel, general-purpose model, 80°	WLRH2
G12	Adjustable roller lever: Overtravel, high-sensitivity, 80°	WLRG2
CA12-2N	Adjustable roller lever: Overtravel, 90°	WLRCA2-2N
CL	Adjustable rod lever: Standard	WLRCL
HL	Adjustable rod lever: Overtravel, general-purpose model, 80°, 25 to 140 mm	WLRH2
HLAL4	Adjustable rod lever: Overtravel, general-purpose model, 80°, 350 to 380 mm	WLRH2
GL	Adjustable rod lever: Overtravel, high-sensitivity, 80°, 25 to 140 mm	WLRG2
CL-2N	Adjustable rod lever: Overtravel, 90°, 25 to 140 mm	WLRCA2-2N
HAL5	Rod spring lever: Protective, Overtravel, general-purpose model, 80°	WLRH2
CA32-41	Fork lever lock: Protective, WL-5A100	WLRCA32
CA32-42	Fork lever lock: Protective, WL-5A102	WLRCA32
CA32-43	Fork lever lock: Protective, WL-5A104	WLRCA32
D	Plunger: Top plunger	---
D2	Plunger: Top-roller plunger	---
D28	Plunger: Sealed top-roller plunger	---
D3	Plunger: Top-ball plunger	---
SD	Plunger: Horizontal plunger	---

Limit switches

Symbol	Actuator type	Switches without levers
SD2	Plunger: Horizontal-roller plunger	---
SD3	Plunger: Horizontal-ball plunger	---
NJ	Flexible rod: Coil spring	---
NJ-30	Flexible rod: Coil spring, multi-wire	---
NJ-2	Flexible rod: Coil spring, resin rod	---
NJ-S2	Flexible rod: Steel wire	---

3. Environment-resistant Model Specifications

Blank: Standard
RP: Corrosion-proof (See note 1.)
P1: Weather-resistant (See note 1.)

4. Built-in Switch Specifications

Blank: General-purpose built-in switch
55: Hermetically-sealed built-in switch (See note 1.)

5. Temperature Specifications

Blank: Standard: –10°C to 80°C
TH: Heat-resistive: 5°C to 120°C (See note 1.)
TC: Low temperature: –40°C to 40°C (See note 1.)

6. Special Hermetic Model Specifications

Blank: No cables or molding
139: General-purpose built-in switch with cables attached and molded conduit opening and cover (cover cannot be removed). (See note 1.)
140: Airtight built-in switch with cables attached and molded conduit opening, cover, and case cover (cover cannot be removed). (See note 1.)
141: Airtight built-in switch with cables attached and molded conduit opening, cover, and case cover (cover cannot be removed). The Head opening is created to protect it from cutting powder. (See note 1.)
145: Airtight built-in switch with cables attached and molded conduit opening, cover, and case cover (cover cannot be removed, Head can be mounted in any of 4 directions).
The Head opening is created to protect it from cutting powder. (See note 1.)
RP40: Airtight built-in switch with cables attached, SC Connector can be used, molded conduit opening, cover, and case cover (cover cannot be removed, Head direction can be changed). (See note 1.)
RP60: Airtight built-in switch with cables attached, fluorine rubber-molded conduit opening, cover, and case cover (cover cannot be removed, Head direction cannot be changed). (See note 1.)

7. Conduit Size, Ground Terminal Specifications (See note 2.)

Blank:	G $^{1}/_{2}$	Without ground terminal
G1:	G $^{1}/_{2}$	With ground terminal
G:	Pg13.5	With ground terminal
Y:	M20	With ground terminal
TS:	$^{1}/_{2}$-14NPT	With ground terminal

8. Indicator Type

	Element	Voltage	Leakage Current
LE:	Neon lamp	125 VAC 250 VAC	Approx. 0.6 mA Approx. 1.9 mA
LD:	LED	10 to 115 VAC/VDC	Approx. 0.5 mA

9. Lamp Wiring

2: NC connection: Light-ON when operating
3: NO connection: Light-ON when not operating

10. Lever Type

Blank: Standard lever
A: Double nut lever

Note: 1. For information on applicable models, see page 18.
2. Switches with ground terminals meet EN/IEC standards (and have the CE marking).

Ground Terminal Models

WL□-□
1 2

1: Type of actuator
2: Conduit opening size
The models differ depending on the size of the case's conduit thread.

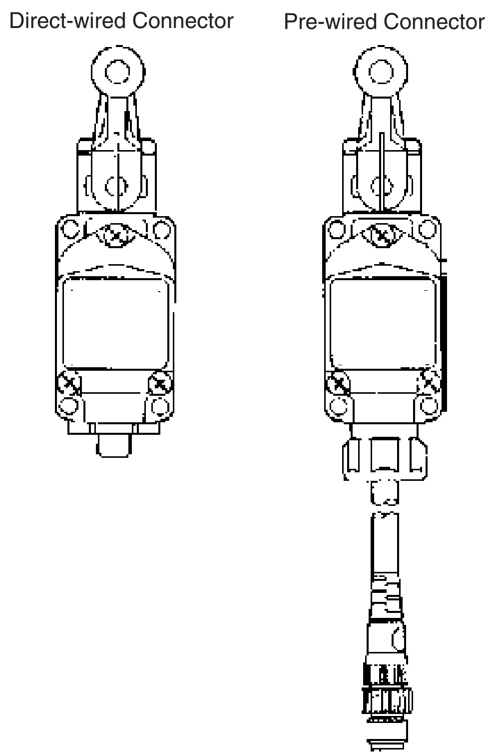
Model	Conduit opening size
G1	G $^{1}/_{2}$
G	Pg 13.5
Y	M20
TS	$^{1}/_{2}$-14NPT

Sensor I/O Connector Models

WL □□-□LD□
1 2 3 4

1. **Electrical Rating**
   Blank: Standard
   01: Microload
2. **Actuator Type**
   CA2: Roller lever: Standard
   GCA2: Roller lever: High-precision
   H2: Roller lever: Overtravel, general-purpose
   G2: Roller lever: Overtravel, high-sensitivity
   D2: Plunger: Top-roller plunger
   D28: Plunger: Sealed top-roller plunger
3. **Built-in Switch Type**
   Blank: Standard
   55: Hermetically sealed
4. **Wiring Specifications**
   K13A: Direct-wired Connector (2-core: AC, NO wiring, connector pins No. 3, 4)
   K13: Direct-wired Connector (2-core: DC, NO wiring, connector pins No. 3, 4)
   K43A: Direct-wired Connector (4-core: AC)
   K43: Direct-wired Connector (4-core: DC)
   -M1J: Pre-wired Connector (See note 2.) (2-core: DC, NO wiring, connector pins No. 3, 4)
   -M1GJ: (See note 1.) Pre-wired Connector (See note 2.) (2-core: DC, NO wiring, connector pins No. 1, 4)
   -M1JB: (See note 1.) Pre-wired Connector (See note 2.) (2-core: DC, NC wiring, connector pins No. 3, 2)
   -AGJ03: Pre-wired Connector (See note 2.) (4-core, AC)
   -DGJ03: (See note 1.) Pre-wired Connector (See note 2.) (4-core, DC)
   -DK1EJ03: (See note 1.) Pre-wired Connector (See note 2.) (3-core: DC, NO wiring, connector pins No. 2, 3, 4)

Note: 1. Models with pre-wired connectors and DC specifications have EN/IEC approval.
2. With 0.3-m cable attached.



Spatter-prevention Models

WL□ □ - □□S □
1 2 3 4 5

1. **Electrical Rating**
   Blank: Standard
   01: Microload
2. **Actuator Type**
   CA2: Roller lever: Standard model
   GCA2: Roller lever: High-precision model
   H2: Roller lever: Overtravel, general-purpose model
   G2: Roller lever: Overtravel, high-sensitivity model
   D28: Plunger: Sealed top-roller plunger
3. **Built-in Switch Type**
   Blank: Standard
   55: Hermetically sealed
4. **Indicator Lamp**
   Blank: None
   LD: LED indicator lamp (AC/DC common)
   LE: Neon Lamp
5. **Wiring Specifications**
   -M1J-1: Pre-wired Connector (See note.)
   (2-core: DC, NO wiring, connector pins No. 3, 4)
   -M1GJ-1: Pre-wired Connector (See note.)
   (2-core: DC, NO wiring, connector pins No. 1, 4)
   -DGJS03: Pre-wired Connector (See note.) (4 core, DC)

Note: With 0.3-m cable attached.

Ordering Information

■ Classification

Specifications				Standard	Overtravel	High-precision	Features	Page
Actuators	Roller lever			Yes	Yes	Yes	Five models: Roller lever, adjustable roller lever, adjustable rod lever, fork lever lock, rod spring lever.	35 to 52 20 to 22 27, 31 to 33
	Plunger			Yes	---	---	Six models: Top plunger, top-roller plunger, top-ball plunger, horizontal plunger, horizontal-roller plunger, horizontal-ball plunger.	
	Flexible rod			Yes	---	---	Two models: coil spring and steel wire.	
Load/ contact	Standard load		SPST-NO/ SPST-NC type	Yes			Standard models use a two-circuit double-break switch.	
	Microload		SPST-NO/ SPST-NC type	Yes			Specifications include gold-plated contacts.	
Environment-resistant models (See note 3.)	Airtight-seal		WL□-55	Yes (Cannot be used with heat-resistive and low-temperature models.)			Uses an airtight-sealed built-in switch.	24, 34
	Hermetic seal	Molded terminals	WL□-139				Lead wires are attached. The case cover and conduit section are molded from epoxy resin to improve sealing performance.	
			WL□-140 WL□-141 WL□-145				Lead wires are attached. The case is filled with epoxy resin, to ensure high sealing performance. The Head opening is protected from cutting powder. (WL□-141 and -145 models) Only WLG2, WLCA2, and WLGCA2 can be fabricated. (WL□-141 models.)	
		Anti-coolant	WL□-RP40				The connector can be removed, so it is possible to use flexible wires in the cable. The Head can be removed.	
			WL□-RP60				Rubber parts are made from fluorine rubber. The Head cannot be removed.	
	Spatter-prevention		WL□-S	Yes			To improve spatter prevention during welding, a heat-resistant resin is used, and screws and rollers are all made from stainless steel.	25, 27, 29, 31, 34, 47

Specifications			Standard	Overtravel	High-precision	Features	Page
Environment-resistant models (See note 3.)	Heat-resistive	WL□-TH	Yes (Cannot be used with airtight, hermetic, low-temperature, corrosion-proof, or lamp-equipped models.)			To improve heat resistance, silicone rubber is used for rubber parts and for the built-in switch. The operating temperature range is +5°C to 120°C.	24
	Low-temperature	WL□-TC	Yes (Cannot be used with airtight, hermetic, heat-resistive, corrosion-proof, or lamp-equipped models.)			To improve low temperature resistance, silicone rubber is used. The operating temperature range is –40°C to 40°C.	
	Corrosion-proof (See note 4.)	WL□-RP	Yes (Cannot be used with lamp-equipped models.)			Diecast parts such as the switch box are made of corrosion-proof aluminum. Rubber-sealing parts are made of fluorine rubber and exposed nuts and screws are made of stainless steel. These all aid in resisting oil, chemicals and adverse weather conditions.	
	Outdoor specifications	WL□-P1	--- (See note 5.)	Yes (See note 6.)	---	Rotary shafts are made of unquenched (i.e., untreated) stainless steel to improve corrosion resistance. Exposed nuts and screws are made of stainless steel and rubber sealing parts of silicone rubber. These factors all combine to create a product which is resistant to temperature changes and adverse weather conditions.	
Lamp-equipped		WL□-LE	Yes			Operating status can be checked at a glance. Lit when operating and not lit when not operating. WL□-LE: 100 VAC/VDC min. WL□-LD: 115 VAC/VDC min. (Refer to page 29 for detailed ratings.)	22, 30, 31, 33, 44
		WL□-LD	Yes				
Relevant pages			Pages 35 to 52			---	---

Note: 1. Do not expose to extreme changes in temperature.

2. Standard Models: Operate on each side at an angle of 45°.
Possible to set to one-side operation on either side.
Pretravel (PT) is 15°.
Overtravel Models: Standard and high-sensitivity models operate on each side at an angle of 80°.
Not possible to set to one-side operation.
-2N Series operate on each side at an angle of 90°.
Possible to set to one-side operation on either side.
High-precision Models: Operate on each side at an angle of 45°.
Possible to set to one-side operation on either side.
Pretravel (PT) is 5°.

3. When ordering, add the suffix for the environment-resistant model or indicator specifications required according to the operating environment and purpose.

4. The overtravel model (-2N Series), fork lever lock model (WLCA32-41 to 44), horizontal plunger (WLSD□) model, heat-resistive model, low-temperature model, and lamp-equipped model cannot be used with the corrosion-proof model.

5. Outdoor specifications are available for some standard models. Consult your OMRON representative for details.

6. Outdoor specifications are only available for general models and high-sensitivity models.

Limit switches

■ List of Models

General-purpose Models

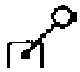
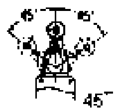
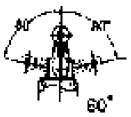
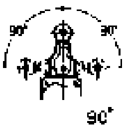
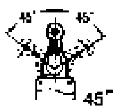
These Limit Switches are two-circuit double-break switches housed in rugged diecast, thus making it an oil-tight, waterproof and dustproof construction (complies with IP67).

In addition to the standard models, microload models are also available.

A wide range of actuators with a range of functions are available; rotating lever, plunger, flexible rod etc.

The rubber material in the standard models is designed to be resistant to water and most oils.

Roller Lever Models: Short, Medium, and Long Lever Models

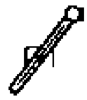
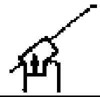
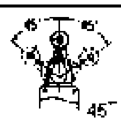
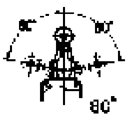
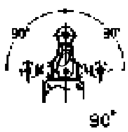
Type		Total travel (TT)	Features	Actuator (See note 2.)		
				WL-1A100 Roller Lever: Short lever (R38) 	WL-1A200 Roller Lever: Medium lever (R50) 	WL-1A300 Roller Lever: Long lever (R63) 
Standard			One-side operation is possible. (See note 3.) Head can be mounted in any of the four directions.	WLCA2	WLCA2-7	WLCA2-8
Over-travel	General		One-side operation is impossible. (See note 3.) Head can be mounted in any of the four directions.	WLH2	---	---
	High-sensitivity		One-side operation is possible. (See note 3.) Head can be mounted in any of the four directions.	WLG2	---	---
	Side-installation		One-side operation is possible. (See note 3.) Head can be mounted in any of the two directions. (When the Head can be mounted horizontally, the Head can be mounted in any of the four directions.)	WLCA2-2N	---	---
High-precision			One-side operation is possible. (See note 3.) Head can be mounted in any of the four directions.	WLGCA2	---	---

Note: 1. For the approved standards file numbers, refer to page 27.

2. For external dimensions and other information, refer to pages 35 to 52.

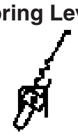
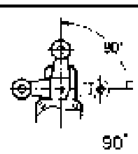
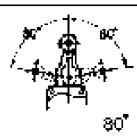
3. One-side operation means that three operational directions can be selected electrically, according to the change in direction of the operating plunger. Those models for which one-side operation is impossible can only operate on both sides. For details, see page 52.

Adjustable Roller Levers and Adjustable Rod Levers

Type		Total Travel (TT)	Features	Actuator (See note 2.)	
				WL-2A100 Adjustable Roller Lever 	WL-4A100 Adjustable Rod Lever (Adjustable length: 25 to 140 mm) WL-3A100 (Adjustable length: 350 to 380 mm) 
Standard			One-side operation possible. (See note 3.) Head can be mounted in any of the four directions.	WLCA12	---
				---	WLCL (WL-4A100)
Overtrav-el	General		One-side operation possible. (See note 3.) Head can be mounted in any of the four directions.	WLH12	WLHL (WL-4A100)
					WLHAL4 (WL-3A100)
	High-sensi-tivity		One-side operation possible. (See note 3.) Head can be mounted in any of the four directions.	WLG12	WLGL (WL-4A100)
	Side-instal-lation		One-side operation is possible. (See note 3.) Head can be mounted in any of the two directions. (When the Head can be mounted horizontally, the Head can be mounted in any of the four directions.)	WLCA12-2N	WLCL-2N (WL-4A100)

Note: 1. For the approved standards file numbers, refer to page 27.
2. For external dimensions and other information, refer to pages 35 to 52.
3. One-side operation means that three operational directions can be selected electrically, according to the change in direction of the operating plunger. The operating plunger is set for operation on both sides before delivery. Those models for which one-side operation is impossible can only operate on both sides. For details, see page 52. The operational plunger is factory-set to both sides.

Rod Spring Levers and Fork Lever Locks

Type		Total travel (TT)	Features	Actuator (See note 2.)	
				WL-3A200 Rod Spring Lever 	Fork Lever Locks: WL-5A100, WL-5A102, WL-5A104 
Protective			Head can be mounted in any of the four directions.	---	WLCA32-41 (WL-5A100)
					WLCA32-42 (WL-5A102)
					WLCA32-43 (WL-5A104)
Overtrav-el	General		One-side operation is possible. (See note 3.) Head can be mounted in any of the four directions.	WLHAL5	---

Note: 1. For the approved standard file numbers, refer to page 27.
2. For external dimensions and other information, refer to pages 35 to 52.
3. One-side operation means that three operational directions can be selected electrically, according to the change in direction of the operating plunger. The operating plunger is set for operation on both sides before delivery. Those models for which one-side operation is impossible can only operate on both sides. For details, see page 52. The operational plunger is factory-set to both sides.
4. The fork lever lock is configured so that the dog pushes the lever to reverse the output and this reversed state is maintained even after the dog continues on. If the dog then pushes the lever from the opposite direction, the lever will return to its original position.

Standard Plungers

Type	Actuators	Model
Top	Top Plunger	WLD
	Top-roller Plunger	WLD2
		WLD28 (See note.)
	Top-ball Plunger	WLD3
Horizontal	Horizontal Plunger	WLSD
	Horizontal-roller Plunger	WLSD2
	Horizontal-ball Plunger	WLSD3

Note: Sealed roller.

Standard Flexible Rods

Actuators		Model
Coil spring	Spring dia. 6.5	WLNJ
	Spring dia. 4.8	WLNJ-30
	Resin rod dia. 8.0	WLNJ-2
Steel wire	1.0-dia. wire	WLNJ-S2

Microload Models

A series of microload models has also been developed for the configurations outlined on pages 20 to 22. The model numbers become WL01☐. For example, WLCA2 becomes WL01CA2.

Lamp-equipped Models

Operating characteristics	Rated voltage	Leakage current	Lamp-equipped Switch	Lamp-equipped cover only
Neon lamp	125 VAC	Approx. 0.6 mA	WL☐-LE (See note 1.)	WL-LE
	250 VAC	Approx. 1.9 mA		
LED	10 to 115 VAC/VDC	Approx. 0.5 mA	WL☐-LD (See note 1.)	WL-LD

Note: 1. In the model number, ☐ indicates the actuator number. For example, CA2, D, NJ, etc.

2. The default setting is "light-ON when not operating." Turn the lamp holder by 180° to change the setting to "light-ON when operating."

Ordering Information

When ordering general-purpose indicator-equipped models insert the specifications number at the end of the basic model number.

E.g.: When a neon lamp is installed in a General-purpose/Standard Roller Lever Switch (WLCA2).

WLCA2	LE
↑	↑
Standard	Lamp specifications

When ordering indicator-equipped molded terminal models, insert the specifications number at the end of the standard model number.

E.g.: When a Neon Lamp (WL-LE) is installed in a general-purpose molded terminal model (WLCA2-139).

WLCA2-139	LE	2	
↑	↑	↑	
Standard	Lamp specifications	Lamp wiring	2: NC connection: Light-ON when operating 3: NO connection: Light-ON when not operating

Note: The indicator cover cannot be replaced on the molded terminals. In all cases the indicator does not light when the load is ON.

Sensor I/O Connector Models

A reduction in the amount of wiring and parts makes maintenance easy and reduced wiring mistakes, in addition it's already compact size for fitting into areas of limited space.

Ordering Information

Item		Standard	Overtravel	High sensitivity
Actuators	Rotating lever	Yes	Yes	Yes
	Plunger	Yes	---	---
Load	Standard load (SPST-NO/SPST-NC)	Yes		
	Microload (SPST-NO/SPST-NC)	Yes		
High-precision models WL-□55		Yes		
Spatter-prevention models (See note 3.)		Yes		
Lamp		Yes		

Note: 1. Standard Models: For standard models only one-side operation at an angle of 45° is possible.
Overtravel Models: Only one-side operation at an angle of 80° is possible. One-side operation only is not possible.
High-precision Models: Only one-side operation at an angle of 45° is possible, and pretravel (PT) is 5°, as opposed to 15° for standard models.
2. For information other than that listed at the above, contact your OMRON representative.
3. The spatter-prevention models are only available as pre-wired connectors.

Direct-wired Connectors

Type	2-core (NO)	4-core
Lamp-equipped	WL□-LDK13	WL□-LDK43
Double-seal	WL□-55LDK13	WL□-55LDK43

Note: 1. In the model number, □ indicates the actuator number. For example, Overtravel Model WLG2-LDK13.
2. The lamp is set to "light-ON when not operating" (NO connection).

Pre-wired Connectors

Type	2-core (NO)	2-core (NC)	4-core	3-core (NO)
Lamp-equipped	WL□-LD-M1J	WL□-LD-M1JB	WL□-LD-DGJ03	WL□-LD-DK1EJ03
Double-seal	WL□-55LD-M1J	WL□-55LD-M1JB	WL□-55LD-DGJ03	WL□-55LD-DK1EJ03

Note: 1. In the model number, □ indicates the actuator number. For example, Overtravel Model WLG2-LD-M1J.
2. The lamp is set to "light-ON when not operating" (NO connection).

Environment-resistant Models

Airtight, Hermetic Seal, Low-temperature, Heat-resistive, Corrosion-proof, and Weather-resistant Models

Using the general-purpose model, six types of environment-resistant models can be created to meet a variety of difficult operating conditions. Select the model most appropriate to your environment.

Type		Usage	Environment-resistant construction			Appropriate models
WL□-55	Airtight seal	For use in locations subject to splashes of water and anti-coolant	Uses the W-10FB3-55 Airtight Built-in Switch. (See note 2.)			All models except the low-temperature and heat-resistive models. (See note 3.)
WL□-139	Hermetic seal (molded terminals and anti-coolant models)		General-purpose built-in switch	Connection lead wires: Standard 5-m VCT (vinyl cabtire cable) cable attached. Finished diameter: 11.5 mm, 4-core.	The case cover and conduit opening are molded from epoxy resin. The cover cannot be removed.	All models except the low-temperature and heat-resistive models. (See note 4.)
WL□-140			Hermetically-sealed built-in switch	Connection lead wires: Standard 5-m VCT cable, with high flexibility and good anti-oil properties attached. Finished diameter: 11.5 mm, 4-core.	The case cover, cover box and conduit opening are molded from epoxy resin. The cover cannot be removed (141, 145). The Head opening is protected from cutting powder. (WL□-141)	
WL□-141						
WL□-145						
WL□-RP40					The connector can be removed, so it is possible to use flexible wires in the cable.	
WL□-RP60					Rubber parts are made from fluorine rubber.	
WL□-TC	Low-temperature	Can be used at a temperature of –40°C (The operating temperature range is –40°C to 40°C), but cannot withstand icing.	Uses the general-purpose built-in switch. Silicone rubber is used for rubber parts such as the O-ring, gasket, etc.			All models except airtight, hermetic, heat-resistive, corrosion-proof, or lamp-equipped models.
WL□-TH	Heat-resistive	Can be used in temperatures of 120°C (The operating temperature range is 5°C to 120°C).	Uses a special built-in switch made from heat-resistant resin. Silicone rubber is used for rubber parts such as the O-ring, gasket etc.			All models except airtight, hermetic, low-temperature, corrosion-proof, lamp-equipped, nylon roller (WLCA2-26N), seal roller models, and resin rod (WLNJ-2) models.
WL□-RP	Corrosion-proof	For use in locations subject to corrosive gases and chemicals.	Diecast parts such as the switch box are made of corrosion-proof aluminum. Rubber sealing parts are made of fluorine rubber which aids in resisting oil, chemicals and adverse weather conditions. Exposed nuts and screws (except the actuator section) are made of stainless steel. Moving and rotary parts such as rollers are made of sintered stainless steel or stainless steel.			All models except overtravel model (-2N), fork lever lock models (WLCA32-41 to -43), low-temperature, heat-resistive, and lamp-equipped models.
WL□-P1	Outdoor specifications	For use in parking lots and other such outdoor locations.	Rubber parts are made from silicone rubber, which has a high-tolerance to deterioration over time, and changes in temperature. Rollers are made of stainless steel to improve corrosion resistance. Exposed nuts and screws are made of stainless steel.			Only the general-purpose overtravel models (WLH2/12), the overtravel high-sensitivity models (WLG2/12) and some standard models (e.g., WLCA2) can be used. Excluding heat-resistive models.

Note: 1. Consult your OMRON representative for the microload WL01□ models.

2. Use the SC Connector for the conduit opening.

3. The actuator can be created using the standard model.

4. The actuator can be created using the standard model. For WL-□141 and -145, only WLG2, WLCA2, WLGCA2, and WLH2 can be used.

Ordering Information

Use the following as a guide when ordering environment-resistant models.

E.g.: For a hermetic model of WLCA2

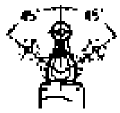
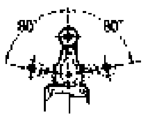
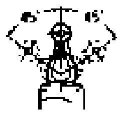
WLCA2 - 55
↑ ↑
Standard Specifications No.

An additional catalog is available for outdoor specifications models.

Spatter-prevention Models

These models are most effective in an arc welding line or places where cutting powder is spattered.

Standard Models

Type		Total travel (TT)	Actuators	Neon lamp		LED
				125 VAC	250 VAC	10 to 115 VAC/DC
				Approx. 0.6 mA	Approx. 1.9 mA	Approx. 0.5 mA
Standard		One-side operation is possible 	Double nut lever 	WLCA2-LEAS		WLCA2-LDAS
			Allen-head lever 	WLCA2-LES		WLCA2-LDS
Overtravel	General	One-side operation is impossible 	Double nut lever	WLH2-LEAS		WLH2-LDAS
			Allen-head lever	WLH2-LES		WLH2-LDS
	High-sensitivity		Double nut lever	WLG2-LEAS		WLG2-LDAS
			Allen-head lever	WLG2-LES		WLG2-LDS
High-precision		One-side operation is possible 	Double nut lever 	WLGCA2-LEAS		WLGCA2-LDAS
			Allen-head lever 	WLGCA2-LES		WLGCA2-LDS

Note: Consult your OMRON representative for the microload WL01□ models.

Levers/Lamp-equipped Covers

Type	Without lever 	Complete Head (lever with Head) 	Double nut lever 	Allen-head lever 	Lamp-equipped cover 
Model	Add an "R" to the product number to order. E.g.: WL□CA2-LES	WL-1H1100S (in case of WLCA2-□, WLGCA2-□)	WL-1A105S (forward and backward lever)	WL-1A103S (forward and backward lever)	WL-LES (Neon Lamp)
		WL-2H1100S (in case of WLH2-□, WLG2-□)			WL-LDS (LED)

Switches Without Lever

WLRCA2-LES, WLRCA2-LDS
WLRH2-LES, WLRH2-LDS, WLRG2-LES
WLRG2-LDS
WLRGCA2-LES, WLRGCA2-LDS

Head Models

Actuators	Set model	Head model	Head model without lever
Roller lever 	WLCA2	WL-1H1100	WLRCA2
	WLGCA2	WL-1H1100-1 (See note.)	WLRGCA2
	WLG2	WL-2H1100	WLRG2
	WLH2	WL-2H1100-1 (See note.)	WLRH2
	WLCA2-2N	WL-6H1100	WLRCA2-2N
Adjustable roller lever 	WLCA12	WL-1H2100	WLRCA2
	WLG12	WL-2H2100	WLRG2
	WLH12	WL-2H2100-1 (See note.)	WLRH2
	WLCA12-2N	WL-6H2100	WLRCA2-2N
Adjustable rod lever 	WLCL	WL-4H4100	WLRCL
	WLGL	WL-2H4100	WLRG2
	WLCL-2N	WL-6H4100	WLRCA2-2N
Top plunger 	WLD	WL-7H100	---
	WLD2	WL-7H200	
	WLD3	WL-7H300	
	WLD28	WL-7H400	
Horizontal plunger 	WLSD	WL-8H100	---
	WLSD2	WL-8H200	
	WLSD3	WL-8H300	
Fork lever lock 	WLCA32-41	WL-5H5100	WLRCA32
Coil spring 	WLNJ	WL-9H100	---
	WLNJ-30	WL-9H200	
	WLNJ-2	WL-9H300	
	WLNJ-S2	WL-9H400	

Note: For the model number of Heads without lever, simply remove the numbers after WL-□H. For example, WL-1H1100 becomes WL-1H. WLH2 and WLH12 however, become WL-2H-1, and WLGCA2 becomes WL-1H-1. Other Head models are available, but must be ordered separately.

Specifications

■ Approved Standards

Agency	Standard	File No.
UL	UL508	E76675
CSA	CSA C22.2 No. 14	LR45746
TÜV Rheinland	EN60947-5-1	R9551016

Note: Contact your OMRON representative for more information on approved models.

■ Approved Standard Ratings

General-purpose Models

UL/CSA

Standard Models: A600

Rated voltage	Carry current	Current		Volt-amperes	
		Make	Break	Make	Break
120 VAC	10 A	60 A	6 A	7,200 VA	720 VA
240 VAC		30 A	3 A		
480 VAC		15 A	1.5 A		
600 VAC		12 A	1.2 A		

Microload Models:
0.1 A at 125 VAC, 0.1 A at 30 VDC

TÜV (EN60947-5-1)

(Only Ground Terminal Models are Approved)

Model	Category/rating	Thermal current	Indicator
WL□-□	AC-15 2 A/250 V DC12 2 A/48 V	10 A	---
WL01□	AC-14 0.1 A/125 V DC12 0.1 A/48 V	0.5 A	---
WL□-LE	AC-15 2 A/250 V	10 A	Neon lamp
WL01□-LE	AC-14 0.1 A/125 V	0.5 A	Neon lamp
WL□-LD	AC-15 2 A/115 V DC12 2 A/48 V	10 A	LED
WL01□-LD	AC-14 0.1 A/115 V DC12 0.1 A/48 V	0.5 A	LED

Note: As an example, AC-15 2 A/250 V means the following:

Application category	AC-15
Rated operating current (Ie)	2 A
Rated operating voltage (Ue)	250 V

Spatter-prevention Models

UL/CSA

LE (Neon Lamp) A300

Rated voltage	Carry current	Current		Volt-amperes	
		Make	Break	Make	Break
120 VAC	10 A	60 A	6 A	7,200 VA	720 VA
240 VAC		30 A	3 A		

LD (LED)

Rated voltage	Carry current
115 VAC	10 A
115 VDC	0.8 A

■ Ratings

General-purpose Models/Environment-resistant Models

Standard Load Models

Type	Rated voltage	Non-inductive load				Inductive load			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
Standard, overtravel (except high-sensitivity models), and high-precision models.	125 VAC	10 A		3 A	1.5 A	10 A		5 A	2.5 A
	250 VAC	10 A		2 A	1 A	10 A		3 A	1.5 A
	500 VAC	10 A		1.5 A	0.8 A	3 A		1.5 A	0.8 A
	8 VDC	10 A		6 A	3 A	10 A		6 A	
	14 VDC	10 A		6 A	3 A	10 A		6 A	
	30 VDC	6 A		4 A	3 A	6 A		4 A	
	125 VDC	0.8 A		0.2 A	0.2 A	0.8 A		0.2 A	
	250 VDC	0.4 A		0.1 A	0.1 A	0.4 A		0.1 A	
Overtravel (high-sensitivity models)	125 VAC	5 A		---		---		---	
	250 VAC	5 A							
	125 VDC	0.4 A		---		---		---	
	250 VDC	0.2 A							

Note: 1. The above figures are for standard currents.
2. Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
3. Lamp load has an inrush current of 10 times the steady-state current.
4. Motor load has an inrush current of 6 times the steady-state current.
5. For PC loads, use the microload models.

Inrush current	NC	30 A max. (15 A max. (See note.))
	NO	20 A max. (10 A max. (See note.))

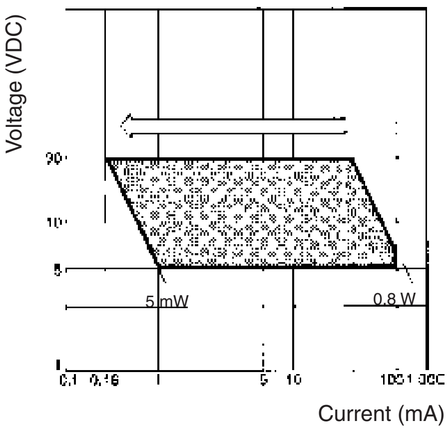
Note: Only for high-sensitivity overtravel models.

Microload Models

Rated voltage	Resistive load
125 VAC	0.1 A
30 VDC	

Operation within the three zones illustrated in the following diagram will produce optimum performance.

Recommended Load Range: 5 to 30 VDC, 0.5 to 100 mA



Lamp-equipped Models

Neon lamp (WL-LE)		LED (WL-LD)
125 VAC	**250 VAC**	**10 to 115 VAC/DC**
Approx. 0.6 mA	**Approx. 1.9 mA**	**Approx. 0.5 mA**
WLD28-LES		WLD28-LDS

Sensor I/O Connector Models

Type	Rated voltage	Non-inductive load				Inductive load			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
For DC	12 VDC	1 A	1 A	1 A	1 A	1 A	1 A	1 A	1 A
	24 VDC	1 A	1 A	1 A	1 A	1 A	1 A	1 A	1 A
	48 VDC	1 A	1 A	1 A	1 A	1 A	1 A	1 A	1 A
	115 VDC	0.8 A	0.8 A	0.2 A	0.2 A	0.8 A	0.8 A	0.2 A	0.2 A
For AC	115 VAC	1 A	1 A	1 A	1 A	1 A	1 A	1 A	1 A

Note: 1. The above figures are for standard currents.
2. Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
3. Lamp load has an inrush current of 10 times the steady-state current.
4. Motor load has an inrush current of 6 times the steady-state current.

Spatter-prevention Models

Model	Rated current	Non-inductive load				Inductive load			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
WL□-LES	125 VAC	10 A		3 A	1.5 A	10 A		5 A	2.5 A
	250 VAC	10 A		2 A	1 A	10 A		3 A	1.5 A
	125 VDC	0.8 A		0.2 A	0.2 A	0.8 A		0.2 A	0.2 A
	250 VDC	0.4 A		0.1 A	0.1 A	0.4 A		0.1 A	0.1 A
WL□-LDS	115 VAC	10 A		3 A	1.5 A	10 A		5 A	2.5 A
	12 VDC	10 A		6 A	3 A	10 A		6 A	
	24 VDC	6 A		4 A	3 A	6 A		4 A	
	48 VDC	3 A		2 A	1.5 A	3 A		2 A	

Note: 1. The above figures are for standard currents.
2. Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
3. Lamp load has an inrush current of 10 times the steady-state current.
4. Motor load has an inrush current of 6 times the steady-state current.

Inrush current	**NC**	30 A max.
	NO	20 A max.
Operating temperature		–10°C to 80°C (with no icing)
Operating humidity		95% max.

■ Characteristics

General-purpose Models/Environment-resistant Models

Degree of protection	IP67
Durability (See note 3.)	Mechanical: 15,000,000 operations min. (See note 4.) Electrical: 750,000 operations min. (See note 5.)
Operating speed	1 mm to 1 m/s (for WLCA2)
Operating frequency	Mechanical: 120 operations/minute min. Electrical: 30 operations/minute min.
Rated frequency	50/60 Hz
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	25 mΩ max. (initial value)
Dielectric strength	1,000 VAC (600 VAC), 50/60 Hz for 1 min between non-continuous terminals. 2,200 VAC, 50/60 Hz for 1 min/Uimp 2.5 kV non-current-carrying metal part and ground. 2,200 VAC, 50/60 Hz for 1 min Uimp 2.5 kV between each terminal and non-current-carrying metal part.
Rated insulation voltage (U_i)	250 V (EN60947-5-1)
Switching overvoltage	1,000 V max. (EN60947-5-1)
Pollution degree (operating environment)	3 (EN60947-5-1)
Short-circuit protective device (SCPD)	10 A, fuse type gG or gI (IEC269)
Conditional short-circuit current	100 A (EN60947-5-1)
Conventional enclosed thermal current (I_{the})	10 A, 0.5 A (EN60947-5-1)
Protection against electric shock	Class I
Vibration resistance	10 to 55 Hz, 1.5-mm double amplitude (See note 6.)
Shock resistance	Destruction: 1,000 m/s^2 min. Malfunction: 300 m/s^2 min. (See note 6.)
Ambient temperature	Operating: –10°C to 80°C (with no icing) (See note 7.)
Ambient humidity	Operating: 95% max.
Weight	Approx. 275 g (in the case of WLCA2)

Note: 1. The above figures are initial values.

2. The figures in parentheses for dielectric strength, are those for the overtravel (high-sensitivity) model.

3. The values are calculated at an operating temperature of 5°C to 35°C, and an operating humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.

4. 10,000,000 operations min. for general-purpose, high-sensitivity, and flexible rod overtravel models.

5. 500,000 operations min. for high-precision and outdoor specifications models. All microload models however, are 1,000,000 operations min.

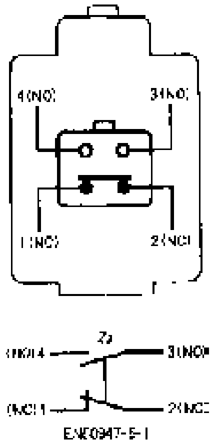
6. Except the flexible rod models. The shock resistance (malfunction) for microload models is 200 m/s^2 min.

7. For low temperature models this is –40°C to 40°C (no icing). For heat-resistive models the range is +5°C to 120°C.

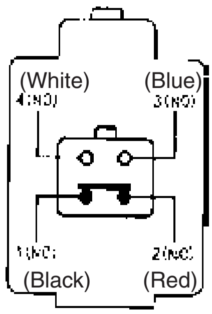
■ Contact Form

General-purpose Models

Standard (WL□)/Microload (WL01□) Models

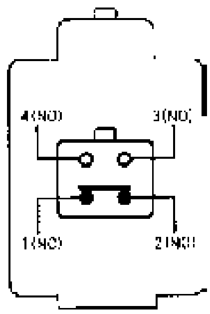


Environment-resistant Models

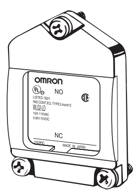
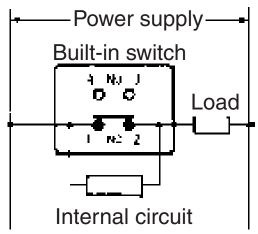
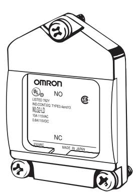
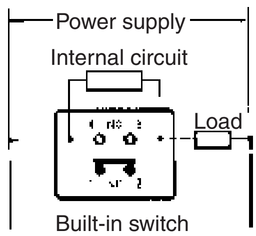


Spatter-prevention Models

Standard Model



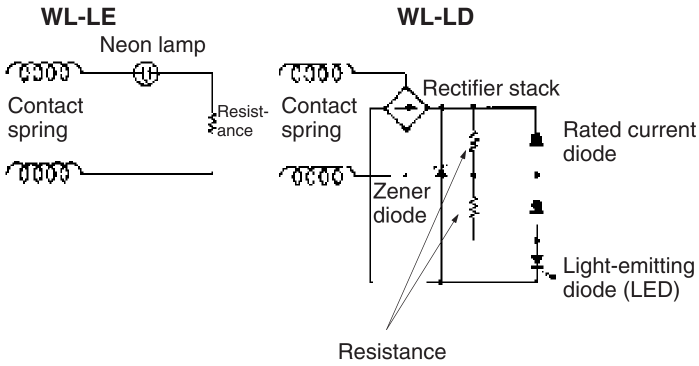
Lamp-equipped Models

Light-ON when operating (See note 1.)	WL-LE WL-LD		
Light-ON when not operating (See note 2.)	WL-LE WL-LD		

Note: 1. Light-ON when operating means that the lamp lights when the Limit Switch contacts (NC) release, or when the actuator rotates or is pushed down.

2. Light-ON when not operating means the lamp remains lit when the actuator is free, or when the Limit Switch contacts (NO) close when the actuator rotates or is pushed down.

Internal circuit of Lamp-equipped Models



■ Wiring Specifications of Sensor I/O Connector Models

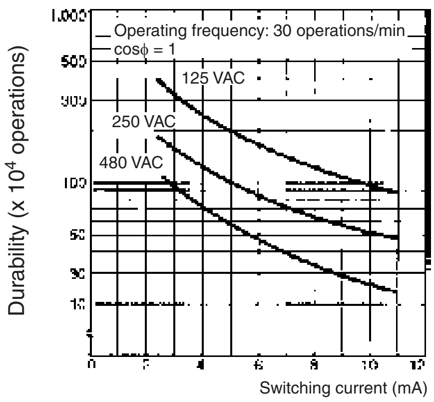
Direct-wired Connector				Pre-wired Connector									
2-core		4-core		2-core						4-core		3-core	
K13 (DC) K13A (AC)		K43 (DC) K43A (AC)		M1J (DC)		M1GJ (DC)		M1JB (DC)		DGJ03 (DC) AGJ03 (AC)		DK1EJ03 (DC)	
Built-in switch	Connec-tor	Built-in switch	Connec-tor	Built-in switch	Connec-tor	Built-in switch	Connec-tor	Built-in switch	Connec-tor	Built-in switch	Connec-tor	Built-in switch	Connec-tor
1 (NC)	---	1 (NC)	1	1 (NC)	---	1 (NC)	---	1 (NC)	3	1 (NC)	1	1 (NC)	---
2 (NC)	---	2 (NC)	2	2 (NC)	---	2 (NC)	---	2 (NC)	2	2 (NC)	2	2 (NC)	2
3 (NO)	3	3 (NO)	3	3 (NO)	3	3 (NO)	1	3 (NO)	---	3 (NO)	3	3 (NO)	3
4 (NO)	4	4 (NO)	4	4 (NO)	4	4 (NO)	4	4 (NO)	---	4 (NO)	4	4 (NO)	4

Engineering Data

General-purpose Models/Spatter-prevention Models/Environment-resistant Models

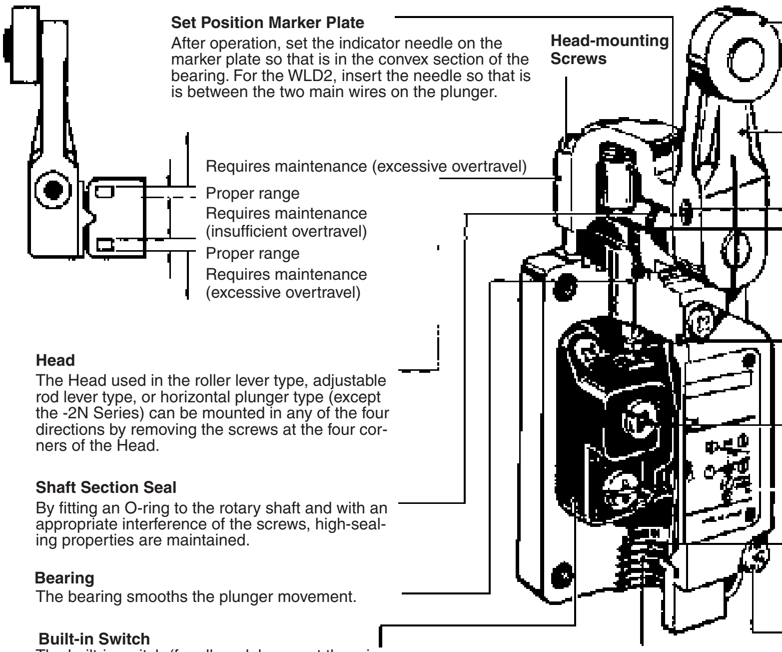
Electrical Durability

Operating temperature: 5°C to 30°C
Operating humidity: 40% to 70%.



Nomenclature

■ General-purpose Models



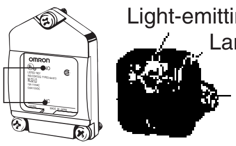
Note: 1. The display for conduit threads has changed from PF$^1/_2$ to G$^1/_2$, according to revisions of JIS B 0202. This is only a change in the display, so the thread size and pitch have not changed. (Conduit threads Pg 13.5 and $^1/_2$-14NPT are also available.)

2. By changing the orientation of the operational plunger, three operational directions can be selected electrically. (This is only possible with general-purpose roller lever, adjustable roller lever, and adjustable rod lever models. For the overtravel models, only -2N Series models have this function.)

Lamp-equipped Models

The operating status of the Switch can be checked using a neon lamp of LED indictor.

Circuit checks and troubleshooting errors are easy done.



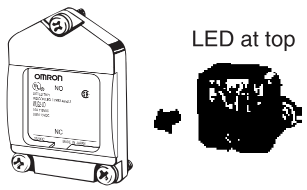
The built-in switch's terminal screws are used to connect the lamp terminal (indicator cover). Since the connection spring (coil spring) is used for this connection, it will not be necessary to connect to the lamp terminal. When a ground terminal is provided however, lead wire method must be used.

WL-LD has a built-in rectifier stack, so it will not be necessary to change the polarity.

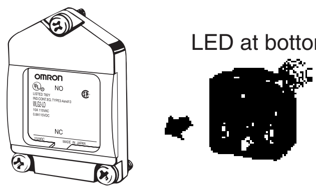
The indicator cover is molded from diecast aluminum and has outstanding sealing properties. Furthermore, regardless of whether the power is connected or not, the operating status is shown (operating or not operating), and indicators can be switched from light-ON when operating and light-ON when not operating, by simply rotating the lamp holder by 180°. (Molded terminals do not have this switching capacity.)

The lamp-equipped models are ideal in locations using a conveyor belt where items need to be checked, or locations that are difficult to inspect for faults.

Light-ON when Operating



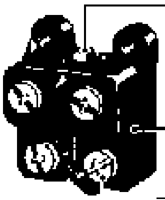
Light-ON when Not Operating



Limit switches

■ Environment-resistant Models

Airtight Built-in Switch



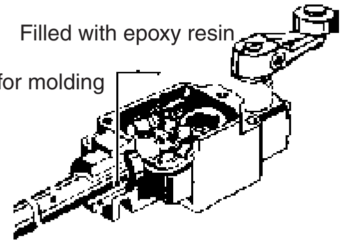
Sealed by the rubber boot of the plunger

Sealed by the resin molded into the case cover

Four, M4 ±terminal screws

Hermetic Seal Model

The lead wires are sealed to the Limit Switch with resin, providing a hermetically sealed construction.



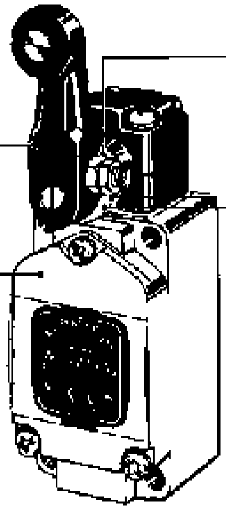
Filled with epoxy resin

Leads for molding

Exclusive connector

■ Spatter-prevention Models

Double Nut Lever



Roller, Roller Axis
Using stainless steel prevents spatter from adhering.

Operating Lever
Melamine sinter-painted, it is easy to peel off the spatter.

Lamp Cover
Heat-resistant resin is used for the lamp cover.
By using spherical surface for the display part, it disperses the direction of spatter.

SUS304 is used for double nut.

Screws
SUS304 is used, preventing spatter from adhering.

Head Cap
Using Teflon prevents spatter from adhering.

Note: Spatter means the Zn powder produced when welding.
Adhering spatter to the Limit Switch may cause malfunction of lever or lamp cover.

The lack of gap prevents spatter powder from clogging.

Dimensions

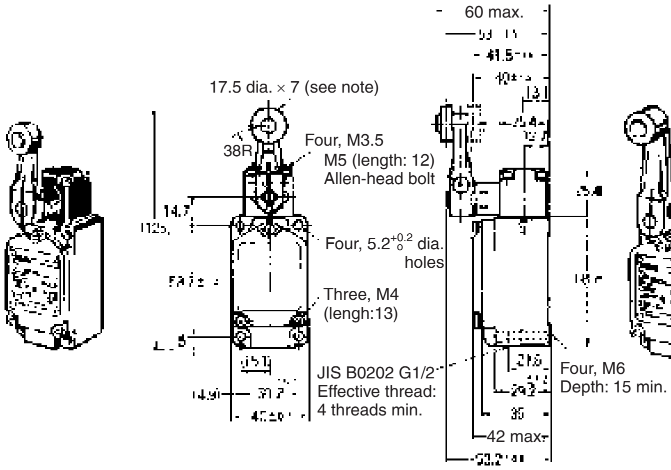
■ General-purpose Models

Standard Models

Note: 1. Rotating Lever Models: For all models WL☐ indicates a standard model and WL01☐ indicates a microload model.
2. Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

Roller Lever

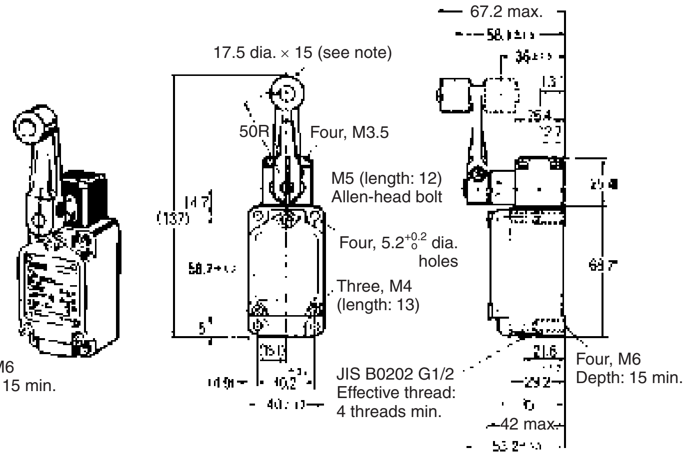
WLCA2
WL01CA2



Note: Stainless sintered roller

Roller Lever

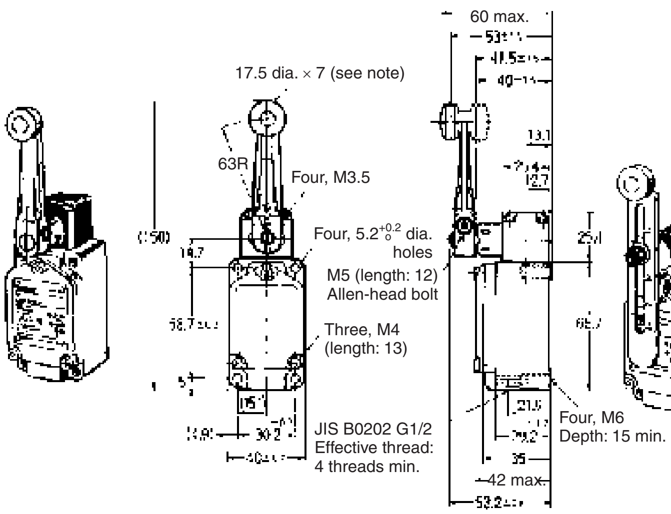
WLCA2-7
WL01CA2-7



Note: Stainless steel roller

Roller Lever

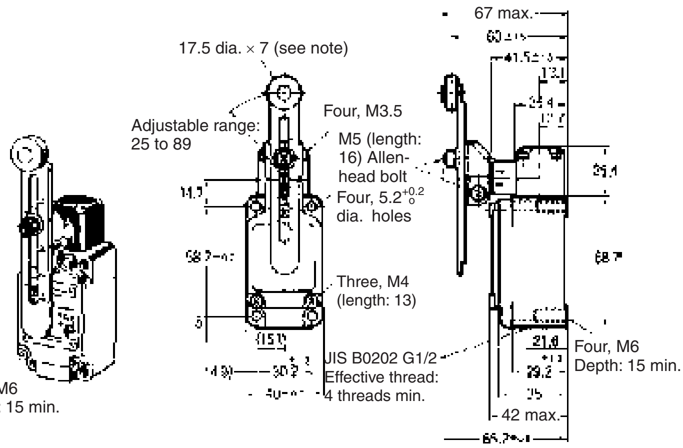
WLCA2-8
WL01CA2-8



Note: Stainless sintered roller

Adjustable Roller Lever

WLCA12
WL01CA12



Note: Stainless sintered roller

Operating characteristics	WLCA2 WL01CA2	WLCA2-7 WL01CA2-7	WLCA2-8 WL01CA2-8	WLCA12 WL01CA12 (See note.)
Operating force: OF max.	13.34 N	10.2 N	8.04 N	13.34 N
Release force: RF min.	2.23 N	1.67 N	1.34 N	2.23 N
Pretravel: PT	15±5°	15±5°	15±5°	15±5°
Overtravel: OT min.	30°	30°	30°	30°
Movement differential: MD max.	12°	12°	12°	12°

Note: The operating characteristics for WLCA12 and WL01CA12 are measured at the lever length of 38 mm.

Limit switches

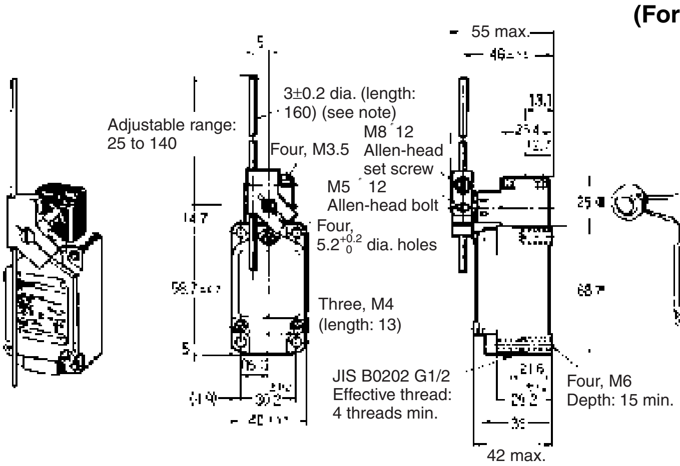
OF and RF for WLCA12, with a lever length of 89 mm.

Operating characteristics	WLCA12, WL01CA12
OF	5.68 N
RF	0.95 N

Rotating Lever Models: For all models WL indicates a standard model and WL01□ indicates a microload model.

Adjustable Rod Lever

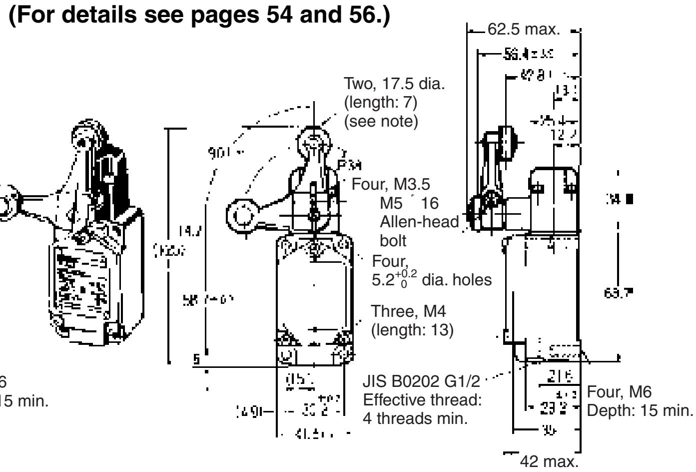
WLCL
WL01CL



Note: Stainless steel rod

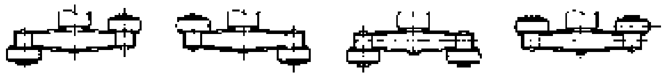
Fork Lever Lock

WLCA32-41 to 44
WL01CA32-41 to 44
(For details see pages 54 and 56.)



Note: Plastic roller. This illustration shows the external dimen-sions of the WLCA32-41. (Models WLCA32-041 to -044 and WL01CA32-041 to -044 have stainless steel rollers.)

WLCA32-41 **WLCA32-42** **WLCA32-43** **WLCA32-44**



Note: Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

Operating characteristics	WLCL, WL01CL
Operating force: OF max.	1.39 N
Release force: RF min.	0.27 N
Pretravel: PT	15±5°
Overtravel: OT min.	30°
Movement differential: MD max.	12°

Note: The operating characteristics for WLCA12 and WL01CA12 are measured at the lever length of 140 mm.

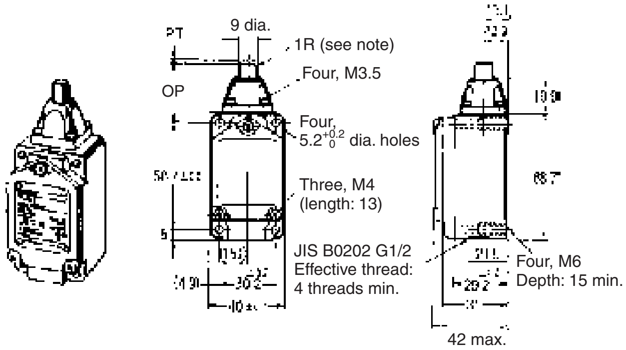
Operating characteristics	WLCA32-41 to 44, WL01CA32-41 to 44
Force necessary to reverse the direction of the lever: Max.	11.77 N
Movement until the lever reverses	50±5°
Movement until switch operation: Max.	55°
Movement after switch operation: Min.	35°

Note: 1. Plunger Models: For all models WL☐ indicates a standard model and WL01☐ indicates a microload model.

2. Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

Top Plunger

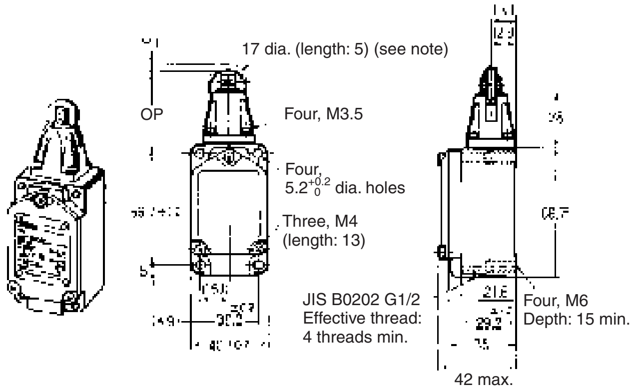
WLD
WL01D



Note: Stainless steel plunger

Top-roller Plunger

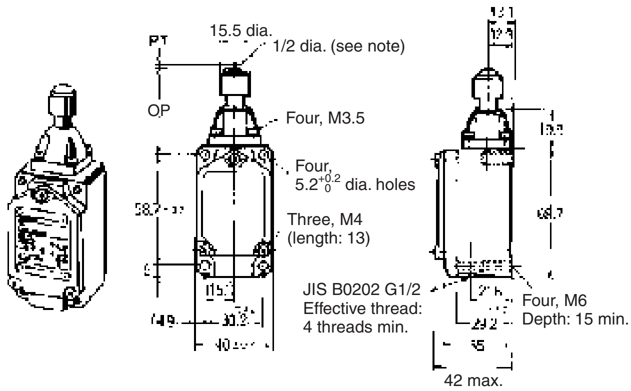
WLD2
WL01D2



Note: Stainless sintered roller

Top-ball Plunger

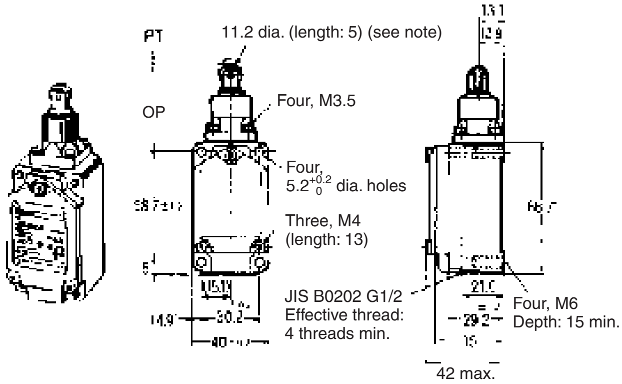
WLD3
WL01D3



Note: Stainless steel ball

Sealed Top-roller Plunger

WLD28
WL01D28



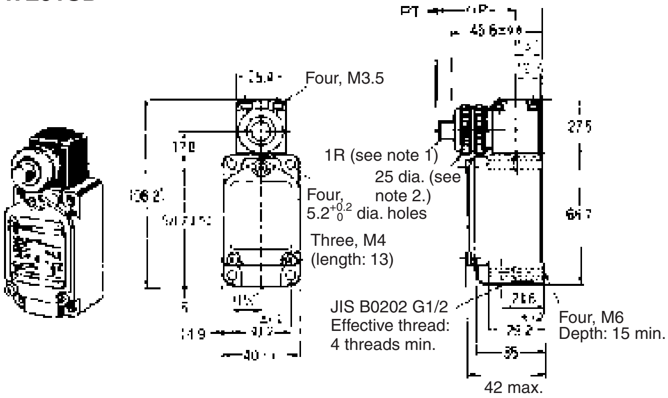
Note: Stainless steel roller

Limit switches

Note: Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

Horizontal Plunger

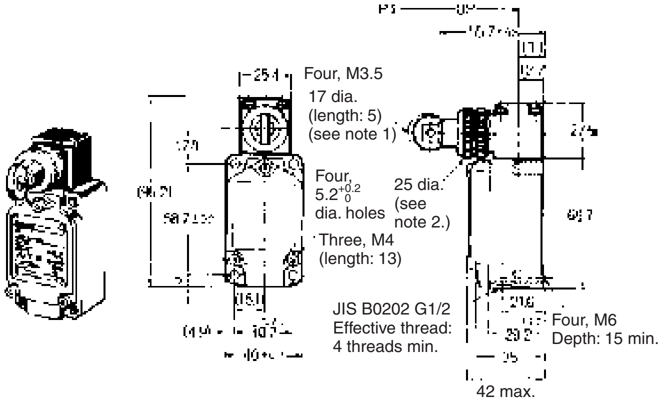
WLSD
WL01SD



Note: 1. Stainless steel plunger
2. Cosmetic nuts.

Horizontal-roller Plunger

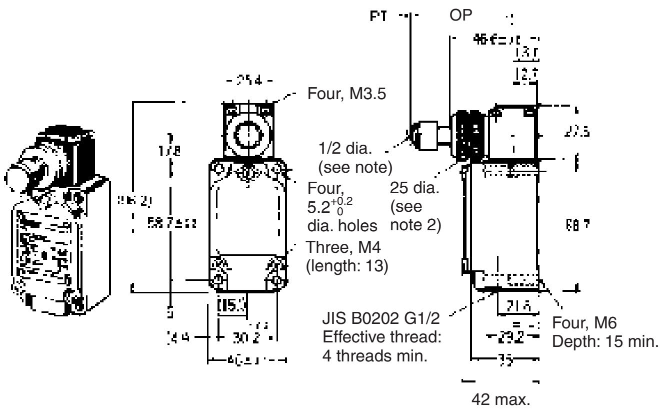
WLSD2
WL01SD2



Note: 1. Stainless sintered roller
2. Cosmetic nuts
3. The WLSD21 model, which has the roller rotated by 90° is also available.

Horizontal-ball Plunger

WLSD3
WL01SD3



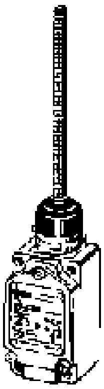
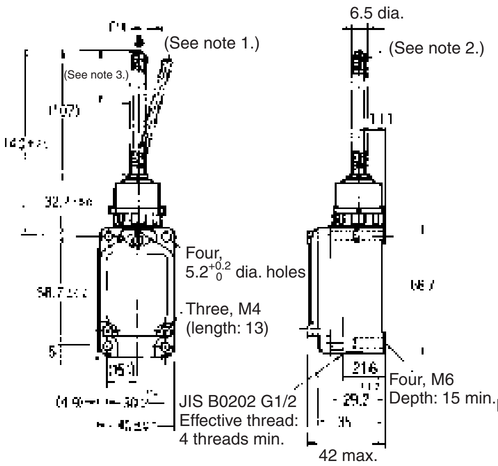
Note: 1. Stainless steel ball
2. Cosmetic nuts

Operating characteristics	WLD WL01D	WLD2 WL01D2	WLD3 WL01D3	WLD28 WL01D28	WLSD WL01SD	WLSD2 WL01SD2	WLSD3 WL01SD3
Operating force: OF max.	26.67 N	26.67 N	26.67 N	16.67 N	40.03 N	40.03 N	40.03 N
Release force: RF min.	8.92 N	8.92 N	8.92 N	4.41 N	8.89 N	8.89 N	8.89 N
Pretravel: PT max.	1.7 mm	1.7 mm	1.7 mm	1.7 mm	2.8 mm	2.8 mm	2.8 mm
Overtravel: OT min.	6.4 mm	5.6 mm	4 mm	5.6 mm	6.4 mm	5.6 mm	4 mm
Movement differential: MD max.	1 mm	1 mm	1 mm	1 mm	1 mm	1 mm	1 mm
Operating position: OP	34±0.8 mm	44±0.8 mm	44.5±0.8 mm	44±0.8 mm	40.6±0.8 mm	54.2±0.8 mm	54.1±0.8 mm
Total travel position: TTP max.	29.5 mm	39.5 mm	41 mm	39.5 mm	---	---	---

Note: 1. Flexible Rod Models: For all models WL□ indicates a standard model and WL01□ indicates a microload model.
2. Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

Coil Spring

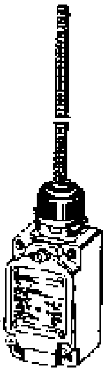
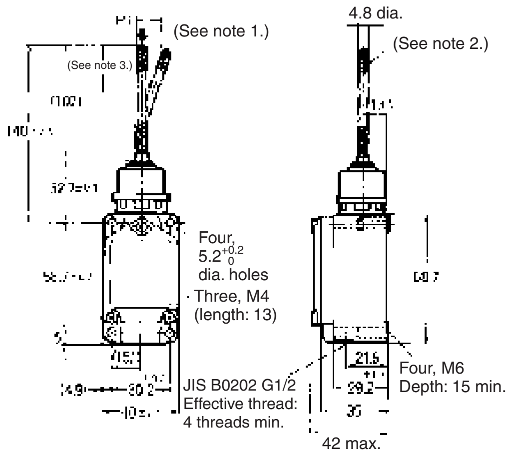
WLNJ
WL01NJ

Note: 1. The coil spring may be operated from any direction except the axial direction (↓).
2. Stainless steel coil spring
3. Optimum operating range of the coil spring is within 1/3 of the entire length from the top end.

Coil Spring (Multi-wire)

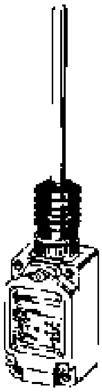
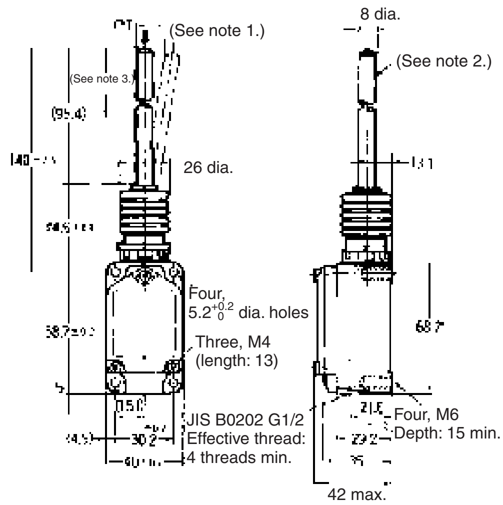
WLNJ-30
WL01NJ-30

Note: 1. The coil spring may be operated from any direction except the axial direction (↓).
2. Piano wire coil
3. Optimum operating range of the coil spring is within 1/3 of the entire length from the top end.

Coil Spring (Resin Rod)

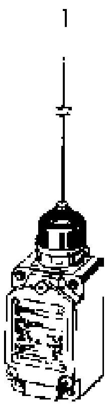
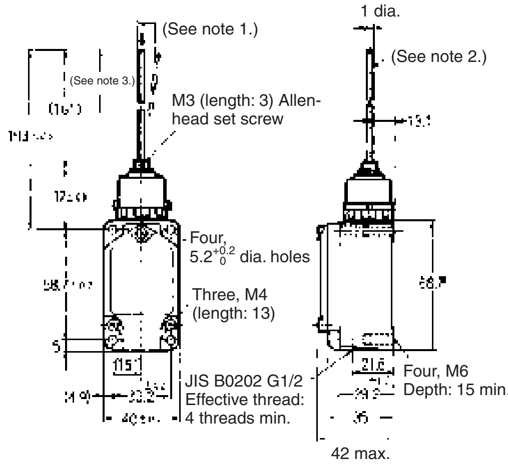
WLNJ-2
WL01NJ-2

Note: 1. The coil spring may be operated from any direction except the axial direction (↓).
2. Polyamide resin rod
3. Optimum operating range of the rod is within 1/3 of the entire length from the top end.

Steel Wire

WLNJ-S2
WL01NJ-S2

Note: 1. The coil spring may be operated from any direction except the axial direction (↓).
2. Stainless steel wire
3. Optimum operating range of the wire is within 1/3 of the entire length from the top end.

Operating characteristics	WLNJ WL01NJ (See note.)	WLNJ30 WL01NJ30 (See note.)	WLNJ-2 WL01NJ-2 (See note.)	WLNJ-S2 WL01NJ-S2 (See note.)
Operating force: OF max.	1.47 N	1.47 N	1.47 N	0.28 N
Pretravel: PT	20±10 mm	20±10 mm	40±20 mm	40±20 mm

Note: These values are taken from the top end of the wire or spring.

Limit switches

Overtravel Models

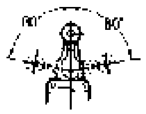
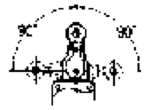
Overtravel models are Limit Switches which are provided with a greater OT to facilitate dog setting.

The overtravel models are classified into three types; general-purpose, high-sensitivity, and models which are capable of one-side 90° operation, the -2N Series.

The -2N Series can also be installed on either side.

Since this model is identical to the standard model in dimensions, both models are interchangeable.

Like the standard model, it is oil-tight, waterproof, and dustproof (complies with IP67).

General-purpose, high sensitivity models	Side-installation models
	
Head can be mounted in any of the four directions. The lever operates on either side at 80°. One-side operation is impossible.	The Head can be mounted in two directions, forward and backward. The lever operates on either side at 90°. One side operation is possible.

General-purpose/High Sensitivity Models

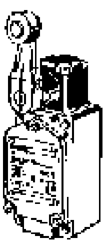
Note: 1. For all models WL☐ indicates a standard model and WL01☐ indicates a microload model.

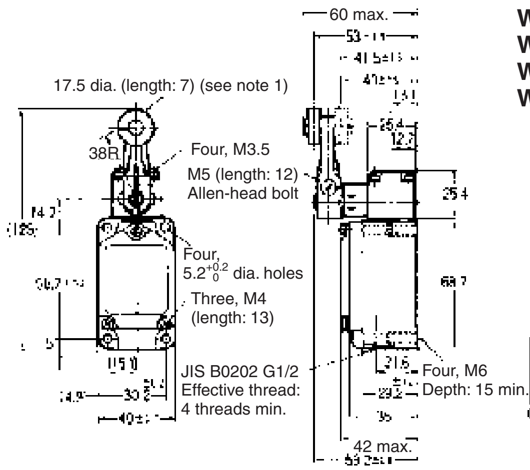
2. One-side operation is not possible with the general-purpose and high-sensitivity models.

3. Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

Roller Lever

WLH2
WL01H2
WLG2
WL01G2





Note: 1. Stainless sintered roller

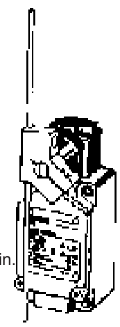
2. WL☐G2 is identical to other models except in the shape of the set position marker plate.

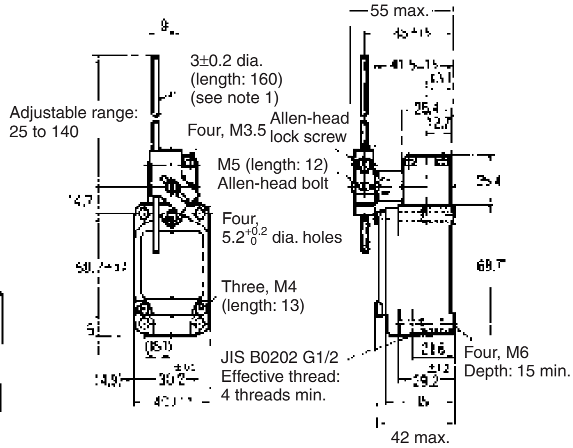
3. The built-in switch for WLH2 is W-10FB3.

4. The built-in switch for WLG2 is W-10FB3-8.

Adjustable Rod Lever

WLHL
WL01HL
WLGL
WL01GL





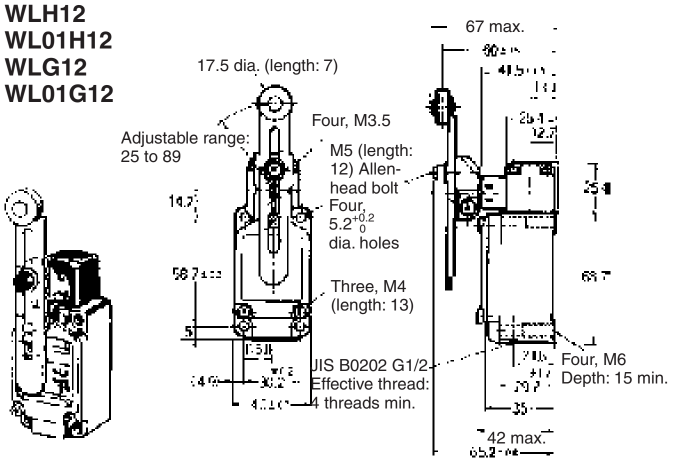
Note: 1. WL☐GL is identical to other models except in the shape of the set position marker plate.

2. The built-in switch for WLHL is W-10FB3.

3. The built-in switch for WLGL is W-10FB3-8.

Adjustable Roller Lever

WL H12
WL01H12
WLG12
WL01G12



Note: 1. Stainless sintered roller
2. WL□G12 is identical to other models except in the shape of the set position marker plate.
3. The built-in switch for WLH12 is W-10FB3.
4. The built-in switch for WLG12 is W-10FB3-8.

Operating characteristics	WLH2 WL01H2	WLG2 WL01G2	WLHL WL01HL (See note 2.)	WLGL WL01GL (See note 2.)	WLH12 WL01H12 (See note 1.)	WLG12 WL01G12 (See note 1.)
Operating force: OF max.	9.81 N	9.81 N	2.84 N	2.84 N	9.81 N	9.81 N
Release force: RF min.	0.98 N	0.98 N	0.25 N	0.25 N	0.98 N	0.98 N
Pretravel: PT	15±5°	$10°^{+2}_{-1}$	15±5°	$10°^{+2}_{-1}$	15±5°	$10°^{+2}_{-1}$
Overtravel: OT min.	55°	65°	55°	65°	55°	65°
Movement differential: MD max.	12°	7°	12°	7°	12°	7°

Note: 1. The operating characteristics of WLH12, WL01HL12, WLG12, and WL01G12 are measured at the lever length of 38 mm.
2. The operating characteristics of WLHL, WL01HL, WLGL, and WL01GL are measured at the rod length of 140 mm.

OF and RF for WLH12 and WL01H12, with a lever length of 89 mm.

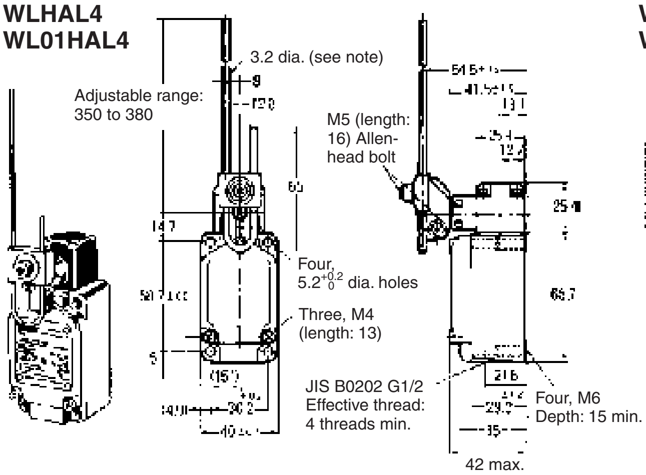
Operating characteristics	WLH12, WL01H12	WLG12, WL01G12
OF	4.18 N	4.18 N
RF	0.42 N	0.42 N

Limit switches

Note: 1. For all models WL□ indicates a standard model and WL01□ indicates a microload model.
2. Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

Adjustable Rod Lever

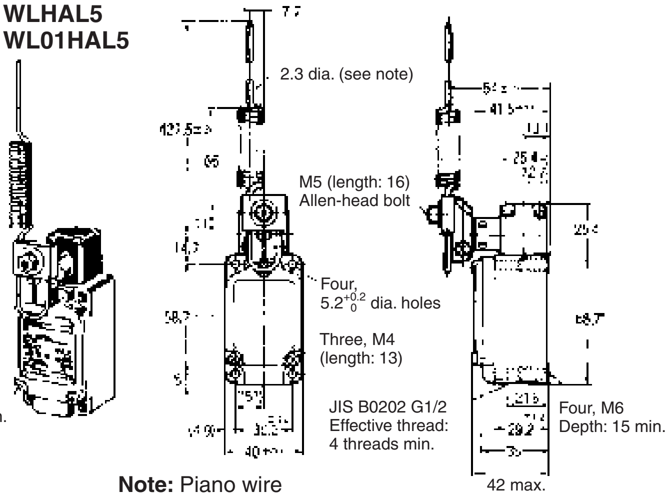
WLHAL4
WL01HAL4



Note: Stainless steel rod

Rod Spring Lever

WLHAL5
WL01HAL5



Note: Piano wire

Operating characteristics	WLHAL4 WL01HAL4 (See note 2.)	WLHAL5 WL01HAL5
Operating force: OF max.	0.98 N	0.90 N
Release force: RF min.	0.15 N	0.09 N
Pretravel: PT	15±5°	15±5°
Overtravel: OT min.	55°	55°
Movement differential: MD max.	12°	12°

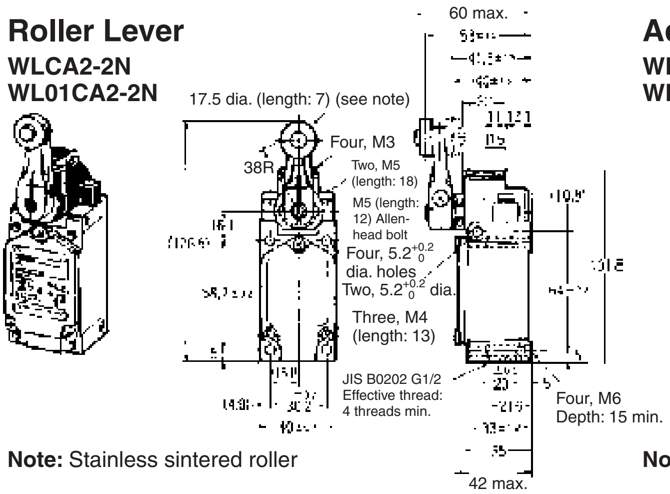
Note: 1. With WLHAL4, WL01HAL4, WLHAL5, and WL01HAL5, the actuator's tare is large, so depending on the installation direction, they may not be properly reset. Always install so that the actuator is facing downwards.
2. The operating characteristics of WLHAL4, and WL01HAL4 are measured at the rod length of 380 mm.

Side-installation Models

90° operation on one side is possible by simply changing the direction of the cam.
Note: 1. For all models WL□ indicates a standard model and WL01□ indicates a microload model.
2. With the side-installation models, 90° operation on one side is possible by simply changing the direction of the cam.
3. Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

Roller Lever

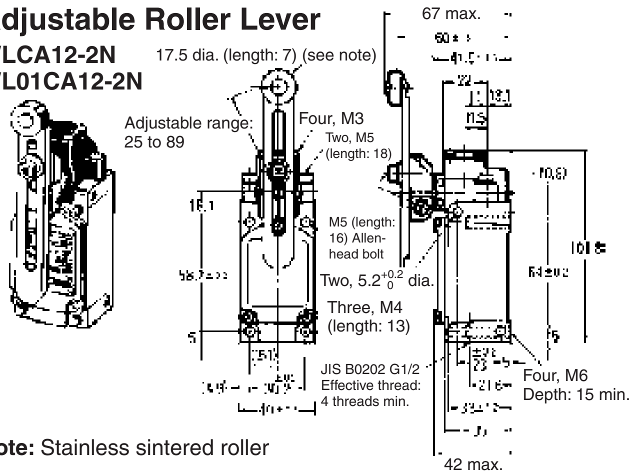
WLCA2-2N
WL01CA2-2N



Note: Stainless sintered roller

Adjustable Roller Lever

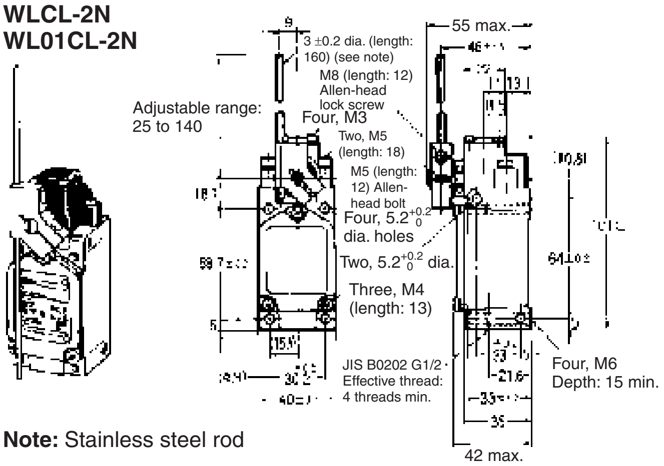
WLCA12-2N
WL01CA12-2N



Note: Stainless sintered roller

Adjustable Rod Lever

WLCL-2N
WL01CL-2N



Note: Stainless steel rod

Operating characteristics	WLCA2-2N WL01CA2-2N	WLCA12-2N WL01CA12-2N (See note 1.)	WLCL-2N WL01CL-2N (See note 2.)
Operating force: OF max.	9.61 N	9.61 N	2.84 N
Release force: RF min.	1.18 N	1.18 N	0.25 N
Pretravel: PT max.	20°	20°	20°
Overtravel: OT min.	70°	70°	70°
Movement differential: MD max.	10°	10°	10°

Note: 1. The operating characteristics of WLCA12-2N and WL01CA12-2N are measured at the lever length of 38 mm.
2. The operating characteristics of WLCL-2N and WL01CL-2N are measured at the rod length of 140 mm.

OF and RF for WLCA12-2N and WL01CA12-2N, with a lever length of 89 mm.

Operating characteristics	WLCA12-2N, WL01CA12-2N
OF	4.10 N
RF	0.50 N

High-precision Models

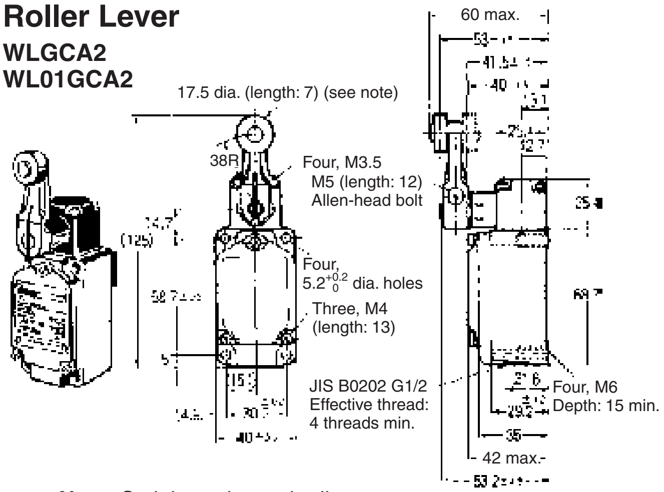
The high-precision models feature a pretravel of 5° (as compared with 15° for the standard models) and a repeat accuracy twice as great as standard models. The high-precision models are ideal for positioning control of machine tools.

For all models WL□ indicates a standard model and WL01□ indicates a microload model.

Note: Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

Roller Lever

WLGCA2
WL01GCA2



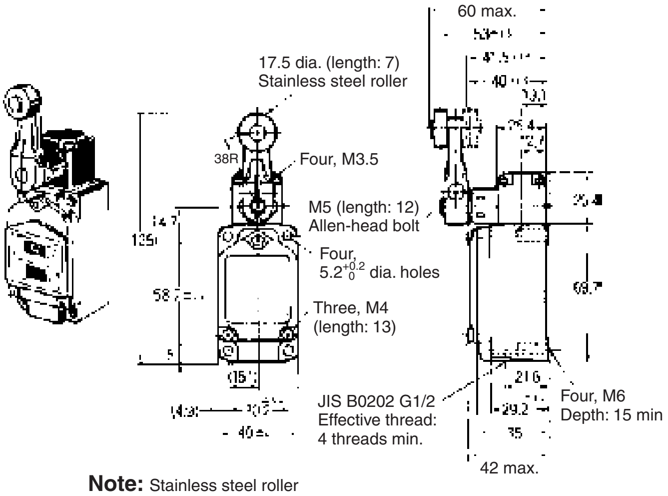
Note: Stainless sintered roller

Operating characteristics	WLGCA2 WL01GCA2
Operating force: OF max.	13.34 N
Release force: RF min.	1.47 N
Pretravel: PT	$5°^{+2}_{0}$
Overtravel: OT min.	40°
Movement differential: MD max.	3°

Lamp-equipped Models

Roller Lever

WLCA2-LE/LD
WL01CA2-LE/LD



Note: Stainless steel roller

Note: Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

OF max.	13.34 N
RF min.	2.23 N
PT	15±5°
OT min.	30°
MD max.	12°

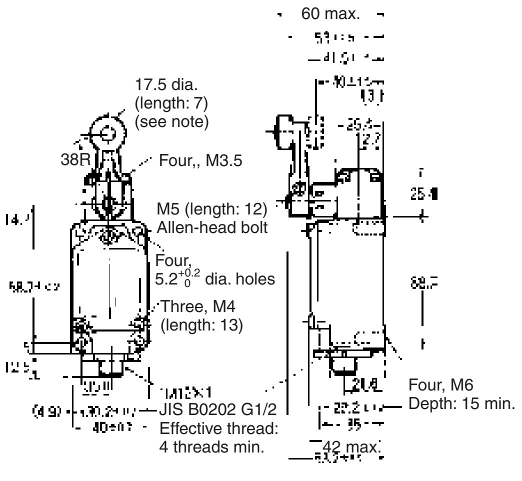
Sensor I/O Connector Models

Roller Lever Models

Standard Model (WLCA2), High-precision Model (WLGCA2), Overtravel Model (WLH2), and Overtravel High-sensitivity Model (WLG2)

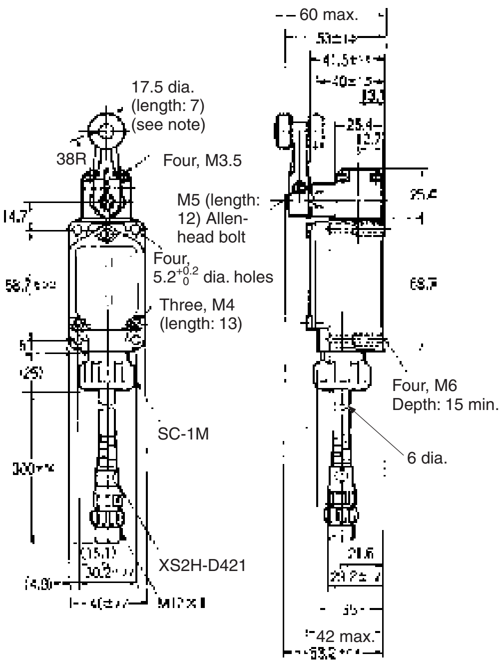
Note: 1. For the WLG2 model, only the dimensions for the set position marker plate change.
2. Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.
3. The above diagram is for a lamp-equipped model.

Direct-wired Connector Models



Note: Stainless sintered roller

Pre-wired Connector Models



Note: Stainless sintered alloy roller

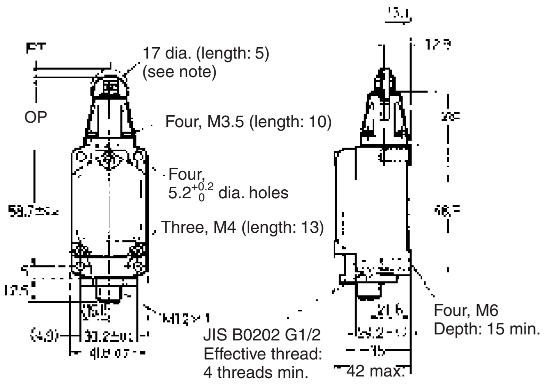
Operating characteristics	Roller lever/Standard model	Roller lever/High precision model	Roller lever/Overtravel model	Roller lever/Overtravel high sensitivity model
Operating force: OF max.	13.34 N	13.34 N	9.81 N	9.81 N
Release force: RF min.	2.23 N	1.47 N	0.98 N	0.98 N
Pretravel: PT	15±5°	$5°^{+2°}_{-0°}$	15±5°	$10°^{+2°}_{-1°}$
Overtravel: OT min.	30°	40°	55°	65°
Movement differential: MD max.	12°	3°	12°	7°

Top-roller Plunger

WLD2

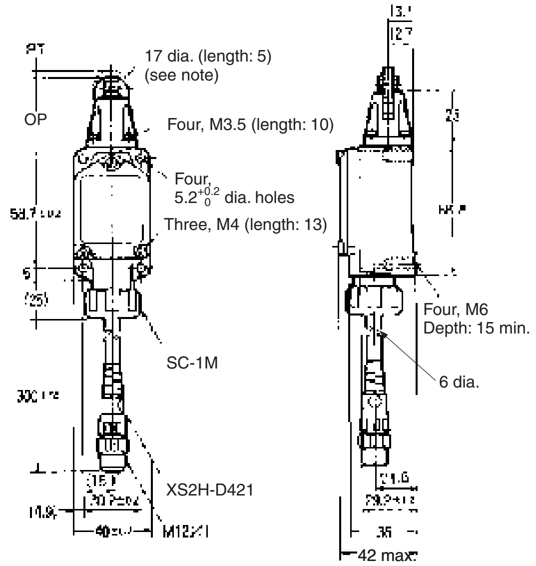
Note: 1. Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.
2. The above diagram is for a lamp-equipped model.

Direct-wired Connector Models



Note: Stainless sintered roller

Pre-wired Connector Models



Note: Stainless sintered roller

Operating characteristics	Top-roller plunger actuator
Operating force: OF max.	26.67 N
Release force: RF min.	8.92 N
Pretravel: PT max.	1.7 mm
Overtravel: OT min.	5.6 mm
Movement differential: MD max.	1 mm
Operating position: OP	44±0.8 mm
Total travel position: TTP max.	39.5 mm

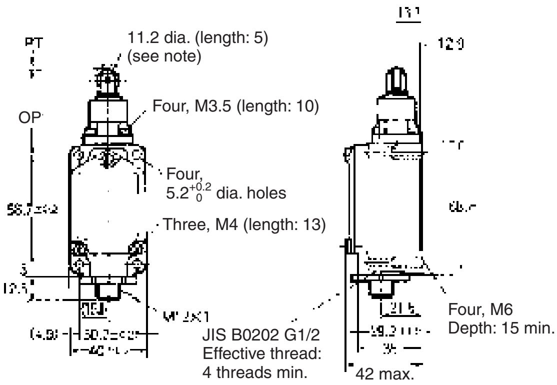
Limit switches

Sealed Top-roller Plunger

WLD28

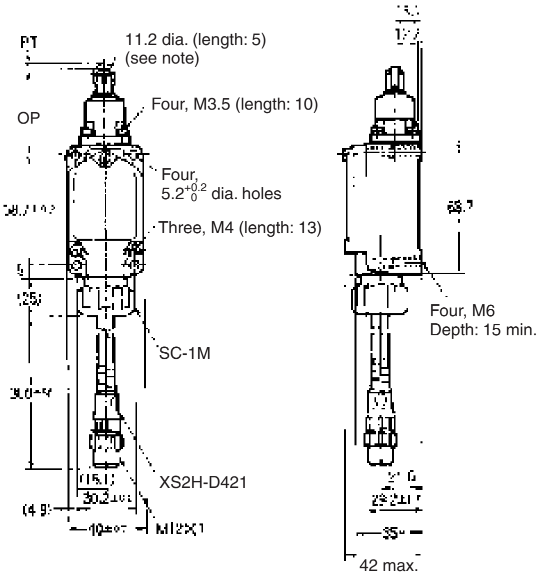
Note: 1. Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.
2. The above diagram is for a lamp-equipped model.

Direct-wired Connector Models



Note: Stainless sintered alloy roller

Pre-wired Connector Models



Note: Stainless sintered alloy roller

Operating characteristics	Sealed top-roller plunger actuator
Operating force: OF max.	16.67 N
Release force: RF min.	4.41 N
Pretravel: PT max.	1.7 mm
Overtravel: OT min.	5.6 mm
Movement differential: MD max.	1 mm
Operating position: OP	44±0.8 mm
Total travel position: TTP max.	39.5 mm

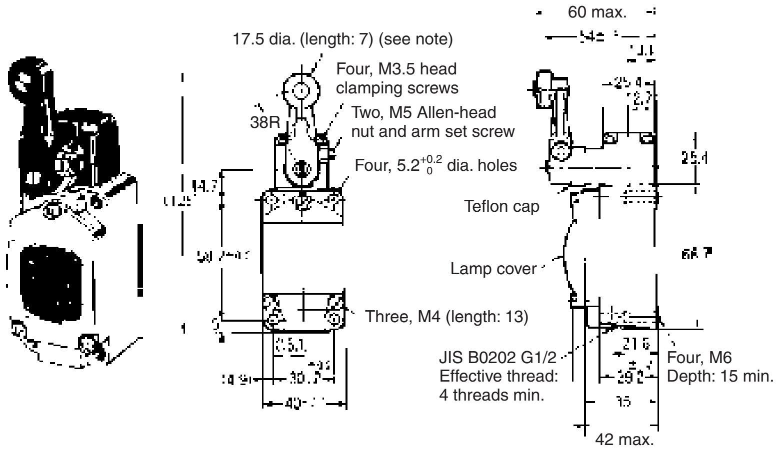
■ Environment-resistant Models

The dimensions and operating characteristics are the same as general-purpose, environment-resistant models.

■ Spatter-prevention Models

Roller Lever (Screw Terminals)

WLCA2-□S/WL01□-□S
WLH2-□S/WLG2-□S
WLGCA2-□S

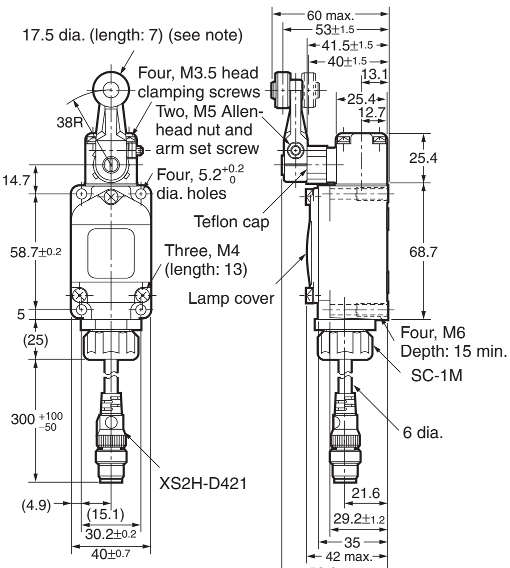


Note: Stainless steel roller

Roller Lever (Pre-wired Connector)

WLCA2-□S-M1J/WL01□-□S-M1J
WLH2-□S-M1J/WLG2-□S-M1J
WLGCA2-□S-M1J

Note: The dimensions are the same regardless of the number of core lines.



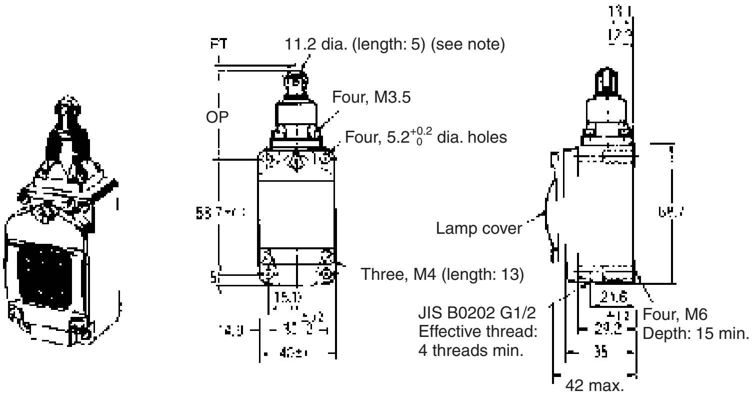
Note: Stainless steel roller

Operating characteristics	Standard	Overtravel models		High-precision
		General	High-sensitivity	
Operating force: OF max.	13.34 N	9.81 N	9.81 N	13.34 N
Release force: RF min.	2.23 N	0.98 N	0.98 N	1.47 N
Pretravel: PT	15°±5°	15°±5°	$10°^{+2}_{-1}$	$5°^{+2°}_{-0°}$
Overtravel: OT min.	30°	55°	65°	40°
Movement differential: MD max.	12°	12°	7°	3°

Limit switches

Sealed Top-roller Plunger (Screw Terminals)

WLD28-□S

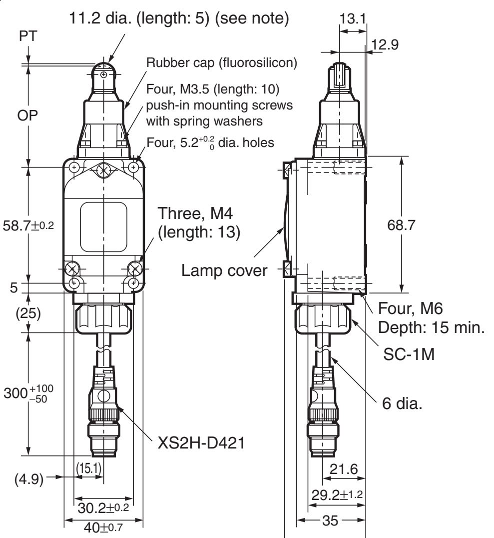


Note: Stainless steel roller

Sealed Top-roller Plunger (Pre-wired Connector)

WLD28-□S-M1J

Note: The dimensions are the same regardless of the number of core lines.



Note: Stainless steel roller

Operating characteristics	WLD28-L□S
Operating force: OF max.	16.67 N
Release force: RF min.	4.41 N
Pretravel: PT max.	1.7 mm
Overtravel: OT min.	5.6 mm
Movement differential: MD max.	1 mm
Operating position: OP	44±0.8 mm
Total travel position: TTP max.	39.5 mm

Note: Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

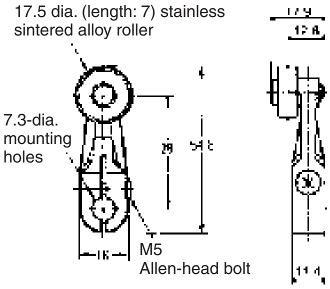
■ Actuators (Levers Only)

Note: 1. Lever: Only rotating lever models are illustrated.

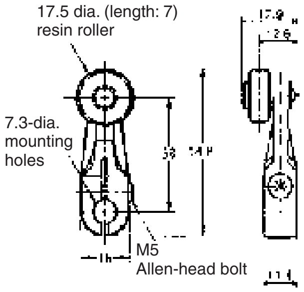
2. Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

3. When using the adjustable roller (rod) lever, make sure that the lever is facing downwards. Use caution, as telegraphing (the Switch turns ON and OFF repeatedly due to inertia) may occur.

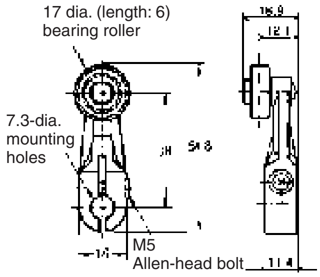
WL-1A100
Standard Lever



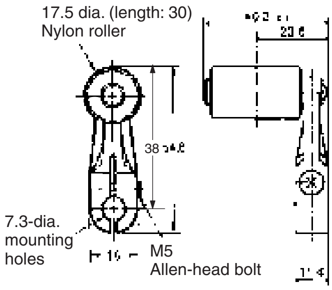
WL-1A115
Resin Roller



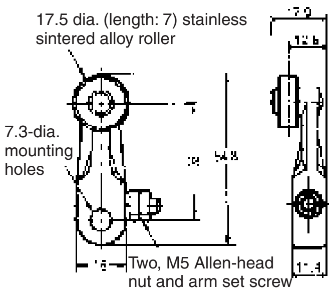
WL-1A400
Bearing Roller



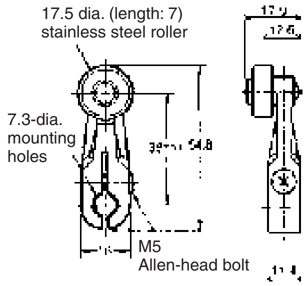
WL-1A118
Nylon Roller: Roller Width: 30 mm



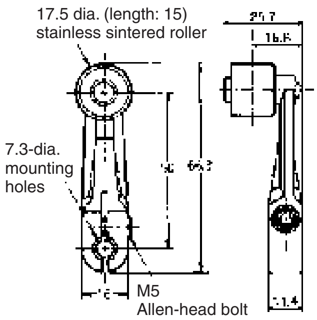
WL-1A105
Double Nut



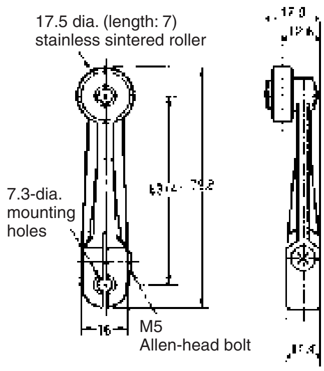
WL-1A103S
Spatter Prevention



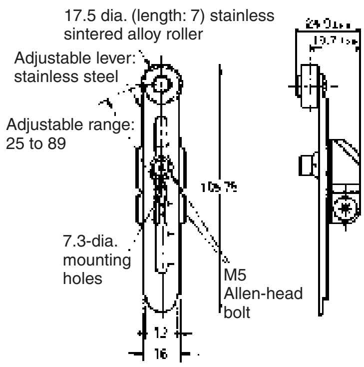
WL-1A200
Lever Length: 50
Roller Width: 15



WL-1A300
Lever Length: 63

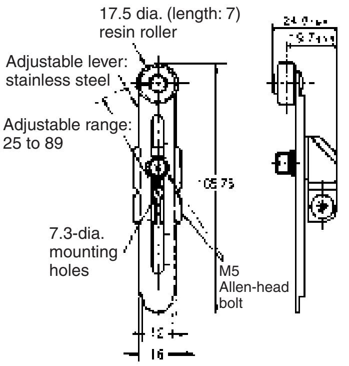


WL-2A100

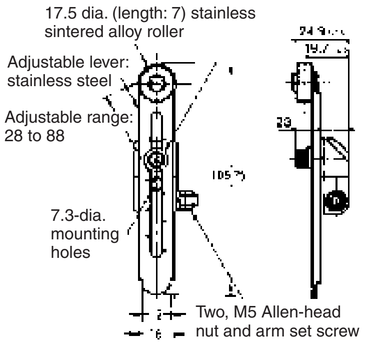


Limit switches

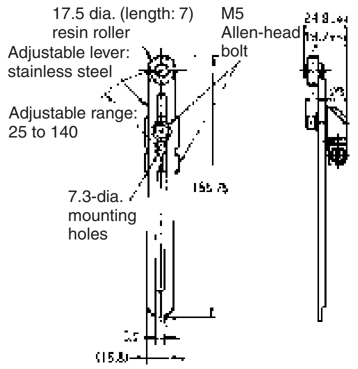
WL-2A111
Resin Roller



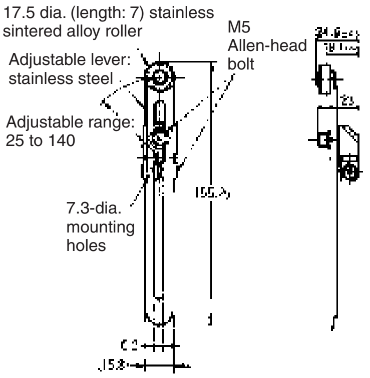
WL-2A107
Double Nut



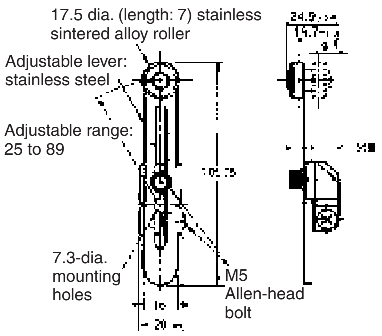
WL-2A108
Resin Roller



WL-2A122

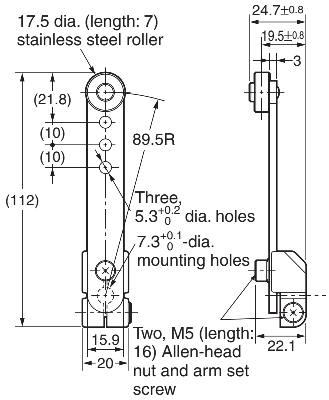


WL-2A106

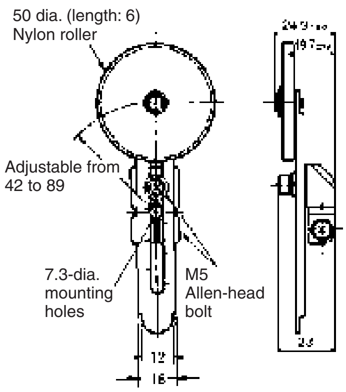


Note: Can be installed on the rear side.

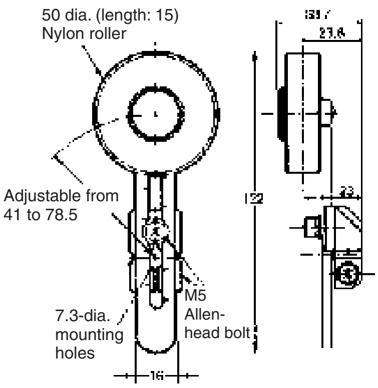
WL-2A130



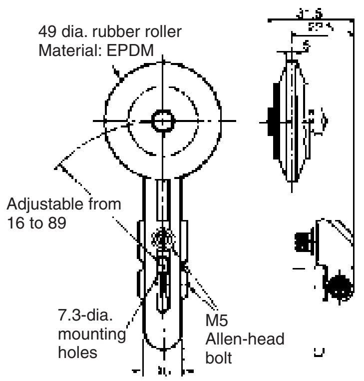
WL-2A104



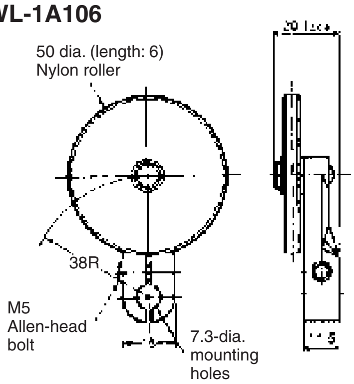
WL-2A110



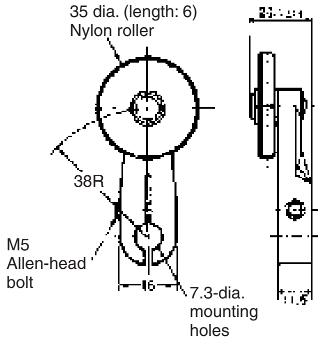
WL-2A105



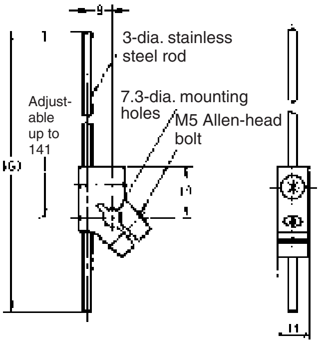
WL-1A106



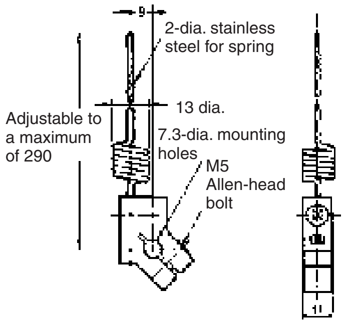
WL-1A110



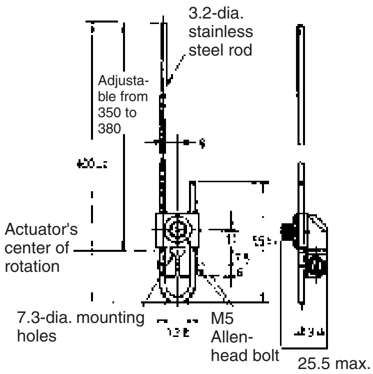
WL-4A100



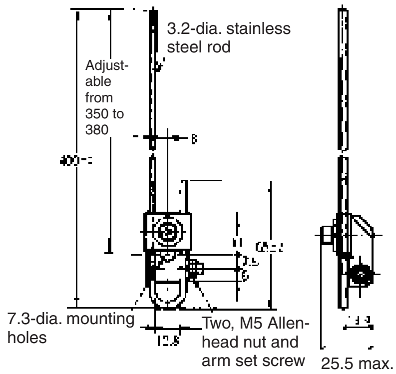
WL-4A201



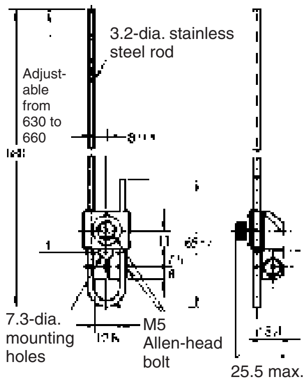
WL-3A100



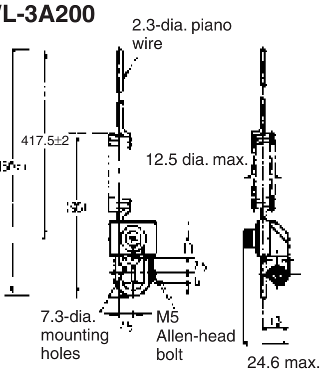
WL-3A106
Double Nut



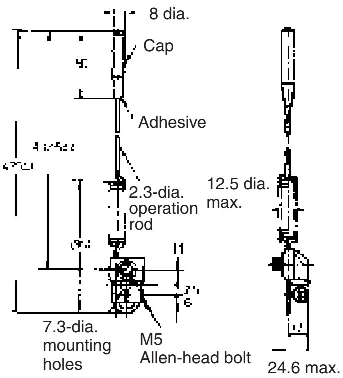
WL-3A108



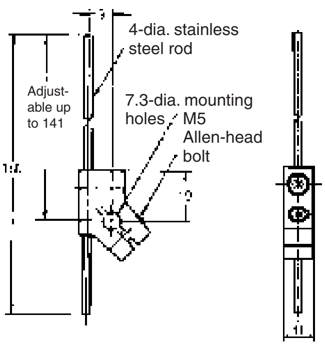
WL-3A200



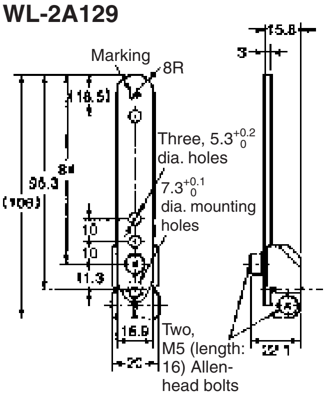
WL-3A203



WL-4A112

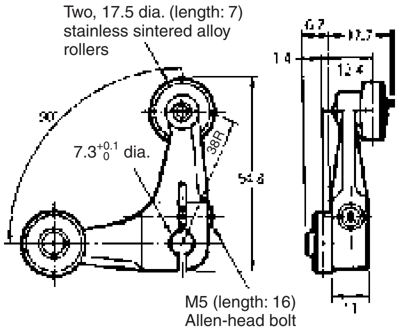


WL-2A129



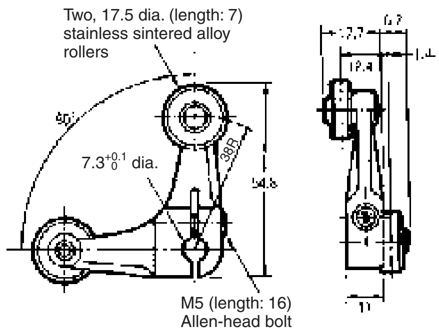
Limit switches

WL-5A101



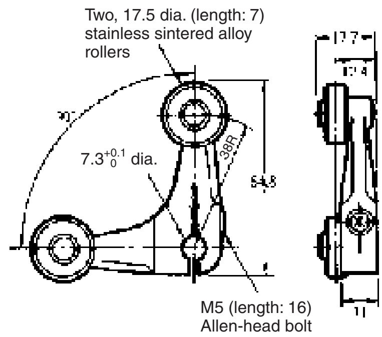
WL-5A100 has a resin roller

WL-5A103



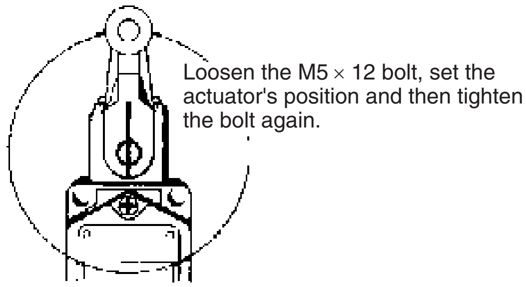
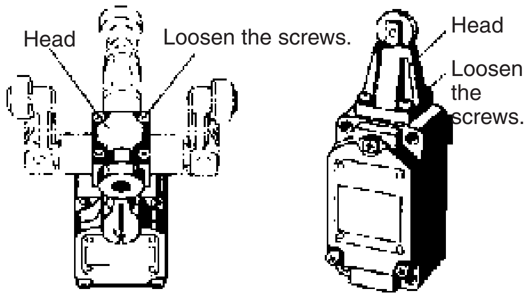
WL-5A102 has a resin roller

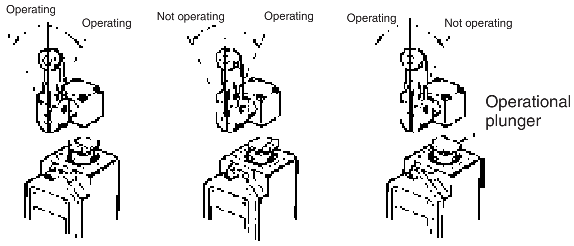
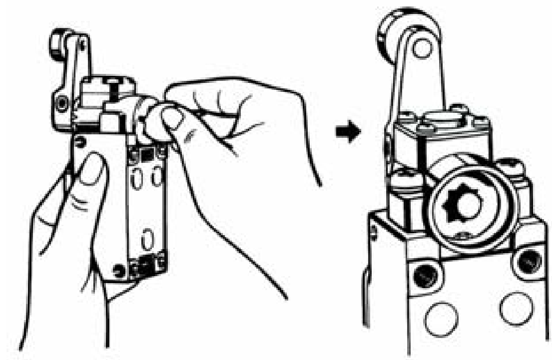
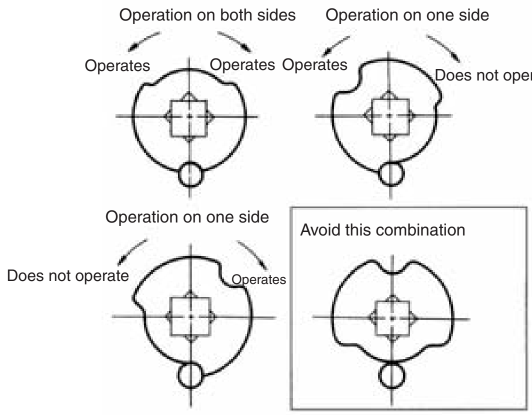
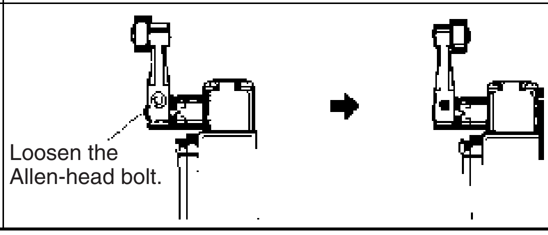
WL-5A105

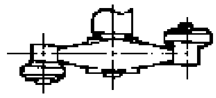
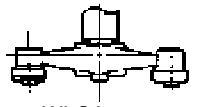
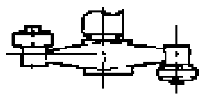
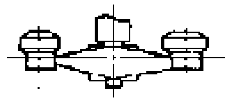
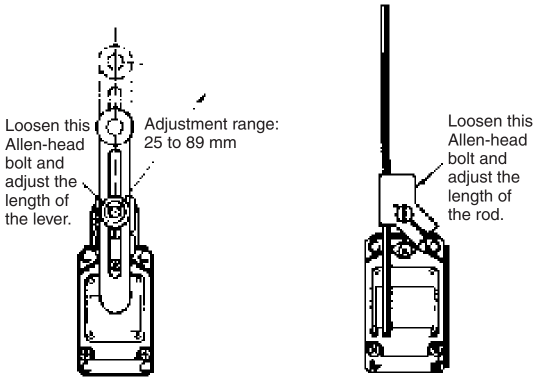


WL-5A104 has a resin roller

Installation

Item	Appropriate model/actuator	Details
Changing the installation position of the actuator By loosening the Allen-head bolt on the actuator lever, the position of the actuator can be set anywhere within the 360°. With Lamp-equipped Switches, the actuator lever comes in contact with the top of the lamp cover, so use caution when rotating and setting the lever. When the lever only moves forwards and backwards, it will not contact the lamp cover.	Roller Levers: WLCA2, WL01CA2, WLH2, WL01H2, WLG2, WL01G2 Adjustable Roller Levers: WLCA12, WL01CA12, WLH12, WL01H12, WLG12, WL01G12 Adjustable Rod Levers: WLCL, WL01CL, WLHL, WL01HL, WLGL, WL01GL	
Changing the orientation of the Head By removing the screws in the four corners of the Head, the Head can be set in any of the four directions. Be sure to change the plunger for internal operations at the same time. (The operational plunger does not need to be changed on overtravel general-purpose and high-sensitivity models.) The roller plunger can be set in either two positions at 90°. WLCA2-2N and WL01CA2-2N can only be set in either the forward or backward direction.	Roller Levers: WLCA□, WL01CA□, WLGCA□ Adjustable Rod Levers: WLCL, WL01CL Horizontal Plungers: WLSD□, WL01SD□ Roller Plungers: WLD2, WL01D2 Sealed Roller Plungers: WLD28, WL01D28. **Note:** Does not include -RP60 Series or -141 Series.	

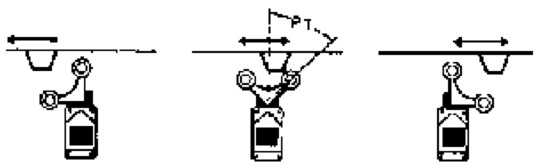
Item	Appropriate model/actuator	Details
Changing the operating direction By removing the Head on models which can operate on one-side only, and then changing the direction of the operational plunger, one of three operating directions can be selected. In the case of overtravel models, by loosening the rubber holder using either a coin or a flat-blade screwdriver, and changing the direction of the internal rubber section, one of three operating directions can be selected. The tightening torque for the screws on the Head is 0.78 to 0.88 N·m.	Roller Levers: WLCA2, WL01CA2, WLGCA2, WLMGCA2□ Adjustable Roller Levers: WLCA12, WL01CA12 Adjustable Rod Levers: WLCL, WL01CL Overtravel Models: WLCA□-2N, WL01CA□-2N **Note:** The diagram at the right is not correct for the overtravel -2N models.	The output of the Switch will be changed, regardless of which direction the lever is pushed. The output of the Switch will only be changed when the lever is pushed in one direction.  Operation in both directions Clockwise operation Counterclockwise operation For details on overtravel -2N models, refer to page 43. **Cam direction changing procedure for side-installation models** Loosen the cam holder with a coin or screwdriver. Take out the cam from the Switch. Change the direction of the cam as required by your intended operation and then reinstall the cam.  Relationship of cam to operation as observed from the rear of Switch 
Installing the roller on the inside By installing the roller lever in the opposite direction, the roller can be installed on the inside. (Set so that operation can be completed within a 180° level range.)	Roller Levers: WLCA□, WL01CA□, except for the adjustable roller levers. Fork Lever Locks: WLCA32-4□, WL01CA32-4□	

Item	Appropriate model/actuator	Details
Selecting the roller position There are four types of fork lever lock for use depending on the roller position.	Fork Lever Locks: WLCA32-4□, WL01CA32-4□	WLCA32-41  WLCA32-43  WLCA32-42  WLCA32-44  **Note:** An explanation of the operation of fork lever locks is provided after this table.
Adjusting the length of the rod or lever The length of the rod or lever can be adjusted by loosening the Allen-head bolt.	Adjustable Roller Levers: WLCA12, WL01CA12 etc. Adjustable Rod Levers: WLCL, WL01CL, etc.	WLCA12 etc. 

■ Operation of Fork Lever Locks

The fork lever lock is configured so that the dog pushes the lever to reverse the output and this reversed state is maintained even after the dog continues on. If the dog then pushes the lever from the opposite direction, the lever will return to its original position.

Example



NC terminal: ON   NO terminal: ON   NO terminal: ON

Precautions

Refer to the *Technical Information for Limit Switches* (Cat. No. C121).

■ Correct Use

When a rod or wired-type actuator is used, do not touch the top end of the actuator. Doing so may result in injury.
Applicable models: WLHAL5 and WL01HAL5 Rod Spring Levers and WLNJ-S2 and WL01NJ-S2 Steel-wire Actuators.

A short-circuit may cause damage to the Switch, so insert a circuit breaker fuse, of 1.5 to 2 times the rated current, in parallel with the Switch. In order to meet EN approval ratings, use a 10-A fuse that corresponds to IEC269, either a gI or gG for general-purpose types and spatter-prevention models only.

When wiring terminal screws, use M4 round crimp terminals and tighten screws to the recommended torque. Wiring with broken wires, or the incorrect crimp terminals, or not tightening screws to the recommended torque can lead to short-circuits, leakage current, and fire.

When performing internal wiring there is a chance of short-circuit, leakage current, or fire, so be sure to protect the inside of the Switch from splashes of oil or water, corrosive gases, and cutting powder.

Using an inappropriate connector or assembling Switches incorrectly (assembly, tightening torque) can result in malfunction, leakage current, or fire, so be sure to read the instruction manual thoroughly beforehand.

Even when the connector is assembled and set correctly, the end of the cable and the inside of the Switch may come in contact. This can lead to malfunction, leakage current, or fire, so be sure to protect the end of the cable from splashes of oil or water and corrosive gases.

Environmental Precautions

When the Switch is used in locations subject to splashes of water or oil, the material of the seal, which ensures the sealing properties of the Switch, may undergo changes in shape and quality. This is due to deterioration (including expansion and contraction), and may result in reduced performance, ineffective return, and ineffective sealing (leading to ineffective contact, insulation, leakage current, and fire). Confirm the possible effects of the operating environment on the Switch before use.

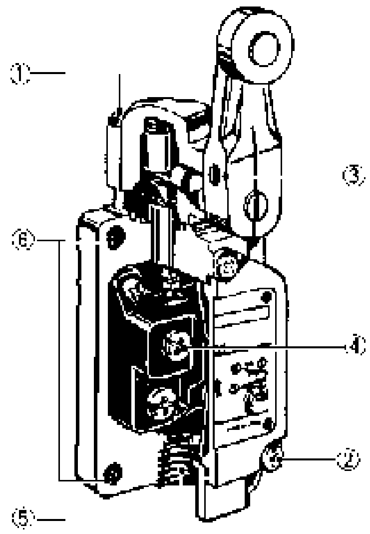
Built-in Switch

Do not remove or replace the built-in switch. If the position of the built-in switch moves, it can cause reduced performance, and if the insulation sheet moves (separator), the insulation may become ineffective.

Tightening Torque

If screws are too loose they can lead to an early malfunction of the Switch, so ensure that all screws are tightened using the correct torque.

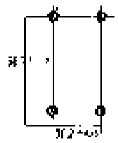
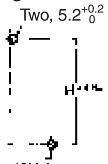
No.	Type	Torque
①	Head mounting screw	0.78 to 0.88 N·m
②	Cover mounting screw	1.18 to 1.37 N·m
③	Allen-head bolt (for securing the lever)	4.90 to 5.88 N·m
④	Terminal screw	0.59 to 0.78 N·m
⑤	Connector	1.77 to 2.16 N·m
⑥	Main Unit screws	4.90 to 5.88 N·m



In particular, when changing the direction of the Head, make sure that all screws are tightened again to the correct torque. Do not allow foreign objects to fall into the Switch.

Installing the Switch

To install the Switch, make a mounting panel, as shown in the following diagram, and tighten screws using the correct torque.

Standard/Overtravel model	Overtravel model (side installation)
Mounting holes Four, $5.2^{+0.2}_{0}$ dia. holes 	Mounting holes Two, $5.2^{+0.2}_{0}$ dia. holes 

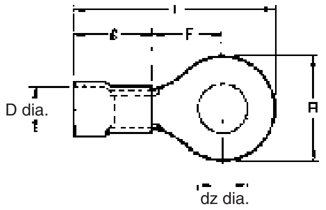
Connectors

Either the easy-to-use Allen-head nut or the SC Connector can be used as connectors. To ensure high-sealing properties, use the SC Connector. Consult your OMRON representative for details on SC Connectors.

Wiring

Use 1.25-mm lead wires and M4-insulation covered crimp terminals for wiring.

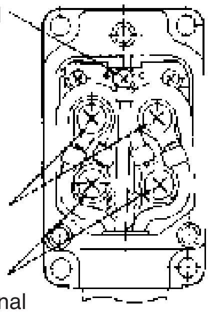
Crimp Terminal External Dimensions



dz dia.: 4.3
D dia.: 4.5
B: 8.5
L: 21.0
F: 7.8
ℓ: 9.0 (mm)

Wiring Method

Switch Box Section



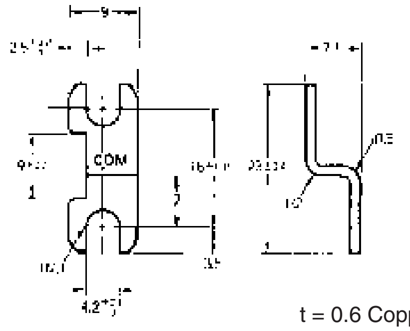
Note: The ground terminal is only installed on models with ground terminals.

Rotating Lever Set Position

All rotating lever models, except the fork lever lock, have a set position marker plate. (See page 33.) After operation, set the indicator needle on the marker plate so that is in the convex section of the bearing.

Terminal Plate

By using a short circuit plate, as shown in the following diagram, the Switch can be fabricated into a single-polarity double-break model. When ordering specify WL Terminal Plate (product code: WL-9662F).



t = 0.6 Copper plate

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

 In the interest of product improvement, specifications are subject to change without notice.

Enclosed Switch
D4C

Sealed, Compact, and Slim-bodied Switch Offers Choice of Many Actuators

- Liquid- and dust-resistance conforms to IEC IP67 standard.
- Triple-sealed construction:
  Plunger section sealed via nitrile rubber packing seal and diaphragm; switch section sealed via nitrile rubber cap; cable entrance sealed via encapsulating material.
- Standard cable (S-FLEX VCTF) in 2-, 3-, or 5-meter lengths offers high flexibility with outstanding oil and extreme temperature resistance.
- Low temperature models are available.

Model Number Structure

■ Model Number Legend

Standard Models

D4C-□□□
1 2 3

1. Rated Current
1: 5 A at 250 VAC, 4 A at 30 VDC
2: 5 A at 125 VAC (with LED indicator)
3: 4 A 30 VDC (with LED indicator)
4: 0.1 A at 125 VAC, 0.1 A at 30 VDC
5: 0.1 A at 125 VAC (with LED indicator)
6: 0.1 A at 30 VDC (with LED indicator)

2. Cable Specifications
2: VCTF oil-resistant cable (3 m)
3: VCTF oil-resistant cable (5 m)
4: VCTF (3 m)
5: VCTF (5 m)
6: SJT(O) (3 m)
7: SJT(O) (5 m)
8: VCTF oil-resistant cable (2 m)
9: VCTF (2 m)

3. Actuator
01: Pin plunger
02: Roller plunger
03: Crossroller plunger
10: Bevel plunger
20: Roller lever
24: Roller lever (high-sensitivity model)
31: Sealed pin plunger
32: Sealed roller plunger
33: Sealed crossroller
41: Panel mount pin plunger
42: Panel mount roller plunger
43: Panel mount crossroller plunger
50: Plastic rod
60: Center roller lever plunger

Note 1: Some combinations of the above may not be supported.
2: With standard models, the operation indicator turns OFF when the switch operates. If models with operation indicators that turn ON when the switch operates are required, add "-B" to the end of the model number.

Pre-wired Models (Use VCTF Oil-resistant Cable)

D4C-□0□□-□□□□□□
1 2 3 4

1. Operation Indicator Lamp
- 1: Without operation indicator
- 2: 1 A at 125 VAC (with operation indicator)
- 3: 1 A at 30 VDC (with operation indicator)

2. Actuator
- 01: Pin plunger
- 02: Roller plunger
- 31: Sealed plunger
- 32: Sealed roller plunger
- 24: Roller lever (high-sensitivity model)

3. Wiring Specifications
- DK1EJ: Pre-wired models (3 conductors: DC specification, NC wiring)
- AK1EJ: Pre-wired models (3 conductors: AC specification, NC wiring)
- M1J: Connector models for ASI devices (2 conductors: NO wiring)

4. Cable length
- 03: 0.3 m
- 05: 0.5 m
- 10: 1 m

Wiring Specifications

Internal switch	Connector
COM	3
NC	2
NO	4

Note: Since the above wiring specifications are different from those for the D4CC, be careful not to mistake them.

Weather-resistant Models

D4C-□□□-P
1 2 3

1. Rated Current
- 1: 5 A at 250 VAC, 4 A at 30 VDC
- 2: 5 A at 125 VAC (with LED indicator)
- 3: 4 A at 30 VDC (with LED indicator)
- 4: 0.1 A at 125 VAC, 0.1 A at 30 VDC
- 5: 0.1 A at 125 VAC (with LED indicator)
- 6: 0.1 A at 30 VDC (with LED indicator)

2. Cable Specifications
- 2: VCTF oil-resistant cable (3 m)
- 3: VCTF oil-resistant cable (5 m)

3. Actuator
- 20: Roller lever
- 24: Roller lever (high-sensitivity model)
- 27: Variable roller lever
- 29: Variable rod lever

Ordering Information

■ List of Models

Standard Models

Actuator	Standard cable models						UL/CSA-approved cable models			
	S-FLEX VCTF Cable*			VCTF Cable**			5 A at 250 VAC without LED indicator		5 A at 125 VAC with LED indicator (100 VAC)	
							SJT(O) Cable***			
	EN60947-5-1 approved						UL/CSA approved			
	2 m	3 m	5 m	2 m	3 m	5 m	3 m	5 m	3 m	5 m
Pin plunger	D4C-□801	D4C-□201	D4C-□301	D4C-□901	D4C-□401	D4C-□501	D4C-1601	D4C-1701	D4C-2601	D4C-2701
Sealed plunger	D4C-□831	D4C-□231	D4C-□331	D4C-□931	D4C-□431	D4C-□531	D4C-1631	D4C-1731	D4C-2631	D4C-2731
Roller plunger	D4C-□802	D4C-□202	D4C-□302	D4C-□902	D4C-□402	D4C-□502	D4C-1602	D4C-1702	D4C-2602	D4C-2702
Sealed roller plunger	D4C-□832	D4C-□232	D4C-□332	D4C-□932	D4C-□432	D4C-□532	D4C-1632	D4C-1732	D4C-2632	D4C-2732
Crossroller plunger	D4C-□803	D4C-□203	D4C-□303	D4C-□903	D4C-□403	D4C-□503	D4C-1603	D4C-1703	D4C-2603	D4C-2703
Sealed crossroller plunger	D4C-□833	D4C-□233	D4C-□333	D4C-□933	D4C-□433	D4C-□533	D4C-1633	D4C-1733	D4C-2633	D4C-2733
Bevel plunger	D4C-□810	D4C-□210	D4C-□310	D4C-□910	D4C-□410	D4C-□510	D4C-1610	D4C-1710	D4C-2610	D4C-2710
Coil spring	D4C-□850	D4C-□250	D4C-□350	D4C-□950	D4C-□450	D4C-□550	D4C-1650	D4C-1750	D4C-2650	D4C-2750
Roller lever	D4C-□820	D4C-□220	D4C-□320	D4C-□920	D4C-□420	D4C-□520	D4C-1620	D4C-1720	D4C-2620	D4C-2720
Roller lever (high-sensitivity model)	D4C-□824	D4C-□224	D4C-□324	D4C-□924	D4C-□424	D4C-□524	D4C-1624	D4C-1724	D4C-2624	D4C-2724
Panel mount pin plunger	D4C-□841	D4C-□241	D4C-□341	D4C-□941	D4C-□441	D4C-□541	D4C-1641	D4C-1741	D4C-2641	D4C-2741
Panel mount roller plunger	D4C-□842	D4C-□242	D4C-□342	D4C-□942	D4C-□442	D4C-□542	D4C-1642	D4C-1742	D4C-2642	D4C-2742
Panel mount crossroller plunger	D4C-□843	D4C-□243	D4C-□343	D4C-□943	D4C-□443	D4C-□543	D4C-1643	D4C-1743	D4C-2643	D4C-2743
Center roller lever plunger	D4C-□860	D4C-□260	D4C-□360	D4C-□960	D4C-□460	D4C-□560	D4C-1660	D4C-1760	D4C-2660	D4C-2760

Note 1. Cold-resistant models are also available. Order these models with reference to the following example.
D4C-1201 → D4C-1201-C

2. Models with viscosity-resistant oil specification (with an oil drain hole) are also available. Order these models with reference to the following example. Applicable only to the plunger models.
D4C-1202 → D4C-1202-M

3. Variable roller lever models are also available.

* Oil-resistant vinyl cabtire cables.

** Ordinary vinyl cabtire cables.

*** Models with SJT(O) Cables (approved by UL and CSA standards) conform to UL and CSA standards.

Standard Models (Continued)

Actuator	CENELEC cable models EN60947-5-1 approved			
	1 m	2 m	3 m	5 m
Pin plunger	D4C-1G01 1 M	D4C-1G01 2 M	D4C-1G01 3 M	D4C-1G01 5 M
Sealed plunger	D4C-1G31 1 M	D4C-1G31 2 M	D4C-1G31 3 M	D4C-1G31 5 M
Roller plunger	D4C-1G02 1 M	D4C-1G02 2 M	D4C-1G02 3 M	D4C-1G02 5 M
Sealed roller plunger	D4C-1G32 1 M	D4C-1G32 2 M	D4C-1G32 3 M	D4C-1G32 5 M
Crossroller plunger	D4C-1G03 1 M	D4C-1G03 2 M	D4C-1G03 3 M	D4C-1G03 5 M
Sealed crossroller plunger	D4C-1G33 1 M	D4C-1G33 2 M	D4C-1G33 3 M	D4C-1G33 5 M
Bevel plunger	D4C-1G10 1 M	D4C-1G10 2 M	D4C-1G10 3 M	D4C-1G10 5 M
Coil spring	D4C-1G50 1 M	D4C-1G50 2 M	D4C-1G50 3 M	D4C-1G50 5 M
Roller lever	D4C-1G20 1M	D4C-1G20 2 M	D4C-1G20 3 M	D4C-1G20 5 M
Roller lever (high-sensitivity model)	D4C-1G24 1 M	D4C-1G24 2 M	D4C-1G24 3 M	D4C-1G24 5 M
Panel mount pin plunger	D4C-1G41 1 M	D4C-1G41 2 M	D4C-1G41 3 M	D4C-1G41 5 M
Panel mount roller plunger	D4C-1G42 1 M	D4C-1G42 2 M	D4C-1G42 3 M	D4C-1G42 5 M
Panel mount crossroller plunger	D4C-1G43 1 M	D4C-1G43 2 M	D4C-1G43 3 M	D4C-1G43 5 M

Pre-wired Models (Use VCTF Oil-resistant Cable)

Actuator	1 A at 125 VAC without operation indicator	1 A at 125 VAC with operation indicator	1 A at 30 VDC without operation indicator	1 A at 30 VDC with operation indicator
Pin plunger	D4C-1001-AK1EJ□	D4C-2001-AK1EJ□	D4C-1001-DK1EJ□	D4C-3001-DK1EJ□
Roller plunger	D4C-1002-AK1EJ□	D4C-2002-AK1EJ□	D4C-1002-DK1EJ□	D4C-3002-DK1EJ□
Sealed plunger	D4C-1031-AK1EJ□	D4C-2031-AK1EJ□	D4C-1031-DK1EJ□	D4C-3031-DK1EJ□
Sealed roller plunger	D4C-1032-AK1EJ□	D4C-2032-AK1EJ□	D4C-1032-DK1EJ□	D4C-3032-DK1EJ□
Roller lever (high-sensitivity model)	D4C-1024-AK1EJ□	D4C-2024-AK1EJ□	D4C-1024-DK1EJ□	D4C-3024-DK1EJ□

Note 1. The □ contains the length of the cable.
For example: 30 cm → D4C-1001-AK1EJ03

2. M1 models are also available. Contact your OMRON sales representative for further information.

Weather-resistant Models

Actuator		5 A at 250 VAC 4 A at 30 VDC without operation indicator	0.1 A at 125 VAC 0.1 A at 30 VDC without operation indicator	5 A at 125 VAC with operation indicator	4 A at 30 VDC with operation indicator	0.1 A at 125 VAC with operation indicator	0.1 A at 30 VDC with operation indicator
Roller lever	3 m	D4C-1220-P	D4C-4220-P	D4C-2220-P	D4C-3220-P	D4C-5220-P	D4C-6220-P
	5 m	D4C-1320-P	D4C-4320-P	D4C-2320-P	D4C-3320-P	D4C-5320-P	D4C-6320-P
Roller lever (high-sensitivity model)	3 m	D4C-1224-P	D4C-4224-P	D4C-2224-P	D4C-3224-P	D4C-5224-P	D4C-6224-P
	5 m	D4C-1324-P	D4C-4324-P	D4C-2324-P	D4C-3324-P	D4C-5324-P	D4C-6324-P
Variable roller lever	3 m	D4C-1227-P	D4C-4227-P	D4C-2227-P	D4C-3227-P	D4C-5227-P	D4C-6227-P
	5 m	D4C-1327-P	D4C-4327-P	D4C-2327-P	D4C-3327-P	D4C-5327-P	D4C-6327-P
Variable rod lever	3 m	D4C-1229-P	D4C-4229-P	D4C-2229-P	D4C-3229-P	D4C-5229-P	D4C-6229-P
	5 m	D4C-1329-P	D4C-4329-P	D4C-2329-P	D4C-3329-P	D4C-5329-P	D4C-6329-P

Individual Parts (Head/Actuator)

Actuator type	Head (with actuator)	Actuator
Pin plunger	D4C-0001	-
Roller plunger	D4C-0002	-
Crossroller plunger	D4C-0003	-
Bevel plunger	D4C-0010	-
Roller lever	D4C-0020	WL-1A100
Roller lever	D4C-0024	WL-1A100
Variable roller lever	D4C-0027	HL-1HPA320
Variable rod lever	D4C-0029	HL-1HPA500
Sealed pin plunger	D4C-0031	-
Sealed roller plunger	D4C-0032	-
Sealed crossroller plunger	D4C-0033	-
Panel mount pin plunger	D4C-0041	-
Panel mount roller plunger	D4C-0042	-
Panel mount crossroller plunger	D4C-0043	-
Plastic rod	D4C-0050	-
Center roller lever	D4C-0060	-

Note 1: The model numbers for heads are of the form D4C-00□□, with the numbers in the squares indicating the type of actuator.

2: Actuators for plunger models, plastic rod models, and center roller lever models cannot be ordered individually. They must be ordered together with the head.

3: Consult your OMRON representative for details on cold-resistant specifications.

Mounting Plates

The WL model incorporated by equipment can be replaced with the D4C together with the Mounting Plate without changing the position of the dog or cam.

List of Replaceable Models

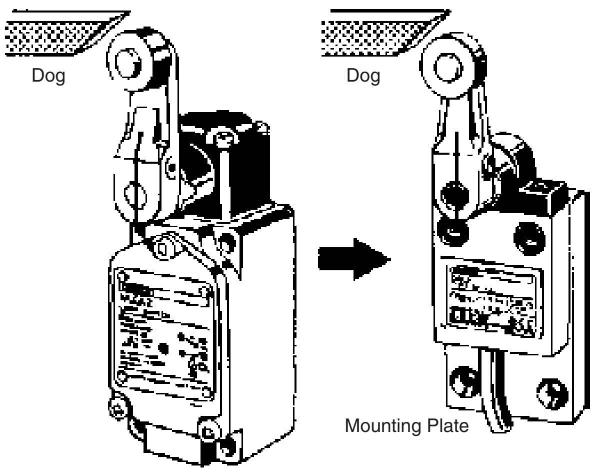
Contact your OMRON representative for the period required for delivery.

WL model (Actuator)	D4C model (Actuator)	Plate
WLD/WL01D (Top plunger)	→D4C-□□01 (Plunger)	D4C-P001
WLD2/WL01D2 (Top-roller plunger)	→D4C-□□02 (Roller plunger)	D4C-P002
WLCA2/WL01CA2 (Roller lever)	→D4C-□□20 (Roller lever)	D4C-P020

Note: The WL01□ is for micro loads.

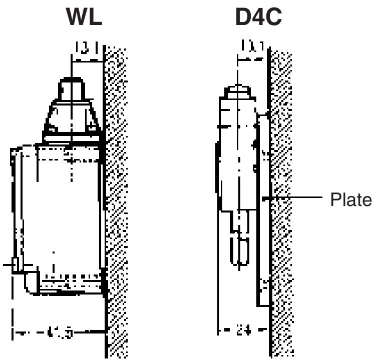
Application Example

Note: The position of the dog remains unchanged.



Remarks

There is no difference in mounting pitch between the Mounting Plate and the WL. The mounting depth of the D4C with the Mounting Plate attached is, however, shorter than that of the panel-mounted WL.



Specifications

■ Approved Standards

Agency	Standard	File No.
TÜV Rheinland	EN60947-5-1	R9451333 (see note 1) J9950970 (see note 2)
UL	UL508	E76675 (see note 3)
CSA	CSA C22.2 No. 14	LR45746 (see note 3)

Note 1: Models with VCTF oil-resistant cables only.
2: Pre-wired models only.
3: SJT(0)-cable models only.

■ Approved Standard Ratings

General Ratings

Model	Rated voltage	Non-inductive load				Inductive load				Inrush current	
		Resistive load		Lamp load		Inductive load		Motor load			
		NC	NO	NC	NO	NC	NO	NC	NO	NC	NO
D4C-1□□□	125 VAC	5 A	5 A	1.5 A	0.7 A	3 A	3 A	2.5 A	1.3 A	20 A max.	10 A max.
	250 VAC	5 A	5 A	1 A	0.5 A	2 A	2 A	1.5 A	0.8 A		
	8 VDC	5 A	5 A	2 A	2 A	5 A	4 A	3 A	3 A		
	14 VDC	5 A	5 A	2 A	2 A	4 A	4 A	3 A	3 A		
	30 VDC	4 A	4 A	2 A	2 A	3 A	3 A	3 A	3 A		
	125 VDC	0.4 A	0.4 A	0.05 A	0.05 A	0.4 A	0.4 A	0.05 A	0.05 A		
	250 VDC	0.2 A	0.2 A	0.03 A	0.03 A	0.2 A	0.2 A	0.03 A	0.03 A		
D4C-2□□□	125 VAC	5 A	5 A	1.5 A	0.7 A	3 A	3 A	2.5 A	1.3 A		
	125 VDC	0.4 A	0.4 A	0.05 A	0.05 A	0.4 A	0.4 A	0.05 A	0.05 A		
D4C-3□□□	30 VDC	4 A	4 A	2 A	2 A	3 A	3 A	3 A	3 A		
D4C-4□□□	125 VAC	0.1 A	0.1 A	---		---					
	8 VDC	0.1 A	0.1 A								
	14 VDC	0.1 A	0.1 A								
	30 VDC	0.1 A	0.1 A								
D4C-5□□□	125 VAC	0.1 A	0.1 A	---		---					
D4C-6□□□	30 VDC	0.1 A	0.1 A	---		---					

Ratings for Pre-wired Models

Rated voltage	Non-inductive load				Inductive load				Inrush current	
	Resistive load		Lamp load		Inductive load		Motor load			
	NC	NO	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	1	1	1	0.7	1	1	1	1	20 A max.	10 A max.
30 VDC	1	1	1	1	1	1	1	1		

Note 1. Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
2. Lamp loads have an inrush current of 10 times the steady-state current.
3. Motor loads have an inrush current of 6 times the steady-state current.

UL/CSA Approved Ratings

B300 (D4C-16□□, -17□□), B150 (D4C-26□□, -27□□)

NEMA B300 (D4C-16□□, -17□□)

Rated voltage	Carry current	Current		Volt-amperes	
		Make	Break	Make	Break
120 VAC	5 A	30 A	3 A	3,600 VA	360 VA
240 VAC		15 A	1.5 A		

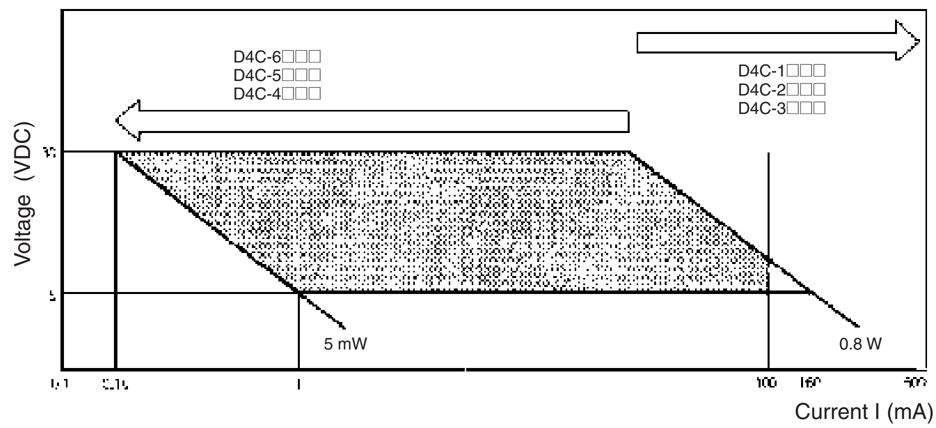
NEMA B150 (D4C-26□□, -27□□)

Rated voltage	Carry current	Current		Volt-amperes	
		Make	Break	Make	Break
120 VAC	5 A	30 A	3 A	3,600 VA	360 VA

TÜV Rheinland Approved Ratings (EN60947-5-1)

Model	Category and rating	I the
D4C-1□□□	AC-15 2 A/250 VAC DC-12 2 A/30 VDC	5 A 4 A
D4C-2□□□	AC-15 2 A/125 VAC	5 A
D4C-3□□□	DC-12 2 A/30 VDC	4 A
D4C-4□□□	AC-14 0.1 A/125 VAC DC-12 0.1 A/30 VDC	0.5 A 0.5 A
D4C-5□□□	AC-14 0.1 A/125 VAC	0.5 A
D4C-6□□□	DC-12 0.1 A/30 VDC	0.5 A

Applicable Load Range



Limit switches

■ Characteristics

Degree of protection	IP67
Durability (see note 2)	Mechanical: 10,000,000 operations min. Electrical: 200,000 operations min. (5A at 250 VAC, resistive load)
Operating speed	0.1 mm to 0.5 m/s (in case of plunger) 1 mm to 1 m/s (in case of roller lever)
Operating frequency	Mechanical: 120 operations/min Electrical: 30 operations/min
Rated frequency	50/60 Hz
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance (initial)	250 mΩ max. (initial value with 2-m VCTF cable) 300 mΩ max. (initial value with 3-m VCTF cable) 400 mΩ max. (initial value with 5-m VCTF cable)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between terminals of the same polarity 1,500 VAC, 50/60 Hz for 1 min between current-carrying metal part and ground, and between each terminal and non-current-carrying metal part, Uimp: 2.5 kV (EN60947-5-1)
Rated insulation voltage (U_i)	300 V (EN60947-5-1)
Switching overvoltage	1,000 VAC, 300 VDC max. (EN60947-5-1)
Pollution degree (operating environment)	3 (IEC60947-5-1)
Short-circuit protective device (SCPD)	10 A fuse type gG (IEC269)
Conditional short-circuit current	100 A (EN60947-5-1)
Conventional enclosed thermal current (I_{the})	5 A, 4 A, 0.5 A (EN60947-5-1)
Protection against electric shock	Class I (with grounding wire)
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: Approx. 1,000 m/s² min. Malfunction: Approx. 500 m/s² min.
Ambient temperature (see note)	Operating: –10°C to 70°C (with no icing)
Ambient humidity	Operating: 95% max.
Weight	With 3-m VCTF cable: 360 g; With 5-m VCTF cable: 540 g

Note 1. The above figures are initial values.

2. The values are calculated at an operating temperature of 5°C to 35°C, and an operating humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.

■ Operating Characteristics

Model	D4C-□□01 D4C-□001-□K1EJ□	D4C-□□31 D4C-□031-□K1EJ□	D4C-□□02 D4C-□002-□K1EJ□	D4C-□□32 D4C-□032-□K1EJ□	D4C-□□03
OF max.	11.77 N	17.65 N	11.77 N	17.65 N	11.77 N
RF min.	4.41 N	4.41 N	4.41 N	4.41 N	4.41 N
PT max.	1.8 mm	1.8 mm	1.8 mm	1.8 mm	1.8 mm
OT min.	3 mm	3 mm	3 mm	3 mm	3 mm
MD max.	0.2 mm	0.2 mm	0.2 mm	0.2 mm	0.2 mm
OP	15.7±1 mm	24.9±1 mm	28.5±1 mm	34.3±1 mm	28.5±1 mm
TT	(5) mm	(5) mm	(5) mm	(5) mm	(5) mm

Model	D4C-□□33	D4C-□□10	D4C-□□50	D4C-□□20 D4C-□□27-P (see note 1) D4C-□□29-P (see note 1)	D4C-□□24 D4C-□□24-P D4C-□024-□K1EJ□
OF max.	17.65 N	11.77 N	1.47 N	5.69 N	5.69 N
RF min.	4.41 N	4.41 N	---	1.47 N	1.47 N
PT max.	1.8 mm	1.8 mm	15°	25°	10±3°
OT min.	3 mm	3 mm	---	40°	50°
MD max.	0.2 mm	0.2 mm	---	3°	3°
OP	34.3±1 mm	28.5±1 mm	---	---	---
TT	(5) mm	(5) mm	---	(70°)	(70°)

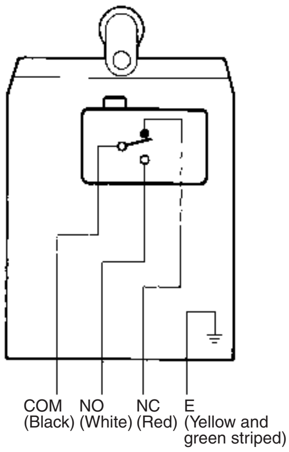
Model	D4C-□□41	D4C-□□42	D4C-□□43	D4C-□□60
OF max.	11.77 N	11.77 N	11.77 N	6.67 N
RF min.	4.41 N	4.41 N	4.41 N	1.47 N
PT max.	1.8 mm	1.8 mm	1.8 mm	10±3°
OT min.	3 mm	3 mm	3 mm	50°
MD max.	0.2 mm	0.2 mm	0.2 mm	3°
OP	31.2±1 mm	36.8±1 mm	36.8 mm	---
TT	(5) mm	(5) mm	(5) mm	---

Note 1. The values given for D4C-□□27-P and D4C-□□29-P are for when the length of the lever is 38 mm.
2. The operating characteristics for M1J□ models are the same as those for □K1EJ□ models.

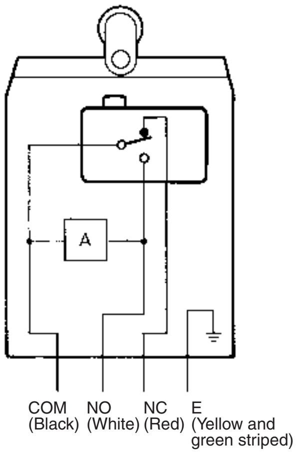
■ Contact Form

Standard Models / Weather-resistant Models

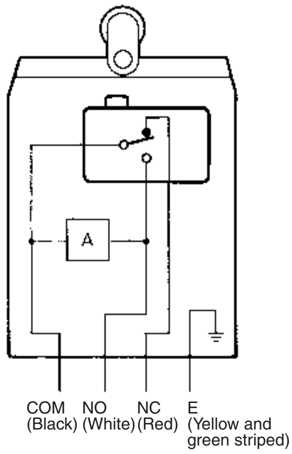
Without LED Indicator (S-FLEX VCTF Cable)



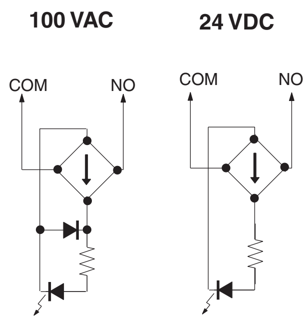
With LED Indicator (S-FLEX VCTF Cable)



With LED Indicator (lights when operated)



LED Indicator Circuits



Yellow/green: VCTF resin cable
Green: VCTF
UL/CSA-approved cable SJT(0)

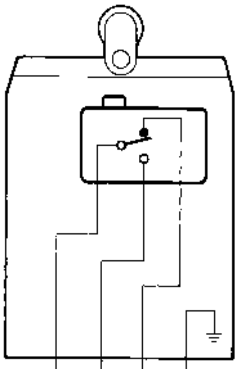
Note 1. "Lights when operated" means that when the actuator is turned or pushed and the Limit Switch contact leaves the NC side, the indicator lights.
2. "Lights when not in operation" means that when the actuator is in the free position, the indicator is lit, and when the actuator is turned or pushed and the contact comes into contact with the NO side, the indicator turns OFF.

Wire Color

Cable	Without LED				With LED			
	COM	NO	NC	E	COM	NO	NC	E
VCTF	Black	White	Red	Green	Black	White	Red	Green
S-FLEX VCTF	Black	White	Red	Yellow/ Green	Black	White	Red	Yellow/ Green
SJT (O)	Black	Blue	Red	Green	Black	Blue	Red	Green
CENELEC CABLE	Blue	Black	Brown	Yellow/ Green	Blue	Black	Brown	Yellow/ Green

Pre-wired Models

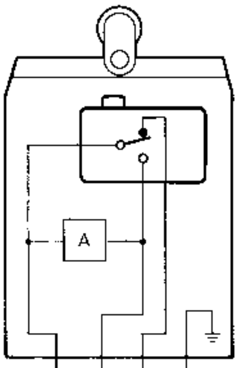
Without LED Indicator



COM NO NC E (See note.)

Pin No. ③ ④ ② —

With LED Indicator (lights when not in operation)

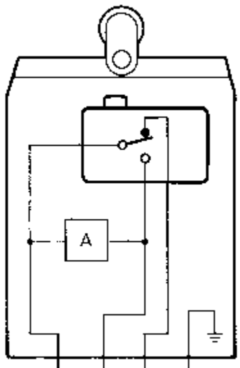


COM NO NC E (See note.)

Pin No. ③ ④ ② —

Note: Not connected to the ground.

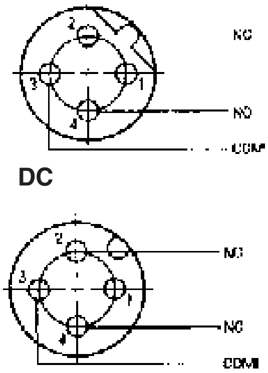
With LED Indicator (lights when operated)



COM (Black) NO (White) NC (Red) E (Yellow and green striped)

Yellow/green: VCTF resin cable
Green: VCTF
UL/CSA-approved cable SJT(0)

AC



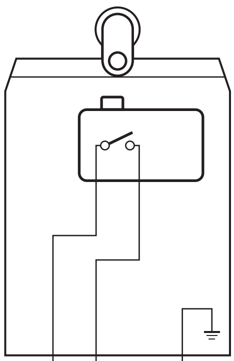
DC

Note 1. "Lights when operated" means that when the actuator is turned or pushed and the Limit Switch contact leaves the NC side, the indicator lights.

2. "Lights when not in operation" means that when the actuator is in the free position, the indicator is lit, and when the actuator is turned or pushed and the contact comes into contact with the NO side, the indicator turns OFF.

Connector Models for ASI Devices

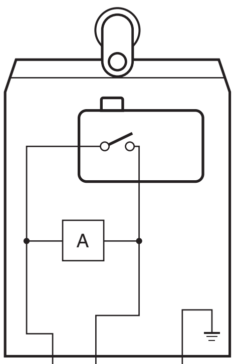
Without LED Indicator



COM NO NC E (See note.)

Pin No. ③ ④ —

With LED Indicator (lights when not in operation)

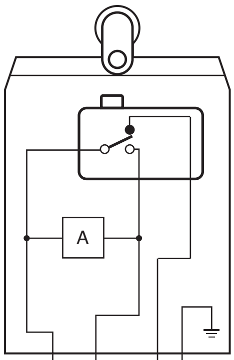


COM NO NC E (See note.)

Pin No. ③ ④ —

Note: Not connected to the ground.

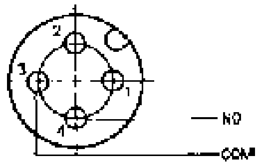
With LED Indicator (lights when operated)



COM (Black) NO (White) NC (Red) E (Yellow and green striped)

Yellow/green: VCTF resin cable
Green: VCTF
UL/CSA-approved cable SJT(0)

DC



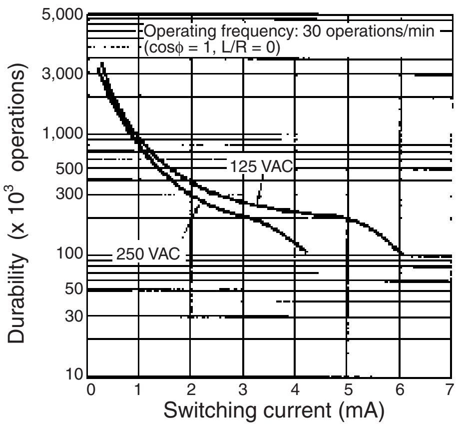
Note 1. "Lights when operated" means that when the actuator is turned or pushed and the Limit Switch contact leaves the NC side, the indicator lights.

2. "Lights when not in operation" means that when the actuator is in the free position, the indicator is lit, and when the actuator is turned or pushed and the contact comes into contact with the NO side, the indicator turns OFF.

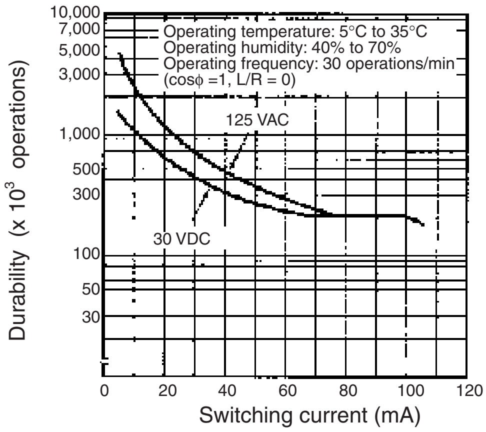
Engineering Data

■ Electrical Durability

D4C-1□□□, -2□□□, -3□□□



D4C-4□□□, -5□□□, -6□□□



■ Leakage Current for LED-indicator Models

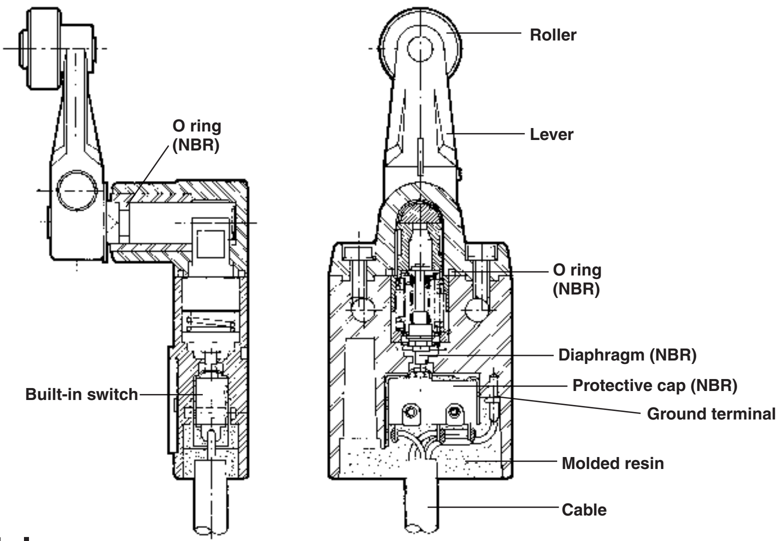
Model	Voltage	Leakage current	Resistance
D4C-2□□	125 VAC	1.7 mA	68 kΩ
D4C-3□□	30 VDC	1.7 mA	15 kΩ
D4C-5□□	125 VAC	1.7 mA	68 kΩ
D4C-6□□	30 VDC	1.7 mA	15 kΩ

Limit switches

Nomenclature

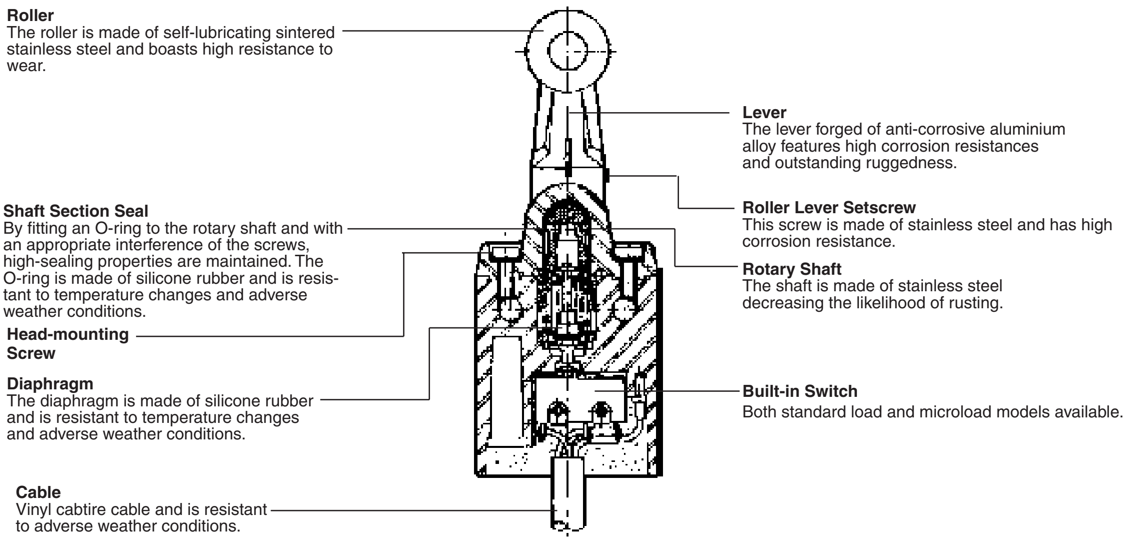
Standard Models

Roller Lever Models Without Indicator



Weather-resistant Models

Roller Lever Models Without Indicator

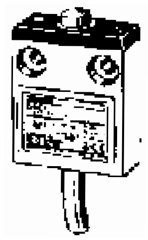


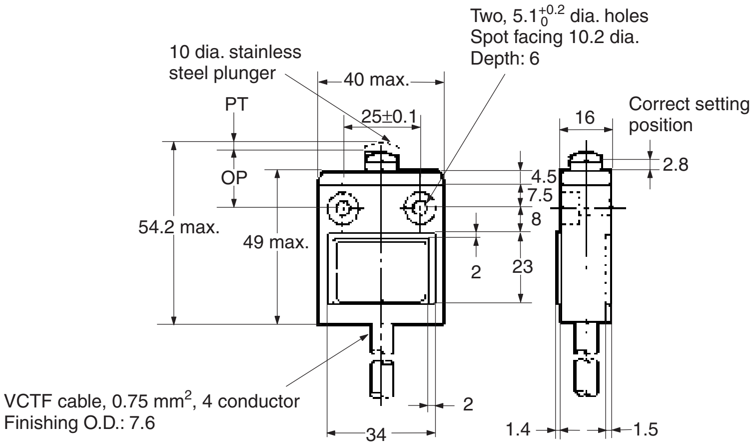
Dimensions

Note 1. All units are in millimeters unless otherwise indicated.
2. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

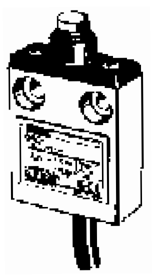
Standard Models

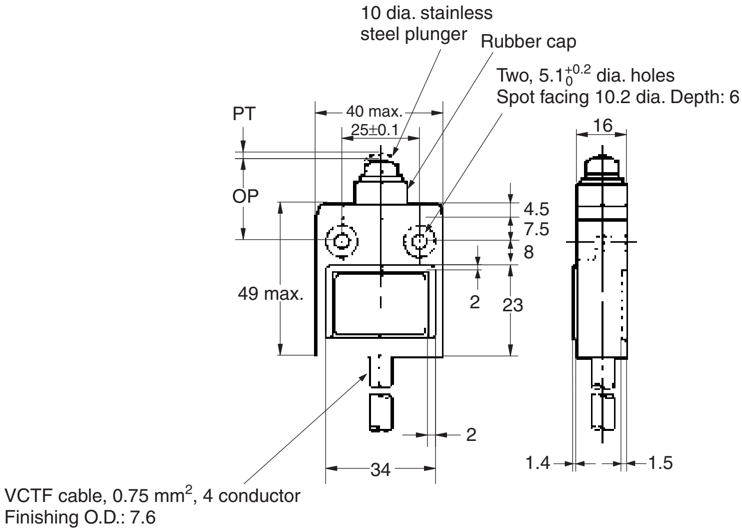
Pin Plunger
D4C-□□01



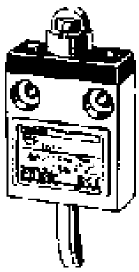


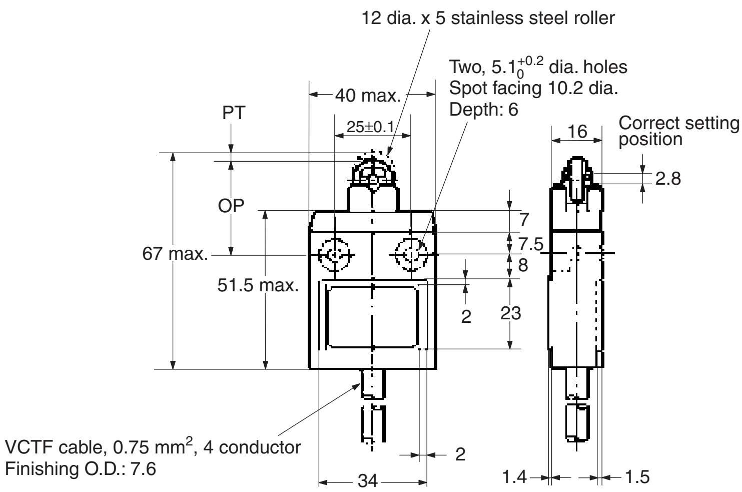
Sealed Plunger
D4C-□□31





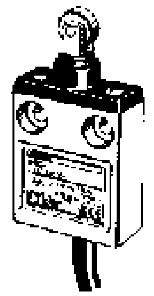
Roller Plunger
D4C-□□02

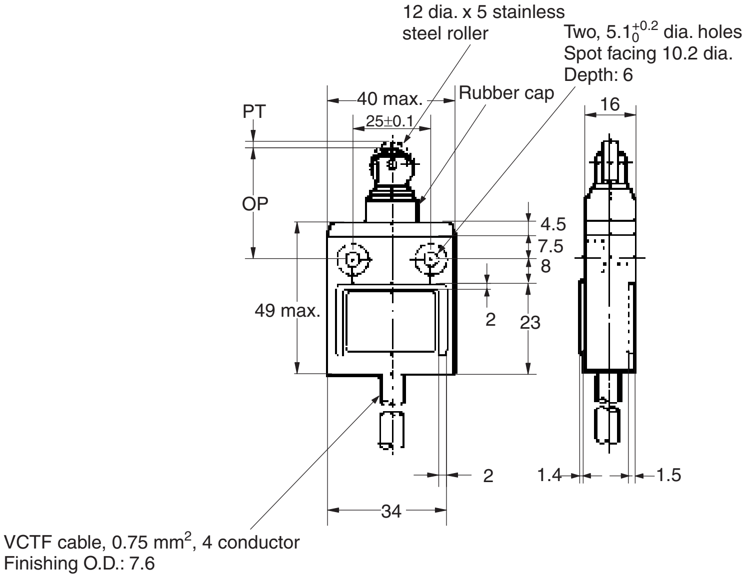




Sealed Roller Plunger

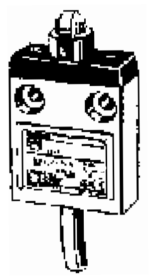
D4C-□□32

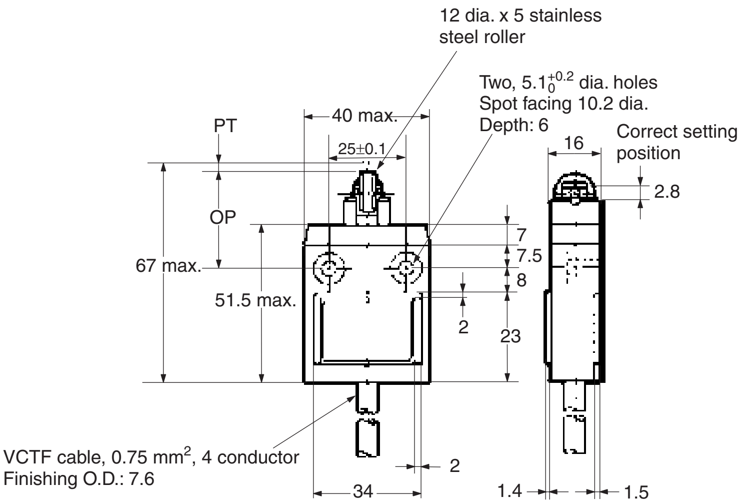




Crossroller Plunger

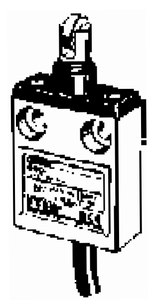
D4C-□□03

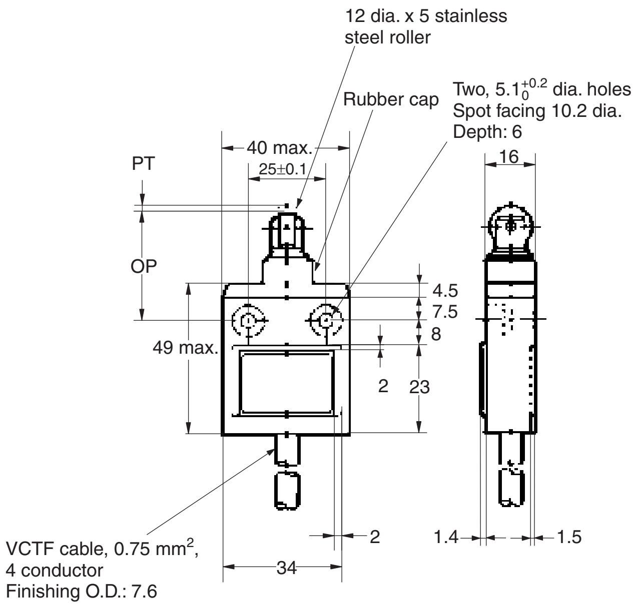




Sealed Crossroller Plunger

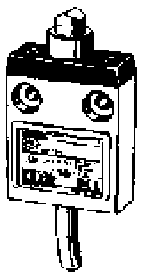
D4C-□□33

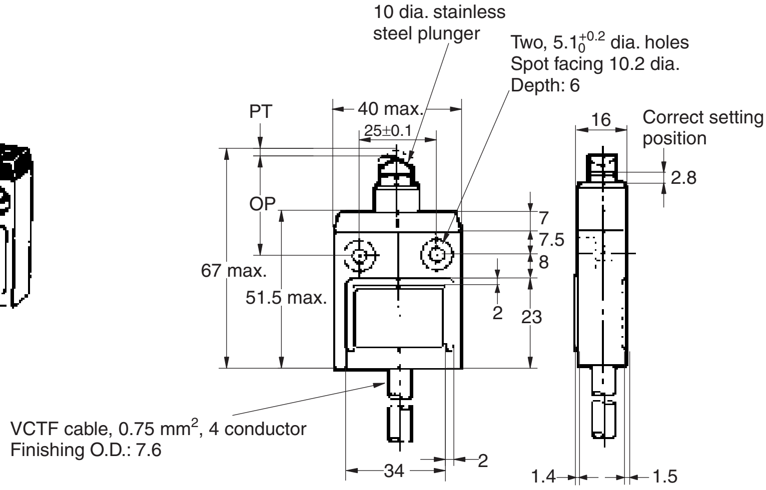




Bevel Plunger

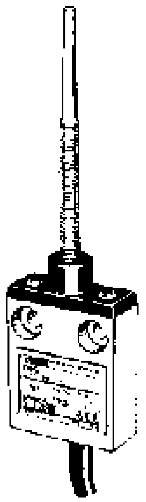
D4C-□□10

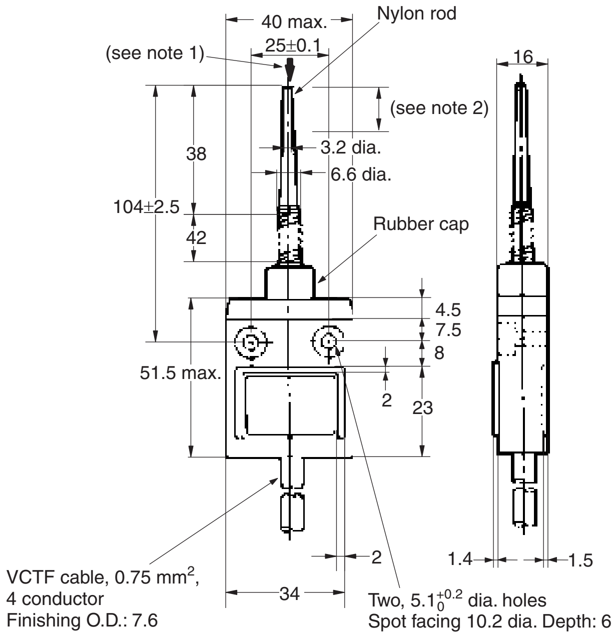




Coil Spring

D4C-□□50



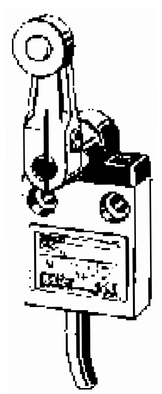


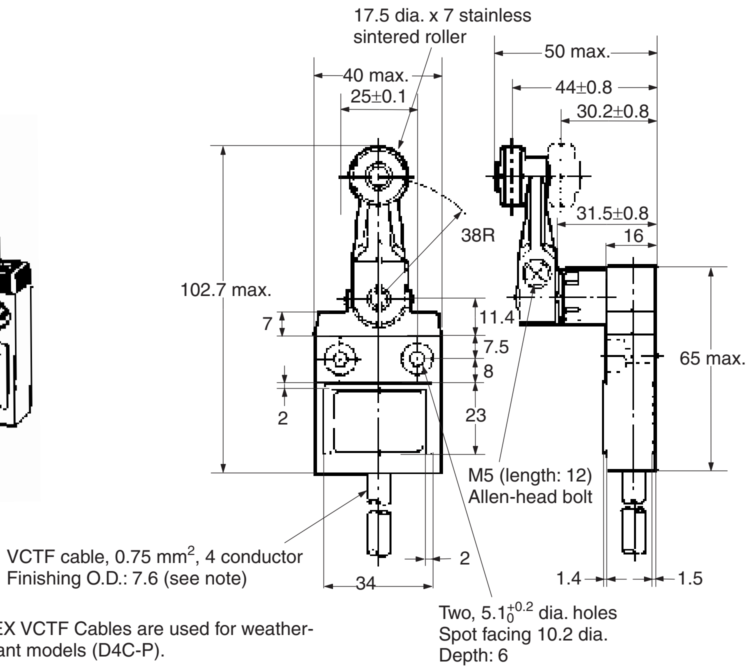
Note: 1. Operation is possible in any direction except in parallel to the axis ↓.

2. The ideal range for operation is between the tip of the rod and 1/3 of the length of the actuator.

Roller Lever

D4C-□□20
D4C-□□20-P

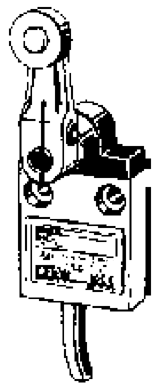


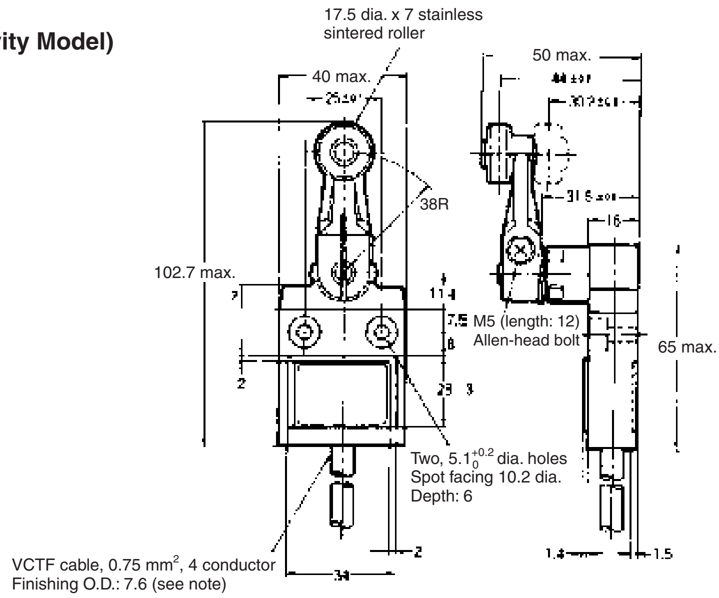


Note: S-FLEX VCTF Cables are used for weather-resistant models (D4C-P).

Roller Lever (High-Sensitivity Model)

D4C-□□24
D4C-□□24-P

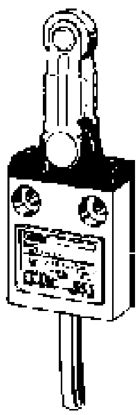


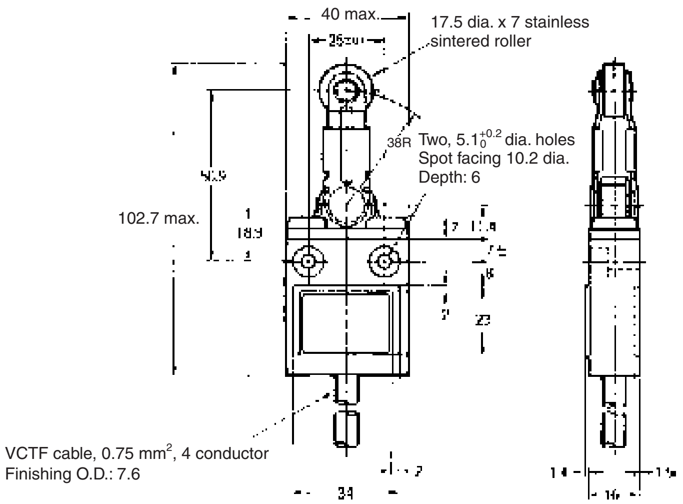


Note: S-FLEX VCTF Cables are used for weather-resistant models (D4C-P).

Center Roller Lever Plunger

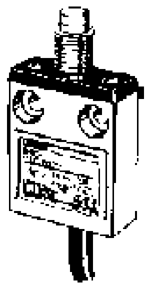
D4C-□□60

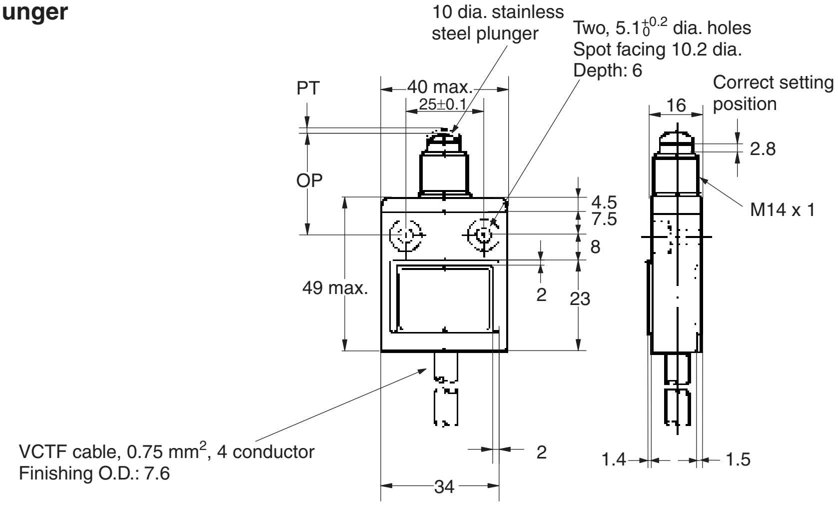




Panel Mount Pin Plunger

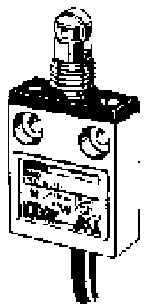
D4C-□□41

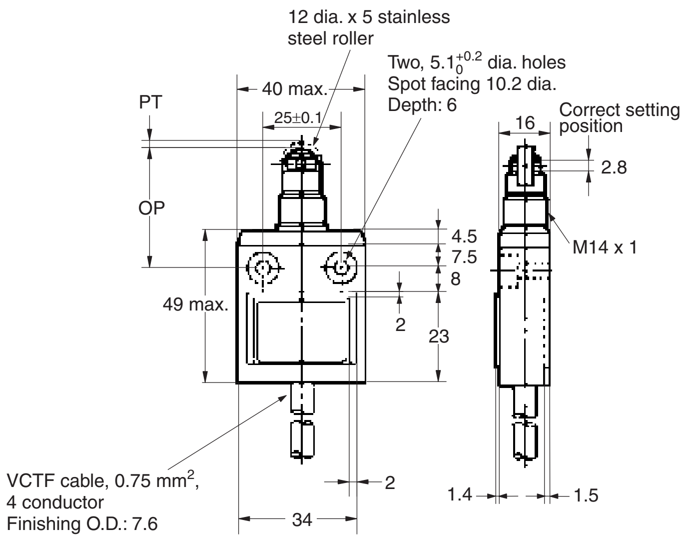




Panel Mount Roller Plunger

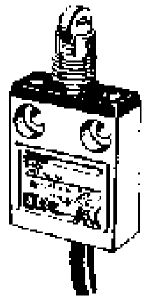
D4C-□□42

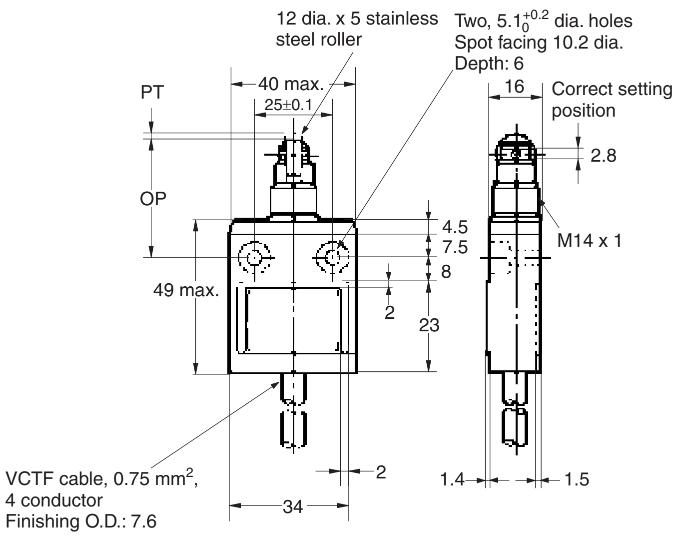




Panel Mount Crossroller Plunger

D4C-□□43



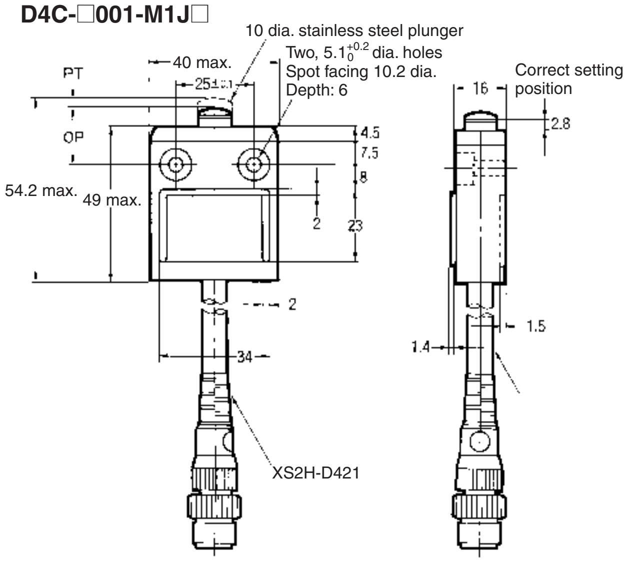


Note: Two nuts (thickness: 2.5; distance across: 17) are included with the D4C-□□41, D4C-□□42 and D4C-□□43.

Pre-wired Models

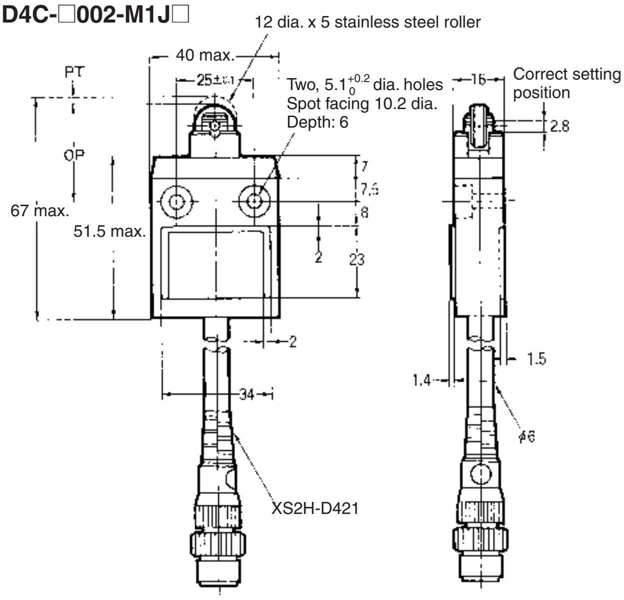
Pin Plunger

D4C-□001-□K1EJ□
D4C-□001-M1J□



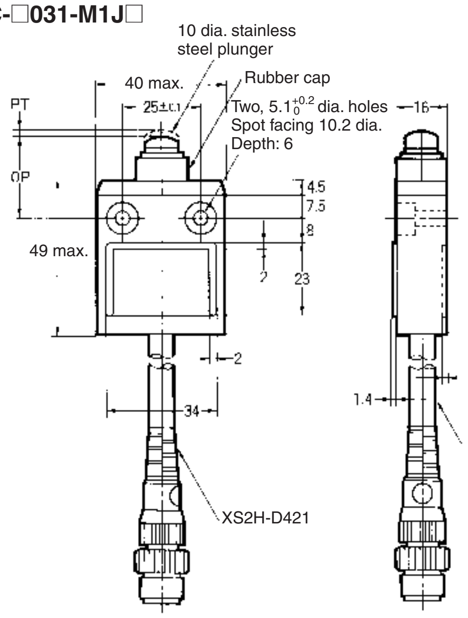
Roller Plunger

D4C-□002-□K1EJ□
D4C-□002-M1J□



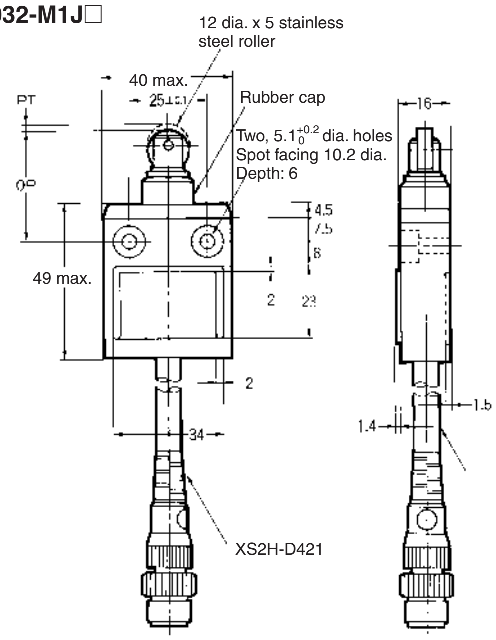
Sealed Pin Plunger

D4C-□031-□K1EJ□
D4C-□031-M1J□



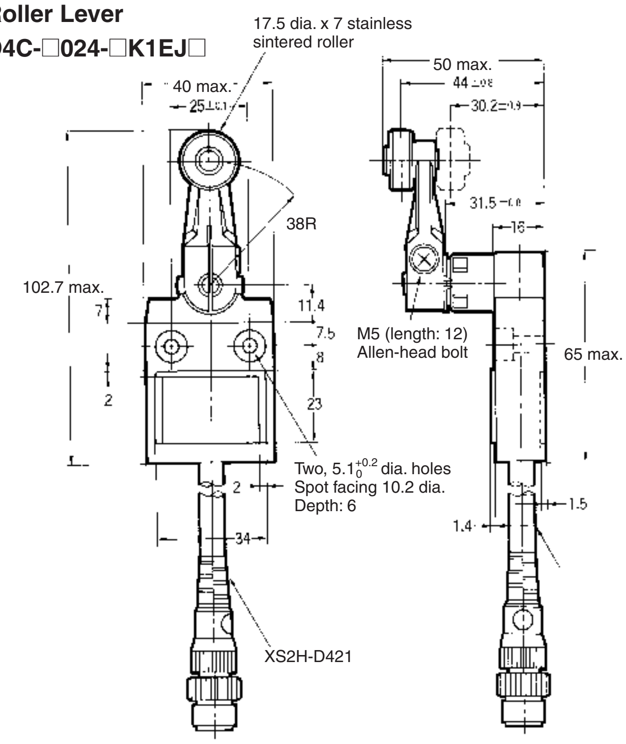
Sealed Roller Plunger

D4C-□032-□K1EJ□
D4C-□032-M1J□



Roller Lever

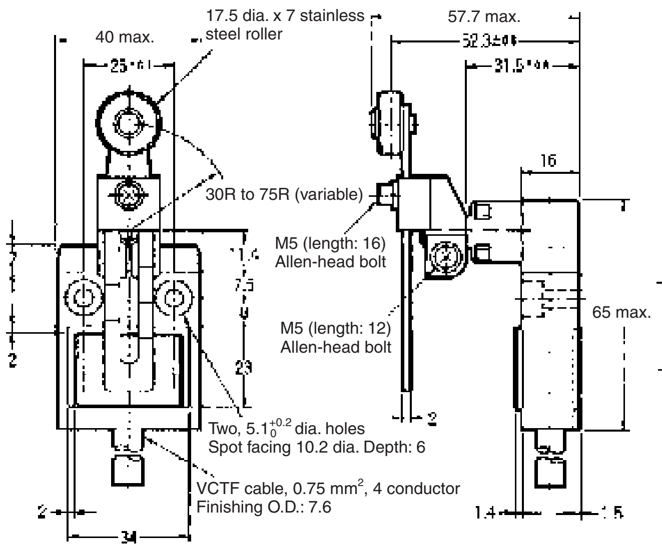
D4C-□024-□K1EJ□



Weather-resistant Models

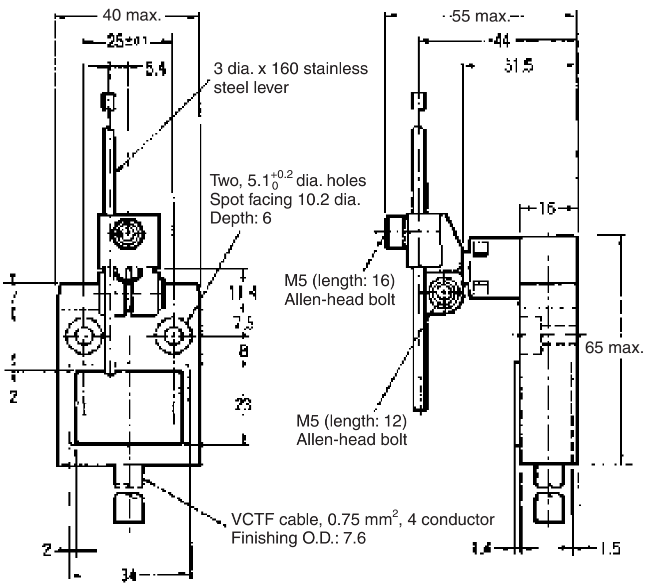
Adjustable Roller Lever

D4C-□□27-P



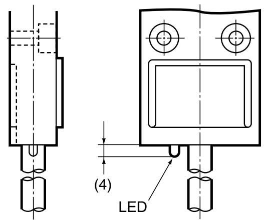
Adjustable Rod Lever

D4C-□□29-P



Models with LED Indicator

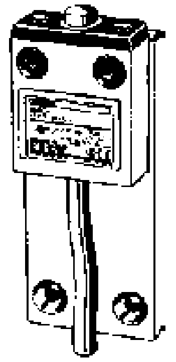
The dimensions of the LED indicator for models equipped with one are shown below.

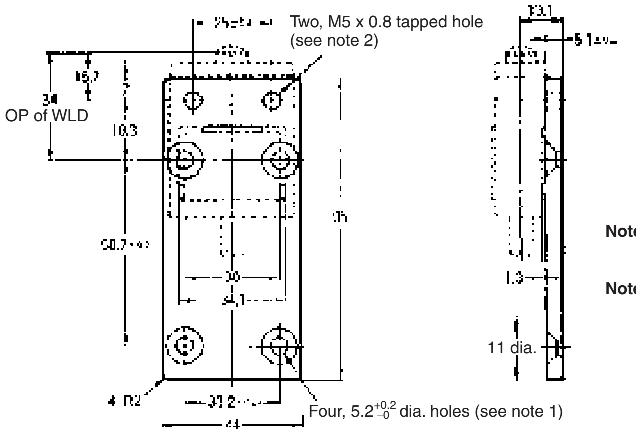


Limit switches

Special Mounting Plates (Plates are not provided with Limit Switches.)

D4C-P001

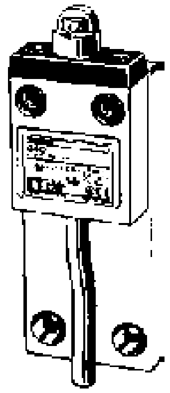


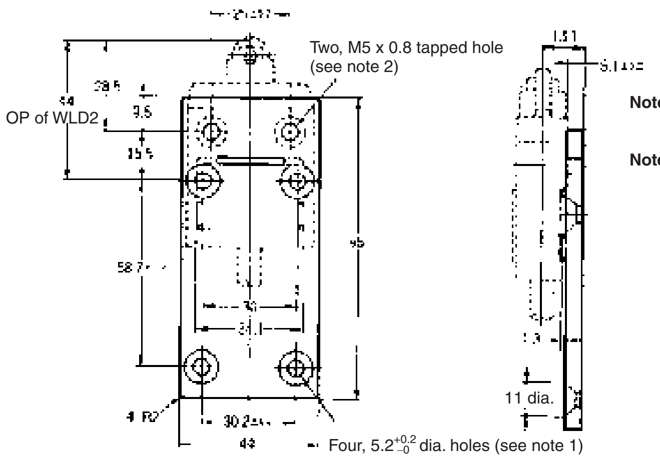


Note: Four, M5 x 0.8 hexagon pan-head bolts and two M5 x 0.8 Allen-head bolts are provided.

Note: **1.** Tighten the $5.2^{+0.2}_{-0}$ dia. holes with the M5 x 10 hexagon pan-head screws.
2. Insert the M5 Allen-head bolts into the M5 tapping holes to tighten the Mounting Plate securely.

D4C-P002

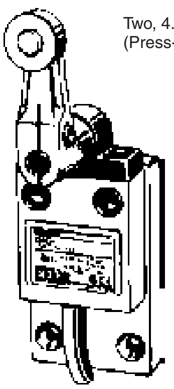


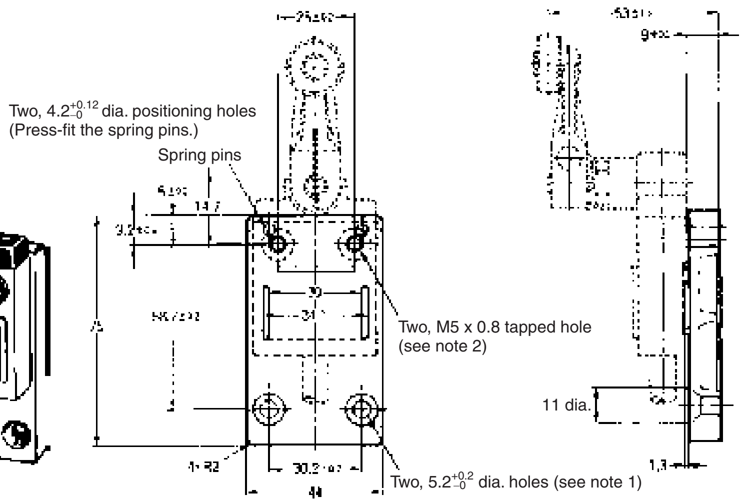


Note: Four, M5 x 0.8 hexagon pan-head bolts and two M5 x 0.8 Allen-head bolts are provided.

Note: **1.** Tighten the $5.2^{+0.2}_{-0}$ dia. holes with the M5 x 10 hexagon pan-head screws.
2. Insert the M5 Allen-head bolts into the M5 tapping holes to tighten the Mounting Plate securely.

D4C-P020





Note: Four, M5 x 0.8 hexagon pan-head bolts and two M5 x 0.8 Allen-head bolts are provided.

Note: **1.** Tighten the $5.2^{+0.2}_{-0}$ dia. holes with the M5 x 10 hexagon pan-head screws.
Four, M5 x 0.8 hexagon pan-head bolts, two M5 x 0.8 Allen-head bolts are provided, and two 4 x 14 spring pins are provided.
2. Insert the M5 Allen-head bolts into the M5 tapping holes to tighten the Mounting Plate securely.

Note: Each dimension has a tolerance of ±0.4 mm unless otherwise specified.

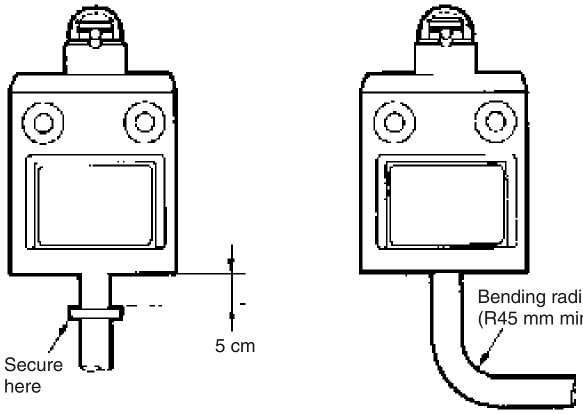
Precautions

■ Correct Use

Handling

The bottom of the Switch at the cable outlet is resin-molded. Secure the cable at a point 5 cm from the Switch bottom to prevent exertion of excess force on the cable.

When bending the cable, provide a bending radius of 45 mm min. so as not to damage the cable insulation or sheath. Excessive bending may cause fire or leakage current.



Connections

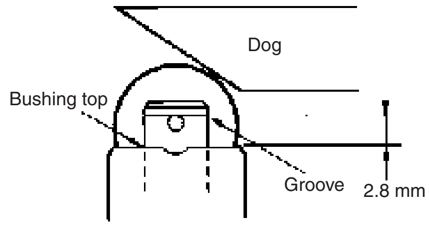
Be sure to connect a fuse with a breaking current 1.5 to 2 times larger than the rated current to the Limit Switch in series in order to protect the Limit Switch from damage due to short-circuiting.

When using the Limit Switch for the EN ratings, use the gI or gG 10-A fuse.

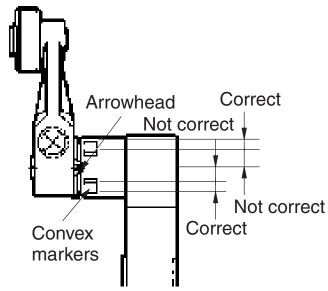
Operation

Operation method, shapes of cam and dog, operating frequency, and overtravel have a significant effect on the service life and precision of a Limit Switch. For this reason, the dog angle must be 30° max., the surface roughness of the dog must be 6.3S min. and hardness must be Hv400 to 500.

To allow the plunger-type actuator to travel properly, adjust the dog and cam to the proper setting positions. The proper position is where the plunger groove fits the bushing top.



To allow the roller lever-type actuator to travel properly, adjust the dog and cam so that the arrow head is positioned between the two convex markers as shown below.

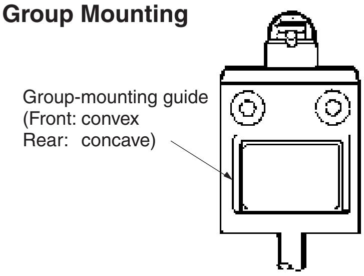


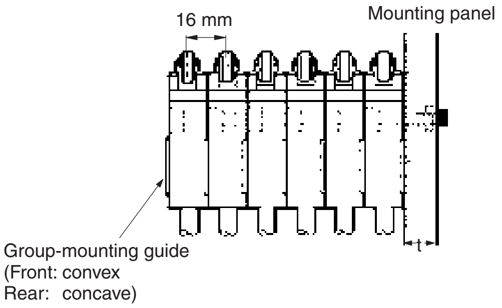
Limit switches

Mounting

A maximum of 6 Switches may be group-mounted. In this case, pay attention to the mounting direction so that the convex part of the group-mounting guide on one Switch fits into the concave part of the guide on the other Switch as shown in the figure below. For group mounting, the mounting panel must have a thickness (t) of 6 mm min.

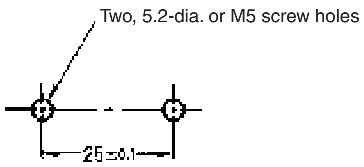
Group Mounting





If the mounting panel is warped or has protruding parts, a malfunction may result. Make sure that the mounting panel is not warped and has even surfaces.

Mounting Holes



Use a Switch with a rubber cap when using the plunger type in an environment where malfunction is possible due to environmental conditions such as dust or cutting chips which may not allow resetting.

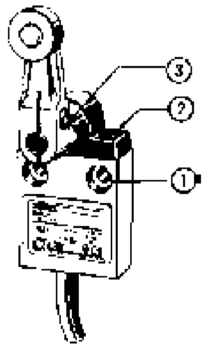
Do not expose the Switch to water exceeding 70°C or use it in steam.

When the D4C is used in a circuit of a device to be exported to Europe, classified as Overvoltage Class III as specified in IEC664, provide a contact protection circuit.

Tighten each screw to a torque according to the following table.

No.	Type	Torque
1	M5 Allen-head bolt	4.90 to 5.88 N·m
2	M3.5 head mounting screw	0.78 to 0.88 N·m
3	M5 Allen-head bolt	4.90 to 5.88 N·m

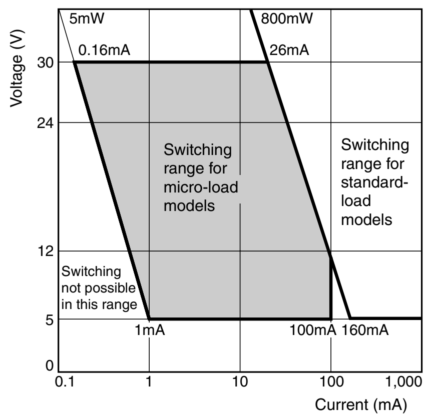
Note: By removing the two screws from the head, the head direction can be rotated 180°. After changing the head direction, re-tighten to the torque specified above. Be careful not to allow any foreign substance to enter the Switch.



Micro-load Models (D4C-4, -5, -6)

Switching Range

Micro-load models can be used for switching in the range shown below.



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. C032-E2-08 In the interest of product improvement, specifications are subject to change without notice.

Small Sealed Switch
D4E-□N

Slim and Compact Switch with Better Seal and Ensuring Longer Service Life than D4E

- Flat springs with an improved lever ratio of the built-in switch ensure smooth snap action and long life expectancy.
- Protection cover protects the built-in switch from dust and oil. Plunger incorporates a tough seal cap that lasts for a long time.
- One touch connector eliminates need for tedious wiring operations and reduces downtime for wiring and maintenance (models with standard, easy-to-use screw terminals are also available).
- Minute load model with gold cladding is optimal for electronic control.
- Molded terminal types as well as molded terminal types with operating indicator lamps are available for screw terminal systems.
- No difference in mounting pitch and characteristics between D4E-□N and D4E models.

Model Number Structure

■ Model Number Legend

D4E-□□□□□N
1 2 3 4

1. Rated Current

1: 5 A at 125 VAC
(1 A at 125 VAC/30 VDC for model with a connector)

2: 0.1 A at 125 VAC
(0.1 A at 125 VAC/30 VDC for model with a connector)

2. Actuator

A: Roller plunger
B: Crossroller plunger
C: Plunger
D: Sealed roller plunger
E: Sealed crossroller plunger
F: Sealed plunger
G: Roller lever
H: One-way action roller lever

3. Terminals

00: AC connector
10: DC connector
20: Screw terminals without a cable
21: Screw terminals with a cable (right-hand)
22: Screw terminals with a cable (left-hand)
23: Molded terminals with a cable (right-hand)
24: Molded terminals with a cable (left-hand)
(Cable is S-FLEX VCTF 3 m)

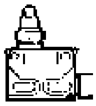
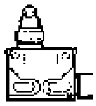
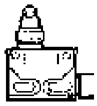
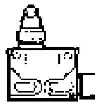
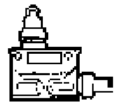
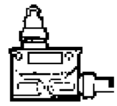
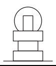
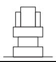
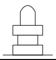
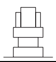
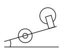
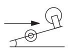
4. Operation Indicator

L: Neon lamp (250 VAC)
L1: LED (12 VDC)
L2: LED (24 VDC)
L3: LED (48 VDC)

Note: 1. Only the molded terminal models can be equipped with an operation indicator.
2. Desired Switches may not be manufactured depending on the combination between molds and indicators. Contact our sales representative for further information.

Ordering Information

■ List of Models

Actuator	One-touch connector type		Screw terminal type			
	General-purpose	Micro load	General-purpose without cable	Micro load without cable	General-purpose with cable	Micro load with cable
						
Roller plunger 	D4E-1A□0N	D4E-2A□0N	D4E-1A20N (see note 2)	D4E-2A20N	D4E-1A21N	D4E-2A21N
Crossroller plunger 	D4E-1B□0N	D4E-2B□0N	D4E-1B20N (see note 2)	D4E-2B20N	D4E-1B21N	D4E-2B21N
Plunger 	D4E-1C□0N	D4E-2C□0N	D4E-1C20N (see note 2)	D4E-2C20N	D4E-1C21N	D4E-2C21N
Sealed roller plunger 	D4E-1D□0N	D4E-2D□0N	D4E-1D20N (see note 2)	D4E-2D20N	D4E-1D21N	D4E-2D21N
Sealed crossroller plunger 	D4E-1E□0N	D4E-2E□0N	D4E-1E20N (see note 2)	D4E-2E20N	D4E-1E21N	D4E-2E21N
Sealed plunger 	D4E-1F□0N	D4E-2F□0N	D4E-1F20N (see note 2)	D4E-2F20N	D4E-1F21N	D4E-2F21N
Roller lever 	D4E-1G□0N	D4E-2G□0N	D4E-1G20N (see note 2)	D4E-2G20N	D4E-1G21N	D4E-2G21N
One-way action roller lever 	D4E-1H□0N	D4E-2H□0N	D4E-1H20N (see note 2)	D4E-2H20N	D4E-1H21N	D4E-2H21N

Note: 1. When ordering, specify the current type by replacing the blank box of the model number with 0 for AC connector or 1 for DC connector.

2. Approved by UL and CSA.

3. For the plunger and lever actuator models, the NC and NO terminal indicators are reversed.

4. Cold tolerance specifications are available for actuator models with an A, B, C, G, or H in the model number. When ordering, add C to the model number.
For example: D4E-1A20N → D4E-1A20N-C

Accessories (Order Separately)

Plug

Model	Current	Type	No. of conductors	Cable length	Applicable models
XS2F-A421-D90-A	AC	Straight	4	2 m	D4E-□□00N
XS2F-A421-G90-A				5 m	
XS2F-D421-D80A	DC			2 m	D4E-□□10N
XS2F-D421-G80-A				5 m	

Specifications

■ Approved Standards

Agency	Standard	File No.
UL	UL508	E76675
CSA	CSA C22.2 No. 14	LR45746
TÜV Rheinland	EN60947-5-1	R9551015

■ Approved Standard Ratings

UL, CSA

A300

Voltage	Carry current	Current		Volt-amperes	
		Make	Break	Make	Break
120 V	10 A	60 A	6 A	7,200 VA	720 VA
240 V		30 A	3 A		

TÜV (EN60947-5-1)

D4E- 1 G 23 L N
I II III IV

Model				Applicable category and ratings	Thermal current (I_{the})	Indicator
I	II	III	IV			
1	□	00		AC-14 0.5 A/125 VAC	5 A	---
1	□	10		DC-12 0.5 A/30 VDC	5 A	---
1	□	20, 21, 22		AC-15 2A/250 VAC DC-12 2A/48 VDC	5 A	---
1	□	23, 24	L	AC-15 2A/250 VAC	5 A	Neon lamp
1	□	23, 24	L1	DC-12 2A/12 VDC	5 A	LED
1	□	23, 24	L2	DC-12 2A/24 VDC	5 A	LED
1	□	23, 24	L3	DC-12 2A/48 VDC	5 A	LED
2	□	00		AC-14 0.1A/125 VAC	0.5 A	---
2	□	10		DC-12 0.1A/30 VDC	0.5 A	---
2	□	20, 21, 22		AC-14 0.1A/125 VAC DC-12 0.1A/48 VDC	0.5 A	---
2	□	23, 24	L	AC-14 0.1A/125 VAC	0.5 A	Neon lamp
2	□	23, 24	L1	DC-12 0.1A/12 VDC	0.5 A	LED
2	□	23, 24	L2	DC-12 0.1A/24 VDC	0.5 A	LED
2	□	23, 24	L3	DC-12 0.1A/48 VDC	0.5 A	LED

Note: 1. □: Actuator variation of item II

2. AC-14 0.5 A/125 VAC means as follows:
Applicable category: AC-14
Rated operating current (I_e): 0.5 A
Rated operating voltage (U_e): 125 VAC

Limit switches

■ Ratings

Rated voltage	General-purpose								Micro load	
	Non-inductive load				Inductive load				Non-inductive load	
	Resistive load		Lamp load		Inductive load		Motor load		Resistive load	
	NC	NO	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	5 (1) A		1.5 (1) A		3 (1) A		2 (1) A	1 (1) A	0.1 A	
250 VAC	5 (1) A		1.5 (1) A		3 (1) A		1 A	0.5 A	---	
8 VDC	5 (1) A		---		1.5 (1) A		---		0.1 A	
14 VDC	5 (1) A		---		1.5 (1) A		---		0.1 A	
30 VDC	5 (1) A		---		1.5 (1) A		---		0.1 A	
125 VDC	0.5 A		---		0.05 A		---		---	
250 VDC	0.25 A		---		0.03 A		---		---	

Inrush current	NC	10 A max.
	NO	10 A max.

Note: 1. The above current ratings are for a standard current and the values in parentheses are for models with a connector.
2. Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
3. Lamp load has an inrush current of 10 times the steady-state current.
4. Motor load has an inrush current of 6 times the steady-state current.

■ Characteristics

Degree of protection	IP67
Durability (see note 3)	Mechanical: 10,000,000 operations min. Electrical: 500,000 operations min. (5 A at 250 VAC, resistive load) 5,000,000 operations min. (10 mA at 24 VDC, resistive load)
Operating speed	0.1 mm to 0.5 m/sec
Operating frequency	Mechanical: 120 operations/min Electrical: 30 operations/min
Rated frequency	50/60 Hz
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	15 mΩ max. (initial value)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between terminals of same polarity 1,500 VAC, 50/60 Hz for 1 min/Uimp at 2.5 kV (EN60947-5-1) between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal part
Rated insulation voltage (Ui)	250 VAC
Switching overvoltage	1,000 VAC max. (EN60947-5-1)
Pollution degree (operating environment)	3 (EN60947-5-1)
Short-circuit protective device (SCPD)	10 A fuse (type gG or gI, IEC269 approved)
Conditional short-circuit current	100 A (EN60947-5-1)
Conventional enclosed thermal current (I_{the})	5 A (EN60947-5-1)
Protection against electric shock	Class II (grounding not required with double insulation)
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 min. Malfunction: 300 m/s^2 min.
Ambient temperature	Operating: –10°C to 80°C (with no icing)
Ambient humidity	Operating: 95% max.
Weight	Approx. 86 g (in case of roller plunger)

Note: 1. The above values are initial values.
2. The above ratings may vary depending on the model. Contact your OMRON representative for further details.
3. Durability values are calculated at an operating temperature of 5°C to 35°C, and an operating humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.

Operating Characteristics

Model	D4E-1A□□N D4E-2A□□N	D4E-1B□□N D4E-2B□□N	D4E-1C□□N D4E-2C□□N	D4E-1D□□N D4E-2D□□N	D4E-1E□□N D4E-2E□□N
OF max.	11.77 N	11.77 N	11.77 N	11.77 N	11.77 N
RF min.	4.90 N	4.90 N	4.90 N	4.90 N	4.90 N
PT max.	1.5 mm	1.5 mm	1.5 mm	1.5 mm	1.5 mm
OT min.	3 mm	3 mm	3 mm	3 mm	3 mm
MD (reference value)	(0.1 mm)	(0.1 mm)	(0.1 mm)	(0.1 mm)	(0.1 mm)
OP	31.4±0.8 mm	31.4±0.8 mm	25.4±0.8 mm	41.3±0.8 mm	41.3±0.8 mm

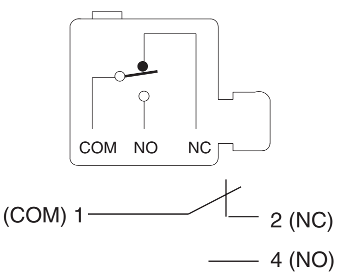
Model	D4E-1F□□N D4E-2F□□N	D4E-1G□□N D4E-2G□□N	D4E-1H□□N D4E-2H□□N
OF max.	11.77 N	3.92 N	3.92 N
RF min.	4.90 N	0.78 N	0.78 N
PT max.	1.5 mm	2 mm	2 mm
OT min.	3 mm	4 mm	4 mm
MD (reference value)	(0.1 mm)	(0.3 mm)	(0.3 mm)
OP	30±0.8 mm	23.1±0.8 mm	34.3±0.8 mm

Note: The values given in parentheses are reference values.

Contact Form

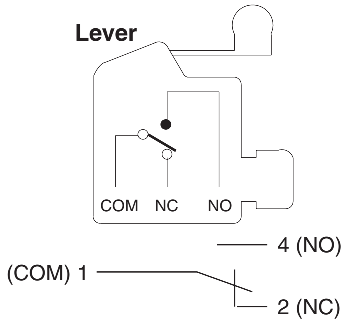
Screw Terminal Type

Plunger



EN60947-5-1

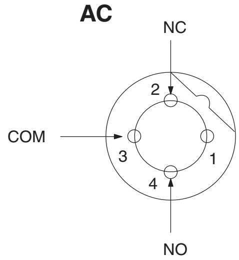
Lever



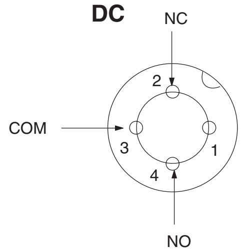
EN60947-5-1

Connector Type

AC



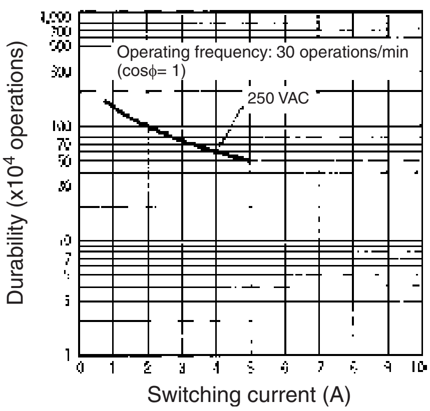
DC



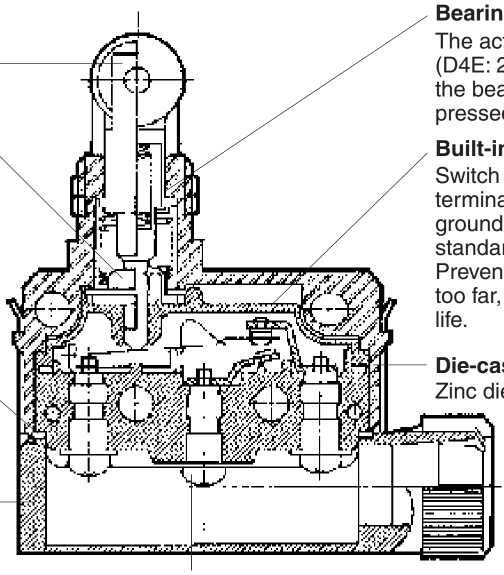
Engineering Data

Electrical Durability (cosϕ=1)

Operating temperature: 5°C to 30°C
Operating humidity: 40% to 70%.



Nomenclature



Movable Plunger

Rubber Cap (NBR)
Rubber cap provides a tight seal and ensures a long service life and smooth reset at low temperatures.

Seal Packing (NBR)
Seal packing withstands a pressure of 186 kPa (D4E's seal packing withstands a pressure of 98 kPa).

Terminal Protection Cover
D4E-□N has a wide wiring space of 10 mm horizontally (D4E has a space of 7.5 mm horizontally).

Bearing
The actuator strength has been increased to 4,903 N (D4E: 294 N) in order to prevent faulty resetting of the bearing, which may occur when the roller is pressed with excessive force.

Built-in Switch
Switch cover ensures high insulation between the terminals and die-cast. Double insulation means that grounding is unnecessary. Meets UL, CSA, and EN standards.
Prevents the movable piece from being pushed in too far, and thereby contributes to a longer service life.

Die-cast Case
Zinc die-cast case is anti-corrosive and tough.

Screw Terminal
Screw terminal incorporates a M3 screw with a toothed washer.

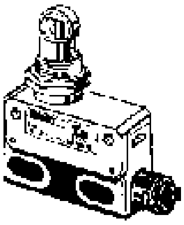
Wiring Ease
Wired made easier using (D4CC-type) plug-in connector.

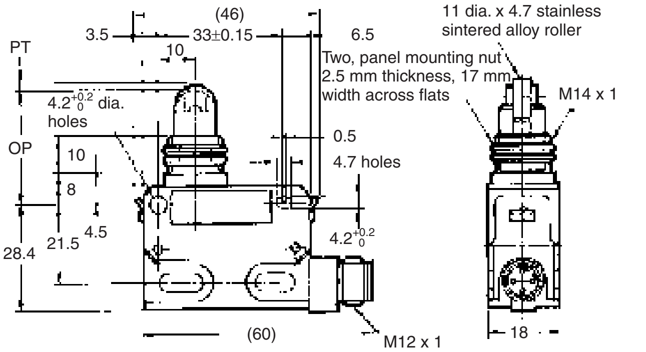
Dimensions

Note: 1. All units are in millimeters unless otherwise indicated.
2. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.
3. A 3-m lead wire cable equivalent to the 3-conductor VCTF S-FLEX cable (0.75 mm², 7 mm in dia.) is provided.
4. A 5.8- to 7.6-dia. cable can be applied to the seal rubber for the lead wire outlet.

Roller Plunger

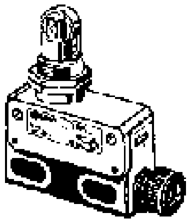
D4E-1A00N
D4E-1A10N
D4E-2A00N
D4E-2A10N

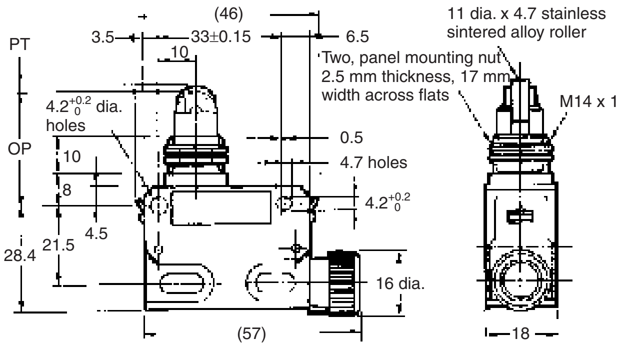




Roller Plunger

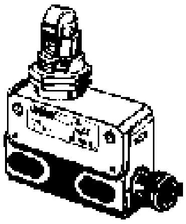
D4E-1A20N (See note 4.)
D4E-2A20N (See note 4.)
D4E-1A21N (See note 3.)
D4E-2A21N (See note 3.)

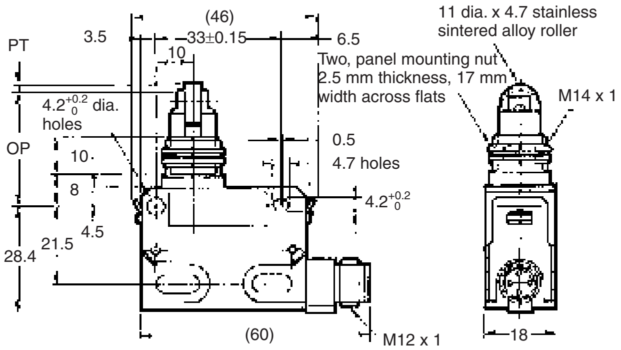




Cross Roller Plunger

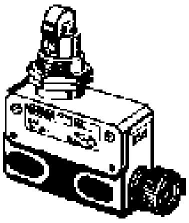
D4E-1B00N
D4E-1B10N
D4E-2B00N
D4E-2B10N

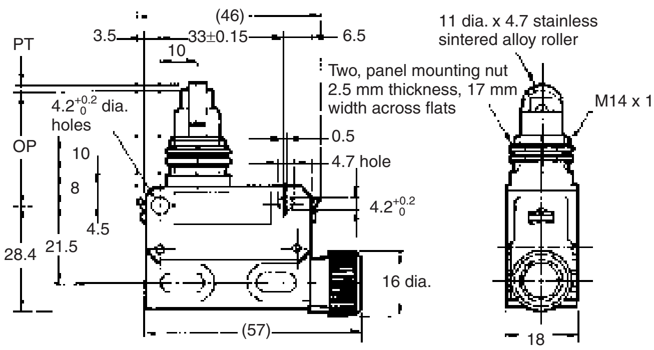




Cross Roller Plunger

D4E-1B20N
D4E-2B20N
D4E-1B21N
D4E-2B21N

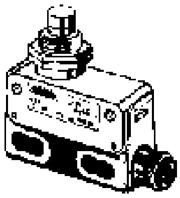


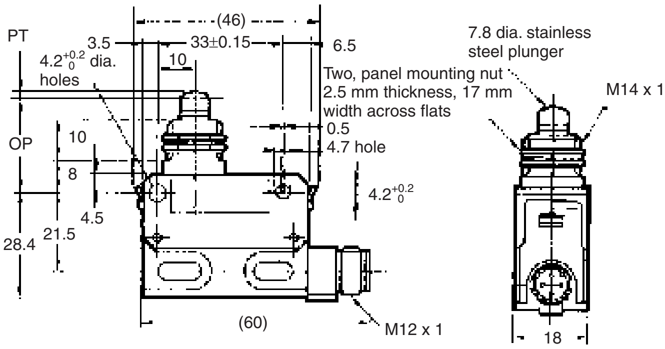


Limit switches

Plunger

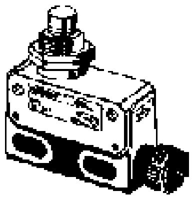
D4E-1C00N
D4E-1C10N
D4E-2C00N
D4E-2C10N

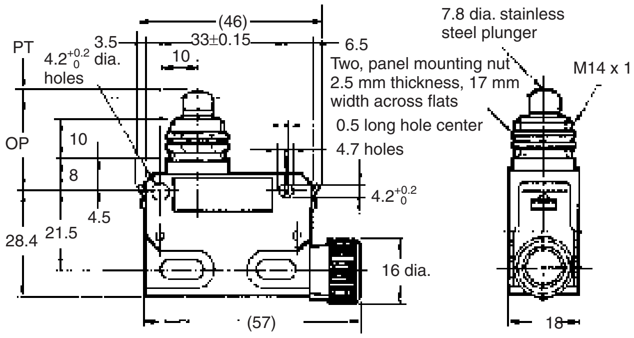




Plunger

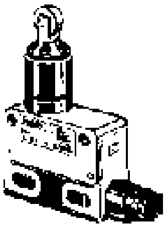
D4E-1C20N (See note 4.)
D4E-2C20N (See note 4.)
D4E-1C21N (See note 3.)
D4E-2C21N (See note 3.)

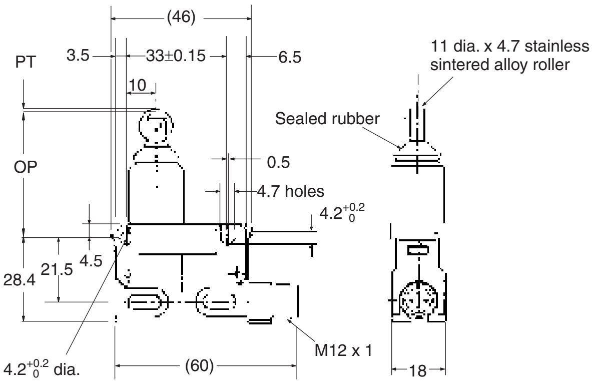




Sealed Roller Plunger

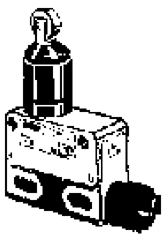
D4E-1D00N
D4E-1D10N
D4E-2D00N
D4E-2D10N

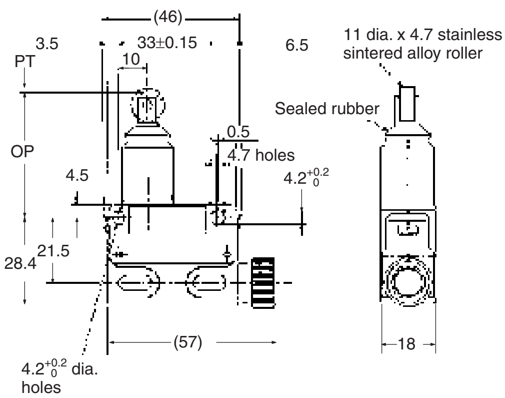




Sealed Roller Plunger

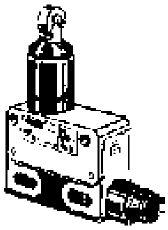
D4E-1D20N (See note 4.)
D4E-2D20N (See note 4.)
D4E-1D21N (See note 3.)
D4E-2D21N (See note 3.)

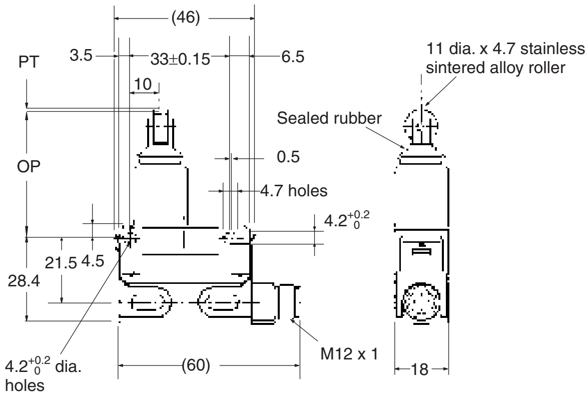




Sealed Cross Roller Plunger

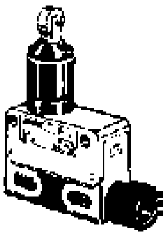
D4E-1E00N
D4E-1E10N
D4E-2E00N
D4E-2E10N

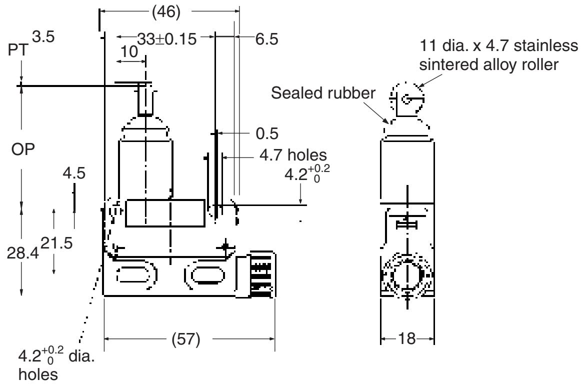




Sealed Cross Roller Plunger

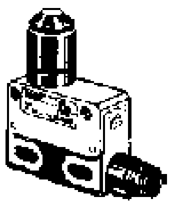
D4E-1E20N (See note 4.)
D4E-2E20N (See note 4.)
D4E-1E21N (See note 3.)
D4E-2E21N (See note 3.)

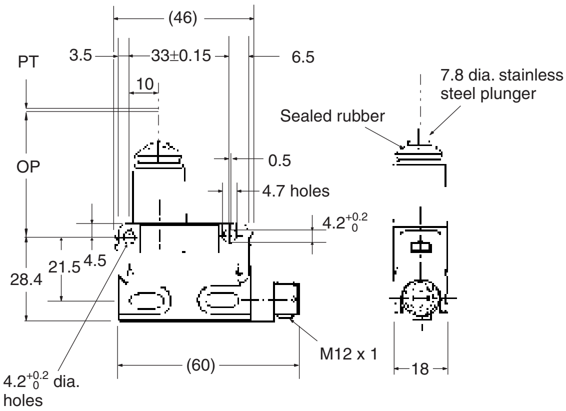




Sealed Plunger

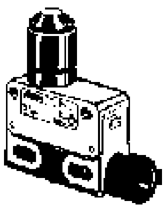
D4E-1F00N
D4E-1F10N
D4E-2F00N
D4E-2F10N

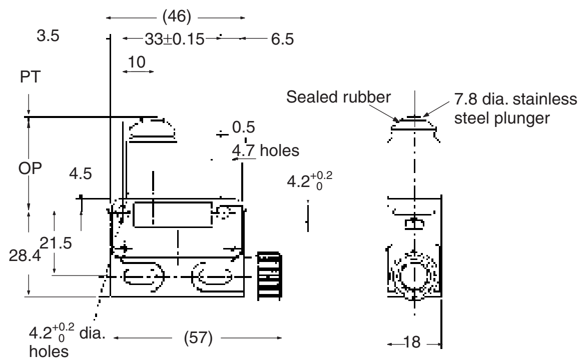




Sealed Plunger

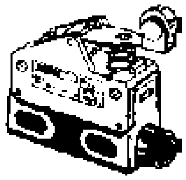
D4E-1F20N (See note 4.)
D4E-2F20N (See note 4.)
D4E-1F21N (See note 3.)
D4E-2F21N (See note 3.)

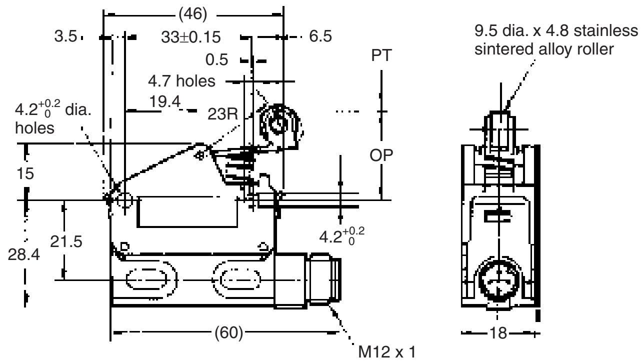




Roller Lever

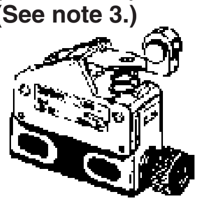
D4E-1G00N
D4E-1G10N
D4E-2G00N
D4E-2G10N

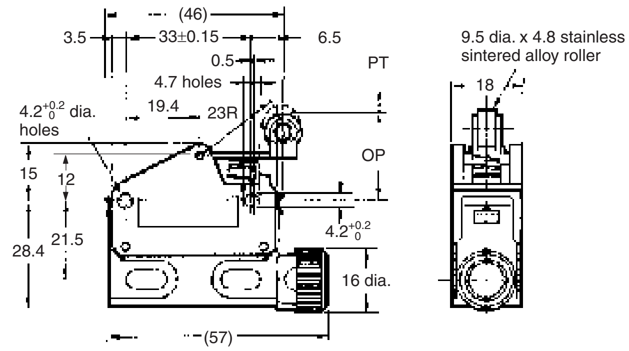




Roller Lever

D4E-1G20N (See note 4.)
D4E-2G20N (See note 4.)
D4E-1G21N (See note 3.)
D4E-2G21N (See note 3.)

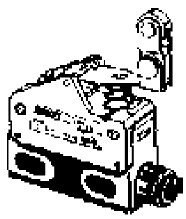


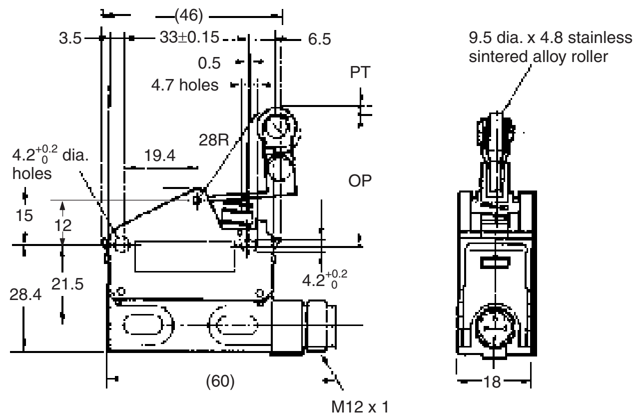


One-way Action Roller Lever

D4E-1H00N
D4E-1H10N
D4E-2H00N
D4E-2H10N

Operating direction

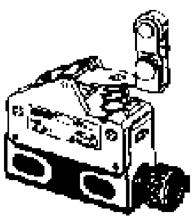


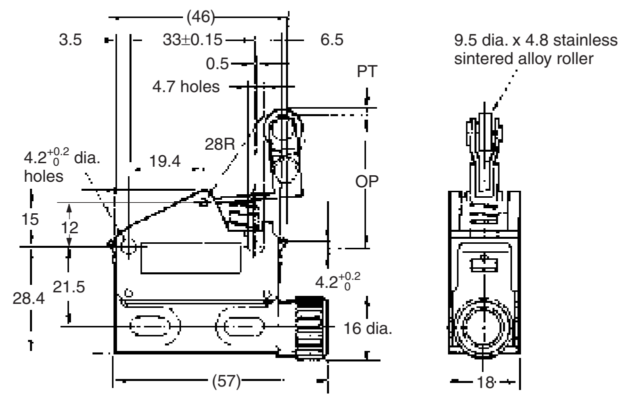


One-way Action Roller Lever

D4E-1H20N (See note 4.)
D4E-2H20N (See note 4.)
D4E-1H21N (See note 3.)
D4E-2H21N (See note 3.)

Operating direction

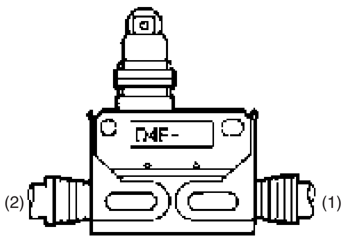




Molded Terminal Models

■ Molded Terminal Models

The molded-terminal model is available with right-hand, left-hand and underside leads and is recommended for use where the Switch is exposed to dust, oil or moisture. It can be used like a screw-terminal model (with a cable), and the dimensions and operating characteristics are the same as for standard models.



Example:
Standard type: D4E-1A20N
Location of lead output: Right-hand → D4E-1A23N

Suffix by Location of Lead Outlet

Location of lead output	Suffix for pre-wired terminal
	COM, NC, NO
(1) Right-hand	D4E-□□23N
(2) Left-hand	D4E-□□24N

Lead Supplies

Leads	Nominal cross-sectional area	Finished outside diameter	Terminal connections	Standard length
V.C.T.F. S-FLEX (vinyl cabtire coat)	0.75 mm²	3 conductors 7 mm dia.	Black: COM White: NO Red: NC	3 m

Comparison between Old and New Mold Terminal Models

The D4E-N and D4E are different from each other in terminal specifications.

Location of lead output	D4E-N	D4E
Right-hand	D4E-□□23N	D4E-□□21
Left-hand	D4E-□□24N	D4E-□□23
Underside	---	D4E-□□22

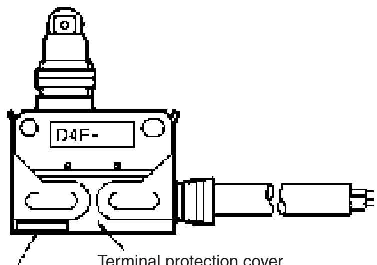
■ Operation of Indicator-equipped Models

The molded terminal model may be equipped with an operation indicator (neon lamp or LED) upon request to facilitate maintenance and inspection.

The operation indicator is designed to illuminate when the Switch is not operating. (Because of the molded terminal model, any change to the Switch wiring cannot be made.)

AC Operation

A neon lamp indicator is provided.
The operating voltage is 90 to 250 VAC.

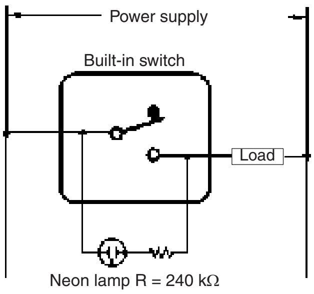


There is no difference in operating characteristics between D4E AC Models and corresponding D4E Standard Models.

There is no difference in dimensions between D4E AC Models and D4E Standard Models.

Example:
Basic type: D4E-1A23N
When placing your order for the molded terminal model with an neon lamp operation indicator, specify the model number as D4E-1A23LN.

Internal Circuit

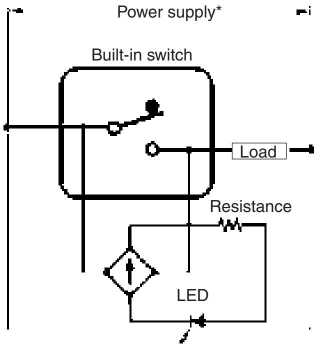


DC Operation

LED indicator is provided.
As a rectifier stack is incorporated, into the unit and no directionality exists for connection of + and –, this type can also be operated on AC.

Voltage ratings of LED indicators are as shown in the table below.

Internal Circuit



Note: *An external 24VDC power supply can be used, eg. OMRON S8VS.

Type	Voltage rating	Lamp current	Internal resistance
L1	12 V	Approx. 2.4 mA	4.3 kΩ
L2	24 V	Approx. 1.2 mA	18 kΩ
L3	48 V	Approx. 2.1 mA	22 kΩ

Example:
When ordering a D4E DC Model, add the following suffix to the model number.

Basic Model: The model number of the D4E-1A23N with a built-in 12-V LED indicator is D4E-1A23L1N.

Precautions

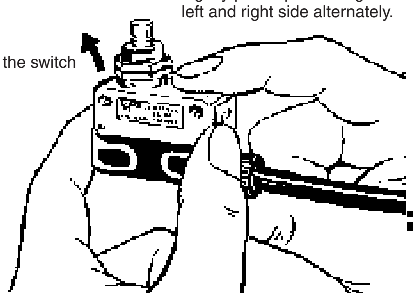
Refer to the *Technical Information for Limit Switches* (Cat. No. C121).

■ Correct Use

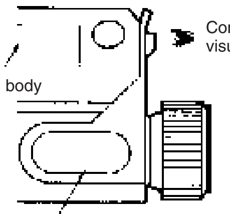
Do not solder the screw terminals.

Sealing materials may deteriorate when used outdoors or when exposed to cutting oil, solvents, or chemicals. Check this on actual equipment and, if deterioration is foreseen, consult your OMRON representative in advance.

If the one-touch connector is to be mounted onto the switch body, lightly push up the fitting so that the switch body can then be inserted into the clamp.



Be sure that the clamp is inserted to the full depth, because the Switch will not function properly if one of the clamps is improperly inserted.



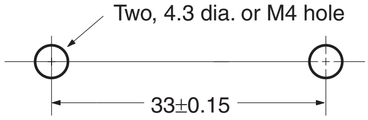
If the clamp is properly inserted up to the full depth, it will not slide out easily. Be sure to carefully confirm all the above items.

Be sure to connect a fuse with a breaking current 1.5 to 2 times the rated current to the Limit Switch in series in order to protect the Limit Switch from damage due to short-circuiting.
When using the Limit under the EN ratings, use a gI or gG 10-A fuse that conforms to IEC260.

Mounting

Secure the Switch with two M4 screws and washers. The tightening torque applied to each terminal must be 1.18 to 1.37 N·m. Tighten the screws to the specified torque. An excessive tightening torque may damage the Switch and cause a malfunction.

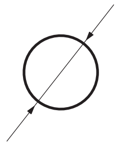
Mounting Holes



When mounting the panel mount-type Switch with screws on a side surface, remove the hexagonal nuts from the actuator.

When mounting the panel mount type on a panel, tighten the hexagonal nuts of the actuator to a torque less than 7.85 N·m.

Mounting Hole



Operating method, shape of cam or dog, operating frequency, and the overtravel (OT) have significant effect on the service life and precision of the Limit Switch. Make sure that the shape of the cam is smooth enough.

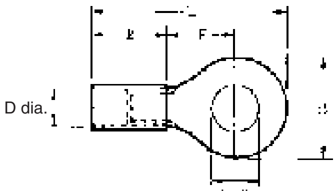
Check that OT has a sufficient margin. The actual OT should be rated OT x 0.7 to 1.

Do not change the operating position by remodeling the actuator.

Wiring

When wiring screw terminals, M3-size round solderless terminals with an insulation tube is recommended. The conductor size should be 0.75 mm^2 and cable diameter should be 7 mm.

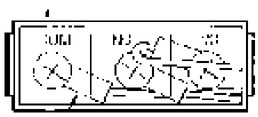
Refer to the following when wiring.



dz dia.:	3.2
D dia.:	1.9
B:	5.2
L:	16.4
F:	5.8
ℓ:	8.0 (mm)

Wiring Method

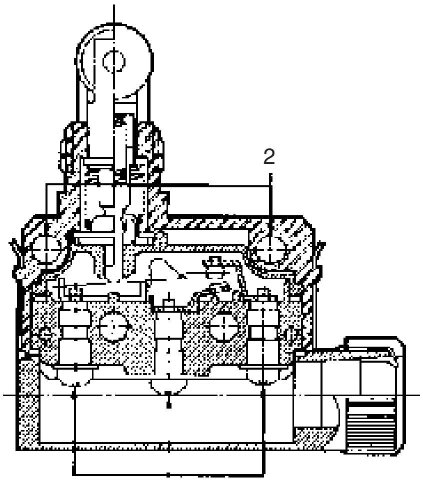
D4E-N



Tightening Torque

A loose screw may result in a malfunction. Be sure to tighten each screw to the proper tightening torque as shown below.

No.	Type	Torque
1	Terminal screw (M3)	0.24 to 0.44 N·m
2	Switch mounting screw (M4)	1.18 to 1.37 N·m



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. C028-E2-05

In the interest of product improvement, specifications are subject to change without notice.

Enclosed Switch D4MC

Economical, High Utility Enclosed Switch

- High precision and long life (10,000,000 mechanical operations) through employment of the moving spring used in OMRON Z Basic Switch.
- Sealed with gasket diaphragm to provide high sealing property without use of any adhesive or pin.
- Suitable for applications demanding higher mechanical strength, dustproof and drip-proof properties than those on basic switches.
- Panel mount versions have the same operating position as Z Basic Switch.
- Resin molded terminal versions are available.
- Approved by UL, CSA, and CCC (Chinese standard).

Model Number Structure

■ Model Number Legend

D4MC-☐
1

1. Actuator
5000: Panel mount plunger
5020: Panel mount roller plunger
5040: Panel mount crossroller plunger
1020: Short hinge lever
1000: Hinge lever
2000: Hinge roller lever
2020: Short hinge roller lever
3030: One-way action short hinge roller lever

Limit switches

Ordering Information

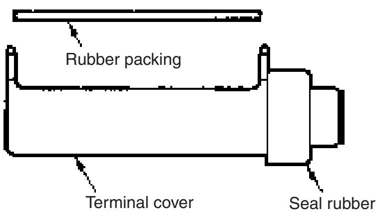
■ List of Models

Actuator	Model
Panel mount plunger	D4MC-5000
Panel mount roller plunger	D4MC-5020
Panel mount crossroller plunger	D4MC-5040
Short hinge lever	D4MC-1020
Hinge lever	D4MC-1000
Hinge roller lever	D4MC-2000
Short hinge roller lever	D4MC-2020
One-way action short hinge roller lever	D4MC-3030

Note: Use molded terminal models (refer to page 100) when using the Switch under one of the following conditions:
a) dusty, b) high amount of dripping oil, or c) high humidity

■ Terminal Protective Cover, Seal Rubber, and Rubber Packing

(The Switch is equipped with these 3 items as a standard.)



- ZC Terminal Cover
  (Product code: ZC55-0002H)
- ZC Seal Rubber
  (Product code: SC-1404C)
- ZC Rubber Packing
  (Product code: ZC55-0003F)

Specifications

■ Approved Standards (Except Molded Terminal Models)

Agency	Standard	File No.
UL	508	E76675
CSA	C22.2 No. 14	E45258
CCC (CQC)	GB14048.5	2003010303077627

Note: Ask your OMRON representative for information on approved models.

■ Approved Standard Ratings

UL/CSA

A300

Rated voltage	Carry current	Current		Volt-amperes	
		Make	Break	Make	Break
120 VAC	10 A	60 A	6 A	7,200 VA	720 VA
240 VAC		30 A	3 A		

EN60947-1 and EN60947-5-1

250 V, 10 A (AC12) (Tested by ASTA)

CCC (GB14048.5)

Applicable category and ratings
AC-12 10 A/250 VAC

■ General Ratings

Rated voltage	Non-inductive load				Inductive load			
	Resistive load		Lamp load		Inductive load		Motor load	
	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	10 A		3 A	1.5 A	10 A		5 A	2.5 A
250 VAC	10 A		2.5 A	1.25 A	10 A		3 A	1.5 A
480 VAC	3 A		1.5 A	0.75 A	2.5 A		1.5 A	0.75 A
8 VDC	10 A		3 A	1.5 A	6 A		5 A	2.5 A
14 VDC	10 A		3 A	1.5 A	6 A		5 A	2.5 A
30 VDC	6 A		3 A	1.5 A	5 A		5 A	2.5 A
125 VDC	0.5 A		0.4 A	0.4 A	0.05 A		0.05 A	0.05 A
250 VDC	0.25 A		0.2 A	0.2 A	0.03 A		0.03 A	0.03 A

Inrush current	NC	30 A max.
	NO	15 A max.

Note: 1. The above figures are for steady-state currents.

2. Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).

3. Lamp load has an inrush current of 10 times the steady-state current.

4. Motor load has an inrush current of 6 times the steady-state current.

5. The above ratings were tested under the following conditions.
Ambient temperature: 20±2°C
Ambient humidity: 65±5%
Operating frequency: 20 operations/min

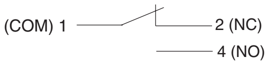
■ Characteristics

Degree of protection	IP67
Durability	Mechanical: 10,000,000 operations min. Electrical: 500,000 operations min.
Operating speed	0.05 mm/s to 0.5 m/s (for plunger models)
Operating frequency	Mechanical: 120 operations/min Electrical: 20 operations/min
Rated frequency	50/60 Hz
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	15 mΩ max. (initial value)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between terminals of the same polarity 2,000 VAC, 50/60 Hz for 1 min between current-carrying metal parts and ground, and between each terminal and non-current-carrying part
Rated insulation voltage (U_i)	1,000 VAC
Pollution degree (operating environment)	3 (IEC947-5-1)
Protection against electric shock	Class II
PTI (tracking characteristics)	175
Switch category	D (IEC335)
Rated operating current (I_e)	10 A
Rated operating voltage (U_e)	250 VAC
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note)
Shock resistance	Destruction: 1,000 m/s^2 min. Malfunction: 100 m/s^2 min. (for plunger models) (see note)
Ambient temperature	Operating: –10°C to 80°C (with no icing)
Ambient humidity	Operating: 35% to 95%
Weight	Approx. 71 g (at panel mount plunger)

Note: Less than 1 ms under a free state at the operating limits.

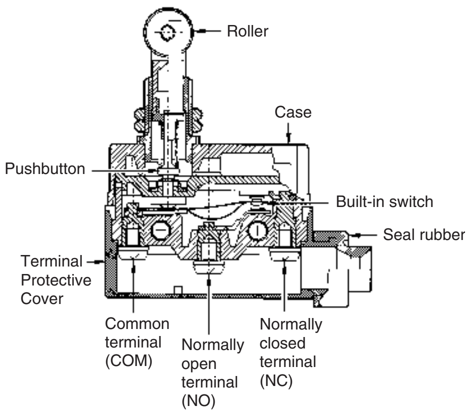
Connections

■ Contact Form



Nomenclature

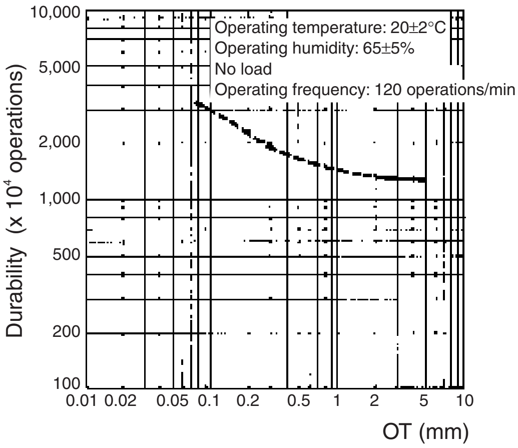
Changing the Terminal Protective Cover around allows the cable to be pulled out from either the right or the left.



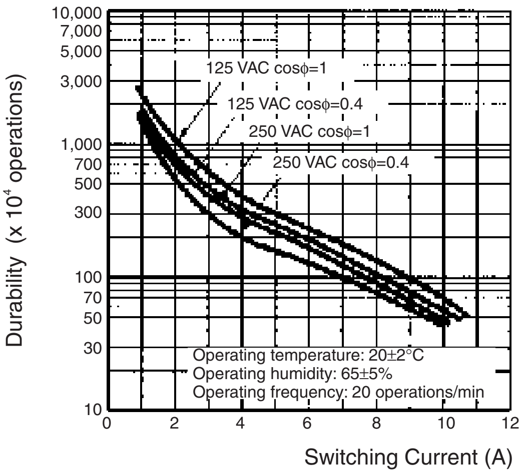
Note: M4 binding head screws (with toothed washers) are used as the terminal screws.

Engineering Data

■ Mechanical Durability (D4MC-5000)



■ Electrical Durability



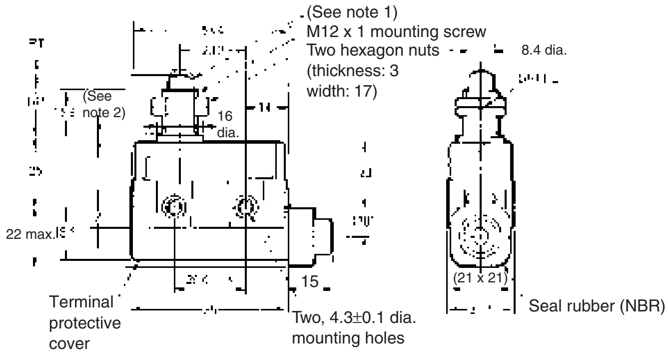
Limit switches

Dimensions

Note: 1. All units are in millimeters unless otherwise indicated.

2. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

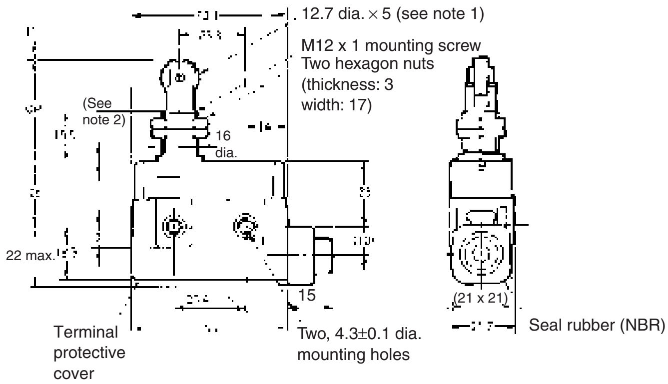
Panel Mount Plunger
D4MC-5000



Note: **1.** Stainless steel plunger
2. The length of the imperfect threads is 1.5 mm maximum.
3. Do not use the M12 mounting screw and the case mounting hole at the same time.

Model	D4MC-5000
OF max.	5.88 N
RF min.	0.98 N
PT max.	1.6 mm
OT min.	5 mm
MD max.	0.2 mm
OP	21.8± 1.2 mm
FP max.	---

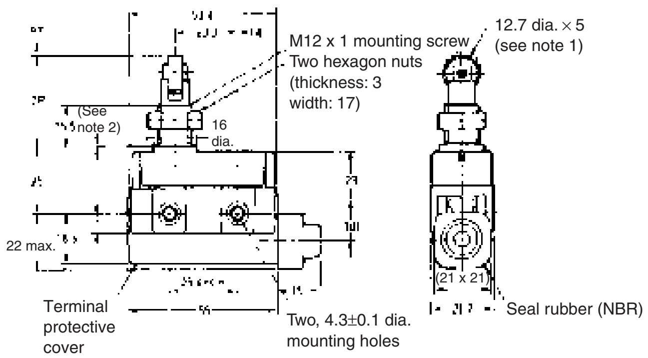
Panel Mount Roller Plunger
D4MC-5020



Note: **1.** Stainless steel roller
2. The length of the imperfect threads is 1.5 mm maximum.
3. Do not use the M12 mounting screw and the case mounting hole at the same time.

Model	D4MC-5020
OF max.	5.88 N
RF min.	0.98 N
PT max.	1.6 mm
OT min.	5 mm
MD max.	0.2 mm
OP	33.4±1.2 mm
FP max.	---

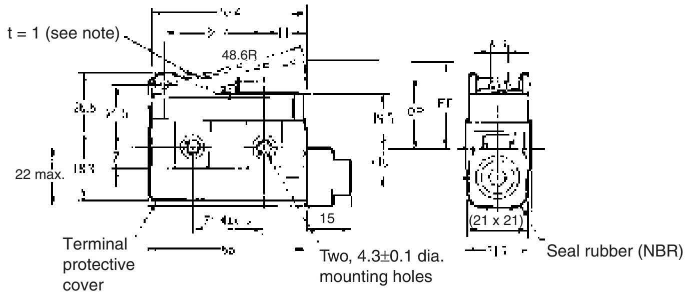
Panel Mount Crossroller Plunger
D4MC-5040



Note: **1.** Stainless steel roller
2. The length of the imperfect threads is 1.5 mm maximum.
3. Do not use the M12 mounting screw and the case mounting hole at the same time.

Model	D4MC-5040
OF max.	5.88 N
RF min.	0.98 N
PT max.	1.6 mm
OT min.	5 mm
MD max.	0.2 mm
OP	33.4±1.2 mm
FP max.	---

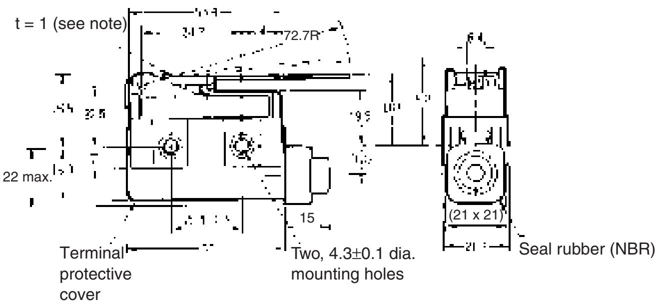
Short Hinge Lever
D4MC-1020



Note: Stainless steel lever

Model	D4MC-1020
OF max.	2.55 N
RF min.	0.34 N
PT max.	---
OT min.	2.5 mm
MD max.	1.7 mm
OP	25±1 mm
FP max.	33 mm

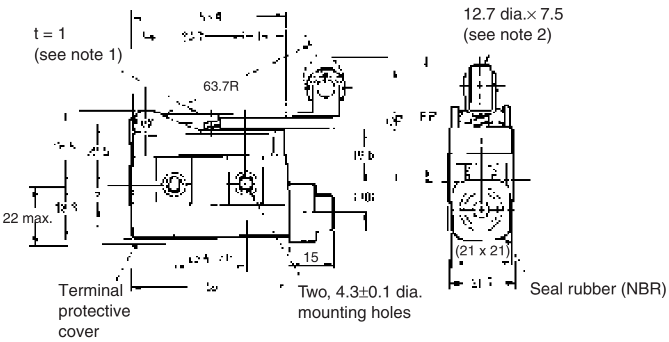
Hinge Lever
D4MC-1000



Note: Stainless steel lever

Model	D4MC-1000
OF max.	1.67 N
RF min.	0.25 N
PT max.	---
OT min.	4 mm
MD max.	3 mm
OP	25±1 mm
FP max.	36 mm

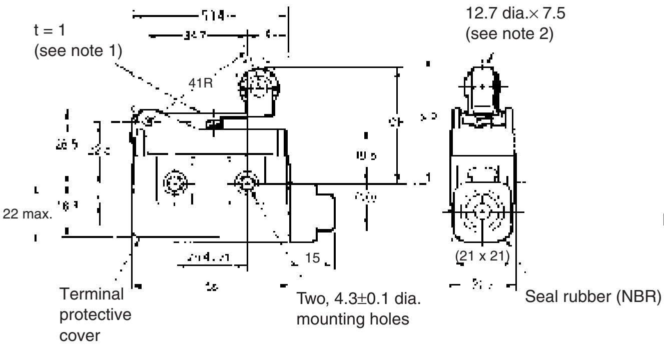
Hinge Roller Lever
D4MC-2000



Note: **1.** Stainless steel lever
2. Plastic roller

Model	D4MC-2000
OF max.	1.96 N
RF min.	0.39 N
PT max.	---
OT min.	5 mm
MD max.	3 mm
OP	40±1 mm
FP max.	51 mm

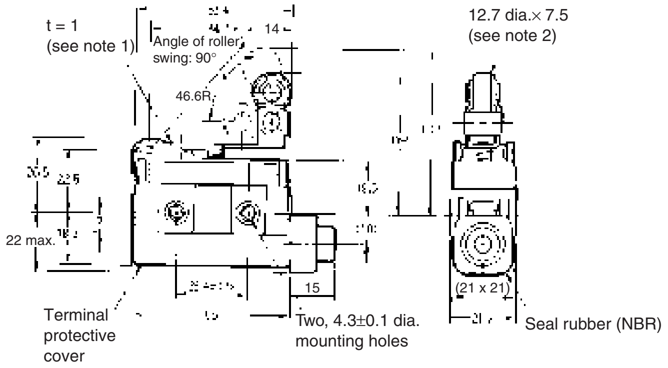
Short Hinge Roller Lever
D4MC-2020



Note: 1. Stainless steel lever
2. Plastic roller

Model	D4MC-2020
OF max.	2.94 N
RF min.	0.39 N
PT max.	---
OT min.	2 mm
MD max.	1.5 mm
OP	40±1 mm
FP max.	47 mm

One-way Action Short Hinge Roller Lever
D4MC-3030



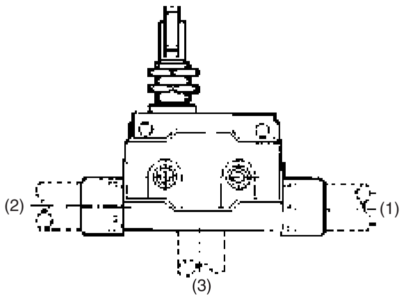
Note: 1. Stainless steel lever
2. Plastic roller

Model	D4MC-3030
OF max.	2.94 N
RF min.	0.39 N
PT max.	---
OT min.	2 mm
MD max.	1.5 mm
OP	50±1 mm
FP max.	57.2 mm

Molded Terminal Models

■ Molded Terminal Models

The molded terminal model is available with right-hand, left-hand and underside leads and is recommended for use where the Switch is exposed to dust, oil, or moisture.



When placing your order for the Switch specify the required length of V.C.T. cable in addition to the model number of the Switch

Example:
Standard type: D4MC-5020
Location of lead outlet: Underside
Length of lead: 1 m (V.C.T. lead)
When placing your order for the above Switch specify the model number as D4MC-5023 VCT 1M

Suffix by Location of Lead Outlet

Location of lead outlet	Model
	COM, NC, and NO
Right-hand	D4MC-□□□1
Left-hand	D4MC-□□□2
Underside	D4MC-□□□3

Leads Supplied

Leads	Nominal cross-sectional area	Finished outside diameter	Terminal connections	Standard length
V.C.T. (Vinyl cabtire cable)	1.25 mm²	3 core:10.5 mm dia.	Black: COM White: NO Red: NC	1, 3 m

Precautions

Refer to the *"Precautions for All Switches" on CD.*

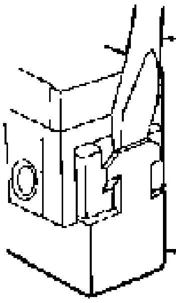
■ Correct Use

Operating

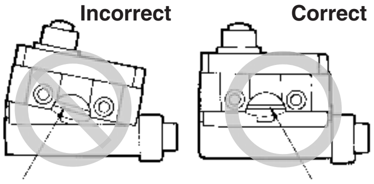
Excessive dog angle, operating speed, or overtravel (OT) may damage the actuator. Check that OT has a sufficient margin. The actual OT should be rated OT x 0.7 to 1.

Handling

- Do not expose the Switch to water exceeding 60°C or use it in steam.
- Do not use the Switch in oil or water.
- An 8.5- to 10.5-dia. cable can be applied as seal rubber for the lead wire outlet. (Use two- or three-core cable of VCT1.25 mm^2.)
- When detaching the Terminal Protective Cover, insert a screwdriver and apply a force in the opening direction. Do not use excess force to remove the cover. Doing so may cause deformation in the fitting section and reduce the holding force.



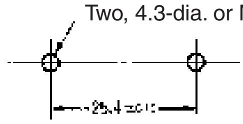
When mounting the Terminal Protective Cover to the case, align the cover on the case and then press the cover down to mount it firmly. If the cover is pressed down in an inclined position, rubber packing will deform and thus affect the sealing capability.



Mounting

When mounting the Switch with screws on a side surface, fasten the Switch with M4 screws and use washers, spring washers, etc., to ensure secure mounting.

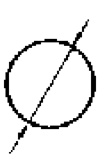
Mounting Holes



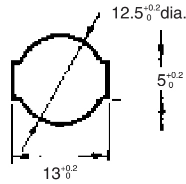
- When mounting the Panel Mount-type Switch (D4MC-5000, D4MC-5020, or D4MC-5040) with screws on a side surface, remove the hexagonal nuts from the actuator.
- When mounting the panel mount type on a panel, be careful not to tighten to an excessive torque. Tightening the screws to a torque exceeding 4.91 N·m will cause the plunger to fail.

Mounting Hole Dimensions

D4MC-5000



D4MC-5020, D4MC5040



Correct Tightening Torque

A loose screw may cause malfunctions. Be sure to tighten each screw to the proper tightening torque as shown in the table.

No.	Type	Torque
1	Terminal screw	0.78 to 1.18 N·m
2	Panel mounting screw	2.94 to 4.92 N·m
3	Side mounting screw	1.18 to 1.47 N·m

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. C027-E2-09

In the interest of product improvement, specifications are subject to change without notice.

Enclosed Switch
SHL

Subminiature Enclosed Switch (Measuring 48 x 17.5 x 45 mm) with High Sealing Property

- Built-in coil spring type basic switch housed in rigid zinc diecast alloy casting boasts long life and high precision.
- Requires nearly the same operating force as conventional basic precision switches (2.35 to 3.92 N).
- Molded terminal model is available.
- Operation indicator model is also available.

Model Number Structure

■ Model Number Legend

Standard Models

SHL-□55-□
1 2

1. Actuator

D: Plunger
Q: Panel mount plunger
Q22: Panel mount roller plunger
Q21: Panel mount crossroller plunger
W: Short hinge lever
W1: Hinge lever
W2: Short hinge roller lever
W21: Hinge roller lever
W3: One-way action short hinge roller lever
W31: One-way action hinge roller lever

2. Rated Current

None: Standard
01: Micro Load

Note: Refer to page 110 for *Molded Terminal Models.*

Limit switches

Ordering Information

■ List of Models

Actuator	Standard model	Micro voltage
Plunger	SHL-D55	SHL-D55-01
Panel mount plunger	SHL-Q55	SHL-Q55-01
Panel mount roller plunger	SHL-Q2255	SHL-Q2255-01
Panel mount crossroller plunger	SHL-Q2155	SHL-Q2155-01
Short hinge lever	SHL-W55	SHL-W55-01
Hinge lever	SHL-W155	SHL-W155-01
Short hinge roller lever	SHL-W255	SHL-W255-01
Hinge roller lever	SHL-W2155	SHL-W2155-01
One-way action short hinge roller lever	SHL-W355	SHL-W355-01
One-way action hinge roller lever	SHL-W3155	SHL-W3155-01

Specifications

■ Approved Standards

Agency	Standard	File No.
UL	UL508	E76675
CSA	CSA C22.2 No. 14	LR45746
TÜV Rheinland	EN60947-5-1	R9451332

■ Approved Standard Ratings

UL/CSA

A300

Rated voltage	Carry current	Current		Volt-amperes	
		Make	Break	Make	Break
120 VAC	10 A	60 A	6 A	7,200 VA	720 VA
240 VAC		30 A	3 A		

TÜV Rheinland Approved Ratings (EN60947-5-1)

Model	Category and rating	I the
SHL-□55	AC-15 2 A/125 V DC-12 2 A/48 V	5 A 4 A
SHL-□55-01	AC-14 0.1 A/125 V DC-12 0.1 A/48 V	0.5 A 0.5 A
SHL-□55-L	AC-15 2 A/125 V	5 A
SHL-□55-01L	AC-14 0.1 A/125 V	0.5 A
SHL-□55-01L2	DC-12 0.1 A/12 V	0.5 A
SHL-□55-L3	DC-12 2 A/24 V	4 A
SHL-□55-01L3	DC-12 0.1 A/24 V	0.5 A
SHL-□55-L4	DC-12 2 A/24 V	4 A
SHL-□55-01L4	DC-12 0.1 A/24 V	0.5 A
SHL-□55-L5	DC-12 2 A/48 V	4 A
SHL-□55-01L5	DC-12 0.1 A/48 V	0.5 A

Note: For details on the above models, refer to *Model Number Legend* under *Molded Terminal Models*.

■ Ratings

Rated voltage	Non-inductive load				Inductive load				Inrush current	
	Resistive load		Lamp load		Inductive load		Motor load			
	NC	NO	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	10 A		1.5 A		3 A		2.5 A		15 A max.	
250 VAC	10 A		1.5 A		2 A		1.5 A			
480 VAC	2 A		---		---		---			
8 VDC	10 A		2 A		5 A		2 A			
14 VDC	10 A		2 A		5 A		2 A			
30 VDC	5 A		1.5 A		1.5 A		1.5 A			
125 VDC	0.4 A		0.4 A		0.05 A		0.05 A			
250 VDC	0.2 A		0.2 A		0.03 A		0.03 A			

Note: 1. The above figures are for steady-state currents.
2. Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
3. Lamp load has an inrush current of 10 times the steady-state current.
4. Motor load has an inrush current of 6 times the steady-state current.

Micro Voltage/Current Load Model

Rated voltage	Non-inductive load	
	Resistive load	
	NC	NO
125 VAC	0.1 A	
8 VDC	0.1 A	
14 VDC	0.1 A	
30 VDC	0.1 A	

Characteristics

Degree of protections (see note 3)	IP67 (EN60947-5-1)
Durability (see note 4)	Mechanical: 10,000,000 operations min. Electrical: 500,000 operations min.
Operating speed	0.1 mm to 0.5 m/s (hinge lever models)
Operating frequency	Mechanical: 120 operations/min Electrical: 30 operations/min
Rated frequency	50/60 Hz
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	15 mΩ max.(initial value)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between terminals of the same polarity 2,000 VAC, 50/60 Hz for 1 min/Uimp at 2.5 kV (EN60947-5-1) between current-carrying metal part and ground, and between each terminal and non-current-carrying metal part
Rated insulation voltage (U_i)	150 V (EN60947-5-1)
Switching overvoltage	1,000 VAC max., 300 VDC max. (EN60947-5-1)
Pollution degree (operating environment)	3 (EN60947-5-1)
Short-circuit protective device (SCPD)	10 A fuse type gG (IEC269)
Conditional short-circuit current	100 A (EN60947-5-1)
Conventional enclosed thermal current (I_{the})	5 A (EN60947-5-1)
Protection against electric shock	Class II (grounding not required with double insulation)
OFF reverse voltage	1,000 VAC max., 300 VDC max. (EN60947-5-1)
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 min. Malfunction: 300 m/s^2 min.
Ambient temperature	Operating: –10°C to 80°C (no icing)
Ambient humidity	Operating: 95% max.
Weight (see note 5)	Approx. 62 to 72 g

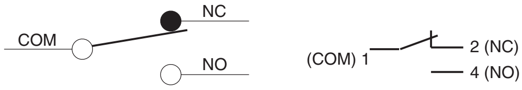
Note: 1. The above figures are for standard currents.
2. The above ratings may vary depending on the model. Contact your OMRON representative for further details.
3. The head section of the plunger type SHL-D(Q)□□ is excluded.
4. Durability values are calculated at an operating temperature of 5°C to 35°C, and an operating humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.
5. The values are for the plunger-type models.

Operating Characteristics

Model	SHL-D55 SHL-D55-01	SHL-Q55 SHL-Q55-01	SHL-Q2255 SHL-Q2255-01	SHL-Q2155 SHL-Q2155-01	SHL-W55 SHL-W55-01
OF max.	9.81 N	9.81 N	9.81 N	9.81 N	3.14 N
RF min.	1.96 N	1.96 N	1.96 N	1.96 N	0.78 N
PT max.	1.5 mm	1.5 mm	1.5 mm	1.5 mm	8 mm
OT min.	2 mm	2 mm	2 mm	2 mm	3 mm
MD max.	0.5 mm	0.5 mm	0.5 mm	0.5 mm	2.5 mm
OP	34±0.8 mm	34±0.8 mm	43±0.8 mm	43±0.8 mm	21.5±1 mm
FP max.	---	---	---	---	29.5 mm

Model	SHL-W155 SHL-W155-01	SHL-W255 SHL-W255-01	SHL-W2155 SHL-W2155-01	SHL-W355 SHL-W355-01	SHL-W3155 SHL-W3155-01
OF max.	2.35 N	3.92 N	2.55 N	3.92 N	2.55 N
RF min.	0.44 N	0.78 N	0.49 N	0.78 N	0.49 N
PT max.	13 mm	8 mm	13 mm	8 mm	13 mm
OT min.	5 mm	3 mm	5.5 mm	3 mm	5.5 mm
MD max.	4 mm	2.5 mm	4 mm	2.5 mm	4 mm
OP	21.5±1 mm	33±1 mm	33.5±1 mm	44.5±1 mm	44.5±1 mm
FP max.	34.5 mm	41 mm	46.5 mm	52.5 mm	57.5 mm

Contact Form

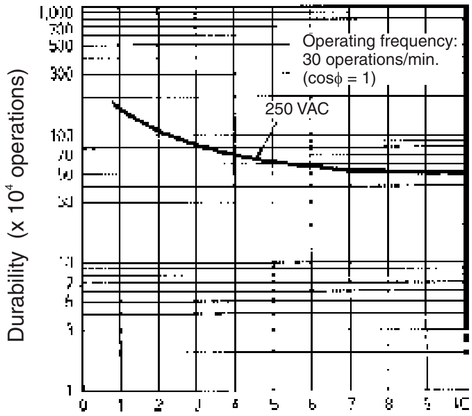


EN60947-5-1

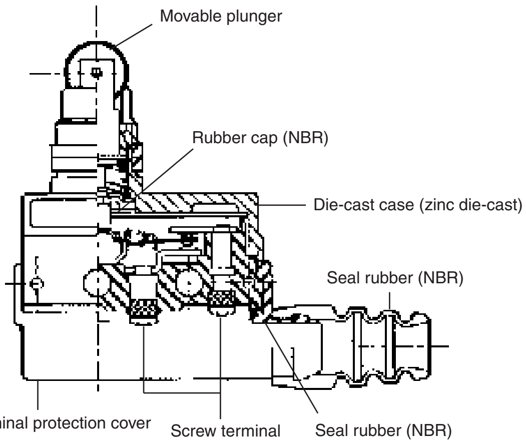
Engineering Data

Electrical Durability

Ambient temperature: 5˚C to 35˚C
Ambient humidity: 40% to 50%



Nomenclature

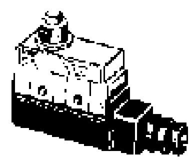


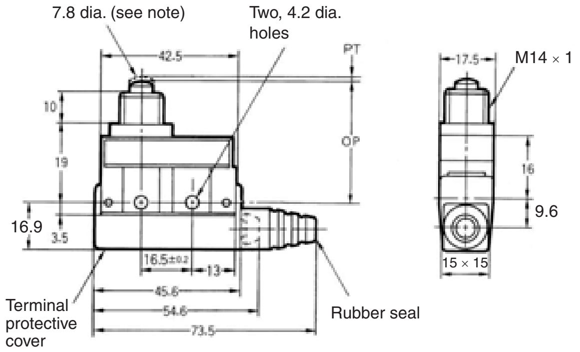
Dimensions

Note: 1. All units are in millimeters unless otherwise indicated.

2. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

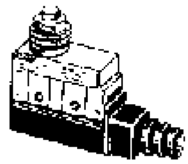
Plunger
SHL-D55, SHL-D55-01

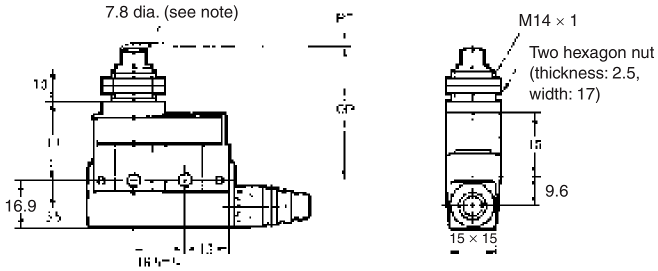




Note: Stainless steel pin plunger

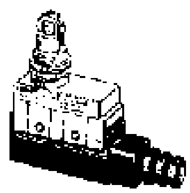
Panel Mount Plunger
SHL-Q55, SHL-Q55-01

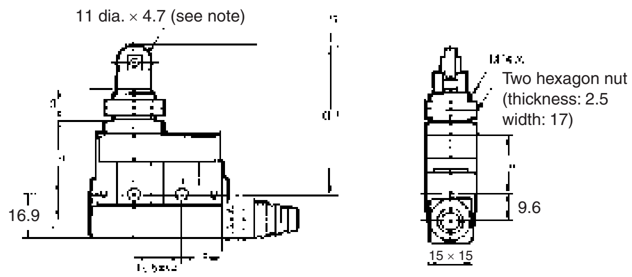




Note: Stainless steel pin plunger

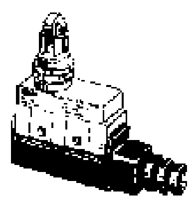
Panel Mount Roller Plunger
SHL-Q2255, SHL-Q2255-01

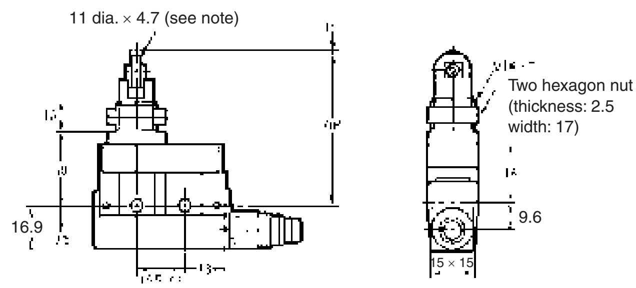




Note: Stainless sintered alloy roller

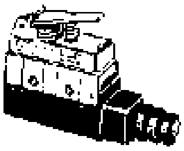
Panel Mount Crossroller Plunger
SHL-Q2155, SHL-Q2155-01

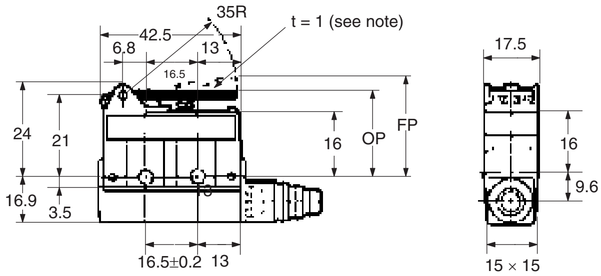




Note: Stainless sintered alloy roller

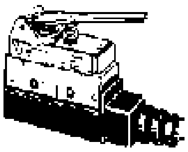
Short Hinge Lever
SHL-W55, SHL-W55-01

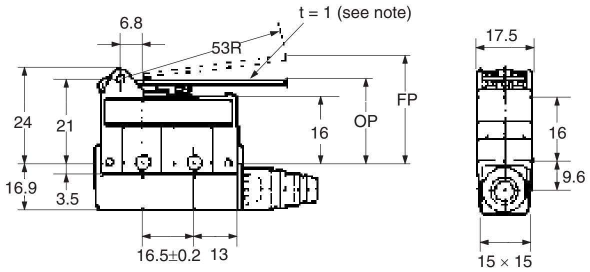




Note: Stainless steel lever

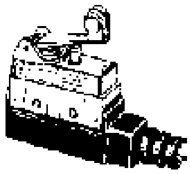
Hinge Lever
SHL-W155, SHL-W155-01

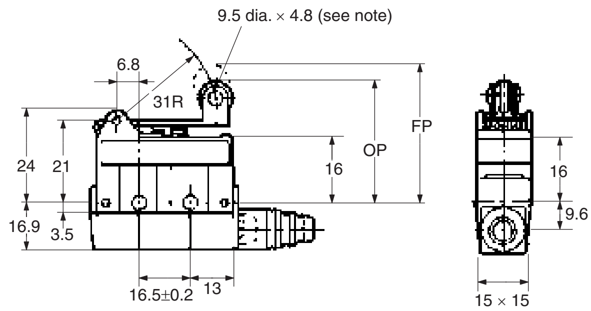




Note: Stainless steel lever

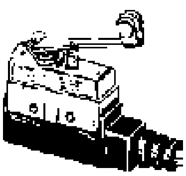
Short Hinge Roller Lever
SHL-W255, SHL-W255-01

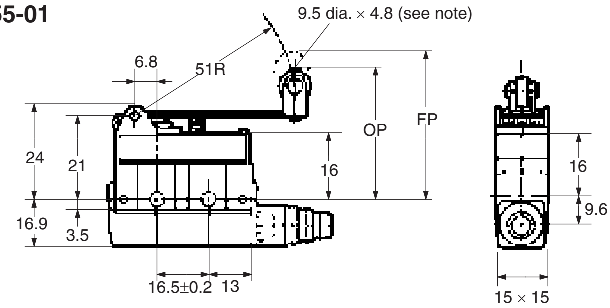




Note: Sintered stainless roller

Hinge Roller Lever
SHL-W2155, SHL-W2155-01

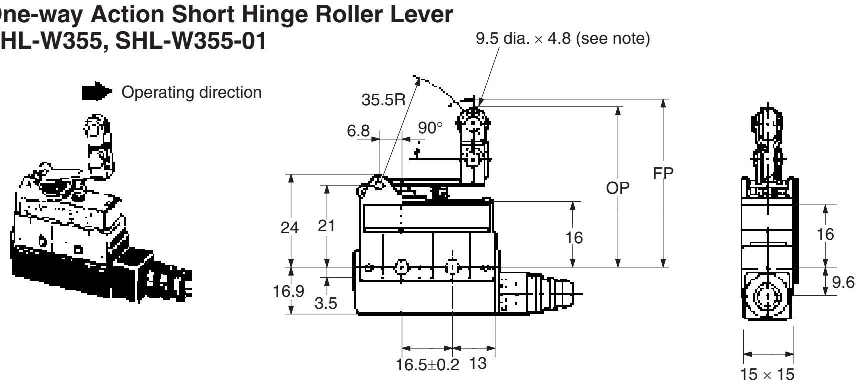




Note: Sintered stainless roller

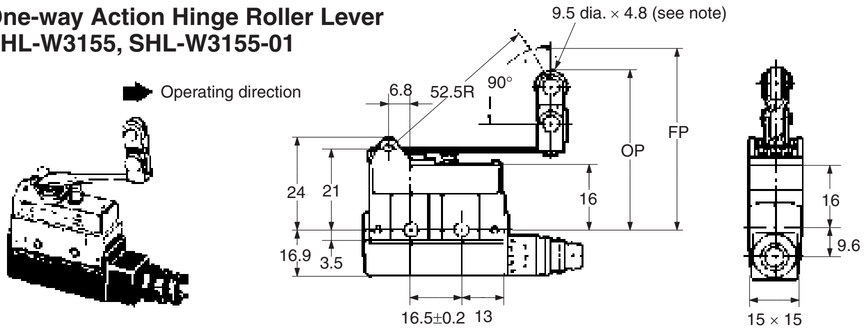
Limit switches

One-way Action Short Hinge Roller Lever
SHL-W355, SHL-W355-01



Note: Stainless sintered roller

One-way Action Hinge Roller Lever
SHL-W3155, SHL-W3155-01



Note: Stainless sintered roller

Molded Terminal Models

■ Model Number Legend

Molded Terminal Models

SHL-□55-□□M□
1 2 3 4

Items 1 (Actuator) and 2 (Rated Current) are the same as those in *Standard Models*.

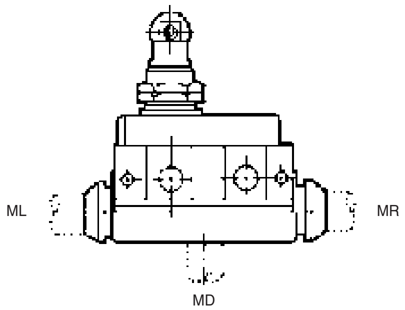
3. Operation Indicator

None: Not provided
L: Neon Lamp: 90 to 250 VAC
L2: LED: 12 V
L3: LED: 24 V
L4: LED: 24 V
L5: LED: 48 V

4. Location of Lead Outlet

R: Right-hand
L: Left-hand
D: Underside

Use of the molded terminal model is recommended in locations subject to excessive dust, oil drips, or moisture.
All types of SHL Switches can be fabricated into a molded terminal version. In this case, the molded terminal model will have the same dimensions an operating characteristics as the basic model from which the molded terminal model is fabricated.



Note: Three leads (COM, NO, and NC) are provided for terminal connections.

Example:
Basic type: SHL-Q2255
Location of lead outlet: Right-hand
When placing your order for the above Switch specify the model number as SHL-Q2255-MR

Suffix by Location of Lead Outlet

Location of lead outlet	Model
Right-hand	SHL-□-MR
Left-hand	SHL-□-ML
Underside	SHL-□-MD

Lead Supplies

Leads	Nominal cross-sectional area	No. of conductors/ cond. dia.	Finished outside diameter	Terminal connections	Standard length
VCTF (Vinyl cabtire cable)	0.75 mm^2	30/0.18 dia.	3-core 7 dia.	Black: COM White: NO Red: NC	3 m

■ Operation Indicator-equipped Models

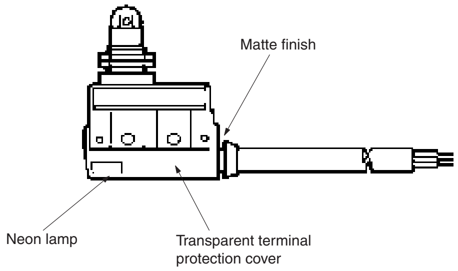
UL, CSA and/or EN (IEC) approved models are available.

The molded terminal model may be equipped with an operation indicator (neon lamp or LED) upon request to facilitate maintenance and inspection.

The operation indicator is designed to illuminate when the Switch is not operating. (Because of the molded terminal model, any change to the Switch wiring cannot be made.)

AC Operation

A neon lamp indicator is provided.
The operating voltage is 90 to 250 VAC.

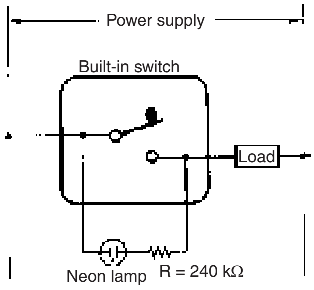


Operating characteristics are the same as the basic model from which the operation indicator equipped model is fabricated.

Dimension are the same as the standard model.

Example:
Basic type: SHL-Q2255-01MR
When placing your order for the molded terminal model with an neon lamp operation indicator, specify the model number as SHL-Q2255-01LMR.

Contact Circuit



DC Operation

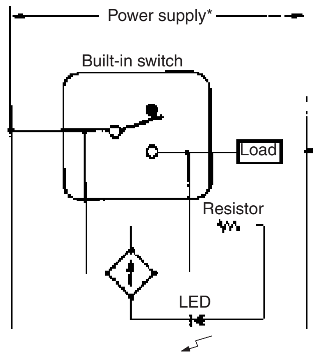
LED indicator is provided.
As a rectifier stack is incorporated, into the unit and no directionality exists for connection of + and –, this type can also be operated on AC.

Voltage ratings of LED indicators are as shown in the table below.

The Switch case has a protrusion to facilitate visual confirmation of LED indicator.

Example:
Basic type: SHL-Q2255-01MR
When placing your order for the molded terminal with an LED indicator rated at 12 V, specify the model number as SHL-Q2255-01L2MR.

Contact Circuit



*An external power supply can be used, eg. OMRON S8VS or S82K.

Type	Voltage rating	Lamp current	Internal resistance
L2	12 V	Approx. 2.4 mA	4.3 kΩ
L3	24 V	Approx. 2 mA	10 kΩ
L4	24 V	Approx. 1.2 mA	18 kΩ
L5	48 V	Approx. 2.1 mA	22 kΩ

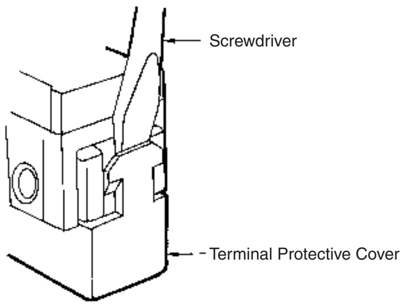
Precautions

■ Correct Use

Be sure to connect a fuse with a breaking current 1.5 to 2 times the rated current to the Limit Switch in series in order to protect the Limit Switch from damage due to short-circuiting.
When using the Limit under the EN ratings, use a gI or gG 10-A fuse that conforms to IEC260.

Handling

When detaching the Terminal Protective Cover, insert a screwdriver and apply a force in the opening direction. Do not use excess force to remove the cover. Doing so may cause deformation in the fitting section and reduce the holding force.



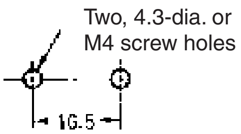
When mounting the Terminal Protective Cover to the case, align the cover on the case and then press the cover down to mount it firmly. If the cover is pressed down in an inclined position, rubber packing will deform and thus affect the sealing capability.

Mounting

Secure the Switch with two M4 screws and washers. The tightening torque applied to each terminal must be 1.18 to 1.37 N·m. Tighten the screws to the specified torque. An excessive tightening torque may damage the Switch and cause a malfunction.

When mounting the panel mount-type Switch with screws on a side surface, remove the hexagonal nuts from the actuator.

Mounting Holes



When mounting the panel mount type (SHL-Q55, SHL-Q2255, or SHL-Q2155) on a panel, tighten the hexagonal nuts of the actuator to a torque less than 7.84 N·m.

Tightening Torque

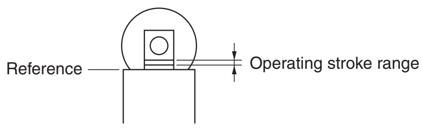
A loose screw may result in a malfunction. Be sure to tighten each screw to the proper tightening torque as shown below.

No.	Type	Torque
1	Terminal screw (M3 screw)	0.24 to 0.44 N·m
2	Panel mounting screw (M4 screw)	1.18 to 1.37 N·m

When wiring, use M3 round solderless terminals and apply insulation shielding to the connections. Tighten the terminals screws to 0.24 to 0.44 N·m.

Operating Stroke

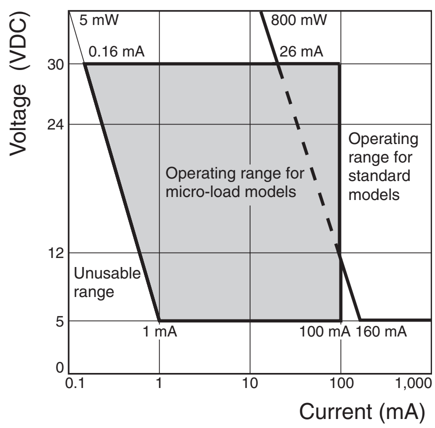
Ensure that the operating stroke for roller plunger models is within the set position display.



Micro Load Applicable Ranges

When using a Limit Switch for opening or closing micro-load circuit (zones 1 through 3), contact failure may occur if a Limit Switch with ordinary contact specifications is used. Therefore, when using Limit Switches in the micro-load range, use ones with contact specifications that are suited to each zone.

Use the SHL-□-01 micro-load models within the zones (1 through 3) shown in the following diagram.



The above diagram is for standard conditions (5°C to 35°C, 40% to 70%). Since the values vary depending on the operating environment conditions, contact your OMRON representative for further details.

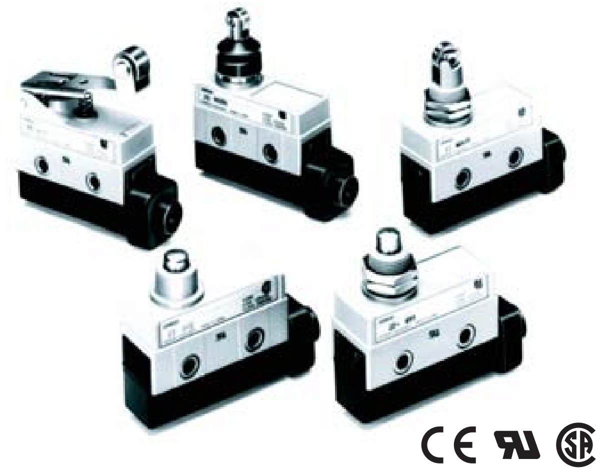
Others

The standard seal rubber for the lead wire outlet is one that allows 6- to 8-dia. cables. The appropriate nominal cross-section of the lead wire is 0.75 mm^2. (When the sealing capability is required over a long period of time, use mold specifications.)

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Enclosed Switch
ZC-□55

Small, High-precision Enclosed Switch



- Employs a modified version of Z Basic Switch as built-in switch.
- Same mounting pitch as Z Basic Switch.
- Pre-wired molded terminal models are available.
- Requires less operating force than conventional limit switches.
- Long life expectancy and economical.
- UL, CSA, and EN models are available.

Model Number Structure

■ Model Number Legend

ZC-□55
1

1. Actuator

D: Plunger
Q: Panel mount plunger
Q22: Panel mount roller plunger
Q21: Panel mount crossroller plunger
N22: Sealed roller plunger
N21: Sealed crossroller plunger
W: Short hinge lever
W1: Hinge lever
W2: Short hinge roller lever
W21: Hinge roller lever
W3: One-way action short hinge roller lever
W31: One-way action hinge roller lever

Ordering Information

■ List of Models

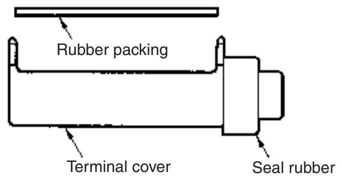
Actuator	Model	Actuator	Model
Plunger	ZC-D55	**Short hinge lever**	ZC-W55
Panel mount plunger	ZC-Q55	**Hinge lever**	ZC-W155
Panel mount roller plunger	ZC-Q2255	**Short hinge roller lever**	ZC-W255
Panel mount crossroller plunger	ZC-Q2155	**Hinge roller lever**	ZC-W2155
Sealed roller plunger	ZC-N2255	**One-way action short hinge roller lever**	ZC-W355
Sealed crossroller plunger	ZC-N2155	**One-way action hinge roller lever**	ZC-W3155

Note: 1. Use molded terminal models (refer to page 121) when using the Switch under one of the following conditions: a) dusty, b) high amount of dripping oil, or c) high humidity

2. Micro-load models are available.
e.g. Standard model — Micro-load model
ZC-Q55 — ZC-Q55-01

Terminal Protective Cover, Seal Rubber, and Rubber Packing

(The Switch is equipped with these 3 items as a standard.)



- ZC Terminal Cover
  (Product code: ZC55-0002H)
- ZC Seal Rubber
  (Product code: SC-1404C)
- ZC Rubber Packing
  (Product code: ZC55-9999G)

Specifications

■ Approved Standards (Except Molded Terminal Models and Operation Indicator-equipped Model)

Agency	Standard	File No.
UL	UL508	E76675
CSA	C22.2, No. 14	LR45258
TÜV Rheinland	EN60947-1, EN60947-5-1	J9650089

■ Approved Standard Ratings

UL/CSA
A300

Voltage	Carry current	Current		Volt-amperes	
		Make	Break	Make	Break
120 VAC	10 A	60 A	6 A	7,200 VA	720 VA
240 VAC		30 A	3 A		

Micro load	0.1 A, 125 VAC 0.1 A, 30 VDC

TÜV Rheinland

250 V, 10 A (AC12)

■ Ratings

Rated voltage	Non-inductive load				Inductive load			
	Resistive load		Lamp load		Inductive load		Motor load	
	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	10 A		3 A	1.5 A	10 A		5 A	2.5 A
250 VAC	10 A		2.5 A	1.25 A	10 A		3 A	1.5 A
8 VDC	10 A		3 A	1.5 A	6 A		5 A	2.5 A
14 VDC	10 A		3 A	1.5 A	6 A		5 A	2.5 A
30 VDC	6 A		3 A	1.5 A	5 A		5 A	2.5 A
125 VDC	0.5 A		0.4 A	0.4 A	0.05 A		0.05 A	0.05 A
250 VDC	0.25 A		0.2 A	0.2 A	0.03 A		0.03 A	0.03 A

Inrush current	NC	30 A max.
	NO	15 A max.

Note: 1. The above figures are for steady-state currents.
2. Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
3. Lamp load has an inrush current of 10 times the steady-state current.
4. Motor load has an inrush current of 6 times the steady-state current.
5. The above ratings were tested under the following conditions according to JIS C4508.
Ambient temperature: 20±2°C
Ambient humidity: 65±5%
Operating frequency: 20 operations/min

■ Characteristics

Degree of protections	IP67
Durability	Mechanical: 10,000,000 operations min. Electrical: 500,000 operations min.
Operating speed	0.05 mm to 0.5 m/s (at pin plunger)
Operating frequency	Mechanical: 120 operations/min Electrical: 20 operations/min
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	15 mΩ max. (initial value)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between non-continuous terminals 2,000 VAC, 50/60 Hz for 1 min between current-carrying metal part and ground, and between each terminal and non-current-carrying metal parts
Rated insulation voltage (U_i)	1,000 VAC
Pollution degree (operating environment)	3 (IEC947-5-1)
Short-circuit protective device	10 A-fuse type gG (IEC 269)
Protection against electric shock	Class II
PT1 (tracking characteristics)	175
Switch category	D (IEC335)
Rated operating current (Ie)	10 A
Rated operating voltage (Ue)	250 VAC
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note)
Shock resistance	Destruction: 1,000 m/s^2 max. Malfunction: 300 m/s^2 max. (at pin plunger) (see note)
Ambient temperature	Operating: –10°C to 80°C (with no icing)
Ambient humidity	Operating: 35% to 95%
Weight	Approx. 92 g (in case of ZC-Q22(21)55)

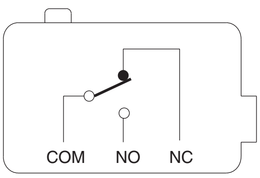
Note: Less than 1 ms under a free state at the operating limits.

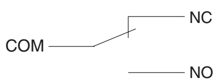
■ Operating Characteristics

Model	ZC-D55	ZC-Q55	ZC-Q2255	ZC-Q2155	ZC-N2255	ZC-N2155
OF max.	11.8 N	11.8 N			6.86 N	
RF min.	4.90 N	4.90 N			1.67 N	
PT max.	1.5 mm	1.5 mm			1.5 mm	
OT min.	2.4 mm	3 mm			2.5 mm	
MD max.	0.2 mm	0.2 mm			0.2 mm	
OP	32.4±0.8 mm	38.2±0.8 mm	47.4±0.8 mm			

Model	ZC-W55	ZC-W155	ZC-W255	ZC-W2155	ZC-W355	ZC-W3155
OF max.	3.92 N	2.75 N	3.92 N	2.75 N	3.92 N	2.75 N
RF min.	0.78 N	0.59 N	0.78 N	0.59 N	0.78 N	0.59 N
OT min.	6 mm	8.4 mm	6 mm	8.4 mm	6 mm	8.4 mm
MD max.	1 mm	1.4 mm	1 mm	1.4 mm	1 mm	1.4 mm
OP	28.5±1.2 mm	28.5±1.2 mm	43±1.2 mm	43±1.2 mm	53±1.2 mm	53±1.2 mm
FP max.	34.7 mm	36.7 mm	49.2 mm	51.3 mm	59.2 mm	61.2 mm

■ Contact Form

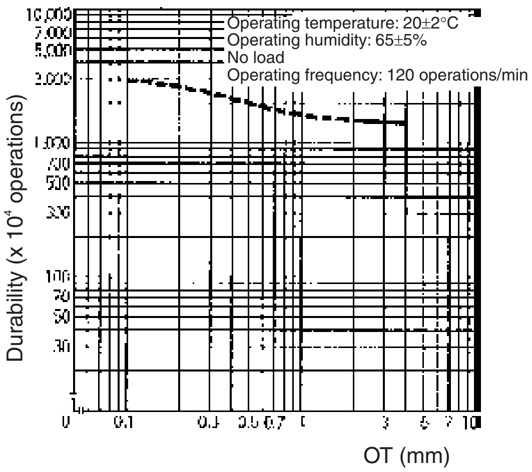




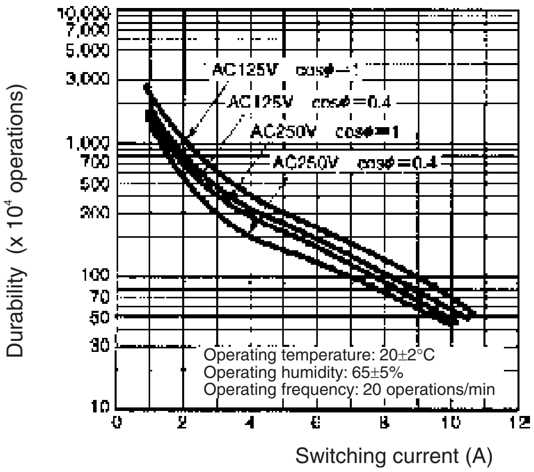
EN60947-5-1

Engineering Data

■ Mechanical Durability (for ZC-Q55)

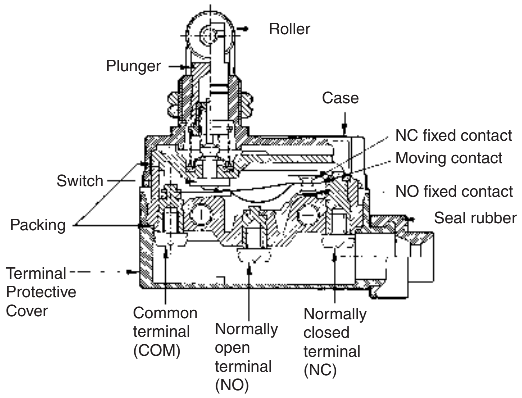


■ Electrical Durability



Nomenclature

Changing the Terminal Protective Cover around allows the cable to be pulled out from either the right or the left.

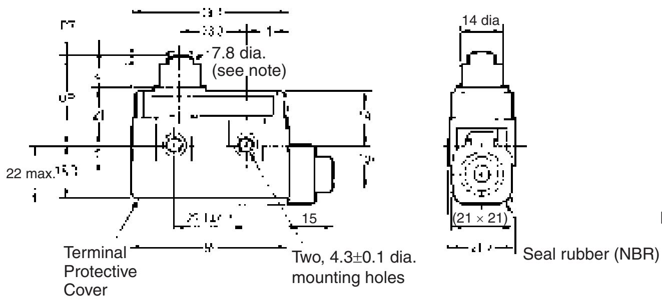


Note: M4 binding head screws (with toothed washers) are used as the terminal screws.

Dimensions

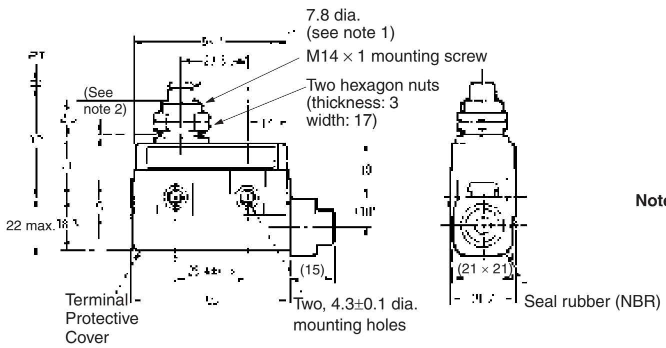
Note: 1. All units are in millimeters unless otherwise indicated.
2. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

Plunger
ZC-D55



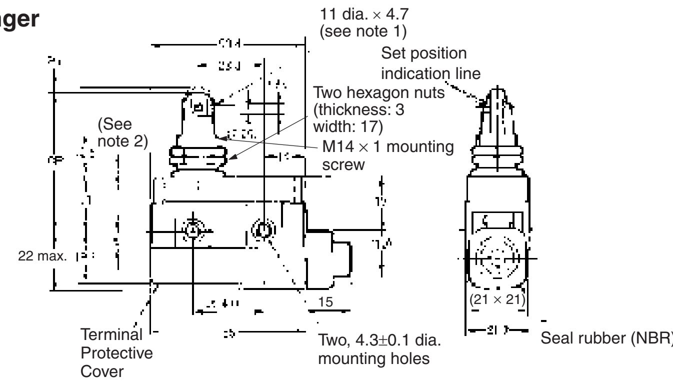
Note: Stainless steel plunger

Panel Mount Plunger
ZC-Q55



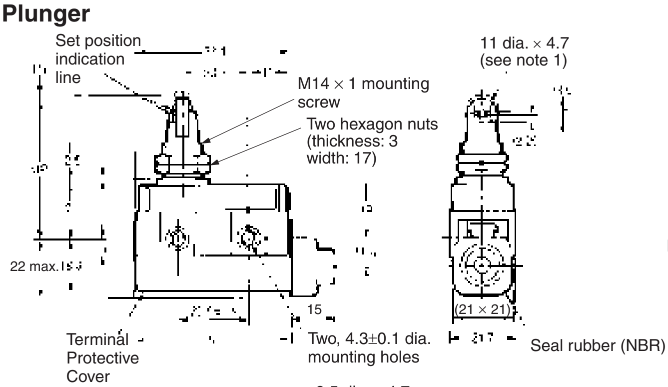
Note: 1. Stainless steel plunger
2. The length of the imperfect threads is 1.5 mm maximum.
3. Do not use the M14 mounting screw and the case mounting hole at the same time.

Panel Mount Roller Plunger
ZC-Q2255



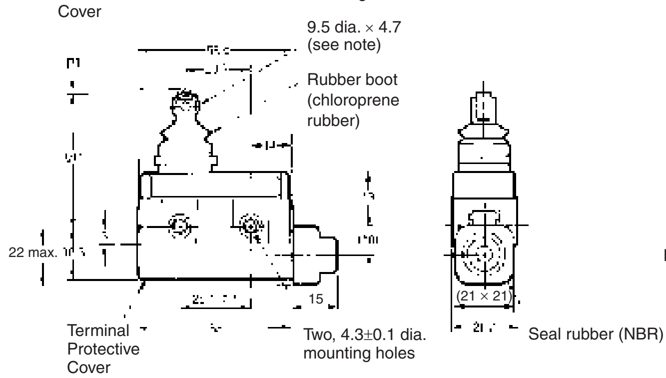
Note:
1. Stainless sintered alloy roller
2. The length of the imperfect threads is 1.5 mm maximum.
3. Do not use the M14 mounting screw and the case mounting hole at the same time.

Panel Mount Crossroller Plunger
ZC-Q2155



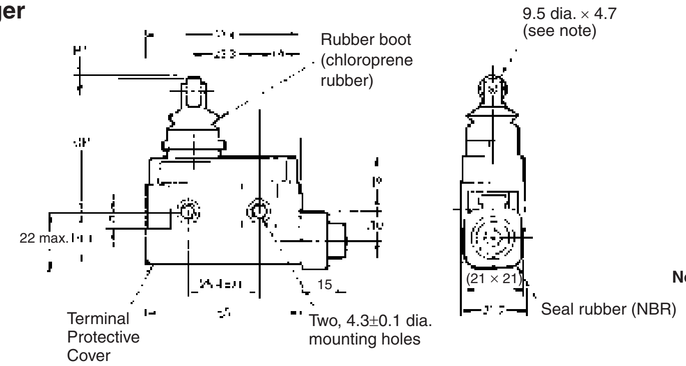
Note:
1. Stainless sintered alloy roller
2. The length of the imperfect threads is 1.5 mm maximum.
3. Do not use the M14 mounting screw and the case mounting hole at the same time.

Sealed Roller Plunger
ZC-N2255



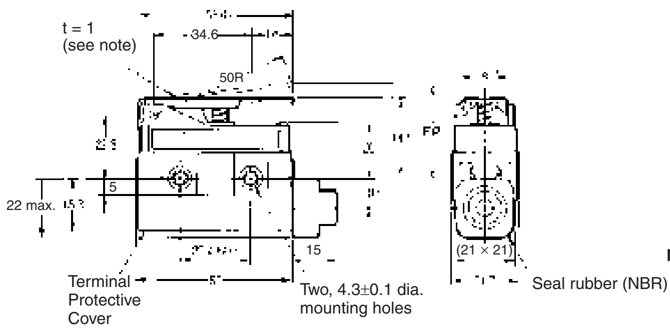
Note: Stainless sintered alloy roller

Sealed Crossroller Plunger
ZC-N2155



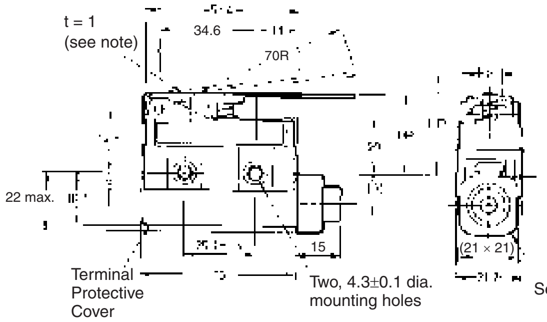
Note: Stainless sintered alloy roller

Short Hinge Roller Lever
ZC-W55



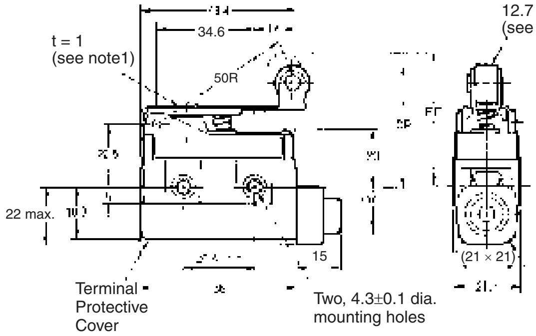
Note: Stainless steel lever

Hinge Lever
ZC-W155



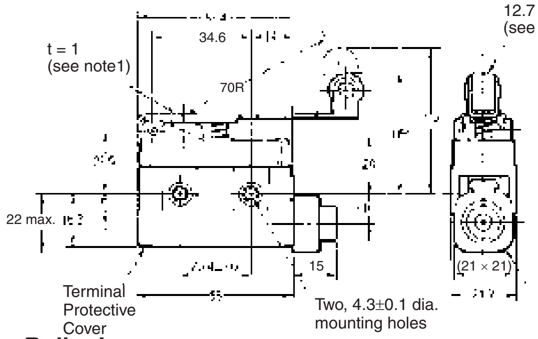
Note: Stainless steel lever

Short Hinge Roller Lever
ZC-W255



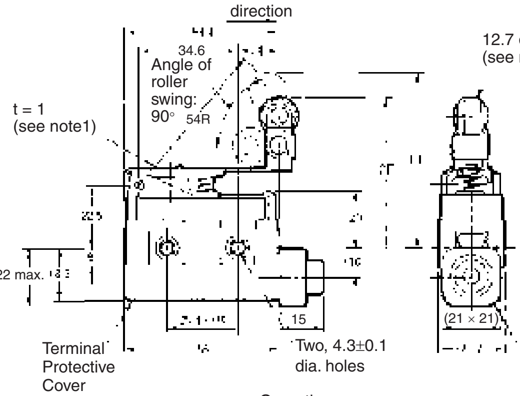
Note: 1. Stainless steel lever
2. Stainless steel roller

Hinge Roller Lever
ZC-W2155



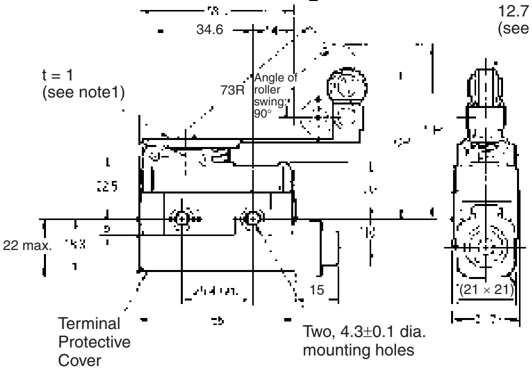
Note: 1. Stainless steel lever
2. Stainless steel roller

One-way Action Short Hinge Roller Lever
ZC-W355



Note: 1. Stainless steel lever
2. Stainless steel roller

One-way Action Hinge Roller Lever
ZC-W3155



Note: 1. Stainless steel lever
2. Stainless steel roller

Limit switches

■ Operation Indicator-equipped Models

All the models can be equipped upon request with a operation indicator to facilitate maintenance and inspection.

Because the indicator is incorporated in the Terminal Protective Cover, the dimensions of the Limit Switch are not affected. In this model, the lead wire is to be connected to the screw terminal. (A connecting washer is provided on the tip of the lead wire).

The lead wire can be connected to either the NC or NO terminal.

Operating characteristics are the same as the standard model from which the operation indicator equipped model is fabricated.

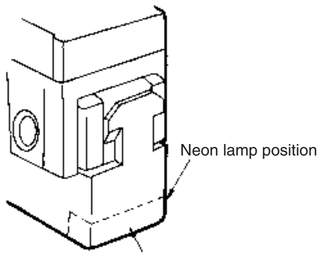
AC Operation

The operating voltage range is from 90 to 250 VAC.

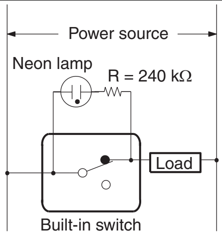
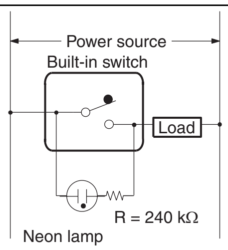
The dimensions are the same as the standard type. The top of the Terminal Protective Cover is transparent to allow checking the operation easily.

When placing your order for the indicator equipped, AC-operated model, add suffix "L" to the end of the model number.

Example:
Standard type: ZC-Q2255
Indicator equipped type: ZC-Q2255-L



Contact Circuit

NC terminal	
NO terminal	

Note: If the wiring is as shown above, the operation of the respective parts will be as follows:

Contact	Neon lamp	Load	Actuator
NC	ON	Does not operate	Operates
	OFF	Operates	Does not operate
NO	ON	Does not operate	Does not operate
	OFF	Operates	Operates

DC Operation

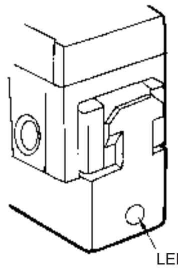
The DC-operated is provided with an LED indicator.

Since a rectifier stack is incorporated into the unit to permit reversing the polarity, this type can also operate on AC power source. An external 24VDC power supply can be used, eg. OMRON S8VS or S82K.

The LED projects from the housing for easy visibility.

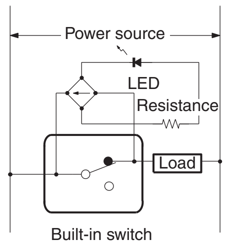
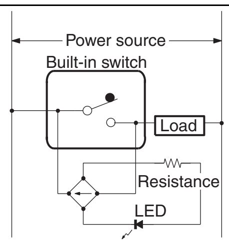
When placing your order, add suffix "L2" to "L5" to the model number of the standard type.

Example:
Standard type: ZC-Q2255
Indicator equipped type: ZC-Q2255-L2



Type	Voltage rating	Leakage current	Internal resistance
L2	12 V	Approx. 2.4 mA	4.3 kΩ
L4	24 V	Approx. 1.2 mA	18 kΩ

Contact Circuit

NC terminal	
NO terminal	

Note: If the wiring is as shown above, the operation of the respective parts will be as follows:

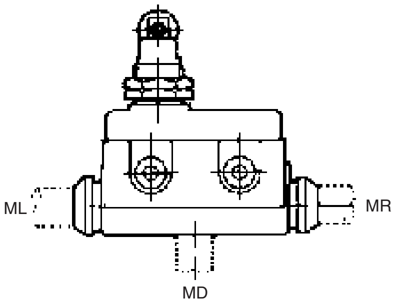
Contact	LED	Load	Actuator
NC	ON	Does not operate	Operates
	OFF	Operates	Does not operate
NO	ON	Does not operate	Does not operate
	OFF	Operates	Operates

Molded Terminal Models

■ Molded Terminal Model

The molded-terminal model is available with right-hand, left-hand and underside leads and is recommended for use where the Switch is exposed to dust, oil or moisture.

The molded-terminal model is not approved by UL and CSA.



Suffix by Location of Lead Outlet

Location of lead output	Model
	COM, NC and NO
Right-hand	ZC-□-MR
Left-hand	ZC-□-ML
Underside	ZC-□-MD

Lead Supplies

Leads	Nominal cross-sectional area	Finished outside diameter	Terminal connections	Standard length
V.C.T. (vinyl cabtire cable)	1.25 mm^2	3 core: 10.5 dia.	Black: COM White: NO Red: NC	1, 3, 5 m

Note: When placing your order for the Switch, specify the required length of V.C.T. cable in addition to the model number of the Switch.

Example:
Standard type: ZC-Q2155
Location of lead output: Underside
Length of lead: 1 m (V.C.T. lead)
When placing your order for the above Switch, specify the model number as ZC-Q2155-MD VCT 1 m.

Limit switches

Precautions

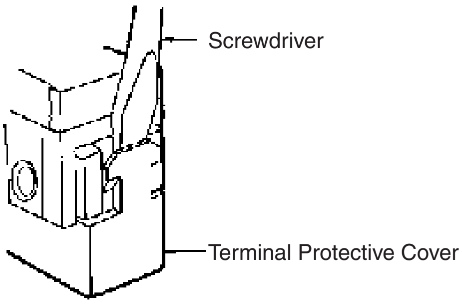
■ Correct Use

Dog Angle

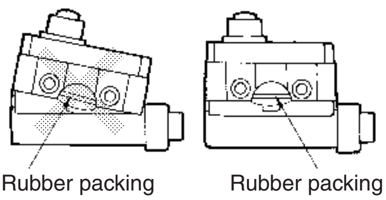
When operating the roller type, be sure to set the dog angle to less than 30° (even when operating at a low speed). Operating the model at a dog angle exceeding 30° will soon cause abrasion or damage. Do not apply a twisting force to the plunger. Set the OT to 70% to 100% of the specified value so that the actuator will not exceed the OT.

Handling

When detaching the Terminal Protective Cover, insert a screwdriver and apply a force in the opening direction. Do not use excess force to remove the cover. Doing so may cause deformation in the fitting section and reduce the holding force.



When mounting the Terminal Protective Cover to the case, align the cover on the case and then press the cover down to mount it firmly. If the cover is pressed down in an inclined position, rubber packing will deform and thus affect the sealing capability.

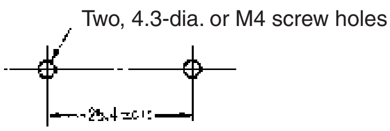


- A 8.5- to 10.5-dia. cable can be applied as seal rubber for the lead wire outlet. (Use two- or three-core cable of VCT1.25 mm^2.)
- Use weather-proof rubber (chloroprene rubber) as seal rubber for the ZC-N22(21)55.

Mounting

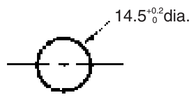
- When mounting the Switch with screws on a side surface, fasten the Switch with M4 screws and use washers, spring washers, etc., to ensure secure mounting.

Mounting Holes



- When mounting the Panel Mount-type Enclosed Switch (ZC-Q55, ZC-Q2255, or ZC-Q2155) with screws on a side surface, remove the hexagonal nuts from the actuator.

Mounting Hole Dimensions



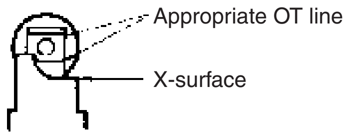
Tightening Torque

A loose screw may result in a malfunction. Be sure to tighten each screw to the proper tightening torque as shown below.

No.	Type	Torque
1	Terminal screw	0.78 to 1.18 N·m
2	Panel mounting screw	4.90 to 7.84 N·m
3	Side mounting screw	1.18 to 1.47 N·m

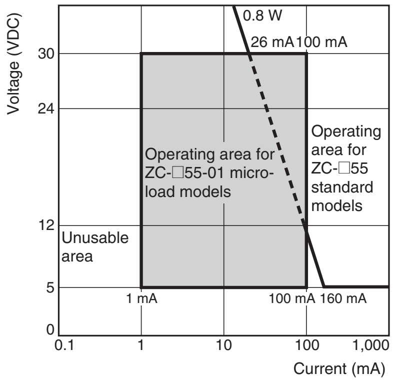
Operation

With the ZC-Q22(21)55, an appropriate OT line is marked on the plunger. Set the OT so that it is between the two X-surface lines.



Micro-load Applicable Ranges

Using a standard load switch for opening and closing a micro-load circuit may cause wear on the contacts. Use the switch within the operating range. (Refer to the diagram below.) Even when using micro-load models within the operating range shown below, if inrush current occurs when the contact is opened or closed, it may cause the contact surface to become rough, and so decrease life expectancy. Therefore, insert a contact protection circuit where necessary. The minimum applicable load is the N-level reference value. This value indicates the malfunction reference level for the reliability level of 60% (λ_{60}). The equation $\lambda_{60} = 0.5 \times 10^{-6}$/operations indicates that the estimated malfunction rate is less than 1/2,000,000 operations with a reliability level of 60%.



Model	ZC-□55-01	ZC-□55
Minimum applicable load	1 mA at 5 VDC	160 mA at 5 VDC

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. C025-E2-09 In the interest of product improvement, specifications are subject to change without notice.

Special-purpose Basic Switch
DZ

DPDT Basic Switch for Two Independent Circuit Control

- Incorporates two completely independent built-in switches.
- Ideal for switching the circuits operating on two different voltages, and for controlling two independent circuits.
- Interchangeable with OMRON Z Basic Switches, as both switches are identical in mounting hole dimensions, mounting pitch and pin plunger position.

Model Number Structure

■ Model Number Legend

DZ-10G□-1□
1 2 3 4 5

1. **Ratings**
   10: 10 A (250 VAC)
2. **Contact Gap**
   G: 0.5 mm
3. **Actuator**
   None: Pin plunger
   V: Hinge lever
   V22: Short hinge roller lever
   V2: Hinge roller lever
   W: Hinge lever
   W22: Short hinge roller lever
   W2: Hinge roller lever
4. **Contact Form**
   1: DPDT
5. **Terminals**
   A: Solder terminal
   B: Screw terminal

Ordering Information

■ List of Models

Actuator	OT	Solder terminal	Screw terminal
Pin plunger	0.13 mm min.	DZ-10G-1A	DZ-10G-1B
Hinge lever	1.6 mm min.	DZ-10GW-1A	DZ-10GW-1B
	0.4 mm min.	DZ-10GV-1A	DZ-10GV-1B
Short hinge roller lever	0.9 mm min.	DZ-10GW22-1A	DZ-10GW22-1B
	0.13 mm min.	DZ-10GV22-1A	DZ-10GV22-1B
Hinge roller lever	1.2 mm min.	DZ-10GW2-1A	DZ-10GW2-1B
	0.26 mm min.	DZ-10GV2-1A	DZ-10GV2-1B

Specifications

■ Approved Standards

Agency	Standard	File No.
UL	UL508	E41515
CSA	CSA C22.2 No. 55	LR21642

■ Approved Standard Ratings

UL508 (File No. E41515)/ CSA C22.2 No. 55 (File No. LR21642)

Rated voltage	DZ-10G
125 VAC	10 A 1/3 HP
250 VAC	10 A 1/4 HP
480 VAC	2 A
125 VDC	0.5 A
250 VDC	0.25 A

■ Ratings

Rated voltage	Non-inductive load				Inductive load				Inrush current	
	Resistive load		Lamp load		Inductive load		Motor load			
	NC	NO	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	10 A		2 A	1 A	6 A		3 A	1.5 A	30 A max.	15 A max.
250 VAC	10 A		1.5 A	0.7 A	4 A		2 A	1 A		
8 VDC	10 A		3 A	1.5 A	6 A		5 A	2.5 A		
14 VDC	10 A		3 A	1.5 A	6 A		5 A	2.5 A		
30 VDC	10 A		3 A	1.5 A	4 A		3 A	1.5 A		
125 VAC	0.5 A		0.5 A		0.05 A		0.05 A			
250 VDC	0.25 A		0.25 A		0.03 A		0.03 A			

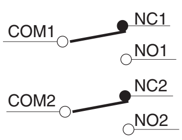
Note: 1. Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
2. Lamp load has an inrush current of 10 times the steady-state current.
3. Motor load has an inrush current of 6 times the steady-state current.

■ Characteristics

Operating speed	0.1 mm to 1 m/s (at pin plunger)
Operating frequency	Mechanical: 240 operations/min Electrical: 20 operations/min
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	15 mΩ max. (initial value)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between non-continuous terminals 1,500 VAC, 50/60 Hz for 1 min between current-carrying metal parts and non-current-carrying metal part, and between current-carrying metal part and ground and between switches
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 {approx. 100G} max. Malfunction: 300 m/s^2 {approx. 30G} max. (See notes 1 and 2.)
Durability	Mechanical: 1,000,000 operations min. Electrical: 500,000 operations min.
Ambient temperature	Operating: –25°C to 80°C (with no icing)
Ambient humidity	Operating: 35% to 85% max.
Weight	Approx. 30 to 50 g

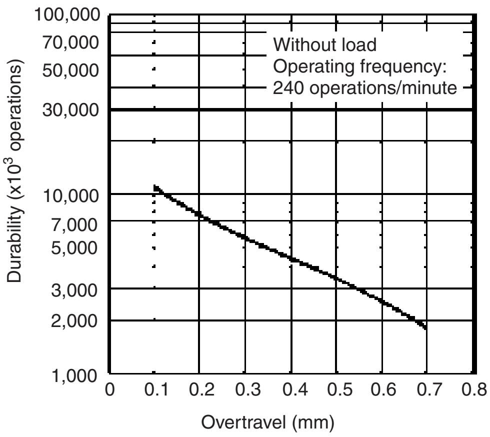
Note: 1. The values are for pin plunger models. (Contact your OMRON representative for other models.)
2. Malfunction: 1 ms max.

■ Contact Form (DPDT)

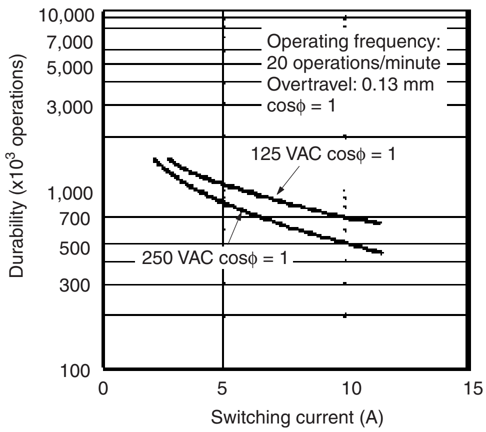


Engineering Data

■ Mechanical Durability (Pin Plunger)



■ Electrical Durability (Pin Plunger)



Dimensions

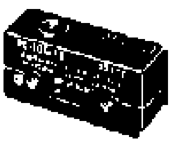
■ Dimensions and Operating Characteristics

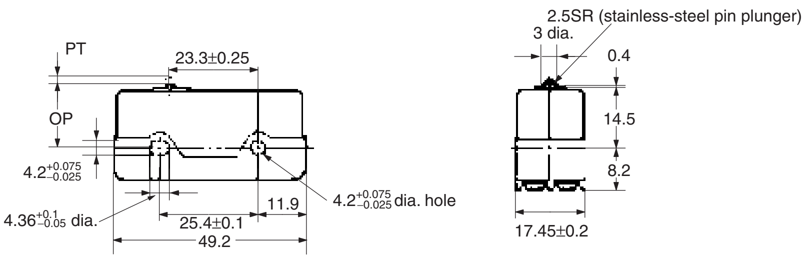
Note: 1. All units are in millimeters unless otherwise indicated.

2. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

3. The solder terminal model has a suffix "-1A" in its model number and its omitted dimensions are the same as the corresponding dimensions of the pin plunger model.

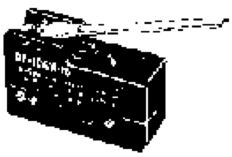
Pin Plunger
DZ-10G-1B

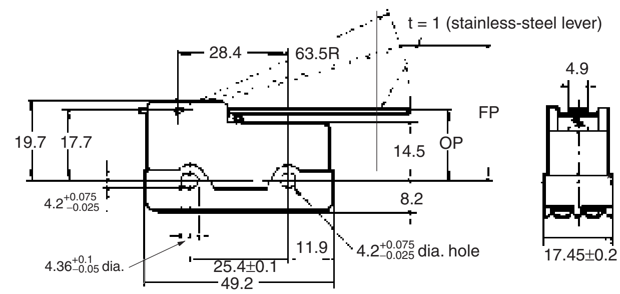




OF max.	5.59 N {570 gf}
RF min.	0.55 N {57 gf}
PT max.	1.7 mm
OT min.	0.13 mm
MD max.	0.4 mm
OP	15.6±0.4 mm

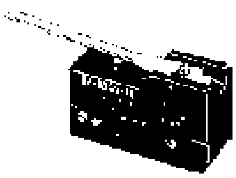
Hinge Lever
DZ-10GW-1B

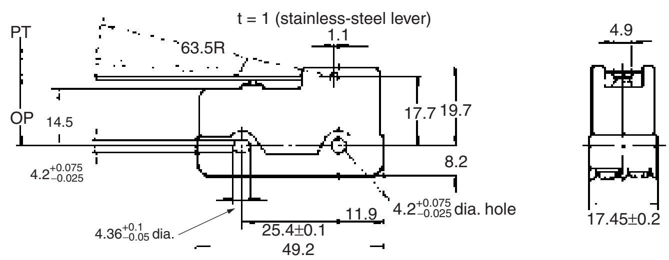




OF max.	1.67 N {170 gf}
RF min.	0.27 N {28 gf}
OT min.	1.6 mm
MD max.	4 mm
FP max.	46.3 mm
OP	21.8±1 mm

DZ-10GV-1B

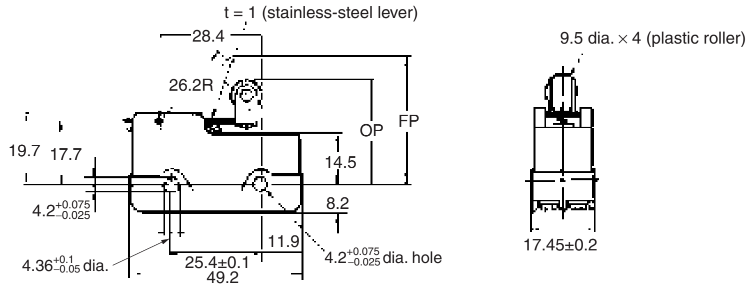




OF max.	1.96 N {200 gf}
RF min.	0.13 N {14 gf}
PT max.	6 mm
OT min.	0.4 mm
MD max.	1.7 mm
OP	18.3±1 mm

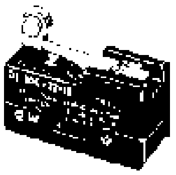
Short Hinge Roller Lever

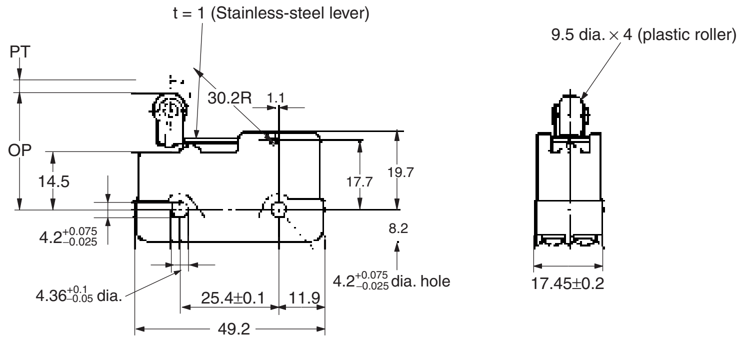
DZ-10GW22-1B



OF max.	3.92 N {400 gf}
RF min.	0.83 N {85 gf}
OT min.	0.9 mm
MD max.	2.4 mm
FP max.	39.7 mm
OP	30.2±0.8 mm

DZ-10GV22-1B

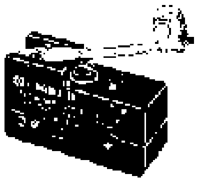


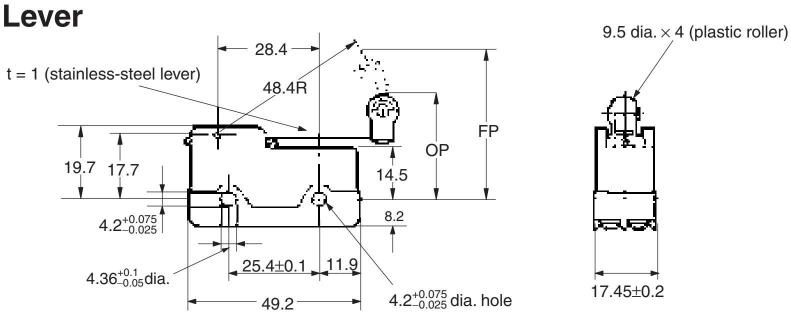


OF max.	4.22 N {430 gf}
RF min.	0.41 N {42 gf}
PT max.	3 mm
OT min.	0.13 mm
MD max.	0.6 mm
OP	29.4±0.8 mm

Hinge Roller Lever

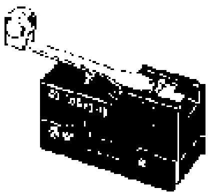
DZ-10GW2-1B

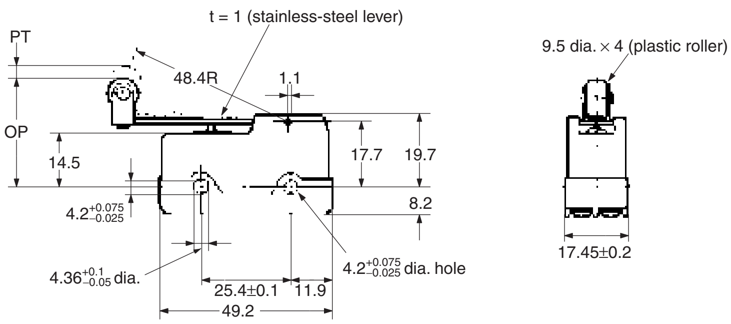




OF max.	2.09 N {213 gf}
RF min.	0.41 N {42 gf}
OT min.	1.2 mm
MD max.	3.3 mm
FP max.	47.6 mm
OP	31.8±0.8 mm

DZ-10GV2-1B

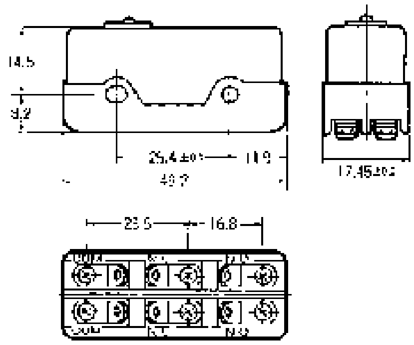




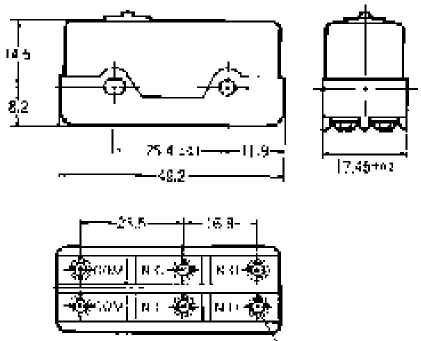
OF max.	2.65 N {270 gf}
RF min.	0.33 N {34 gf}
PT max.	4 mm
OT min.	0.26 mm
MD max.	1.1 mm
OP	29.4±0.8 mm

■ Terminals

Solder Terminals (-1A)



Screw Terminals (-1B)



Six M3 pan head screws
(with toothed washer)

Precautions

Refer to the *Technical Information for Basic Switches* (Cat. No. C122) for common precautions.

■ Cautions

Terminal Connection

When soldering lead wires to the Switch, make sure that the capacity of the soldering iron is 60 W maximum. Do not take more than 5 s to solder any part of the Switch. Improper soldering may cause abnormal heat radiation from the Switch and the Switch may burn.

The characteristics of the Switch will deteriorate if a soldering iron with a capacity of more than 60 W is applied to any part of the Switch for 6 s or more.

Operation

Make sure that the switching frequency or speed is within the specified range.

If the switching speed is extremely slow, the contact may not be switched smoothly, which may result in a contact failure or contact welding.

If the switching speed is extremely fast, switching shock may damage the Switch soon. If the switching frequency is too high, the contact may not catch up with the speed.

The rated permissible switching speed and frequency indicate the switching reliability of the Switch.

The life of a Switch is determined at the specified switching speed. The life varies with the switching speed and frequency even when they are within the permissible ranges. In order to determine the life of a Switch model to be applied to a particular use, it is best to conduct an appropriate durability test on some samples of the model under actual conditions.

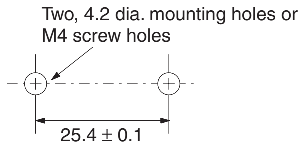
Make sure that the actuator travel does not exceed the permissible OT position. The operating stroke must be set to 70% to 100% of the rated OT.

■ Correct Use

Mounting

Use M4 mounting screws with plane washers or spring washers to securely mount the Switch. Tighten the screws to a torque of 1.18 to 1.47 N·m {12 to 15 kgf·cm}

Mounting Holes



■ Accessories (Order separately)

Refer to *Z/A/X/DZ Common Accessories* for details about Terminal Covers, Separators, and Actuators.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. B060-E2-07

General-purpose Basic Switch
X

Direct Current Switch with Built-in Magnetic Blowout

- Incorporates a small permanent magnet in the contact mechanism to deflect the arc to effectively extinguish it.
- Same shape and mounting procedures as the Z Basic Switches.

Model Number Structure

■ Model Number Legend

X-10G□-□
1 2 3 4

1. **Ratings**
   10: 10 A (125 VDC)
2. **Contact Gap**
   G: 0.9 mm
3. **Actuator**
   None: Pin plunger
   D: Short spring plunger
   S: Slim spring plunger
   Q: Panel mount plunger
   Q21: Panel mount cross roller plunger
   Q22: Panel mount roller plunger
   L: Leaf spring
   W: Hinge lever
   W2: Hinge roller lever
   W21: Short hinge lever
   W22: Short hinge roller lever
   W4: Low-force hinge lever
   M: Reverse hinge lever
   M2: Reverse hinge roller lever
   M22: Reverse short hinge roller lever
4. **Terminals**
   None: Solder terminal
   B: Screw terminal (with toothed washer)

Limit switches

Ordering Information

■ List of Models

Actuator	Solder	Screw
Pin plunger	X-10G	X-10G-B
Slim spring plunger	X-10GS	X-10GS-B
Short spring plunger	X-10GD	X-10GD-B
Panel mount plunger	X-10GQ	X-10GQ-B
Panel mount roller plunger	X-10GQ22	X-10GQ22-B
Panel mount cross roller plunger	X-10GQ21	X-10GQ21-B
Leaf spring	X-10GL	X-10GL-B
Short hinge lever	X-10GW21	X-10GW21-B

Actuator	Solder	Screw
Hinge lever	X-10GW	X-10GW-B
Low-force hinge lever	X-10GW4	X-10GW4-B
Short hinge roller lever	X-10GW22	X-10GW22-B
Hinge roller lever	X-10GW2	X-10GW2-B
Reverse hinge lever	X-10GM	X-10GM-B
Reverse short hinge roller lever	X-10GM22	X-10GM22-B
Reverse hinge roller lever	X-10GM2	X-10GM2-B

Note: The plungers of reverse-type models are continuously pressed by the compression coil springs and the plungers are freed by operating the levers.

Specifications

■ Approved Standards

Agency	Standard	File No.
UL	UL508	E41515
CSA	CSA C22.2 No. 55	LR21642

■ Approved Standard Ratings

UL508 (File No. E41515)
CSA C22.2 No.55 (File No. LR21642)

Rated voltage	X-10G
125 VDC	10 A
250 VDC	3 A

■ Ratings

Rated voltage	Non-inductive load			Inductive load			
	Resistive load	Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO
8 VDC	10 A	3 A	1.5 A	10 A	10 A	5 A	2.5 A
14 VDC	10 A	3 A	1.5 A	10 A	10 A	5 A	2.5 A
30 VDC	10 A	3 A	1.5 A	10 A	10 A	5 A	2.5 A
125 VDC	10 A	3 A	1.5 A	7.5 A	6 A	5 A	2.5 A
250 VDC	3 A	1.5 A	0.75 A	2 A	1.5 A	2 A	1.5 A

Note: 1. The above values are for the steady-state current.
2. Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
3. Lamp load has an inrush current of 10 times the steady-state current.
4. Motor load has an inrush current of 6 times the steady-state current.
5. The above electrical ratings also apply to the AC voltage.
6. With the reverse-type models (X-10GM□), the normally closed circuits and normally open circuits are reversed.
7. The ratings values apply under the following test conditions:
Ambient temperature: 20±2°C
Ambient humidity: 65±5%
Operating frequency: 20 operations/min

■ Characteristics

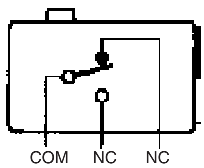
Operating speed	0.1 mm to 1 m/s (see note 1)
Operating frequency	Mechanical: 240 operations/min Electrical: 20 operations/min
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	15 mΩ max. (initial value)
Dielectric strength	1,500 VAC, 50/60 Hz for 1 min between terminals of the same polarity, between current-carrying metal parts and the ground, and between each terminal and non-current-carrying metal parts
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note 2)
Shock resistance	Destruction: 1,000 m/s^2 {approx. 100G} max. Malfunction: 300 m/s^2 {approx. 30G} max. (see note 1, 2)
Durability	Mechanical: 1,000,000 operations min. Electrical: 100,000 operations min.
Degree of protection	IP00
Degree of protection against electric shock	Class I
Proof tracking index (PTI)	175
Switch category	D (IEC335-1)
Ambient temperature	Operating: –25°C to 80°C (with no icing)
Ambient humidity	Operating: 35% to 85% max.
Weight	Approx. 27 to 63 g

Note: 1. The values are for the pin plunger models. (Contact your OMRON representative for other models.)
2. Malfunction: 1 ms max.

■ Contact Specification

Item		X-10
Contacts	Material	Silver alloy
	Gap (standard value)	0.9 mm
Inrush current	NC	30 A max.
	NO	15 A max.

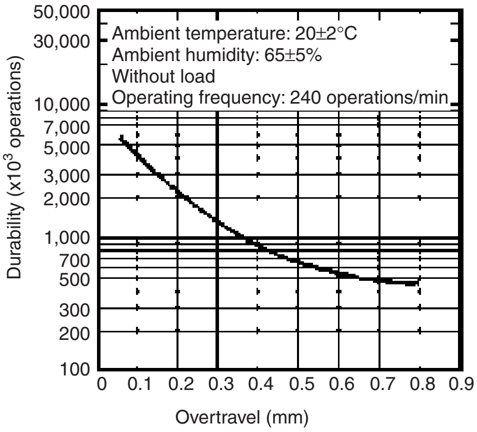
■ Contact Form (SPDT)



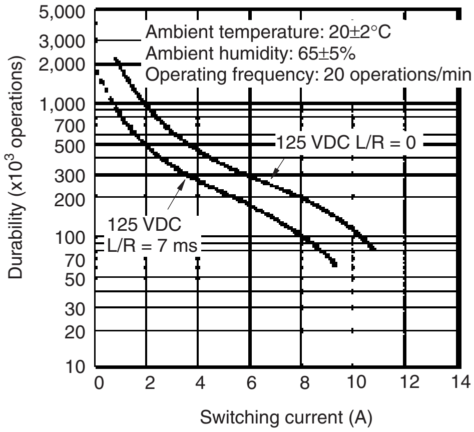
Note: With the reverse-type models (X-10GM□), the NC and NO terminal arrangements are reversed.

Engineering Data

■ Mechanical Durability (Pin Plunger)



■ Electrical Durability (Pin Plunger)



Dimensions

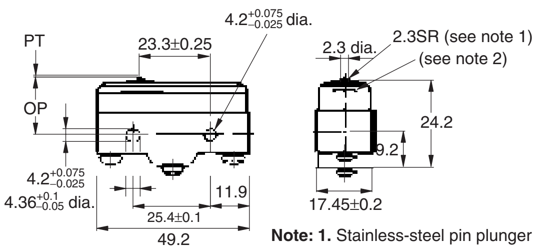
Note: 1. All units are in millimeters unless otherwise indicated.

2. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

■ Dimensions and Operating Characteristics

The models, illustrations, and graphics are for screw-terminal models. (The dimensions for models that are omitted here are the same as for pin-plunger models.)

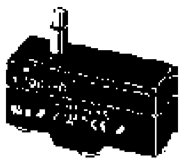
Pin Plunger
X-10G-B

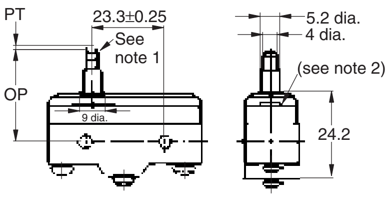


Note: 1. Stainless-steel pin plunger
2. Three vent holes

OF max.	5.00 N {510 gf}
RF min.	1.12 N {114 gf}
PT max.	0.9 mm
OT min.	0.13 mm
MD max.	0.18 mm
OP	15.9±0.4 mm

Slim Spring Plunger
X-10GS-B

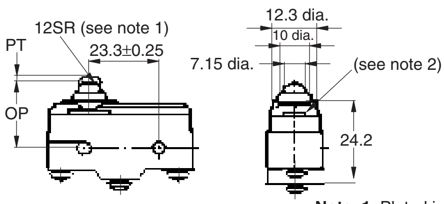




Note: 1. Stainless-steel pin plunger (flat, 1R chamfering)
2. Vent holes (3 places)

OF max.	5.00 N {510 gf}
RF min.	1.12 N {114 gf}
PT max.	0.9 mm
OT min.	1.6 mm
MD max.	0.18 mm
OP	28.2±0.5 mm

Short Spring Plunger
X-10GD-B

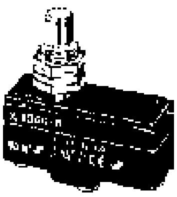


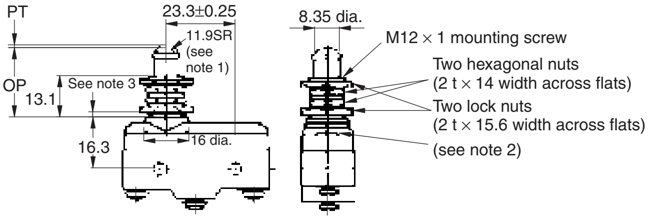
Note: 1. Plated iron plunger
2. Three vent holes

OF max.	5.00 N {510 gf}
RF min.	1.12 N {114 gf}
PT max.	0.9 mm
OT min.	1.6 mm
MD max.	0.18 mm
OP	21.2±0.5 mm

Panel Mount Plunger

X-10GQ-B



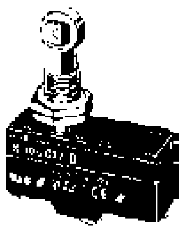


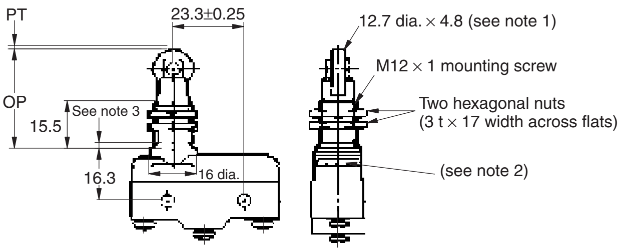
OF max.	5.00 N {510 gf}
RF min.	1.12 N {114 gf}
PT max.	0.9 mm
OT min.	5.5 mm
MD max.	0.18 mm
OP	21.8±0.8 mm

Note: 1. Stainless-steel pin plunger
2. Three vent holes
3. Imperfect screw part with a maximum length of 1.5 mm.

Panel Mount Roller Plunger

X-10GQ22-B



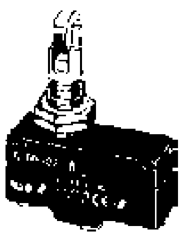


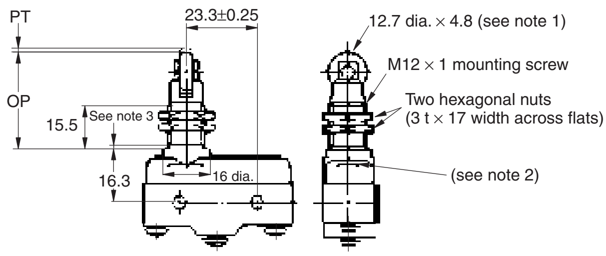
OF max.	5.00 N {510 gf}
RF min.	1.12 N {114 gf}
PT max.	0.9 mm
OT min.	3.6 mm
MD max.	0.18 mm
OP	33.4±1.2 mm

Note: 1. Stainless-steel roller
2. Three vent holes
3. Imperfect screw part with a maximum length of 1.5 mm.

Panel Mount Cross Roller Plunger

X-10GQ21-B



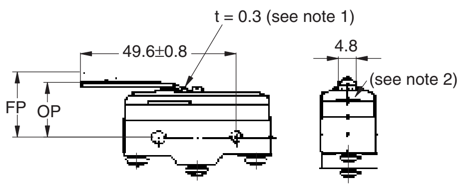


OF max.	5.00 N {510 gf}
RF min.	1.12 N {114 gf}
PT max.	0.9 mm
OT min.	3.6 mm
MD max.	0.18 mm
OP	33.4±1.2 mm

Note: 1. Stainless-steel roller
2. Three vent holes
3. Imperfect screw part with a maximum length of 1.5 mm.

Leaf Spring

X-10GL-B



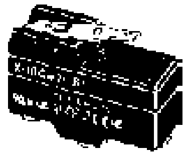
Note: 1. Stainless-steel spring lever
2. Three vent holes

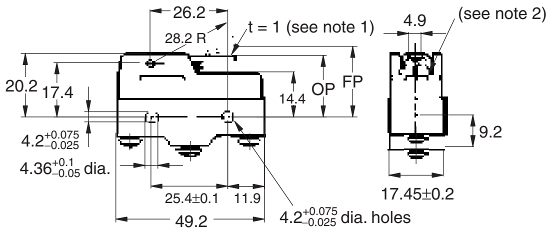
OF max.	1.96 N {200 gf}
RF min.	0.14 N {14 gf}
OT min.	1.6 mm (see note)
MD max.	2.3 mm
FP max.	22.1 mm
OP	17.4±0.8 mm

Note: 1. Reference value
2. Be sure to use the switch at the rated OT value of 1.6 mm.

Short Hinge Lever

X-10GW21-B



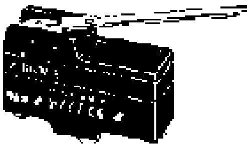


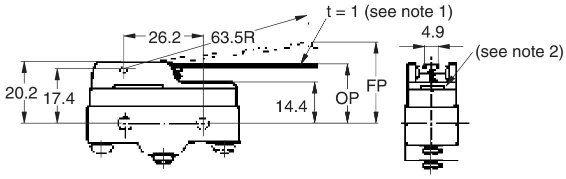
Note: **1.** Stainless-steel lever
2. Three vent holes

OF max.	2.45 N {250 gf}
RF min.	0.31 N {32 gf}
OT min.	2.1 mm
MD max.	1.7 mm
FP max.	25.5 mm
OP	20.7±0.8 mm

Hinge Lever

X-10GW-B



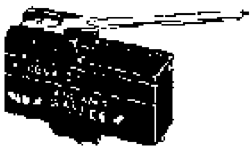


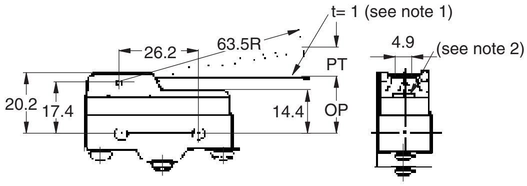
Note: **1.** Stainless-steel lever
2. Three vent holes

OF max.	1.08 N {110 gf}
RF min.	0.14 N {14 gf}
OT min.	4.8 mm
MD max.	3.9 mm
FP max.	34.6 mm
OP	21.1±0.8 mm

Low-force Hinge Lever

X-10GW4-B



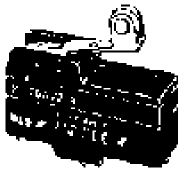


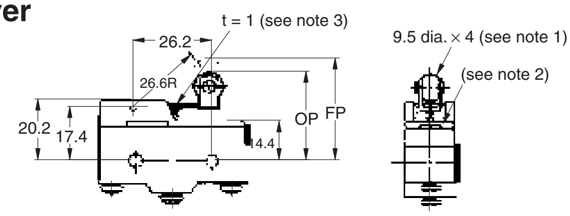
Note: **1.** Stainless-steel lever
2. Three vent holes

OF max.	0.25 N {25 gf}
RF min.	0.05 N {5 gf}
PT max.	14.3 mm
OT min.	4.8 mm
MD max.	3.9 mm
OP	21.1±0.8 mm

Short Hinge Roller Lever

X-10GW22-B



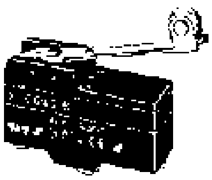


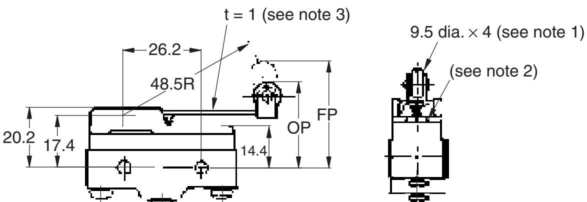
Note: **1.** Plastic roller
2. Three vent holes
3. Stainless-steel spring lever

OF max.	2.16 N {220 gf}
RF min.	0.34 N {35 gf}
OT min.	2.4 mm
MD max.	1.7 mm
FP max.	37.1 mm
OP	32.2±0.8 mm

Hinge Roller Lever

X-10GW2-B



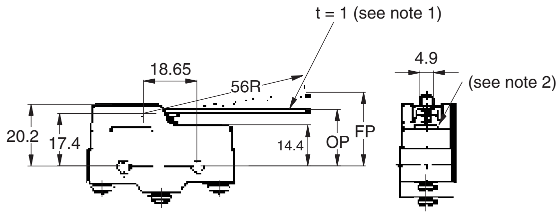


Note: **1.** Plastic roller
2. Three vent holes
3. Stainless-steel spring lever

OF max.	1.42 N {145 gf}
RF min.	0.21 N {21 gf}
OT min.	4 mm
MD max.	3 mm
FP max.	40.5 mm
OP	32.2±0.8 mm

Reverse Hinge Lever

X-10GM-B

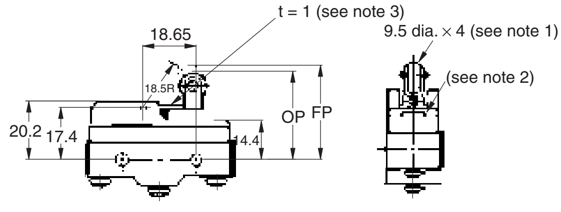


Note: 1. Stainless-steel lever
2. Three vent holes

OF max.	2.16 N {220 gf}
RF min.	0.25 N {25 gf}
OT min.	5.5 mm
MD max.	2.1 mm
FP max.	26.8 mm
OP	21.1±0.8 mm

Reverse Short Hinge Lever

X-10GM22-B

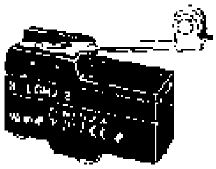


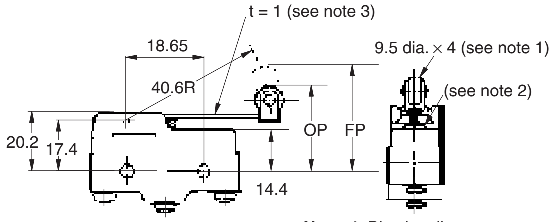
Note: 1. Plastic roller
2. Three vent holes
3. Stainless-steel spring lever

OF max.	6.86 N {700 gf}
RF min.	1.52 N {155 gf}
OT min.	2 mm
MD max.	0.75 mm
FP max.	36.1 mm
OP	32.2±0.8 mm

Reverse Hinge Roller Lever

X-10GM2-B



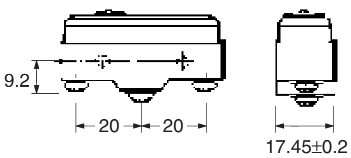


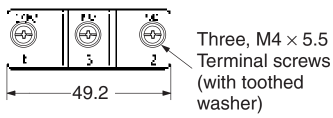
Note: 1. Plastic roller
2. Three vent holes
3. Stainless-steel spring lever

OF max.	3.14 N {320 gf}
RF min.	0.49 N {50 gf}
OT min.	4 mm
MD max.	1.5 mm
FP max.	37.4 mm
OP	32.2±0.8 mm

■ Terminals

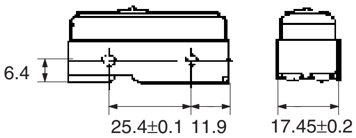
Screw Terminals (-B)

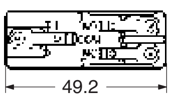




Appropriate terminal screw tightening torque:
0.78 to 1.18 N·m {8 to 12 kgf·cm}.

Solder Terminal





Note: 1. Tighten the terminal screws to a torque of 0.78 to 1.18 N·m {8 to 12 kgf·cm}.
2. In case of DC voltage, set the COM to the positive terminal.

Precautions

Refer to the *Technical Information for Basic Switches* (Cat. No. C122) for common precautions.

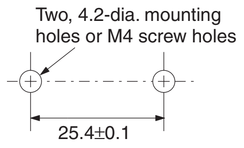
■ Correct Use

Mounting

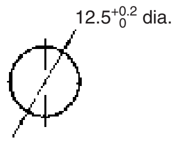
Use M4 mounting screws with plane washers or spring washers to securely mount the Switch. Tighten the screws to a torque of 1.18 to 1.47 N·m {12 to 15 kgf·cm}

The Switch can be panel mounted, provided that the hexagonal nut of the actuator is tightened to a torque of 2.94 to 4.9 N·m {30 to 50 kgf·cm}.

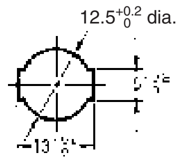
Mounting Holes



Panel Mount Plunger



Panel Mount Roller Plunger



Handling

Set the common (COM) terminal to the positive terminal. If it is set to the negative terminal, the Switch will not turn OFF.

When using the Switch under an inductive load, the arc suppression capability varies depending on current. If the current becomes 0.6 to 1.2 A or of the time constant L/R exceeds 7 ms, be sure to provide an arc suppressor.

Since the Switch incorporates a permanent magnet, attention must be paid to the following points:

- Avoid mounting the Switch directly onto a magnetic substance.
- Do not subject the Switch to severe shocks.
- Avoid placing the Switch in a strong magnetic field.
- Be sure to prevent iron dust or iron chips from adhering to the built-in magnet or the magnetic blowout function of the Switch will be adversely affected.
- Do not apply thermal shock to the Switch, or the magnetic flux will be diminished.

Since a ventilation hole is provided to avoid abnormal corrosion due to operating conditions, provide a dustproofing device in locations where the Switch is exposed to dust.

Do not change operating positions for the actuator. Changing the position may cause malfunction.

Panel-mounted Model (X-10GQ□)

To side-mount the panel-mount Switch to the panel with screws, remove the hexagonal nut from the actuator.

Too large a dog angle and too fast operating speed may damage the Switch when the Switch is side-mounted on the panel.

Too fast operating speed and too long overtravel of the roller plunger Switch may result in damage to the Switch.

■ Accessories (Order separately)

Refer to *Z/A/X/DZ Common Accessories* for details about Terminal Covers, Separators, and Actuators.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. B003-E2-08

In the interest of product improvement, specifications are subject to change without notice.

General-purpose Basic Switch
Z

Best-selling Basic Switch Boasting High Precision and Wide Variety

- A large switching capacity of 15 A with high repeat accuracy.
- A wide range of variations in contact form for your selection: basic, split-contact, maintained-contact, and adjustable contact gap types.
- A series of standard models for micro loads is available.
- A series of molded terminal-type models incorporating safety terminal protective cover is available.

Model Number Structure

■ Configuration

Basic models	General-purpose		Refer to page 139.
	Drip-proof	Without terminal protective cover	Refer to individual datasheets. (Contact your OMRON representative).
		With terminal protective cover	Refer to individual datasheets. (Contact your OMRON representative).
		Molded terminal	Refer to page 141.
Split-contact models	General-purpose		Refer to page 141.
Maintained-contact models	General-purpose		Refer to page 141.

Basic Models

General-purpose

A variety of actuators is available for a wide range of application.

The contact mechanism of models for micro loads is a crossbar type with gold-alloy contacts, which ensures highly reliable operations for micro loads.

Contact Gap:
H: 0.25 mm (high-sensitivity, micro voltage current load)
G: 0.5 mm (standard)
E: 1.8 mm (high-capacity)
F: 1.0 mm (split-contact models)

Split-contact Models

This type is identical in construction to the general-purpose basic switch except that it has two pairs of simultaneous acting contacts by splitting moving contacts.

Since the moving contacts are connected to a common terminal, either parallel or series connection is possible.

Highly reliable micro load switching is ensured if the model is used as a twin-contact switch.

Maintained-contact Models

The maintained-contact type has a reset button at the bottom of the switch case, in addition to the pushbutton (plunger) located on the opposite side of the reset button. Use these buttons alternately.

Since the Switch has greater pretravel than overtravel, it is suitable for use in reversible control circuits, manual reset circuits, safety limit circuits, and other circuits which are not preferable for automatic resetting. (For further details, refer to individual datasheets.)

■ Model Number Legend

Basic Models

Z-□□□□-□
1 2 3 4 5

1. **Ratings**
   01: 0.1 A (for micro load)
   15: 15 A
2. **Contact Gap**
   H: 0.25 mm (high-sensitivity, micro load)
   G: 0.5 mm (standard)
   E: 1.8 mm (high-capacity)
3. **Actuator**
   None: Pin plunger
   S: Slim spring plunger
   D: Short spring plunger
   K: Spring plunger (medium OP)
   K3: Spring plunger (high OP)
   Q3: Panel mount plunger (low OP)
   Q: Panel mount plunger (medium OP)
   Q8: Panel mount plunger (high OP)
   Q22: Panel mount roller plunger
   Q21: Panel mount cross roller plunger
   L: Leaf spring (high OF)
   L2: Roller leaf spring
   W21: Short hinge lever
   W: Hinge lever (low OF)
   W3: Hinge lever (medium OF)
   W32: Hinge lever (high OF)
   W4: Low-force hinge lever
   W44: Long hinge lever
   W78: Low-force wire hinge lever (low OF)
   W52: Low-force wire hinge lever (high OF)
   W22: Short hinge roller lever
   W2: Hinge roller lever
   W25: Hinge roller lever (large roller)
   W49: Short hinge cross roller lever
   W54: Hinge cross roller lever
   W2277: Unidirectional short hinge roller lever (Low OF)
   M: Reverse hinge lever
   M22: Reverse short hinge roller lever
   M2: Reverse hinge roller lever
   NJ: Flexible rod (high OF)
   NJS: Flexible rod (low OF)
4. **Degree of Protection**
   None: General-purpose
   55: Drip-proof
   A55: Drip-proof (including the terminals)
5. **Terminals**
   None: Solder terminal
   B: Screw terminal (with toothed washer)
   B5V: Screw terminal with terminal cover (for Z-15G□A55 only)

Note: For combinations of models, refer to the following pages.

Split-contact Models

Z-10F□Y-B
1 2 3 4 5

1. **Ratings**
   10: 10 A
2. **Contact Gap**
   F: 1 mm (high-capacity)
3. **Actuator**
   None: Pin plunger
   S: Slim spring plunger
   D: Short spring plunger
   Q: Panel mount plunger
   Q22: Panel mount roller plunger
   W: Hinge lever
   W22: Short hinge roller lever
   W2: Hinge roller lever
   M22: Reverse short hinge roller lever
4. **Construction**
   Y: Split-contact models
5. **Terminals**
   None: Solder terminal
   B: Screw terminal (with toothed washer)

Maintained-contact Models

Z-15-E□R
1 2 3 4

1. **Ratings**
   15: 15 A
2. **Contact Gap**
   E: 1.8 mm (High capacity)
3. **Actuator**
   None: Pin plunger
   S: Slim spring plunger
   W: Hinge lever
4. **Structure**
   R: Maintained-contact models

Ordering Information

■ List of Models

Basic Models (General-purpose)

Actuator			Standard	High-sensitivity	High-capacity	Micro load
			G (0.5 mm)	H (0.25 mm)	E (1.8 mm)	H (0.25 mm)
Pin plunger		Solder terminal	Z-15G	Z-15H	Z-15E	Z-01H
		Screw terminal	Z-15G-B	Z-15H-B	Z-15E-B	Z-01H-B
Slim spring plunger		Solder terminal	Z-15GS	Z-15HS	---	Z-01HS
		Screw terminal	Z-15GS-B	Z-15HS-B	---	Z-01HS-B
Short spring plunger		Solder terminal	Z-15GD	Z-15HD	Z-15ED	Z-01HD
		Screw terminal	Z-15GD-B	Z-15HD-B	Z-15ED-B	Z-01HD-B
Panel mount plunger	Low OP	Solder terminal	Z-15GQ3	---	---	---
		Screw terminal	Z-15GQ3-B			
	Medium OP	Solder terminal	Z-15GQ	Z-15HQ	Z-15EQ	Z-01HQ
		Screw terminal	Z-15GQ-B	Z-15HQ-B	Z-15EQ-B	Z-01HQ-B
	High OP	Solder terminal	Z-15GQ8	---	---	---
		Screw terminal	Z-15GQ8-B			
Panel mount roller plunger		Solder terminal	Z-15GQ22	Z-15HQ22	Z-15EQ22	---
		Screw terminal	Z-15GQ22-B	Z-15HQ22-B	Z-15EQ22-B	---
Panel mount cross roller plunger		Solder terminal	Z-15GQ21	Z-15HQ21	Z-15EQ21	---
		Screw terminal	Z-15GQ21-B	Z-15HQ21-B	Z-15EQ21-B	
Leaf spring		Solder terminal	Z-15GL	---	---	---
		Screw terminal	Z-15GL-B			
Roller leaf spring		Solder terminal	Z-15GL2	---	---	---
		Screw terminal	Z-15GL2-B			
Short hinge lever		Solder terminal	Z-15GW21	---	---	---
		Screw terminal	Z-15GW21-B			
Hinge lever	Low OF	Solder terminal	Z-15GW	Z-15HW	---	---
		Screw terminal	Z-15GW-B	Z-15HW-B	---	---
	Medium OF	Solder terminal	Z-15GW3	---	---	---
		Screw terminal	Z-15GW3-B			
	High OF	Solder terminal	Z-15GW32			---
		Screw terminal	Z-15GW32-B			
Low-force hinge lever		Solder terminal	Z-15GW4	Z-15HW24	---	---
		Screw terminal	Z-15GW4-B	Z-15HW24-B	---	
Low-force wire hinge lever	Low OF	Solder terminal	---	Z-15HW78	---	---
		Screw terminal		Z-15HW78-B	---	
	High OF	Solder terminal	---	Z-15HW52	---	---
		Screw terminal		Z-15HW52-B	---	
Short hinge roller lever		Solder terminal	Z-15GW22	Z-15HW22	Z-15EW22	Z-01HW22
		Screw terminal	Z-15GW22-B	Z-15HW22-B	Z-15EW22-B	Z-01HW22-B
Short hinge cross roller lever		Solder terminal	Z-15GW49	---	---	---
		Screw terminal	Z-15GW49-B			
Hinge roller lever	Parallel	Solder terminal	Z-15GW2	Z-15HW2	---	---
		Screw terminal	Z-15GW2-B	Z-15HW2-B	---	---
	Large roller	Solder terminal	Z-15GW25	---	---	---
		Screw terminal	Z-15GW25-B			

Actuator		Standard	High-sensitivity	High-capacity	Micro load
		G (0.5 mm)	H (0.25 mm)	E (1.8 mm)	H (0.25 mm)
Hinge cross roller lever	Solder terminal	Z-15GW54	---	---	---
	Screw terminal	Z-15GW54-B			
Unidirectional short hinge roller lever	Solder terminal	Z-15GW2277	---	---	---
	Screw terminal	Z-15GW2277-B			
Reverse hinge lever (see note)	Solder terminal	Z-15GM	---	---	---
	Screw terminal	Z-15GM-B			
Reverse short hinge roller lever (see note)	Solder terminal	Z-15GM22	---	---	---
	Screw terminal	Z-15GM22-B			
Reverse hinge roller lever (see note)	Solder terminal	Z-15GM2	---	---	---
	Screw terminal	Z-15GM2-B			

Note: The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.

Minimum Order Lot

The following models are available at the minimum order lot specified below. Orders must be placed per lot.

Actuator	Standard	High-sensitivity	Minimum order lot (pcs)
	G (0.5 mm)	H (0.25 mm)	
Short spring plunger	Z-15GD-B	---	10
Panel mount plunger	Z-15GQ Z-15GQ-B Z-15GQ8-B	---	
Panel mount roller plunger	Z-15GQ22 Z-15GQ22-B	---	
Panel mount cross roller plunger	Z-15GQ21-B	---	
Short hinge lever	Z-15GW21-B	---	
Hinge lever	Z-15GW Z-15GW-B	---	
Low-force hinge lever	Z-15GW4-B	Z-15HW24-B	
Low-force hinge wire lever	---	Z-15HW78-B	
Short hinge roller lever	Z-15GW22 Z-15GW22-B	---	
Hinge roller lever	Z-15GW2 Z-15GW2-B	---	
Reverse short hinge roller lever	Z-15GM22-B	---	
Reverse hinge roller lever	Z-15GM2-B	---	

Split-contact Models

Actuator			F (1.0 mm)
Pin plunger		Solder terminal	---
		Screw terminal	Z-10FY-B
Slim spring plunger		Solder terminal	---
		Screw terminal	Z-10FSY-B
Short spring plunger		Solder terminal	---
		Screw terminal	Z-10FDY-B
Panel mount plunger	Medium OP	Solder terminal	---
		Screw terminal	Z-10FQY-B
Panel mount roller plunger		Solder terminal	---
		Screw terminal	Z-10FQ22Y-B
Hinge lever	Low OP	Solder terminal	---
		Screw terminal	Z-10FWY-B
Short hinge roller lever		Solder terminal	---
		Screw terminal	Z-10FW22Y-B
Hinge roller lever	Parallel	Solder terminal	---
		Screw terminal	Z-10FW2Y-B
Reverse short hinge roller lever		Solder terminal	---
		Screw terminal	Z-10FM22Y-B

Note: The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.

Maintained-contact Models

Actuator	Maintained-contact model
Pin plunger	Z-15ER
Slim spring plunger	Z-15ESR
Hinge lever	Z-15EWR

Basic Models (Drip-proof Models)

Actuator			Basic model (drip-proof)		
			Standard		Micro load
			G (0.5 mm)		H (0.25 mm)
			Without drip-proof terminal protective cover	With drip-proof terminal protective cover	Without drip-proof terminal protective cover
Pin plunger		Solder terminal	Z-15G55	---	Z-01H55
		Screw terminal	Z-15G55-B	Z-15GA55-B5V	Z-01H55-B
Short spring plunger		Solder terminal	Z-15GD55	---	Z-01HD55
		Screw terminal	Z-15GD55-B		Z-01HD55-B
Spring plunger	Medium OP	Solder terminal	Z-15GK55	---	---
		Screw terminal	Z-15GK55-B		
	HIgh OP	Solder terminal	Z-15GK355	---	---
		Screw terminal	Z-15GK355-B	Z-15GK3A55-B5V	
Panel mount plunger	Medium OP	Solder terminal	Z-15GQ55	---	---
		Screw terminal	Z-15GQ55-B	Z-15GQA55-B5V	
Panel mount roller plunger		Solder terminal	Z-15GQ2255	---	---
		Screw terminal	Z-15GQ2255-B	Z-15GQ22A55-B5V	
Panel mount cross roller plunger		Solder terminal	---	---	---
		Screw terminal	Z-15GQ2155-B	Z-15GQ21A55-B5V	
Leaf spring		Solder terminal	Z-15GL55	---	---
		Screw terminal	Z-15GL55-B		
Roller leaf spring		Solder terminal	Z-15GL255	---	---
		Screw terminal	Z-15GL255-B		
Short hinge lever		Solder terminal	Z-15GW2155	---	---
		Screw terminal	Z-15GW2155-B		

Actuator			Basic model (drip-proof)		
			Standard		Micro load
			G (0.5 mm)		H (0.25 mm)
			Without drip-proof terminal protective cover	With drip-proof terminal protective cover	Without drip-proof terminal protective cover
Long hinge lever		Solder terminal	Z-15GW4455	---	---
		Screw terminal	Z-15GW4455-B	Z-15GW44A55-B5V	
Hinge lever		Solder terminal	Z-15GW55	---	---
		Screw terminal	Z-15GW55-B	Z-15GWA55-B5V	
Short hinge roller lever		Solder terminal	Z-15GW2255	---	Z-01HW2255
		Screw terminal	Z-15GW2255-B	Z-15GW22A55-B5V	Z-01HW2255-B
Hinge roller lever	Parallel	Solder terminal	Z-15GW255	---	---
		Screw terminal	Z-15GW255-B	Z-15GW2A55-B5V	
Unidirectional short hinge roller lever		Solder terminal	Z-15GW227755	---	---
		Screw terminal	Z-15GW227755-B	Z-15GW2277A55-B5V	
Reverse hinge lever (see note 1)		Solder terminal	Z-15GM55	---	---
		Screw terminal	Z-15GM55-B		
Reverse short hinge roller lever (see note 1)		Solder terminal	Z-15GM2255	---	---
		Screw terminal	Z-15GM2255-B		
Reverse hinge roller lever (see note 1)		Solder terminal	Z-15GM255	---	---
		Screw terminal	Z-15GM255-B		
Flexible rod (coil spring) (see note 2)		Solder terminal	Z-15GNJ55	---	---
		Screw terminal	Z-15GNJ55-B		

Note: 1. The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers.

2. The tip is made of resin.

Minimum Order Lot

The following models are available at the minimum order lot specified below. Orders must be placed per lot.

Actuator	Standard		High-sensitivity	Minimum order lot
	G (0.5 mm)		H (0.25 mm)	
Short spring plunger	Z-15GD55-B	---	---	10
Spring plunger	Z-15GK55-B	---	---	
Hinge lever	Z-15GW4455-B Z-15GW55 Z-15GW55-B	---	---	
Short hinge roller lever	Z-15GW2255 Z-15GW2255-B	---	---	
Hinge roller lever	Z-15GW255-B	---	---	
Flexible rod (coil spring)	Z-15GNJ55-B	---	---	
Flexible rod (steel wire)	---	---	Z-15HNJS55-B	

Basic Models (Drip-proof High-sensitivity Models)

Actuator		High-sensitivity
		H (0.25 mm)
Flexible rod (steel wire)	Solder terminal	Z-15HNJS55
	Screw terminal	Z-15HNJS55-B

Specifications

■ Approved Standards

Agency	Standard	File No.
UL	UL508	E41515
CSA	CSA C22.2 No. 55	LR21642
TÜV Rheinland	EN61058-1	R9451585

■ Approved Standard Ratings

UL508 (File No. E41515) CSA C22.2 No.55 (File No. LR21642)

Rated voltage	Z-15	Z-10F	Z-01H
125 VAC	15 A 1/8 HP	6 A 1/10 HP	0.1 A
250 VAC	15 A 1/4 HP	6 A 1/8 HP	---
480 VAC	15 A	6 A	---
30 VDC	---	---	0.1 A
125 VDC	0.5 A	0.6 A	---
250 VDC	0.25 A	0.3 A	---

Note: Consult with OMRON about approved part numbers by standards.

EN (EN61058-1)

Rated voltage	Z-15H□-B	Z-15G□-B	Z-01H□-B
250 VAC	15 A	15 A	---
125 VAC	---	---	0.1 A
30 VDC	---	---	0.1 A

■ Ratings

Z-15 (Except Micro Load and Flexible Rod Models)

Item / Model	Rated voltage	Non-inductive load				Inductive load			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
G, H, E	**125 VAC 250 VAC 500 VAC**	15 (10) A (see note) 15 (10) A (see note) 10 A		3 A 2.5 A 1.5 A	1.5 A 1.25 A 0.75 A	15 (10) A (see note) 15 (10) A (see note) 6 A		5 A 3 A 1.5 A	2.5 A 1.5 A 0.75 A
G	**8 VDC 14 VDC 30 VDC 125 VDC 250 VDC**	15 A 15 A 6 A 0.5 A 0.25 A		3 A 3 A 3 A 0.5 A 0.25 A	1.5 A 1.5 A 1.5 A 0.5 A 0.25 A	15 A 10 A 5 A 0.05 A 0.03 A		5 A 5 A 5 A 0.05 A 0.03 A	2.5 A 2.5 A 2.5 A 0.05 A 0.03 A
H	**8 VDC 14 VDC 30 VDC 125 VDC 250 VDC**	15 A 15 A 2 A 0.4 A 0.2 A		3 A 3 A 2 A 0.4 A 0.2 A	1.5 A 1.5 A 1.4 A 0.4 A 0.2 A	15 A 10 A 1 A 0.03 A 0.02 A		5 A 5 A 1 A 0.03 A 0.02 A	2.5 A 2.5 A 1 A 0.03 A 0.02 A
E	**8 VDC 14 VDC 30 VDC 125 VDC 250 VDC**	15 A 15 A 15 A 0.75 A 0.3 A		3 A 3 A 3 A 0.75 A 0.3 A	1.5 A 1.5 A 1.5 A 0.75 A 0.3 A	15 A 15 A 10 A 0.4 A 0.2 A		5 A 5 A 5 A 0.4 A 0.2 A	2.5 A 2.5 A 2.5 A 0.4 A 0.2 A

Note: Figures in parentheses are for the Z-15HW52 and Z-15HW78(-B) models, the AC ratings of these models are 125 and 250 V only.

Z-15 (Flexible Rod Models)

Rated voltage	Non-inductive load				Inductive load			
	Resistive load		Lamp load		Inductive load		Motor load	
	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC 250 VAC	15 A		2 A 1 A	1 A 0.5 A	7 A 5 A		2.5 A 1.5 A	2 A 1 A
8 VDC 14 VDC 30 VDC 125 VDC 250 VDC	15 A 15 A 2 A 0.4 A 0.2 A		2 A 2 A 2 A 0.4 A 0.2 A	1 A 1 A 1 A 0.4 A 0.2 A	7 A 7 A 1 A 0.03 A 0.02 A		3 A 3 A 1 A 0.03 A 0.02 A	1.5 A 1.5 A 0.5 A 0.03 A 0.02 A

Z-01H

Rated voltage	Resistive load	
	NC	NO
125 VAC	0.1 A	
8 VDC 14 VDC 30 VDC	0.1 A 0.1 A 0.1 A	

Z-10F

Model	Rated voltage	Non-inductive load				Inductive load			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
Series connection	125 VAC 250 VAC	10 A 10 A		4 A 2.5 A	2 A 1.5 A	6 A		5 A 3 A	2.5 A 1.5 A
	30 VDC 125 VDC 250 VDC	10 A 1 A 0.6 A		4 A 1 A 0.6 A	2 A 1 A 0.6 A	6 A 0.1 A 0.05 A		6 A 0.1 A 0.05 A	3 A 0.1 A 0.05 A
Parallel connection	125 VAC 250 VAC	6 A 6 A		3 A 2.5 A	1.5 A 1.25 A	4 A 4 A		4 A 2 A	2 A 1 A
	30 VDC 125 VDC 250 VDC	6 A 0.6 A 0.3 A		4 A 0.6 A 0.3 A	2 A 0.6 A 0.3 A	4 A 0.1 A 0.05 A		6 A 0.1 A 0.05 A	3 A 0.1 A 0.05 A

Note: 1. The above current ratings are the values of the steady-state current.
2. Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
3. Lamp load has an inrush current of 10 times the steady-state current.
4. Motor load has an inrush current of 6 times the steady-state current.
5. The normally closed and normally open ratings of reverse hinge lever models are opposite to each other.
6. The AC ratings of molded terminals are 125 and 250 V only.
7. The ratings values apply under the following test conditions:
Ambient temperature: 20±2°C
Ambient humidity: 65±5%
Operating frequency: 20 operations/min

■ Characteristics

Item	Basic (except micro load and flexible rod)/ maintained contact Z-15	Basic (micro load) Z-01H	Basic (flexible rod) Z-15	Split-contact Z-10F
Operating speed (see note)	0.01 mm to 1 m/s (see note 1)		1 mm to 1 m/s	0.1 mm to 1 m/s (see note 1)
Operating frequency	Mechanical: 240 operations/min Electrical: 20 operations/min		Mechanical: 120 operations/min Electrical: 20 operations/min	Mechanical: 240 operations/min Electrical: 20 operations/min
Insulation resistance	100 MΩ min. (at 500 VDC)			
Contact resistance	15 mΩ max. (initial value)	50 mΩ max. (initial value)	15 mΩ max. (initial value)	25 mΩ max. (initial value)
Dielectric strength	Between contacts of same polarity Contact gap G: 1,000 VAC, 50/60 Hz for 1 min Contact gap H: 600 VAC, 50/60 Hz for 1 min Contact gap E: 1,500 VAC, 50/60 Hz for 1 min Between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts 2,000 VAC, 50/60 Hz for 1 min		Between contacts of same polarity Contact gap G: 1,000 VAC, 50/60 Hz for 1 min Contact gap H: 600 VAC, 50/ 60 Hz for 1 min Between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts 2,000 VAC, 50/60 Hz for 1 min	Between contacts of same polarity Contact gap F: 1,500 VAC, 50/60 Hz for 1 min Between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts 2,000 VAC, 50/60 Hz for 1 min
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note 5)		Malfunction: 10 to 20 Hz, 1.5-mm double amplitude (see note 5)	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note 5)
Shock resistance	Destruction: 1,000 m/s^2 {approx. 100G} max. Malfunction: 300 m/s^2 {approx. 30G} max. (see note 2, 5)		Destruction: 1,000 m/s^2 {approx. 100G} max. Malfunction: 50 m/s^2 {approx. 5G} max. (see note 5)	Destruction: 1,000 m/s^2 {approx. 100G} max. Malfunction: 300 m/s^2. {approx. 30G} max. (see note 3, 5)
Durability	Mechanical: Contact gap G, H: 20,000,000 operations min. (see note 4) Contact gap E: 300,000 operations Electrical: Contact gap G, H: 500,000 operations min. Contact gap E: 100,000 operations min.		Mechanical: 1,000,000 operations min. Electrical: 100,000 operations min.	Mechanical: 500,000 operations min. (see note 1) Electrical: 100,000 operations min.
Degree of protection	General-purpose: IP00 Drip-proof: IP62			
Degree of protection against electric shock	Class I			
Proof tracking index (PTI)	175			
Switch category	D (IEC335-1)			
Ambient temperature	Operating: General-purpose: –25°C to 80°C (with no icing) Drip-proof: –15°C to 80°C (with no icing)			
Ambient humidity	Operating: General-purpose: 35% to 85% Drip-proof: 35% to 95%			
Weight	Approx. 22 to 58 g		Approx. 42 to 48 g	Approx. 34 to 61 g

Note: 1. The values are for the plunger models. (For the lever models, the values are at the plunger section.) (Contract your OMRON representative for other models.)

2. The values are for the Z-15G pin plunger.

3. The values are for the Z-10FY-B.

4. The values are for the pin plunger. The durability for models other than the pin plunger is 10,000,000 min.

5. Malfunction: 1 ms max.

■ Contacts Specification

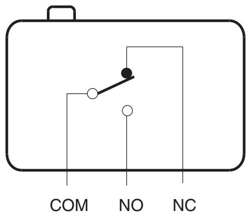
Item		Z-15	Z-01H	Z-10F
Contacts	Shape	Rivet	Single crossbar	Rivet
	Material	Silver alloy	Gold alloy	Silver alloy
Inrush current	NC	30 A max.	0.1 A max.	40 A max.
	NO	15 A max.	0.1 A max.	20 A max.

■ Contact Form

Basic Models

General-purpose

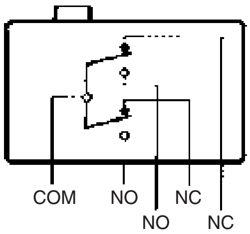
Contact Form (SPDT)



Note: The Z-15GM is a reversible model and the NO and NC positions are reversed.

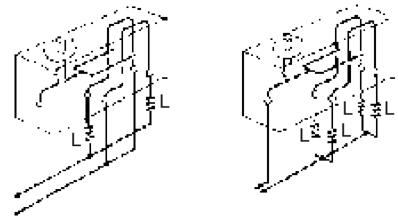
Split-contact Models

Contact Form (Split-contact)



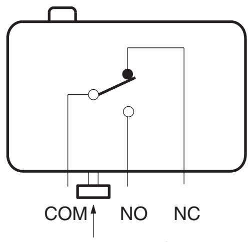
Connection Example

Series Connection **Parallel Connection**



Maintained-contact Models

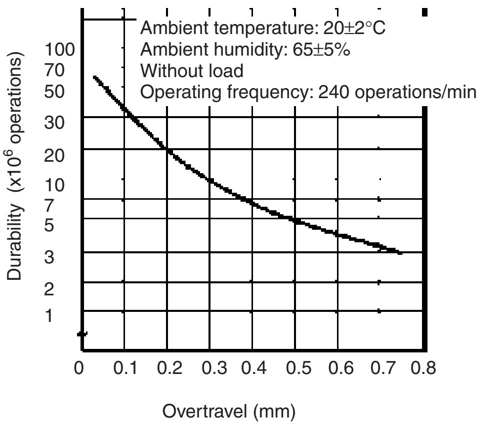
Contact Form (Maintained-contact)



Engineering Data

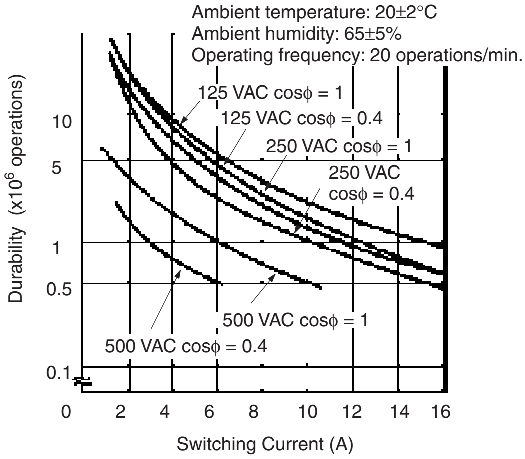
■ Mechanical Durability

Z-15G



■ Electrical Durability

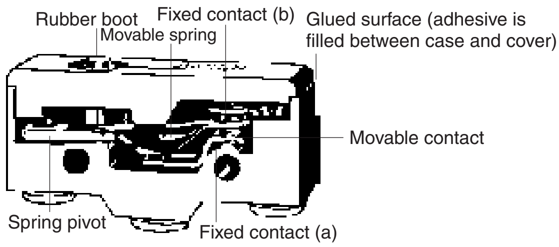
Z-15G



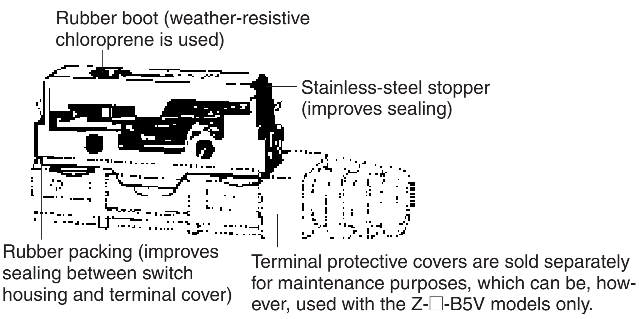
Nomenclature

■ Drip-proof Construction

Without Terminal Protective Cover



With Terminal Protective Cover



Limit switches

Dimensions

Note: 1. Unless otherwise indicated, all units are in millimeters.
2. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

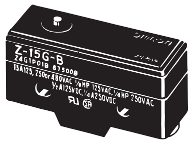
■ Dimensions and Operating Characteristics

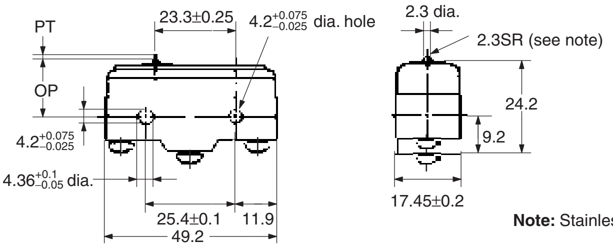
Basic Models (General-purpose) & Split-contact Models

The models, illustrations, and graphics are for screw-terminal models (-B). The "-A" at the end of the model number for solder terminal models has been omitted. For details of the terminals, refer to *Terminals* above.

Pin Plunger

Z-15G-B, Z-15E-B
Z-15H-B, Z-01H-B
Z-10FY-B



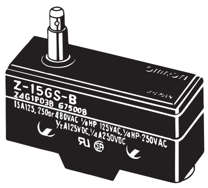


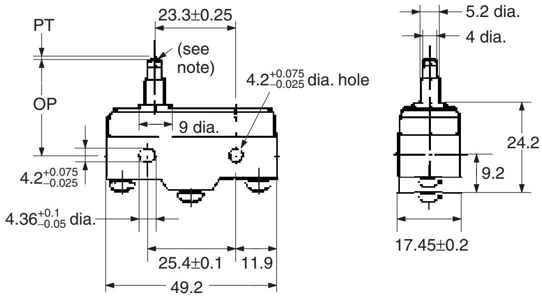
Note: Stainless-steel plunger

	Z-15G-B	Z-15H-B	Z-15E-B	Z-01H-B	Z-10FY-B
OF	2.45 to 3.43 N {250 to 350 gf}	1.96 to 2.75 N {200 to 280 gf}	6.12 to 7.85 N {625 to 800 gf}	2.45 N {250 gf} max.	4.46 to 7.26 N {455 to 740 gf}
RF min.	1.12 N {114 gf}	1.12 N {114 gf}	1.12 N {114 gf}	0.78 N {80 gf}	1.12 N {114 gf}
PT max.	0.4 mm	0.3 mm	0.8 mm	0.5 mm	0.8 mm
OT min.	0.13 mm	0.13 mm	0.13 mm	0.13 mm	0.13 mm
MD max.	0.05 mm	0.025 mm	0.13 mm	0.04 mm	0.1 mm
OP	15.9±0.4 mm				

Slim Spring Plunger

Z-15GS-B, Z-15HS-B,
Z-01HS-B, Z-10FSY-B



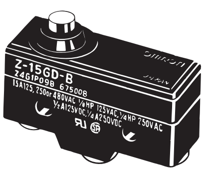


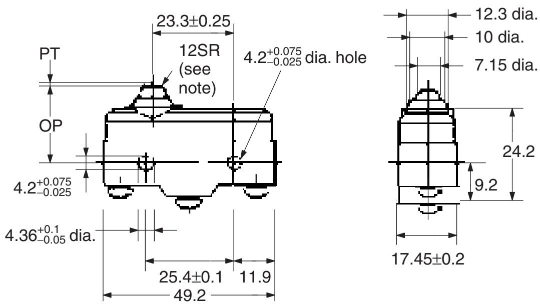
Note: Stainless-steel plunger (flat, 1R chamfered)

	Z-15GS-B	Z-15HS-B	Z-01HS	Z-10FSY-B
OF	2.45 to 3.43 N {250 to 350 gf}	1.96 to 2.79 N {200 to 285 gf}	2.45 N {250 gf} max.	4.46 to 7.26 N {455 to 740 gf}
RF min.	1.12 N {114 gf}	1.12 N {114 gf}	0.78 N {80 gf}	1.12 N {114 gf}
PT max.	0.4 mm	0.3 mm	0.5 mm	0.8 mm
OT min.	1.6 mm	1.6 mm	1.6 mm	1.6 mm
MD max.	0.05 mm	0.025 mm	0.05 mm	0.1 mm
OP	28.2±0.5 mm			

Short Spring Plunger

Z-15GD-B, Z-01HD-B
Z-15HD-B, Z-10FDY-B
Z-15ED-B



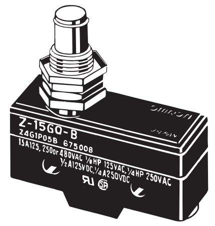


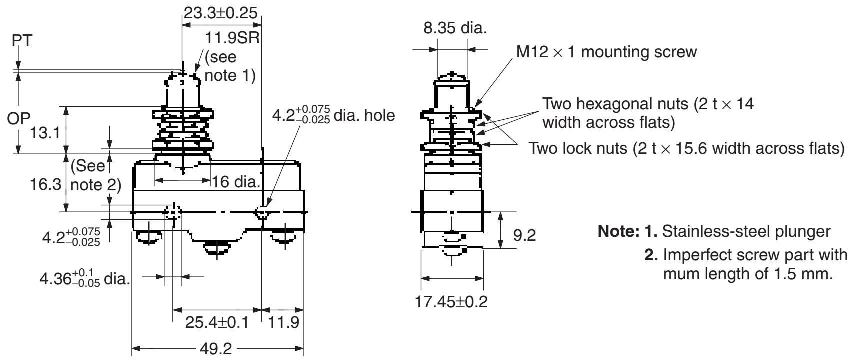
Note: Plated iron plunger

	Z-15GD-B	Z-15HD-B	Z-15ED-B	Z-01HD-B	Z-10FDY-B
OF	2.45 to 3.43 N {250 to 350 gf}	1.96 to 2.79 N {200 to 285 gf}	6.13 to 7.85 N {625 to 800 gf}	2.45 N {250 gf} max.	4.46 to 7.26 N {455 to 740 gf}
RF min.	1.12 N {114 gf}	1.12 N {114 gf}	1.12 N {114 gf}	0.78 N {80 gf}	1.12 N {114 gf}
PT max.	0.4 mm	0.3 mm	0.8 mm	0.5 mm	0.8 mm
OT min.	1.6 mm	1.6 mm	1.6 mm	1.6 mm	1.6 mm
MD max.	0.05 mm	0.025 mm	0.13 mm	0.05 mm	0.1 mm
OP	21.5±0.5 mm				

Panel Mount Plunger

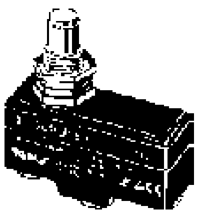
Z-15GQ-B, Z-01HQ-B
Z-15HQ-B, Z-10FQY-B
Z-15EQ-B

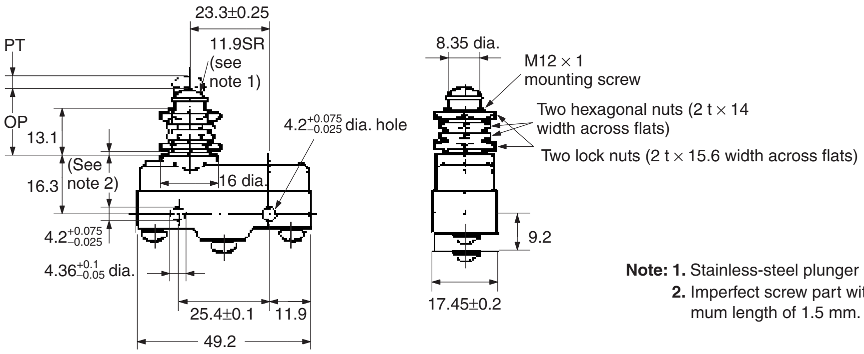




Note: 1. Stainless-steel plunger
2. Imperfect screw part with a maximum length of 1.5 mm.

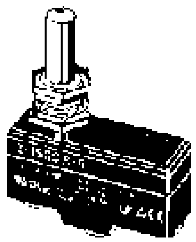
Z-15GQ3-B

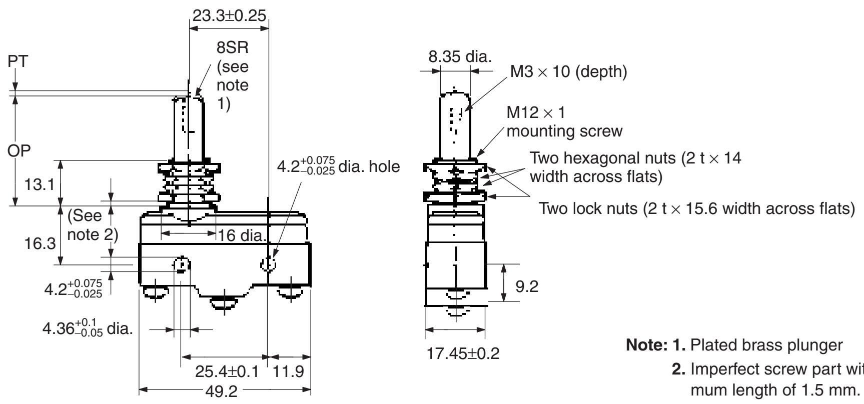




Note: 1. Stainless-steel plunger
2. Imperfect screw part with a maximum length of 1.5 mm.

Z-15GQ8-B





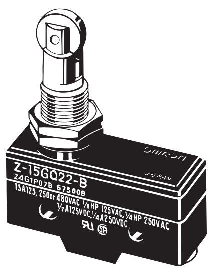
Note: 1. Plated brass plunger
2. Imperfect screw part with a maximum length of 1.5 mm.

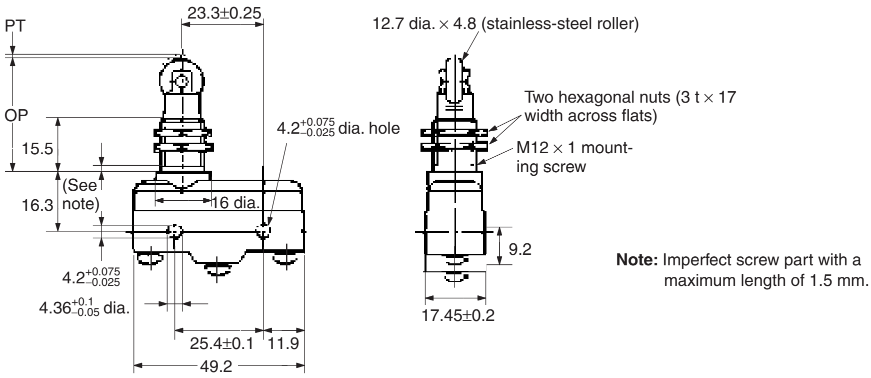
	Z-15GQ-B	Z-15HQ-B	Z-15EQ-B	Z-01HQ-B	Z-10FQY-B	Z-15GQ3-B	Z-15GQ8-B
OF	2.45 to 3.43 N {250 to 350 gf}	1.96 to 2.79 N {200 to 285 gf}	6.13 to 7.85 N {625 to 800 gf}	2.45 N {250 gf} max.	4.46 to 7.26 N {455 to 740 gf}	2.45 to 3.43 N {250 to 350 gf}	2.45 to 3.43 N {250 to 350 gf}
RF min.	1.12 N {114 gf}	1.12 N {114 gf}	1.12 N {114 gf}	0.78 N {80 gf}	1.12 N {114 gf}	1.12 N {114 gf}	1.12 N {114 gf}
PT max.	0.4 mm	0.3 mm	0.8 mm	0.5 mm	0.8 mm	4.2 mm	0.5 mm
OT min.	5.5 mm	5.5 mm	5.5 mm	5.5 mm	5.5 mm	2.5 mm	5.5 mm
MD max.	0.05 mm	0.025 mm	0.13 mm	0.05 mm	0.1 mm	2.2 mm	0.05 mm
OP	21.8±0.8 mm					18.8±0.8 mm	32.5±1 mm

Note: 1. Do not use the M12 mounting screw and the case mounting hole at the same time, or excessive pulling force will be imposed on the Switch and the case and cover may be damaged.
2. On the model Z-15GQ3-B, PT can be set to a value larger than that for the Z-15GQ.
3. On the model Z-15GQ8-B, operating position can be adjusted by providing a screw in the plunger section.
The M3 hole with a depth of 10 mm is a through hole. Take precautions so that no water or screw lock agent penetrates into the hole.

Panel Mount Roller Plunger

Z-15GQ22-B, Z-15EQ22-B
Z-15HQ22-B, Z-10FQ22Y-B



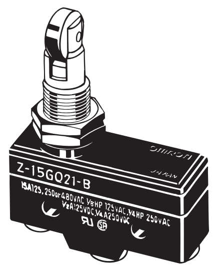


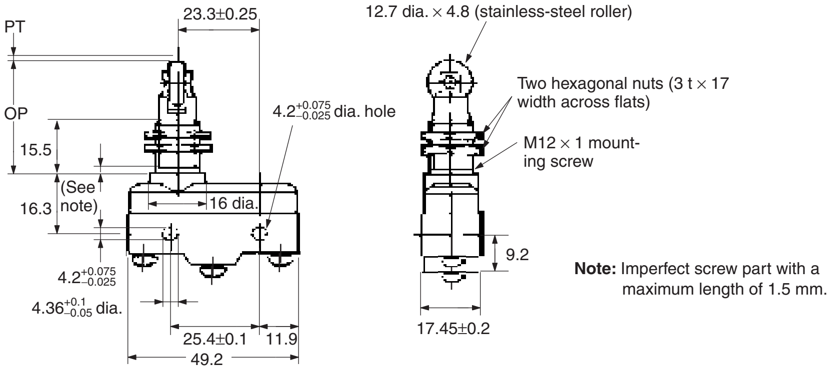
	Z-15GQ22-B	Z-15HQ22-B	Z-15EQ22-B	Z-10FQ22Y-B
OF	2.45 to 3.43 N {250 to 350 gf}	1.96 to 2.79 N {200 to 285 gf}	6.13 to 7.85 N {625 to 800 gf}	4.46 to 7.26 N {455 to 740 gf}
RF min.	1.12 N {114 gf}	1.12 N {114 gf}	1.12 N {114 gf}	1.12 N {114 gf}
PT max.	0.4 mm	0.3 mm	0.8 mm	1 mm
OT min.	3.58 mm	3.58 mm	3.58 mm	3.55 mm
MD max.	0.05 mm	0.025 mm	0.13 mm	0.1 mm
OP	33.4±1.2 mm			

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Panel Mount Cross Roller Plunger

Z-15GQ21-B, Z-15HQ21-B,
Z-15EQ21-B



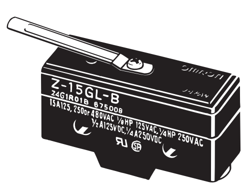


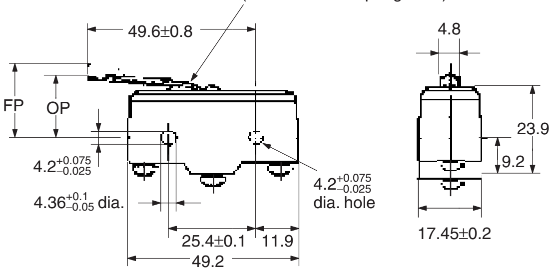
	Z-15GQ21-B	Z-15HQ21-B	Z-15EQ21-B
OF	2.45 to 3.43 N {250 to 350 gf}	1.96 to 2.79 N {200 to 285 gf}	6.13 to 7.85 N {625 to 800 gf}
RF min.	1.12 N {114 gf}	1.12 N {114 gf}	1.12 N {114 gf}
PT max.	0.4 mm	0.3 mm	0.8 mm
OT min.	3.58 mm	3.58 mm	3.58 mm
MD max.	0.05 mm	0.025 mm	0.13 mm
OP	33.4±1.2 mm		

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Leaf Spring

Z-15GL-B



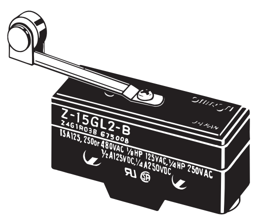


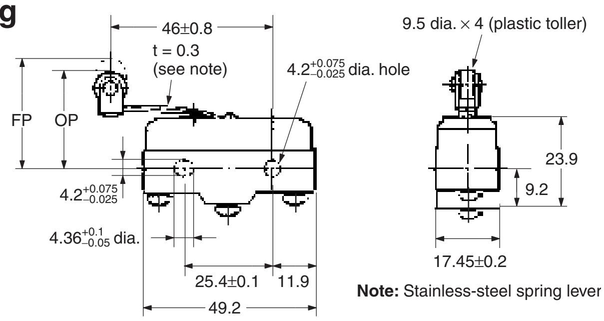
OF max.	1.38 N {141 gf}
RF min.	0.14 N {14 gf}
OT min.	1.6 mm (see note)
MD max.	1.3 mm
FP max.	20.6 mm
OP	17.4±0.8 mm

Note: When operating, be sure not to exceed 1.6 mm.

Roller Leaf Spring

Z-15GL2-B



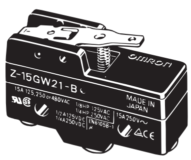


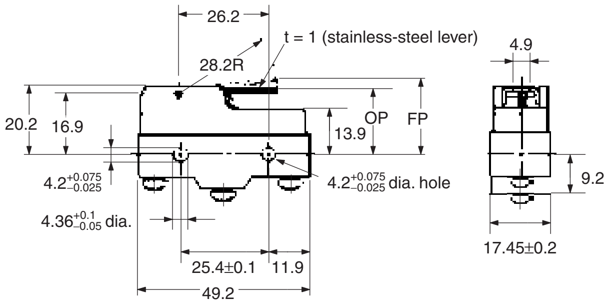
OF max.	1.38 N {141 gf}
RF min.	0.14 M {14 gf}
OT min.	1.6 mm (see note)
MD max.	1.3 mm
FP max.	31.8 mm
OP	28.6±0.8 mm

Note: When operating, be sure not to exceed 1.6 mm.

Short Hinge Lever

Z-15GW21-B

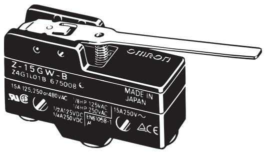


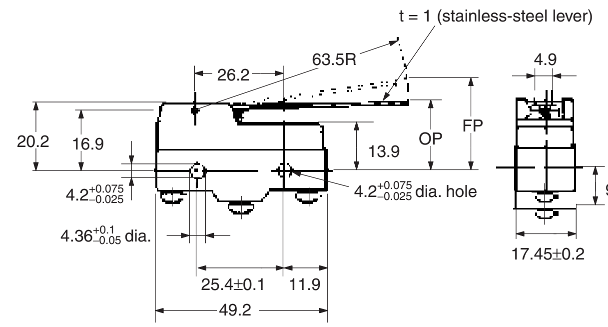


OF max.	1.57 N {160 gf}
RF min.	0.27 N {28 gf}
OT min.	2 mm
MD max.	1 mm
FP max.	24.8 mm
OP	19±0.8 mm

Hinge Lever

Z-15GW-B, Z-15GW32-B
Z-15HW-B, Z-10FWY-B
Z-15GW3-B (Lever Length: 56R)
(see note)



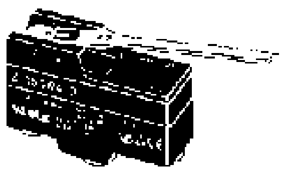


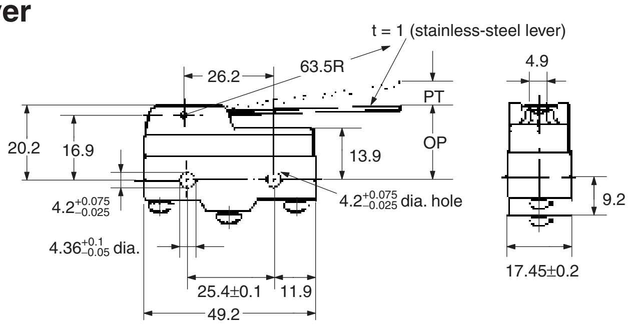
Note: The external dimensions of the actuator vary.

	Z-15GW-B	Z-15HW-B	Z-15GW32-B	Z-10FWY-B	Z-15GW3-B
OF max.	0.69 N {70 gf}	0.66 N {67 gf}	1.47 to 1.96 N {150 to 200 gf}	0.88 N {90 gf}	0.78 N {80 gf}
RF min.	0.14 N {14 gf}	0.14 N {14 gf}	0.92 N {94 gf}	0.14 N {14 gf}	0.15 N {15.5 gf}
OT min.	5.6 mm	5.6 mm	5.6 mm	5.6 mm	4.8 mm
MD max.	1.27 mm	0.63 mm	1.27 mm	2.4 mm	1.12 mm
FP max.	28.2 mm	27.4 mm	28.2 mm	29.8 mm	27.2 mm
OP	19±0.8 mm				

Low-force Hinge Lever

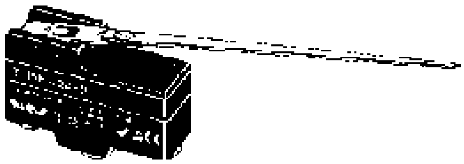
Z-15GW4-B

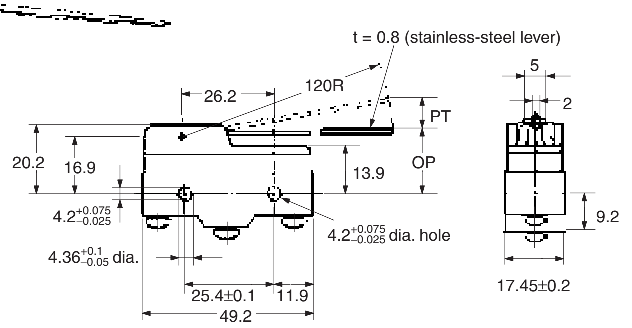




OF max.	274 mN {28 gf}
RF min.	34.3 mN {3.5 gf}
PT max.	10 mm
OT min.	5.6 mm
MD max.	1.27 mm
OP	19±0.8 mm

Z-15HW24-B

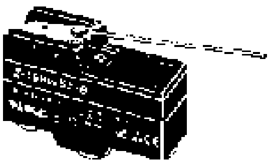


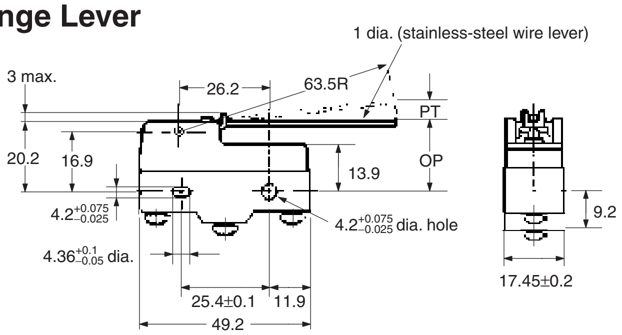


OF max.	58.8 mN {6 gf}
RF min.	4.90 mN {0.5 gf}
PT max.	19.8 mm
OT min.	10 mm
MD max.	2 mm
OP	19.8±1.6 mm

Low-force Wire Hinge Lever

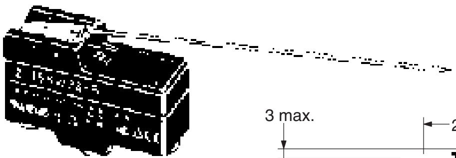
Z-15HW52-B

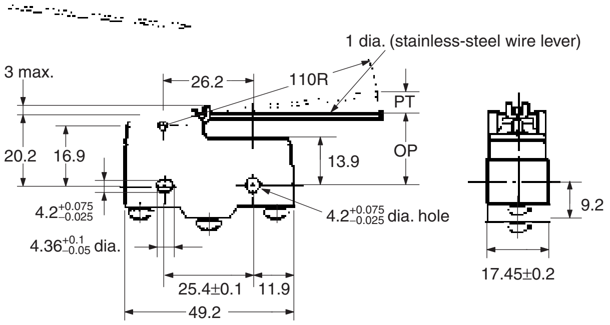




OF max.	58.8 mN {6 gf}
RF min.	4.90 mN {0.5 gf}
PT max.	8.3 mm
OT min.	5.6 mm
MD max.	0.65 mm
OP	19±1 mm

Z-15HW78-B



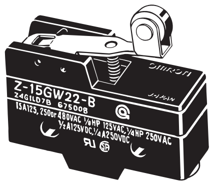


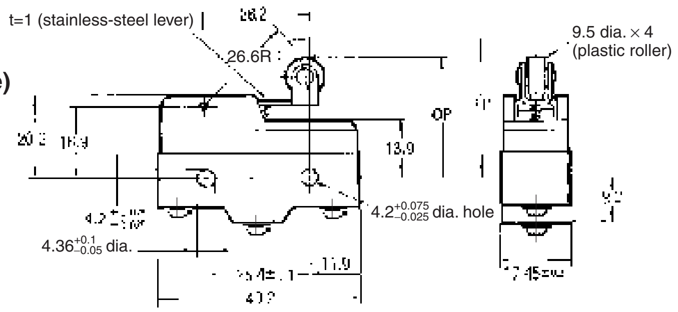
OF max.	39.2 mN {4 gf}
RF min.	2.94 mN {0.3 gf}
PT max.	10 mm
OT min.	6 mm
MD max.	3 mm
OP	20±1 mm

Note: The AC rating is 10 A at 125 or 250 V.

Short Hinge Roller Lever

Z-15GW22-B, Z-01HW22-B
Z-15HW22-B, Z-10FW22Y-B (see note)
Z-15EW22-B, Z-15GW2-B
Z-15HW2-B (see note), Z-10FW2Y-B (see note)
(Lever Length: 48.5R) (see note)



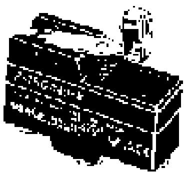


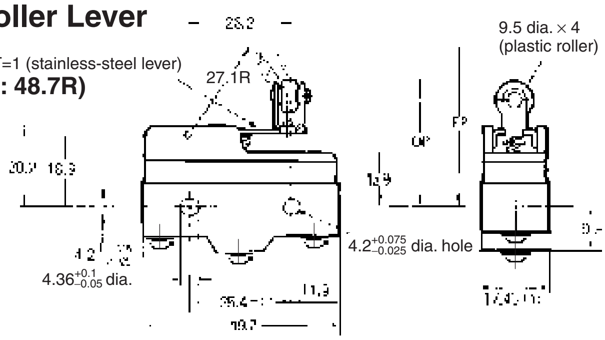
Note: The external dimensions of the actuator vary.

	Z-15GW22-B	Z-15HW22-B	Z-15EW22-B	Z-01HW22-B	Z-10FW22Y-B	Z-15GW2-B	Z-15HW2-B	Z-10FW2Y-B
OF max.	1.57 N {160 gf}	1.47 N {150 gf}	1.94 N {198 gf}	1.57 N {160 gf}	2.45 N {250 gf}	0.98 N {100 gf}	0.84 N {86 gf}	1.27 N {130 gf}
RF min.	0.41 N {42 gf}	0.41 N {42 gf}	0.41 N {42 gf}	0.27 N {28 gf}	0.34 N {35 gf}	0.22 N {22 gf}	0.22 N {22 gf}	0.22 N {22 gf}
OT min.	2.4 mm	2.4 mm	2.4 mm	2.4 mm	2.4 mm	4 mm	4 mm	4 mm
MD max.	0.5 mm	0.45 mm	1.3 mm	0.5 mm	1 mm	1.02 mm	0.6 mm	2 mm
FP max.	32.5 mm		35.1 mm	32.5 mm	34.8 mm	36.5 mm		37.4 mm
OP	30.2±0.4 mm		30.2±0.4 mm	30.2±0.4 mm	30.2±0.4 mm	30.2±0.8 mm		30.2±0.8 mm

Short Hinge Cross Roller Lever

Z-15GW49-B
Z-15GW54-B (Lever Length: 48.7R)
(see note)

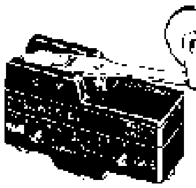


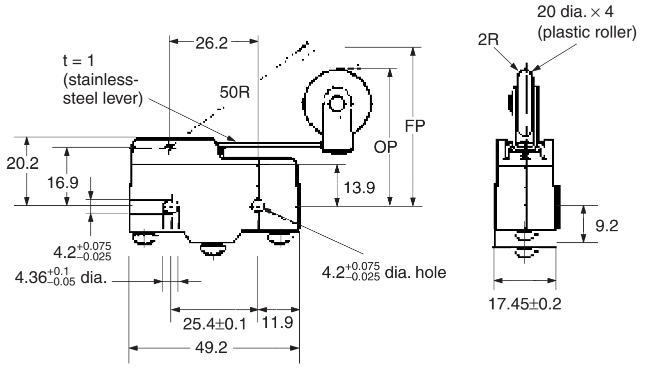


Model	Z-15GW49-B	Z-15GW54-B
OF max.	1.67 N {170 gf}	0.98 N {100 gf}
RF min.	0.41 N {42 gf}	0.22 N {22 gf}
OT min.	2.4 mm	4 mm
MD max.	0.51 mm	1 mm
FP max.	33.3 mm	37.3 mm
OP	31±0.4 mm	31±0.8 mm

Note: The external dimensions of the actuator vary.

Z-15GW25-B

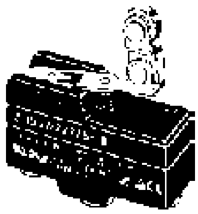


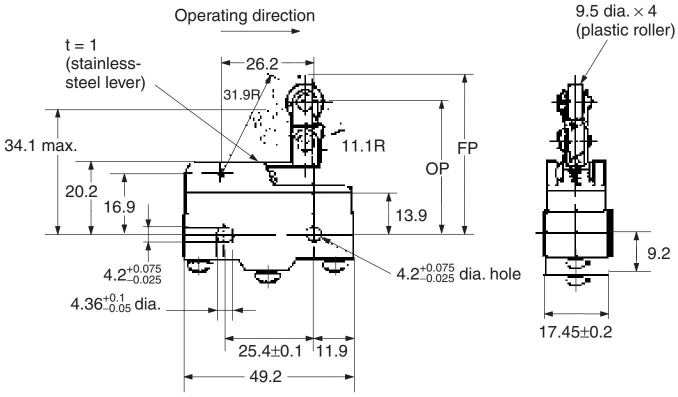


OF max.	0.98 N {100 gf}
RF min.	0.21 N {21 gf}
OT min.	4 mm
MD max.	1.6 mm
FP max.	47.5 mm
OP	41.2±0.8 mm

Unidirectional Short Hinge Roller Lever

Z-15GW2277-B



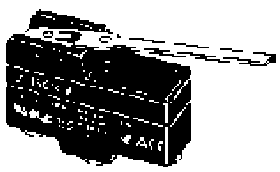


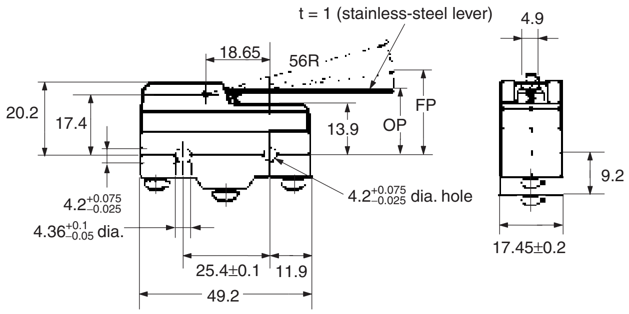
OF max.	1.67 N {170 gf}
RF min.	0.41 N {42 gf}
OT min.	2.4 mm
MD max.	0.51 mm
FP max.	43.6 mm
OP	41.3±0.8 mm

Reverse Hinge Lever

Note: The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.

Z-15GM-B



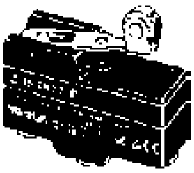


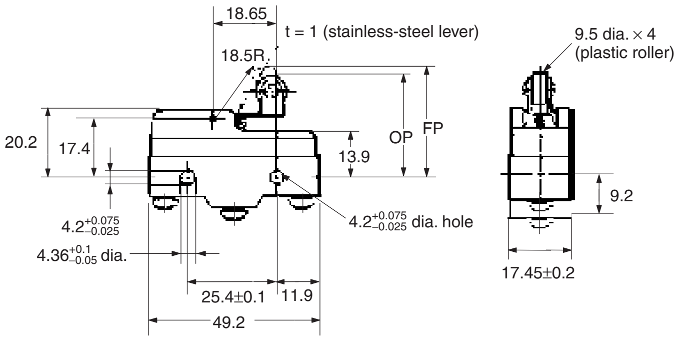
OF max.	1.67 N {170 gf}
RF min.	0.27 N {28 gf}
OT min.	5.6 mm
MD max.	0.89 mm
FP max.	23.8 mm
OP	19±0.8 mm

Reverse Short Hinge Roller Lever

Note: The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.

Z-15GM22-B,
Z-10FM22Y-B



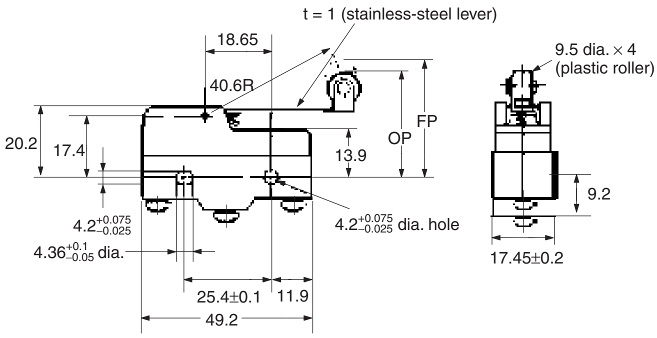


Model	Z-15GM22-B	Z-10FM22Y-B
OF max.	5.28 N {538 gf}	6.37 N {650 gf}
RF min.	1.67 N {170 gf}	1.67 N {170 gf}
OT min.	2 mm	2 mm
MD max.	0.28 mm	0.56 mm
FP max.	31.8 mm	33 mm
OP	29.4±0.4 mm	29.4±0.4 mm

Reverse Hinge Roller Lever

Note: The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.

Z-15GM2-B

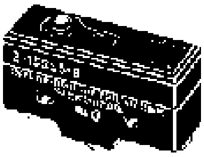


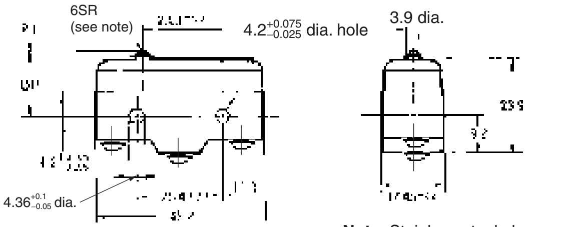
OF max.	2.35 N {240 gf}
RF min.	0.55 N {56 gf}
OT min.	4 mm
MD max.	0.64 mm
FP max.	35 mm
OP	30.2±0.8 mm

Basic Models (Drip-proof) without Terminal Protective Cover

Pin Plunger

Z-15G55-B
Z-01H55-B



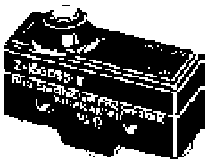


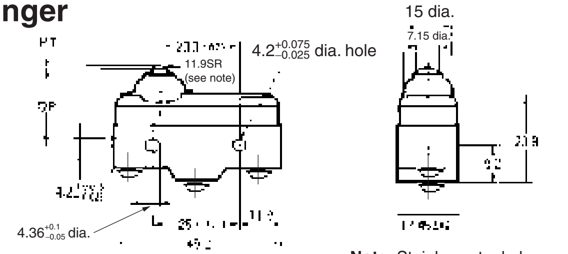
Note: Stainless-steel plunger

Model	Z-15G55-B	Z-01H55-B
OF	2.45 to 4.22 N {250 to 431 gf}	3.43 N {350 gf} max.
RF min.	1.12 N {114 gf}	0.78 N {80 gf}
PT max.	2.2 mm	2.2 mm
OT min.	0.13 mm	0.13 mm
MD max.	0.06 mm	0.06 mm
OP	15.9±0.4 mm	

Short Spring Plunger

Z-15GD55-B
Z-01HD55-B



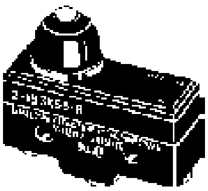


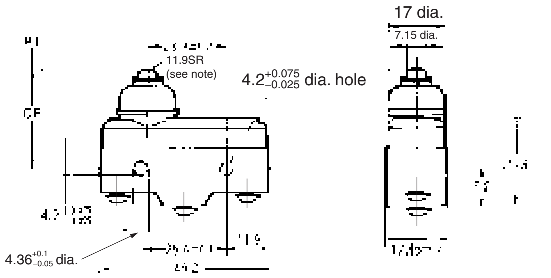
Note: Stainless-steel plunger

Model	Z-15GD55-B	Z-01HD55-B
OF max.	5.30 N {541 gf}	3.63 N {370 gf}
RF min.	1.12 N {114 gf}	0.78 N {80 gf}
PT max.	1.8 mm	1.9 mm
OT min.	1.6 mm	1.6 mm
MD max.	0.06 mm	0.06 mm
OP	21.5±0.5 mm	

Spring Plunger

Z-15GK55-B

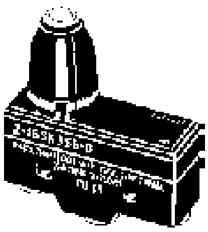


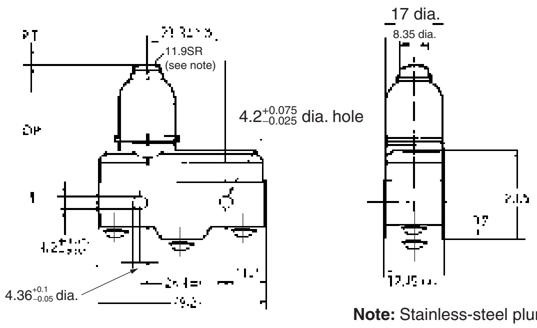


Note: Stainless-steel plunger

OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	2.3 mm
OT min.	1.6 mm
MD max.	0.06 mm
OP	28.2±0.5 mm

Z-15GK355-B



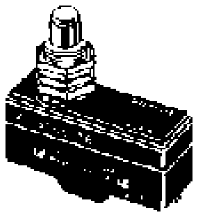


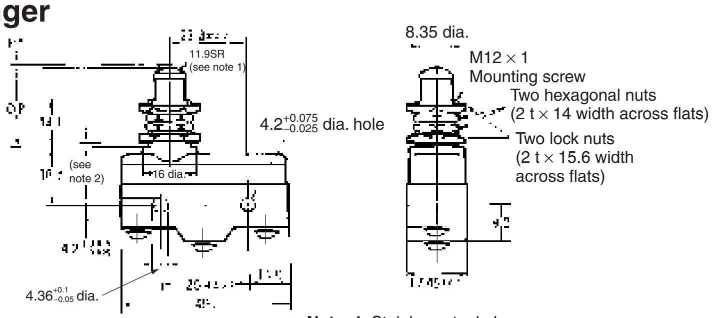
Note: Stainless-steel plunger

OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	2.4 mm
OT min.	3.5 mm
MD max.	0.06 mm
OP	37.8±1.2 mm

Panel Mount Plunger

Z-15GQ55-B





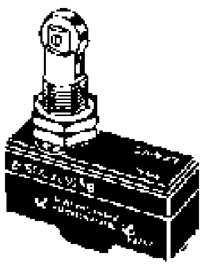
Note: 1. Stainless-steel plunger
2. Imperfect screw part with a maximum length of 1.5 mm.

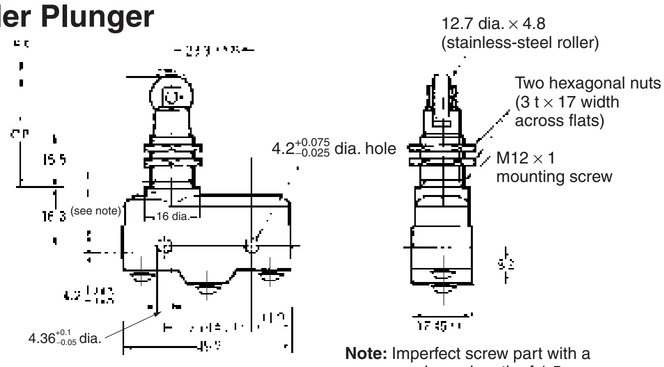
OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	1.8 mm
OT min.	5.5 mm
MD max.	0.06 mm
OP	21.8±0.8 mm

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Panel Mount Roller Plunger

Z-15GQ2255-B





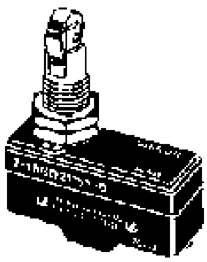
Note: Imperfect screw part with a maximum length of 1.5 mm.

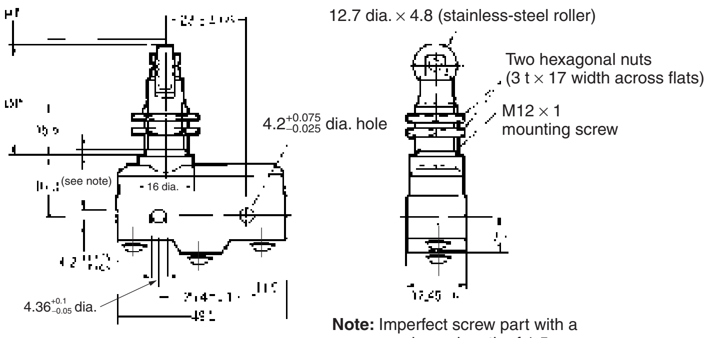
OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	1.8 mm
OT min.	3.58 mm
MD max.	0.06 mm
OP	33.4±1.2 mm

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Panel Mount Cross Roller Plunger

Z-15GQ2155-B





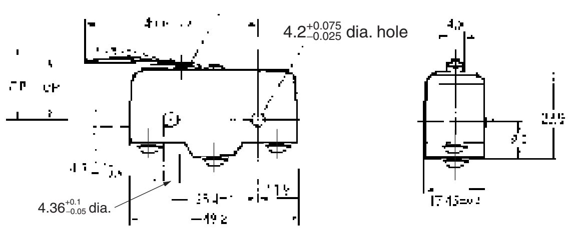
Note: Imperfect screw part with a maximum length of 1.5 mm.

OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	1.8 mm
OT min.	3.58 mm
MD max.	0.06 mm
OP	33.4±1.2 mm

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Leaf Spring

Z-15GL55-B

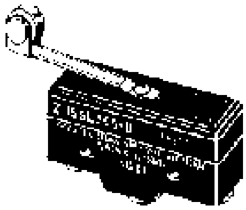


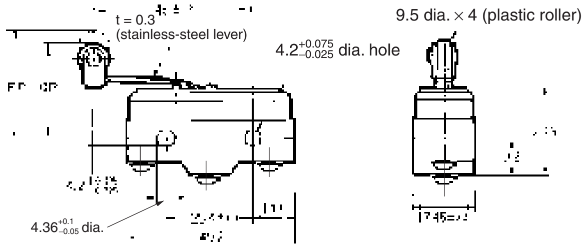
OF max.	1.96 N {200 gf}
RF min.	0.14 N {14 gf}
OT min.	1.6 mm
MD max.	1.3 mm
FP max.	20.6 mm
OP	17.5±0.8 mm

Note: When operating, be sure not to exceed 1.6 mm.

Roller Leaf Spring

Z-15GL255-B



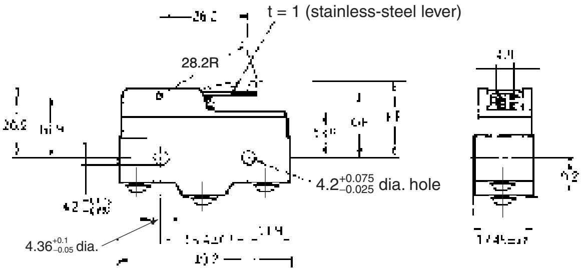


OF max.	1.96 N {200 gf}
RF min.	0.14 N {14 gf}
OT min.	1.6 mm
MD max.	1.3 mm
FP max.	31.8 mm
OP	28.6±0.8 mm

Note: When operating, be sure not to exceed 1.6 mm.

Short Hinge Lever

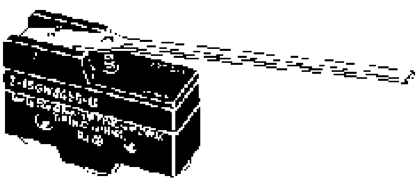
Z-15GW2155-B

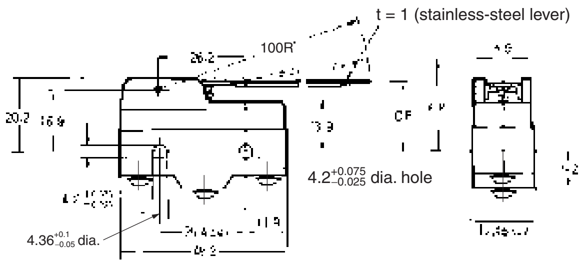


OF max.	1.86 N {190 gf}
RF min.	0.27 N {28 gf}
OT min.	2 mm
MD max.	1 mm
FP max.	25 mm
OP	19±0.8 mm

Long Hinge Lever

Z-15GW4455-B

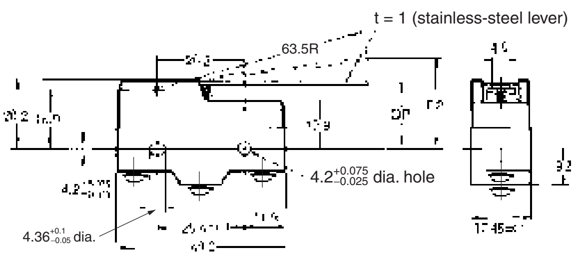




OF max.	0.88 N {90 gf}
RF min.	0.14 N {14 gf}
OT min.	5.6 mm
MD max.	3.5 mm
FP max.	33 mm
OP	19±1.2 mm

Hinge Lever

Z-15GW55-B

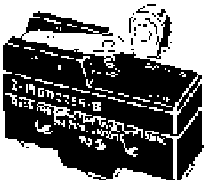


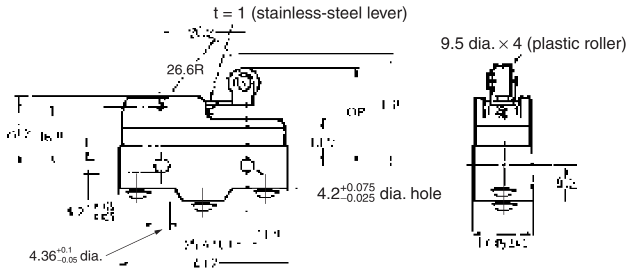
OF max.	0.98 N {100 gf}
RF min.	0.14 N {14 gf}
OT min.	5.6 mm
MD max.	2 mm
FP max.	28.2 mm
OP	19±0.8 mm

Limit switches

Short Hinge Roller Lever

Z-15GW2255-B
Z-01HW2255-B

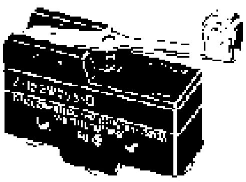


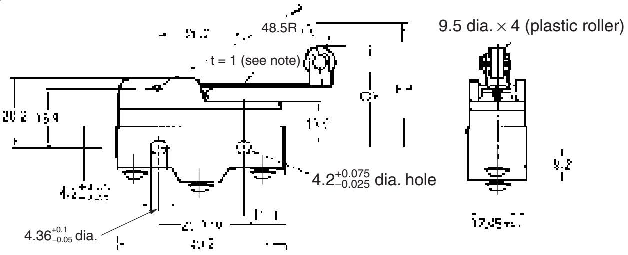


Model	Z-15GW2255-B	Z-01HW2255-B
OF max.	1.96 N {200 gf}	1.96 N {200 gf}
RF min.	0.41 N {42 gf}	0.27 N {28 gf}
OT min.	2.4 mm	2.4 mm
MD max.	0.8 mm	0.8 mm
FP max.	32.9 mm	
OP	30.2±0.4 mm	

Hinge Roller Lever

Z-15GW255-B



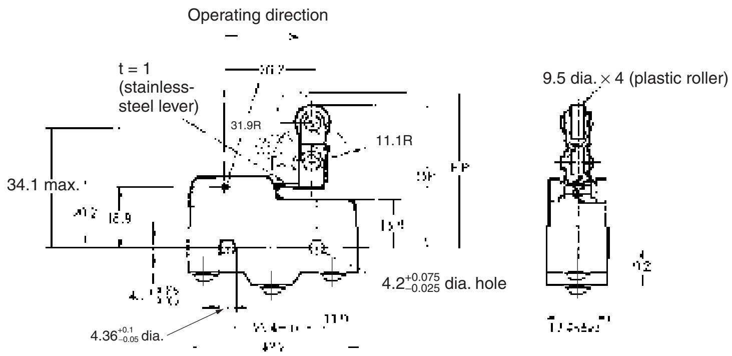


Note: Stainless-steel lever

OF max.	1.27 N {130 gf}
RF min.	0.21 N {21 gf}
OT min.	4 mm
MD max.	1.6 mm
FP max.	36.5 mm
OP	30.2±0.8 mm

Unidirectional Short Hinge Roller Lever

Z-15GW227755-B

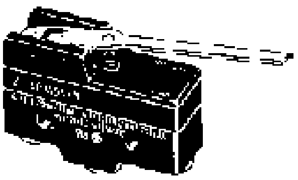


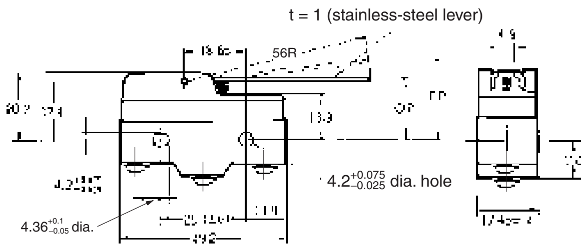
OF max.	1.77 N {181 gf}
RF min.	0.49 N {50 gf}
OT min.	2.4 mm
MD max.	0.8 mm
FP max.	43.6 mm
OP	41.3±0.8 mm

Reverse Hinge Lever

Note: The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.

Z-15GM55-B



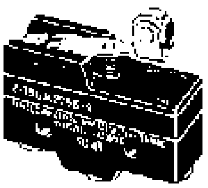


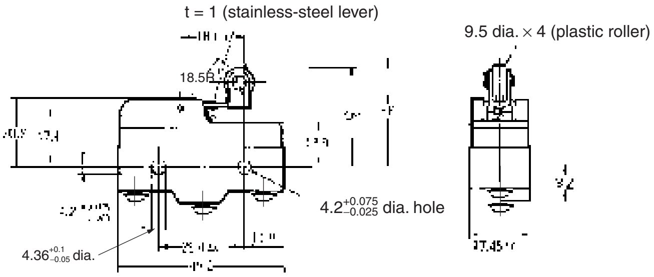
OF max.	1.96 N {200 gf}
RF min.	0.27 N {28 gf}
OT min.	5.6 mm
MD max.	0.89 mm
FP max.	23.8 mm
OP	19±0.8 mm

Reverse Short Hinge Roller Lever

Note: The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.

Z-15GM2255-B



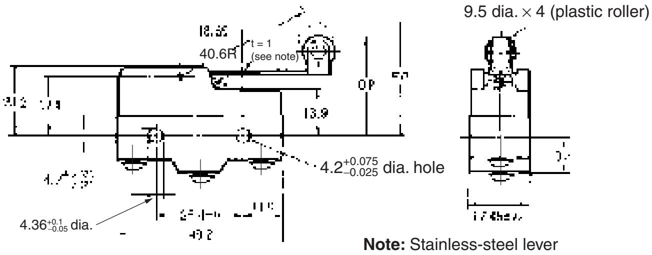


OF max.	5.69 N {581 gf}
RF min.	1.67 N {170 gf}
OT min.	2 mm
MD max.	0.28 mm
FP max.	31.8 mm
OP	29.4±0.4 mm

Reverse Hinge Roller Lever

Note: The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.

Z-15GM255-B



Note: Stainless-steel lever

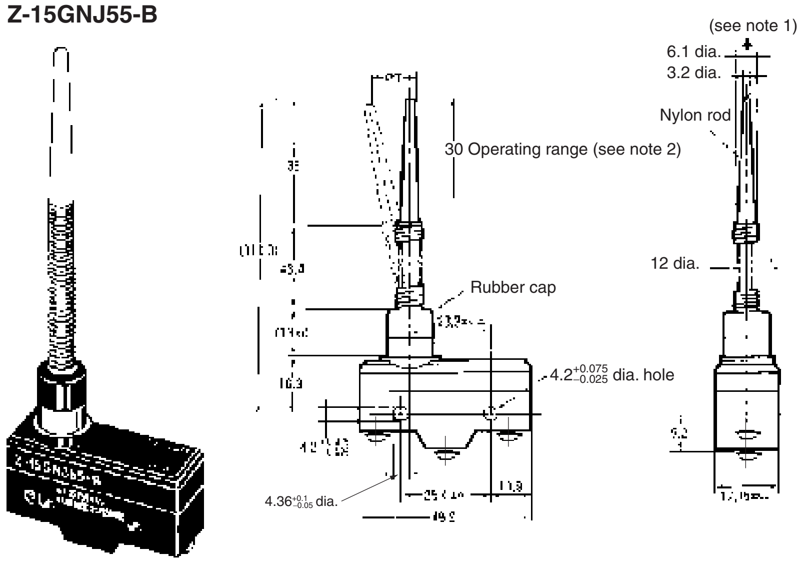
OF max.	2.65 N {270 gf}
RF min.	0.55 N {56 gf}
OT min.	4 mm
MD max.	0.64 mm
FP max.	35 mm
OP	30.2±0.8 mm

Limit switches

Flexible Rod (Coil Spring)

Z-15GNJ55-B

OF max.	0.49 N {50 gf}
PT max.	(20 mm)
OT	42 to 60 mm



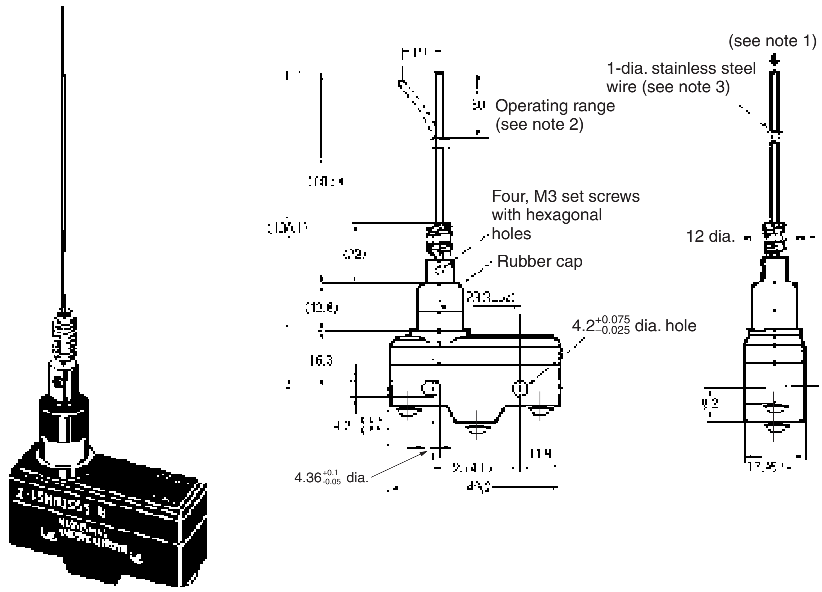
Note: 1. Operation is possible in any direction other than the axial direction (indicated by the arrow ↓).

2. Use only the area within the top 30 mm of the rod as the operating part. (Do not use the area that falls within 80 mm from the mounting hole as the operating part. Using this area may cause damage to the nylon rod.)

Flexible Rod (Steel Wire)

Z-15HNJS55-B

OF max.	0.15 N {15 gf}
PT max.	(25 mm)



Note: 1. Operation is possible in any direction other than the axial direction (indicated by the arrow ↓).

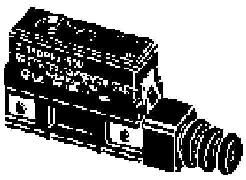
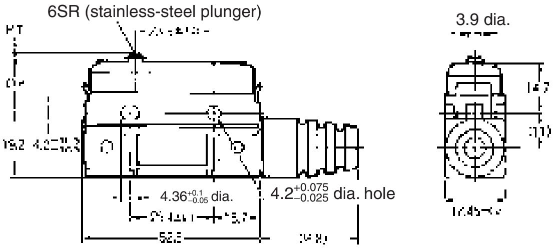
2. Use only the area within the top 30 mm of the rod as the operating part. (Do not use the area that falls within 100 mm from the mounting hole as the operating part. Using this area may cause damage to the steel wire.)

3. The steel wire can be replaced if damaged. (Model: Lever for HNJS55)

Basic Models (Drip-proof) with Terminal Protective Cover

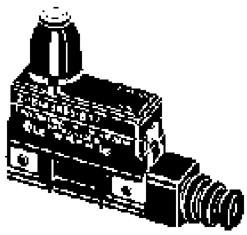
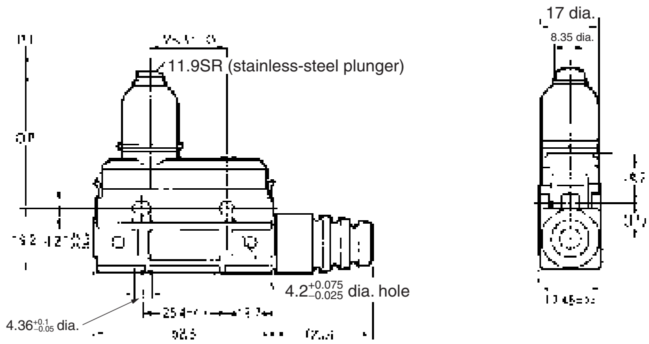
Pin Plunger

Z-15GA55-B5V

OF max.	2.45 to 4.22 N {250 to 431 gf}
RF min.	1.12 N {114 gf}
PT max.	2.2 mm
OT min.	0.13 mm
MD max.	0.06 mm
OP	15.9±0.4 mm

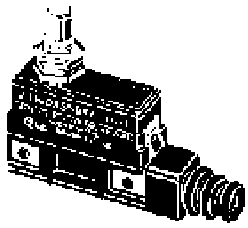
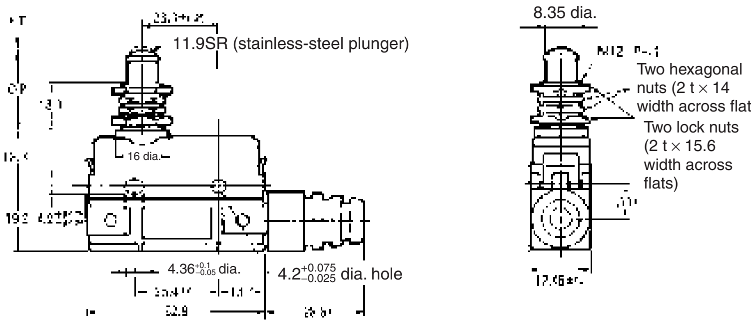
Z-15GK3A55-B5V

OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	2.4 mm
OT min.	3.5 mm
MD max.	0.06 mm
OP	37.8±1.2 mm

Panel Mount Plunger

Z-15GQA55-B5V

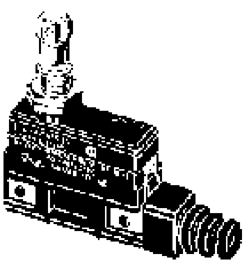
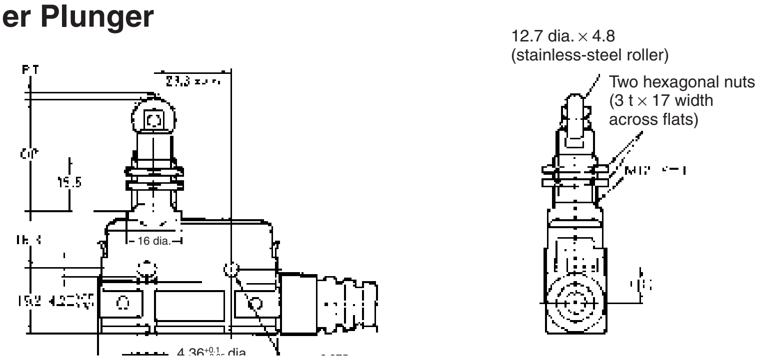



OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	1.8 mm
OT min.	5.5 mm
MD max.	0.06 mm
OP	21.8±0.8 mm

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Panel Mount Roller Plunger

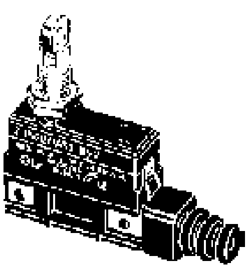
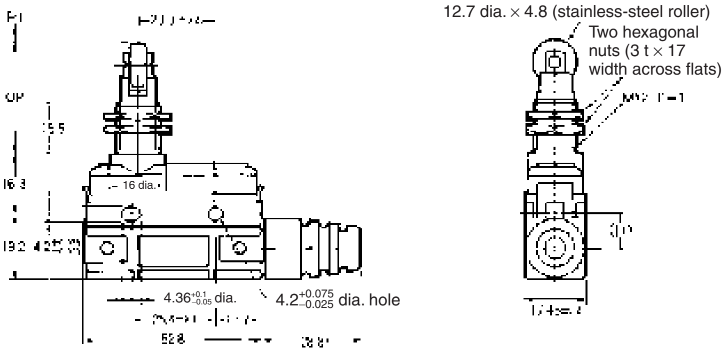
Z-15GQ22A55-B5V

OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	1.8 mm
OT min.	3.58 mm
MD max.	0.06 mm
OP	33.4±1.2 mm

Panel Mount Cross-roller Plunger

Z-15GQ21A55-B5V

be damaged.

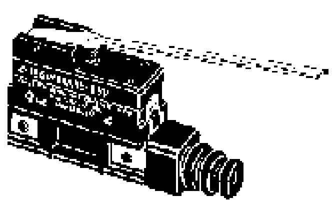
OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	1.8 mm
OT min.	3.58 mm
MD max.	0.06 mm
OP	33.4±1.2 mm

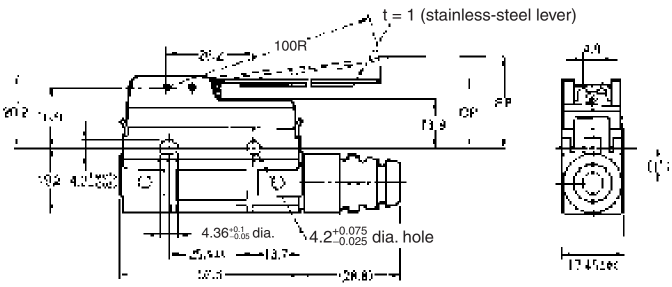
Limit switches

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Long Hinge Lever

Z-15GW44A55-B5V

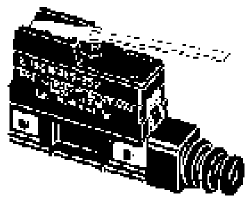


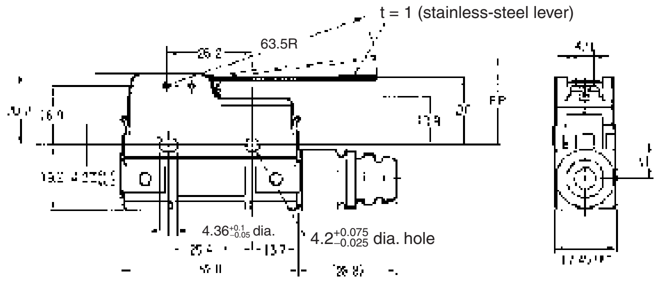


OF max.	0.88 N {90 gf}
RF min.	1.14 N {116 gf}
OT min.	5.6 mm
MD max.	3.5 mm
FP max.	33 mm
OP	19±1.2 mm

Hinge Lever

Z-15GWA55-B5V

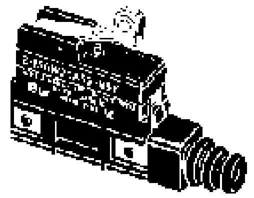


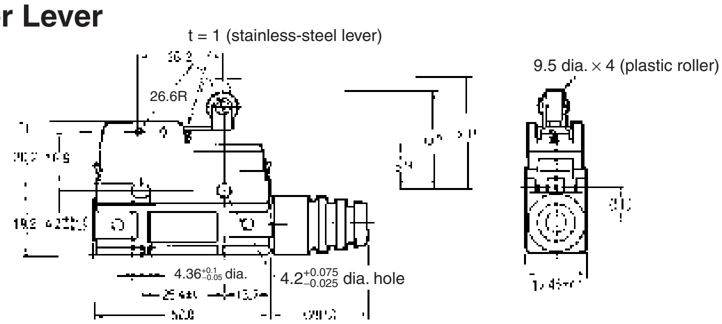


OF max.	0.98 N {100 gf}
RF min.	0.14 N {14 gf}
OT min.	5.6 mm
MD max.	2 mm
FP max.	28.2 mm
OP	19±0.8 mm

Short Hinge Roller Lever

Z-15GW22A55-B5V

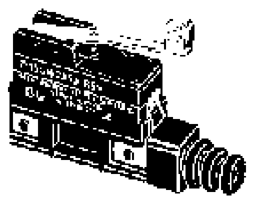


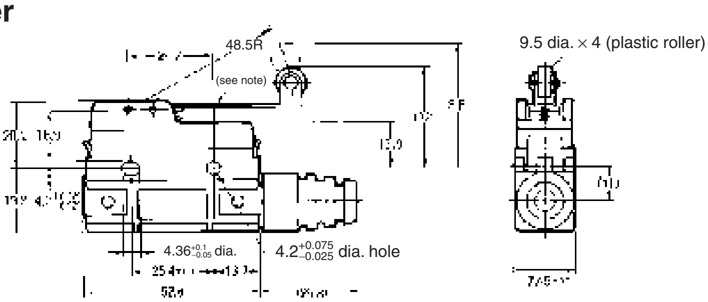


OF max.	1.96 N {200 gf}
RF min.	0.41 N {42 gf}
OT min.	2.4 mm
MD max.	0.8 mm
FP max.	32.9 mm
OP	30.2±0.4 mm

Hinge Roller Lever

Z-15GW2A55-B5V



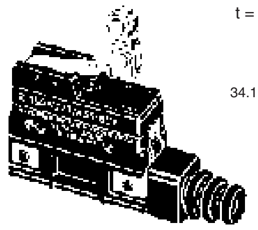


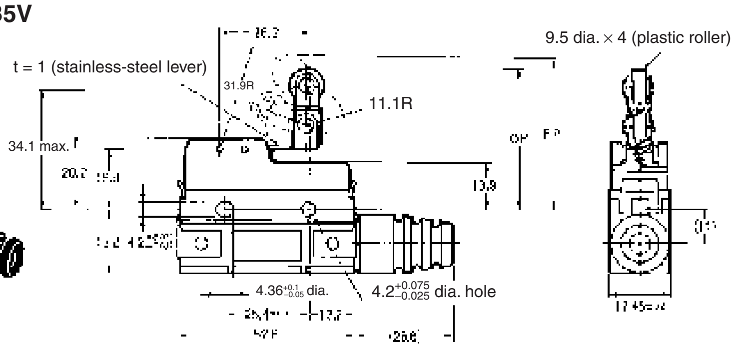
Note: t = 1 (stainless-steel lever)

OF max.	1.27 N {130 gf}
RF min.	0.21 N {21 gf}
OT min.	4 mm
MD max.	1.6 mm
FP max.	36.5 mm
OP	30.2±0.8 mm

Unidirectional Short Hinge Roller Lever

Z-15GW2277A55-B5V



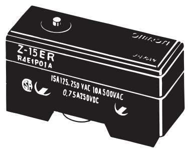


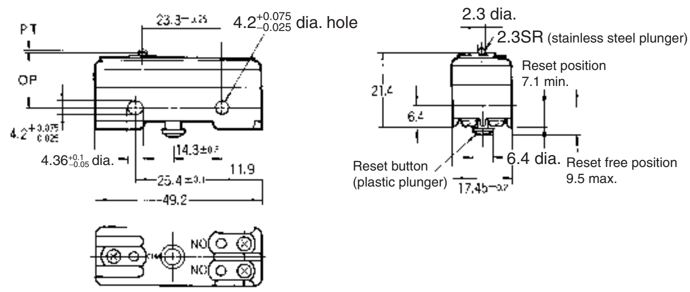
OF max.	1.77 N {181 gf}
RF min.	0.49 N {50 gf}
OT min.	2.4 mm
MD max.	0.8 mm
FP max.	43.6 mm
OP	41.3±0.8 mm

Maintained-contact Models

Pin Plunger

Z-15ER





Plunger

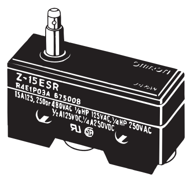
OF max.	1.96 to 2.50 N {200 to 255 gf}
PT max.	0.4 mm
OT min.	0.13 mm
OP	15.9±0.4 mm

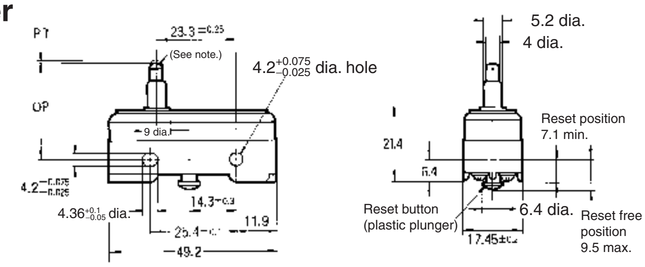
Reset Button

OF max.	0.55 to 2.79 N {56 to 285 gf}
OT min.	0.4 mm

Slim Spring Plunger

Z-15ESR





Note: Stainless steel plunger (tip only, flat, R1 bevel).

Plunger

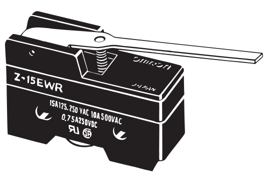
OF max.	2.65 N {270 gf}
PT max.	0.4 mm
OT min.	1.6 mm
OP	28.2±0.5 mm

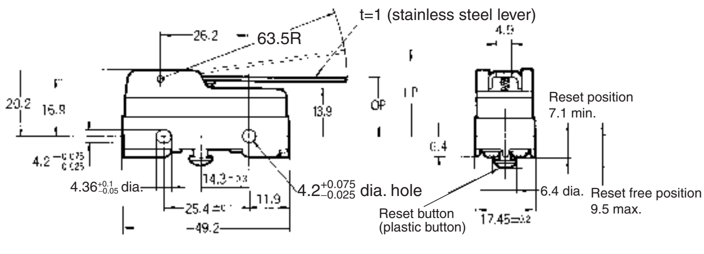
Reset Button

OF max.	2.79 N {285 gf}
OT min.	0.4 mm

Hinge Lever

Z-15EWR





Lever Tip

OF max.	0.54 N {55 gf}
OT min.	5.6 mm
FP max.	28.2 mm
OP	19±0.8 mm

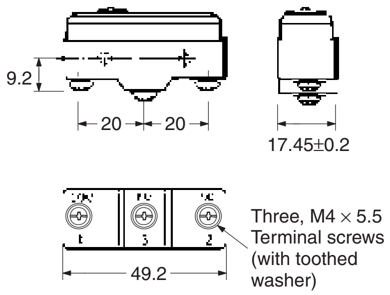
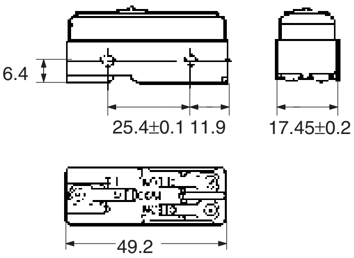
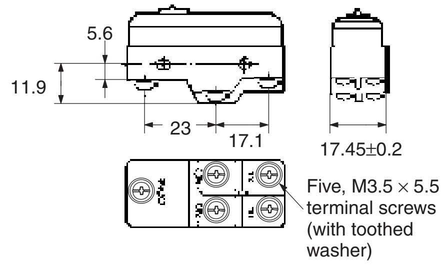
Reset Button

OF max.	2.94 N {0.3 gf}
OT min.	0.4 mm

Limit switches

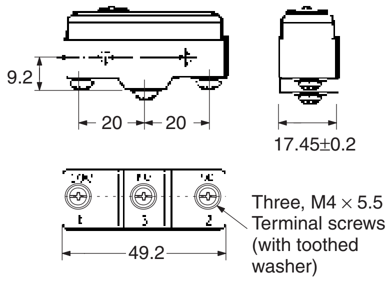
■ Terminals

Basic Models (General-purpose) & Split-contact Models

Basic (General-purpose) Models		Split-contact Models
Screw Terminals (-B)  Appropriate terminal screw tightening torque: 0.78 to 1.18 N·m {8 to 12 kgf·cm}.	**Solder Terminal**  	**Screw Terminals (Y-B)**  Appropriate terminal screw tightening torque: 0.49 to 0.78 N·m {5 to 8 kgf·cm}.
Note: With reverse action models (Z-15GM), the positions of NO and NC terminals are reversed.		**Note:** With reverse action models (Z-10FM), the positions of NO and NC terminals are reversed.

Basic Models (Drip-proof) without Terminal Protective Cover

Without Terminal Protective Cover



Note: With reverse action models (Z-15GM), the positions of NO and NC terminals are reversed.

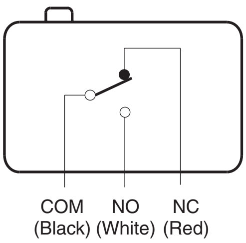
Molded Terminals (Drip-proof Type/Molded Terminal)

■ Model Number Legend

Z-□55-M□□ □M
1 2 3 4

1. **Drip-proof Type**
2. **Lead Outlets**
   None: VSF
   19: VCT
3. **Directions of Lead Outlets**
   Refer to the following diagrams.
4. **Length of Lead Outlets**
   0.5: 0.5 m
   1: 1 m
   2: 2 m
   3: 3 m

■ Contact Form

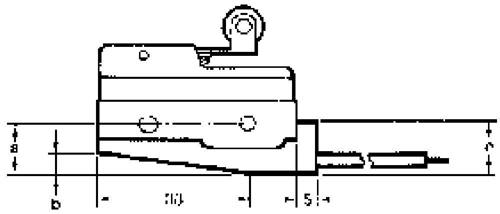


Note: With the reverse action model (Z-15GM), the positions of NO and NC terminals are reversed.

■ Dimensions

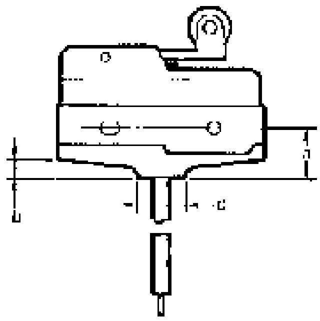
L/R Type

(The following illustration is the R type.)



Lead wire	a	b	d
VSF	12	4	13
VCT	19	11	20

D Type



Lead wire	a	b	d
VSF	12	4	12
VCT	19	11	16

Lead Wire Specifications

Lead wire	Nominal cross-sectional area (mm^2)	Finished outer diameter (mm)	Connection to terminal	Length (m)
VSF (single-core, vinyl cord)	1.25	Approx. 3.1 dia.	Black: COM White: NO Red: NC	0.5, 1, 2, 3
VCT (vinyl-insulated cable)		Three-core: approx. 10.5 dia.		

Note: No models with molded terminals are approved by UL, CSA, or TÜV.

Limit switches

Precautions

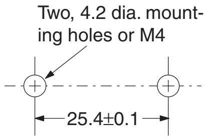
Refer to the *Technical Information for Basic Switches* (Cat. No. C122) for common precautions.

■ Correct Use

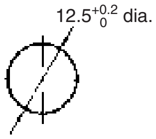
Mounting

Use M4 screws with plane washers and spring washers to mount the Switch. Tighten each mounting screw securely to a torque of 1.18 to 1.47 N·m {12 to 15 kgf·cm}.

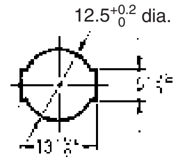
Basic Models (General-purpose) & Split-contact Models



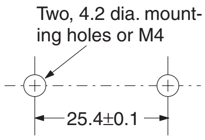
Panel Mount Plunger



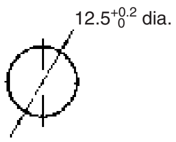
Panel Mount Roller Plunger



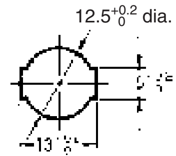
Basic Models (Drip-proof) without Terminal Protective Cover



Panel Mount Plunger



Panel Mount Roller Plunger



Panel Mount Switch (Z-15□Q□, Z-01□Q□)

When mounting the panel mount plunger model with screws on a side surface, be careful of the dog angle and operation speed. Excessive dog angle or operation speed may damage the Switch.

The Switch can be panel mounted, provided that the hexagonal nut of the actuator is tightened to a torque of 2.94 to 4.9 N·m {30 to 50 kgf·cm}.

When using the panel mount plunger model mounted with screws on a side surface, be careful not to apply a large shock. Applying a shock exceeding 100G may damage the Switch.

When using the panel mount plunger model mounted with screws on a side surface, remove the hexagonal nuts from the actuator.

High-sensitivity Switch (Z-15H)

When using the Switch in a DC circuit, be sure to provide an arc suppressor as well because the small contact gap of the Switch may result in contact troubles.

In an application where a high repeat accuracy is required, limit the current that flows through the Switch to within 0.1 A. Also, use a relay to control a high-capacity load if the Switch is connected to such a load. (In this case, the exciting current of the relay coil is the load of the Switch.)

Do not apply a force of 19.6 N {2 kgf} or higher to the pin plunger.

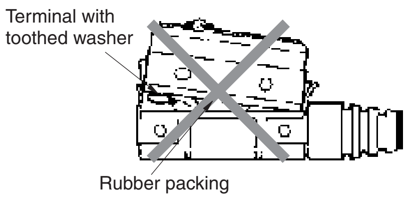
Exercise care that the environment conditions such as temperature and humidity do not change abruptly.

Models with Drip-proof Terminal Cover (Z-□A55-B5V)

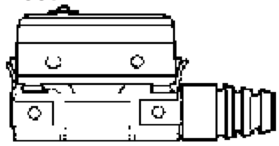
Wiring

To attach the Protective Cover to the case, hold the cover in almost parallel to the case and then push it to the case. If the cover is pushed diagonally, the rubber packing may slip off, degrading the sealability of the Switch.

Incorrect

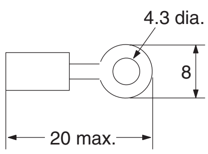


Correct



Use round solderless terminals having the following dimensions to connect leads to the terminals. Tighten the screws of terminals to a torque of 0.78 to 1.18 N·m {8 to 12 kgf·cm}.

Use the terminal shown below.



A cable 8.5 to 10.5 mm in diameter can be applicable to the sealing rubber of the lead outlet of the Switch. A two-core or three-core VCT cable having a cross-sectional area of 1.25 mm^2 is especially suitable for this.

Use M4 small screws with spring toothed washer are used as the terminal screws.

Drip-proof Switch (Z□55)

The Switch is not perfectly oil-tight; so do not dip it in oil or water.

The rubber boots are made from weather-resistive chloroprene rubber.

Do not use Basic Switches in places with radical changes in temperature.

Split-contact Switch (Z-10F□Y)

The applicable current varies depending on how the contacts are used. If the Switch is connected in series, the Switch can endure a current 1.5 to 2 times higher than the current that can be applied in parallel connection.

Flexible Rod Switch (Z-15□NJ□55, Drip-proof)

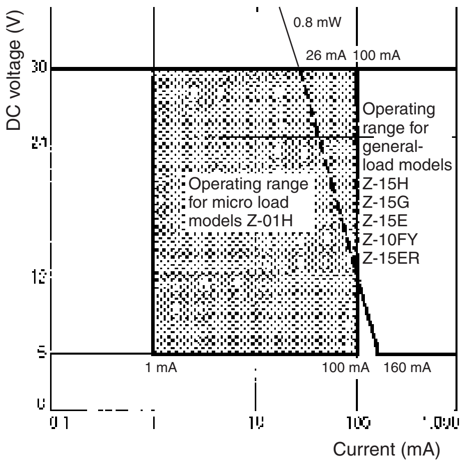
When the rod is fully swung, the Switch may operate when the lever returns, causing chattering. Use a circuit that compensates for chattering wherever possible.

Do not switch the rod to the fullest extent when the Switch is to break a power circuit because such a practice may cause metal deposition to occur between the mating contacts of the Switch.

Micro Load Applicable Range

Using a model for ordinary loads to open or close the contact of a micro load circuit may result in faulty contact. Use models that operate in the following range. However, even when using micro load models within the operating range shown here, if inrush current occurs when the contact is opened or closed, it may increase contact wear and so decrease life expectancy. Therefore, insert a contact protection circuit where necessary.

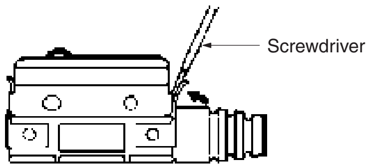
The minimum applicable load is the N-level reference value. This value indicates the malfunction reference level for the reliability level of 60% (λ 60). The equation, λ 60 = 0.5×10^{-6}/operations indicates that the estimated malfunction rate is less than 1/2,000,000 operations with a reliability level of 60%.



Item	Z-01H	Z-15□, Z-10FY
Minimum applicable load	1 mA at 5 VDC	160 mA at 5 VDC

Others

Do not apply an excessive force to the mounting bracket with a screwdriver or a similar object when attaching or detaching the protective cover; otherwise, the cover will be deformed.



This terminal protective cover cannot be used with models whose model number does not have the prefix “-B5V.”

Terminal protective covers can be ordered separately for maintenance use.

■ Accessories (Order Separately)

Refer to *Z/A/X/DZ Common Accessories* for details about Terminal Covers, Separators, and Actuators.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Pushbutton switches

Our pushbutton switches include models from 16 mm to 22 mm in diameter. Available in different varieties of shapes, sizes, colours and functions, this pushbutton switch range allows you to select the right product for your application.

Omron's pushbutton switches feature:

- Range of installation diameters 16 to 22 mm
- Versions with safety standard IP40 and IP65, oil-tight
- Very low installation depth: only 28.5 mm
- 1 or 2 SPDTs
- Variety of shapes: rectangular, square, round
- Illuminated and non-illuminated variants

Which application is required?

Pushbutton switch

Indicator

Panel cutout dimensions?

16 dia.

22 dia.

16 dia.

22 dia.

Illumination?

Yes

No

Yes

No

Yes

Yes

A16L

A16

Page L-5

A22L

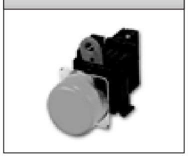
A22

Page L-35

M16

Page L-67

M22



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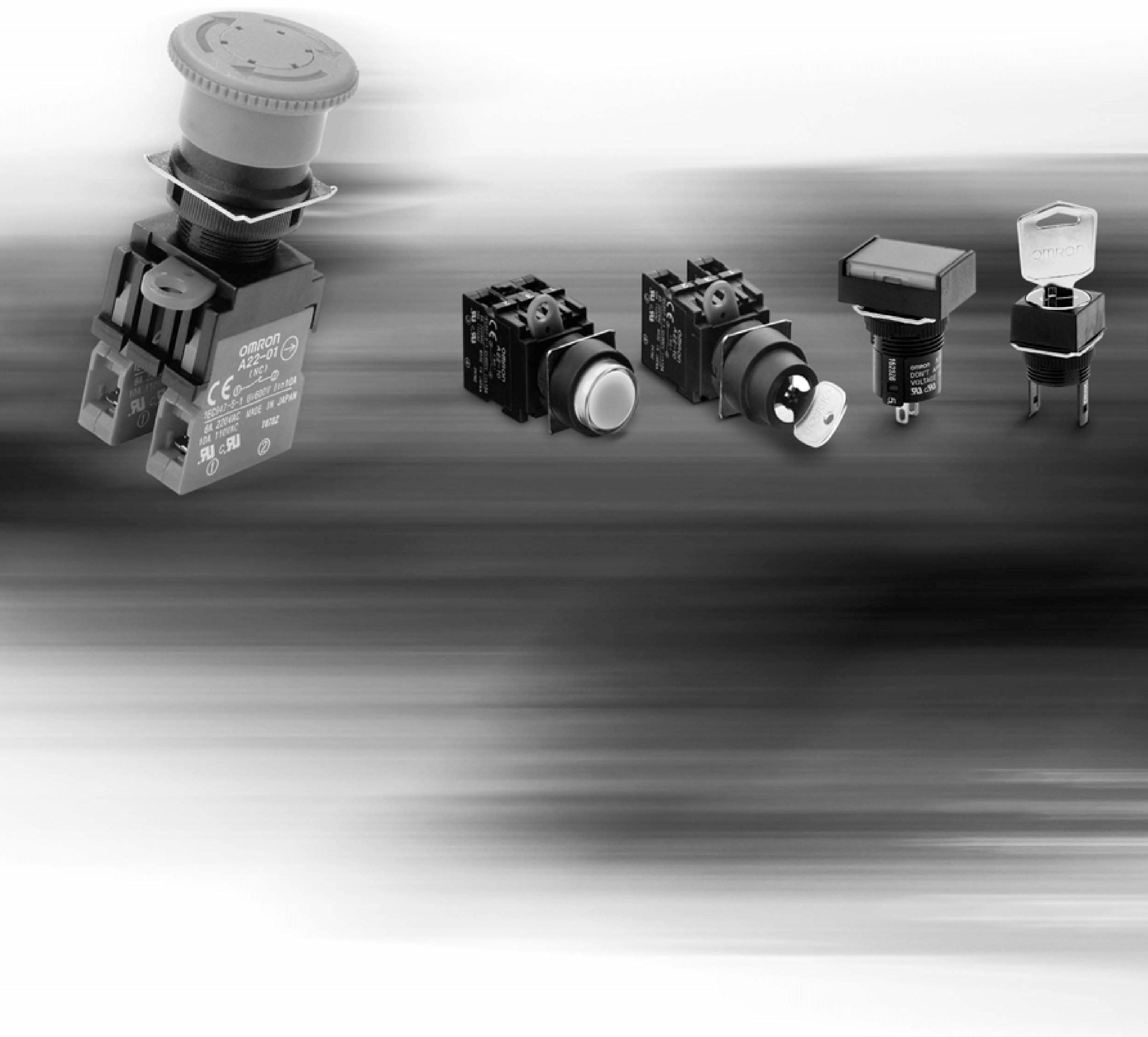
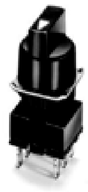


Table of contents

Selection table

		Type	Pushbutton switches			Key-type selector switch	
Selection criteria							
		Model	A16	A16□-P	A22	A165K	A22K
		Mounting	Nut mounting				
		Size	16 mm	16 mm	22 mm	16 mm	22 mm
		Shape	▭ □ ○	▭	▭ □ ○	▭ □ ○	▭ □ ○
Pushbutton colour	Incandescent lamp-lighted	Red	■	■	■		
		Yellow	■	■	■		
		Pure yellow	■	■			
		Green	■	■	■		
		White	■	■	■		
		Blue	■	■	■		
		Orange					
	LED-lighted	Red	■	■	■		
		Yellow	■	■	■		
		Pure yellow	■	■			
		Green	■	■	■		
		White	■	■	■		
		Blue	■	■	■		
	Non-lighted	Red			■		
		Yellow			■		
		Green			■		
		White			■		
		Blue			■		
		Black	■	■	■	■	■
Features		Momentary operation	■	■			■
		Self-holding	■	■			■
		Number of contacts	2	2	6	2	6
		IP rating	IP40 / IP65	IP40 / IP65	IP65	IP65	IP65
		Buzzer					
		Legend plate	■		■	■	■
		Reset method - manual	■	■		■	■
		Reset method - automatic		■		■	
Switch ratings [A]		125 VAC	5	5	10	5	10
		250 VAC	3	3	6	3	6
		30 VDC	3	3	10	3	10
Terminals		Solder	■			■	
		PCB		■		■	
		Screw-less Clamp					
Operating voltage		5 VDC		■	■	■	
		12 VDC		■	■	■	
		24 VDC		■	■	■	
Form		SPDT		■		■	
		DPDT		■		■	
		2 notches		■		■	■
		3 notches				■	■
		SPST-NO			■		■
		SPST-NC			■		■
		SPST-NO + SPST-NC			■		■
		DPST-NO			■		■
		DPST-NC			■		■
		Page	L-5	CD	L-35	CD	CD

		Type	Knob-type selector switch		Indicator	
Selection criteria						
		Model	A165S / W	A22S / W	M16	M22
		Mounting	Nut mounting			
		Size	16 mm	22 mm	16 mm	22 mm
		Shape	▭ □ ○	▭ □ ○	▭ □ ○	▭ □ ○
Pushbutton colour	Incandescent lamp-lighted	Red		■	■	■
		Yellow		■	■	■
		Pure yellow			■	
		Green		■	■	■
		White			■	■
		Blue		■	■	■
		Orange				
	LED-lighted	Red	■	■	■	■
		Yellow	■	■	■	■
		Pure yellow			■	
		Green	■	■	■	■
		White			■	■
		Blue		■	■	■
	Non-lighted	Red				
		Yellow				
		Green				
		White				
		Blue				
		Black		■		
Features		Momentary operation	■	■		
		Self-holding	■	■		
		Number of contacts	2	6		
		IP rating	IP65	IP65	IP40 / IP65	IP65
		Buzzer				
		Legend plate	■	■	■	■
		Reset method - manual		■		
		Reset method - automatic				
Switch ratings [A]		125 VAC	5	10		
		250 VAC	3	6		
		30 VDC	3	10		
Terminals		Solder	■		■	
		PCB	■		■	
		Screw-less Clamp			■	
Operating voltage		5 VDC	■		■	■
		12 VDC	■		■	■
		24 VDC	■		■	■
Form		SPDT	■			
		DPDT	■			
		2 notches	■	■		
		3 notches	■	■		
		SPST-NO		■		
		SPST-NC		■		
		SPST-NO + SPST-NC		■		
		DPST-NO		■		
		DPST-NC		■		
		Page	CD	CD	L-67	L-77

■ Standard □ Available ☐ No / not available

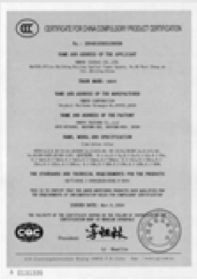
LEADING IN SERVICE

Focussed, progressive, distinctive. Be assured, choose Omron

At Omron we set high standards for ourselves. Our products are known all over the world for their unrivalled quality. But we offer more than just excellent quality. In an environment that places ever greater demands with regard to service, quality and costeffectiveness, other things are important too. Providing a top-quality service is what we do every day, including extra service as standard. This helps to ensure that we can provide tailor-made solutions for applications more effectively and more quickly.

More and more companies are choosing Omron as they seek to work in a partnership that is based on reliability and certainty.

Omron – the reassuring choice.



International standards and approvals

Our products carry all relevant international standards and approvals, including CCC (Chinese Compulsory Certification), which makes exporting your system much easier.

- Reliability, also for your customers
- Maximum flexibility
- Confidence

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More and more people are choosing Omron, as a high degree of reliability is a key feature of its products. You can always rely on Omron. Even if a product unexpectedly malfunctions, our repair team is ready to swing into action.

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The majority of standard Omron products are provided in digital EPLAN format, which means that a few clicks of your mouse are all that is needed to design the right product into your switching panel.

For more information please visit: http://omron-industrial.com/en/eplan/

- Very easy to use
- Always the right product
- Reduced engineering time

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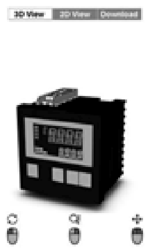
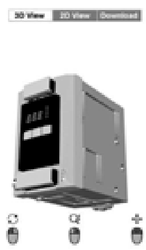
- Large number of formats supported for greater flexibility
- Readily available
- Convenience that saves you time





Pushbutton Switch
A16

Mounting Aperture of 16 mm

- Modular construction (Pushbutton + Case + Lamp + Switch)
- Wide Variety of Control and Signal Devices: Lighted, Non-Lighted, and Buzzer
- UL and cUL approved.
- Conforms to EN60947-5-1, IEC947-5-1
- Quick and easy assembly, snap-in Switch.
- Wide range of switching capacity from standard to microload
- High reliability, IP65
- Short mounting depth, less than 28.5 mm below panel

Model Number Structure

■ Model Number Legend

Completely Assembled

The model numbers used to order sets of Units are illustrated below. One set comprises the Pushbutton, Lamp (lighted models only), Case, and Switch.

(1) (2) (3) (4) (5) (6) (7)

A 1 6 5 L - J R M - 24D - 2

(1) Degree of Protection

Symbol	Protection
No symbol	IP40
5	IP65 oil-resistant

(2) Lighted/Non-lighted

Symbol	Type
No symbol	Non-lighted
L	Lighted

(3) Shape of Pushbutton

Symbol	Shape	
J	Rectangular	2-way guard
A	Square	2-way guard
T	Round	Projecting model
3J	Rectangular	3-way guard
BA	Square	24-mm square

(4) Color of Pushbutton

Symbol	Color
R	Red
Y	Yellow
PY	Pure yellow
G	Green
W	White
A	Blue
B	Black (non-lighted models only)

"Colored-illumination" models operate in the way shown below:

Unlit	Lit
White	Color

The built-in LED is colored.

(5) Switch Operation

Symbol	Operation
M	Momentary
A	Alternate

Momentary-action: Self-resetting
Alternate-action: Self-holding

(6) Light Source

Symbol	Type	Operating voltage	Rated voltage
No symbol	Non-lighted		
5	Incandescent lamp	5 VAC/VDC	6 VAC/VDC
12		12 VAC/VDC	14 VAC/VDC
24		24 VAC/VDC	28 VAC/VDC
5D	LED	5 ±5% VDC	5 VDC
12D		12 ±5% VDC	12 VDC
24D		24 ±5% VDC	24 VDC

Voltage Reduction Unit (24-V Built-in LED)

Symbol	Type	Operating voltage	Rated voltage
T1	LED	90 to 121 VAC/VDC	110 VAC
T2		180 to 242 VAC/VDC	220 VAC

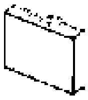
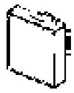
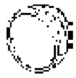
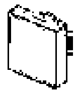
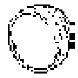
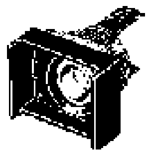
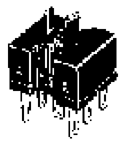
Note: 1. Solder terminals are available only with 100-V models.
2. The Voltage Reduction Unit is not available for models with PCB terminals.

(7) Contact Configuration

Symbol	Type	Terminal
1	SPDT	Solder Terminal
2	DPDT	
1P	SPDT	PCB Terminal
2P	DPDT	
2S	DPDT	Screw-Less Clamp

Only DPDT contacts are available with Screw-Less Clamp.

Neon lamps are not available with models that are ordered as a set. They must be ordered individually if required. Refer to page L-13.

Model	Lighted Pushbutton Switches	Non-lighted Pushbutton Switches
Pushbutton	Rectangular  Square  Round 	Rectangular  Square  Round 
Lamp	LED lamp  Incandescent lamp  Neon lamp 	
Case		
Switch	Solder Terminals (Without Voltage Reduction Unit) 	

Note: There is no Lamp with non-lighted models.

Subassembled

1. Pushbutton

Non-lighted/Lighted

A16□L-□□
1 2 3

1. **Degree of Protection**
   None: IP40
   5: IP65
2. **Flange Shape**
   J: Rectangular
   T: Round
   A: Square
3. **Illumination Color for Non-lighted Models**
   R: Red
   G: Green
   Y: Yellow
   W: White
   A: Blue
   B: Black

Illumination Color for Lighted Models

LED/Incandescent Lamp
R: Red
Y: Yellow
PY: Pure yellow
W: White
A: Blue

LED
GY: Green

Incandescent Lamp
G: Green

Neon Lamp
RN: Red
GN: Green

2. Lamp

A16-□□
1 2

1. **Operating Voltage (Rated Voltage)**
   Incandescent Lamp
   5: 5 VAC/VDC (6 VAC/VDC)
   12: 12 VAC/VDC (14 VAC/VDC)
   24: 24 VAC/VDC (28 VAC/VDC)
   LED
   5DS: 5 VDC (5 VDC)
   12DS: 12 VDC (12 VDC)
   24DS: 24 VDC (24 VDC)
   Neon Lamp
   1N: 100 VAC (110 VAC)
   2N: 200 VAC (220 VAC)

2. **Illumination Color**
   None: Incandescent Lamp
   R: Red (LED)
   G: Green (LED)
   Y: Yellow (LED)
   W: White (LED)
   A: Blue (LED)
   RN: Red (Neon Lamp)
   GN: Green (Neon Lamp)

3. Case

A16□-□□
1 2 3

1. **Degree of Protection**
   None: IP40
   5: IP65 Oil-resistant

2. **Flange Shape**
   CJ: Rectangular
   CT: Round
   CA: Square

3. **Switch Action**
   M: Momentary
   A: Alternate

4. Switch (Solder Terminals)

A16-□-□
1 2

1. **Voltage Reduction Circuit (Operating Voltage/Rated Voltage)**
   None: Without Voltage Reduction Unit
   T1: 100 VAC/110 VAC

2. **Contacts**
   1: SPDT
   2: DPDT

5. Socket (Solder Terminals Only)

M16-□
1

1. **Voltage Reduction Circuit (Operating Voltage/Rated Voltage)**
   0: Without Voltage Reduction Unit
   T1: 100 VAC/110 VAC

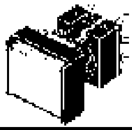
Ordering Information

■ List of Models

Ordering as a Set

The model numbers used to order sets of Units are given in the following tables. One set comprises the Pushbutton, Lamp (lighted models only), Case, and Switch.

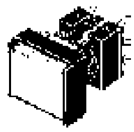
A16□-J (Rectangular) Models



Solder Terminal Models

IP40

Output	Lighting	Operating voltage	Momentary operation (Self-resetting)	Alternate operation (Self-holding)	Pushbutton color symbol (See note 1.)
SPDT	LED without Voltage Reduction Unit	5 VDC	A16L-J□M-5D-1	A16L-J□A-5D-1	R: red Y: yellow PY: pure yellow G: green A: blue W: white
		12 VDC	A16L-J□M-12D-1	A16L-J□A-12D-1	
		24 VDC	A16L-J□M-24D-1	A16L-J□A-24D-1	
	Incandescent lamp	5 VDC/VAC	A16L-J□M-5-1	A16L-J□A-5-1	R: red Y: yellow PY: pure yellow G: green W: white A: blue B: black (See note 2.)
		12 VDC/VAC	A16L-J□M-12-1	A16L-J□A-12-1	
		24 VDC/VAC	A16L-J□M-24-1	A16L-J□A-24-1	
	Non-lighted		A16-J□M-1	A16-J□A-1	
DPDT	LED without Voltage Reduction Unit	5 VDC	A16L-J□M-5D-2	A16L-J□A-5D-2	R: red Y: yellow PY: pure yellow G: green A: blue W: white
		12 VDC	A16L-J□M-12D-2	A16L-J□A-12D-2	
		24 VDC	A16L-J□M-24D-2	A16L-J□A-24D-2	
	Incandescent lamp	5 VDC/VAC	A16L-J□M-5-2	A16L-J□A-5-2	R: red Y: yellow PY: pure yellow G: green W: white A: blue B: black (See note 2.)
		12 VDC/VAC	A16L-J□M-12-2	A16L-J□A-12-2	
		24 VDC/VAC	A16L-J□M-24-2	A16L-J□A-24-2	
	Non-lighted		A16-J□M-2	A16-J□A-2	



IP65 Oil-resistant

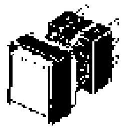
Output	Lighting	Operating voltage	Momentary operation (Self-resetting)	Alternate operation (Self-holding)	Pushbutton color symbol (See note 1.)
SPDT	LED without Voltage Reduction Unit	5 VDC	A165L-J□M-5D-1	A165L-J□A-5D-1	R: red Y: yellow PY: pure yellow G: green A: blue W: white
		12 VDC	A165L-J□M-12D-1	A165L-J□A-12D-1	
		24 VDC	A165L-J□M-24D-1	A165L-J□A-24D-1	
	Incandescent lamp	5 VDC/VAC	A165L-J□M-5-1	A165L-J□A-5-1	R: red Y: yellow PY: pure yellow G: green W: white A: blue B: black (See note 2.)
		12 VDC/VAC	A165L-J□M-12-1	A165L-J□A-12-1	
		24 VDC/VAC	A165L-J□M-24-1	A165L-J□A-24-1	
	Non-lighted		A165-J□M-1	A165-J□A-1	
DPDT	LED without Voltage Reduction Unit	5 VDC	A165L-J□M-5D-2	A165L-J□A-5D-2	R: red Y: yellow PY: pure yellow G: green A: blue W: white
		12 VDC	A165L-J□M-12D-2	A165L-J□A-12D-2	
		24 VDC	A165L-J□M-24D-2	A165L-J□A-24D-2	
	Incandescent lamp	5 VDC/VAC	A165L-J□M-5-2	A165L-J□A-5-2	R: red Y: yellow PY: pure yellow G: green W: white A: blue B: black (See note 2.)
		12 VDC/VAC	A165L-J□M-12-2	A165L-J□A-12-2	
		24 VDC/VAC	A165L-J□M-24-2	A165L-J□A-24-2	
	Non-lighted		A165-J□M-2	A165-J□A-2	

Note: 1. Enter the desired color symbol for the Pushbutton in the □.

2. Black ("B") Pushbuttons are only available for non-lighted models.

A16□-A (Square) Models

Solder Terminal Models



IP40

Output	Lighting	Operating voltage	Momentary operation (Self-resetting)	Alternate operation (Self-holding)	Pushbutton color symbol (See note 1.)
SPDT	LED without Voltage Reduction Unit	5 VDC	A16L-A□M-5D-1	A16L-A□A-5D-1	R: red Y: yellow PY: pure yellow G: green A: blue W: white
		12 VDC	A16L-A□M-12D-1	A16L-A□A-12D-1	
		24 VDC	A16L-A□M-24D-1	A16L-A□A-24D-1	
	Incandescent lamp	5 VDC/VAC	A16L-A□M-5-1	A16L-A□A-5-1	R: red Y: yellow PY: pure yellow G: green W: white A: blue B: black (See note 2.)
		12 VDC/VAC	A16L-A□M-12-1	A16L-A□A-12-1	
		24 VDC/VAC	A16L-A□M-24-1	A16L-A□A-24-1	
	Non-lighted		A16-A□M-1	A16-A□A-1	
DPDT	LED without Voltage Reduction Unit	5 VDC	A16L-A□M-5D-2	A16L-A□A-5D-2	R: red Y: yellow PY: pure yellow G: green A: blue W: white
		12 VDC	A16L-A□M-12D-2	A16L-A□A-12D-2	
		24 VDC	A16L-A□M-24D-2	A16L-A□A-24D-2	
	Incandescent lamp	5 VDC/VAC	A16L-A□M-5-2	A16L-A□A-5-2	R: red Y: yellow PY: pure yellow G: green W: white A: blue B: black (See note 2.)
		12 VDC/VAC	A16L-A□M-12-2	A16L-A□A-12-2	
		24 VDC/VAC	A16L-A□M-24-2	A16L-A□A-24-2	
	Non-lighted		A16-A□M-2	A16-A□A-2	

IP65 Oil-resistant

Output	Lighting	Operating voltage	Momentary operation (Self-resetting)	Alternate operation (Self-holding)	Pushbutton color symbol (See note 1.)
SPDT	LED without Voltage Reduction Unit	5 VDC	A165L-A□M-5D-1	A165L-A□A-5D-1	R: red Y: yellow PY: pure yellow G: green A: blue W: white
		12 VDC	A165L-A□M-12D-1	A165L-A□A-12D-1	
		24 VDC	A165L-A□M-24D-1	A165L-A□A-24D-1	
	Incandescent lamp	5 VDC/VAC	A165L-A□M-5-1	A165L-A□A-5-1	R: red Y: yellow PY: pure yellow G: green W: white A: blue B: black (See note 2.)
		12 VDC/VAC	A165L-A□M-12-1	A165L-A□A-12-1	
		24 VDC/VAC	A165L-A□M-24-1	A165L-A□A-24-1	
	Non-lighted		A165-A□M-1	A165-A□A-1	
DPDT	LED without Voltage Reduction Unit	5 VDC	A165L-A□M-5D-2	A165L-A□A-5D-2	R: red Y: yellow PY: pure yellow G: green A: blue W: white
		12 VDC	A165L-A□M-12D-2	A165L-A□A-12D-2	
		24 VDC	A165L-A□M-24D-2	A165L-A□A-24D-2	
	Incandescent lamp	5 VDC/VAC	A165L-A□M-5-2	A165L-A□A-5-2	R: red Y: yellow PY: pure yellow G: green W: white A: blue B: black (See note 2.)
		12 VDC/VAC	A165L-A□M-12-2	A165L-A□A-12-2	
		24 VDC/VAC	A165L-A□M-24-2	A165L-A□A-24-2	
	Non-lighted		A165-A□M-2	A165-A□A-2	

Note: 1. Enter the desired color symbol for the Pushbutton in the □.

2. Black ("B") Pushbuttons are only available for non-lighted models.

A16□-T (Round) Models

Solder Terminals

IP40

Output	Lighting	Operating voltage	Momentary operation (Self-resetting)	Alternate operation (Self-holding)	Pushbutton color symbol (See note 1.)
SPDT	LED without Voltage Reduction Unit	5 VDC	A16L-T□M-5D-1	A16L-T□A-5D-1	R: red Y: yellow PY: pure yellow G: green A: blue W: white
		12 VDC	A16L-T□M-12D-1	A16L-T□A-12D-1	
		24 VDC	A16L-T□M-24D-1	A16L-T□A-24D-1	
	Incandescent lamp	5 VDC/VAC	A16L-T□M-5-1	A16L-T□A-5-1	R: red Y: yellow PY: pure yellow G: green W: white A: blue B: black (See note 2.)
		12 VDC/VAC	A16L-T□M-12-1	A16L-T□A-12-1	
		24 VDC/VAC	A16L-T□M-24-1	A16L-T□A-24-1	
	Non-lighted		A16-T□M-1	A16-T□A-1	
DPDT	LED without Voltage Reduction Unit	5 VDC	A16L-T□M-5D-2	A16L-T□A-5D-2	R: red Y: yellow PY: pure yellow G: green A: blue W: white
		12 VDC	A16L-T□M-12D-2	A16L-T□A-12D-2	
		24 VDC	A16L-T□M-24D-2	A16L-T□A-24D-2	
	Incandescent lamp	5 VDC/VAC	A16L-T□M-5-2	A16L-T□A-5-2	R: red Y: yellow PY: pure yellow G: green W: white A: blue B: black (See note 2.)
		12 VDC/VAC	A16L-T□M-12-2	A16L-T□A-12-2	
		24 VDC/VAC	A16L-T□M-24-2	A16L-T□A-24-2	
	Non-lighted		A16-T□M-2	A16-T□A-2	

IP65 Oil-resistant

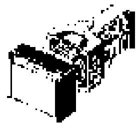
Output	Lighting	Operating voltage	Momentary operation (Self-resetting)	Alternate operation (Self-holding)	Pushbutton color symbol (See note 1.)
SPDT	LED without Voltage Reduction Unit	5 VDC	A165L-T□M-5D-1	A165L-T□A-5D-1	R: red Y: yellow PY: pure yellow G: green A: blue W: white
		12 VDC	A165L-T□M-12D-1	A165L-T□A-12D-1	
		24 VDC	A165L-T□M-24D-1	A165L-T□A-24D-1	
	Incandescent lamp	5 VDC/VAC	A165L-T□M-5-1	A165L-T□A-5-1	R: red Y: yellow PY: pure yellow G: green W: white A: blue B: black (See note 2.)
		12 VDC/VAC	A165L-T□M-12-1	A165L-T□A-12-1	
		24 VDC/VAC	A165L-T□M-24-1	A165L-T□A-24-1	
	Non-lighted		A165-T□M-1	A165-T□A-1	
DPDT	LED without Voltage Reduction Unit	5 VDC	A165L-T□M-5D-2	A165L-T□A-5D-2	R: red Y: yellow PY: pure yellow G: green A: blue W: white
		12 VDC	A165L-T□M-12D-2	A165L-T□A-12D-2	
		24 VDC	A165L-T□M-24D-2	A165L-T□A-24D-2	
	Incandescent lamp	5 VDC/VAC	A165L-T□M-5-2	A165L-T□A-5-2	R: red Y: yellow PY: pure yellow G: green W: white A: blue B: black (See note 2.)
		12 VDC/VAC	A165L-T□M-12-2	A165L-T□A-12-2	
		24 VDC/VAC	A165L-T□M-24-2	A165L-T□A-24-2	
	Non-lighted		A165-T□M-2	A165-T□A-2	

Note: 1. Enter the desired color symbol for the Pushbutton in the □.

2. Black ("B") Pushbuttons are only available for non-lighted models.

Other Models

Models with Reduced-voltage Lighting and Solder Terminals



IP40

Output	Lighting	Operating voltage	Momentary operation (Self-resetting)	Alternate operation (Self-holding)	Pushbutton color symbol (See note 1.)
SPDT	LED (with built-in reduced-voltage lighting function)	100/110 VAC/VDC	A16L-∆□M-T1-1	A16L-∆□A-T1-1	R: red Y: yellow PY: pure yellow G: green W: white A: blue
DPDT		100/110 VAC/VDC	A16L-∆□M-T1-2	A16L-∆□A-T1-2	

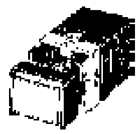
IP65

Output	Lighting	Operating voltage	Momentary operation (Self-resetting)	Alternate operation (Self-holding)	Pushbutton color symbol (See note 1.)
SPDT	LED (with built-in reduced-voltage lighting function)	100/110 VAC/VDC	A165L-∆□M-T1-1	A165L-∆□A-T1-1	R: red Y: yellow PY: pure yellow G: green W: white A: blue
DPDT		100/110 VAC/VDC	A165L-∆□M-T1-2	A165L-∆□A-T1-2	

Note: 1. Enter the desired shape for the Pushbutton in ∆: J (rectangular), A (square), or T (round). Enter the desired color symbol for the Pushbutton in the □.

2. Models with rated voltage 200 to 220 VAC/VDC (T2 models) are only available with Screw-Less Clamps.

Screw-Less Clamp Models



IP40

Output	Lighting	Operating voltage	Momentary operation (Self-resetting)	Alternate operation (Self-holding)	Pushbutton color symbol (See note 1.)
DPDT	LED	5 VDC	A16L-∆□M-5D-2S	A16L-∆□A-5D-2S	R: red Y: yellow PY: pure yellow G: green W: white A: blue B: black (See note 2.)
		12 VDC	A16L-∆□M-12D-2S	A16L-∆□A-12D-2S	
		24 VDC	A16L-∆□M-24D-2S	A16L-∆□A-24D-2S	
	LED (with built-in reduced-voltage lighting function)	100/110 VAC/VDC	A16L-∆□M-T1-2S	A16L-∆□A-T1-2S	
		200/220 VAC/VDC	A16L-∆□M-T2-2S	A16L-∆□A-T2-2S	
	Non-lighted		A16-∆□M-2S	A16-∆□A-2S	

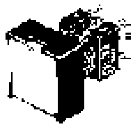
IP65

Output	Lighting	Operating voltage	Momentary operation (Self-resetting)	Alternate operation (Self-holding)	Pushbutton color symbol (See note 1.)
DPDT	LED	5 VDC	A165L-∆□M-5D-2S	A165L-∆□A-5D-2S	R: red Y: yellow PY: pure yellow G: green W: white A: blue B: black (See note 2.)
		12 VDC	A165L-∆□M-12D-2S	A165L-∆□A-12D-2S	
		24 VDC	A165L-∆□M-24D-2S	A165L-∆□A-24D-2S	
	LED (with built-in reduced-voltage lighting function)	100/110 VAC/VDC	A165L-∆□M-T1-2S	A165L-∆□A-T1-2S	
		200/220 VAC/VDC	A165L-∆□M-T2-2S	A165L-∆□A-T2-2S	
	Non-lighted		A165-∆□M-2S	A165-∆□A-2S	

Note: 1. Enter the desired shape for the Pushbutton in ∆: J (rectangular), A (square), or T (round). Enter the desired color symbol for the Pushbutton in the □.

2. Black ("B") Pushbuttons are only available for non-lighted models.

A165□-BA (24-mm Square) Models



Solder Terminals

IP65

Output	Lighting	Operating voltage	Momentary operation (Self-resetting)	Alternate operation (Self-holding)	Pushbutton color symbol (See note 1.)
SPDT	LED	5 VDC	A165L-BA□M-5D-1	A165L-BA□A-5D-1	R: red Y: yellow PY: pure yellow G: green W: white A: blue B: black (See note 2.)
	LED	12 VDC	A165L-BA□M-12D-1	A165L-BA□A-12D-1	
	LED	24 VDC	A165L-BA□M-24D-1	A165L-BA□A-24D-1	
	Non-lighted		A165-BA□M-1	A165-BA□A-1	
DPDT	LED	5 VDC	A165L-BA□M-5D-2	A165L-BA□A-5D-2	
	LED	12 VDC	A165L-BA□M-12D-2	A165L-BA□A-12D-2	
	LED	24 VDC	A165L-BA□M-24D-2	A165L-BA□A-24D-2	
	Non-lighted		A165-BA□M-2	A165-BA□A-2	

Note: 1. Enter the desired color symbol for the Pushbutton in the □.

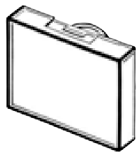
2. Black (“B”) Pushbuttons are only available for non-lighted models.

Ordering Individually

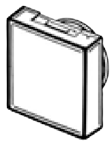
Pushbuttons, Lamps, Cases, and Switches (Sockets) can be ordered separately. Combinations that are not available as sets can be created using individual Units. Also, store the parts as spares for maintenance and repairs.

Pushbutton

Rectangular Models



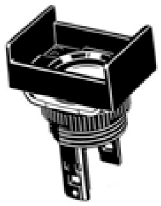
Square Models



Round Models

Note: Use IP40 Pushbuttons with IP40 Switches and use IP65 Pushbuttons with IP65 Switches. There is no Legend Plate built into the Pushbutton

Case

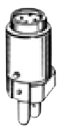


Lighted Models

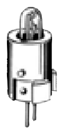
Non-lighted Models

Lamp

LED



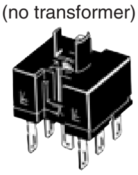
Incandescent lamp



Neon lamp

Socket

Solder terminals (no transformer)

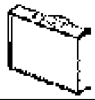
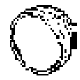
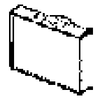
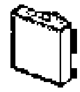
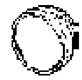


Lighted/non-lighted

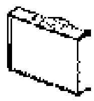
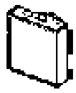
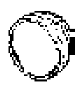
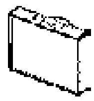
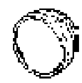
Pushbuttons

Illumination: red, yellow, and white use either LED or incandescent lamps.

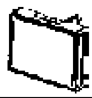
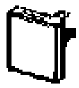
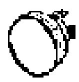
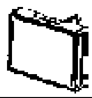
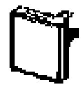
LED

Degree of protection	IP40			Oil-resistant IP65		
Color	Rectangular 	Square 	Round 	Rectangular 	Square 	Round 
Red	A16L-JR	A16L-AR	A16L-TR	A165L-JR	A165L-AR	A165L-TR
Yellow	A16L-JY	A16L-AY	A16L-TY	A165L-JY	A165L-AY	A165L-TY
Pure yellow	A16L-JPY	A16L-APY	A16L-TPY	A165L-JPY	A165L-APY	A165L-TPY
Green	A16L-JGY	A16L-AGY	A16L-TGY	A165L-TGY	A165L-AGY	A165L-TGY
White	A16L-JW	A16L-AW	A16L-TW	A165L-TW	A165L-AW	A165L-TW
Blue	A16L-JA	A16L-AA	A16L-TA	A165L-JA	A165L-AA	A165L-TA

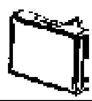
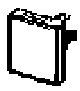
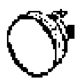
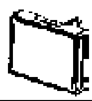
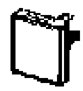
Incandescent Lamps (With the exception of green, the Units are the same as for LEDs.)

Degree of protection	IP40			Oil-resistant IP65		
Color	Rectangular 	Square 	Round 	Rectangular 	Square 	Round 
Red	A16L-JR	A16L-AR	A16L-TR	A165L-JR	A165L-AR	A165L-TR
Yellow	A16L-JY	A16L-AY	A16L-TY	A165L-JY	A165L-AY	A165L-TY
Pure yellow	A16L-JPY	A16L-APY	A16L-TPY	A165L-JPY	A165L-APY	A165L-TPY
Green	A16L-JG	A16L-AG	A16L-TG	A165L-JG	A165L-AG	A165L-TG
White	A16L-JW	A16L-AW	A16L-TW	A165L-JW	A165L-AW	A165L-TW
Blue	A16L-JA	A16L-AA	A16L-TA	A165L-JA	A165L-AA	A165L-TA

Non-lighted (Same as Units for incandescent lamps.)

Degree of protection	IP40			Oil-resistant IP65		
Color	Rectangular 	Square 	Round 	Rectangular 	Square 	Round 
Red	A16L-JR	A16L-AR	A16L-TR	A165L-JR	A165L-AR	A165L-TR
Yellow	A16L-JY	A16L-AY	A16L-TY	A165L-JY	A165L-AY	A165L-TY
Pure yellow	A16L-JPY	A16L-APY	A16L-TPY	A165L-JPY	A165L-APY	A165L-TPY
Green	A16L-JG	A16L-AG	A16L-TG	A165L-JG	A165L-AG	A165L-TG
White	A16L-JW	A16L-AW	A16L-TW	A165L-JW	A165L-AW	A165L-TW
Blue	A16L-JA	A16L-AA	A16L-TA	A165L-JA	A165L-AA	A165L-TA
Black	A16L-JB	A16L-AB	A16L-TB	A165L-JB	A165L-AB	A165L-TB

Neon Lamps

Degree of protection	IP40			Oil-resistant IP65		
Color	Rectangular 	Square 	Round 	Rectangular 	Square 	Round 
Red	A16L-JRN	A16L-ARN	A16L-TRN	A165L-JRN	A165L-ARN	A165L-TRN
Green	A16L-JGN	A16L-AGN	A16L-TGN	A165L-JGN	A165L-AGN	A165L-TGN
White	A16L-JWN	A16L-AWN	A16L-TWN	A165L-JWN	A165L-AWN	A165L-TWN

Switches

Appearance	Classification				Model
	Lighted/non-lighted (common use)	Standard load/microload (common use)	SPDT	Solder terminal	A16-1
			DPDT		A16-2
			SPDT	PCB terminal	A16-1P
			DPDT		A16-2P
			DPDT	Screw-Less Clamp	A16-2S

Switches with Reduced-voltage Lighting

Appearance	Classification				Model
	100 V	Standard load/microload (common use)	SPDT	Solder terminal	A16-T1-1
			DPDT		A16-T1-2
	100 V		DPDT	Screw-less clamp	A16-T1-2S
	200 V				A16-T2-2S

Lamps

LED

Operating voltage / Light color 	5 VDC	12 VDC	24 VDC
Red	A16-5DSR	A16-12DSR	A16-24DSR
Yellow	A16-5DSY	A16-12DSY	A16-24DSY
Green	A16-5DSG	A16-12DSG	A16-24DSG
White (See note.)	A16-5DSW	A16-12DSW	A16-24DSW
Blue	A16-5DA	A16-12DA	A16-24DA

Note: Use the white LED together with white or pure yellow Pushbuttons.

Incandescent Lamp

Operating voltage 	5 VAC/VDC	12 VAC/VDC	24 VAC/VDC
Model	A16-5	A16-12	A16-24

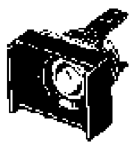
Neon Lamp

Operating voltage 	100 VAC	200 VAC
Red (See note.)	A16-1NRN	A16-2NRN
Green	A16-1NGN	A16-2NGN

Note: Use the red neon lamp with red or white Pushbuttons.

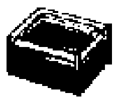
Pushbutton switches

Cases

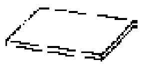
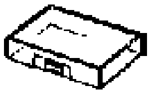
Appearance	Classification			Model
	IP40	Momentary operation	Rectangular (2-way guard)	A16-CJM
			Rectangular (3-way guard)	A16-C3JM
			Square	A16-CAM
			Round	A16-CTM
		Alternate operation	Rectangular (2-way guard)	A16-CJA
			Rectangular (3-way guard)	A16-C3JA
			Square	A16-CAA
			Round	A16-CTA
	Oil-resistant IP65	Momentary operation	Rectangular (2-way guard)	A165-CJM
			Rectangular (3-way guard)	A165-C3JM
			Square	A165-CAM
			Round	A165-CTM
		Alternate operation	Rectangular (2-way guard)	A165-CJA
			Rectangular (3-way guard)	A165-C3JA
			Square	A165-CAA
			Round	A165-CTA

Accessories (Order Separately)

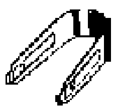
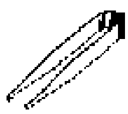
Accessories

Name	Appearance	Classification	Model	Remarks
Switch Guards		For rectangular models	A16ZJ-5050	Cannot be used with the Dust Cover.
		For square and round models	A16ZA-5050	
Dust Covers		For rectangular models	A16ZJ-5060	Cannot be used with the Switch Guard.
		For square models	A16ZA-5060	
		For round models	A16ZT-5060	
Panel Plugs		For rectangular models	A16ZJ-3003	Used for covering the panel cutouts for future panel expansion.
		For square models	A16ZA-3003	
		For round models	A16ZT-3003	

Replacements

Name	Appearance	Classification			Model	Remarks
Legend Plates		Rectangular	IP40	Milky	A16ZJ-5204	A single Legend Plate (transparent) is included with a standard model. The milky Legend Plate can be used with the IP40 and oil-resistant IP65.
				Transparent	A16ZJ-5202	
			Oil-resis-tant IP65	Milky	A16ZJ-5204	
				Transparent	A16ZJ-5203	
		Square	IP40	Milky	A16ZA-5204	
				Transparent	A16ZA-5202	
			Oil-resis-tant IP65	Milky	A16ZA-5204	
				Transparent	A16ZA-5203	
		Round	IP40	Milky	A16ZT-5204	
				Transparent	A16ZT-5202	
			Oil-resis-tant IP65	Milky	A16ZT-5204	
				Transparent	A16ZT-5203	
Color Caps (for IP40)		LED indicator/incan-descent lamp/non-lighted		White	A16Z□-5001W	Insert one of the following letters into the box (□). J: Rectangular A: Square T: Round The Color Cap is usually supplied. Re-place the Cap if the color is to be changed. When using an LED indicator, be sure to use a Color Cap that matches the lu-minescent color of the LED. The materials used for the IP40 and oil-resistant IP65 are different so be sure to use a Color Cap that matches the specifications of the Switch.
				Red	A16Z□-5001R	
	Rectangular			Yellow	A16Z□-5001Y	
		LED indicator		Pure yellow	A16Z□-5001PY	
				Green	A16Z□-5001GY	
		Incandescent lamp/ non-lighted		Blue	A16Z□-5001A	
				Green	A16Z□-5001G	
	Square	Non-lighted		Black	A16Z□-5011B	
Color Caps (for oil-resistant IP65)		LED indicator/incan-descent lamp/non-lighted		White	A16Z□-5101W	
				Red	A16Z□-5101R	
				Yellow	A16Z□-5101Y	
	Round	LED indicator		Pure yellow	A16Z□-5101PY	
				Green	A16Z□-5101GY	
		Incandescent lamp/ non-lighted		Blue	A16Z□-5101A	
				Green	A16Z□-5101G	
		Non-lighted		Black	A16Z□-5111B	

Tools

Name	Appearance	Model	Applicable types					Remarks
			Pushbutton Switch	Knob-type Selector Switch	Key-type Selector Switch	Emergency Stop Switch	Indicator	
Extractor		A3PJ-5080	Yes	No	No	No	Yes	Convenient for ex-tracting Pushbut-ton Switches
Screw Fitting		A16Z-3004	Yes	Yes	Yes	Yes	Yes	Convenient for ganged installa-tion. Tighten to a torque of 0.39 N·m min.
Extractor		A16Z-5080	Yes	Yes	Yes	Yes	Yes	Convenient for ex-tracting the Switch and Lamps.

Specifications

■ Approved Standards

Agency	Standards	File No.
UL, cUL (See note.)	UL508	E41515
---	EN60947-5-1	---

Note: cUL: CSA, C22.2 No. 14

■ Approved Standard Ratings

UL, cUL (File No. E41515)

5 A at 125 VAC, 3 A at 250 VAC (general use)
3 A at 30 VDC (resistive)

EN60947-5-1 (Low Voltage Directive)

3 A at 250 VAC (AC12), 3 A at 30 VDC (DC12)

■ Ratings

Contacts

AC resistive load	DC resistive load
3 A at 250 VAC 5 A at 125 VAC	3 A at 30 VDC

Minimum applicable load: 1 mA at 5 VDC
Rated values are obtained from tests conducted under the following conditions.

1. Load: Resistive load
2. Mounting conditions: No vibration and no shock
3. Temperature: 20±2 °C
4. Operating frequency: 20 operations/min

Super-bright LED

Rated voltage	Rated current	Operating voltage	Internal limiting resistor
5 VDC	30 mA (15 mA)	5 VDC±5%	33 Ω (68 Ω)
12 VDC	15 mA	12 VDC±5%	270 Ω (560 Ω)
24 VDC	10 mA	24 VDC±5%	1600 Ω (2,000 Ω)

Note: The values in parentheses are for models with blue Pushbuttons.

Incandescent Lamp

Rated voltage	Rated current	Operating voltage
6 VAC/VDC	60 mA	5 VAC/VDC
14 VAC/VDC	40 mA	12 VAC/VDC
28 VAC/VDC	24 mA	24 VAC/VDC

■ Characteristics

Item		Pushbutton Switch
Allowable operating frequency	**Mechanical**	Momentary operation: 120 operations/minute max. (See note 1.) Alternate operation: 60 operations/minute max. (See note 1.)
	Electrical	20 operations/minute max. (See note 1.)
Insulation resistance		100 MΩ min. (at 500 VDC)
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min between terminals of same polarity 2,000 VAC, 50/60 Hz for 1 min between terminals of different polarity and also between each terminal and ground 1,000 VAC, 50/60 Hz for 1 min between lamp terminals (See note 2.)
Vibration resistance	**Malfunction**	10 to 55 Hz, 1.5-mm double amplitude (malfunction within 1 ms)
Shock resistance	**Mechanical**	500 m/s^2
	Malfunction	150 m/s^2 max. (malfunction within 1 ms)
Durability	**Mechanical**	Momentary operation: 2,000,000 operations min. Alternate operation: 200,000 operations min. (See note 1.)
	Electrical	100,000 operations min. (See note 1.)
Ambient temperature		Operating: –10°C to 55°C (with no icing or condensation) Storage: –25°C to 65°C (with no icing or condensation)
Ambient humidity		Operating: 35% to 85%
Electric shock protection class		Class II
PTI (tracking characteristic)		175
Degree of contamination		3 (IEC947-5-1)
Weight		Approx. 10 g (in the case of a lighted DPDT switch with solder terminals)

Note: **1.** Set and reset constitute one operation.
2. With LED and incandescent lamp not mounted.

Screw-Less Clamp

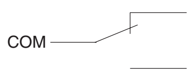
Item		Screw-Less Clamp			
Recommended wire size		0.5 mm^2 twisted wire or 0.8 mm-dia. solid wire			
Usable wires and tensile strength	Twisted wire	0.3 mm^2	0.5 mm^2	0.75 mm^2	1.25 mm^2
	Solid wire	0.5 mm dia.	0.8 mm dia.	1.0 mm dia.	---
	Tensile strength	10 N	20 N	30 N	40 N
Length of exposed wire		10 ñ1 mm			

■ Operating Characteristics

Type / Features	Pushbutton Switch			
	IP40		Oil-resistant IP65	
	SPDT	DPDT	SPDT	DPDT
Operating force (OF) max.	2.45 N	4.41 N	2.94 N	4.91 N
Releasing force (RF) min.	0.29 N			
Total travel (TT)	Approx. 3 mm			
Pretravel (PT) max.	2.5 mm			
Lock stroke (LTA) min. (See note.)	0.5 mm			

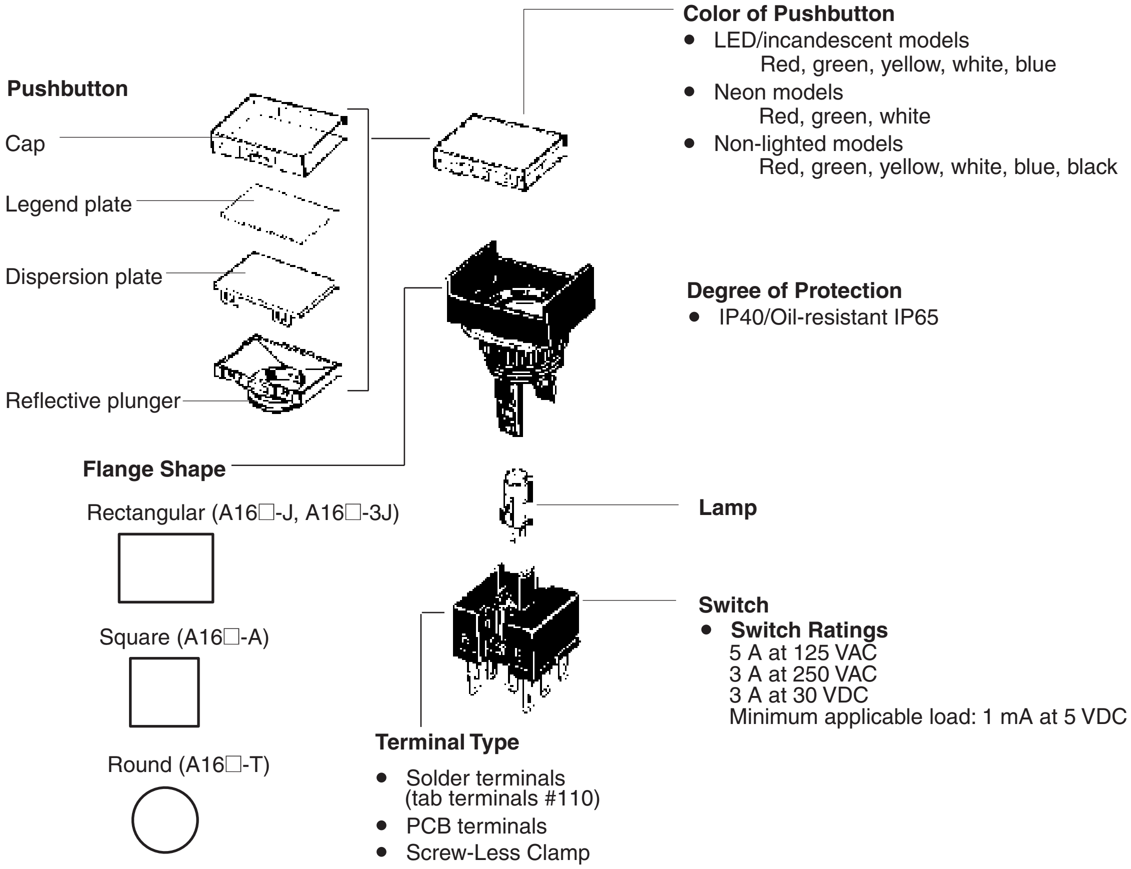
Note: Lock stroke is only for alternate operation.

■ Contact Form

Name	Contact
DPDT	

Pushbutton switches

Nomenclature



Dimensions

Note: All units are in millimeters unless otherwise indicated.

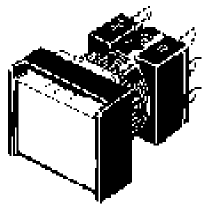
■ Lighted/Non-lighted Pushbutton Switches without Voltage Reduction Unit

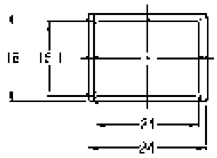
The lamp terminal is also provided with non-lighted models.

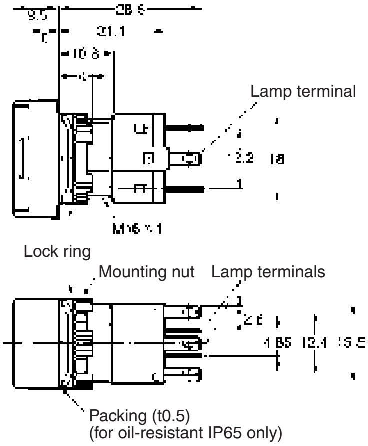
Solder terminals and tab terminals (#110) can be both used with Lighted and Non-lighted Pushbutton Switches.

Rectangular
A16□-J

Solder terminals (tab terminals #110)

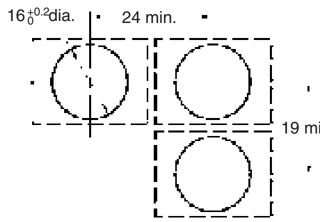






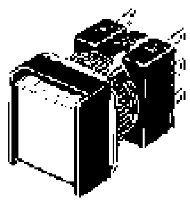
Panel Cutouts

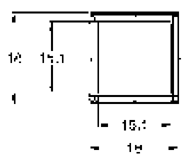
See page L-29 for panel cutouts

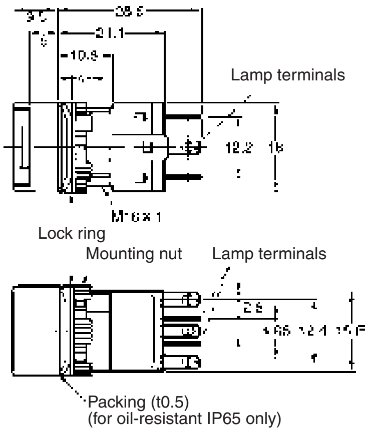


Square
A16□-A

Solder terminals (tab terminals #110)

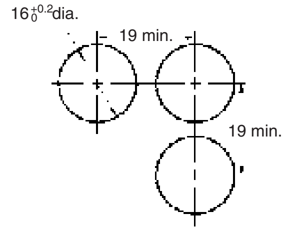






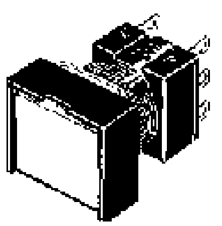
Panel Cutouts

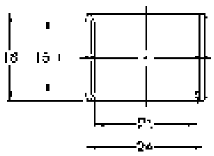
See page L-29 for panel cutouts

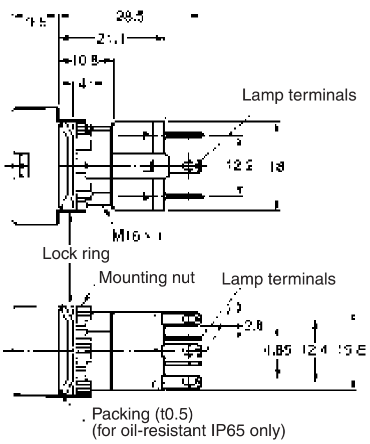


Rectangular
A16□-3J

Solder terminals (tab terminals #110)

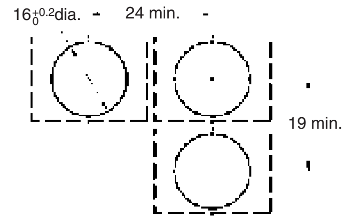




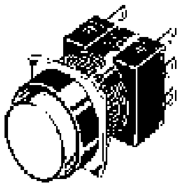


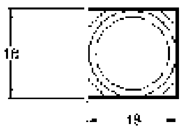
Panel Cutouts

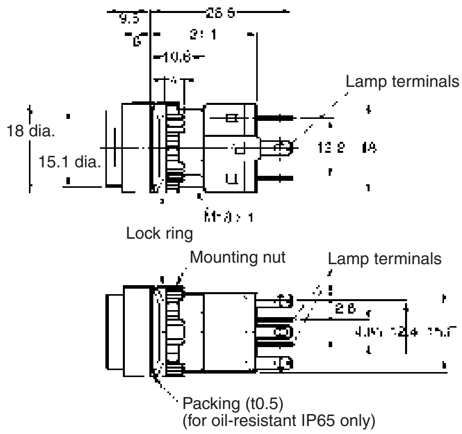
See page L-29 for panel cutouts



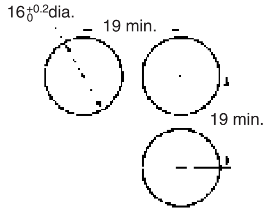
Round
A16□-T
Solder terminals (tab terminals #110)





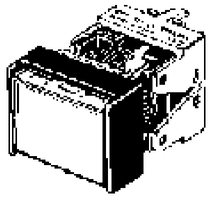


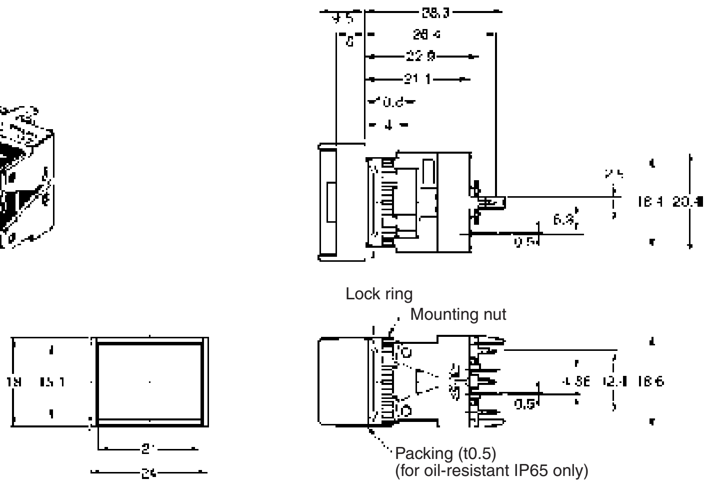
Panel Cutouts
See page L-29 for panel cutouts



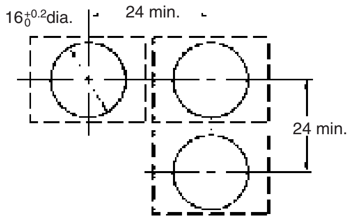
The following diagrams show the rectangular model as a representative example.

Rectangular
A16□-J
PCB terminals

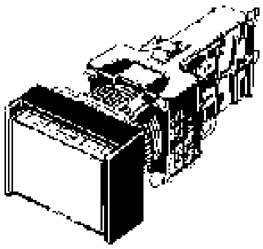


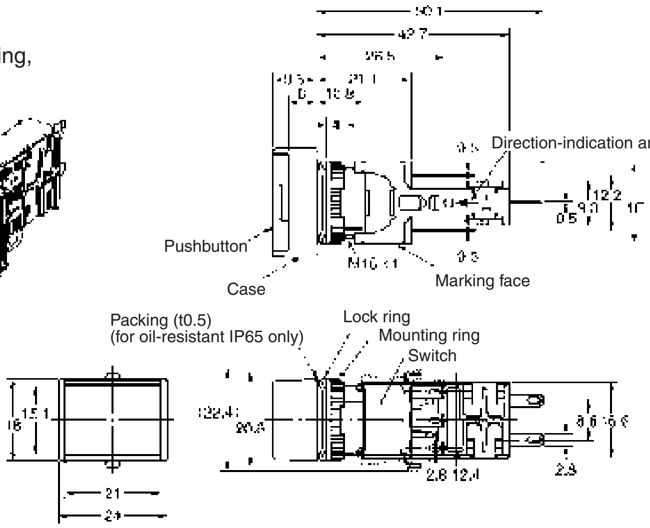


Panel Cutouts
See page L-29 for panel cutouts

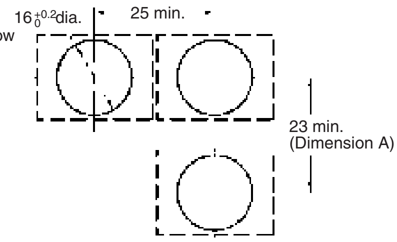


Rectangular
A16□-T1, T2
Voltage-reduction lighting,
solder terminals
(tab terminals #110)



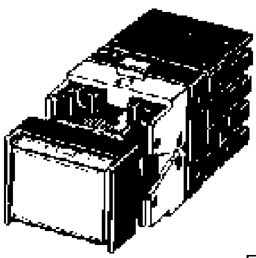


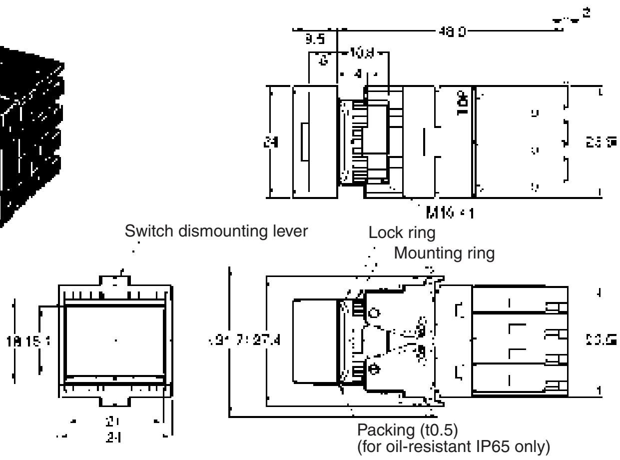
Panel Cutouts
See page L-29 for panel cutouts



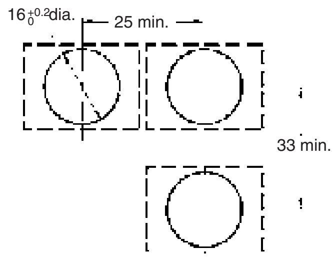
Recommended panel thickness: 0.5 to 3.2 mm

Rectangular
A16□-2S
Screw-Less Clamp



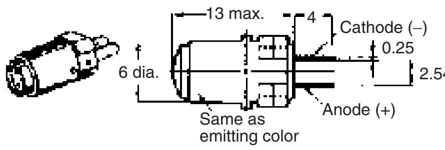


Panel Cutouts
See page L-29 for panel cutouts

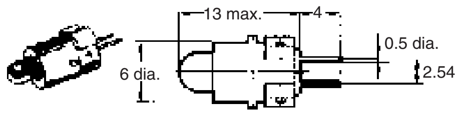


■ Lamps

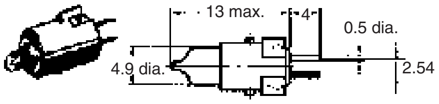
LED
A16-5DS□/-12DS□/-24DS□



Incandescent Lamp
A16-5/-12/-24

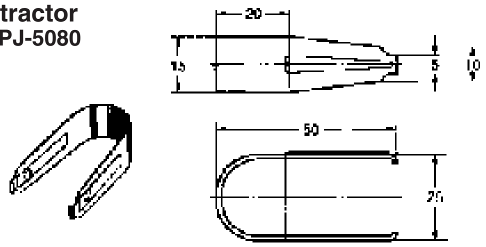


Neon Lamp
A16-1N/-2N

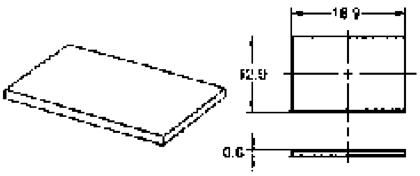


■ Accessories, Tools, and Components

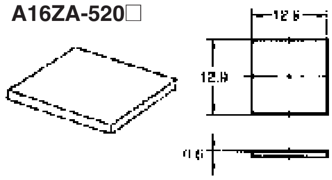
Extractor
A3PJ-5080



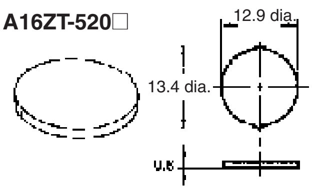
Legend Plates
A16ZJ-520□



A16ZA-520□



A16ZT-520□

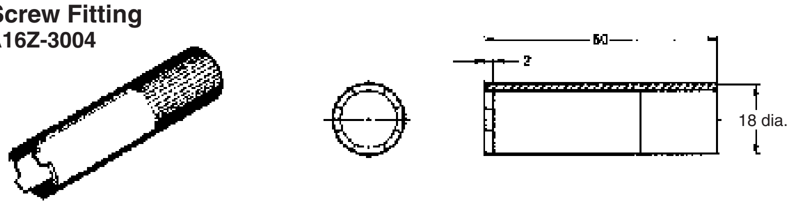


Note: 1. The panel is 0.6 mm thick.
2. The panel is made of the materials listed in the following table.

Color	Degree of protection	Materials
Milky	IP40	Polyacrylate resin
	IP65	
Transparent	IP40	Polycarbonate resin
	IP65	Polyacrylate resin

Note: The standard model is transparent.

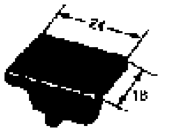
Screw Fitting
A16Z-3004



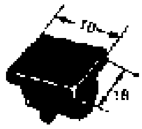
Panel Plugs (Black Resin)

Select the Plug that fits the panel design and mount from the front of the Panel. Panel cutouts are the same as those for Switches.

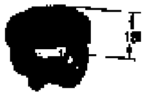
Rectangular
A16ZJ-3003



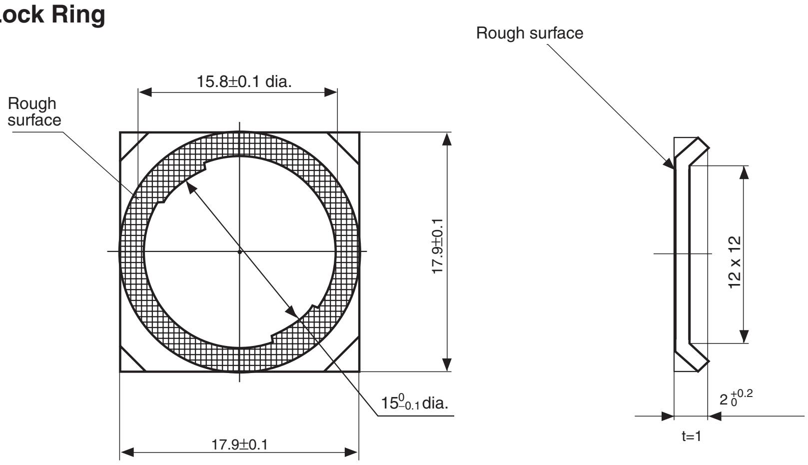
Square
A16ZA-3003



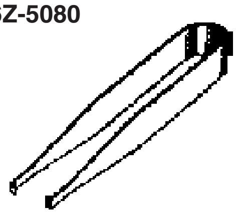
Round
A16ZT-3003

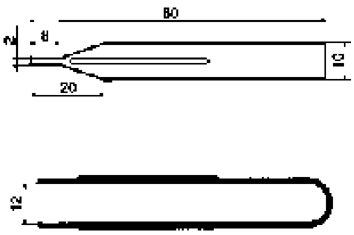


Lock Ring



Extractor
A16Z-5080

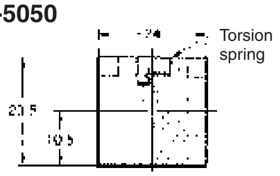


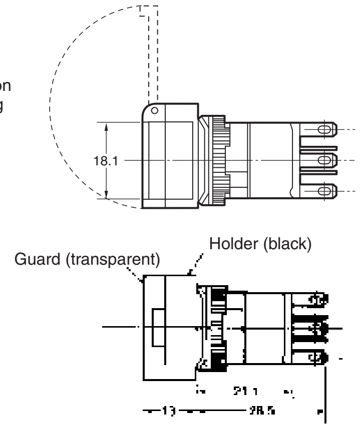


■ Dimensions with Accessories

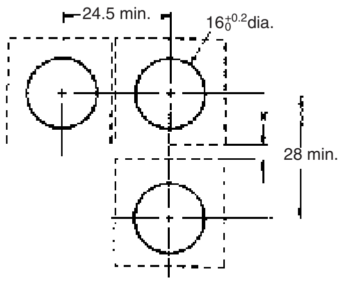
Switch Guards

Rectangular
A16ZJ-5050



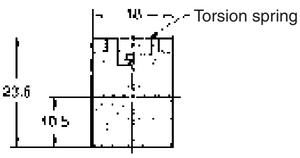


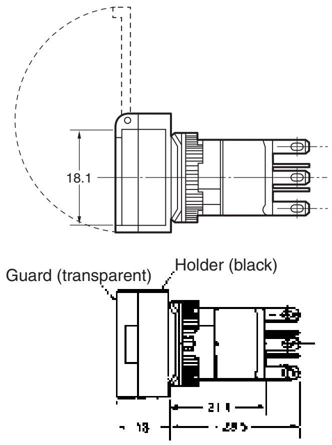
Panel Cutouts (Top View)



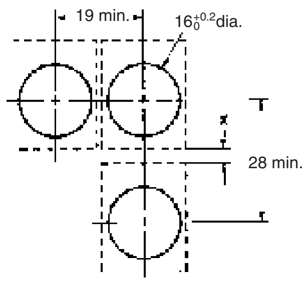
Note: The above illustration shows the case where 4.5 mm is provided for the distance "x." If no clearance is required for the "x" section, the vertical mounting dimension can be as small as 24 mm. Set this distance according to operating conditions.

Square
A16ZA-5050





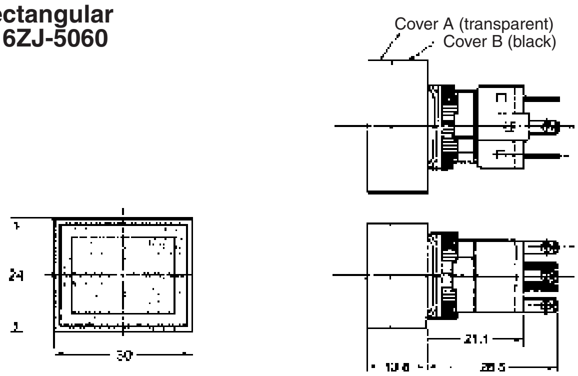
Panel Cutouts (Top View)



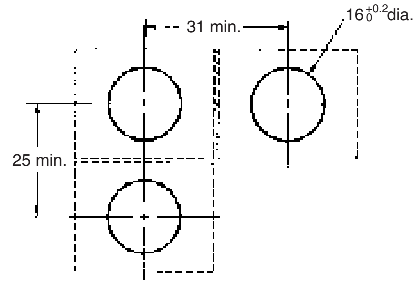
Note: The above illustration shows the case where 4.5 mm is provided for the distance "x." If no clearance is required for the "x" section, the vertical mounting dimension can be as small as 24 mm.Set this distance according to operating conditions.For models with PCB terminals, the horizontal mounting dimension is 24 mm min.

Dust Covers

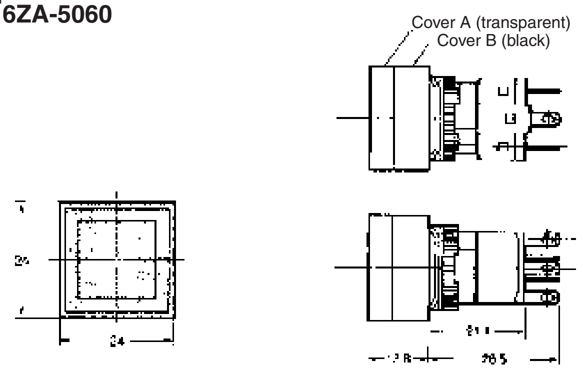
Rectangular
A16ZJ-5060



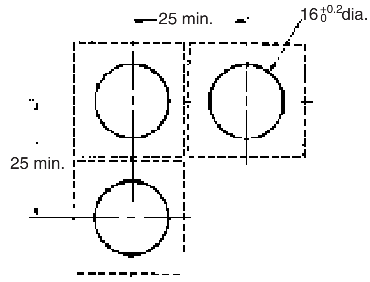
Panel Cutouts



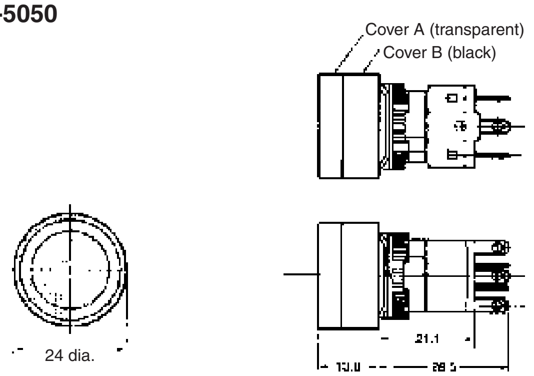
Square
A16ZA-5060



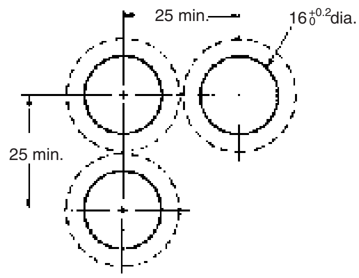
Panel Cutouts



Round
A16ZT-5050



Panel Cutouts



Pushbutton switches

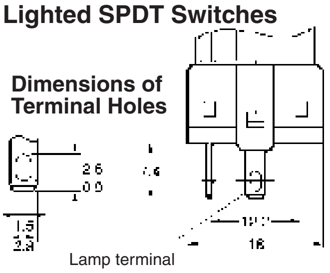
■ Terminal Arrangement

Models without Reduced-voltage Lighting

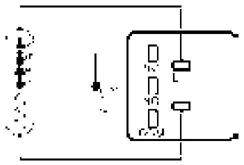
Non-lighted Pushbutton Switches are also provided with lamp terminals.

Solder Terminals

Lighted SPDT Switches

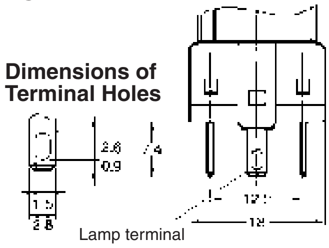


Terminal Arrangement (Bottom View)

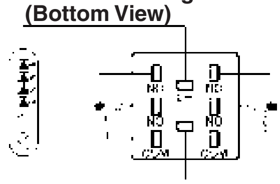


Note: The L+ is not shown on the Switch.

Lighted DPDT Switches



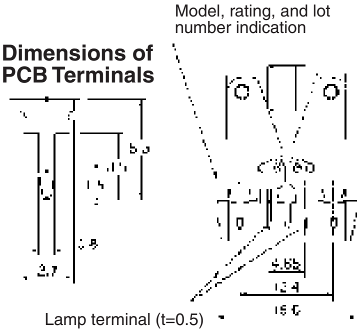
Terminal Arrangement (Bottom View)



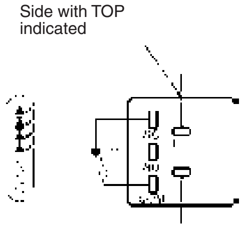
Note: The L+ is not shown on the Switch.

PCB Terminals

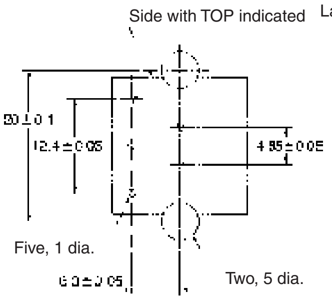
Lighted SPDT Switches



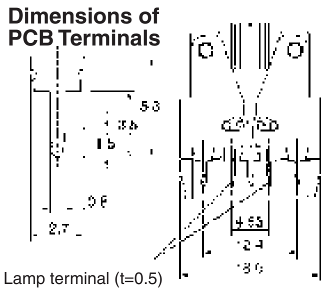
Terminal Arrangement (Bottom View)



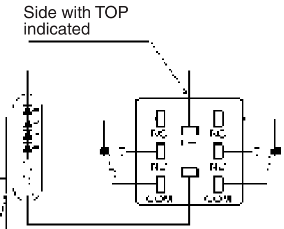
PCB Cutouts (Bottom View)



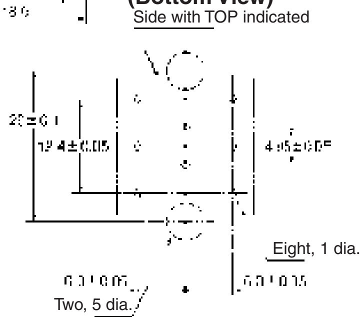
Lighted DPDT Switches



Terminal Arrangement (Bottom View)



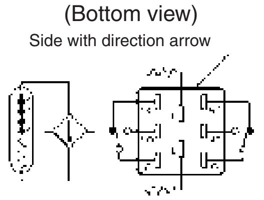
PCB Cutouts (Bottom View)



Voltage Reduction Units

DPDT lighted models

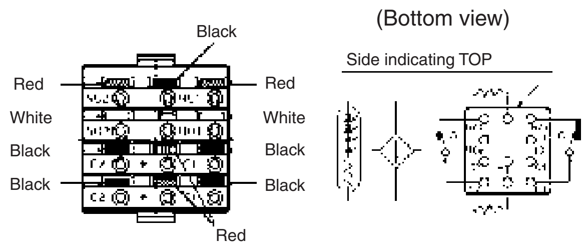
(Bottom view)



- The voltage-reduction circuit is built in.

Screw-Less Clamps

DPDT lighted models

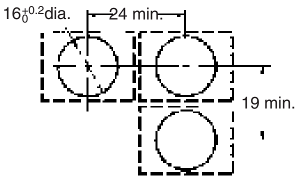


- Voltage-reduction lighting models with Screw-Less Clamps (A16L-□T1-2S, A16L-□T2-2S) incorporate voltage-reduction circuits.

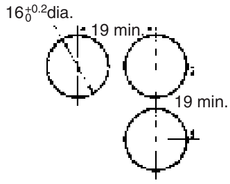
■ Panel Cutouts

Solder Terminals

Rectangular A16□-J/M16□-□J (Top View)



Square A16□-A/M16□-A
Round A16□-T/M16□-T
(Top View)

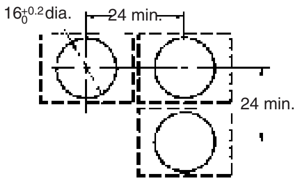


Note: 1. Make sure the thickness of the mounting panel is between 0.5 and 3.2 mm. If, however, a Switch Guard or Dust Cover is used, the thickness of the mounting panel must be between 0.5 and 2 mm.

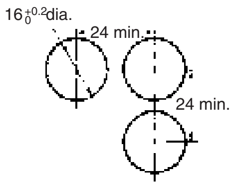
2. If the panel is to be finished with coating, etc., make sure that the panel meets the specified dimensions after coating.

PCB Terminals

Rectangular A16□-J/M16□-J (Top View)



Square A16□-A/M16□-A, A165□-BA, M165-BA
Round A16□-T/M16□-T
(Top View)



Note: 1. Ensure that the variation in the distance between the centers of neighboring mounting holes is less than ±0.1 mm.

2. Make sure the thickness of the mounting panel is between 0.5 and 3.2 mm. If, however, a Switch Guard or Dust Cover is used, the thickness of the mounting panel must be between 0.5 and 2 mm.

3. If the panel is to be finished with coating, etc., make sure that the panel meets the specified dimensions after coating.

Installation

■ Panel Mounting

After mounting the Pushbutton Unit (i.e., the Pushbutton and the Case) to the panel, snap in the Switch Unit (i.e., the Switch and the Lamp) from the back of the panel.

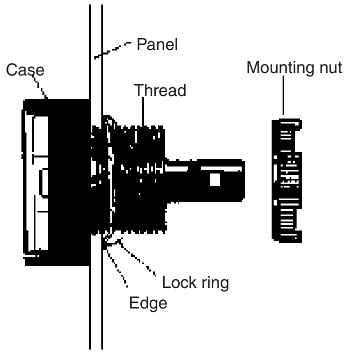
Mounting to the Panel

Insert the Pushbutton Unit into the front of the panel, and fix the lock ring and mounting nut from the terminal side.

Make sure that the lock ring is aligned with the thread of the Case and the edge of the lock ring is touching the panel.

Tighten the mounting nuts to a torque of 0.29 to 0.49 N·m.

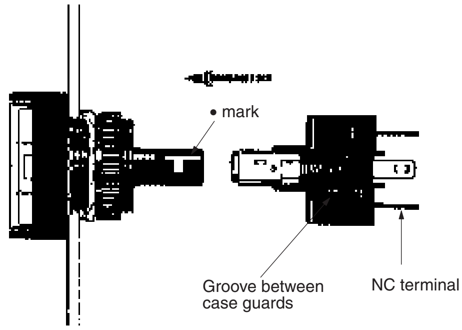
The maximum tightening torque is 0.49 N·m.



Mounting the Switch Unit

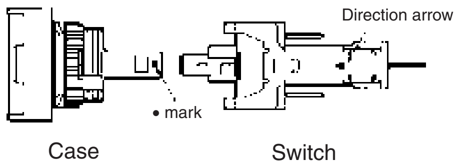
Snap on the Switch Unit to the Pushbutton Unit.

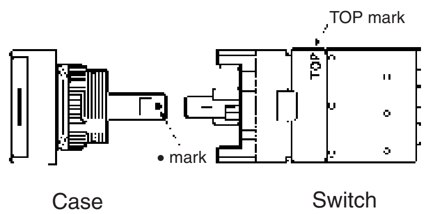
Make sure that the Switch Unit has the correct orientation when snapping it onto the Case. Align the • mark on the Case with the groove between the case guards on the NC terminal side of the Switch Unit in the way shown below, and push the Switch Unit into the Case until it clicks into place. Confirm that the Switch Unit is securely in place before using.



Mounting the Switch Unit for Voltage Reduction Types

1. The mounting panel thickness must be 0.5 to 3.2 mm.
2. The mounting ring must be tightened to a torque 0.29 to 0.49 N·m.
3. The mounting hole must be cut out in the way described previously. The dimension A is the length required for removing the Switch when it is in the mounted state. If Switches are mounted side-by-side separated by less than the specified distance, it may not be possible to remove the Switch.
4. Be sure to mount the Case to the Switch with the correct orientation. Mount with the • mark on the Case facing in the same direction as the side of the Switch with the direction arrow or the word TOP.

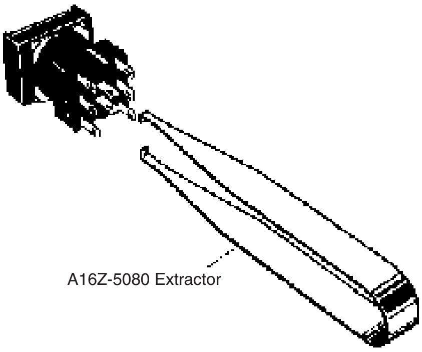




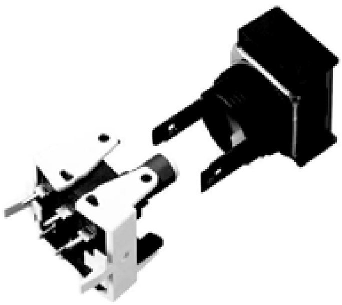
Removing the Switch Unit

Grip the part between the Switch holder of the Case and the Switch Unit using the A16Z-5080 Extractor, and pull to remove the Switch Unit.

• 16-mm Models



• A16-P Models (with PCB Terminals)

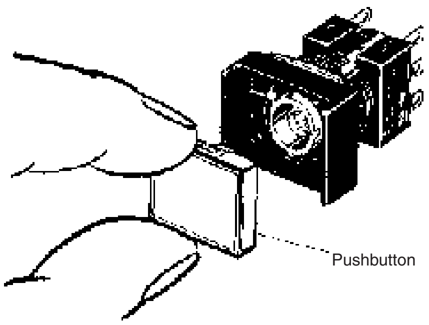


The Switch Unit can be mounted or dismounted by simply opening or closing the lever.

■ Mounting and Replacing the Pushbutton

Removing and Mounting the Pushbutton

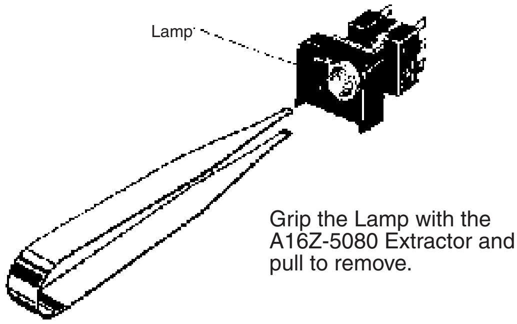
1. Remove the Pushbutton as shown in the following diagram. If the Pushbutton cannot be removed by hand, use the A3PJ-5080 Extractor.



2. To attach the Pushbutton, push until it clicks into place.

Removing the Lamp

Removing from the Pushbutton End

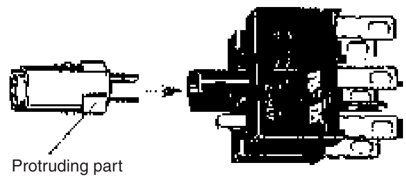


Removing from the Switch End

The Lamp can be removed by hand once the Switch is removed using the A16Z-5080 Extractor.

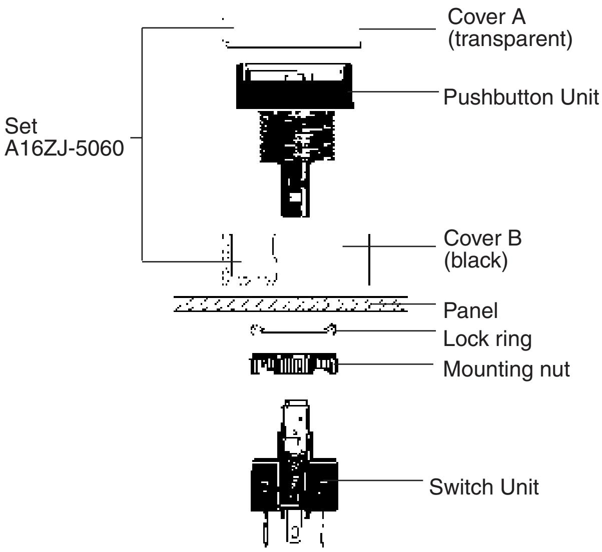
Installing the Lamp

When mounting the Lamp, make sure it is facing the direction shown in the following diagram. Insert the Lamp while matching the protruding part of the Lamp and the small guides on the outer surface of the Case.



The Lamp can be mounted from the Pushbutton end by using the A16Z-5080 Extractor. The lamp can be mounted by following the opposite procedure for removing the Lamp.

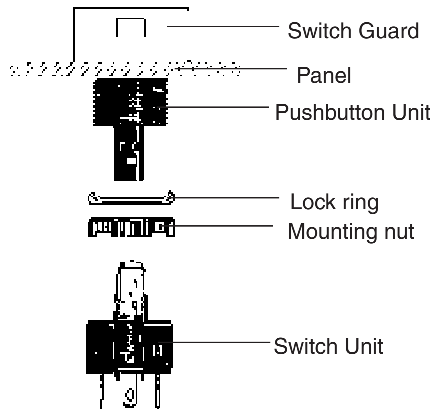
■ Mounting the A16Z Dust Cover



1. Separate the Dust Cover into 2 parts: cover A and cover B.
2. Insert the Case into cover B.
3. Mount these parts together onto the panel.
4. From the back of the panel, mount the lock ring and secure with the mounting nut.
5. Insert cover A into cover B. Ensure that the entire perimeter of cover A is securely attached to cover B by pressing in different directions.
6. Mount the Switch Unit to the Case.

Note: Recommended panel thickness: 0.5 to 2 mm.

■ Mounting the A16Z Switch Guard



1. Insert the Case into the Switch Guard.
2. Mount these parts together onto the panel.

Precautions

Refer to the *Technical Information for Pushbutton Switches* (Cat. No. A143).

⚠ WARNING

Do not apply a voltage between the incandescent lamp and the terminal that is greater than the rated voltage. If the incandescent lamp is broken, the operating part may pop out.

Always turn OFF the power and wait for 10 minutes before replacing the incandescent lamp. If the lamp is replaced immediately after the power is turned OFF, the remaining heat may cause burns.

■ Correct Use

Mounting

Always make sure that the power is turned OFF before mounting, removing, or wiring the Switch, or performing maintenance.

Do not tighten the mounting nut more than necessary using tools such as pointed-nose pliers. Doing so will damage the mounting nut. The tightening torque is 0.29 to 0.49 N·m.

Wiring

Solder Terminal

Solder terminals and quick-connect terminals (#110) are commonly used for terminals.

Be sure to use electrical wires that are a size appropriate for the applied voltage and carry current (conductor size is 0.5 to 0.75 mm^2). Perform soldering according to the conditions provided below. If the soldering is not properly performed, the lead wires will become detached, resulting in short-circuits.

1. Hand soldering: 30 W, within 5 s
2. Dip soldering: 240 °C, within 3 s

Wait for one minute after soldering before exerting any external force on the solder.

Use non-corrosive resin fluid as the flux.

Make sure that the electric cord is wired so that it does not touch the Unit. If the electric cord touches the Unit, then electric wires with a heat resistance of 100°C min. must be used.

After wiring the Switch, maintain an appropriate clearance and creepage distance.

Screw-Less Clamps

Mounting Procedure

1. Strip a length of 10 mm off the end of the wire (allowable range: 10±1 mm).
2. Bunch wire strands together and straighten them.
3. Insert the wire into the insertion hole while pressing the release button at the side of the hole. (Using a precision screwdriver is recommended.)
4. Let go of the release button to lock the wire into place.
5. After locking, pull on the wire gently to confirm that it is securely locked.

Removing Procedure

Remove wires by pulling them while pressing the release button.

Note: When reusing wires that have already been locked, cut off the end of the wire and strip the wire again before using.

Operating Environment

The IP65 model is designed with a degree of protection so that it will not sustain damage if it is subjected to water from any direction to the front of the panel.

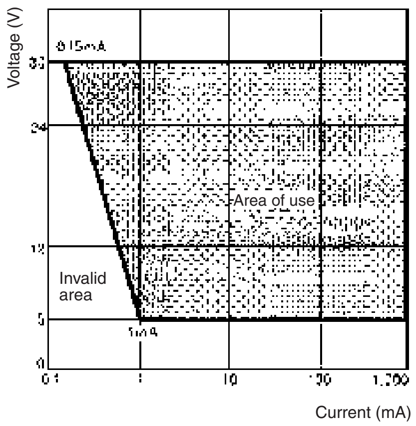
Using the Microload

Insert a contact protection circuit, if necessary, to prevent the reduction of life expectancy due to extreme wear on the contacts caused by loads where inrush current occurs when the contact is opened and closed.

The A16 allows both a standard load (125 V at 5A, 250 V at 3 A) and a microload. If a standard load is applied, however, the microload area cannot be used. If the microload area is used with a standard load, the contact surface will become rough, and the opening and closing of the contact for a microload may become unreliable.

The minimum applicable load is the N-level reference value. This value indicates the malfunction reference level for the reliability level of 60% (λ 60) (conforming to JIS C5003).

The equation, λ 60 = 0.5 x 10^{-4}/operations indicates that the estimated malfunction rate is less than 1/2,000,000 operations with a reliability level of 60%.



LED

The LED current-limiting resistor is built-in, so internal resistance is not required.

Rated voltage	Internal limiting resistor
5 VDC	33 Ω (82 Ω)
12 VDC	270 Ω (470 Ω)
24 VDC	1600 Ω (2400 Ω)

Note: The values in parentheses are for models with blue Pushbutton Units.

Others

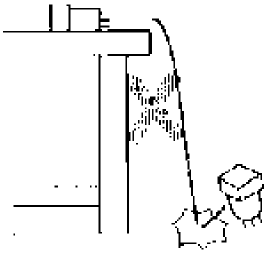
The oil-resistant IP65 uses NBR rubber and is resistant to general cutting oil and cooling oil. Some particular oils cannot be used with the oil-resistant IP65, however, so contact your OMRON representative for details.

If the panel is to be finished with coating, etc., make sure that the panel meets the specified dimensions after the coating.

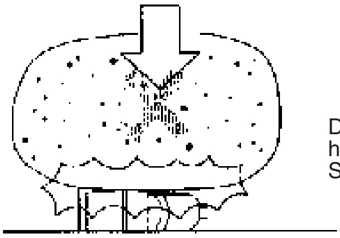
Do not subject the Switch to extreme shock or vibration. Doing so will cause malfunctions and damage to the Switch.

Do not let sharp objects come into contact with the Switches that are made of resin. Doing so will damage the Switches, causing scratches on the outside of the operating parts, and malfunction.

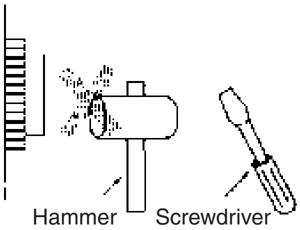
When handling the Switches, do not throw or drop them.



Do not allow the Switch to drop and hit the ground.



Do not place or drop heavy objects on the Switch.



Do not operate the Switch with hard or sharp objects.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. A124-E2-02

Pushbutton Switch
A22

Install in 22-dia. or 25-dia. Panel Cutout

- Easy mounting and removal of Switch Unit.
- Increase wiring efficiency with three-row mounting of Switch Blocks.
- Finger protection mechanism on Switch Unit provided as a standard feature.
- Use 25-dia. ring to install in 25-dia. panel cutouts.
- Mounted using either open-type (fork-type) or closed-type (round-type) crimp terminals.
- Wide range of shapes and colors.
- IP65 oil resistance (non-lighted models)
  IP65 (lighted models)
- EN60947-5-1
- UL and cUL approved (File No. E41515)

Model Number Structure

■ Model Number Legend

Completely Assembled

Shipped as a set which includes the Pushbutton, Lamp (lighted type only), and Switch.

1 2 3 4 5 6
A22□-□□-□-□□

1 Lighted/Non-lighted

Code	Description
None	Non-lighted
L	Lighted

2 Flange Shape

Code	Description
Non-lighted	
F	Round/Flat
T	Round/Projection
G	Round/Full-guard
H	Round/Half-guard
C	Square/Projection
D	Square/Full-guard
S	Round/Mushroom (30-dia. head)
M	Round/Mushroom (40-dia. head)
Lighted	
T	Round/Projection
G	Round/Full-guard
H	Round/Half-guard
C	Square/Projection
D	Square/Full-guard

3 Illumination Color

Code	Description
R	Red
G	Green
Y	Yellow
W	White
A	Blue
B	Black (for non-lighted type only)

4 Light Source

Code	Operating Voltage	
Without Voltage Reduction Unit		
6D	LED	6 VDC
6A		6 VAC
12A		12 VAC/VDC
24A		24 VAC/VDC
5	Incandescent lamp	5 VAC/VDC
12		12 VAC/VDC
24		24 VAC/VDC
H1		100 VAC/VDC
With Voltage Reduction Unit		
T1	LED	110 VAC (See note 1)
T2		220 VAC (See note 2)

5 Contacts

Code	Description
10	SPST-NO
01	SPST-NC
11	SPST-NO + SPST-NC
20	DPST-NO
02	DPST-NC

Note: Refer to page L-50 for contact ratings

6 Switch Action

Code	Description
M	Momentary
A	Alternate

Note: 1. Operational voltage: 95 to 115 VAC
2. Operational voltage: 190 to 230 VAC
3. The LED lamp (24 VAC/VDC) can be lit by directly applying 110 VAC/VDC (220 VAC/VDC) to the lamp terminal.
4. LED incorporates the 24-VAC/VDC type to the Voltage Reduction Unit models.

Subassembled

The Pushbutton, Lamp, or Switch can be ordered separately. Use them in combination for models that are not available as assembled Units. These can also be used as inventory for maintenance parts.

1. Pushbutton

A22□-□□ (1: first box; 2, 3: boxes after the hyphen)

1 Lighted/Non-lighted

Code	Description
None	Non-lighted
L	Lighted

2 Flange Shape

Code	Description
Non-lighted	
F	Round/Flat
T	Round/Projection
G	Round/Full-guard
H	Round/Half-guard
C	Square/Projection
D	Square/Full-guard
S	Round/Mushroom (30-dia. head)
M	Round/Mushroom (40-dia. head)
Lighted	
T	Round/Projection
G	Round/Full-guard
H	Round/Half-guard
C	Square/Projection
D	Square/Full-guard

3 Illumination Color

Code	Description
R	Red
G	Green
Y	Yellow
W	White
A	Blue
B	Black (for non-lighted type only)

2. Lamp

A22-□□ (1, 2)

1 Operating Voltage (Rated Voltage)

Code	Description
Incandescent lamp	
5	5 VAC (6 VAC)
12	12 VAC (14 VAC)
24	24 VAC (28 VAC)
H1	100 VAC (130 VAC)
LED lamp	
6D	6 VDC (6 VDC)
6A	6 VAC (6 VAC)
12A	12 VAC/VDC (12 VAC/VDC)
24A	24 VAC/VDC (24 VAC/VDC)

2 Illumination Color

Code	Description
None	Incandescent lamp
R	Red
G	Green
Y	Yellow
A	Blue

3. Switch (Standard Load)

A22□-□□-□ (1: first box; 2, 3: second and third boxes; 4: last box)

1 Lighted/Non-lighted

Code	Description
None	Non-lighted
L	Lighted

2 Contacts

Code	Description
10	SPST-NO
01	SPST-NC
11	SPST-NO + SPST-NC
20	DPST-NO
02	DPST-NC

3 Switch Action

Code	Description
M	Momentary
A	Alternate

4 Voltage Reduction Unit (Lighted Type Only)

Code	Description
None	Without Voltage Reduction Unit
T1	110 VAC (See note 1)
T2	220 VAC (See note 2)

Note: 1. Operational voltage: 95 to 115 VAC

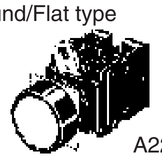
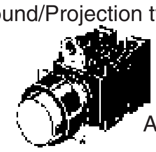
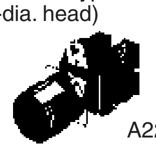
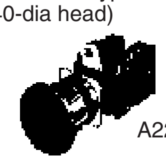
2. Operational voltage: 190 to 230 VAC

Ordering Information

■ List of Models

Ordering as a Set

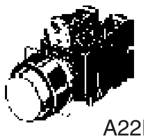
Non-lighted (Round Type)

Appearance	Output	Momentary operation (self-resetting)	Alternate operation (self-holding)	Illumination color
Round/Flat type  A22-F	SPST-NO	A22-F□-10M	A22-F□-10A	Insert one of the following letters into the box □. R (red) Y (yellow) G (green) W (white) A (blue) B (black)
	SPST-NC	A22-F□-01M	A22-F□-01A	
	SPST-NO + SPST-NC	A22-F□-11M	A22-F□-11A	
	DPST-NO	A22-F□-20M	A22-F□-20A	
	DPST-NC	A22-F□-02M	A22-F□-02A	
Round/Projection type  A22-T	SPST-NO	A22-T□-10M	A22-T□-10A	
	SPST-NC	A22-T□-01M	A22-T□-01A	
	SPST-NO + SPST-NC	A22-T□-11M	A22-T□-11A	
	DPST-NO	A22-T□-20M	A22-T□-20A	
	DPST-NC	A22-T□-02M	A22-T□-02A	
Round/Full-guard type  A22-G	SPST-NO	A22-G□-10M	A22-G□-10A	
	SPST-NC	A22-G□-01M	A22-G□-01A	
	SPST-NO + SPST-NC	A22-G□-11M	A22-G□-11A	
	DPST-NO	A22-G□-20M	A22-G□-20A	
	DPST-NC	A22-G□-02M	A22-G□-02A	
Round/Half-guard type  A22-H	SPST-NO	A22-H□-10M	A22-H□-10A	Insert one of the following letters into the box □. R (red) Y (yellow) G (green) W (white) A (blue) B (black)
	SPST-NC	A22-H□-01M	A22-H□-01A	
	SPST-NO + SPST-NC	A22-H□-11M	A22-H□-11A	
	DPST-NO	A22-H□-20M	A22-H□-20A	
	DPST-NC	A22-H□-02M	A22-H□-02A	
Round/Small-size Mushroom type (30-dia. head)  A22-S	SPST-NO	A22-S□-10M	A22-S□-10A	
	SPST-NC	A22-S□-01M	A22-S□-01A	
	SPST-NO + SPST-NC	A22-S□-11M	A22-S□-11A	
	DPST-NO	A22-S□-20M	A22-S□-20A	
	DPST-NC	A22-S□-02M	A22-S□-02A	
Round/Medium-size Mushroom type (40-dia head)  A22-M	SPST-NO	A22-M□-10M	A22-M□-10A	
	SPST-NC	A22-M□-01M	A22-M□-01A	
	SPST-NO + SPST-NC	A22-M□-11M	A22-M□-11A	
	DPST-NO	A22-M□-20M	A22-M□-20A	
	DPST-NC	A22-M□-02M	A22-M□-02A	

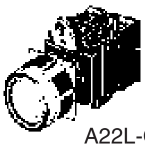
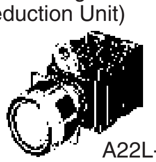
Non-lighted (Square Type)

Appearance	Output	Momentary operation (self-reset)	Alternate operation (self-holding)	Illumination color
Square/Projection type  A22-C	SPST-NO	A22-C□-10M	A22-C□-10A	Insert one of the following letters into the box □. R (red) Y (yellow) G (green) W (white) A (blue) B (black)
	SPST-NC	A22-C□-01M	A22-C□-01A	
	SPST-NO + SPST-NC	A22-C□-11M	A22-C□-11A	
	DPST-NO	A22-C□-20M	A22-C□-20A	
	DPST-NC	A22-C□-02M	A22-C□-02A	
Square/Guard type  A22-D	SPST-NO	A22-D□-10M	A22-D□-10A	
	SPST-NC	A22-D□-01M	A22-D□-01A	
	SPST-NO + SPST-NC	A22-D□-11M	A22-D□-11A	
	DPST-NO	A22-D□-20M	A22-D□-20A	
	DPST-NC	A22-D□-02M	A22-D□-02A	

Lighted (Round Type)

Appearance	Output	Lighting	Operating voltage	Momentary operation (self-resetting)	Alternate operation (self-holding)	Illumination color
Round/Projection type LED lighting (without Voltage Reduction Unit)  A22L-T	SPST-NO	LED	6 VDC	A22L-T□-6D-10M	A22L-T□-6D-10A	Insert one of the following letters into the box □. R (red) Y (yellow) G (green) W (white) A (blue)
			6 VAC	A22L-T□-6A-10M	A22L-T□-6A-10A	
			12 VAC/VDC	A22L-T□-12A-10M	A22L-T□-12A-10A	
			24 VAC/VDC	A22L-T□-24A-10M	A22L-T□-24A-10A	
	SPST-NC		6 VDC	A22L-T□-6D-01M	A22L-T□-6D-01A	
			6 VAC	A22L-T□-6A-01M	A22L-T□-6A-01A	
			12 VAC/VDC	A22L-T□-12A-01M	A22L-T□-12A-01A	
			24 VAC/VDC	A22L-T□-24A-01M	A22L-T□-24A-01A	
	SPST-NO + SPST-NC		6 VDC	A22L-T□-6D-11M	A22L-T□-6D-11A	
			6 VAC	A22L-T□-6A-11M	A22L-T□-6A-11A	
			12 VAC/VDC	A22L-T□-12A-11M	A22L-T□-12A-11A	
			24 VAC/VDC	A22L-T□-24A-11M	A22L-T□-24A-11A	
	DPST-NO		6 VDC	A22L-T□-6D-20M	A22L-T□-6D-20A	
			6 VAC	A22L-T□-6A-20M	A22L-T□-6A-20A	
			12 VAC/VDC	A22L-T□-12A-20M	A22L-T□-12A-20A	
			24 VAC/VDC	A22L-T□-24A-20M	A22L-T□-24A-20A	
	DPST-NC		6 VDC	A22L-T□-6D-02M	A22L-T□-6D-02A	
			6 VAC	A22L-T□-6A-02M	A22L-T□-6A-02A	
			12 VAC/VDC	A22L-T□-12A-02M	A22L-T□-12A-02A	
			24 VAC/VDC	A22L-T□-24A-02M	A22L-T□-24A-02A	

Appearance	Output	Lighting	Operating voltage	Momentary operation (self-resetting)	Alternate operation (self-holding)	Illumination color
Round/Projection type LED voltage-reduction lighting (with Voltage Reduction Unit)  A22L-T	SPST-NO	LED	110 VAC	A22L-T□-T1-10M	A22L-T□-T1-10A	Insert one of the following letters into the box □. R (red) Y (yellow) G (green) W (white) A (blue)
			220 VAC	A22L-T□-T2-10M	A22L-T□-T2-10A	
	SPST-NC		110 VAC	A22L-T□-T1-01M	A22L-T□-T1-01A	
			220 VAC	A22L-T□-T2-01M	A22L-T□-T2-01A	
	SPST-NO + SPST-NC		110 VAC	A22L-T□-T1-11M	A22L-T□-T1-11A	
			220 VAC	A22L-T□-T2-11M	A22L-T□-T2-11A	
	DPST-NO		110 VAC	A22L-T□-T1-20M	A22L-T□-T1-20A	
			220 VAC	A22L-T□-T2-20M	A22L-T□-T2-20A	
	DPST-NC		110 VAC	A22L-T□-T1-02M	A22L-T□-T1-02A	
			220 VAC	A22L-T□-T2-02M	A22L-T□-T2-02A	
Round/Half-guard type LED lighting (without Voltage Reduction Unit)  A22L-H	SPST-NO		6 VDC	A22L-H□-6D-10M	A22L-H□-6D-10A	
			6 VAC	A22L-H□-6A-10M	A22L-H□-6A-10A	
			12 VAC/VDC	A22L-H□-12A-10M	A22L-H□-12A-10A	
			24 VAC/VDC	A22L-H□-24A-10M	A22L-H□-24A-10A	
	SPST-NC		6 VDC	A22L-H□-6D-01M	A22L-H□-6D-01A	
			6 VAC	A22L-H□-6A-01M	A22L-H□-6A-01A	
			12 VAC/VDC	A22L-H□-12A-01M	A22L-H□-12A-01A	
			24 VAC/VDC	A22L-H□-24A-01M	A22L-H□-24A-01A	
	SPST-NO + SPST-NC		6 VDC	A22L-H□-6D-11M	A22L-H□-6D-11A	
			6 VAC	A22L-H□-6A-11M	A22L-H□-6A-11A	
			12 VAC/VDC	A22L-H□-12A-11M	A22L-H□-12A-11A	
			24 VAC/VDC	A22L-H□-24A-11M	A22L-H□-24A-11A	
	DPST-NO		6 VDC	A22L-H□-6D-20M	A22L-H□-6D-20A	
			6 VAC	A22L-H□-6A-20M	A22L-H□-6A-20A	
			12 VAC/VDC	A22L-H□-12A-20M	A22L-H□-12A-20A	
			24 VAC/VDC	A22L-H□-24A-20M	A22L-H□-24A-20A	
	DPST-NC		6 VDC	A22L-H□-6D-02M	A22L-H□-6D-02A	
			6 VAC	A22L-H□-6A-02M	A22L-H□-6A-02A	
			12 VAC/VDC	A22L-H□-12A-02M	A22L-H□-12A-02A	
			24 VAC/VDC	A22L-H□-24A-02M	A22L-H□-24A-02A	

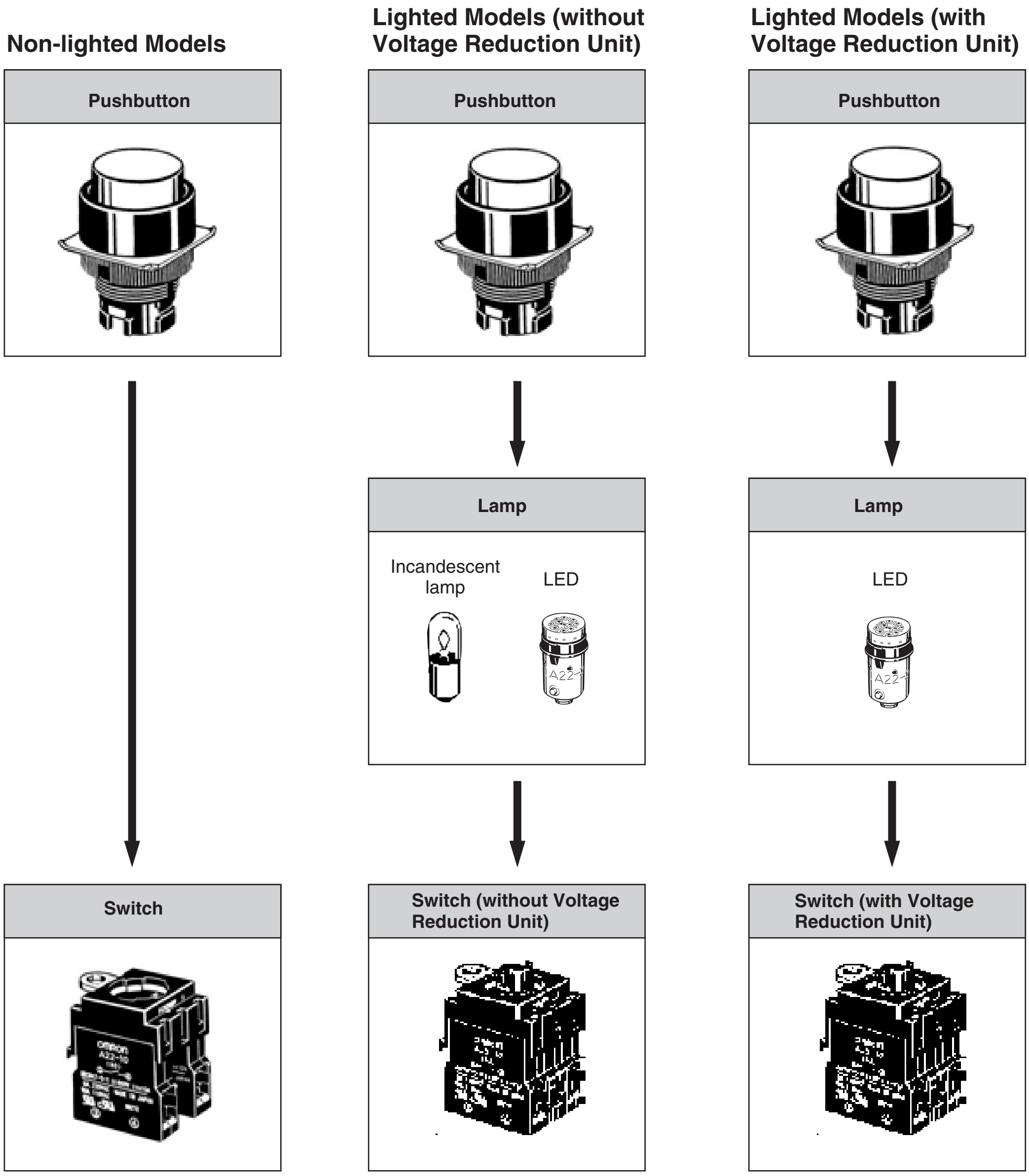
Appearance	Output	Lighting	Operating voltage	Momentary operation (self-resetting)	Alternate operation (self-holding)	Illumination color
Round/Half-guard type LED voltage-reduction lighting (with Voltage Reduction Unit)  A22L-H	SPST-NO	LED	110 VAC	A22L-H□-T1-10M	A22L-H□-T1-10A	Insert one of the following letters into the box □. R (red) Y (yellow) G (green) W (white) A (blue)
			220 VAC	A22L-H□-T2-10M	A22L-H□-T2-10A	
	SPST-NC		110 VAC	A22L-H□-T1-01M	A22L-H□-T1-01A	
			220 VAC	A22L-H□-T2-01M	A22L-H□-T2-01A	
	SPST-NO + SPST-NC		110 VAC	A22L-H□-T1-11M	A22L-H□-T1-11A	
			220 VAC	A22L-H□-T2-11M	A22L-H□-T2-11A	
	DPST-NO		110 VAC	A22L-H□-T1-20M	A22L-H□-T1-20A	
			220 VAC	A22L-H□-T2-20M	A22L-H□-T2-20A	
	DPST-NC		110 VAC	A22L-H□-T1-02M	A22L-H□-T1-02A	
			220 VAC	A22L-H□-T2-02M	A22L-H□-T2-02A	
Round/Full-guard type LED lighting (without Voltage Reduction Unit)  A22L-G	SPST-NO		6 VDC	A22L-G□-6D-10M	A22L-G□-6D-10A	
			6 VAC	A22L-G□-6A-10M	A22L-G□-6A-10A	
			12 VAC/VDC	A22L-G□-12A-10M	A22L-G□-12A-10A	
			24 VAC/VDC	A22L-G□-24A-10M	A22L-G□-24A-10A	
	SPST-NC		6 VDC	A22L-G□-6D-01M	A22L-G□-6D-01A	
			6 VAC	A22L-G□-6A-01M	A22L-G□-6A-01A	
			12 VAC/VDC	A22L-G□-12A-01M	A22L-G□-12A-01A	
			24 VAC/VDC	A22L-G□-24A-01M	A22L-G□-24A-01A	
	SPST-NO + SPST-NC		6 VDC	A22L-G□-6D-11M	A22L-G□-6D-11A	
			6 VAC	A22L-G□-6A-11M	A22L-G□-6A-11A	
			12 VAC/VDC	A22L-G□-12A-11M	A22L-G□-12A-11A	
			24 VAC/VDC	A22L-G□-24A-11M	A22L-G□-24A-11A	
	DPST-NO		6 VDC	A22L-G□-6D-20M	A22L-G□-6D-20A	
			6 VAC	A22L-G□-6A-20M	A22L-G□-6A-20A	
			12 VAC/VDC	A22L-G□-12A-20M	A22L-G□-12A-20A	
			24 VAC/VDC	A22L-G□-24A-20M	A22L-G□-24A-20A	
	DPST-NC		6 VDC	A22L-G□-6D-02M	A22L-G□-6D-02A	
			6 VAC	A22L-G□-6A-02M	A22L-G□-6A-02A	
			12 VAC/VDC	A22L-G□-12A-02M	A22L-G□-12A-02A	
			24 VAC/VDC	A22L-G□-24A-02M	A22L-G□-24A-02A	
Round/Full-guard type LED voltage-reduction lighting (with Voltage Reduction Unit)  A22L-G	SPST-NO		110 VAC	A22L-G□-T1-10M	A22L-G□-T1-10A	
			220 VAC	A22L-G□-T2-10M	A22L-G□-T2-10A	
	SPST-NC		110 VAC	A22L-G□-T1-01M	A22L-G□-T1-01A	
			220 VAC	A22L-G□-T2-01M	A22L-G□-T2-01A	
	SPST-NO + SPST-NC		110 VAC	A22L-G□-T1-11M	A22L-G□-T1-11A	
			220 VAC	A22L-G□-T2-11M	A22L-G□-T2-11A	
	DPST-NO		110 VAC	A22L-G□-T1-20M	A22L-G□-T1-20A	
			220 VAC	A22L-G□-T2-20M	A22L-G□-T2-20A	
	DPST-NC		110 VAC	A22L-G□-T1-02M	A22L-G□-T1-02A	
			220 VAC	A22L-G□-T2-02M	A22L-G□-T2-02A	

Lighted (Square Type)

Appearance	Output	Lighting	Operating voltage	Momentary operation (self-resetting)	Alternate operation (self-holding)	Illumination color
Square/Projection type LED lighting (without Voltage Reduction Unit)  A22L-C	SPST-NO	LED	6 VDC	A22L-C□-6D-10M	A22L-C□-6D-10A	Insert one of the following letters into the box □. R (red) Y (yellow) G (green) W (white) A (blue)
			6 VAC	A22L-C□-6A-10M	A22L-C□-6A-10A	
			12 VAC/VDC	A22L-C□-12A-10M	A22L-C□-12A-10A	
			24 VAC/VDC	A22L-C□-24A-10M	A22L-C□-24A-10A	
	SPST-NC		6 VDC	A22L-C□-6D-01M	A22L-C□-6D-01A	
			6 VAC	A22L-C□-6A-01M	A22L-C□-6A-01A	
			12 VAC/VDC	A22L-C□-12A-01M	A22L-C□-12A-01A	
			24 VAC/VDC	A22L-C□-24A-01M	A22L-C□-24A-01A	
	SPST-NO + SPST-NC		6 VDC	A22L-C□-6D-11M	A22L-C□-6D-11A	
			6 VAC	A22L-C□-6A-11M	A22L-C□-6A-11A	
			12 VAC/VDC	A22L-C□-12A-11M	A22L-C□-12A-11A	
			24 VAC/VDC	A22L-C□-24A-11M	A22L-C□-24A-11A	
	DPST-NO		6 VDC	A22L-C□-6D-20M	A22L-C□-6D-20A	
			6 VAC	A22L-C□-6A-20M	A22L-C□-6A-20A	
			12 VAC/VDC	A22L-C□-12A-20M	A22L-C□-12A-20A	
			24 VAC/VDC	A22L-C□-24A-20M	A22L-C□-24A-20A	
	DPST-NC		6 VDC	A22L-C□-6D-02M	A22L-C□-6D-02A	
			6 VAC	A22L-C□-6A-02M	A22L-C□-6A-02A	
			12 VAC/VDC	A22L-C□-12A-02M	A22L-C□-12A-02A	
			24 VAC/VDC	A22L-C□-24A-02M	A22L-C□-24A-02A	
Square/Projection type LED voltage-reduction lighting (with Voltage Reduction Unit)  A22L-C	SPST-NO		110 VAC	A22L-C□-T1-10M	A22L-C□-T1-10A	
			220 VAC	A22L-C□-T2-10M	A22L-C□-T2-10A	
	SPST-NC		110 VAC	A22L-C□-T1-01M	A22L-C□-T1-01A	
			220 VAC	A22L-C□-T2-01M	A22L-C□-T2-01A	
	SPST-NO + SPST-NC		110 VAC	A22L-C□-T1-11M	A22L-C□-T1-11A	
			220 VAC	A22L-C□-T2-11M	A22L-C□-T2-11A	
	DPST-NO		110 VAC	A22L-C□-T1-20M	A22L-C□-T1-20A	
			220 VAC	A22L-C□-T2-20M	A22L-C□-T2-20A	
	DPST-NC		110 VAC	A22L-C□-T1-02M	A22L-C□-T1-02A	
			220 VAC	A22L-C□-T2-02M	A22L-C□-T2-02A	

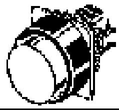
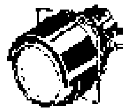
Appearance	Output	Lighting	Operating voltage	Momentary operation (self-resetting)	Alternate operation (self-holding)	Illumination color
Square/Full-guard type LED lighting (without Voltage Reduction Unit)  A22L-D	SPST-NO	LED	6 VDC	A22L-D□-6D-10M	A22L-D□-6D-10A	Insert one of the following letters into the box □. R (red) Y (yellow) G (green) W (white) A (blue)
			6 VAC	A22L-D□-6A-10M	A22L-D□-6A-10A	
			12 VAC/VDC	A22L-D□-12A-10M	A22L-D□-12A-10A	
			24 VAC/VDC	A22L-D□-24A-10M	A22L-D□-24A-10A	
	SPST-NC		6 VDC	A22L-D□-6D-01M	A22L-D□-6D-01A	
			6 VAC	A22L-D□-6A-01M	A22L-D□-6A-01A	
			12 VAC/VDC	A22L-D□-12A-01M	A22L-D□-12A-01A	
			24 VAC/VDC	A22L-D□-24A-01M	A22L-D□-24A-01A	
	SPST-NO + SPST-NC		6 VDC	A22L-D□-6D-11M	A22L-D□-6D-11A	
			6 VAC	A22L-D□-6A-11M	A22L-D□-6A-11A	
			12 VAC/VDC	A22L-D□-12A-11M	A22L-D□-12A-11A	
			24 VAC/VDC	A22L-D□-24A-11M	A22L-D□-24A-11A	
	DPST-NO		6 VDC	A22L-D□-6D-20M	A22L-D□-6D-20A	
			6 VAC	A22L-D□-6A-20M	A22L-D□-6A-20A	
			12 VAC/VDC	A22L-D□-12A-20M	A22L-D□-12A-20A	
			24 VAC/VDC	A22L-D□-24A-20M	A22L-D□-24A-20A	
	DPST-NC		6 VDC	A22L-D□-6D-02M	A22L-D□-6D-02A	
			6 VAC	A22L-D□-6A-02M	A22L-D□-6A-02A	
			12 VAC/VDC	A22L-D□-12A-02M	A22L-D□-12A-02A	
			24 VAC/VDC	A22L-D□-24A-02M	A22L-D□-24A-02A	
Square/Full-guard type LED voltage-reduction lighting (with Voltage Reduction Unit)  A22L-D	SPST-NO		110 VAC	A22L-D□-T1-10M	A22L-D□-T1-10A	
			220 VAC	A22L-D□-T2-10M	A22L-D□-T2-10A	
	SPST-NC		110 VAC	A22L-D□-T1-01M	A22L-D□-T1-01A	
			220 VAC	A22L-D□-T2-01M	A22L-D□-T2-01A	
	SPST-NO + SPST-NC		110 VAC	A22L-D□-T1-11M	A22L-D□-T1-11A	
			220 VAC	A22L-D□-T2-11M	A22L-D□-T2-11A	
	DPST-NO		110 VAC	A22L-D□-T1-20M	A22L-D□-T1-20A	
			220 VAC	A22L-D□-T2-20M	A22L-D□-T2-20A	
	DPST-NC		110 VAC	A22L-D□-T1-02M	A22L-D□-T1-02A	
			220 VAC	A22L-D□-T2-02M	A22L-D□-T2-02A	

Ordering Individually



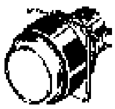
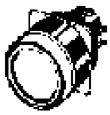
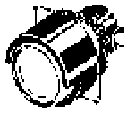
Pushbutton

Non-lighted

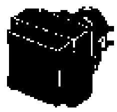
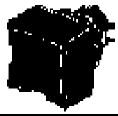
Color	IP65 oil-resistant models			
	Flat type 	Projection type 	Full-guard type 	Half-guard type 
Red	A22-FR	A22-TR	A22-GR	A22-HR
Green	A22-FG	A22-TG	A22-GG	A22-HG
Yellow	A22-FY	A22-TY	A22-GY	A22-HY
White	A22-FW	A22-TW	A22-GW	A22-HW
Blue	A22-FA	A22-TA	A22-GA	A22-HA
Black	A22-FB	A22-TB	A22-GB	A22-HB

Color	IP65 oil-resistant models			
	Square/Projection type 	Square/Full-guard type 	Round/Mushroom type (30-dia. head) 	Round/Mushroom type (40-dia. head) 
Red	A22-CR	A22-DR	A22-SR	A22-MR
Green	A22-CG	A22-DG	A22-SG	A22-MG
Yellow	A22-CY	A22-DY	A22-SY	A22-MY
White	A22-CW	A22-DW	A22-SW	A22-MW
Blue	A22-CA	A22-DA	A22-SA	A22-MA
Black	A22-CB	A22-DB	A22-SB	A22-MB

Lighted

Color	IP65		
	Projection type 	Full-guard type 	Half-guard type 
Red	A22L-TR	A22L-GR	A22L-HR
Green	A22L-TG	A22L-GG	A22L-HG
Yellow	A22L-TY	A22L-GY	A22L-HY
White	A22L-TW	A22L-GW	A22L-HW
Blue	A22L-TA	A22L-GA	A22L-HA

Note: Common to incandescent lamps and LED lamps.

Color	IP65	
	Square/Projection 	Square/Full-guard type 
Red	A22L-CR	A22L-DR
Green	A22L-CG	A22L-DG
Yellow	A22L-CY	A22L-DY
White	A22L-CW	A22L-DW
Blue	A22L-CA	A22L-DA

Lamp

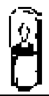
LED Lamp

		Operating voltage	6 V	12 V	24 V	24 V Super-bright
Appearance	AC/DC	LED light	Model			
	DC	Red	A22-6DR	---	---	---
		Green	A22-6DG	---	---	---
		Yellow (See note 2.)	A22-6DY	---	---	---
		Blue	A22-6DA	---	---	---
	AC	Red	A22-6AR	---	---	---
		Green	A22-6AG	---	---	---
		Yellow (See note 2.)	A22-6AY	---	---	---
		Blue	A22-6AA	---	---	---
	AC and DC	Red	---	A22-12AR	A22-24AR	A22-24ASR
		Green	---	A22-12AG	A22-24AG	A22-24ASG
		Yellow (See note 2.)	---	A22-12AY	A22-24AY	A22-24ASY
		Blue	---	A22-12AA	A22-24AA	A22-24ASA

Note: 1. For voltage-reduction lighting, use the A22-24A□.

2. Used when the Pushbutton color is yellow or white.

Incandescent Lamp

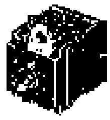
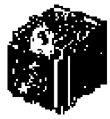
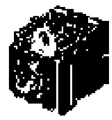
Operating voltage	5 VAC/VDC	12 VAC/VDC	24 VAC/VDC	100 VAC/VDC
	A22-5	A22-12	A22-24	A22-H1

Switch (Standard Load)

Non-lighted

Switch operation 	Contacts	Model
Momentary	SPST-NO	A22-10M
	SPST-NC	A22-01M
	SPST-NO + SPST-NC	A22-11M
	DPST-NO	A22-20M
	DPST-NC	A22-02M
Alternate	SPST-NO	A22-10A
	SPST-NC	A22-01A
	SPST-NO + SPST-NC	A22-11A
	DPST-NO	A22-20A
	DPST-NC	A22-02A

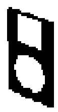
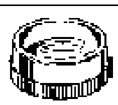
Lighted

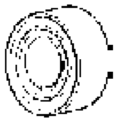
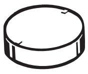
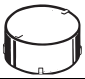
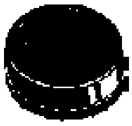
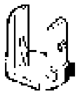
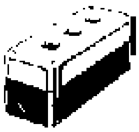
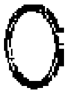
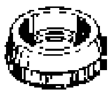
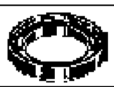
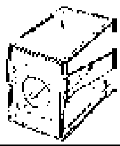
Switch operation	Contacts	Voltage reduction circuits		
		Without Voltage Reduction Unit	With Voltage Reduction Unit	
			110 VAC	220 VAC
				
Momentary	SPST-NO	A22L-10M	A22L-10M-T1	A22L-10M-T2
	SPST-NC	A22L-01M	A22L-01M-T1	A22L-01M-T2
	SPST-NO + SPST-NC	A22L-11M	A22L-11M-T1	A22L-11M-T2
	DPST-NO	A22L-20M	A22L-20M-T1	A22L-20M-T2
	DPST-NC	A22L-02M	A22L-02M-T1	A22L-02M-T2
Alternate	SPST-NO	A22L-10A	A22L-10A-T1	A22L-10A-T2
	SPST-NC	A22L-01A	A22L-01A-T1	A22L-01A-T2
	SPST-NO + SPST-NC	A22L-11A	A22L-11A-T1	A22L-11A-T2
	DPST-NO	A22L-20A	A22L-20A-T1	A22L-20A-T2
	DPST-NC	A22L-02A	A22L-02A-T1	A22L-02A-T2

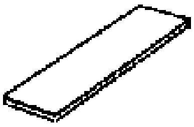
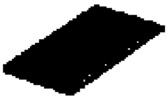
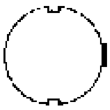
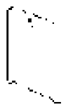
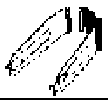
Note: 1. The above diagrams show the DPST-NO contact models as representative examples.
2. For voltage-reduction lighting, use the A22-24A□.

■ Accessories (Order Separately)

Common to A22, A22S/W, A22K, M22, and A22E

Item		Appearance	Classification		Model	Remarks
Switch Blocks			SPST-NO	Standard load	A22-10	Provided as standard. Order Switch Blocks only when adding or replacing them.
				Microload	A22-10S	
			SPST-NC	Standard load	A22-01	
				Microload	A22-01S	
			DPST-NO	Standard load	A22-20	
				Microload	A22-20S	
			DPST-NC	Standard load	A22-02	
				Microload	A22-02S	
Lamp Sockets			Direct lighting		A22-TN	Used when changing the lighting method. (LED only)
			Voltage-reduction lighting	110 VAC	A22-T1	
				220 VAC	A22-T2	
Mounting Latches			For momentary models		A22-3200	Provided as standard. Order Mounting Latches only when mounting Switch Blocks or Lamp Sockets that are purchased individually.
			For alternate models		A22-3210	
Legend Plate Frames	Standard size		With Snap-in Legend Plate (Without text)	White	A22Z-3321	Snap-in Legend Plate is acrylic.
				Red	A22Z-3322	
				Black	A22Z-3323	
			Without Snap-in Legend Plate		A22Z-3320	
	Large size		With Snap-in Legend Plate (Without text)	White	A22Z-3331	
				Red	A22Z-3332	
				Black	A22Z-3333	
			Without Snap-in Legend Plate		A22Z-3330	
Lock Ring			Round		A22Z-3360	The body is equipped with a Lock Ring. This Lock Ring is used when a more secure lock feature is required.
Metallic Bezel Rings			For flat or projection models		A22Z-3580	Replace with the standard model. Material: nickel-plated zinc
			For full-guard models		A22Z-3582	

Item		Appearance	Classification		Model	Remarks
Sealing Caps			For flat models		A22Z-3600F	Used to prevent dust or water from entering the Operation Unit (Push button, etc.). Color: opaque Material: silicon
			For projection models		A22Z-3600T	
			For full-guard models		A22Z-3600G	
Caps	A22	For A22 	For projection, full-guard, or half-guard models		A22Z-3490	Material: polycarbonate resin
	M22	For M22 	For round models		A22Z-3495	
Color Caps			Red		A22Z-30TR	Used for changing the Pushbutton color of the (round) Pushbutton Switches.
			Green		A22Z-30TG	
			Yellow		A22Z-30TY	
			White		A22Z-30TW	
			Blue		A22Z-30TA	
Three-throw Spacer					A22Z-3003	Used when mounting three Non-lighted Switches. (See page L-65.)
Hole Plug			Round		A22Z-3530	Can be plugged into pre-cut panel holes for future expansion. The color is black.
Control Boxes (Enclosures)			One hole	Exclusively for A22	A22Z-B101	For those designed exclusively for A22, DPST-NO or DPST-NC Switches cannot be used. Material: Polycarbonate resin
				Compatible with A3T	A22Z-B201	
			One hole, yellow box (for emergency stop)	Exclusively for A22	A22Z-B101Y	
				Compatible with A3T	A22Z-B201Y	
			Two holes	Exclusively for A22	A22Z-B102	
				Compatible with A3T	A22Z-B202	
			Three holes	Exclusively for A22	A22Z-B103	
				Compatible with A3T	A22Z-B203	
Connectors			Applicable cable diameter (mm)	7 to 9 dia.	A22Z-3500-1	Plastic connector used to extend a cable from the Switch Box. (See page L-63.)
				9 to 11 dia.	A22Z-3500-2	
25-dia. Ring			---		A22Z-R25	Use when mounting to a panel with a 25-dia. hole. For details, refer to page L-54. Since this is not attached to the main body, order separately.
30-dia. Metal Flange			Flat, projecting		A22Z-F30	Use instead of the standard flange when mounting into a panel with a 30-dia. hole. For details of mounting hole dimensions, refer to the corresponding section for the A30.
			Full guard		A22Z-G30	
30-dia. Resin Attachment			Round		A22Z-A30	Use when mounting to a panel with a 30-dia. hole. For details, refer to page L-56.
Lock Plate			---		A22Z-3380	Use to fix the lever on the Switch.
Simple Protective Cover			---		A11Z-3700	Prevents foreign matter entering into the Switch from the back of the panel.

Item		Appearance	Classification		Model	Remarks
Snap-in Legend Plates	Standard size		Without text	Black	A22Z-3443B	Attached to the Standard-size Legend Plate Frame. Material: Acrylic (See page L-56.)
				Red	A22Z-3443R	
				White	A22Z-3443W	
				Transparent	A22Z-3443C	
			White text on red background	m	A22Z-3443R-2	
				STOP	A22Z-3443R-4	
			White text on black back-ground	l	A22Z-3443B-1	
				START	A22Z-3443B-3	
				ON	A22Z-3443B-5	
				OFF	A22Z-3443B-6	
				UP	A22Z-3443B-7	
				DOWN	A22Z-3443B-8	
				POWER ON	A22Z-3443B-9	
				OFF-ON	A22Z-3443B-10	
	Large size		Without text	Black	A22Z-3453B	Attached to the Large-size Legend Plate Frame Material: Acrylic (See page L-56.)
				Red	A22Z-3453R	
				White	A22Z-3453W	
				Transparent	A22Z-3453C	
	For Emer-gency Stop Switch		60-dia. round plate with black let-ters on a yellow background		A22Z-3466-1	“EMERGENCY STOP” is en-graved on the plate. Used as an Emergency Stop Switch Legend Plate
			90-dia. round plate with black let-ters on a yellow background		A22Z-3476-1	
Character Films			No print (Round)		A22Z-3460	After printing on a film, affix to the indicator plate of the Lighted Pushbutton Switch. (The back is coated with adhesive.)
			Character print (Round)	l	A22Z-3460-1	
				m	A22Z-3460-2	
				START	A22Z-3460-3	
				STOP	A22Z-3460-4	
			No print (Square)		A22Z-3480	
Lamp Extractor			---		A22Z-3901	Rubber tool used to easily replace Lamps
Tightening Wrench			---		A22Z-3905	Tool used to tighten nuts from the back of the panel
Cap Tightening Tool			---		A22Z-3908	Used for replacing the cap of the Half-guard Pushbutton Switch.
Cap Puller			---		A3PJ-5080	Used for removing the cap from the Pushbutton of the Square Lighted Pushbutton Switch.

Specifications

Common to A22, A22S/W, A22K, and A22E

■ Approved Standards

Recognized organization	Standards	File No.
UL, cUL (See note.)	UL508	E41515
---	EN60947-5-1	---

Note: cUL: CSA C22.2 No. 14

■ Approved Standard Ratings

UL, cUL (File No. E41515)

6 A at 220 VAC, 10 A at 110 VAC

EN60947-5-1 (Low Voltage Directive)

10 A at 220 VAC

■ Ratings

Contacts (Standard Load)

Rated carry current	Rated voltage	Rated current (A)			
		AC15 (inductive load)	AC12 (resistive load)	DC13 (inductive load)	DC12 (resistive load)
10	24 VAC	10	10	---	---
	110 VAC	5	10		
	220 VAC	3	6		
	380 VAC	2	3		
	440 VAC	1	2		
	24 VDC	---	---	1.5	10
	110 VDC			0.5	2
	220 VDC			0.2	0.6
	380 VDC			0.1	0.2

Note: 1. Rated current values are determined according to the testing conditions. The above ratings were obtained by conducting tests under the following conditions.
(1) Ambient temperature: 20°±2°C
(2) Ambient humidity: 65±5%
(3) Operating frequency: 20 operations/minute

2. Minimum applicable load: 10 mA at 5 VDC

Contacts (Microload)

Rated applicable load	Minimum applicable load
50 mA at 5 VDC (Resistive load)	1 mA at 5 VDC

LED Indicators without Voltage Reduction Unit

Rated voltage	Rated current	Operating voltage
6 VDC	60 mA (20 mA)	6 VDC±5%
6 VAC	60 mA (20 mA)	6 VAC/VDC±5%
12 VAC/VDC	30 mA (10 mA)	12 VAC/VDC±5%
24 VAC/VDC	15 mA (10 mA)	24 VAC/VDC±5%

Note: Values in parentheses are for blue Pushbuttons.

Super-bright LED Indicator

Rated voltage	Rated current	Operating voltage
24 VAC/VDC	15 mA	24 VAC/VDC ±5%

Incandescent Lamp

Rated voltage	Rated current	Operating voltage
6 VAC/VDC	200 mA	5 VAC/VDC
14 VAC/VDC	80 mA	12 VAC/VDC
28 VAC/VDC	40 mA	24 VAC/VDC
130 VAC/VDC	20 mA	100 VAC/VDC

Voltage-reduction Lighting

Rated voltage	Operational voltage	Applicable lamp (BA8S/13□ gold)
110 VAC	95 to 115 VAC	LED Lamp (A22-24A□)
220 VAC	190 to 230 VAC	

■ Characteristics

Item		Pushbutton Switches		Emergency Stop Switches		Knob-type Selector Switches		Key-type Selector Switch
		Non-lighted models: A22-F A22-T A22-G A22-S A22-C A22-D A22-H A22-M	Lighted models: A22L-T A22L-G A22L-H A22L-D A22L-C	Non-lighted model: A22E	Lighted model: A22EL	Non-lighted model: A22S	Lighted model: A22W	Non-lighted model: A22K
Allowable operating frequency	**Mechanical**	Momentary operation: 60 operations/minute max.		30 operations/minute max.		Manual release: 30 operations/minute max. Automatic release: 30 operations/minute max.		
	Electrical	30 operations/minute max.				30 operations/minute max.		
Insulation resistance		100 MΩ min. (at 500 VDC)						
Dielectric strength		2,500 VAC, 50/60 Hz for 1 min between terminals of same polarity 2,500 VAC, 50/60 Hz for 1 min between terminals of different polarity and also between each terminal and ground						
Vibration resistance		Malfunction (See note 2.): 10 to 55 Hz, 1.5-mm double amplitude						
Shock resistance	**Mechanical**	1,000 m/s^2	1,000 m/s^2	1,000 m/s^2		1,000 m/s^2	1,000 m/s^2	1,000 m/s^2
	Malfunction (See note 2.)	1,000 m/s^2 max.	600 m/s^2 max.	250 m/s^2 max.		1,000 m/s^2 max.	600 m/s^2 max.	1,000 m/s^2 max.
Durability	**Mechanical**	Momentary operation: 5,000,000 operations min.		Momentary operation: 300,000 operations min.		500,000 operations min.	100,000 operations min.	500,000 operations min.
	Electrical	500,000 operations min.		300,000 operations min.	300,000 operations min.	500,000 operations min.	100,000 operations min.	500,000 operations min.
Ambient temperature (See note 1.)		Operating: -20°C to 70°C Storage: -40°C to 70°C	Operating: -20°C to 55°C Storage: -40°C to 70°C	Operating: -20°C to 70°C Storage: -40°C to 70°C	Operating: -20°C to 55°C Storage: -40°C to 70°C	Operating: -20°C to 70°C Storage: -40°C to 70°C	Operating: -20°C to 55°C Storage: -40°C to 70°C	Operating: -20°C to 70°C Storage: -40°C to 70°C
Ambient humidity		Operating: 35% to 85%						
Degree of protection		IP65 (oil-resistant)	IP65	IP65 (oil-resistant)	IP65	IP65 (oil-resistant)	IP65	IP65 (oil-resistant)
Electric shock protection class		Class II						
PTI (tracking characteristic)		175						
Degree of contamination		3 (IEC947-5-1)						

Note: 1. With no icing or condensation.
2. Malfunction within 1 ms.

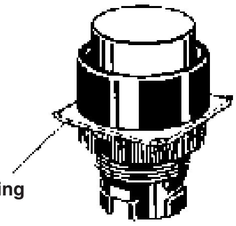
Pushbutton switches

■ Operating Characteristics (for SPST-NO/SPST-NC)

Item	Pushbutton Switches	Emergency Stop Switches	Knob-type Selector Switches		Key-type Selector Switch	
	Lighted Non-lighted Pushbutton Switches	Push-lock turn-reset system	Manual release	Automatic release	Manual release	Automatic release
	A22-F A22-G A22-C A22-S A22-T A22-H A22-D A22-M A22L-T A22L-H A22L-D A22L-G A22L-C	A22E, A22EL	A22S, A22W	A22S, A22W	A22K	
Total travel force (TTF) max.	29.4 N	44.1 N	0.34 N·m (See note.)	0.25 N·m for two notches (See note.) 0.34 N·m for three notches (See note.)	0.34 N·m (See note.)	0.25 N·m for three notches (See note.) 0.34 N·m for three notches (See note.)
Total travel (TT)	5.5 mm max.	10±1 mm	Approx. 90° for two notches (Approx. 45° for three notches)		Approx. 90° for two notches (Approx. 45° for three notches)	
Releasing force (RF) min.	---	0.25 N·m max. (See note.)	0.34 N·m max. (See note.)	---	0.34 N·m max. (See note.)	---

Note: Rotation torque for Emergency Stop Pushbutton, Knob-type Selector, and Key-type Selector Switches.

Nomenclature



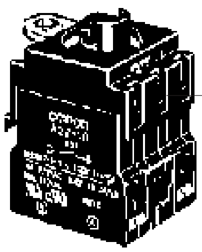
Lock Ring

Pushbutton

- **Available Colors**
  Non-lighted:
  Red, green, yellow, white, blue, black
  Lighted:
  Red, green yellow, white, blue

Lamp

- **Light Source**
  LED lamp
  Incandescent lamp



Switch

- **Contacts**
  SPST-NO, SPST-NC, SPST-NO + SPST-NC,
  DPST-NO, DPST-NC
  (Minimum applicable load: 10 mA at 5 VDC)
- **Lighting Method**
  Non-lighted
  Lighted (without Voltage Reduction Unit)
  Lighted (with Voltage Reduction Unit)

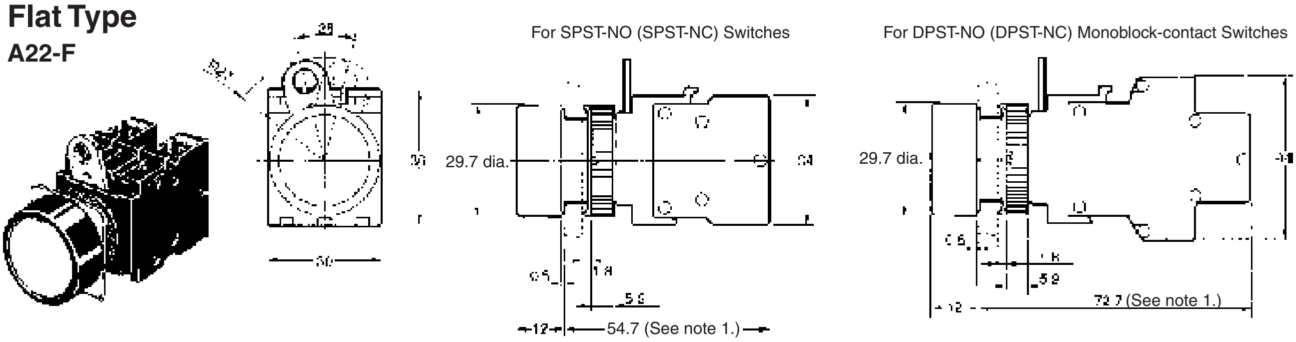
The above illustration shows a lighted model.

Dimensions

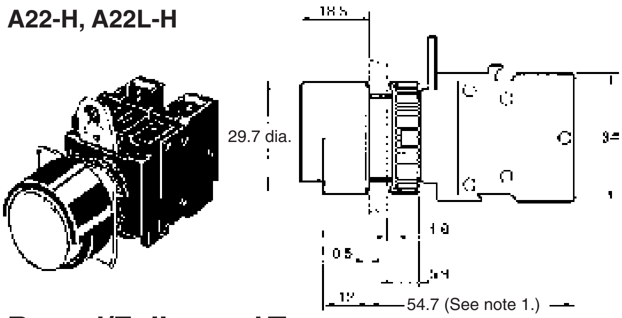
Note: 1. All units are in millimeters unless otherwise indicated.
2. The following illustrations are for momentary operation.

■ Lighted/Non-lighted Pushbutton Switches

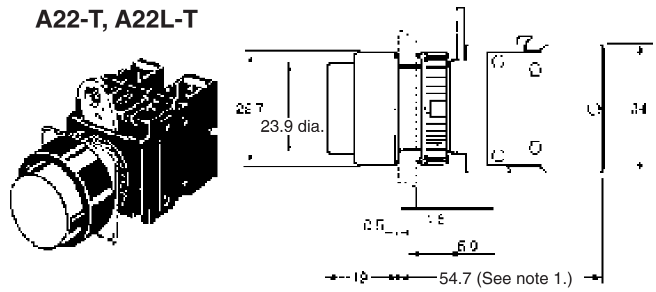
Flat Type
A22-F



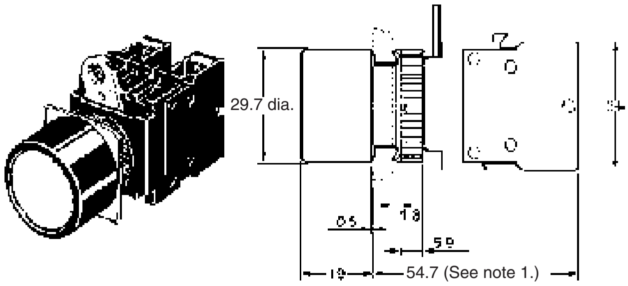
Round/Half-guard Type
A22-H, A22L-H



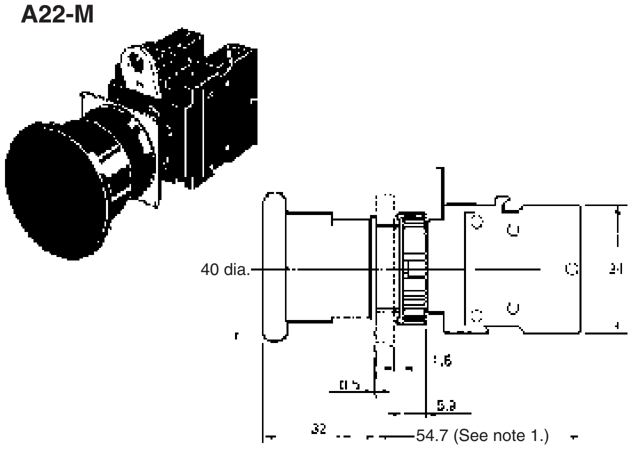
Round/Projection Type
A22-T, A22L-T



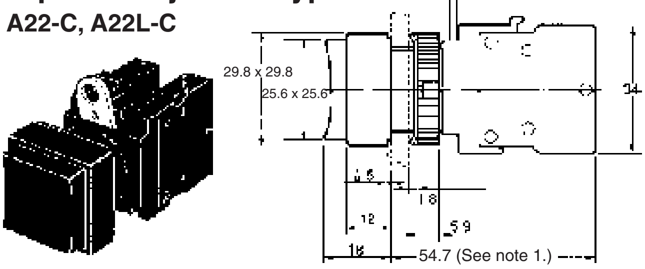
Round/Full-guard Type
A22-G, A22L-G



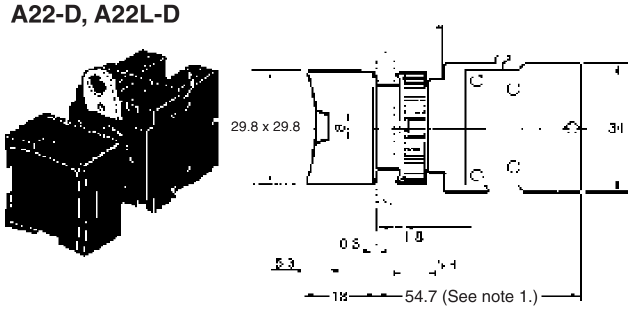
40-dia. Mushroom Type
A22-M



Square/Projection Type
A22-C, A22L-C



Square/Full-guard Type
A22-D, A22L-D



Note: 1. Alternate operation models are 9.3 mm longer.
2. Lighted models have the same dimensions as shown above, whether they are with or without Voltage Reduction Units.

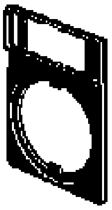
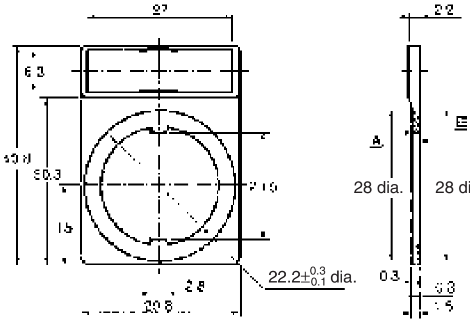
Pushbutton switches

Accessories

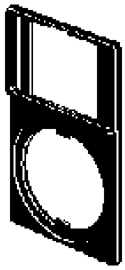
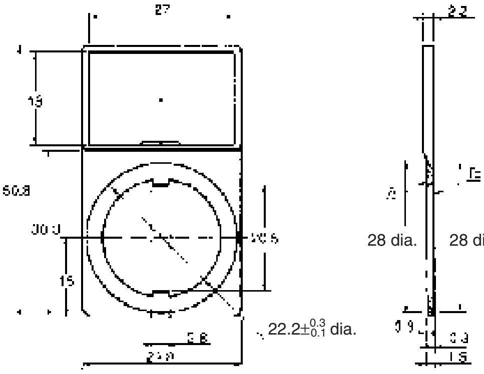
Note: All units are in millimeters unless otherwise indicated.

Legend Plate Frames

A22Z-332□

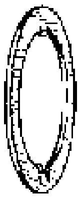
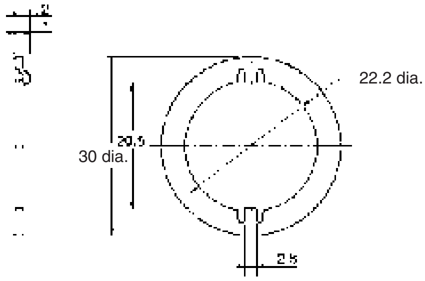



A22Z-333□

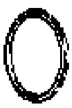
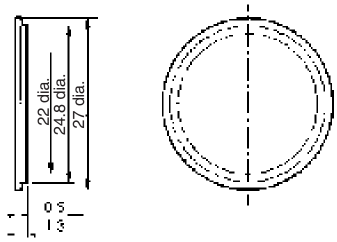
Lock Ring

A22Z-3360

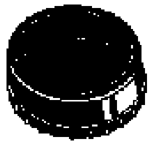
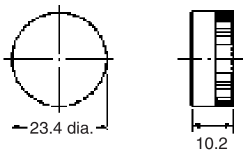
25-dia. Ring

A22Z-R25

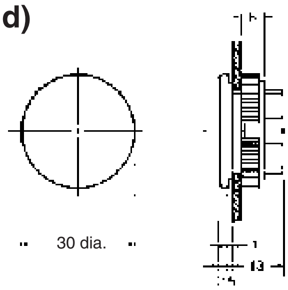
Color Cap

A22L-30T□

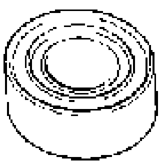
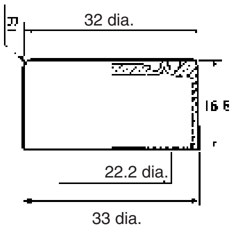
Hole Plug (Round)

A22Z-3530

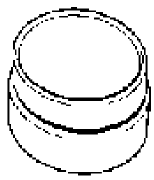
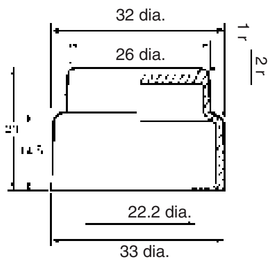



Sealing Caps

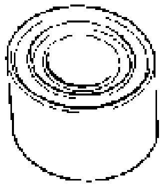
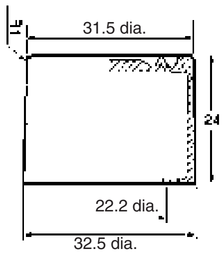
For Flat Models
A22Z-3600F

For Projection Models
A22Z-3600T

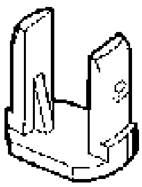



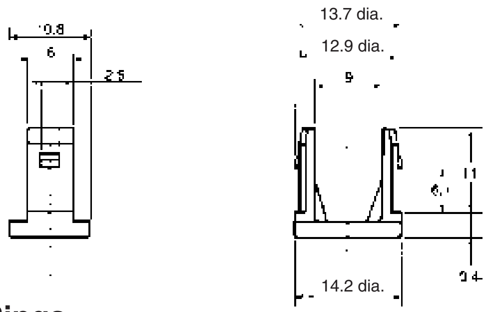
For Full-guard Models
A22Z-3600G

Three-throw Spacer

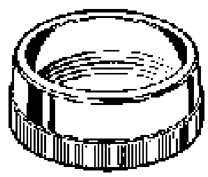
A22Z-3003

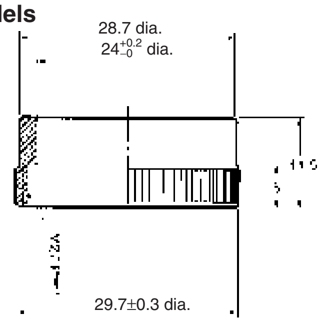




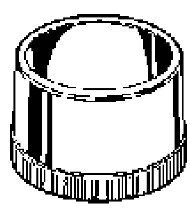
Metallic Bezel Rings

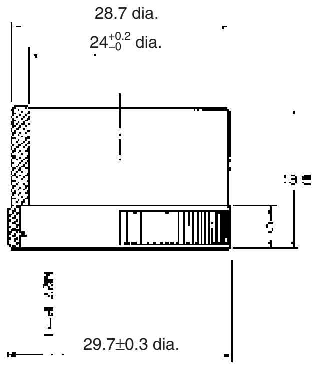
For Flat/Projection Models
A22Z-3580





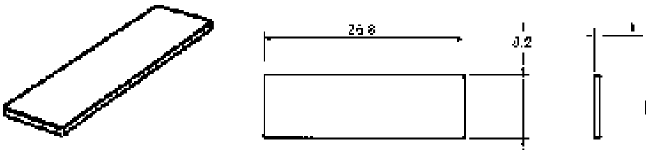
For Full-guard Models
A22Z-3582



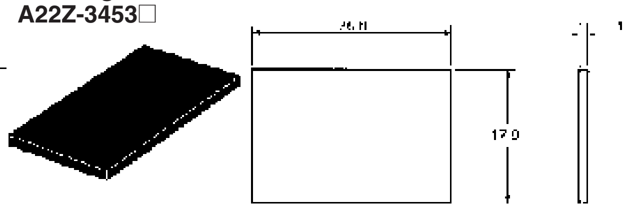


Snap-in Legend Plates

For Standard Models
A22L-3443□-□

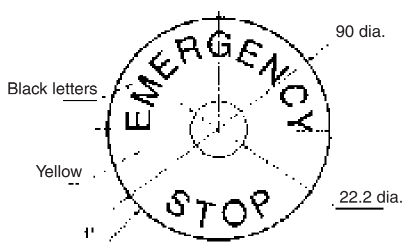


For Large Models
A22Z-3453□

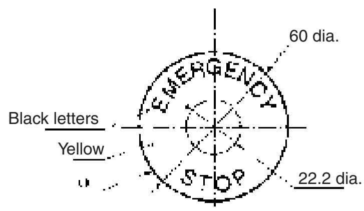


For Emergency-stop Models

A22Z-3476-1 (90 dia.)

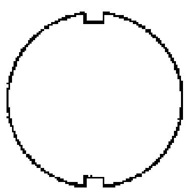


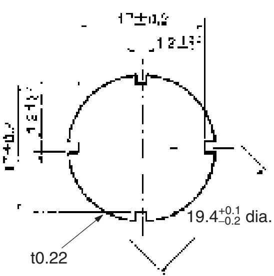
A22Z-3466-1 (60 dia.)



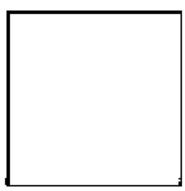
Character Film

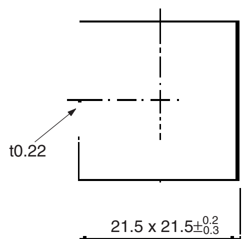
For Round Models
A22Z-3460-□





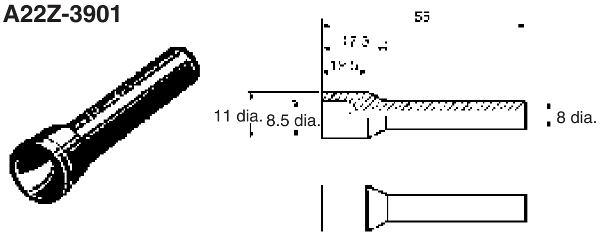
For Square Models
A22Z-3480





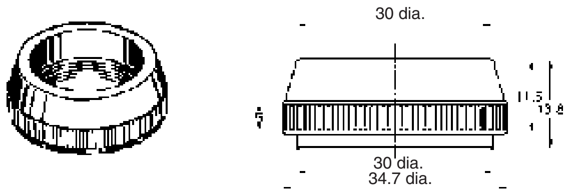
Lamp Extractor

A22Z-3901



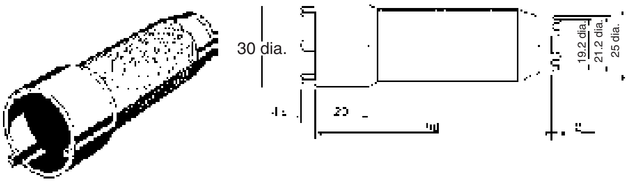
30-dia. Metal Flange

A22Z-F30



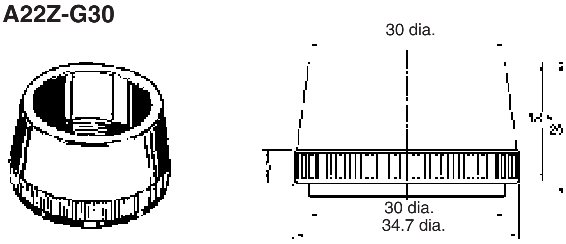
Tightening Wrench

A22Z-3905



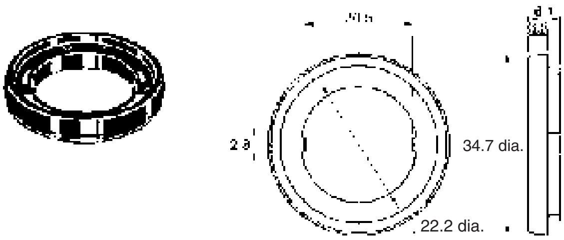
30-dia. Metal Flange

A22Z-G30



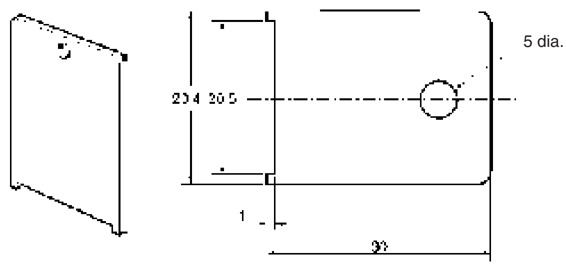
30-dia. Resin Attachment

A22Z-A30



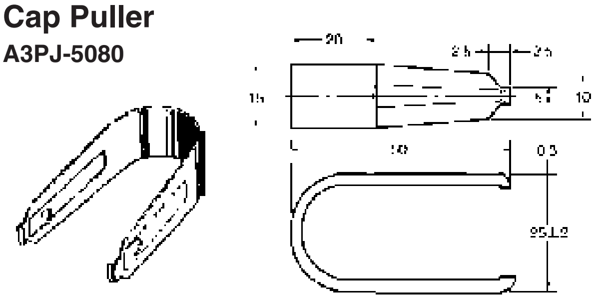
Cap Tightening Tool

A22Z-3908



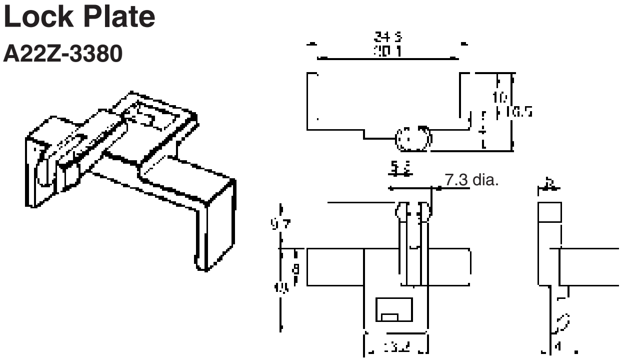
Cap Puller

A3PJ-5080



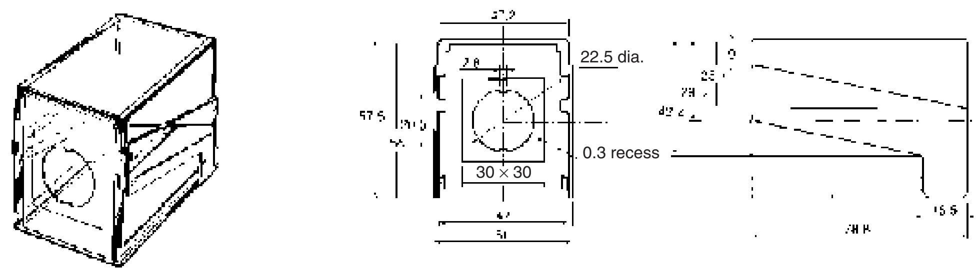
Lock Plate

A22Z-3380



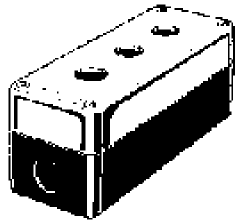
Simple Protective Cover

A22Z-3700

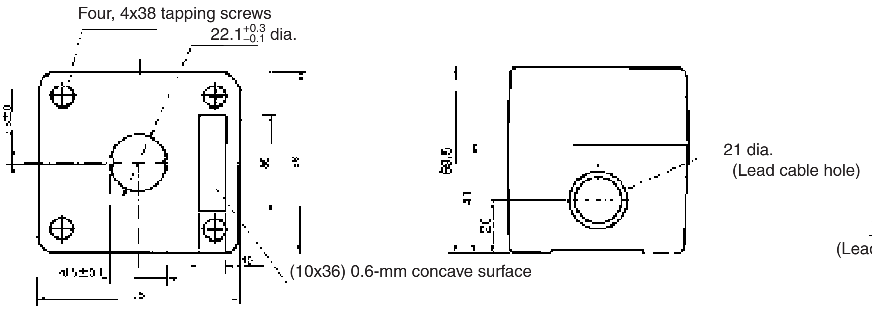


Control Box (Enclosure)

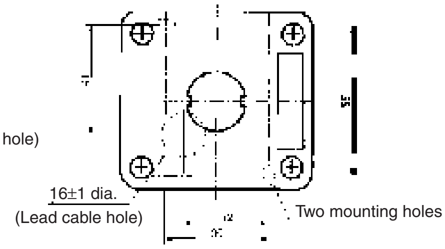
A22Z-B10□



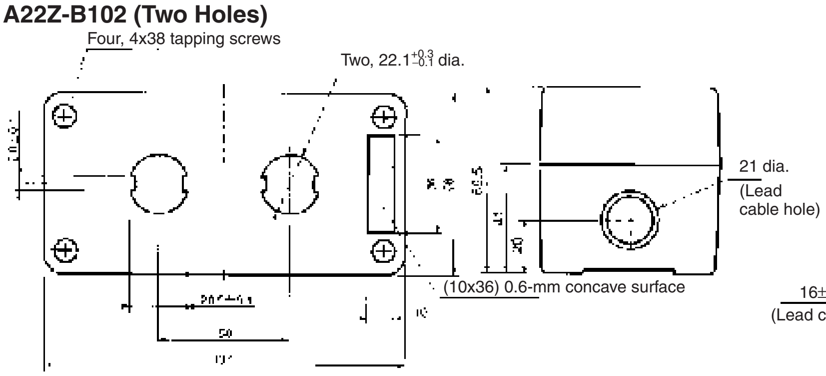
A22Z-B101 (One Hole)
A22Z-B101Y



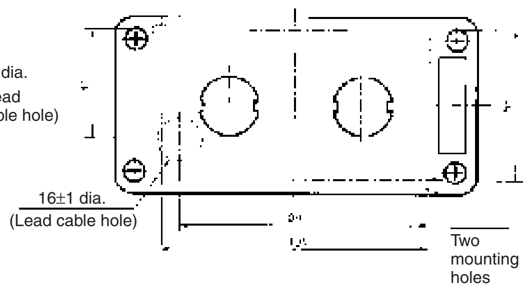
Cable Port Hole (Top View)



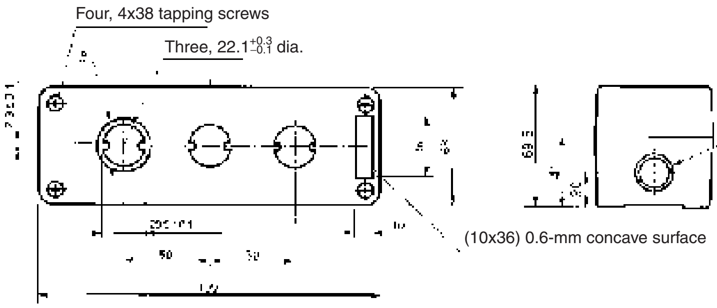
A22Z-B102 (Two Holes)



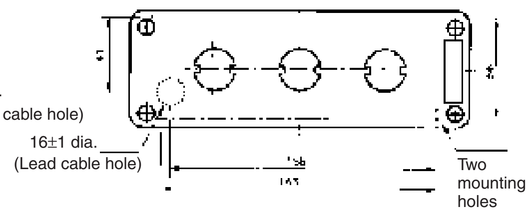
Cable Port Hole (Top View)



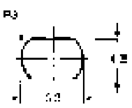
A22Z-B103 (Three Holes)



Cable Port Hole (Top View)

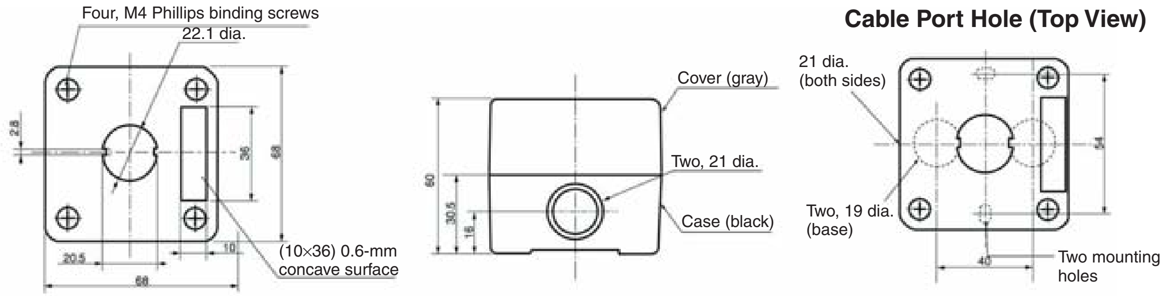


Panel Mounting Hole

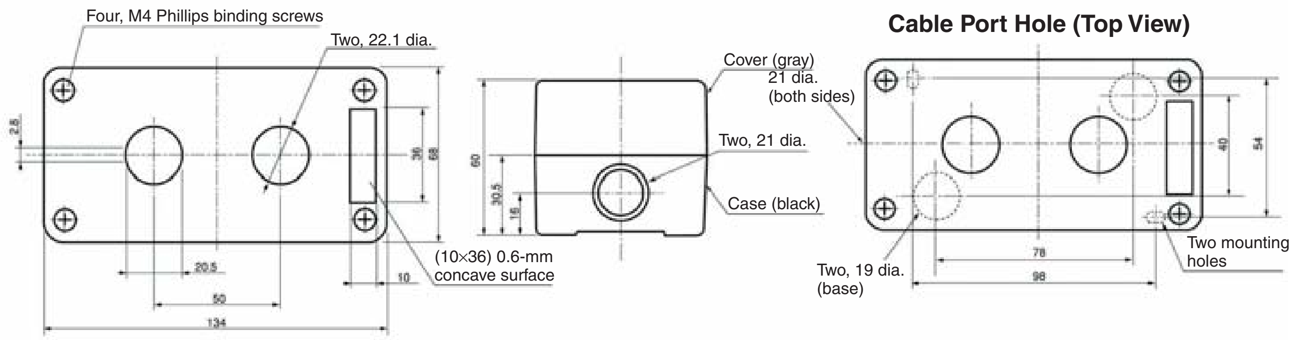


Pushbutton switches

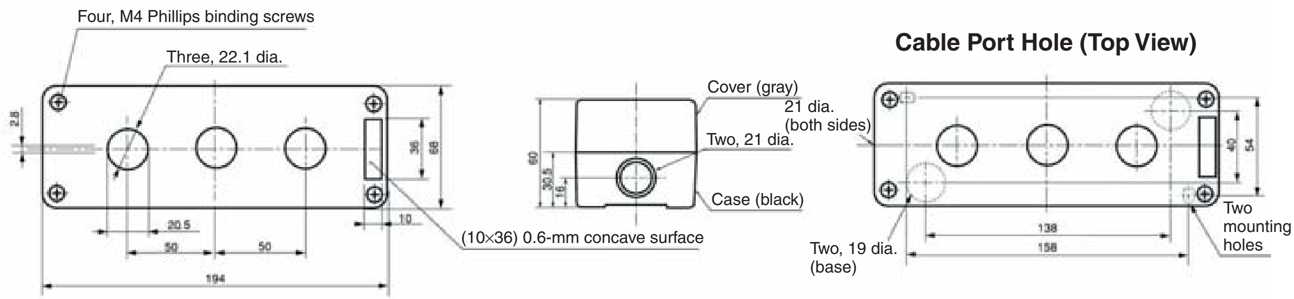
A22Z-B201 (One Hole)
A22Z-B201Y



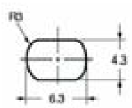
A22Z-B202 (Two Holes)



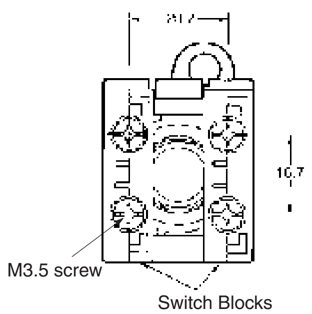
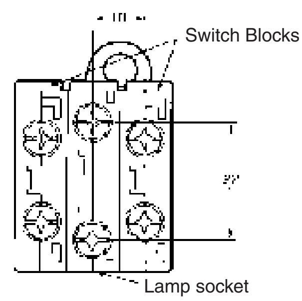
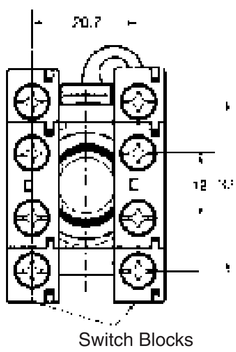
A22Z-B203 (Three Holes)



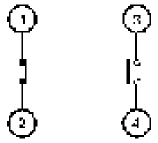
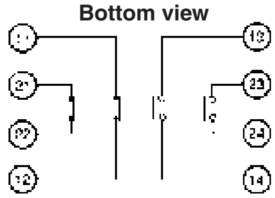
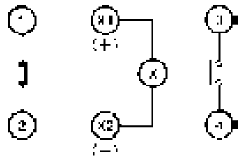
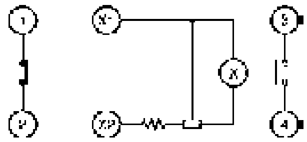
Panel Mounting Hole



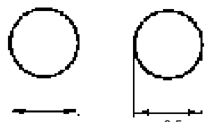
■ Terminal Arrangement (Bottom View)

Non-lighted (SPST-NO + SPST-NC)	Lighted (SPST-NO + SPST-NC)	Non-lighted (DPST-NO + DPST-NC)
		

■ Terminal Connection

Type	Terminal connection
Non-lighted (SPST-NO + SPST-NC)	**Bottom view** 
Non-lighted (DPST-NO + DPST-NC)	**Bottom view** 
Lighted without Voltage Reduction Unit (SPST-NO + SPST-NC)	**Bottom view** 
Lighted with Voltage Reduction Unit (SPST-NO + SPST-NC)	**Bottom view** 

■ Panel Cutouts



$22.3^{+0.4}_{0}$ dia. $25^{+0.5}_{0}$ dia.

Note: 1. When applying coating such as paint to the panel, the dimensions should be those after the application of coating. Lock ring is provided as a standard item.

2. Recommended panel thickness: 1 to 5 mm.

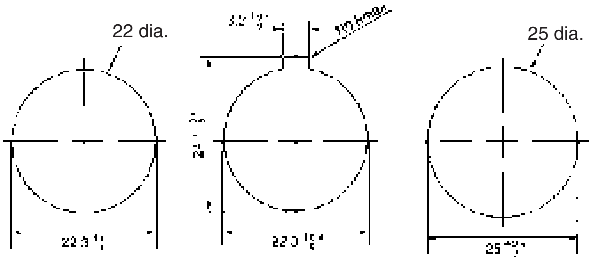
3. Use an A22Z-R25 Ring when mounting to a panel with 25-mm holes.

Installation

Common to A22, A22S/W, A22K, M22, and A22E

■ Mounting to the Panel

Panel Hole Dimensions



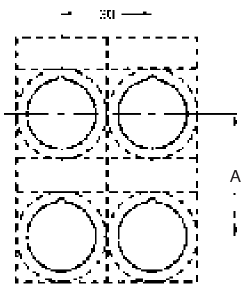
For 25-dia. holes, always use 25-dia. Rings. (Since the cutout dimensions are large, IP65 cannot be guaranteed unless 25-dia. Rings are used.)

If outer surface treatment such as coating is performed for the panel, the panel dimensions after outer surface treatment must meet the specified panel dimensions.

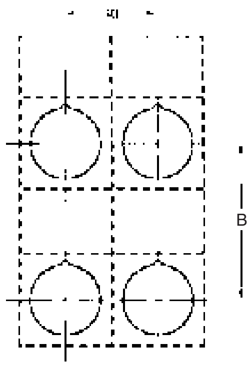
Note: Recommended panel thickness: 1 to 5 mm.

Matrix Installation

1. The following panel hole dimensions apply when Switch Unit and the Standard-size Legend Plate Frame and Lock Ring are mounted, and lead wires are connected directly to the Switch Block.



2. The following panel hole dimensions apply when the Large-size Legend Plate Frame is mounted, and when crimp terminals are connected to the Switch Block terminals.



Pitches A and B between the centers of the mounting holes are as follows:

For 1. above:

Switch Blocks	A
A22-10, A22-10S, A22-01, A22-01S	45 mm min.
A22-20, A22-20S, A22-02, A22-02S, A22-11, A22-11S	55 mm min.

For 2. above:

Type of crimp terminal	Switch Blocks	B
Bare crimp terminals	A22-10, A22-10S, A22-01, A22-01S	51 mm min.
	A22-20, A22-20S, A22-02, A22-02S, A22-11, A22-11S	61 mm min.
Crimp terminals with insulating sheath	A22-10, A22-10S, A22-01, A22-01S	60 mm min.
	A22-20, A22-20S, A22-02, A22-02S, A22-11, A22-11S	70 mm min.

Note: 1. The above dimensions are the minimum dimensions for when the wires described under *Applicable Wire Size* on page L-66 are used. If a different wires are used, the wiring dimensions may be different so determine an appropriate pitch before setup.

2. With pushbuttons of external dimensions greater than 30 mm, set the pitch according to the dimensions. (When using matrix installation for the A22-M□, mount with a pitch of 40 mm instead of 30 mm in the diagram above.)

3. When using a pushbutton with external dimensions exceeding 30 mm, use a pitch appropriate for the pushbutton.

Mounting the Operation Unit on the Panel

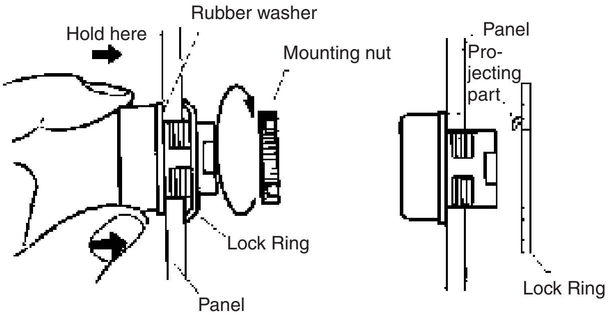
Insert the Operation Unit (Pushbutton, etc.) from the front surface of the panel, insert the Lock Ring and the mounting nut from the terminal side, then tighten the nut. Before tightening, check that the rubber washer is present between the Pushbutton Unit and the panel.

When using a Legend Plate Frame, put one rubber washer each between the Legend Plate Frame and the panel and between the Operation Unit and the Legend Plate Frame. (One rubber washer will be provided when one Legend Plate Frame is ordered.)

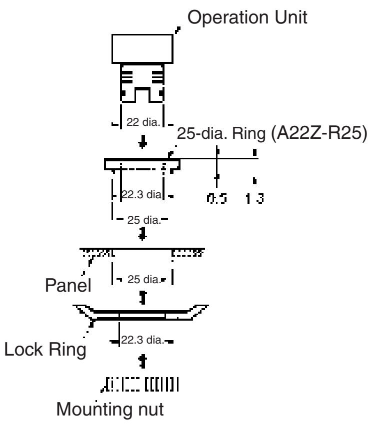
Align the Lock Ring with the groove in the casing, then insert the Lock Ring so that its edge is located on the panel side.

Tighten the mounting nut at a torque of 0.98 to 1.96 N·m.

When using a Lock Ring, replace with the supplied Lock Ring, insert the projecting part into the lock slot, and then tighten the mounting nut.

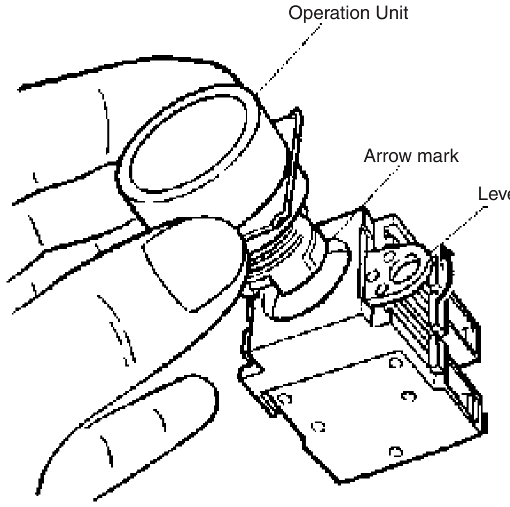


When the panel cutout dimension is 25 dia., remove the supplied rubber washer and mount the 25-dia. Ring as shown below. (Since the A22Z-R25 is not attached to the main body, order separately.)



Mounting the Switch on the Pushbutton Unit

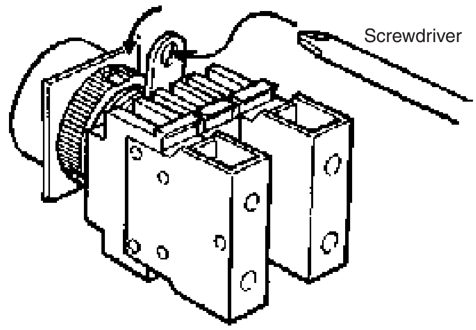
Insert the Pushbutton Unit into the Switch Unit, aligning the arrow mark inscribed on the Case with the lever on the Switch Blocks, then move the lever in the direction indicated by the arrow in the following figure.



Removing the Switch

Move the lever in the direction indicated by the arrow in the following figure, then pull the Pushbutton Unit or the Switch Blocks.

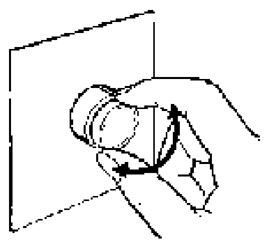
Since the lever has a hole with an inside diameter of 6.5 mm, the lever can be moved in the specified direction by inserting a screwdriver into the hole and then moving the screwdriver.



■ Mounting/Replacing the Color Cap

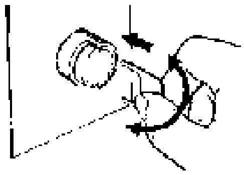
Projection, Fall-guard

Grip and rotate the Color Cap with your fingers.



Half-guard Indicators

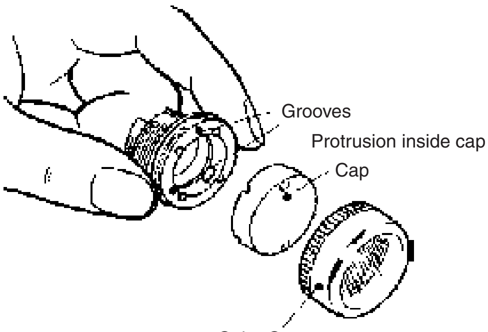
Put the tips of the Cap Tightening Tool (A22Z-3908) into the Color Cap slot and turn the Tool.



■ Assembling the Cap

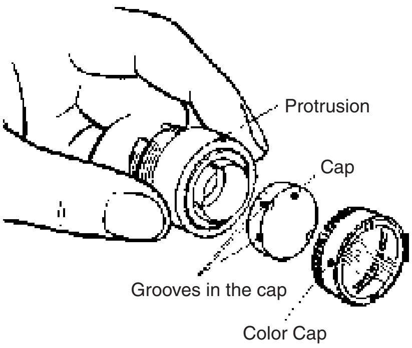
Lighted Pushbutton Switch

Mount the Color Cap so that the protrusions inside the cap fit into the grooves in the Pushbutton Unit.



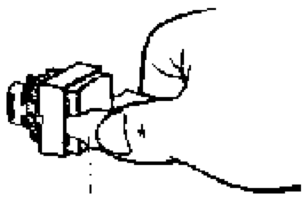
Indicator

Mount the Color Cap so that the protrusions inside the Pushbutton Unit fit into the grooves in the cap.

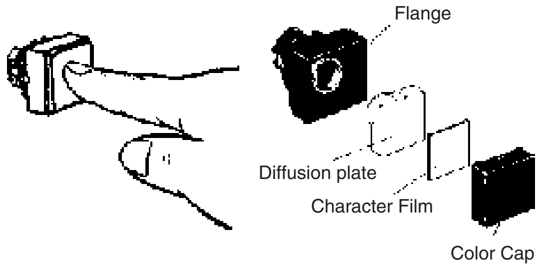


Square Pushbutton/Indicator

Removing the Color Cap:
Insert the protruding tip of the Cap Puller (A3PJ-5080) into the Cap slot, hold the plate spring, and pull them to remove the Color Cap.

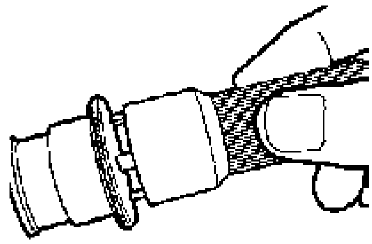


Mounting the Color Cap:
Mount the Color Cap on the flange and firmly push the Color Cap. When the Color Cap is inserted, check whether it operates properly. When replacing the Lamp, remove the Color Cap and diffusion plate with fingers or Cap Puller.
Attach the Character Film properly so that it fits inside the protruding part of the diffusion plate. Then, match the diffusion plate to the square flange and insert the Cap.



Emergency Stop Switch

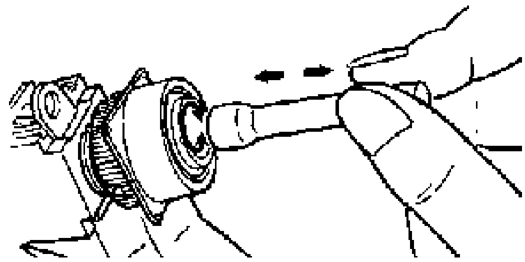
Insert the protrusion of the Tightening Wrench (A22Z-3905) into the Cap slot and then turn to remove the Cap.



■ Installing/Replacing the Lamp

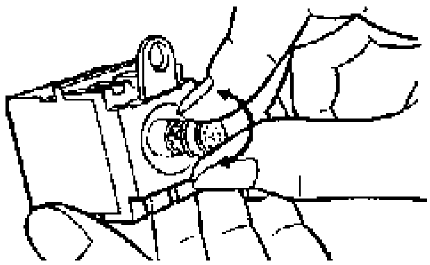
Installing/Replacing from the Panel Surface

Insert the Lamp Extractor (A22Z-3901) into the lamp, then rotate the Extractor while pressing it.



Installing/Replacing on the Switch

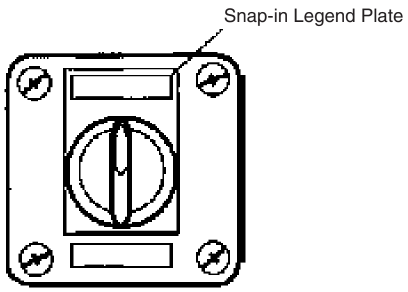
Grip the indicator with your fingers, then rotate the indicator while pressing it against the Switch.



■ Control Box (Enclosure)

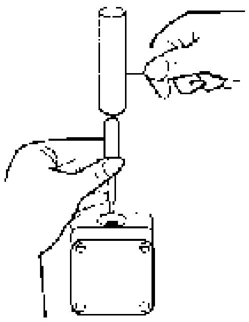
Mounting the Switch

The Standard-size Legend Plate Frame can be mounted. Mount the Frame as shown in the following diagram. Mount the Switch in the same way as for an ordinary panel.



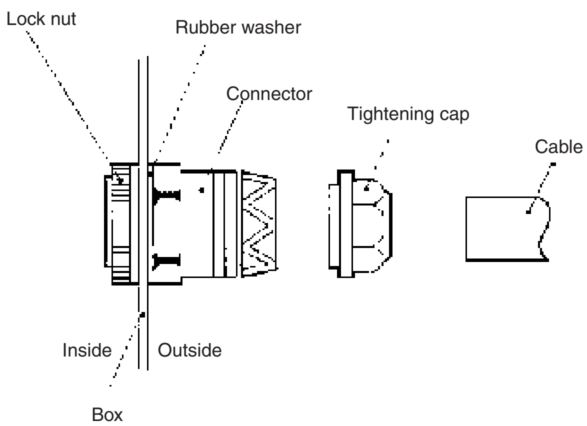
Creating a Cable Port Hole

Place the tip of a screwdriver on the surface where the cable port hole is to be created with the cover attached and strike the screwdriver to punch a hole. Attempts to punch a hole on the other side of the case will damage the Box.



Securing the Connector Cable

1. Insert the connector into the cable port hole in the Box and secure with the fixing nut inside the box.
2. Open a hole in the thin rubber section of the rubber ring.
3. Pass the tightening cap through the cable, insert the cable into the connector, and tighten the hexagonal nut to secure the cable.

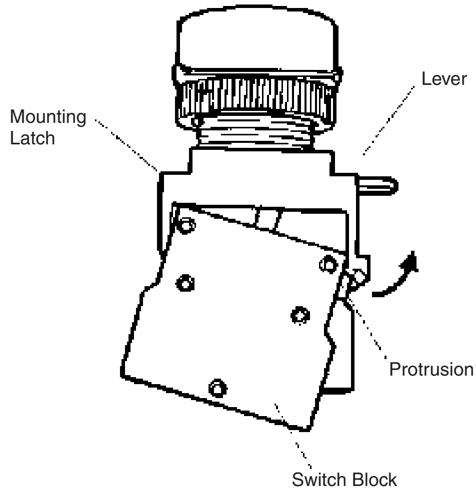


Cable diameter	Connector
7 to 9 dia.	A22Z-3500-1
9 to 11 dia.	A22Z-3500-2

■ Installing/Removing the Switch Blocks

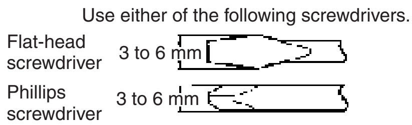
Installing the Switch Blocks

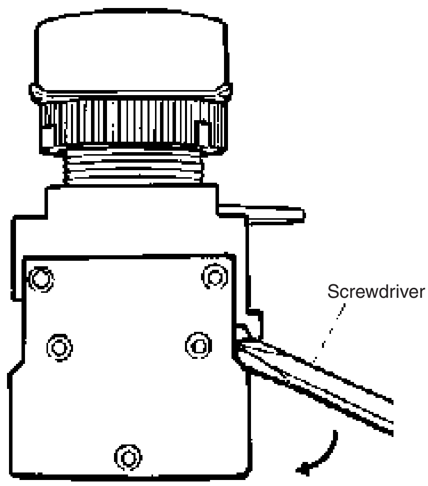
Hook the small protrusion on the Mounting Latch into the groove on the other side of the lever, then push up the Switch Block in the direction indicated by the arrow in the figure below.



Removing the Switch Blocks

Insert a screwdriver between the Mounting Latch and the Switch Block, then push down the screwdriver in the direction indicated by the arrow in the following figure.

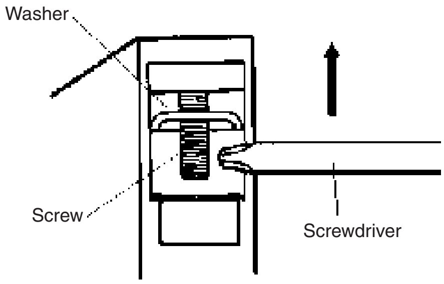




Wiring

Wiring Round Crimp Terminals

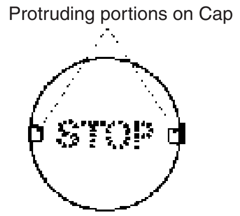
Loosen the terminal screw from the Switch Unit until it completely comes off the groove, insert a screwdriver as shown in the following figure, then push up the washer in the direction indicated by the arrow to temporarily secure it. Now, a round crimp terminal can be connected. After inserting the terminal, tighten the screws to complete wiring.



Engraving

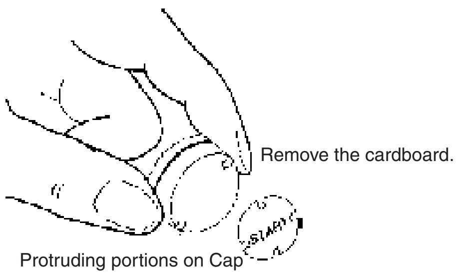
Engrave the characters on the surface on the Cap. Make sure that the characters are aligned parallel to the imaginary line connecting the two protruding portions to the left and right of the Cap.

The characters must not be engraved deeper than 0.5 mm. Apply an alcohol-based paint coating, such as melamine, alkyd, or acrylic resin paint coating, to the engraved characters.



Affixing Character Film

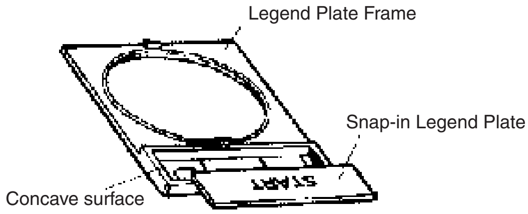
Hold the Cap, remove the cardboard on the Film, and attach the Film to the Cap. Make sure that the protruding portions of the Cap engage the cutout portions of the Film and that the characters are aligned parallel to the imaginary line connecting the two protruding portions to the left and right of the Cap.



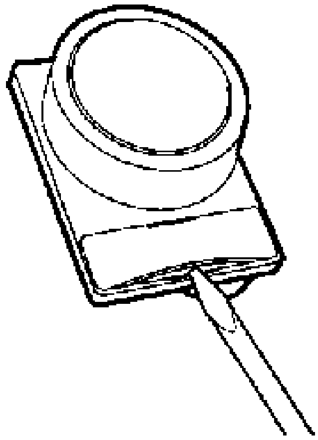
Mounting and Dismounting Snap-in Legend

Press and secure the Snap-in Legend Plate onto the Legend Plate Frame.

The direction of the characters will vary with the mounting direction of the control panel if the Switch is a knob or key selector model.

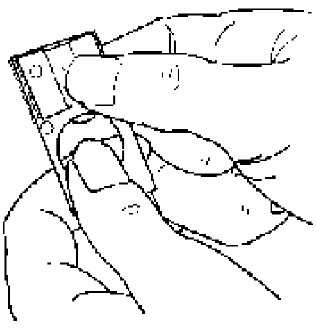


To easily remove the Snap-in Legend Plate from the Legend Plate Frame mounted to the panel, insert a Tool with a thin tip into the space between the Snap-in Legend Plate and the Legend Plate Frame.



The Snap-in Legend Plate is easily removed by pressing the Snap-in Legend Plate from the back of the Legend Plate Frame.

The Legend Plate Frame is made of acrylic resin, which is easily damaged by shock. Be sure to handle the Legend Plate Frame with care.



■ Engraving Method

Material: Acrylic

Engrave the characters directly on the matted side of the Snap-in Legend Plate.

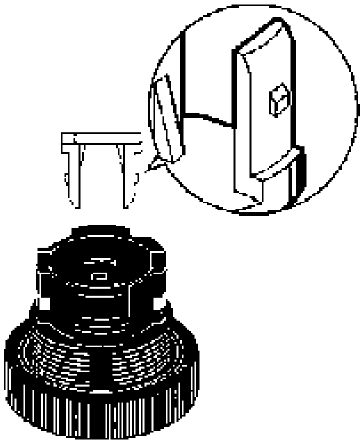
The characters must be engraved no deeper than 0.5 mm.

Apply alcohol-based paint coating to the engraved characters.

If the Snap-in Legend Plate is transparent, engrave the mirror-written characters on the back of the Snap-in Legend Plate and apply paint coating to the characters. Then apply paint coating of a different color to the remaining part of the Snap-in Legend Plate.

■ Mounting Three-throw Spacer (A22Z-3003)

Press and secure the two protruding portions of the Three-throw Spacer to the two indented portions of the inner side of the control panel.



Precautions

Common to A22, A22S/W, A22K, M22, and A22E

⚠ WARNING

Do not apply a voltage between the incandescent lamp and the terminal that is greater than the rated voltage. If the incandescent lamp is broken, the Operation Units may pop out.
Always turn OFF the power and wait for 10 minutes before replacing the incandescent lamp. If the lamp is replaced immediately after the power is turned OFF, the remaining heat may cause burns.

■ Correct Use

Mounting

Always make sure that the power is turned OFF before mounting, removing, or wiring the Switch, or performing maintenance.

Do not tighten the mounting ring more than necessary using tools such as pointed-nose pliers. Doing so will damage the mounting ring. The tightening torque is 0.98 to 1.96 N·m.

Recommended panel thickness: 1 to 5 mm.

Wiring

After wiring the Switch, maintain an appropriate clearance and creepage distance.

When DC-specific LEDs are used, wire the Switch so that the X1 terminal is positive.

Terminal screws must be Phillips or slotted M3.5 screws with a square washer.

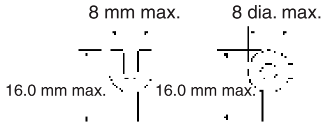
The tightening torque is 1.08 to 1.27 N·m.

Single wires, stranded wires, and crimp terminals can be connected to the Switch.

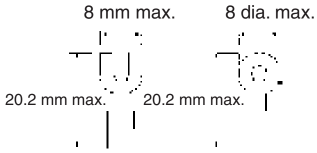
Applicable Wire Size

Stranded wire: 2 mm^2 max.
Solid wire: 1.6 dia. max.

Bare Crimp Terminals



Crimp Terminals with Insulating Sheath



Operating Environment

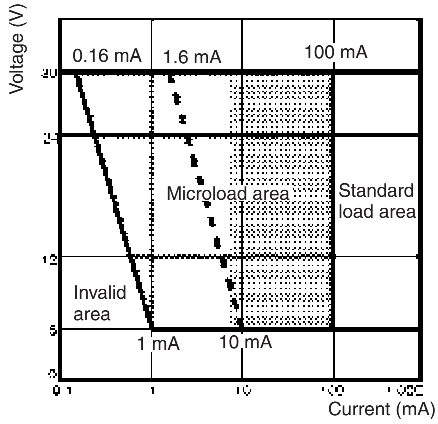
The IP65 model is designed with a degree of protection so that it will not sustain damage if it is subjected to water from any direction to the front of the panel.

Using the Microload

Insert a contact protection circuit, if necessary, to prevent the reduction of life expectancy due to extreme wear on the contacts caused by loads where inrush current occurs when the contact is opened and closed.

The minimum applicable load is the N-level reference value. This value indicates the malfunction reference level for the reliability level of 60% (λ 60) (conforming to JIS C5003).

The equation, λ 60 = 0.5 x 10^{-6}/operations indicates that the estimated malfunction rate is less than 1/2,000,000 operations with a reliability level of 60%.



LED

The LED current-limiting resistor is built-in, so internal resistance is not required.

If commercially available LEDs are used, select the ones that meet the following conditions:

Base: BA9S/13□

Overall length: 26 mm max.

Power consumption: 2.6 W max.

Others

If the panel is to be finished with coating, etc., make sure that the panel meets the specified dimensions after the coating.

Do not subject the Switch to extreme shock or vibration. Doing so will cause malfunctions and damage to the Switch.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. A128-E2-02

Indicator
M16

Cylindrical 16-dia. Indicator

- Same basic design as the A16 Pushbutton Switch.
- UL and cUL approved (File No. E41515).

Model Number Structure

■ Model Number Legend

Completely Assembled

The model numbers used to order sets of Units are illustrated below. One set comprises the Display, Case, Lamp, and Socket.

(1) (2) (3) (4) (5)

M 1 6 5 - T R - 24D - P

(1) Degree of Protection

Symbol	Protection
No symbol	IP40
5	IP65 oil-resistant

(2) Shape of Display

Symbol	Shape
J	Rectangular
A	Square
T	Round
3J	Rectangular (3-way guard)
BA	Square (24-mm square)

(3) Color of Display

Symbol	Color
R	Red
G	Green
Y	Yellow
PY	Pure yellow
W	White
A	Blue

(4) Light Source

Symbol	Type	Operating voltage	Rated voltage
5	Incandescent lamp	5 VAC/VDC	6 VAC/VDC
12		12 VAC/VDC	14 VAC/VDC
24		24 VAC/VDC	28 VAC/VDC
5D	LED	5 ±5% VDC	5 VDC
12D		12 ±5% VDC	12 VDC
24D		24 ±5% VDC	24 VDC

Voltage Reduction Unit (24-V Built-in LED)

Symbol	Type	Operating voltage	Rated voltage
T1	LED	90 to 121 VAC/VDC	110 VAC/VDC
T2		180 to 242 VAC/VDC	220 VAC/VDC

Solder terminals are available only with 100-V models.

The Voltage Reduction Unit is not available for models with PCB terminals.

(5) Terminal Type

Symbol	Terminal type
No symbol	Solder terminals
P	PCB terminals
S	Screw-Less Clamp

Ordering Information

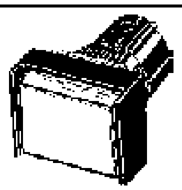
■ List of Models

Ordering as a Set

The model numbers used to order sets of Units are given in the following tables. One set comprises the Display, Case, Lamp, and Socket.

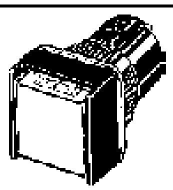
M16□-J (Rectangular) Models

Solder Terminal Models

Appearance	Lighting	Operating voltage	IP40	IP65 oil-resistant	Display color symbol (See note.)
	LED without Voltage Reduction Unit	5 VDC	M16-J□-5D	M165-J□-5D	R: red Y: yellow G: green A: blue W: white PY: Pure yellow
		12 VDC	M16-J□-12D	M165-J□-12D	
		24 VDC	M16-J□-24D	M165-J□-24D	
	Incandescent lamp	5 VDC/VAC	M16-J□-5	M165-J□-5	
		12 VDC/VAC	M16-J□-12	M165-J□-12	
		24 VDC/VAC	M16-J□-24	M165-J□-24	

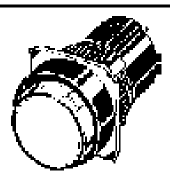
M16□-A (Square) Models

Solder Terminal Models

Appearance	Lighting	Operating voltage	IP40	IP65 oil-resistant	Display color symbol (See note.)
	LED without Voltage Reduction Unit	5 VDC	M16-A□-5D	M165-A□-5D	R: red Y: yellow G: green A: blue W: white PY: Pure yellow
		12 VDC	M16-A□-12D	M165-A□-12D	
		24 VDC	M16-A□-24D	M165-A□-24D	
	Incandescent lamp	5 VDC/VAC	M16-A□-5	M165-A□-5	
		12 VDC/VAC	M16-A□-12	M165-A□-12	
		24 VDC/VAC	M16-A□-24	M165-A□-24	

M16□-T (Round) Models

Solder Terminal Models

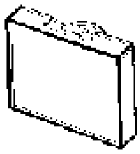
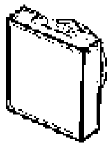
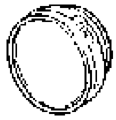
Appearance	Lighting	Operating voltage	IP40	IP65 oil-resistant	Display color symbol (See note.)
	LED without Voltage Reduction Unit	5 VDC	M16-T□-5D	M165-T□-5D	R: red Y: yellow G: green A: blue W: white PY: Pure yellow
		12 VDC	M16-T□-12D	M165-T□-12D	
		24 VDC	M16-T□-24D	M165-T□-24D	
	Incandescent lamp	5 VDC/VAC	M16-T□-5	M165-T□-5	
		12 VDC/VAC	M16-T□-12	M165-T□-12	
		24 VDC/VAC	M16-T□-24	M165-T□-24	

Note: Enter the desired color symbol for the Display in □.

Ordering Individually

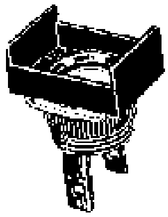
Displays, Cases, Lamps, and Sockets can be ordered separately. Combinations that are not available as sets can be created using individual parts. Also, store the parts as spares for maintenance and repairs.

Display (Refer to page L-70.)

Rectangular	Square	Round
		

Note: Use IP40 Displays in combination with IP40 Sockets and use IP65 Displays in combination with IP65 Sockets.

Case (Refer to page L-71.)



Note: Display Units, which are combinations of Displays and Cases, are also available.

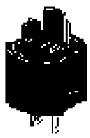
Lighted Models

Lamp (Refer to page L-70.)

LED	Incandescent Lamp	Neon Lamp
		

Socket (Refer to page L-71.)

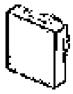
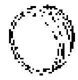
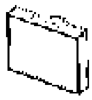
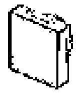
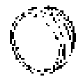
Solder Terminals (Without Voltage Reduction Unit)



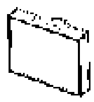
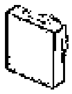
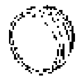
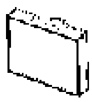
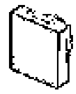
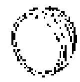
Note: Socket Units, which are combinations of Lamps and Sockets, are also available.

Display

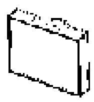
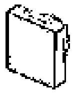
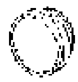
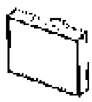
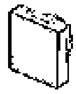
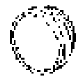
For LED-lighted Models

Sealing	IP40			IP65 oil-resistant		
Appearance / Color of Display	Rectangular 	Square 	Round 	Rectangular 	Square 	Round 
Red	A16L-JR	A16L-AR	A16L-TR	A165L-JR	A165L-AR	A165L-TR
Yellow	A16L-JY	A16L-AY	A16L-TY	A165L-JY	A165L-AY	A165L-TY
Pure yellow	A16L-JPY	A16L-APY	A16L-TPY	A165L-JPY	A165L-APY	A165L-TPY
Green	A16L-JGY	A16L-AGY	A16L-TGY	A165L-JGY	A165L-AGY	A165L-TGY
White	A16L-JW	A16L-AW	A16L-TW	A165L-JW	A165L-AW	A165L-TW
Blue	A16L-JA	A16L-AA	A16L-TA	A165L-JA	A165L-AA	A165L-TA

Incandescent Lamps (With the exception of green, the Units are the same as for LEDs.)

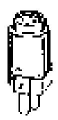
Sealing	IP40			IP65 oil-resistant		
Appearance / Color of Display	Rectangular 	Square 	Round 	Rectangular 	Square 	Round 
Red	A16L-JR	A16L-AR	A16L-TR	A165L-JR	A165L-AR	A165L-TR
Yellow	A16L-JY	A16L-AY	A16L-TY	A165L-JY	A165L-AY	A165L-TY
Pure yellow	A16L-JPY	A16L-APY	A16L-TPY	A165L-JPY	A165L-APY	A165L-TPY
Green	A16L-JG	A16L-AG	A16L-TG	A165L-JG	A165L-AG	A165L-TG
White	A16L-JW	A16L-AW	A16L-TW	A165L-JW	A165L-AW	A165L-TW
Blue	A16L-JA	A16L-AA	A16L-TA	A165L-JA	A165L-AA	A165L-TA

Neon Lamps

Sealing	IP40			IP65 oil-resistant		
Appearance / Color of Display	Rectangular 	Square 	Round 	Rectangular 	Square 	Round 
Red	A16L-JRN	A16L-ARN	A16L-TRN	A165L-JRN	A165L-ARN	A165L-TRN
Green	A16L-JGN	A16L-AGN	A16L-TGN	A165L-JGN	A165L-AGN	A165L-TGN
White	A16L-JWN	A16L-AWN	A16L-TWN	A165L-JWN	A165L-AWN	A165L-TWN

Lamp

LED

	Color	Operating voltage		
		5 VDC	12 VDC	24 VDC
	Red	A16-5DSR	A16-12DSR	A16-24DSR
	Yellow	A16-5DSY	A16-12DSY	A16-24DSY
	Green	A16-5DSG	A16-12DSG	A16-24DSG
	White (See note.)	A16-5DSW	A16-12DSW	A16-24DSW
	Blue	A16-5DA	A16-12DA	A16-24DA

Note: Use the white LED when the required illumination color is white or pure yellow.

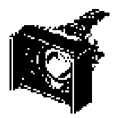
Incandescent Lamp

	Operating voltage	5 VAC/VDC	12 VAC/VDC	24 VAC/VDC
	**Model**	A16-5	A16-12	A16-24

Neon Lamp

	Color of lamp	Color of Display	Operating voltage	
			100 VAC	200 VAC
	Red	White, red	A16-1NRN	A16-2NRN
	Green	Green	A16-1NGN	A16-2NGN

Case

Appearance	Classification		Model number
	IP40	Rectangular	A16-CJM
		Square	A16-CAM
		Round	A16-CTM
	IP65 oil-resistant	Rectangular	A165-CJM
		Square	A165-CAM
		Round	A165-CTM

Socket

Appearance	Classification			Model number
	Solder terminals			M16-0
	PCB terminals			M16-0P
	Screw-Less Clamp			M16-S
	Solder terminals	Voltage-reduction lighting	100 V	M16-T1
Solder terminals	Screw-Less Clamp		100 V	M16-T1-S
			200 V	M16-T2-S

Specifications

■ Approved Standards

Agency	Standards	File No.
UL, cUL (See note.)	UL508	E41515

Note: cUL: CSA, C22.2 No. 14

■ Ratings

Super-bright LED

Rated voltage	Rated current	Operating voltage	Built-in limiting resistance
5 VDC	30 mA (15 mA)	5 VDC ±5%	33 Ω (68 Ω)
12 VDC	15 mA	12 VDC ±5%	270 Ω (560 Ω)
24 VDC	10 mA	24 VDC ±5%	1,600 Ω (2,000 Ω)

Note: The values in parentheses are for blue Pushbuttons.

Incandescent Lamp

Rated voltage	Rated current	Operating voltage
6 VAC/VDC	60 mA	5 VAC/VDC
14 VAC/VDC	40 mA	12 VAC/VDC
28 VAC/VDC	24 mA	24 VAC/VDC

Neon Lamp

Rated voltage	Rated current	Operating voltage
110 VAC	1.5 mA	100 VAC ±10%
220 VAC	1.5 mA	200 VAC ±10%

■ Characteristics

Ambient operating temperature	-10°C to 55°C (with no icing or condensation)
Ambient operating humidity	35% to 85%
Ambient storage temperature	-25°C to 65°C

Note: Characteristics not provided above are the same as those for the A16.

Screw-less Clamp

Item		Screw-less Clamp			
Recommended wire size		0.5 mm² twisted wire or 0.8 mm-dia. solid wire			
Usable wires and tensile strength	Twisted wire	0.3 mm²	0.5 mm²	0.75 mm²	1.25 mm²
	Solid wire	0.5 mm dia.	0.8 mm dia.	1.0 mm dia.	---
	Tensile strength	10 N	20 N	30 N	40 N
Length of exposed wire		10 ±1 mm			

Dimensions

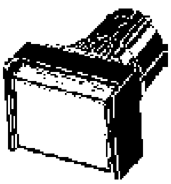
Note: 1. All units are in millimeters unless otherwise indicated.

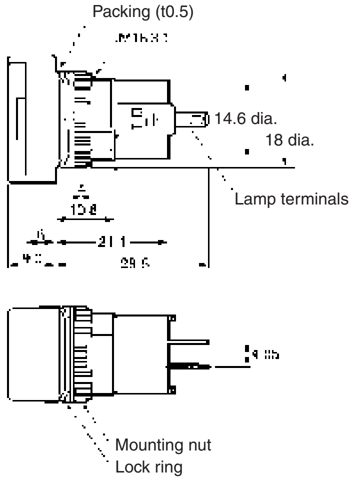
2. Refer to page L-74 for details of panel cutout dimensions.

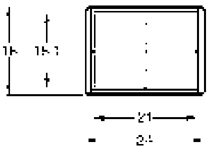
Rectangular

M16-J

Solder terminals



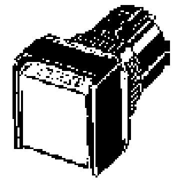


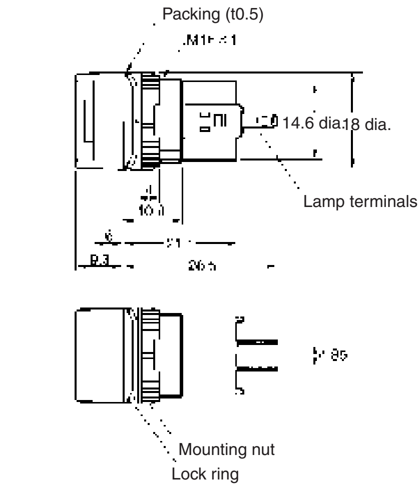


Square

M16-A

Solder terminals

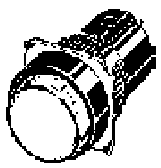


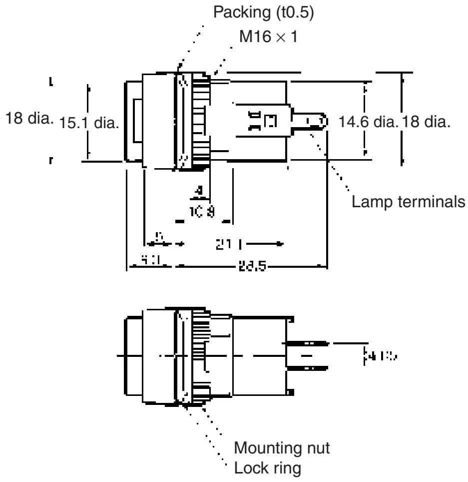


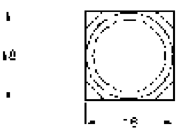
Round

M16-T

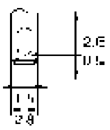
Solder terminals

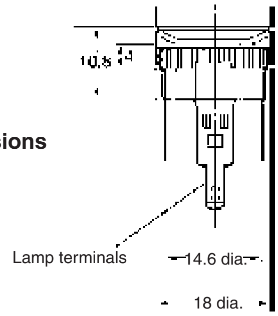






Terminal Hole Dimensions

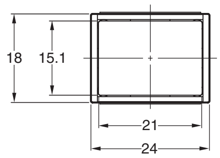


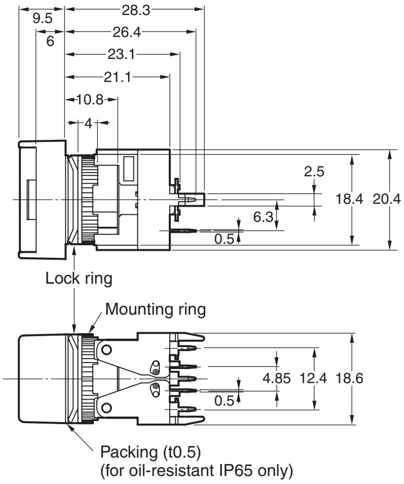


Rectangular
M16□-P

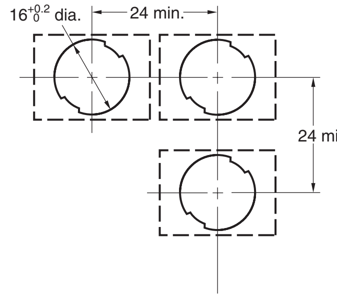
PCB terminals

The rectangular model is given here as a representative example.
Lamp terminals are provided even for non-lighting applications.





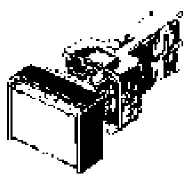
Panel Cutouts

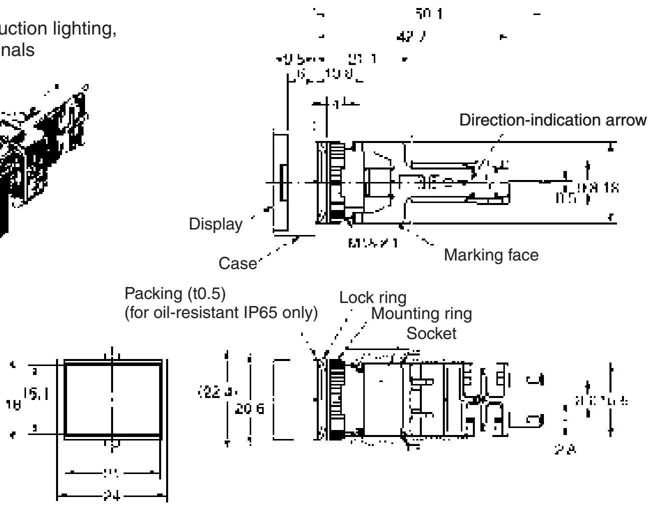


Recommended panel thickness: 0.5 to 3.2 mm

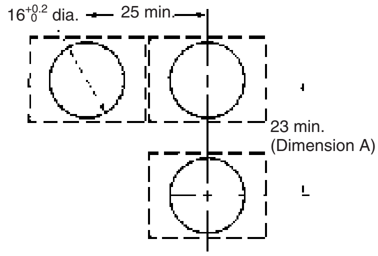
Rectangular
M16□-T1, T2

Voltage-reduction lighting,
solder terminals





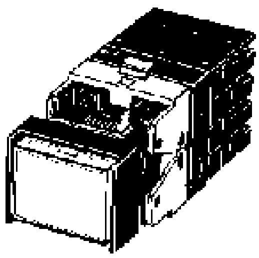
Panel Cutouts

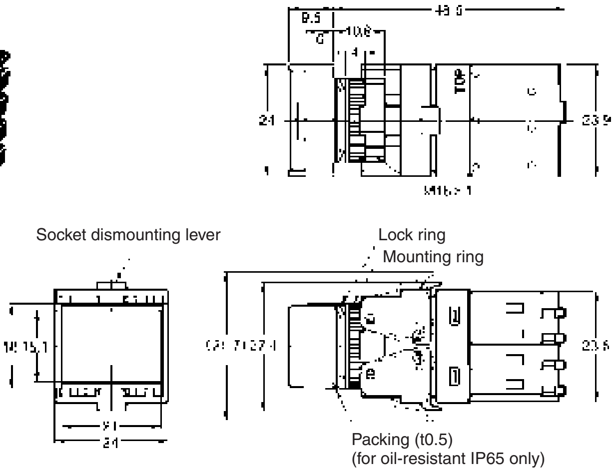


Recommended panel thickness: 0.5 to 3.2 mm

Rectangular
M16□-S

Screw-Less Clamp



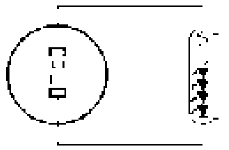


Pushbutton switches

■ Terminal Arrangement

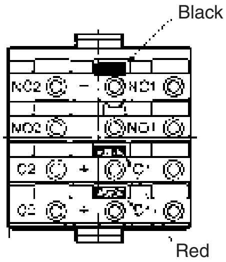
Solder Terminals

Bottom View

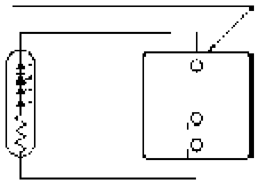


Note: The L+ is not shown on the Socket Unit.

Screw-Less Clamp

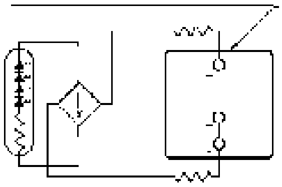


Bottom View



Voltage-reduction Lighting

Bottom View



Note: Voltage-reduction lighting models with Screw-Less Clamps (A16L-□T1-2S, A16L-□T2-2S) incorporate voltage-reduction circuits.

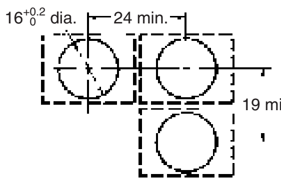
■ Panel Cutouts

Solder Terminals

Solder Terminals

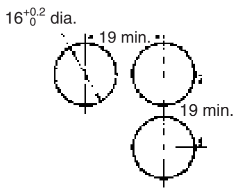
Rectangular M16□-J

(Top View)



Square M16□-A
Round M16□-T

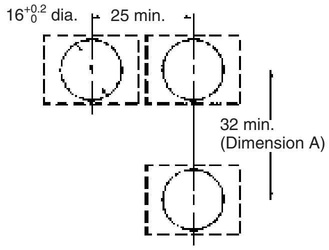
(Top View)



Screw-Less Clamp

Rectangular
M16□-S

(Top View)



Note: 1. Make sure the thickness of the mounting panel is 0.5 to 3.2 mm. If, however, a Switch Guard or Dust Cover is used, the thickness of the mounting panel must be 0.5 to 2 mm.

2. If the panel is to be finished with coating, etc., make sure that the panel meets the specified dimensions after coating.

Installation

Refer to the *Installation* section for the A16.

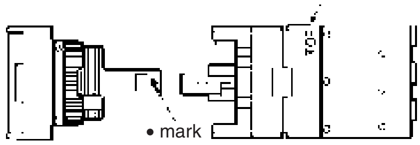
Precautions

Refer to the *Technical Information for Pushbutton Switches* (Cat. No. A143) and the *Precautions* section for the A16.

■ Correct Use

Mounting

When mounting the Case onto the Socket Unit, ensure that the orientation is correct. Perform mounting with the • mark on the Case and the TOP mark on the Socket Unit facing in the same direction.



Wiring

When using stranded wire, gather the ends of the strands together before wiring.

When wiring, insert the wire until it comes into contact with something. After wiring is completed, pull on the wires to confirm that they are connected securely.

After wiring, ensure that continuous pressure is not applied to the terminals.

Refer to internal connections diagrams and confirm the terminal numbers before performing wiring.

Screw-Less Clamps

Mounting Procedure

1. Strip a length of 10 mm off the end of the wire (allowable range: 10±1 mm).
2. Bunch wire strands together and straighten them.
3. Insert the wire into the insertion hole while pressing the release button at the side of the hole. (Using a precision screwdriver is recommended.)
4. Let go of the release button to lock the wire into place.
5. After locking, pull on the wire gently to confirm that it is securely locked.

Removing Procedure

Remove wires by pulling them while pressing the release button.

Note: When reusing wires that have already been locked, cut off the end of the wire and strip the wire again before using.

Pushbutton switches

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

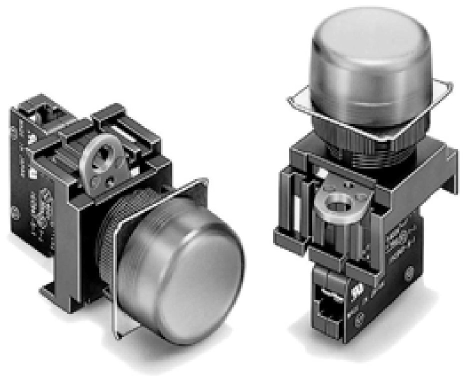
Cat. No. A127-E2-02

In the interest of product improvement, specifications are subject to change without notice.

Indicator
M22

22-dia. and 25-dia. Round Indicator Series

- Easy mounting and removal of Socket Unit.
- Use 25-dia. ring to install in 25-dia. panel cutouts.
- Finger protection mechanism on Lamp provided as a standard feature.
- UL and cUL approved (File No. E41515)



Model Number Structure

■ Model Number Legend

Completely Assembled

Shipped as a set which includes the Display, Lamp, and Socket Unit.

M22-□□-□
(1 2 3)

1 Flange Shape

Code	Description
F	Round/Flat
C	Square/Projection

2 Illumination Color

Code	Description
R	Red
G	Green
Y	Yellow
W	White
A	Blue

3 Light Source

Code	Operating voltage	
Without Voltage Reduction Unit		
6D	LED	6 VDC
6A		6 VAC
12A		12 VAC/VDC
24A		24 VAC/VDC
5	Incandescent lamp	5 VAC/VDC
12		12 VAC/VDC
24		24 VAC/VDC
H1		100 VAC/VDC
With Voltage Reduction Unit		
T1	LED	110 VAC
T2		220 VAC

Note: The LED lamp (24 VAC/VDC) can be lit by directly applying 110 VAC/VDC (220 VAC/VDC) to the lamp terminal. LED incorporates the 24-VAC/VDC type.

Subassembled

The Display, Lamp, or Socket Unit can be ordered separately. Use them in combination for models that are not available as assembled Units. These can also be used as inventory for maintenance parts.

1. Display

M22-□□ (1 2)

1 Flange Shape

Code	Description
F	Round/Flat
C	Square/Projection

2 Cap Color

Code	Description
R	Red
G	Green
Y	Yellow
W	White
A	Blue

2. Lamp

A22-□□ (1 2)

1 Operating Voltage (Rated Voltage)

Code	Description
Incandescent	
5	5 VAC (6 VAC)
12	12 VAC (14 VAC)
24	24 VAC (28 VAC)
H1	100 VAC (130 VAC)
LED	
6D	6 VDC (6 VDC)
6A	6 VAC (6 VAC)
12A	12 VAC/VDC (12 VAC/VDC)
24A	24 VAC/VDC (24 VAC/VDC)

2 Illumination Color

Code	Description
None	Incandescent lamp
R	Red
G	Green
Y	Yellow
A	Blue

3. Socket Unit

M22-00-□ (1)

1 Voltage Reduction Unit

Code	Description
None	Without Voltage Reduction Unit
T1	110 VAC
T2	220 VAC

Ordering Information

■ List of Models

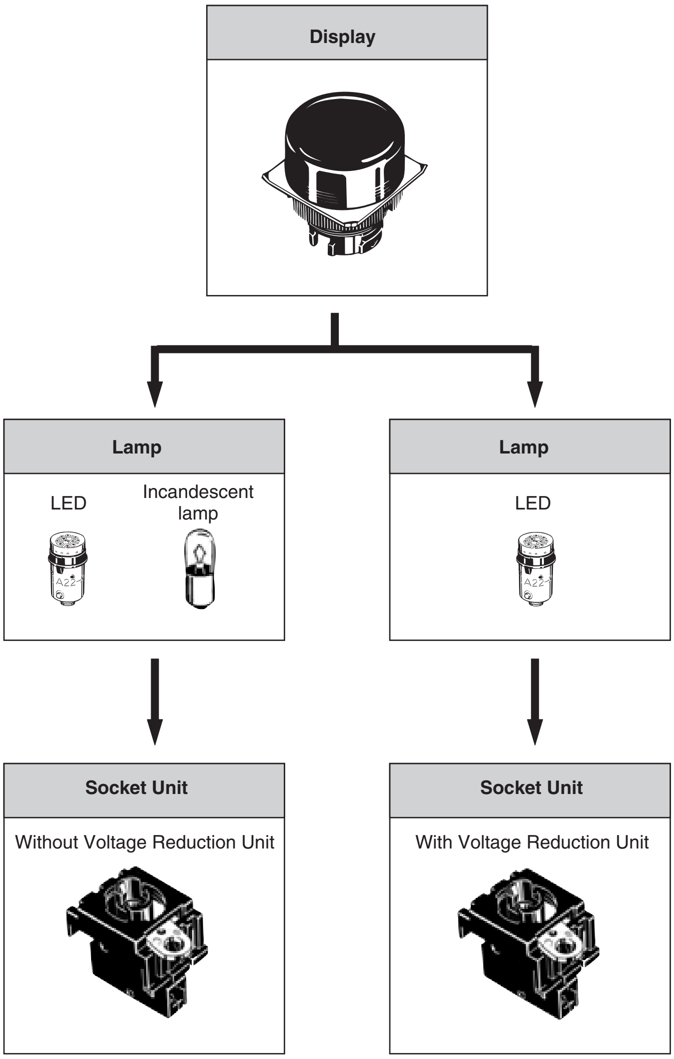
Completely Assembled

Indicator

Appearance	Lighting	Operating voltage	Model	Illumination color
Round/Flat without Voltage Reduction Unit  M22-F	LED	6 VDC	M22-F□-6D	Insert one of the following letters into the box □. R (red) Y (yellow) G (green) W (white) A (blue)
		6 VAC	M22-F□-6A	
		12 VAC/VDC	M22-F□-12A	
		24 VAC/VDC	M22-F□-24A	
Round/Flat with Voltage Reduction Unit  M22-F		110 VAC	M22-F□-T1	
		220 VAC	M22-F□-T2	
Square/Projection without Voltage Reduction Unit  M22-C		6 VDC	M22-C□-6D	
		6 VAC	M22-C□-6A	
		12 VAC/VDC	M22-C□-12A	
		24 VAC/VDC	M22-C□-24A	
Square/Projection with Voltage Reduction Unit  M22-C		110 VAC	M22-C□-T1	
		220 VAC	M22-C□-T2	

Pushbutton switches

Subassembled

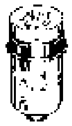


Display

Appearance		IP65 oil-resistant	
		Color of Display	Model
Round/Flat 	M22-F	Red	M22-FR
		Green	M22-FG
		Yellow	M22-FY
		White	M22-FW
		Blue	M22-FA
Square/Projection 	M22-C	Red	M22-CR
		Green	M22-CG
		Yellow	M22-CY
		White	M22-CW
		Blue	M22-CA

Lamp

LED

		Operating voltage	6 V	12 V	24 V	24 V Super-bright
Appearance	AC/DC	LED light	Model			
	AC	Red	A22-6DR	---	---	---
		Green	A22-6DG	---	---	---
		Yellow (see note 2)	A22-6DY	---	---	---
		Blue	A22-6DA	---	---	---
	DC	Red	A22-6AR	---	---	---
		Green	A22-6AG	---	---	---
		Yellow (see note 2)	A22-6AY	---	---	---
		Blue	A22-6AA	---	---	---
	AC and DC	Red	---	A22-12AR	A22-24AR	A22-24ASR
		Green	---	A22-12AG	A22-24AG	A22-24ASG
		Yellow (see note 2)	---	A22-12AY	A22-24AY	A22-24ASY
		Blue	---	A22-12AA	A22-24AA	A22-24ASA

Note: 1. For voltage-reduction lighting, use the A22-24A□.
2. Used when the Display color is yellow or white.

Incandescent

Operating voltage	6 VAC/VDC	12 VAC/VDC	24 VAC/VDC	100 VAC/VDC
	A22-5	A22-12	A22-24	A22-H1

Socket Unit

Voltage-reduction circuits		
Without Voltage Reduction Unit	With Voltage Reduction Unit	
		
Without Voltage Reduction Unit	With Voltage Reduction Unit (110 VAC)	With Voltage Reduction Unit (220 VAC)
M22-00	M22-00-T1	M22-00-T2

Note: For voltage-reduction lighting, use the A22-24A□.

Accessories (Order Separately)

The M22 uses the same accessories as the A22. Refer to the relevant information in the corresponding section for the A22.

Specifications

■ Approved Standards

Recognized organization	Standards	File No.
UL, cUL (see note)	UL508	E41515

Note: cUL: CSA C22.2 No. 14

■ Approved Standard Ratings

UL, cUL (File No. E41515)

2-6W, 120 V max.

■ Ratings

LED Lamp

Rated voltage	Rated current	Operating voltage
6 VDC	60 mA (20 mA)	6 VDC±5%
6 VAC	60 mA (20 mA)	6 VAC±5%
12 VAC/VDC	30 mA (10 mA)	12 VAC/VDC±5%
24 VAC/VDC	15 mA (10 mA)	24 VAC/VDC±5%

Note: The values in parentheses are for blue Indicators.

Super-bright LED Indicator

Rated voltage	Rated current	Operating voltage
24 VAC/VDC	15 mA	24 VAC/VDC±5%

Incandescent Lamp

Rated voltage	Rated current	Operating voltage
6 VAC/VDC	200 mA	5 V
14 VAC/VDC	80 mA	12 V
28 VAC/VDC	40 mA	24 V
130 VAC/VDC	20 mA	100 V

Voltage-reduction Lighting

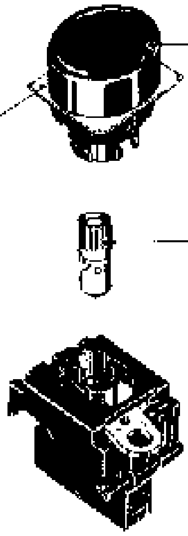
Rated voltage	Operational voltage	Applicable lamp (BA9S/13□ gold)
110 VAC	95 to 115 VAC	LED lamp (A22-24□)
220 VAC	190 to 230 VAC	

■ Characteristics

Item		Indicator M22
Insulation resistance		100 MΩ min. (at 500 VDC)
Dielectric strength		2,500 VAC, 50/60 Hz for 1 min between terminals of same polarity 2,500 VAC, 50/60 Hz for 1 min between terminals of different polarity and also between each terminal and ground
Vibration resistance		Malfunction (See note 2.): 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	**Mechanical**	1,000 m/s^2
	Malfunction (See note 2.)	600 m/s^2 max.
Ambient temperature (See note 1.)		Operating: -20°C to 55°C Storage: -40°C to 70°C
Ambient humidity		Operating: 35°C to 85°C
Degree of protection		IP65
Electric shock protection class		Class II
PTI (tracking characteristic)		175
Degree of contamination		3 (IEC947-5-1)

Note: 1. With no icing or condensation.
2. Malfunction within 1 ms.

Nomenclature



Lock Ring

Display
- **Available Colors**
  Red, green yellow, white, blue

Lamp
- **Light Source**
  LED lamp
  Incandescent lamp

Socket Unit
- **Lighting Method**
  Lighted (without Voltage Reduction Unit)
  Lighted (with Voltage Reduction Unit)

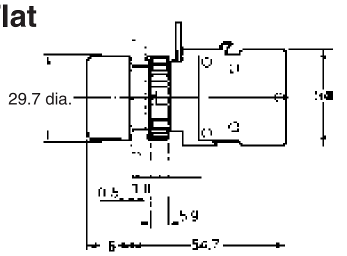
Dimensions

Note: All units are in millimeters unless otherwise indicated.

■ Indicators

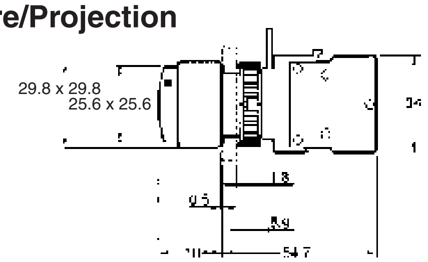
Round/Flat

M22-F



Square/Projection

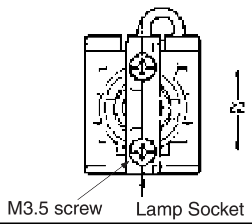
M22-C



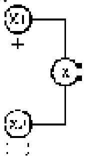
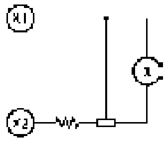
■ Accessories

The M22 uses the same accessories as the A22. Refer to the relevant information in the corresponding section for the A22.

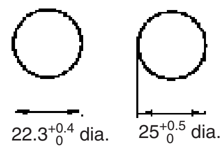
■ Terminal Arrangement (Bottom View)

With/Without Voltage Reduction Unit


■ Terminal Connection

Without Voltage Reduction Unit	With Voltage Reduction Unit
Bottom view 	Top view 

■ Panel Cutouts (Top View)



Note: 1. When applying coating such as paint to the panel, the dimensions should be those after the application of coating. Lock Ring is provided as a standard item.

2. Recommended panel thickness: 1 to 5 mm.

3. Use an A22Z-R25 Ring when mounting to a panel with 25 mm holes.

Installation

The M22 uses the same installation method as the A22. Refer to the relevant information in the *Installation* section for the A22.

Precautions

The precautions for the M22 are the same as those for the A22. Refer to the relevant information in the *Precautions* section for the A22 and the *Technical Information for Pushbutton Switches* (Cat. No. A143).

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. A131-E2-02

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