OMRON

PHOTOMICRO SENSORS

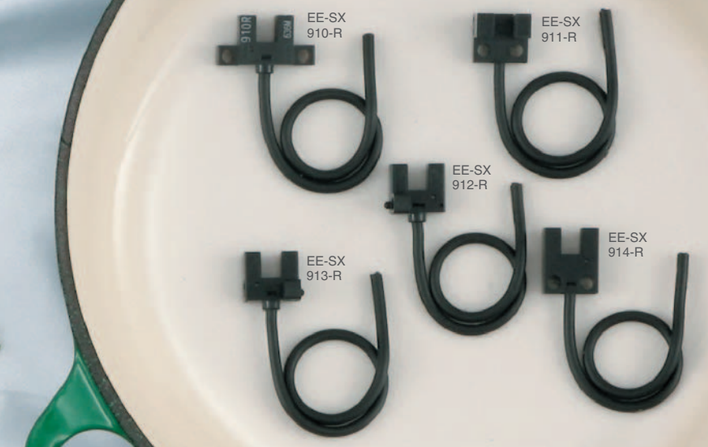
Photomicro Sensors with Built-in Amplifier

realizing

Be sure to read page 27 before ordering.

Actual size

Standard EE-SX47/67 Series



Compact EE-SX91 Series

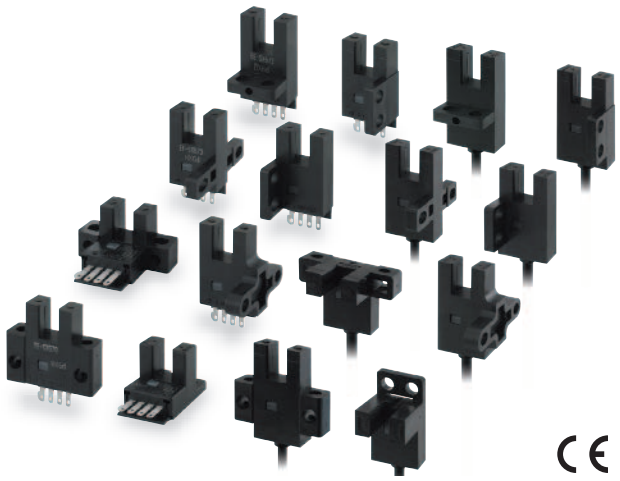
Thin EE-SX77/87 series

A Complete Product Lineup for the Perfect Selection

Slot-type Photomicrosensor with connector or pre-wired models (Non-modulated) *1

EE-SX47/67 NEW

Photomicrosensor with 50- to 100-mA direct switching capacity for built-in application.



- Series includes models that enable switching between dark-ON and light-ON operation.
- Response frequency as high as 1 kHz.
- Easy operation monitoring with bright light indicator.
- Wide operating voltage range: 5 to 24 VDC
- Models in which the light indicator turns ON for dark-ON operation are also available.
- A wide range of variations in eight different shapes.
- Flexible robot cable is provided as a standard feature. *2

⚠ Be sure to read *Safety Precautions* on page 8.

*1. Only the EE-SX67 Series has pre-wired models.
*2. Pre-wired models only.

Ordering Information

Connector models

Infrared light

Appearance	Sensing method	Connecting method	Sensing distance	Output configuration	Indicator mode	Model	
						NPN output	PNP output
Standard 	Through-beam type (with slot)	Connector (4 poles)	5 mm (slot width)	Dark-ON/Light-ON (selectable) *3	Incident light	EE-SX670	EE-SX670P
					No incident light	EE-SX670A	EE-SX670R
				Light-ON	Incident light	EE-SX470	EE-SX470P
L-shaped 				Dark-ON/Light-ON (selectable) *3	Incident light	EE-SX671	EE-SX671P
					No incident light	EE-SX671A	EE-SX671R
				Light-ON	Incident light	EE-SX471	EE-SX471P
T-shaped 				Dark-ON/Light-ON (selectable) *3	Incident light	EE-SX672	EE-SX672P
					No incident light	EE-SX672A	EE-SX672R
				Light-ON	Incident light	EE-SX472	EE-SX472P
Close-mounting 				Dark-ON/Light-ON (selectable) *3	Incident light	EE-SX673	EE-SX673P
					No incident light	EE-SX673A	EE-SX673R
				Light-ON	Incident light	EE-SX473	EE-SX473P
Close-mounting 				Dark-ON/Light-ON (selectable) *3	Incident light	EE-SX674	EE-SX674P
					No incident light	EE-SX674A	EE-SX674R
				Light-ON	Incident light	EE-SX474	EE-SX474P
T-shaped, slot center: 10 mm 				Dark-ON/Light-ON (selectable) *3	Incident light	EE-SX675 NEW	EE-SX675P NEW
F-shaped 				Dark-ON/Light-ON (selectable) *3	Incident light	EE-SX676 NEW	EE-SX676P NEW
R-shaped 				Dark-ON/Light-ON (selectable) *3	Incident light	EE-SX677 NEW	EE-SX677P NEW

*3. These models can be used as Light-ON when the L terminal and positive (+) terminal are connected to each other. To use them as Dark-ON, do not connect these terminals to each other. When used at light-ON, it is useful to select the connector EE-1001-1. The L terminal and positive (+) terminal of this connector are short-circuited in advance.

Pre-wired Models and Models with Junction Connectors

Infrared light

Appearance	Sensing method	Sensing distance	Output configuration	Indicator mode	Connecting method	Model	
						NPN output	PNP output
Standard 	Through-beam type (with slot)	5 mm (slot width)	Dark-ON/ Light-ON (selectable) *	Incident light	Pre-wired models (1 m)	**EE-SX670-WR** NEW	**EE-SX670P-WR** NEW
					Models with junction connectors (0.1 m)	**EE-SX670-C1J-R** NEW	**EE-SX670P-C1J-R** NEW
L-shaped 					Pre-wired models (1 m)	**EE-SX671-WR** NEW	**EE-SX671P-WR** NEW
					Models with junction connectors (0.1 m)	**EE-SX671-C1J-R** NEW	**EE-SX671P-C1J-R** NEW
T-shaped, slot center: 7 mm 					Pre-wired models (1 m)	**EE-SX672-WR** NEW	**EE-SX672P-WR** NEW
					Models with junction connectors (0.1 m)	**EE-SX672-C1J-R** NEW	**EE-SX672P-C1J-R** NEW
Close-mounting 					Pre-wired models (1 m)	**EE-SX673-WR** NEW	**EE-SX673P-WR** NEW
					Models with junction connectors (0.1 m)	**EE-SX673-C1J-R** NEW	**EE-SX673P-C1J-R** NEW
Close-mounting 					Pre-wired models (1 m)	**EE-SX674-WR** NEW	**EE-SX674P-WR** NEW
					Models with junction connectors (0.1 m)	**EE-SX674-C1J-R** NEW	**EE-SX674P-C1J-R** NEW
T-shaped, slot center: 10 mm 					Pre-wired models (1 m)	**EE-SX675-WR** NEW	**EE-SX675P-WR** NEW
					Models with junction connectors (0.1 m)	**EE-SX675-C1J-R** NEW	**EE-SX675P-C1J-R** NEW
F-shaped 					Pre-wired models (1 m)	**EE-SX676-WR** NEW	**EE-SX676P-WR** NEW
					Models with junction connectors (0.1 m)	**EE-SX676-C1J-R** NEW	**EE-SX676P-C1J-R** NEW
R-shaped 					Pre-wired models (1 m)	**EE-SX677-WR** NEW	**EE-SX677P-WR** NEW
					Models with junction connectors (0.1 m)	**EE-SX677-C1J-R** NEW	**EE-SX677P-C1J-R** NEW

* These models can be used as Light-ON when the L line and positive (+) line are connected to each other.
To use them as Dark-ON, do not connect these lines to each other.

Accessories for Models with Connectors (Order Separately)

Type		Cable length	Model	Remarks
Connector			**EE-1001**	
			EE-1001-1	L terminal and positive (+) terminal are already short-circuited.
			EE-1009	
	Connector with Cable	1 m	**EE-1006**	
			EE-1010	
		2 m	**EE-1006**	
			EE-1010	
	Connector with Robot Cable	1 m	**EE-1010-R**	
		2 m	**EE-1010-R**	
Connector Hold-down Clip			**EE-1006A**	For EE-1006 only.

Accessories for Models with Junction Connectors (Order Separately)

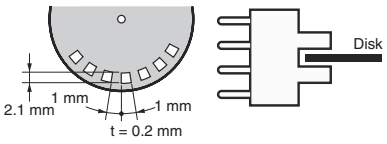
Type	Cable length	Model	Remarks
Connector with Robot Cable	2m	**EE-1016-R-1** NEW	For EE-SX67□-C1J-R.

EE-SX47/67

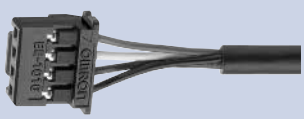
Ratings and Specifications

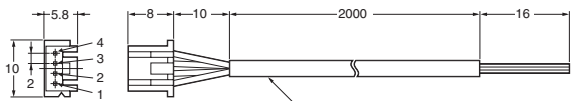
Item		Type	Standard	L-shaped	T-shaped, slot center: 7 mm	Close-mounting		T-shaped, slot center: 10 mm	F-shaped	R-shaped
	NPN models	Connector	EE-SX670 EE-SX670A EE-SX470	EE-SX671 EE-SX671A EE-SX471	EE-SX672 EE-SX672A EE-SX472	EE-SX673 EE-SX673A EE-SX473	EE-SX674 EE-SX674A EE-SX474	EE-SX675	EE-SX676	EE-SX677
		Pre-wired models	EE-SX670-WR	EE-SX671-WR	EE-SX672-WR	EE-SX673-WR	EE-SX674-WR	EE-SX675-WR	EE-SX676-WR	EE-SX677-WR
		Models with junction connectors	EE-SX670-C1J-R	EE-SX671-C1J-R	EE-SX672-C1J-R	EE-SX673-C1J-R	EE-SX674-C1J-R	EE-SX675-C1J-R	EE-SX676-C1J-R	EE-SX677-C1J-R
	PNP models	Connector	EE-SX670P EE-SX670R EE-SX470P	EE-SX671P EE-SX671R EE-SX471P	EE-SX672P EE-SX672R EE-SX472P	EE-SX673P EE-SX673R EE-SX473P	EE-SX674P EE-SX674R EE-SX474P	EE-SX675P	EE-SX676P	EE-SX677P
		Pre-wired models	EE-SX670P-WR	EE-SX671P-WR	EE-SX672P-WR	EE-SX673P-WR	EE-SX674P-WR	EE-SX675P-WR	EE-SX676P-WR	EE-SX677P-WR
		Models with junction connectors	EE-SX670P-C1J-R	EE-SX671P-C1J-R	EE-SX672P-C1J-R	EE-SX673P-C1J-R	EE-SX674P-C1J-R	EE-SX675P-C1J-R	EE-SX676P-C1J-R	EE-SX677P-C1J-R
Sensing distance			5 mm (slot width)							
Sensing object			Opaque: 2 × 0.8 mm min.							
Differential distance			0.025 mm							
Light source			GaAs infrared LED with a peak wavelength of 940 nm							
Indicator *1			Light indicator (red) (turns ON when light is interrupted for models with A or R suffix)							
Supply voltage			5 to 24 VDC ±10%, ripple (p-p): 10% max.							
Current consumption			35 mA max. (NPN models), 30 mA max. (PNP models)							
Control output			NPN open collector: 5 to 24 VDC, 100 mA max. 100 mA load current with a residual voltage of 0.8 V max. 40 mA load current with a residual voltage of 0.4 V max. PNP open collector: 5 to 24 VDC, 50 mA max. 50 mA load current with a residual voltage of 1.3 V max.							
Response frequency *2			1 kHz min. (3 kHz average)							
Ambient illumination			1,000 lx max. with fluorescent light on the surface of the receiver.							
Ambient temperature range			Operating: –25 to +55°C, Storage: –30 to +80°C							
Ambient humidity range			Operating: 5% to 85%, Storage: 5% to 95%							
Vibration resistance			Destruction: 20 to 2,000 Hz (peak acceleration: 100 m/s^2) 1.5-mm double amplitude for 2 h (4-min periods) each in X, Y, and Z directions							
Shock resistance			Destruction: 500 m/s^2 for 3 times each in X, Y, and Z directions							
Enclosure rating			IEC60529 IP50							
Connecting method			Special connectors (direct soldering possible), Pre-wired models (Standard cable length: 1 m), Models with junction connectors (Standard cable length: 0.1 m)							
Weight (packaged)		Connector	Approx. 3.1 g	Approx. 3 g	Approx. 2.4 g	Approx. 2.3 g	Approx. 3 g	Approx. 2.7 g	Approx. 2.2 g	Approx. 2.2 g
		Pre-wired models	Approx. 18.9 g	Approx. 17.3 g	Approx. 17.8 g	Approx. 16.8 g	Approx. 17.1 g	Approx. 18.3 g	Approx. 16.9 g	Approx. 16.9 g
		Models with junction connectors	Approx. 6.3 g	Approx. 4.7 g	Approx. 5.2 g	Approx. 4.2 g	Approx. 4.5 g	Approx. 5.7 g	Approx. 4.3 g	Approx. 4.3 g
Material	Case		Polybutylene phthalate (PBT)							
	Cover emitter/receiver		Polycarbonate							

*1. The indicator is a GaP red LED (peak wavelength: 690 nm).
*2. The response frequency was measured by detecting the rotating disk shown at the right.



Connector for the EE-SX67 with Junction Connector

Item		Product	Connector with Robot Cable
		Model	EE-1016-R-1
		Appearance	
Contact resistance			25 mΩ max.(at 10 mA DC and 20 mV max.)
Insertion strength			20 N max.
Surplus strength (housing holding strength)			15 N min.
Cable length			2 m
Ambient temperature range			–25 to 85°C
Materials	Housing		Nylon
	Contact		Phosphor bronze

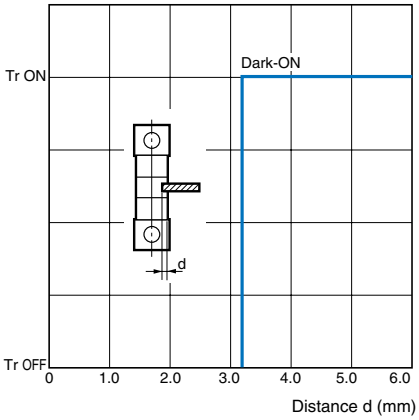


Terminal Arrangement

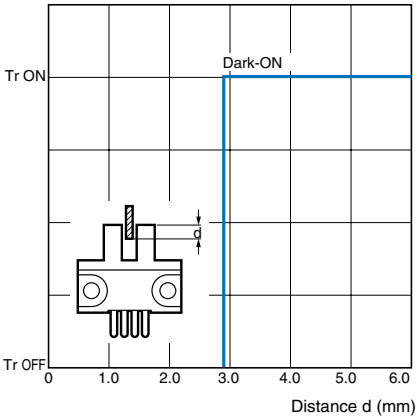
1	⊕	Brown
2	L	Pink
3	⊖	Blue
4	OUT	Black

Engineering Data (Typical)

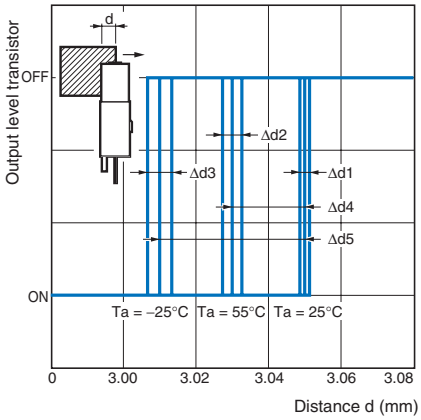
Sensing Position Characteristics



Sensing Position Characteristics



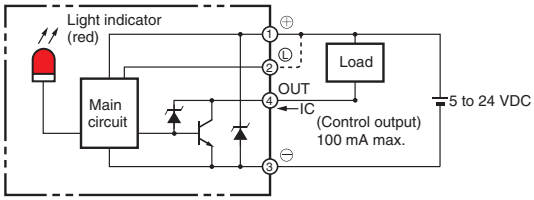
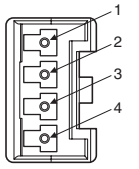
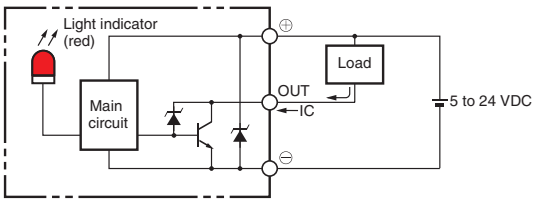
Repeated Sensing Position Characteristics



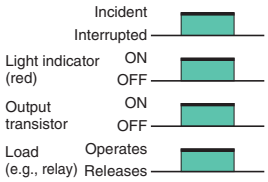
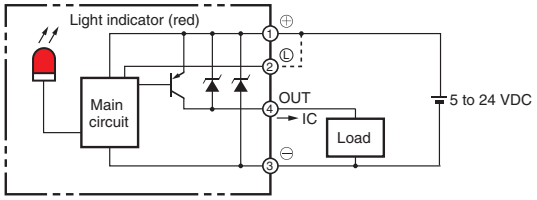
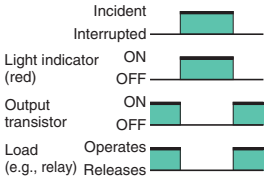
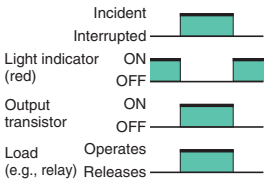
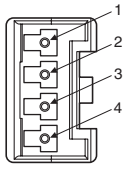
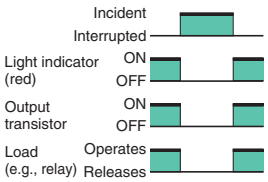
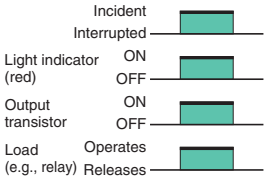
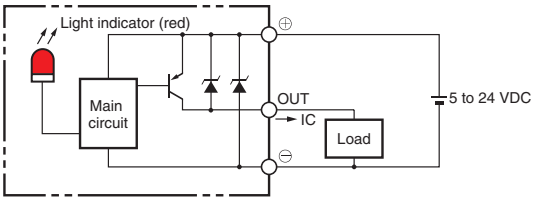
Vcc =12 V, No. of repetitions: 20, Δd1 = 0.002 mm, Δd2 = 0.004 mm, Δd3 = 0.005 mm, Δd4 = 0.02 mm, Δd5 = 0.04 mm

I/O Circuit Diagrams

NPN Output

Model	Output configuration	Timing chart	Terminal connection	Output circuit
EE-SX67□ EE-SX67□-WR EE-SX67□-C1J-R	Light-ON	Incident / Interrupted Light indicator (red): ON / OFF Output transistor: ON / OFF Load (e.g., relay): Operates / Releases	Short-circuited between Ⓛ terminal and positive ⊕ terminal	
	Dark-ON	Incident / Interrupted Light indicator (red): ON / OFF Output transistor: ON / OFF Load (e.g., relay): Operates / Releases	Open between Ⓛ terminal and positive ⊕ terminal	
EE-SX670A EE-SX671A EE-SX672A EE-SX673A EE-SX674A	Light-ON	Incident / Interrupted Light indicator (red): ON / OFF Output transistor: ON / OFF Load (e.g., relay): Operates / Releases	Short-circuited between Ⓛ terminal and positive ⊕ terminal	
	Dark-ON	Incident / Interrupted Light indicator (red): ON / OFF Output transistor: ON / OFF Load (e.g., relay): Operates / Releases	Open between Ⓛ terminal and positive ⊕ terminal	
EE-SX470 EE-SX471 EE-SX472 EE-SX473 EE-SX474	Light-ON	Incident / Interrupted Light indicator (red): ON / OFF Output transistor: ON / OFF Load (e.g., relay): Operates / Releases	---	

PNP Output

Model	Output configuration	Timing chart	Terminal connection	Output circuit
EE-SX67□P EE-SX67□P-WR EE-SX67□P-C1J-R	Light-ON		Short-circuited between Ⓛ terminal and positive ⊕ terminal	
	Dark-ON		Open between Ⓛ terminal and positive ⊕ terminal	
EE-SX670R EE-SX671R EE-SX672R EE-SX673R EE-SX674R	Light-ON		Short-circuited between Ⓛ terminal and positive ⊕ terminal	
	Dark-ON		Open between Ⓛ terminal and positive ⊕ terminal	
EE-SX470P EE-SX471P EE-SX472P EE-SX473P EE-SX474P	Light-ON		---	

Safety Precautions

Refer to *Warranty and Limitations of Liability*.

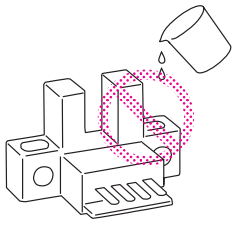
⚠ WARNING

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.

Precautions for Safe Use

● Operating Environment

These Photomicrosensors have an IP50 (conforms to IEC60529) enclosure and do not have a water-proof or dust-proof structure. Therefore, do not use them in applications in which the sensor will be subjected to splashes from water, oil, or any other liquid. Liquid entering the Sensor may result in malfunction.



Precautions for Correct Use

Make sure that this product is used within the rated ambient environment conditions.

● Installation

- When direct soldering to the terminals, use the following guidelines.

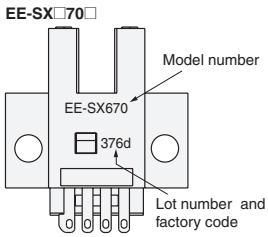
Soldering Conditions

Item	Temperature	Permissible time	Remarks
Soldering iron	350°C max.	3 s max.	The portion between the base of the terminals and the position 1.5 mm from the terminal base must not be soldered.

- The terminal base uses a polycarbonate resin, which could be deformed by excessive soldering heat, resulting in damage to the product's functionality.

● Lot Numbers and Models

In the right illustration, 376d indicates the lot number and factory where the product was manufactured. Do not include this code with the model number when ordering.



Dimensions

(Unit: mm)

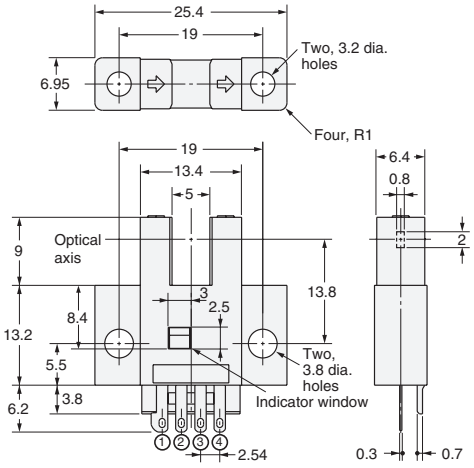
Sensors

EE-SX670/670P
EE-SX670A/670R
EE-SX470/470P

Terminal Arrangement

(1)	⊕	Vcc
(2)	L	L*
(3)	OUT	OUTPUT
(4)	⊖	GND (0 V)

* L Terminal needs no connection for all EE-SX47□ series sensors.

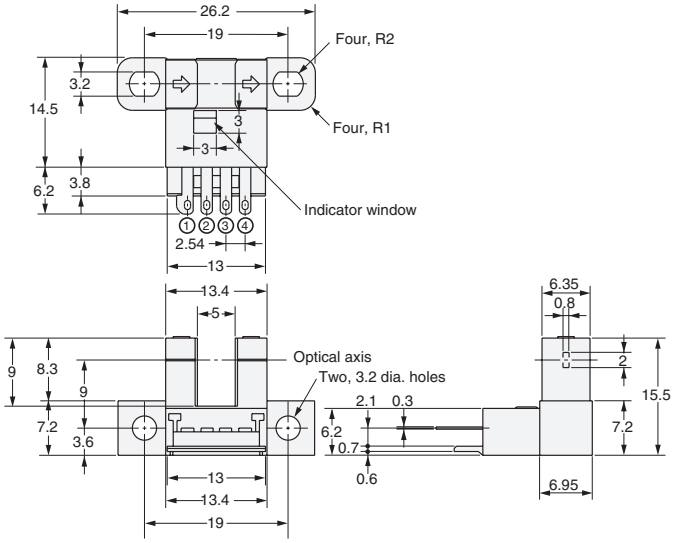


EE-SX671/671P
EE-SX671A/671R
EE-SX471/471P

Terminal Arrangement

(1)	⊕	Vcc
(2)	L	L*
(3)	OUT	OUTPUT
(4)	⊖	GND (0 V)

* L Terminal needs no connection for all EE-SX47□ series sensors.

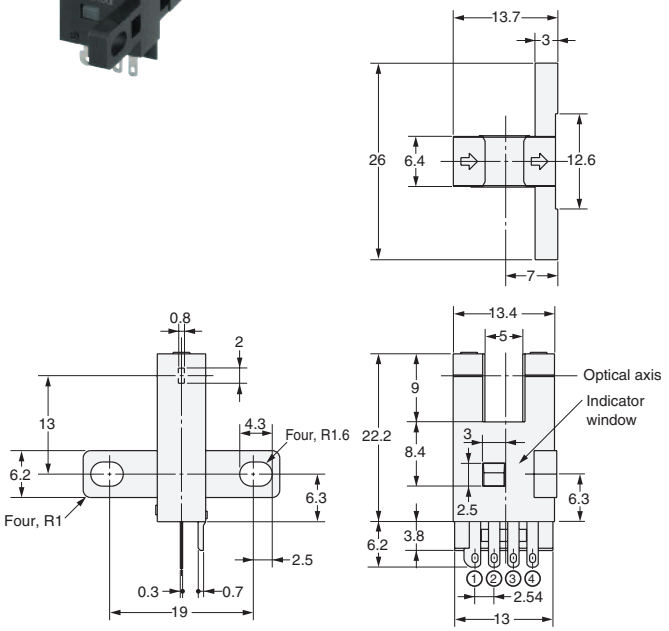


EE-SX672/672P
EE-SX672A/672R
EE-SX472/472P

Terminal Arrangement

(1)	⊕	Vcc
(2)	L	L*
(3)	OUT	OUTPUT
(4)	⊖	GND (0 V)

* L Terminal needs no connection for all EE-SX47□ series sensors.

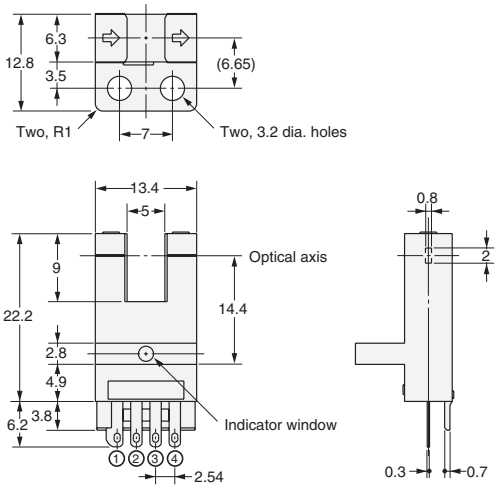


EE-SX673/673P
EE-SX673A/673R
EE-SX473/473P

Terminal Arrangement

(1)	⊕	Vcc
(2)	L	L*
(3)	OUT	OUTPUT
(4)	⊖	GND (0 V)

* L Terminal needs no connection for all EE-SX47□ series sensors.

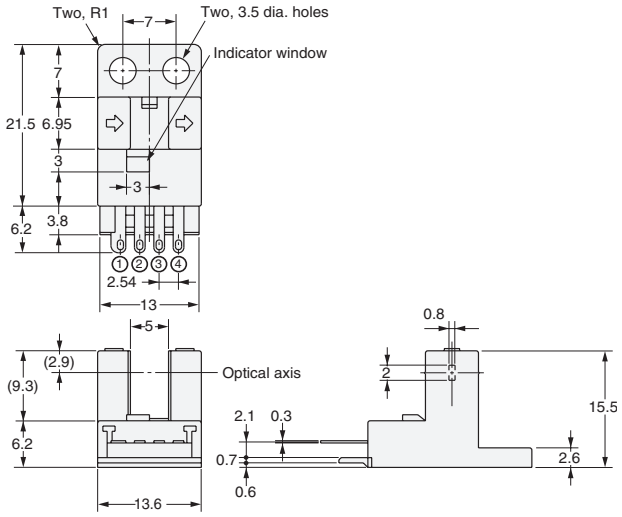


EE-SX674/674P
EE-SX674A/674R
EE-SX474/474P

Terminal Arrangement

(1)	⊕	Vcc
(2)	L	L*
(3)	OUT	OUTPUT
(4)	⊖	GND (0 V)

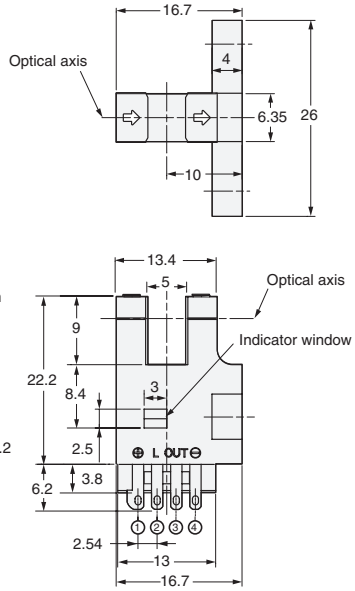
* L Terminal needs no connection for all EE-SX47□ series sensors.



EE-SX675/675P

Terminal Arrangement

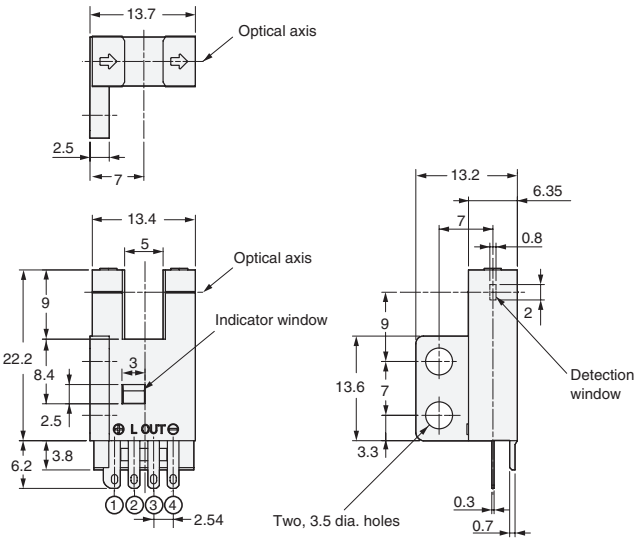
(1)	⊕	Vcc
(2)	L	L
(3)	OUT	OUTPUT
(4)	⊖	GND (0 V)



EE-SX676/676P

Terminal Arrangement

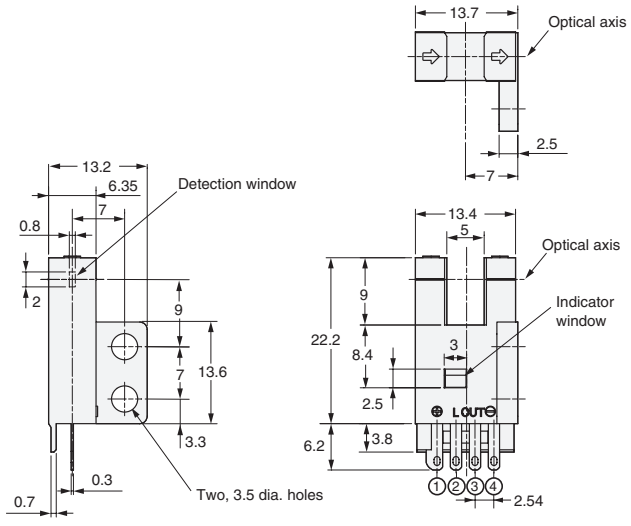
(1)	⊕	Vcc
(2)	L	L
(3)	OUT	OUTPUT
(4)	⊖	GND (0 V)



EE-SX677/677P

Terminal Arrangement

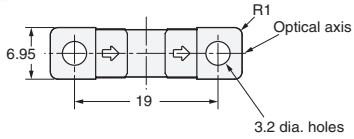
(1)	⊕	Vcc
(2)	L	L
(3)	OUT	OUTPUT
(4)	⊖	GND (0 V)

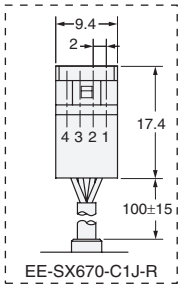


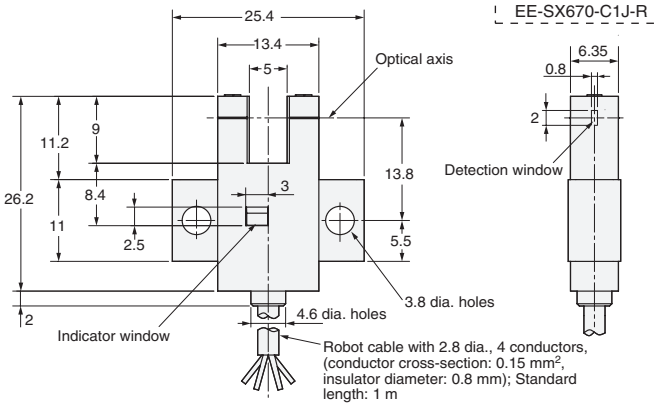
EE-SX670-WR/670P-WR
EE-SX670-C1J-R/670P-C1J-R

Terminal Arrangement

Brown	(1)	Vcc
Pink	(2)	L
Blue	(3)	GND (0 V)
Black	(4)	OUTPUT



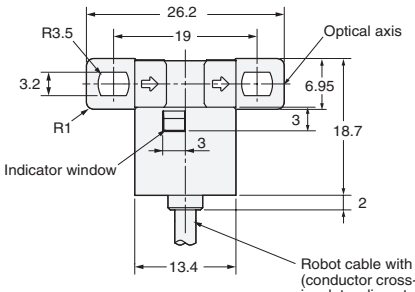


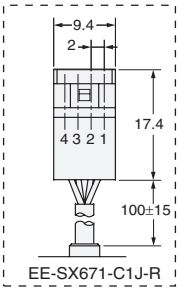


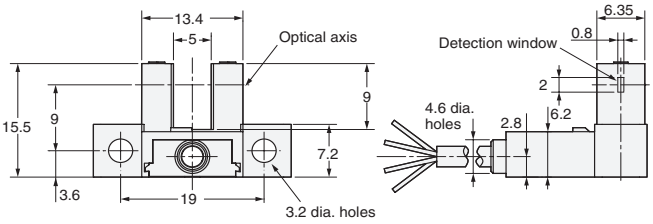
EE-SX671-WR/671P-WR
EE-SX671-C1J-R/671P-C1J-R

Terminal Arrangement

Brown	(1)	Vcc
Pink	(2)	L
Blue	(3)	GND (0 V)
Black	(4)	OUTPUT



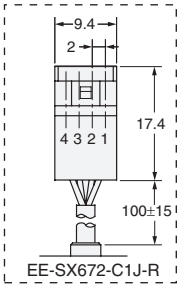


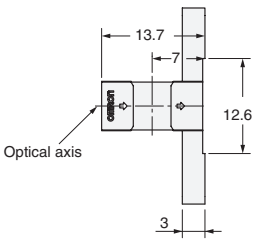


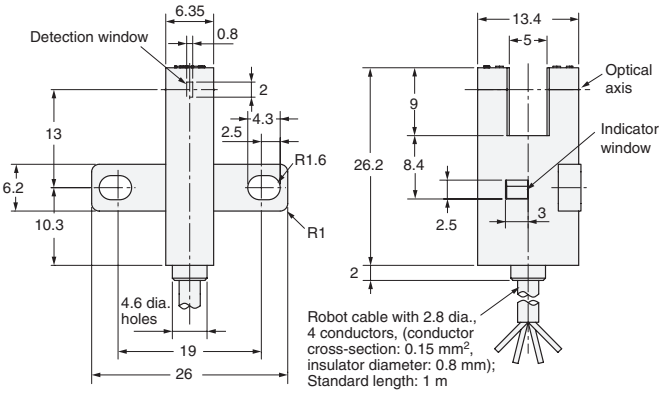
EE-SX672-WR/672P-WR
EE-SX672-C1J-R/672P-C1J-R

Terminal Arrangement

Brown	(1)	Vcc
Pink	(2)	L
Blue	(3)	GND (0 V)
Black	(4)	OUTPUT



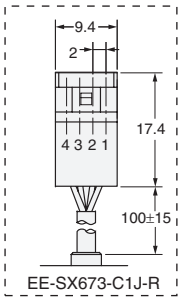


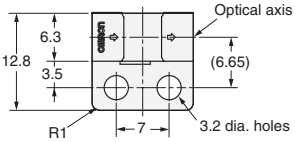


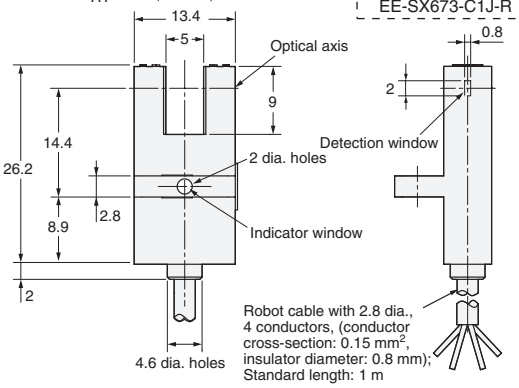
EE-SX673-WR/673P-WR
EE-SX673-C1J-R/673P-C1J-R

Terminal Arrangement

Brown	(1)	Vcc
Pink	(2)	L
Blue	(3)	GND (0 V)
Black	(4)	OUTPUT



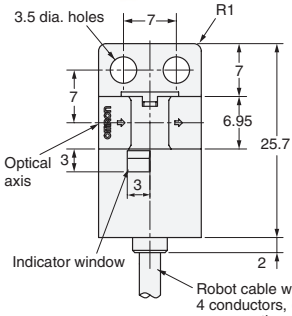


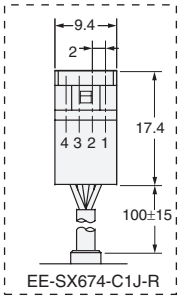


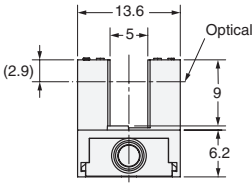
EE-SX674-WR/674P-WR
EE-SX674-C1J-R/674P-C1J-R

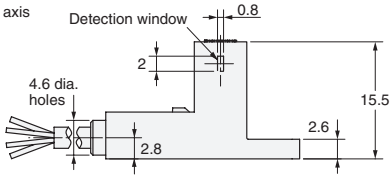
Terminal Arrangement

Brown	(1)	Vcc
Pink	(2)	L
Blue	(3)	GND (0 V)
Black	(4)	OUTPUT





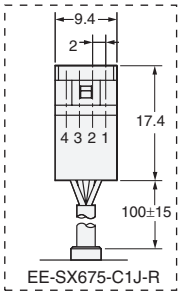


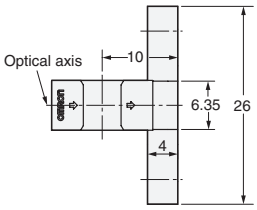


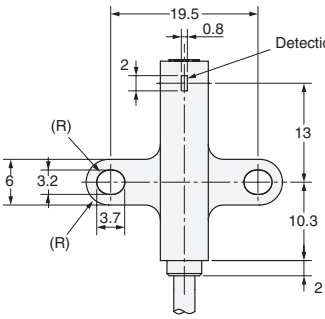
EE-SX675-WR/675P-WR
EE-SX675-C1J-R/675P-C1J-R

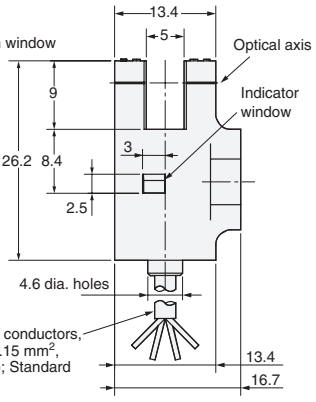
Terminal Arrangement

Brown	(1)	Vcc
Pink	(2)	L
Blue	(3)	GND (0 V)
Black	(4)	OUTPUT







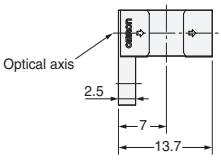


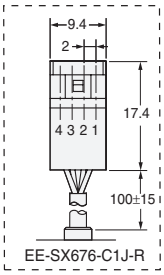
Robot cable with 2.8 dia., 4 conductors, (conductor cross-section: 0.15 mm², insulator diameter: 0.8 mm); Standard length: 1 m

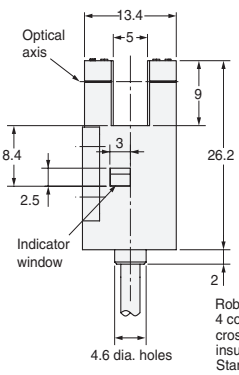
EE-SX676-WR/676P-WR
EE-SX676-C1J-R/676P-C1J-R

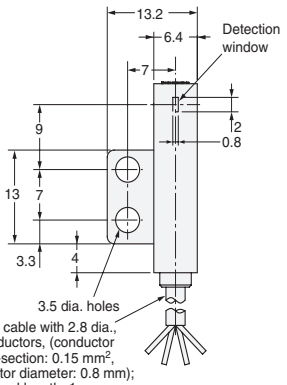
Terminal Arrangement

Brown	(1)	Vcc
Pink	(2)	L
Blue	(3)	GND (0 V)
Black	(4)	OUTPUT







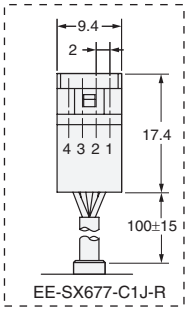


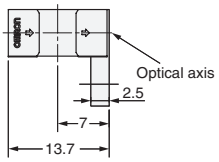
Robot cable with 2.8 dia., 4 conductors, (conductor cross-section: 0.15 mm², insulator diameter: 0.8 mm); Standard length: 1 m

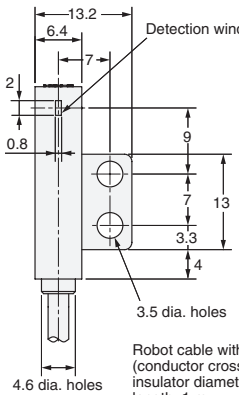
EE-SX677-WR/677P-WR
EE-SX677-C1J-R/677P-C1J-R

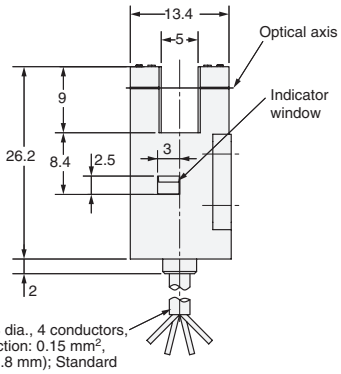
Terminal Arrangement

Brown	(1)	Vcc
Pink	(2)	L
Blue	(3)	GND (0 V)
Black	(4)	OUTPUT







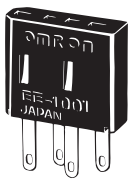


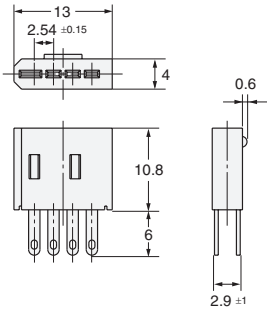
Robot cable with 2.8 dia., 4 conductors, (conductor cross-section: 0.15 mm², insulator diameter: 0.8 mm); Standard length: 1 m

EE-SX47/67 Connector Hold-down Clips

Connector

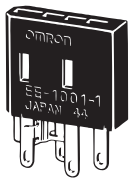
EE-1001

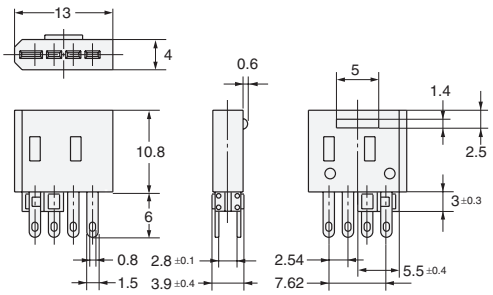




Connector (short-circuited between positive (+) and L terminals)

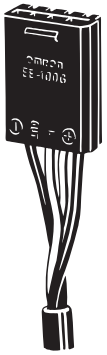
EE-1001-1

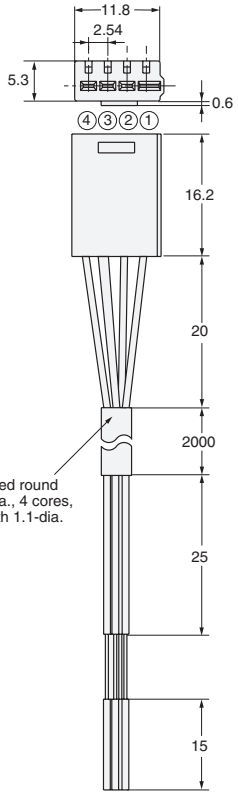




Connector with Cable

EE-1006



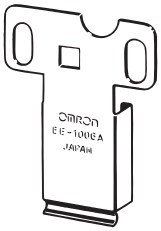


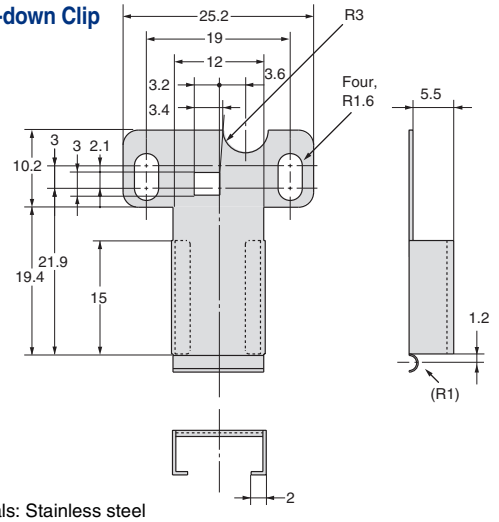
Terminal Arrangement

(1)	⊕	Brown
(2)	L	Pink
(3)	OUT	Black
(4)	⊖	Blue

Connector Hold-down Clip

EE-1006A

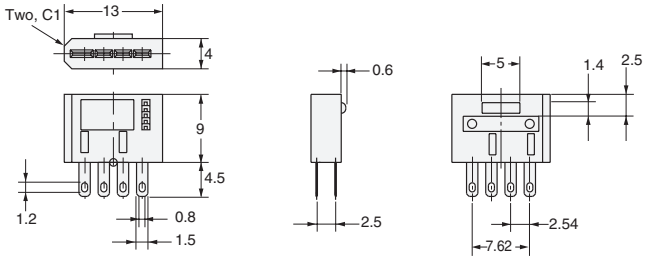




Materials: Stainless steel

Connector

EE-1009

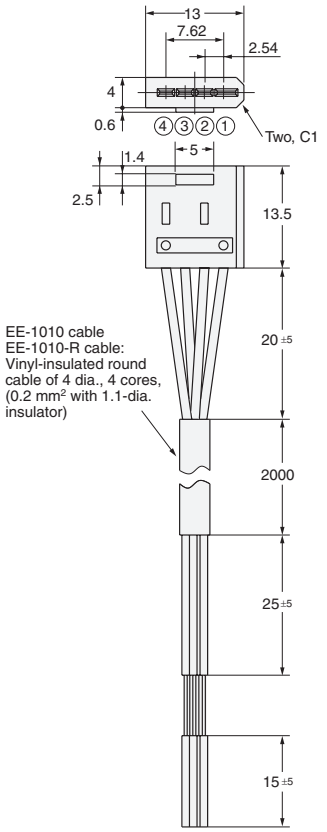


Connector with Cable

EE-1010

Connector with Robot Cable

EE-1010-R



Terminal Arrangement

(1)	⊕	Brown
(2)	L	Pink
(3)	OUT	Black
(4)	⊖	Blue

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

EE-SX77/87

Thin, Compact Photomicrosensor with Attached Cable.

- Compact, thin profile enables dense mounting.
- Indicator is visible from both sides.
- Wide operating voltage range: 5 to 24 VDC

Be sure to read *Safety Precautions* on page 18.

Ordering Information

Pre-wired Models

Infrared light

Appearance	Sensing method	Cable length	Sensing distance	Output configuration	Indicator mode *1	Model	
						NPN output	PNP output
Standard 	Through-beam type (with slot)	2 m	5 mm (slot width)	Dark-ON	Incident light	EE-SX770	EE-SX770P
					No incident light	EE-SX770A	EE-SX770R
				Light-ON	Incident light	EE-SX870	EE-SX870P
					No incident light	EE-SX870A	EE-SX870R
L-shaped 				Dark-ON	Incident light	EE-SX771	EE-SX771P
					No incident light	EE-SX771A	EE-SX771R
				Light-ON	Incident light	EE-SX871	EE-SX871P
					No incident light	EE-SX871A	EE-SX871R
T-shaped 				Dark-ON	Incident light	EE-SX772	EE-SX772P
					No incident light	EE-SX772A	EE-SX772R
				Light-ON	Incident light	EE-SX872	EE-SX872P
					No incident light	EE-SX872A	EE-SX872R

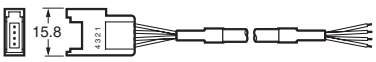
*1. The operation indicator of models with suffix code (A) or (R) will turn ON when the light is interrupted.

e-CON Junction Connector Models *

Infrared light

Appearance	Sensing method	Sensing distance	Output configuration	Indicator mode	Cable length	Model
						NPN output
Standard 	Through-beam type (with slot)	5 mm (slot width)	Dark-ON	Incident light	0.3 m	**EE-SX770-ECON 0.3M**
					2 m	**EE-SX770-ECON 2M**
				No incident light	0.3 m	**EE-SX770A-ECON 0.3M**
					2 m	**EE-SX770A-ECON 2M**
			Light-ON	Incident light	0.3 m	**EE-SX870-ECON 0.3M**
					2 m	**EE-SX870-ECON 2M**
				No incident light	0.3 m	**EE-SX870A-ECON 0.3M**
					2 m	**EE-SX870A-ECON 2M**
L-shaped 			Dark-ON	Incident light	0.3 m	**EE-SX771-ECON 0.3M**
					2 m	**EE-SX771-ECON 2M**
				No incident light	0.3 m	**EE-SX771A-ECON 0.3M**
					2 m	**EE-SX771A-ECON 2M**
			Light-ON	Incident light	0.3 m	**EE-SX871-ECON 0.3M**
					2 m	**EE-SX871-ECON 2M**
				No incident light	0.3 m	**EE-SX871A-ECON 0.3M**
					2 m	**EE-SX871A-ECON 2M**
T-shaped 			Dark-ON	Incident light	0.3 m	**EE-SX772-ECON 0.3M**
					2 m	**EE-SX772-ECON 2M**
				No incident light	0.3 m	**EE-SX772A-ECON 0.3M**
					2 m	**EE-SX772A-ECON 2M**
			Light-ON	Incident light	0.3 m	**EE-SX872-ECON 0.3M**
					2 m	**EE-SX872-ECON 2M**
				No incident light	0.3 m	**EE-SX872A-ECON 0.3M**
					2 m	**EE-SX872A-ECON 2M**

* e-CON is a new industrial standard being promoted by manufacturers of FA devices and connectors.
The E39-ECON□M (cable length: 2 m or 5 m) with an e-CON connector on one end, and the E39-ECONW□M (cable length: 0.5 m to 2 m in units of 0.1 m) with e-CON connectors on both ends are available.
The □ symbol is used to indicate the cable length (e.g., E39-ECON2M).



E39-ECON□M

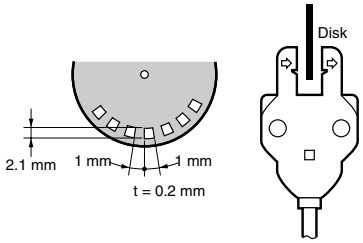
E39-ECONW□M

EE-SX77/87

Ratings and Specifications

Item	Type	Standard	L-shaped	T-shaped
	NPN models	EE-SX770/EE-SX870 EE-SX770A/EE-SX870A	EE-SX771/EE-SX871 EE-SX771A/EE-SX871A	EE-SX772/EE-SX872 EE-SX772A/EE-SX872A
	PNP models	EE-SX770P/EE-SX870P EE-SX770R/EE-SX870R	EE-SX771P/EE-SX871P EE-SX771R/EE-SX871R	EE-SX772P/EE-SX872P EE-SX772R/EE-SX872R
Sensing distance		5 mm (slot width)		
Sensing object		Opaque: 2 × 0.8 mm min.		
Differential distance		0.025 mm		
Light source		GaAs infrared LED with a peak wavelength of 940 nm		
Indicator		Light indicator (red) (turns ON when light is interrupted for models with A or R suffix)		
Supply voltage		5 to 24 VDC ±10%, ripple (p-p): 10% max.		
Current consumption		35 mA max. (NPN models), 30 mA max. (PNP models)		
Control output		NPN open collector: 5 to 24 VDC, 100 mA max. 100 mA load current with a residual voltage of 0.8 V max. 40 mA load current with a residual voltage of 0.4 V max. PNP open collector: 5 to 24 VDC, 50 mA max. 50 mA load current with a residual voltage of 1.3 V max.		
Response frequency *		1 kHz min. (3 kHz average)		
Ambient illumination		1,000 lx max. with fluorescent light on the surface of the receiver		
Ambient temperature range		Operating: −25 to +55°C Storage: −30 to +80°C (with no icing)		
Ambient humidity range		Operating: 5% to 85% Storage: 5% to 95% (with no condensation)		
Vibration resistance		Destruction: 20 to 2,000 Hz (peak acceleration: 100 m/s^2) 1.5-mm double amplitude for 2 h (4-min periods) each in X, Y, and Z directions		
Shock resistance		Destruction: 500 m/s^2 for 3 times each in X, Y, and Z directions		
Enclosure rating		IEC60529 IP60		
Connecting method		Pre-wired (standard cable length: 2 m)		
Weight (packaged)		Approx. 20 g		
Material		Case: Polybutylene phthalate (PBT)		

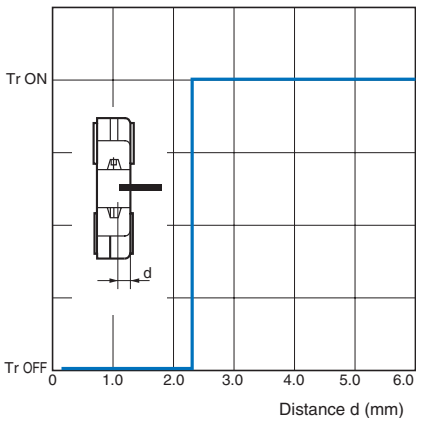
* The response frequency was measured by detecting the following rotating disk.



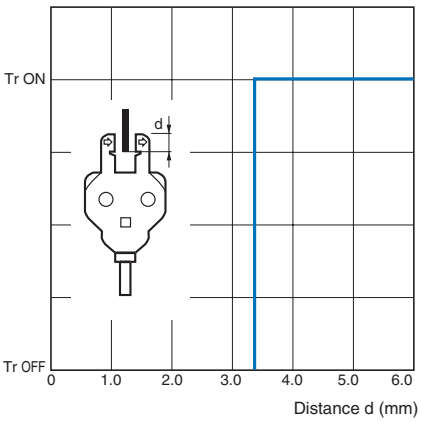
Engineering Data (Typical)

Sensing Position Characteristics

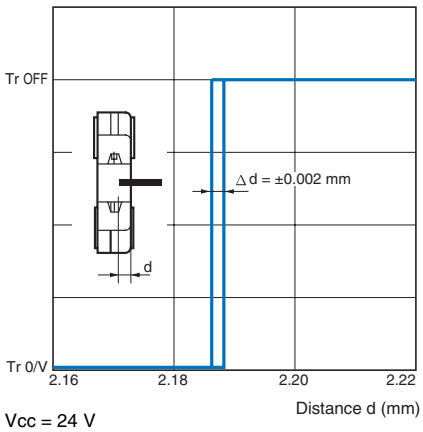
EE-SX770



Sensing Position Characteristics



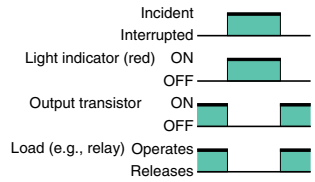
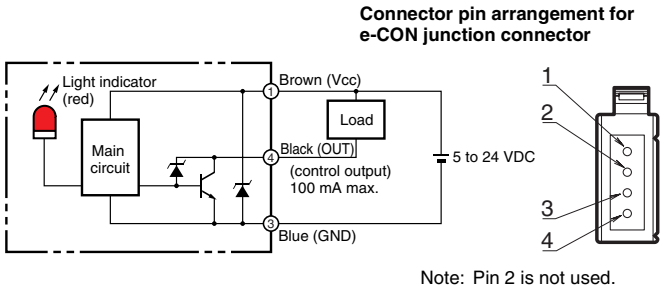
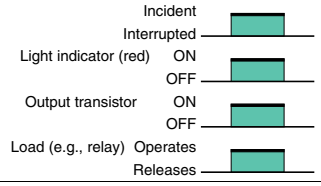
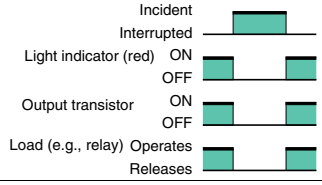
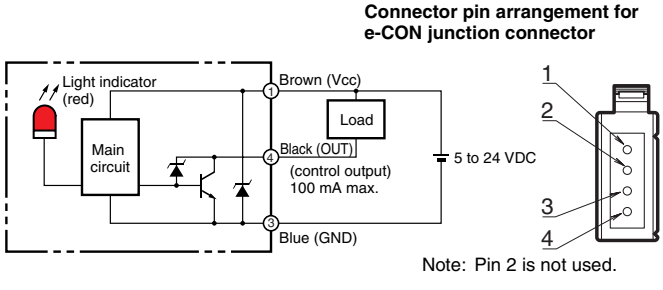
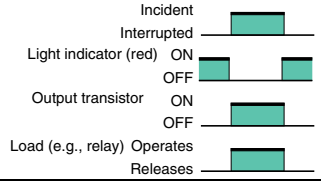
Repeated Sensing Position Characteristics



Vcc = 24 V
No. of repetitions: 20, Ta = 25°C

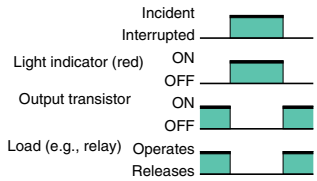
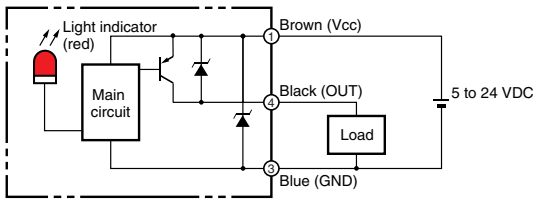
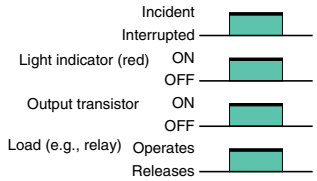
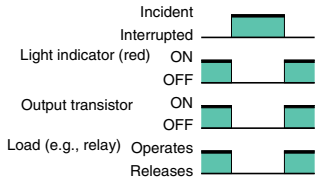
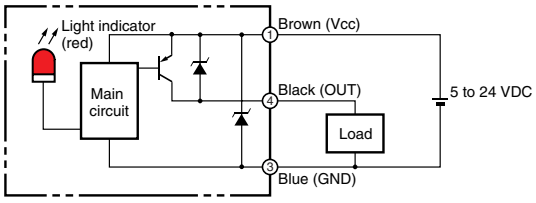
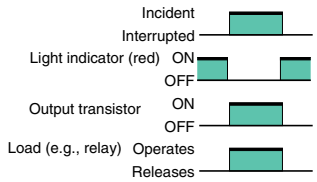
I/O Circuit Diagrams

NPN Output

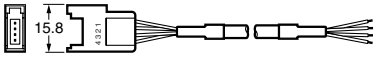
Model	Output configuration	Timing charts	Output circuit
EE-SX770 EE-SX771 EE-SX772	Dark-ON		
EE-SX870 EE-SX871 EE-SX872	Light-ON		
EE-SX770A EE-SX771A EE-SX772A	Dark-ON		
EE-SX870A EE-SX871A EE-SX872A	Light-ON		

Note: Pin 2 is not used.

PNP Output

Model	Output configuration	Timing chart	Output circuit
EE-SX770P EE-SX771P EE-SX772P	Dark-ON		
EE-SX870P EE-SX871P EE-SX872P	Light-ON		
EE-SX770R EE-SX771R EE-SX772R	Dark-ON		
EE-SX870R EE-SX871R EE-SX872R	Light-ON		

Applicable Connectors



E39-ECON□M

E39-ECONW□M

*1. The E39-ECON□M (cable length: 2 m or 5 m) with an e-CON connector on one end, and the E39-ECONW□M with e-CON connectors on both ends (cable length: 0.5 m to 2 m in units of 0.1 m) are available.
*2. The □ symbol is used to indicate the cable length (e.g., E39-ECON2M).

Shield color	Pin No.	Use
Brown	(1)	Power supply (+V)
White	(2)	---
Blue	(3)	Power supply (0 V)
Black	(4)	Output

Note: Pin 2 is not used for all EE-SX77□ and EE-SX87□ series sensors.

Safety Precautions

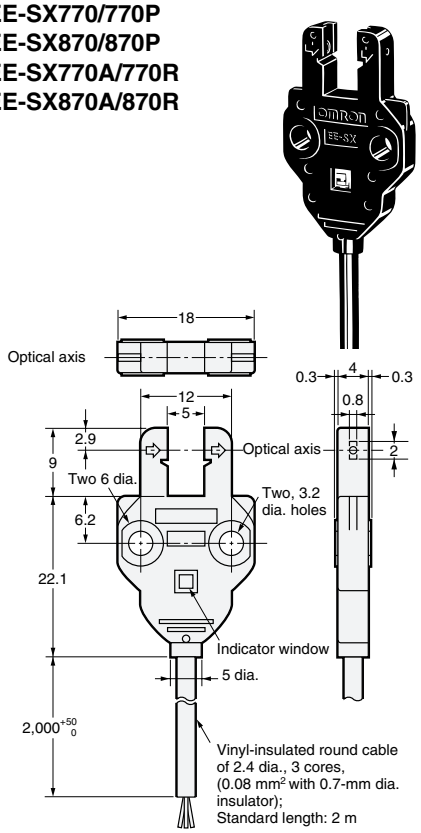
Refer to *Warranty and Limitations of Liability*.

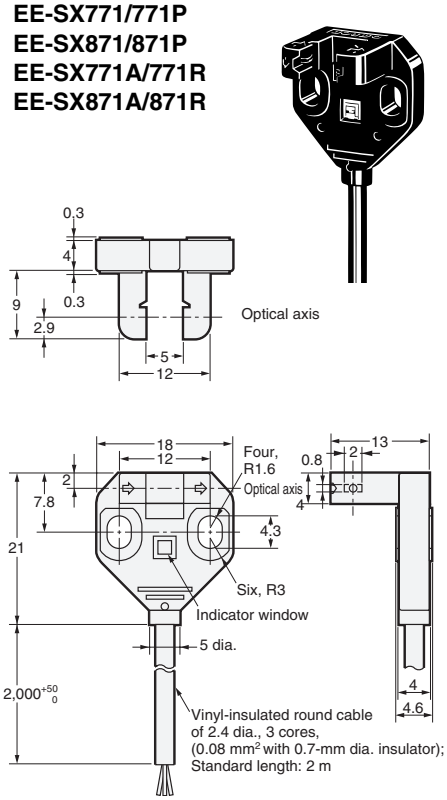
⚠ WARNING

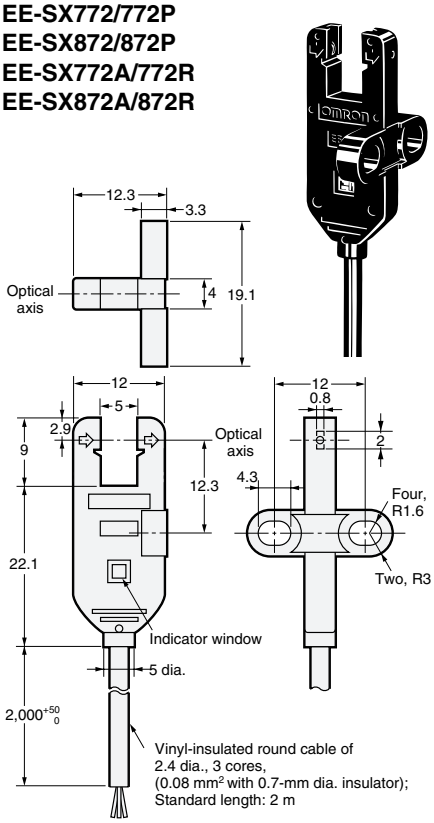
This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.

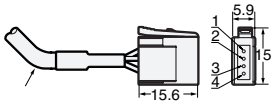
Precautions for Correct Use

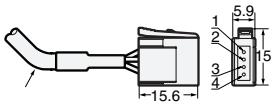
Make sure that this product is used within the rated ambient environment conditions.

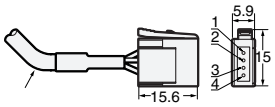












Dimensions

(Unit: mm)

Standard
EE-SX770/770P
EE-SX870/870P
EE-SX770A/770R
EE-SX870A/870R

L-shaped
EE-SX771/771P
EE-SX871/871P
EE-SX771A/771R
EE-SX871A/871R

T-shaped
EE-SX772/772P
EE-SX872/872P
EE-SX772A/772R
EE-SX872A/872R

e-CON Junction Connector

EE-SX□□□-ECON

Vinyl-insulated round cable of 2.4 dia., 3 cores: 0.3/2 m

Terminal	Specifications
1	+ V
2	---
3	0 V
4	Output

e-CON Junction Connector

EE-SX□□□-ECON

Vinyl-insulated round cable of 2.4 dia., 3 cores: 0.3/2 m

Terminal	Specifications
1	+ V
2	---
3	0 V
4	Output

e-CON Junction Connector

EE-SX□□□-ECON

Vinyl-insulated round cable of 2.4 dia., 3 cores: 0.3/2 m

Terminal	Specifications
1	+ V
2	---
3	0 V
4	Output

Compact Pre-wired Photomicrosensor with Built-in Amplifier (Non-modulated)

EE-SX91

Meeting Customer Needs with Compact Sensors that Mount with M3 Screws

- Provided with Both light-ON and dark-ON outputs (antivalent outputs).
- A compact size and choice of five shape for various applications.
- Design available with Compact NPN or PNP output models.
- Allows standard M3 or M2 screws.
- Indicator is visible from many directions for installation in any location.
- Possible to directly switch up to 100 mA.
- Models with junction connectors for simplify wiring and maintenance.
- Flexible robot cables are standard on all models.

Features

A Compact Size and Choice of Five Shape for various Applications

Selectable any five shape to minimize the space required.

Design available with Compact NPN or PNP Output Models

Both NPN and PNP output models are available for use according to system requirements.

Possible to directly switch up to 100 mA

Output control of up to 100 mA is supported for either NPN or PNP outputs.

Models with Connectors for Simplify Wiring and Maintenance

Using models with connectors allows wiring to be used as it is, with no need to replace anything but sensors.

Flexible Robot Cables are Standard on All Models

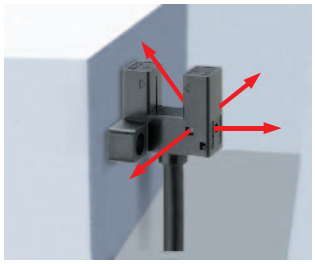
Robot Cables are effective for moving parts, and are provided as standard equipment with all models.

Provided with Both Light-ON and Dark-ON Outputs

Both light-ON and dark-ON outputs are provided on all models, allowing outputs to be switched by simply changing the wiring according to the application.

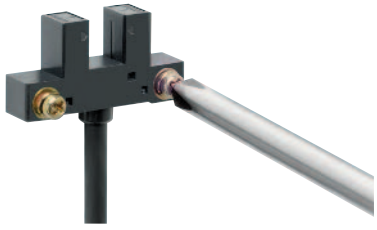
Indicator Visible from Many Directions for Installation in Any Location

The light indicator can be checked from up to four directions.



Allows standard M3 or M2 Screws

The EE-SX91 can be mounted using M3 or M2 screws, so it can be easily replaced from an existing compact sensor mounted with M2 screws.



Ordering Information

List of Models

Models with Robot Cables

Infrared light

Appearance	Sensing method	Sensing distance	Output configuration	Indicator mode	Connecting method (Cable length)	Model	
						NPN output	PNP output
Standard 	Through-beam type (with slot)	5 mm (slot width)	Light-ON Dark-ON (2 outputs)	Lit when light is incident	Pre-wired models (1 m)	**EE-SX910-R**	**EE-SX910P-R**
					Models with junction connectors (0.3 m)	**EE-SX910-C1J-R**	**EE-SX910P-C1J-R**
L-shaped 					Pre-wired models (1 m)	**EE-SX911-R**	**EE-SX911P-R**
					Models with junction connectors (0.3 m)	**EE-SX911-C1J-R**	**EE-SX911P-C1J-R**
F-shaped 					Pre-wired models (1 m)	**EE-SX912-R**	**EE-SX912P-R**
					Models with junction connectors (0.3 m)	**EE-SX912-C1J-R**	**EE-SX912P-C1J-R**
R-shaped 					Pre-wired models (1 m)	**EE-SX913-R**	**EE-SX913P-R**
					Models with junction connectors (0.3 m)	**EE-SX913-C1J-R**	**EE-SX913P-C1J-R**
U-shaped 					Pre-wired models (1 m)	**E-SX914-R**	**EE-SX914P-R**
					Models with junction connectors (0.3 m)	**EE-SX914-C1J-R**	**EE-SX914P-C1J-R**

Accessories (Order Separately)

Connector with Robot Cable

Type	Cable length	Model	Remarks
Connector with Cable	2 m	**EE-1016-R**	Connector with lock, AWG26, 4-core Robot Cable

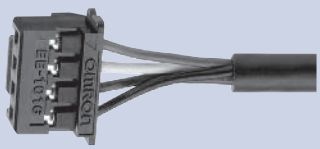
EE-SX91

Ratings and Specifications

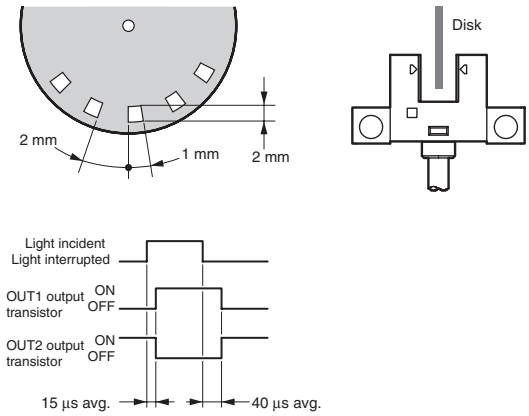
Item		Type	Standard	L-shaped	F-shaped	R-shaped	U-shaped
	NPN models	Pre-wired models	EE-SX910-R	EE-SX911-R	EE-SX912-R	EE-SX913-R	EE-SX914-R
		Models with connectors	EE-SX910-C1J-R	EE-SX911-C1J-R	EE-SX912-C1J-R	EE-SX913-C1J-R	EE-SX914-C1J-R
	PNP models	Pre-wired models	EE-SX910P-R	EE-SX911P-R	EE-SX912P-R	EE-SX913P-R	EE-SX914P-R
		Models with connectors	EE-SX910P-C1J-R	EE-SX911P-C1J-R	EE-SX912P-C1J-R	EE-SX913P-C1J-R	EE-SX914P-C1J-R

Sensing distance		5 mm (slot width)
Sensing object		Opaque: 1.2 × 0.8 mm min.
Differential distance		0.025 mm max.
Light source		GaAs infrared LED
Indicator		Light indicator (red LED)
Supply voltage		5 to 24 VDC ±10%, ripple (p-p): 10% max.
Current consumption		15 mA max.
Control output		Load power supply voltage: 5 to 24 VDC Load current: 100 mA max. 100 mA load current with a residual voltage of 1.0 V max. 5 mA load current with a residual voltage of 0.4 V max.
Protection circuits		Power supply reverse polarity protection; output reverse polarity protection
Response frequency		3 kHz min. (8 kHz average) Light incident: 15 μs average; light interrupted: 40 μs average*
Ambient illumination		1,000 lx max. with fluorescent light on the surface of the receiver
Ambient temperature range		Operating: −25 to 55°C Storage: −30 to 80°C (with no icing or condensation)
Ambient humidity range		Operating: 5% to 85% Storage: 5% to 95% (with no icing or condensation)
Vibration resistance (Destruction)		10 to 2,000 Hz 0.75-mm single amplitude for 2.5 h (15-min periods, 10 cycles) each in X, Y, and Z directions
Shock resistance (Destruction)		500 m/s^2 for 3 times each in X, Y, and Z directions
Connecting method		Pre-wired Models (standard cable length: 1 m), Models with Junction Connectors (standard cable length: 0.3 m)
Enclosure rating		IEC IP50
Weight (packaged)	**Pre-wired Models**	Approx. 17 g
	Models with Connectors	Approx. 7 g
Materials	**Housing**	Polybutylene phthalate (PBT)
	Emitter/receiver	Polycarbonate (PC)

Applicable Connector

Item		Product: Connector with Cable
		Model: EE-1016-R
Appearance		
Contact resistance		25m Ω max. (at 10 mA DC and 20 mV max.)
Insertion strength		20 N max.
Surplus strength (housing holding strength)		15 N min.
Cable length		2 m
Ambient temperature range		-25 to 85°C
Materials	**Housing**	Nylon
	Contact	Phosphor bronze

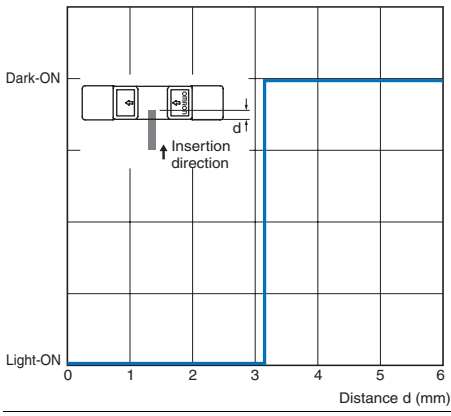
* The response frequency was measured by detecting the following rotating disk. The response times for light incidence and light interruption are shown in the timing chart.



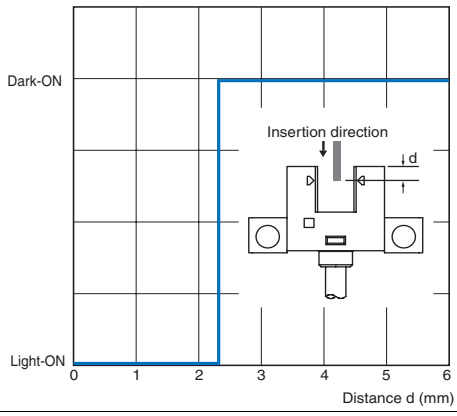
Engineering Data (Typical)

Sensing Position Characteristics

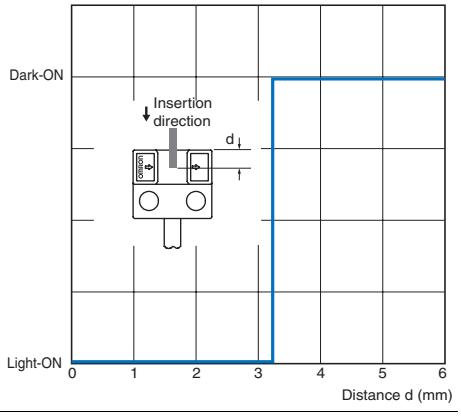
EE-SX910



EE-SX910

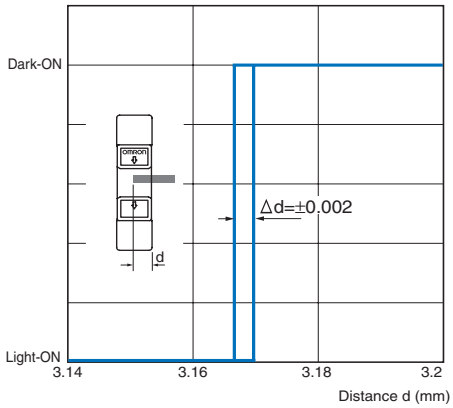


EE-SX911



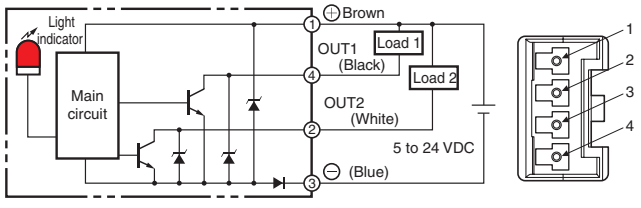
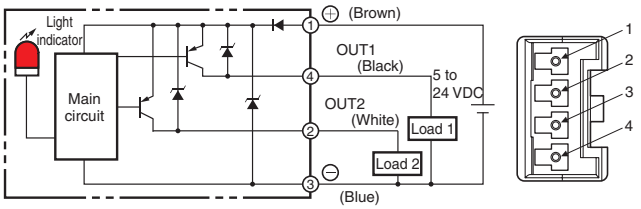
Repeated Sensing Position Characteristics

EE-SX910



Vcc = 24 V, No. of repetitions: 20, Ta = 25°C
(Differential distance = 0.025 mm max.)

I/O Circuit Diagrams

Output type	Model	Output transistor operation status	Timing charts	Output circuit
NPN output	EE-SX910-R EE-SX910-C1J-R EE-SX911-R EE-SX911-C1J-R EE-SX912-R EE-SX912-C1J-R EE-SX913-R EE-SX913-C1J-R EE-SX914-R EE-SX914-C1J-R	OUT1: Light-ON OUT2: Dark-ON	Light incident Light interrupted Light indicator (red) ON / OFF Output 1 transistor ON / OFF	
PNP output	EE-SX910P-R EE-SX910P-C1J-R EE-SX911P-R EE-SX911P-C1J-R EE-SX912P-R EE-SX912P-C1J-R EE-SX913P-R EE-SX913P-C1J-R EE-SX914P-R EE-SX914P-C1J-R		Load 1 (relay) Operates / Releases Output 2 transistor ON / OFF Load 2 (relay) Operates / Releases	

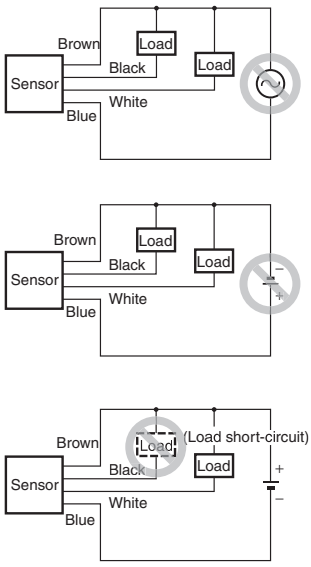
Safety Precautions

⚠ WARNING

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.

Precautions for Safe Use

- Power Supply Voltage
  Do not exceed the voltage range indicated in the specifications. Applying a voltage exceeding the specifications or using an AC power supply may result in rupture or burning.
- Faulty Wiring
  Do not reverse the power supply polarity. Doing so may result in rupture or burning.
- Do not short-circuit the load. (Do not connect to the power supply.)
  Doing so may result in rupture or burning.
- Dispose of this product as industrial waste.



Precautions for Correct Use

●Installation

- It is assumed that EE-SX91 Sensors will be built into a device. These Sensors use non-modulated light and are not equipped to deal with interference from an external light source. When they are used in locations subject to external light interference, such as near a window or under an incandescent light, install them to minimize the effects of external light interference.
- Mount the Sensors securely on a flat surface.
- Use M3 or M2.0 screws to secure the Photomicrosensor. (The stronger M3 screws are recommended. In addition, use flat washers and spring washers to prevent the screws from loosening.) Refer to the following table for the correct tightening torque.

Screw diameter	Tightening torque
M2.0	0.15 N·m max. (1.5 kgf·cm)
M3	0.54 N·m max. (5.5 kgf·cm)

- If the Sensor is to be used on a moving part, secure the cable connection point so that it is not directly subjected to stress.

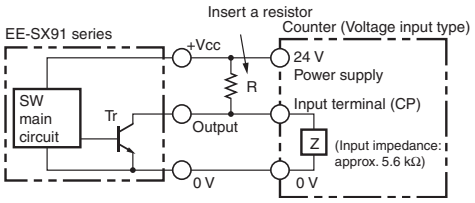
●Wiring

Unused Output Lines

Be sure to isolate output lines that are not going to be used.

Connecting to Devices with Voltage Input Specifications

A Sensor with an open-collector output can be connected to a counter with a voltage input by connecting a resistor between the power source and output. Select a resistor with reference to the following example. The resistance of the resistor is generally 4.7 kΩ and its wattage is 1/2 W for a supply voltage of 24 V and 1/4 W for 12 V.



Example: EE-SX91 Series
Load Resistance of 4.7 kΩ Connected in a Counter

Counter Specifications

Input impedance	5.6 KΩ
Voltage judged as high level (input ON)	4.5 to 30 VDC
Voltage judged as low level (input OFF)	0 to 2 VDC

The high and low levels are found using the following formulas. The input device specifications must satisfy both formulas.

High level:

$$\text{Input voltage } V_H = \frac{Z}{R+Z} \quad Vcc = \frac{5.6\text{ k}}{4.7\text{ k}+5.6\text{ k}} \times 24\text{ V} = 13\text{ V}$$

Low level:

$$\text{Load current } Ic = \frac{Vcc}{R} = \frac{24\text{ V}}{R} = 5.1\text{ mA} \leq 100\text{ mA}$$

Input voltage $V_L \leq 1.0$ V (Residual voltage for 100-mA load current)

Note: Refer to the ratings of the Sensor for the residual voltage of the load current.

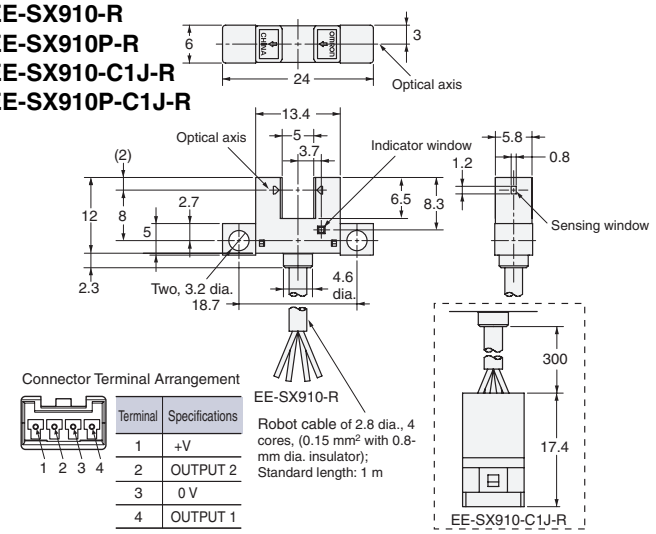
●Other Precautions

- Do not disconnect the Connector from the Sensor when power is supplied to the Sensor, or Sensor damage could result.
- Do not install the Sensor in the following places to prevent malfunction or trouble:
  1. Places exposed to dust or oil mist
  2. Places exposed to corrosive gas
  3. Places directly or indirectly exposed to water, oil, or chemicals
  4. Outdoor or places exposed to intensive light, such as direct sunlight
- Be sure to use the Sensor under the rated ambient temperature.
- The Sensor may be dissolved by exposure to organic solvents, acids, alkali, or aromatic hydrocarbons, aliphatic chloride hydrocarbons causing deterioration in characteristics. Do not expose the Sensor to such chemicals.

Dimensions (Unit: mm)

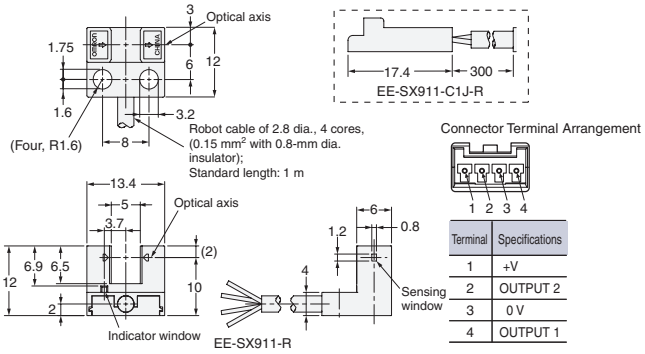
Photomicrosensors

EE-SX910-R
EE-SX910P-R
EE-SX910-C1J-R
EE-SX910P-C1J-R



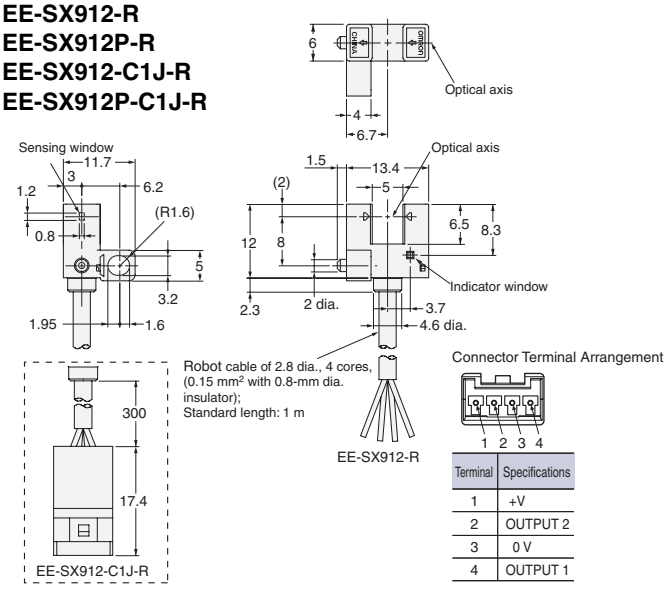
Terminal	Specifications
1	+V
2	OUTPUT 2
3	0 V
4	OUTPUT 1

EE-SX911-R
EE-SX911P-R
EE-SX911-C1J-R
EE-SX911P-C1J-R



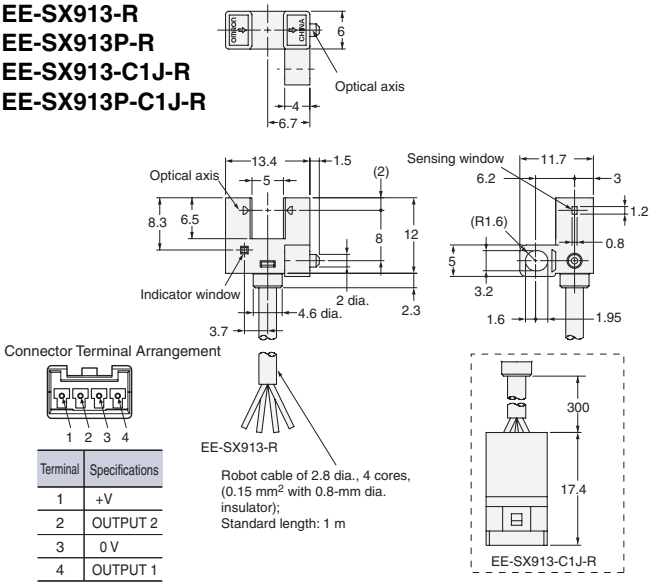
Terminal	Specifications
1	+V
2	OUTPUT 2
3	0 V
4	OUTPUT 1

EE-SX912-R
EE-SX912P-R
EE-SX912-C1J-R
EE-SX912P-C1J-R



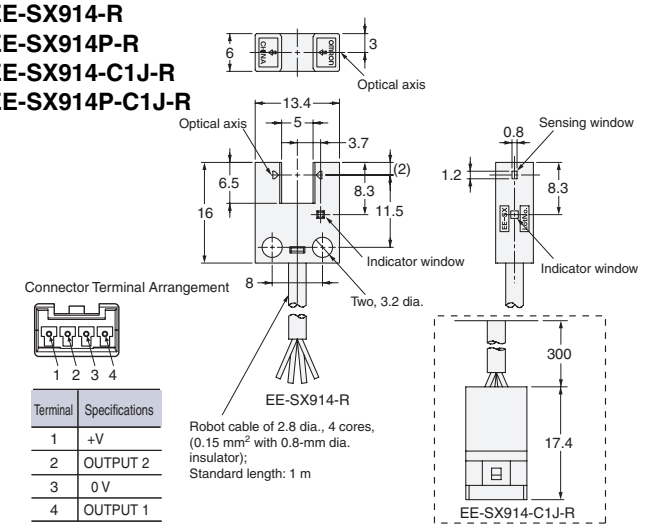
Terminal	Specifications
1	+V
2	OUTPUT 2
3	0 V
4	OUTPUT 1

EE-SX913-R
EE-SX913P-R
EE-SX913-C1J-R
EE-SX913P-C1J-R



Terminal	Specifications
1	+V
2	OUTPUT 2
3	0 V
4	OUTPUT 1

EE-SX914-R
EE-SX914P-R
EE-SX914-C1J-R
EE-SX914P-C1J-R

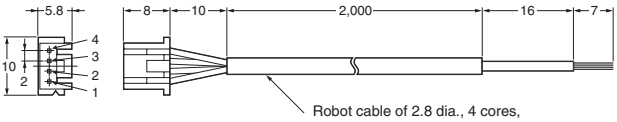


Terminal	Specifications
1	+V
2	OUTPUT 2
3	0 V
4	OUTPUT 1

Accessories (Order Separately)

Connector with Robot Cable

EE-1016-R



Terminal Arrangement

①	⊕	Brown
②	OUTPUT 2	White
③	⊖	Blue
④	OUTPUT 1	Black

UL Standards (UNDERWRITERS LABORATORIES INC.)

LISTING MARK

RECOGNITION MARK

- A nonprofit organization established in 1894 by the American association of fire insurance companies. Underwriters Laboratories (abbreviated to UL hereafter) conducts certification testing on all kinds of electrical products. In many U.S. cities and states, UL certification is legally required on all electrical items sold. To obtain UL certification on an electrical product, all major internal components also require UL certification.
- UL offers two types of certification: the Listing Mark and the Recognition Mark. A Listing Mark generally constitutes the certification of a final product. Products display the Listing Marks shown below. The Recognition Mark applies to the components used in a product, and therefore constitutes a more conditional approval of a product. Products display the Recognition Marks shown below. Depending on a component's UL classification, use of the Recognition Mark may not be required.

- UL has integrated its standards with CSA to employ a co-certification system. These standards also adapt the requirements of the IEC standards.
- Since October 1992, UL has been recognized as a CO (council organization) and TO (test organization) by the SCC (Standard Council of Canada). This authorizes UL to conduct safety tests and certify products conforming to Canadian standards.
- The designs of the Listing and Recognition Marks were changed in January 1998 as shown below.

LISTING MARK

Marks for US	Marks for Canada	Marks for US and Canada
		

RECOGNITION MARK

Marks for US	Marks for Canada	Marks for US and Canada
		

■ Sensors with DC Power Supply of 30 V or Less

1. When connected to one of the circuits (Class 2) described in (1), (2), and (3) below, a sensor can be used even if it is not UL certified. Use the following UL-certified products for combining DC power supplies.
   (1) Limited voltage and current circuits according to UL508
   Circuits taking as a power supply the secondary winding of an isolation transformer satisfying the following conditions:
   - A maximum voltage (with no load) of 30 Vrms (42.4 V peak).
   - A maximum current (1) of no more than 8 A (including short-circuiting) or (2) limited by a circuit breaker (such as a fuse).

No-load voltage (V peak)	Maximum rated current (A)
0 to 20	5.0
From 20 to 30	$\frac{100}{\text{Peak voltage}}$

   (2) Class 2 Power Supply Unit according to UL1310
   (3) Circuits with a maximum voltage of 30 Vrms (42.4 V peak) taking a Class 2 transformer as a power supply according to UL1585
2. If a sensor with UL-certified DC power supply specifications is required, a UL Mark can be affixed to the model in the following table under the condition that it be used in a Class 2 circuit.
   Product Certified for Use in Class 2 Circuits Only (Listing/Recognition Certification)

Model	File No.	Listing certification	Recognition certification
EE-S Series *	E41515		O

* Recognition Marks are not displayed for recognition certification of DC sensors. Only Listing Marks are displayed when UL marking is requested.

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

READ AND UNDERSTAND THIS DOCUMENT

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

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- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
- 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 PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

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It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the product may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

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

ERRORS AND OMISSIONS

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OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

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This document provides information mainly for selecting suitable models. Please read the Instruction sheet carefully for information that the user must understand and accept before purchase, including information on warranty, limitations of liability, and precautions.

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. E382-E1-01 **In the interest of product improvement, specifications are subject to change without notice.**

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