

K3HB-S

Linear Sensor Indicator

EN Instruction Manual

Thank you for purchasing this OMRON product. Read this instruction manual and thoroughly familiarize yourself with the functions and characteristics of the product before using it. This product is designed for use by qualified personnel with knowledge of electrical systems. Keep this instruction manual for future reference.

OMRON Corporation

©All Rights Reserved

6431844-0 G

For detailed application procedures, refer to the *Digital Indicator K3HB-S, X, V, H User's Manual* (Cat. No. N128). For details on using communications functions, refer to the *Digital Indicator K3HB Communications User's Manual* (Cat. No. N129).

Safety Precautions

● Definition of Precautionary Information

WARNING Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.

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

● Precautionary Information

WARNING Do not touch the terminals 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.

Always provide protective circuits in the network. Without protective circuits, malfunctions may possibly result in accidents that cause serious injury or significant property damage.

Provide double or triple safety measures in external control circuits, such as emergency stop circuits, interlock circuits, or limit circuits, to ensure safety in the system if an abnormality occurs due to malfunction of the product or another external factor affecting the product's operation.

CAUTION

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 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 attempt to disassemble, repair, or modify the product. Doing so may occasionally result in minor or moderate injury due to electric shock.

Do not use the equipment for measurements within Measurement Categories II, III, or IV (according to IEC61010-1). 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.

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. Product failure may occasionally prevent operation of comparative outputs, resulting in damage to the connected facilities and equipment.

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
Connector locking screws: 0.18 to 0.22 N·m

Make sure that the product will not be adversely affected if the DeviceNet cycle time is lengthened as a result of changing the program with online editing. Extending the cycle time may cause unexpected operation, occasionally resulting in minor or moderate injury, or damage to the equipment.

Before transferring programs to other nodes or changing I/O memory of other nodes, check the nodes to confirm safety. Changing the program or I/O memory of other nodes may occasionally cause unexpected operation, resulting in minor or moderate injury, or damage to the equipment.

Precautions for Safe Use

- 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
- 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.
- Provide sufficient space around the product for heat dissipation.
- Use and store the product within the specified temperature and humidity ranges. If several products are mounted side-by-side or arranged in a vertical line, the heat dissipation will cause the internal temperature of the products to rise, shortening the service life. If necessary, cool the products using a fan or other cooling method.
- 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.
- Install the product horizontally.
- Mount to a panel between 1 and 8-mm thick.
- Use the specified size of crimp terminals (M3, width: 5.8 mm max.) for wiring. To connect bare wires, use AWG22 to AWG14 to wire the power supply terminals and AWG28 to AWG16 for other terminals. (Length of exposed wire: 6 to 8 mm)
- 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.
- Ensure that the rated voltage is achieved no longer than 2 s after turning the power ON.
- Allow the product to operate without load for at least 15 minutes after the power is turned ON.
- 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.
- Do not use thinner to clean the product. Use commercially available alcohol.
- Be sure to confirm the name and polarity for each terminal before wiring the terminal block and connectors
- Use the product within the noted supply voltage and rated load.
- Do not connect anything to unused terminals.
- Output turns OFF when the mode is changed or settings are initialized. Take this into consideration when setting up the control system.
- Install an external circuit breaker or switch that conforms to IEC60947-1 and IEC60947-3 requirements and label them clearly so that the operator can quickly turn OFF the power.
- Use the specified cables for the communications lines and stay within the specified DeviceNet communications distances. Refer to the *User's Manual* (Cat. No. N129) for details on communications distance specifications and cables.
- Do not pull the DeviceNet communications cables with excessive force or bend them past their natural bending radius.
- Do not connect or remove connectors while the DeviceNet power is being supplied. Doing so will cause product failure or malfunction.

Specifications

● Ratings

Power 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	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
A/D conversion method	Sequential comparison system
Output ratings	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 0 to 20 mA DC, 4 to 20 mA DC: 500 Ω load max. Resolution: Approx. 10,000; Output error: ±0.5 % FS 0 to 5 VDC, 1 to 5 VDC, 0 to 10 VDC: 5 kΩ load min.; Resolution: Approximately 10,000 Output error: ±0.5 % FS, except for 1 V or less: ±0.15 V, -0 V
Ambient operating temperature	-10°C to 55°C (with no icing or condensation)
Ambient operating humidity	25% to 85%
Storage temperature	-25°C to 65°C (with no icing or condensation)
Altitude	2,000 m max.

* When the power is turned ON for models with a DC power supply, a control power supply of 1 A per Linear Sensor Indicator is required. Make sure that the power supply capacity is sufficient when using multiple Linear Sensor Indicators. The recommended DC power supply is the OMRON S8VS-series Power Supply.

● Characteristics

Sampling period	One input: 0.5 ms; Two inputs: 1 ms	
Accuracy	One input: 0.1% FS 1 digit max. (at 23±5°C) Two inputs: 0.2% FS 1 digit max. (at 23±5°C)	
Display range	-19999 to 99999	
Comparative output response time	One input: OFF ON 1ms, ON OFF 1.5ms (At maximum load) Two inputs: OFF ON 2ms, ON OFF 2.5ms (At maximum load)	
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 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 (Digital Panel Meter only)	
Enclosure ratings	Front panel	Conforms to NEMA 4X (equivalent to IP66)
	Rear case	IP20
	Terminals	IP00 + finger protection (VDE0106/100)
Memory protection	EEPROM (non-volatile memory) Number of rewrites: 100,000 times	
Installation environment	Overvoltage category II, Pollution degree 2 (as per IEC61010-1)	
Applicable standards	UL61010C-1, CSA C22.2 No. 1010.1 (evaluated by UL) EN61010-1 (IEC61010-1): Pollution degree 2/ Overvoltage category II (evaluated by TUV Product Service) EN61326: 1997, A1: 1998, A2: 2001	

● Measurement Range

Input type	Set value	Measurement range	Input impedance	Input absolute maximum rating	Terminal No.		
Voltage input	┌─┐─┐	0-5	0 to 5 V	1 MΩ min.	±10 V	E4-E3	
		1-5	1 to 5 V	1 MΩ min.	±10 V		
		5	-5 to 5 V	1 MΩ min.	±10 V		
		┐─┐─┐	-10 to 10 V	1 MΩ min.	±14.5 V		
	Input B	┌─┐─┐	0-5	0 to 5 V	1 MΩ min.	±10 V	E5-E3
			1-5	1 to 5 V	1 MΩ min.	±10 V	
Current input	┌─┐─┐	0-20	0 to 20 mA	120 Ω max.	±31mA	E2-E3	
		4-20	4 to 20 mA	120 Ω max.	±31mA		
	Input B	┌─┐─┐	0-20	0 to 20 mA	120 Ω max.	±31mA	E1-E3
			4-20	4 to 20 mA	120 Ω max.	±31mA	

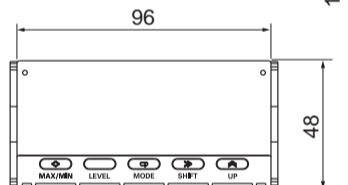
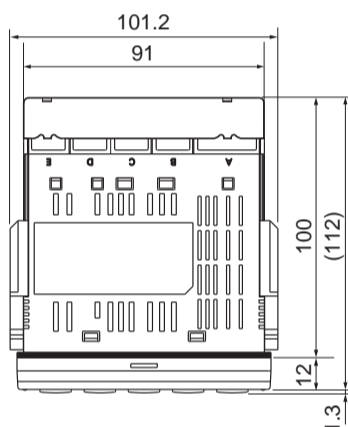
Conformity to Safety Standards

Always use a EN/IEC-compliant power supply with reinforced insulation or double insulation for the DeviceNet power supply. The product must be used indoors for the above applicable standards to apply.

Installation

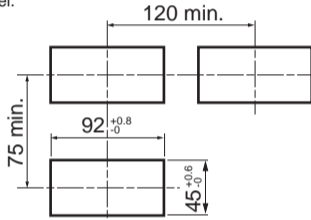
● Dimensions

Units: mm



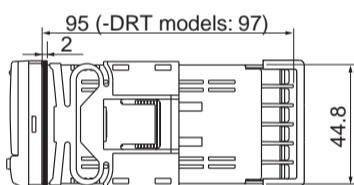
● Panel Cutout Dimensions

Insert the Linear Sensor Indicator into the cutout, fit the adapter into the grooves on the left and right sides of the rear case, and then push the Linear Sensor Indicator into the panel so that there are no gaps between it and the panel.

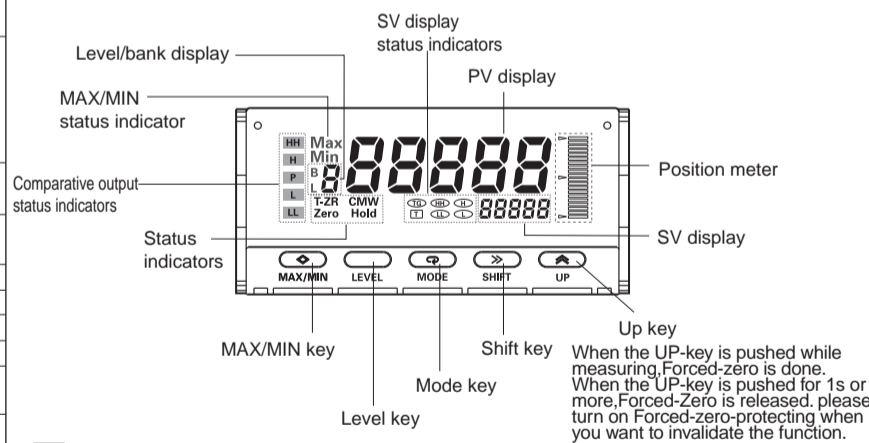


● Contents of Package

- Main Unit
- Terminal cover
- Manual
- Fixture
- DeviceNet Connector*
- Crimp Terminals (HIROSE ELECTRIC CO., LTD.: HR31-SC-121)*
- * -DRT models



Names and Functions of Parts



Error Display

PV display	SV display	Description of error	Counter measure
Unit (UNIT)	ERR	An unexpected Unit was detected.	Check the Unit's model number and mount it in the correct position.
Unit (UNIT)	CHG (CHG)	Displayed the first time the power is turned ON after mounting a new Unit.	Press the [LEVEL] key for at least 3 s. to register the new Unit configuration.
DISP (DISP)	ERR (ERR)	Display error	Repair is necessary. Consult your OMRON representative.
SYS (SYS)	ERR (ERR)	Internal memory error	
EEP (EEP)	ERR (ERR)	Error in non-volatile memory	at least 3 s to return to the factory settings. (See note 1.) Press the [LEVEL] key in this state for
A.ERR (A.ERR)	B.ERR (B.ERR)	Input error (See note 2.)	Return the input to within the measurement range.
99999 or 19999 (flashing)	Normal operation	The input value is out of range or the PV is either greater than 99999 or less than -19999.	Return the input to within the displayable range.

*1: The parameters already set are returned to the factory settings. If the problem still persists after performing initialization, repair is necessary.

*2: If there is an error in input A only, or if there is an error in both inputs A and B, aerr is displayed, and if there is an error in input B only, berr is displayed.

Suitability for Use

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of the products 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.

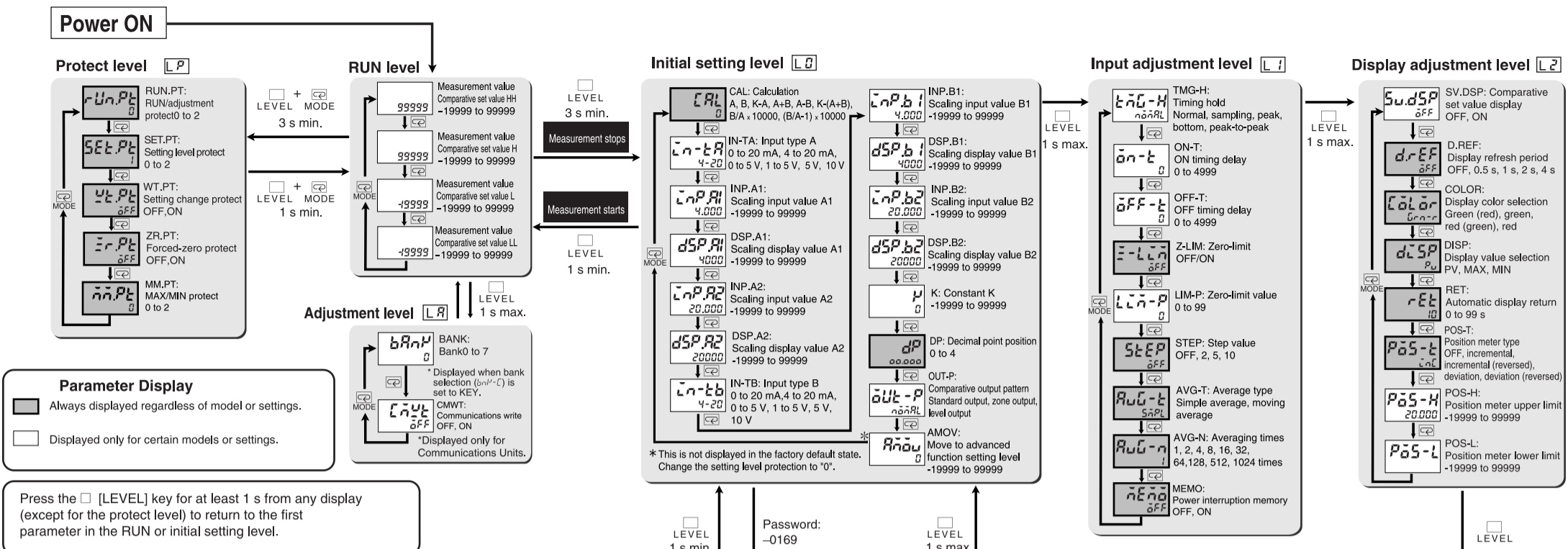
NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

See also Product catalog for Warranty and Limitation of Liability.

Contact Information

- OMRON ELECTRONICS LLC**
One Commerce Drive Schaumburg, IL 601073-5302 U.S.A
Phone: 1-847-843-7900 Fax: 1-847-843-7787
- OMRON CANADA INC.**
885 Milner Avenue Scarborough, Ontario M1B 5V8
Phone: 1-416-286-6465 Fax: 1-416-286-6648
- OMRON EUROPE B.V.**
Wegalaan 67-69 P.O. BOX 13 2130 AA Hoofddorp
Phone: 31-23-56-81-300 Fax: 31-23-56-81-388
- OMRON ELECTRONICS PTE. LTD**
71 Epping Road North Ryde Sydney N.S.W 2113
Phone: 61-2-9878-6377 Fax: 61-2-9878-6981
- OMRON ASIA-PACIFIC PTE LTD**
No.438A Alexandra Road # 05-05/08(Lobby 2),Alexandra
Phone: 65-6835-3011 Fax: 65-6835-2711
- OMRON CORPORATIN**
Shiokoji Horikawa, Shimogyo-ku, KYOTO, 600-8530 Japan
Phone: 81-75-344-7109 Fax: 81-75-344-7149

Parameter Move Diagram



Basic Operation

<Setting Example>

In the following setting example, 1 to 5-V input is scaled to the range 0.000 to 1.000.

- If the measurement value goes above 0.700, comparative output H turns ON.
- If the measurement value goes below 0.500, comparative output L turns ON.

Note 1. Be sure to perform steps C, D, and E in the order given here. Performing the steps in any other order will result in different set values (due to automatic set value initialization) and unexpected operation may occur.

2. To change the setting, press the [SHIFT] Key once. (The setting that can be changed will start flashing.) Change the set value by pressing the [SHIFT] Key and [UP] Key.

A. Check the wiring and turn the power ON. (Connect the sensor to input A.)

The input type is factory-set to 4 to 20-mA input. When the power is turned ON, the display may flash "R-Err" (outside the input range). This simply indicates, however, that the input is outside the range 4 to 20 mA and does not indicate a product failure.

B. Set the calculation to 0.

- Move to the initial setting level by pressing the [LEVEL] key for at least 3 s with the PV displayed (RUN level).
- Set "CAL" to "0" and press the [MODE] key.

C. Set input type A to 1 to 5 V.

- Set "IN-TA" to "1-5" and press the [MODE] key.

D. Set the scaling value.

- Set scaling input value A1 "INP.A1" to "1.000" and press the [MODE] key.
- Set scaling display value A1 "DSP.A1" to "0" and press the [MODE] key.
- Set scaling input value A2 "INP.A2" to "5.000" and press the [MODE] key.
- Set scaling display value A2 "DSP.A2" to "1000" and press the [MODE] key.

E. Set the decimal point position.

- Set the parameter "DP" to "00.000" and press the [MODE] key.

F. Set comparative set value H to 0.700 and set comparative set value L to 0.500.

- Return to the RUN level by pressing the [LEVEL] key for at least 1 s. (Start operation.)
- Press the [MODE] key repeatedly until the SV display status shows (H).
- Set the value to "0.700" and press the [MODE] key. (The SV display status will show (L).)
- Set the value to "0.500" and press the [MODE] key. The setting procedure is completed.

Wiring Diagram

