OMRON

K3HB-C

Up/Down Counting Pulse Meter

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

5452025-0 E

For detailed application procedures, refer to the *Digital Indicator K3HB-R, P, C User's Manual* (Cat. No. N136).
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 III or IV (according to IEC61010-1). Doing so may occasionaly 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 occasionaly 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

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.
3) Provide sufficient space around the product for heat dissipation.
4) 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.
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) Install the product horizontally.
7) Mount to a panel between 1 and 8-mm thick.
8) 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)
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) Ensure that the rated voltage is achieved no longer than 2 s after turning the power ON.
11) Allow the product to operate without load for at least 15 minutes after the power is turned ON.
12) 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.
13) Do not use thinner to clean the product. Use commercially available alcohol.
14) Be sure to confirm the name and polarity for each terminal before wiring the terminal block and connectors
15) Use the product within the noted supply volage and rated load.
16) Do not connect anything to unused terminals.
17) Output turns OFF when the mode is changed or settings are initialized. Take this into consideration when setting up the control system.
18) 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.
19) 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.
20) Do not pull the DeviceNet communications cables with excessive force or bend them past their natural bending radius.
21) Do not connect or remove connectors while the DeviceNet power is being supplied. Doing so will cause product failure or malfunction.
22) Use cables with heat resistance of 70 ℃ min.
23) This is a class A product. In residential areas it may cause radio interference, in which case the user may be required to take adequate measures to reduce interference.

Specifications

Ratings

Power supply voltage		100 to 240 VAC 50/60Hz, 24 VAC 50/60Hz/ 24VDC 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		No-voltage contact, voltage pulse, open collector
Externally supplied power		12 VDC ±10 %, 80 mA
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/0 to 10 VDC: 5 kΩ load max. Resolution: Approx. 10,000; Output error: ±0.5 % FS 1 V or less: ±0.15 V, –0 V
Ambient operating temperature		–10℃ to 55℃ (with no icing or condensation)
Ambient operating humidity		25% to 85%
Storage temperature		–25℃ to 65℃ (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 Weigning Indicator is required. Make sure that the power supply capacity is sufficient when using multiple Weigning Indicators. The recommended DC power supply is the OMRON S8VS-series Power Supply.

Characteristics

Display range	–19999 to 99999
Measurement range	0 to 4 giga count
Input signals	No-voltage contact (30-Hz max. with ON/OFF pulse width of 15 ms min.) Voltage pulse (F1: 30-KHz max. with ON/OFF pulse width of 16 μs min., F2: 25-KHz max. with ON/OFF pulse width of 20 μs min., F3: 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)
Connectable sensors	Residual voltage when ON: 3 V max. Leakage current when OFF: 1.5 mA max. Load current: Must have switching capacity of 20 mA min.; must switch load current of 5 mA 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 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/s² 10 sweeps of 5 min each in X, Y, and Z direcrtions
Shock resistance	150 m/s² (100 m/s² 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)
Enclosure ratings — Rear case	IP20
Enclosure ratings — 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	UL61010-1, CAN/CSA C22.2 No. 61010-1.04 (evaluated by UL) EN61010-1 (IEC61010-1) EN61326-1

* Operation will not be normal if a pulse outside the rated frequency range is input. SYSERR may be displayed.

Functions

Function	Calculated value
F1	Individual input
F2	Quadrature input
F3	Cumulative input

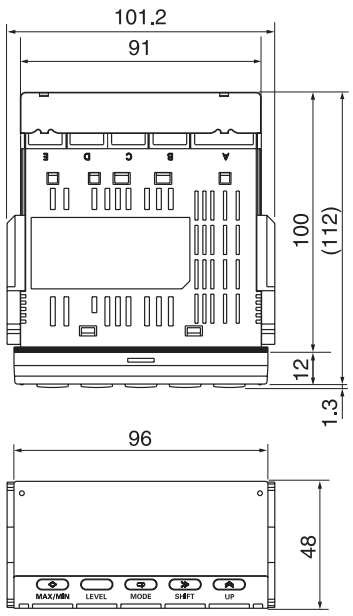
Conformity to Safety Standards

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

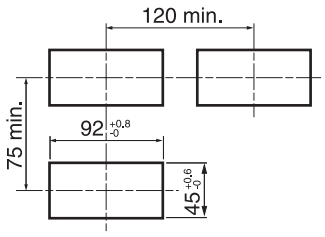
Dimensions

Units: mm



Panel Cutout Dimensions

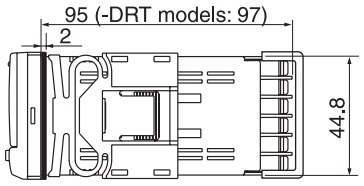
Insert the Process Indicator into the cutout, fit the adapter into the grooves on the left and right sides of the rear case, and then push the Process Indicator into the panel so that there are no gaps between it and the panel.



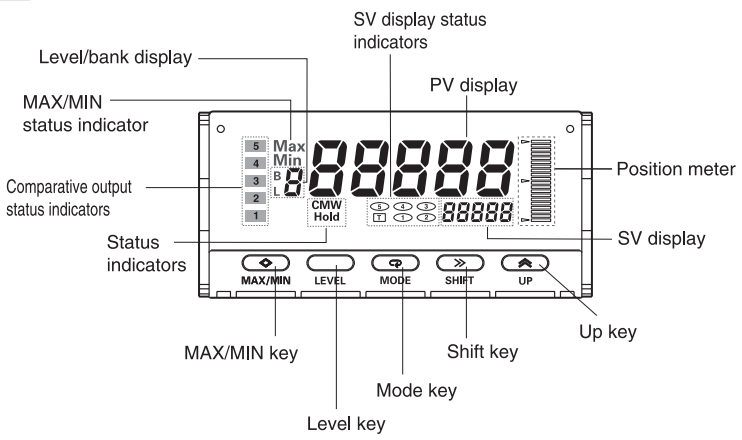
Contents of Package

- Main Unit
- Manual
- Waterproof packing
- DeviceNet Connector*
- Terminal cover
- Fixture
- Unit label
- 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	Countermeasure
UnIt (UNIT)	Err (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 (*2)	Repair is necessary when an internal memory error occurs. Consult your OMRON representative.
		Rated input frequency error (*2)	
EEP (EEP)	Err (ERR)	Error in non-volatile memory	Press the □ [LEVEL] key in this state for at least 3 s to return to the factory settings. (*1)
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 no pulse is input and SYSERR is displayed, then an internal memory error has occurred.

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.

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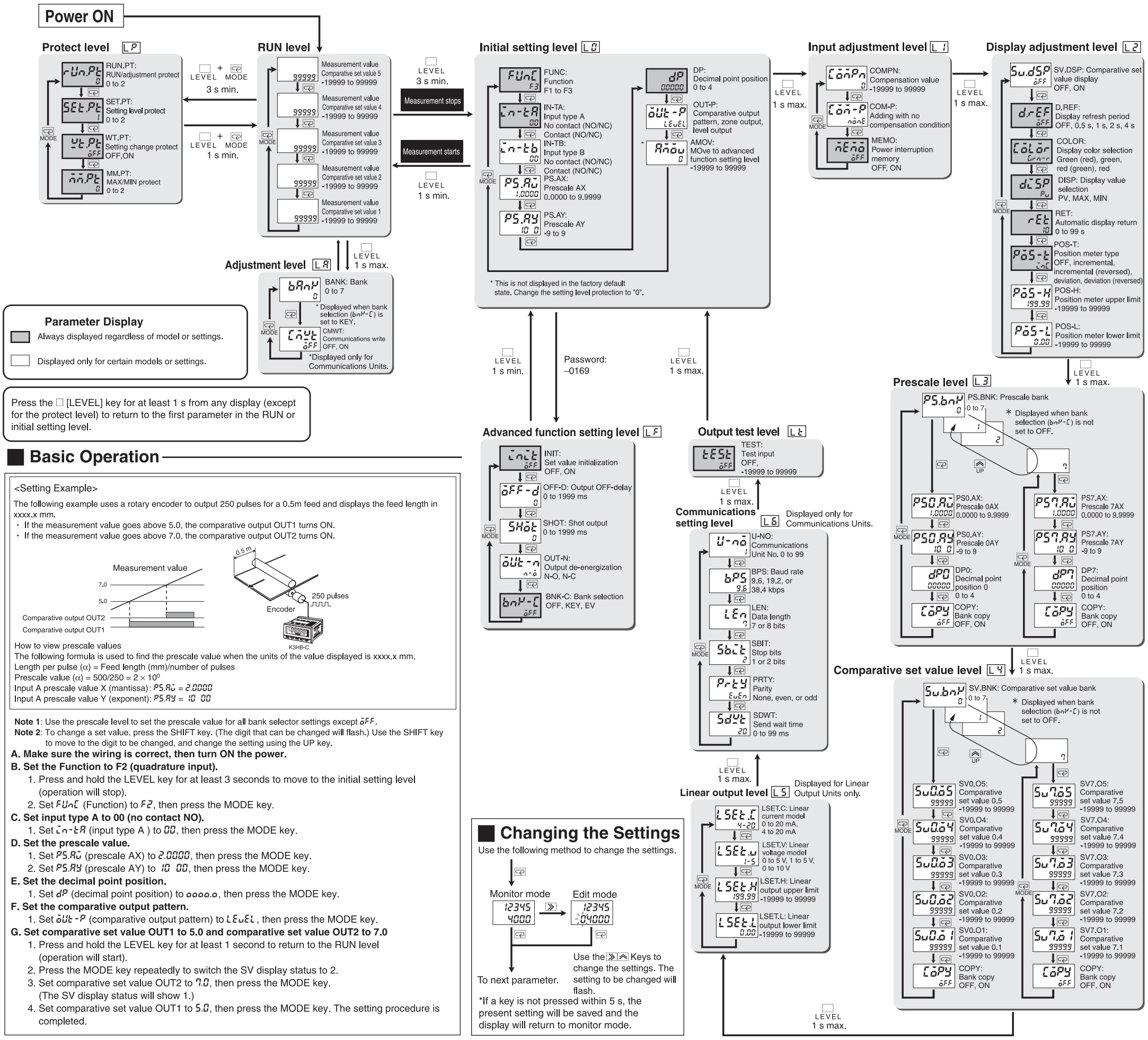
Manufacturer

OMRON CORPORATION
Shiokoji Horikawa, Shimogyo-ku, KYOTO, 600-8530 Japan

Parameter Move Diagram



Parameter Display

- Always displayed regardless of model or settings.
- Displayed only for certain models or settings.

Press the □ [LEVEL] key for at least 1 s from any display (except for the protect level) to return to the first parameter in the RUN or initial setting level.

Basic Operation

<Setting Example>

The following example uses a rotary encoder to output 250 pulses for a 0.5m feed and displays the feed length in xxxx.x mm.

- If the measurement value goes above 5.0, the comparative output OUT1 turns ON.
- If the measurement value goes above 7.0, the comparative output OUT2 turns ON.

How to view prescale values

The following formula is used to find the prescale value when the units of the value displayed is xxxx.x mm.

Length per pulse (α) = Feed length (mm)/number of pulses

Prescale value (α) = 500/250 = 2×10^0

Input A prescale value X (mantissa): PS.AU = 2.0000

Input A prescale value Y (exponent): PS.AY = 10 00

Note 1: Use the prescale level to set the prescale value for all bank selector settings except oFF.

Note 2: To change a set value, press the SHIFT key. (The digit that can be changed will flash.) Use the SHIFT key to move to the digit to be changed, and change the setting using the UP key.

A. Make sure the wiring is correct, then turn ON the power.

B. Set the Function to F2 (quadrature input).

1. Press and hold the LEVEL key for at least 3 seconds to move to the initial setting level (operation will stop).
2. Set FUnC (Function) to F2, then press the MODE key.

C. Set input type A to 00 (no contact NO).

1. Set in-tA (input type A) to 00, then press the MODE key.

D. Set the prescale value.

1. Set PS.AU (prescale AX) to 2.0000, then press the MODE key.
2. Set PS.AY (prescale AY) to 10 00, then press the MODE key.

E. Set the decimal point position.

1. Set dP (decimal point position) to oooo.o, then press the MODE key.

F. Set the comparative output pattern.

1. Set oUt-P (comparative output pattern) to LEvEL, then press the MODE key.

G. Set comparative set value OUT1 to 5.0 and comparative set value OUT2 to 7.0

1. Press and hold the LEVEL key for at least 1 second to return to the RUN level (operation will start).
2. Press the MODE key repeatedly to switch the SV display status to 2.
3. Set comparative set value OUT2 to 7.0, then press the MODE key. (The SV display status will show 1.)
4. Set comparative set value OUT1 to 5.0, then press the MODE key. The setting procedure is completed.

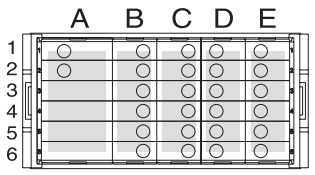
Changing the Settings

Use the following method to change the settings.

*If a key is not pressed within 5 s, the present setting will be saved and the display will return to monitor mode.

Wiring Diagram

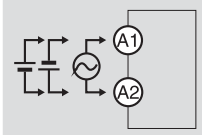
Terminal Arrangement



A

Operating Power Supply

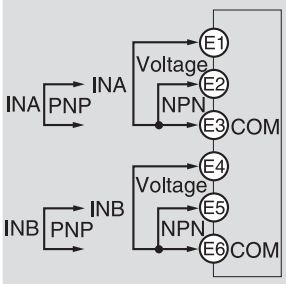
100 to 240 VAC
24 VAC/DC models



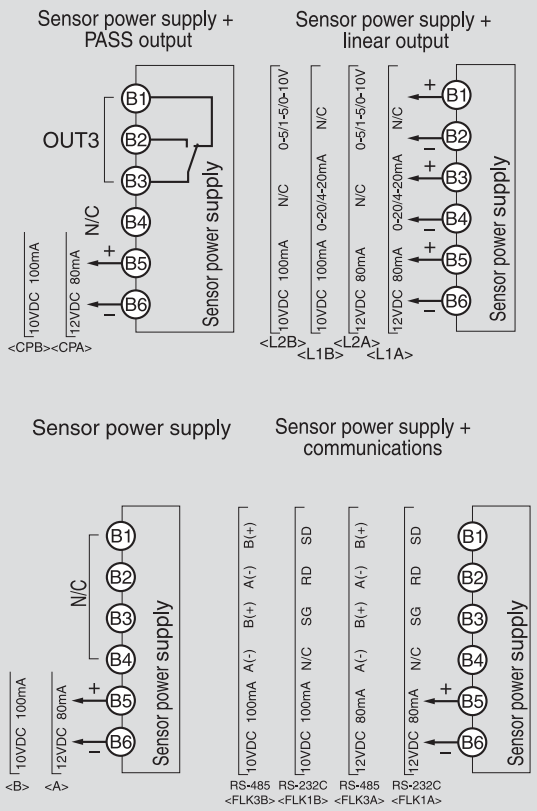
*Check the required power supply type.

E

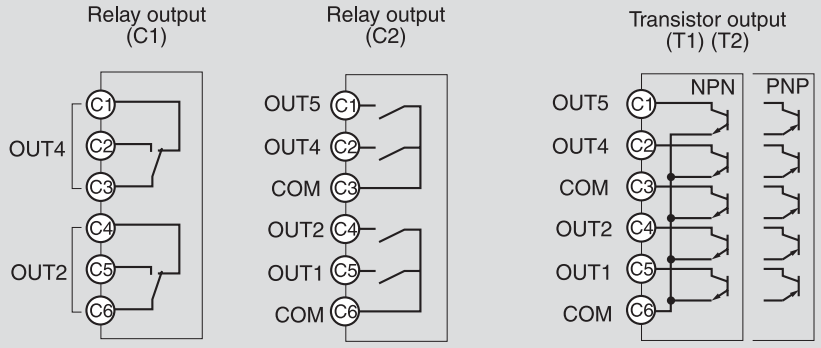
Pulse input



Sensor Power Supply/Output



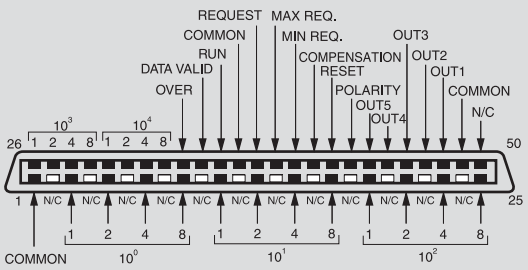
Relays, Transistors, BCD, and DeviceNet



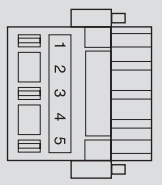
* CPA and CPB can be combined with relay outputs only.

BCD (NPN Open Collector): BCD

- Applicable Connector (Sold separately) HDR-E50MAG1 (HONDA TSUSHIN KOGYO CO., LTD.)
- Special Cable (Sold separately) K32-BCD (OMRON) (HDR-E50MAG1 with 0.3-m cable)



DeviceNet Connector (Included): DRT

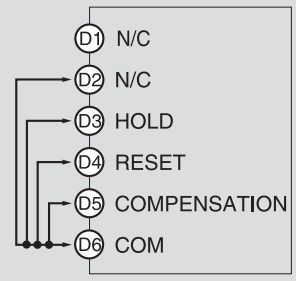


1: V– (Power supply cable: Black)
2: CAN L (Communications cable: Blue)
3: Shield
4: CAN H (Communications cable: White)
5: V+ (Power supply cable: Red)
Applicable Connector:
HR31-5.08P-5SC (01) (HIROSE ELECTRIC CO., LTD.)
* Attach the provided crimp terminals.

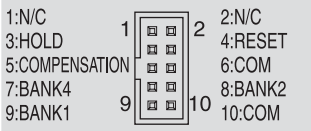
The BCD COMMON is shared.
The pins indicated in the above diagram as blank (white) boxes have been removed.
*Only one of communications, BCD, or DeviceNet can be used by each Process Indicator.

Event Input

Models with Terminal Blocks (1) (3)



Models with Connectors (2) (4)



- Applicable Connector (Sold separately) XG4M-1030 (OMRON)
- Special Cable (Sold separately) K32-DICN (OMRON) (XG4M-1030 with 3-m cable)