

# OMRON

## Model D5SN-S04-□

### Contact-type Displacement sensor

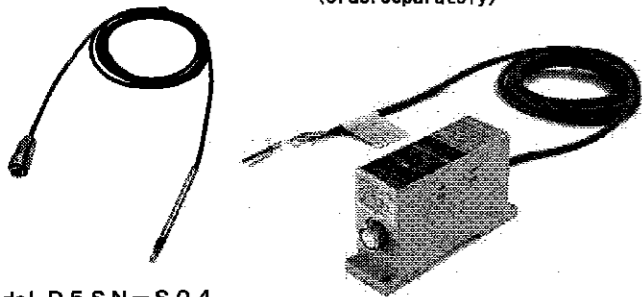
## INSTRUCTION SHEET

Thank you for purchasing an OMRON product.  
Read carefully this Instruction Sheet before use and keep this by your side.

For detailed specifications and notes, please refer to the catalog of model D5SN.

This instruction mentions about sensor unit D5SN-S04-□ and amplifier unit D5SN-A01.

Model D5SN-A01  
(Order separately)



Model D5SN-S04

Omron Corporation

No. 0686672-1C

## CAUTION

- Do not use the switch where explosive gas, ignitable gas, or any other harmful gasses may be present.
- Apply the power supply voltage in the range of the specification value.

### Notice

- Combination of the products  
Connect sensor unit (D5SN-S04-□) to amplifier unit (D5SN-A01).
- Handling of sensor unit
  - Do not apply the shock to the product or drop because it is precision instrument.
  - Do not apply an excessive force that is noted on the "Measuring method" to the plunger.
  - Other wise, it may become broken.
  - Do not push the plunger excessively. Use the product while the alarm indicator is not lit.
  - Do not remove the seal rubber to avoid the crack, scratch, and lost of waterproof or dust proof.
  - Do not shorten or extend the cable to avoid the change of the characteristics.
  - Do not mount the product to the ferromagnetic material and avoid using near the equipment, which cause ferromagnetisms (ex. Motor)
- Power supply
  - Apply the power supply voltage in the range of the specification value.

### 4. Environment

- Do not use products under the following condition.
  - Direct rays of the sun □ Spray of oil or chemicals
  - Humidity or condensing □ Environment where it is subject to corrosive gasses
  - Direct vibration or shock to the body □ Environment where it is subject to dust
  - Static electricity or excessive noise
- Do not use products in water.

### 5. Mounting and dismantling

Mount the sensor according to the specified method and specified location.

Do not apply power when mounting or dismantling the product to avoid the failure.

### 6. Wiring

- Wire according to the wiring diagram. Miss-wiring might result in the failure.
- Do not apply power when wiring, or disconnecting to avoid the failure.
- Separate the cable as far as possible from the primary AC power line which generate overlapped noise.
- Use all outputs within the range of the specifications.
- Do not connect analog output or analog ground line to the common line when use plural units with current output.
- Confirm the wiring before put the electric power.

### ■ Specification / Performance (Ambient temperature: 20°C)

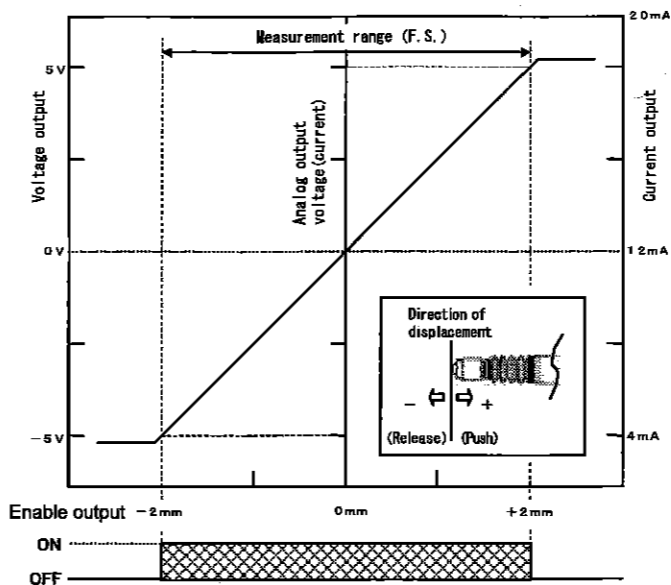
Item	Specification
Part number	Sensor: D5SN-S04 D5SN-S04-L Amplifier: D5SN-A01
Power supply voltage (Operating voltage range)	12 to 24 vdc (10.8 to 26.4 vdc)
Current consumption	80 mA max.
Measurement range (Note. 1)	± 2 mm
Max. actuator travel distance	Approx. 5 mm
Linearity (Note. 2)	0.5% F.S. max.
Repeat accuracy (Note. 3)	1.6 μm max.
Response speed (Note. 3)	200ms max.
Analog output	Voltage: -5 to 5V (Load impedance 10kΩ min.)
	Current: 4 to 20 mA (Load impedance 300Ω min.)
	Enable output (Note. 4)
Enable output (Note. 4)	Output current: 100mA max.
	Corrector dielectric strength (OFF): 26.4 vdc
	Residual voltage (ON): 1.5v max. leakage current (OFF): 0.1mA max.
Measurement force (Note. 5)	1N Max. (D5SN-S04) 0.3N max. (D5SN-S04-L)
Enclosure rating	Sensor (Except for connector): IP67 (D5SN-S04) IP54 (D5SN-S04-L)
	Amplifier: IP30
Ambient temperature (Operating)	Sensor: -10 to 60°C (With no icing or condensing)
	Amplifier: -10 to 55°C (With no icing or condensing)
Ambient humidity (Operating)	Sensor: 25 to 95%
	Amplifier: 25 to 85%
Temperature characteristics (Note. 4)	Sensor: 0.010% F.S./°C
	Amplifier: 0.010% F.S./°C
Weight	Sensor: Approx. 70g (Include cable)
	Amplifier: Approx. 200g (Include cable)

### Notes.

- Measurement range is the stroke within ±2mm at the point where both FAR and NEAR indicator lit.
- F.S. means stroke of actuator in the measurement range (4mm).
- Defined by JIS B 7536.
- Enable output is isolated electrically to other circuits.
- Operating force is measured at the center point of measurement range.
- Temperature characteristics are measured at the center point of

### ■ Output Characteristics

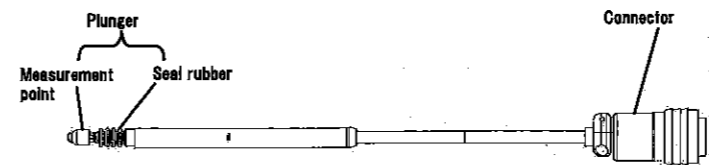
Voltage / Current output



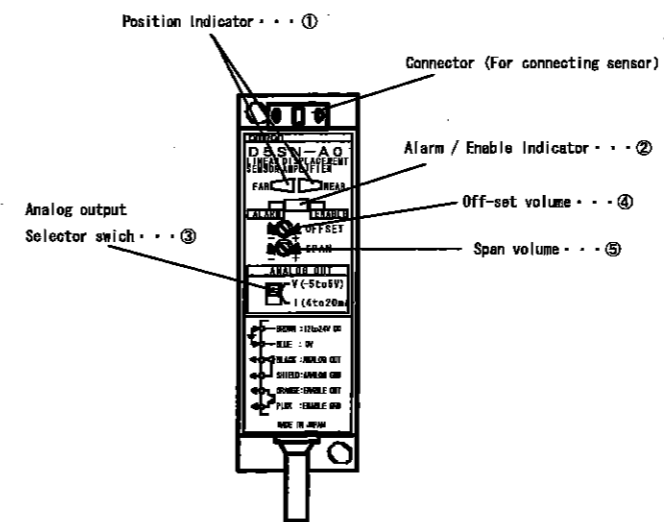
### ■ Part name and function

#### 1. Sensor

Color	Type name
Black	D5SN-S04
Blue	D5SN-S04-L



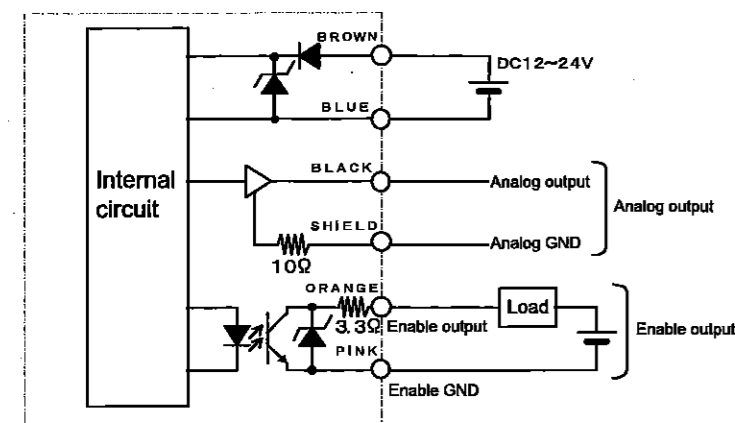
#### 2. Amplifier



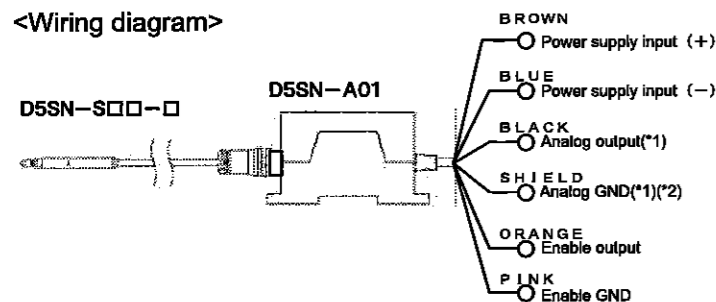
Function	Explanation
① Position Indicator • FAR LED • NEAR LED	LEDs are lit as noted below.  Free Position      Center      Threshold position (It does not move together off set adjustment)
② Alarm / Enable Indicator • Alarm Indicator: Red LED • Enable Indicator: Green LED	• When connector is not connected or sensor cable is broken, Red LED is lit. (Alarm indicator) • When plunger is pushed excessively, Red LED is lit. (Alarm indicator) • When plunger is pushed within the measurement range, Green LED is lit. (Enable indicator)

Function	Explanation
③ Analog output Selector switch	Changeover the analog output select V (-5 to 5V): Voltage output Select I (4 to 20mA): Current output
④ Off-set volume	Volume to adjust output value of center point position Voltage adjustment range (Approx. ±0.5V)  Current adjustment range (Approx. ±0.8mA) 
⑤ Span volume	Volume to adjust output span Voltage adjustment range (10% Min.)  Current adjustment range (10% Min.)  Span is adjustable before shipment. Select V (-5 to 5V): 10V/F.S. Approx. ±1% Select I (-4 to 20mA): 16mA/F.S. Approx. ±1%

## Connection



## <Wiring diagram>



Power supply input(+)	Connect to the power supply 12 to 24vdc, more than 80mA		
Power supply input(-)	Connect to the power supply 0v terminal		
Analog output(*1)	Output is according to the operating position of the sensor plunger.		
	Analog output Selector switch	Analog output	Permissible load resistance
	V (-5 to 5V)	-5 to 5V	10 kΩ Min
	I (4 to 20mA)	4 to 20mA	0 to 300Ω
Analog GND(*1)(*2)	Connect to the input equipment as GND terminal of analog output.		
Enable output	When sensor is set in the measurement range, Enable output is "ON". (NPN Open collector 26.4vdc 100mA, max.)		
Enable GND	Connect to the input equipment. This terminal is isolated from power supply input terminal(-). (Refer to the input / output circuit diagram)		

- \* 1 In case of two or more sensors are used, do not wire analog output terminal and analog GND terminal to the common terminal to avoid the miss-operation.
- \* 2 Connect analog GND to the measurement equipment. Do not connect to other power supply input(-) or enable GND to avoid failure.

## <Connection with power supply>

When you use model D5SN in United States, therefore please be sure to meet the following conditions.

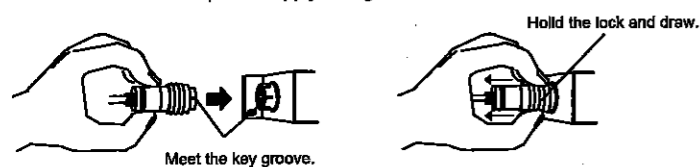
- Connect to the circuit (1) or (2) mentioned below to use.
- (1) Limited voltage current circuit approved by UL508  
The circuit having a power supply of the secondary winding of an insulation transformer which meets the following conditions.  
- Maximum voltage at no-load : 30Vrms (42.4V peak) max.  
- Maximum current : ① 8A max. (including short-circuit) or.  
② In case of limited current with a circuit protector such as a fuse having the rating listed below.

No load voltage (V peak)	Maximum current rating (A)
0 to 20	5.0
Over 20 and up to 30	100/peak voltage

- (2) A class 2 power supply unit conforms to UL1310, or a circuit providing a class 2 transformer conforms to UL1585 as a power supply with maximum voltage of 30 Vrms (42.4V peak)
- DC line shall not be connected to dc-distribution power supply.
- DC cable length shall be shorter than 30m.

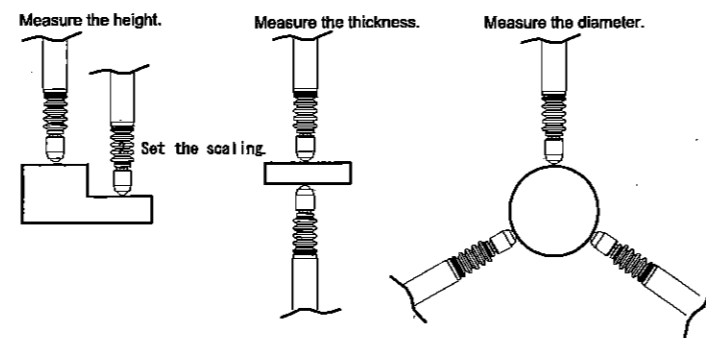
## <Connection and disconnection of sensor connector>

Be sure to turn off the power supply voltage before connection or disconnection.

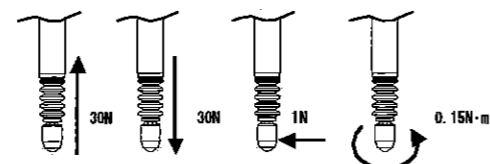


## Measuring method

For your accurate measurement  
Contact the measuring tip to the measuring surface vertically.



- Remove dust on the measuring surface.
- Start measuring after confirmation of stopping the measurement object and response time of sensor.
- Fix sensor cable to avoid the stress to the root of the cable and change of the output.
- In case that storage environment is different from that of use, adapt the sensor to the using environment before use.
- When mount the sensor, it is possible that the repulsion force of plunger deforms mounting parts. Confirm the stability of output before the calibration of the sensor.
- Do not apply an excess force as noted below to the plunger to avoid the damage of the plunger.



## <Example> Measurement of the thickness of sheets

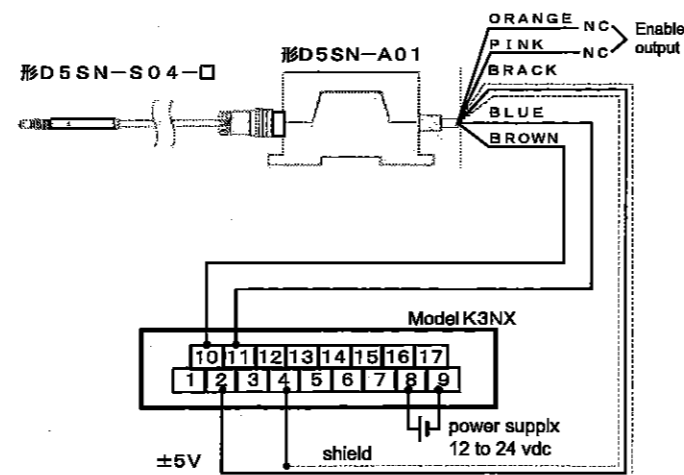
### Required parts

1. Sensor Model D5SN-S04-□
2. Amplifier Model D5SN-A01
3. Power supply Model S82K-01524
4. Digital panel meter Model K3NX-VD2A
5. Measuring stand
6. Block gage  $t=1, 3, 5\text{mm}$   
(Recommended: JIS B7506 Class 0 or 1)
7. Cables for the connection

### Preparation

- 1) Fix the sensor to the measuring table.
- 2) Connect the sensor, amplifier, and others as noted on Fig.a

note: Do not apply power when connecting to avoid the failure.



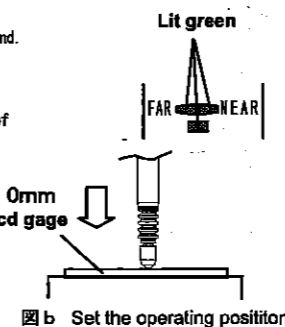
In case that enable output (orange, pink) is not used, insulate the cable from other cables by insulating tape.

### (3) Set up the amplifier and digital panel meter.

- ① Set analog output selector switch to "-5 to 5V".
  - ② Turn on the power supply.
  - ③ Set up the digital panel meter.
    1. Select the input range. (DC Voltage -19.999 to 19.999V)
    2. Set the scaling.
- Input: -5V to 5V, Indicator: -2.000 to 2.000  
\*Refer to the instruction sheet of digital panel meter.
- ④ Wait 20minutes with power supply on. (Warm up)

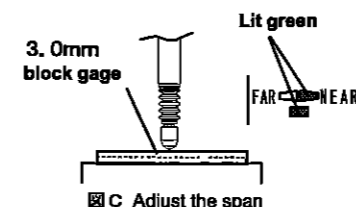
## Calibration

- (1) Set the plunger position  
Put the 3mm - thickness block gage on the measuring stand.  
Adjust the height of the stand at the position where both FAR indicator and NEAR indicator lit.  
Set the operating position of plunger the center point of measurement range.



- (2) Adjust Off - set volume  
Turn the Off - set volume of amplifier and set the indication of digital panel meter "0.000".

- (3) Adjust the span  
Replace 3mm - thickness block gage to the 5mm - thickness gage. Turn the span volume and set the indication of digital panel meter "2.000".



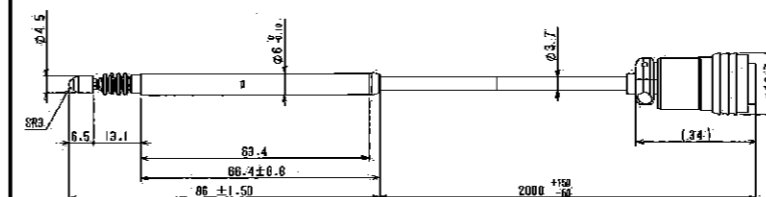
- (4) Minor adjustment  
Replace 5mm - thickness block gage to the 1mm - thickness gage. The indication of digital panel meter is around "-2.000". When the deviation is large, change the block gage and adjust the off-set and span volume. Adjust the indication " -2.000", "0.000", and "+2.000", when the height of block gage "1.0mm", "3.0mm", and "5.0mm", each. The indication is not adjustable every time because output characteristics have not linearity completely.

## Measurement

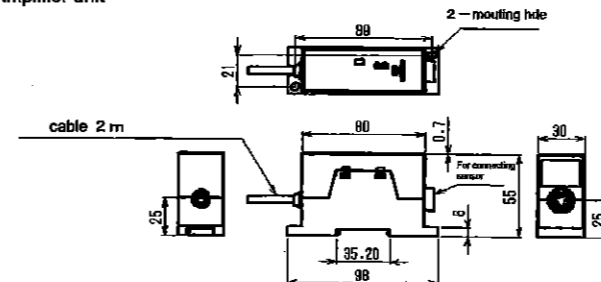
- (1) Adjust the height of the table  
Contact the measuring tip of the sensor to the table and adjust the height of the table with both FAR indicator and enable indicator lit.
- (2) Positive-zero operation  
Let the indication of digital panel meter indicate "0.000" by Positive -Zero operation.
- (3) Put the measured sheet on the measuring table and set it between the measuring tip and the table.
- (4) Digital panel meter indicates the thickness of the sheet (unit:mm).  
Ex. When indicated value of the digital panel meter is "0.067", the thickness of the sheet is 0.067mm.

## Dimensions

### 1. Sensor unit (Model D5SN-S04-□)

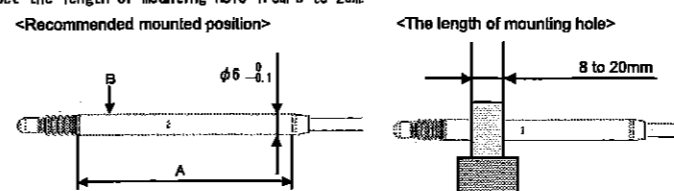


### 2. Amplifier unit

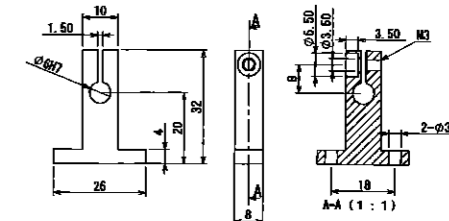


## Mounting and dismantling

1. Sensor unit  
Do not tighten the sensor unit by a screw directly to avoid the brake of the sensor.
2. Mount the sensor unit to "Recommended mounting unit" with the tightening torque from 0.6 to 0.8N \* m by M3 screw
3. Fix the sensor unit in the range of "A" as noted below
4. In case of making the mounting unit by you, design it to set the tightening force 100N max. as noted on the example of the mounting supported with 3-point.
5. Confirm the plunger of the sensor unit moves smoothly after fix it.  
Do not fix the sensor unit with the excess force in the direction of the center of sensor to keep the movement of plunger smoothly.
6. In case of using the product in the environment where the temperature change is big, fix the sensor unit in the range of "B" as noted below  
(in the range of the 6mm diameter of the sensor unit.)
7. Set the length of mounting hole from 8 to 20m.

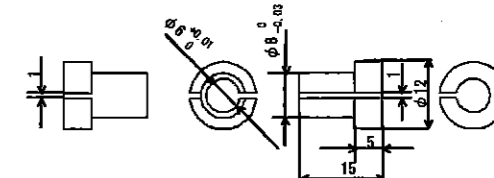


## <Recommended mounting unit> Material; Aluminum alloy

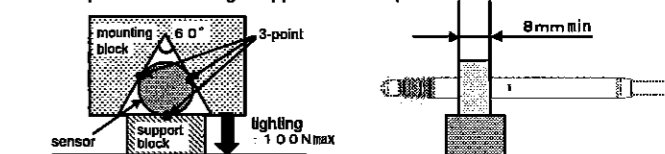


-For your reference-

The shaft holder, which is able to use with this product is sold by Misumi Co., Ltd. Type name is SHSTA6. <Mounting unit for the 8mm-dis. stand.> Material: Brass



## <Example of the mountign supported with 3-point>



## Amplifier unit

- Amplifier unit is mountable with screws of DIN 35 standards rail as noted belows.

(Omron; model PFP-100N, PFP-100N2, order separately)

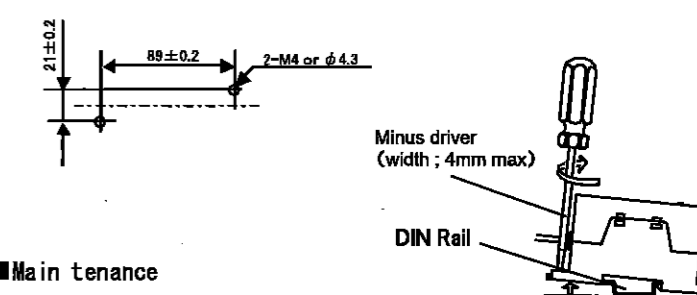
When mounting with screws, the mounting diagram is as follows.

(With 2-pieces of M4 screws, tightening torque is from 0.6 to 1N-m.)

When dismantling it from DIN rail, refer to "How to dismount amplifier".

## <Mounting>

Move the driver to take off the hook



## Main tenance

Confirm whether sensor unit is loosen or not before use.

- Mount the sensor unit with torque of 0.15N \* maximum
- If it is needed, apply the adhesive to fix the screw.
- Clean the sensor unit to avoid the error.
- Sweep the dust on sensor tip with cotton in olede with and wipe it with the line-cleener.

## Suitability for Use

THE PRODUCTS CONTAINED IN THIS SHEET ARE NOT SAFETY RATED. THEY ARE NOT DESIGNED OR RATED FOR ENSURING SAFETY OF PERSONS, AND SHOULD NOT BE RELIED UPON AS A SAFETY COMPONENT OR PROTECTIVE DEVICE FOR SUCH PURPOSES.

Please refer to separate catalogs for OMRON's safety rated products. 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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