



# Operation Manual

PRODUCT NAME

Input block

MODEL / Series / Product Number

*EX250-IE1*  
*EX250-IE2*  
*EX250-IE3*

**SMC Corporation**

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# Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution", "Warning" or "Danger". They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)\*1), and other safety regulations.

\*1) ISO 4414: Pneumatic fluid power -- General rules relating to systems.

ISO 4413: Hydraulic fluid power -- General rules relating to systems.

IEC 60204-1: Safety of machinery -- Electrical equipment of machines .(Part 1: General requirements)

ISO 10218: Manipulating industrial robots -Safety.

etc.



## Caution

**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.



## Warning

**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



## Danger

**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

## Warning

### 1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results.

The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product.

This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

### 2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly.

The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

### 3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

### 4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.



# Safety Instructions

## Caution

### **1. The product is provided for use in manufacturing industries.**

The product herein described is basically provided for peaceful use in manufacturing industries. If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary. If anything is unclear, contact your nearest sales branch.

## **Limited warranty and Disclaimer/Compliance Requirements**

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".

Read and accept them before using the product.

### **Limited warranty and Disclaimer**

#### **1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.\*2)**

Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

#### **2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.**

This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

#### **3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.**

**\*2) Vacuum pads are excluded from this 1 year warranty.**

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

### **Compliance Requirements**

#### **1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.**

#### **2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.**

## Operator

- ◆ This operation manual is intended for those who have knowledge of machinery using pneumatic equipment, and have sufficient knowledge of assembly, operation and maintenance of such equipment. Only those persons are allowed to perform assembly, operation and maintenance.
- ◆ Read and understand this operation manual carefully before assembling, operating or providing maintenance to the product.

### ■ Safety Instructions

#### **Warning**

- Do not disassemble, modify (including changing the printed circuit board) or repair.  
An injury or failure can result.
- Do not operate the product outside of the specifications.  
Do not use for flammable or harmful fluids.  
Fire, malfunction, or damage to the product can result.  
Verify the specifications before use.
- Do not operate in an atmosphere containing flammable or explosive gases.  
Fire or an explosion can result.  
This product is not designed to be explosion proof.
- If using the product in an interlocking circuit:
  - Provide a double interlocking system, for example a mechanical system.
  - Check the product regularly for proper operation.Otherwise malfunction can result, causing an accident.
- The following instructions must be followed during maintenance:
  - Turn off the power supply.
  - Stop the air supply, exhaust the residual pressure and verify that the air is released before performing maintenance.Otherwise an injury can result.

## Caution

- After maintenance is complete, perform appropriate functional inspections.  
Stop operation if the equipment does not function properly.  
Safety cannot be assured in the case of unexpected malfunction.
- Provide grounding to assure the noise resistance of the Serial System.  
Individual grounding should be provided close to the product with a short cable.

### ■ NOTE

- Follow the instructions given below when designing, selecting and handling the product.
- The instructions on design and selection (installation, wiring, environment, adjustment, operation, maintenance, etc.) described below must also be followed.
  - \*Product specifications
    - The direct current power supply to combine should be UL1310 Class 2 power supply when conformity to UL is necessary.
    - The product is a UL approved product only if they have a  mark on the body.
    - Use the specified voltage.  
Otherwise failure or malfunction can result.
    - Reserve a space for maintenance.  
Allow sufficient space for maintenance when designing the system.
    - Do not remove any nameplates or labels.  
This can lead to incorrect maintenance, or misreading of the operation manual, which could cause damage or malfunction to the product.  
It may also result in non-conformity to safety standards.

## ●Product handling

### \*Installation

- Do not drop, hit or apply excessive shock to the fieldbus system.  
Otherwise damage to the product can result, causing malfunction.
- Tighten to the specified tightening torque.  
If the tightening torque is exceeded the mounting screws may be broken.  
IP67 protection cannot be guaranteed if the screws are not tightened to the specified torque.
- Never mount a product in a location that will be used as a foothold.  
The product may be damaged if excessive force is applied by stepping or climbing onto it.

### \*Wiring

- Avoid repeatedly bending or stretching the cables, or placing heavy load on them.  
Repetitive bending stress or tensile stress can cause breakage of the cable.
- Wire correctly.  
Incorrect wiring can break the product.
- Do not perform wiring while the power is on.  
Otherwise damage to the fieldbus system and/or I/O device can result, causing malfunction.
- Do not route wires and cables together with power or high voltage cables.  
Otherwise the fieldbus system and/or I/O device can malfunction due to interference of noise and surge voltage from power and high voltage cables to the signal line.  
Route the wires (piping) of the fieldbus system and/or I/O device separately from power or high voltage cables.
- Confirm proper insulation of wiring.  
Poor insulation (interference from another circuit, poor insulation between terminals, etc.) can lead to excess voltage or current being applied to the product, causing damage.
- Take appropriate measures against noise, such as using a noise filter, when the fieldbus system is incorporated into equipment.  
Otherwise noise can cause malfunction.
- Separate the power line for output devices from the power line for control.  
Otherwise noise or induced surge voltage can cause malfunction.

### \*Environment

- Select the proper type of protection according to the environment of operation.  
IP67 protection is achieved when the following conditions are met.
  - (1) The units are connected properly with fieldbus cable with M12 connector and power cable with M12 (M8) connector.
  - (2) Suitable mounting of each unit and manifold valve.

If using in an environment that is exposed to water splashes, please take measures such as using a cover.  
If the product is to be used in an environment containing oils or chemicals such as coolant or cleaning solvent, even for a short time, it may be adversely affected (damage, malfunction etc.).
- Do not use the product in an environment where corrosive gases or fluids could be splashed.  
Otherwise damage to the product and malfunction can result.
- Do not use in an area where surges are generated.  
If there is equipment which generates a large amount of surge (solenoid type lifter, high frequency induction furnace, motor, etc.) close to the fieldbus system, this may cause deterioration or breakage of the internal circuit of the fieldbus system. Avoid sources of surge generation and crossed lines.
- When a surge-generating load such as a relay or solenoid is driven directly, use an fieldbus system with a built-in surge absorbing element.  
Direct drive of a load generating surge voltage can damage the fieldbus system.
- The product is CE marked, but not immune to lightning strikes. Take measures against lightning strikes in the system.
- Prevent foreign matter such as remnant of wires from entering the fieldbus system to avoid failure and malfunction.

- Mount the product in a place that is not exposed to vibration or impact.  
Otherwise failure or malfunction can result.
- Do not use the product in an environment that is exposed to temperature cycle.  
Heat cycles other than ordinary changes in temperature can adversely affect the inside of the product.
- Do not expose the product to direct sunlight.  
If using in a location directly exposed to sunlight, shade the product from the sunlight.  
Otherwise failure or malfunction can result.
- Keep within the specified ambient temperature range.  
Otherwise malfunction can result.
- Do not operate close to a heat source, or in a location exposed to radiant heat.  
Otherwise malfunction can result.

\*Adjustment and Operation

- Perform settings suitable for the operating conditions.  
Incorrect setting can cause operation failure.
- Please refer to the PLC manufacturer's manual etc. for details of programming and addresses.  
For the PLC protocol and programming refer to the relevant manufacturer's documentation.

\*Maintenance

- Turn off the power supply, stop the supplied air, exhaust the residual pressure and verify the release of air before performing maintenance.  
There is a risk of unexpected malfunction.
- Perform regular maintenance and inspections.  
There is a risk of unexpected malfunction.
- After maintenance is complete, perform appropriate functional inspections.  
Stop operation if the equipment does not function properly.  
Otherwise safety is not assured due to an unexpected malfunction or incorrect operation.
- Do not use solvents such as benzene, thinner etc. to clean the each unit.  
They could damage the surface of the body and erase the markings on the body.  
Use a soft cloth to remove stains.  
For heavy stains, use a cloth soaked with diluted neutral detergent and fully squeezed, then wipe up the stains again with a dry cloth.

## Model Indication and How to Order

### Input block

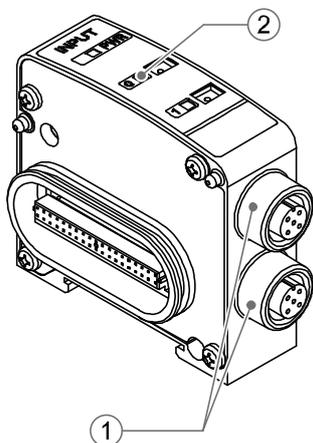
EX250-IE 

● Block type

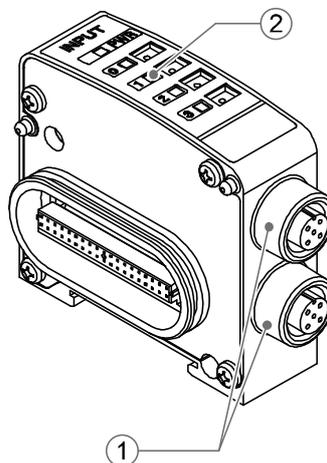
1	Input points: 2, M12 connector (2 pcs.)
2	Input points: 4, M12 connector (2 pcs.)
3	Input points: 4, M8connector (4 pcs.)

## Summary of Product parts

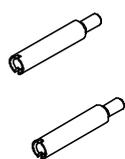
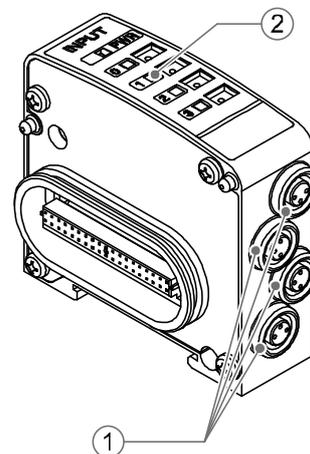
EX250-IE1



EX250-IE2



EX250-IE3



Tie-rod (2 pcs.)  
Accessory

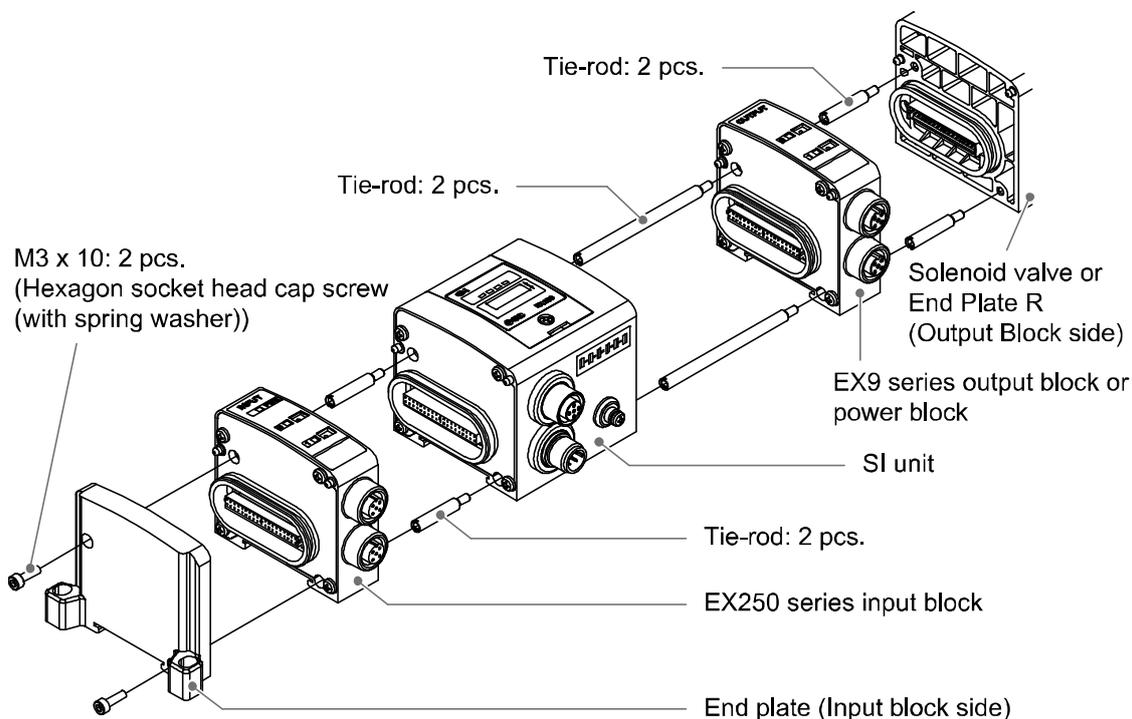
No.	Part name	Function
1	Input equipment connector	Connects the input equipment such as sensor, etc. *1
2	Operation display LED	Displays the status of the power supply and input. *2

\*1: For the wiring, refer to page 10.

\*2: For the Display/Setting, refer to page 18.

# Mounting and Installation

## ■ Installation



### NOTE

Hold the SI unit and the input/output block in order to have no clearance between them while tightening the bolt.

Be sure to tighten bolt by specified tightening torque. (Tightening torque: 0.6 Nm)

### ○ Maintenance

Please be sure to turn off the power supply when performing the following operations.

Addition of input block

- Remove screws from end plate.
- Mount attached tie rod.
- Connect additional input block
- Connect end plate and tighten removed screws by specified tightening torque. (0.6 Nm)

Exchange of input block

- Remove screws from end plate and release connection of each unit.
- Replace old input block with new one. (Tie rod does not need to be removed.)
- Connect end plate and tighten removed screws by specified tightening torque. (0.6 Nm)

Caution for maintenance

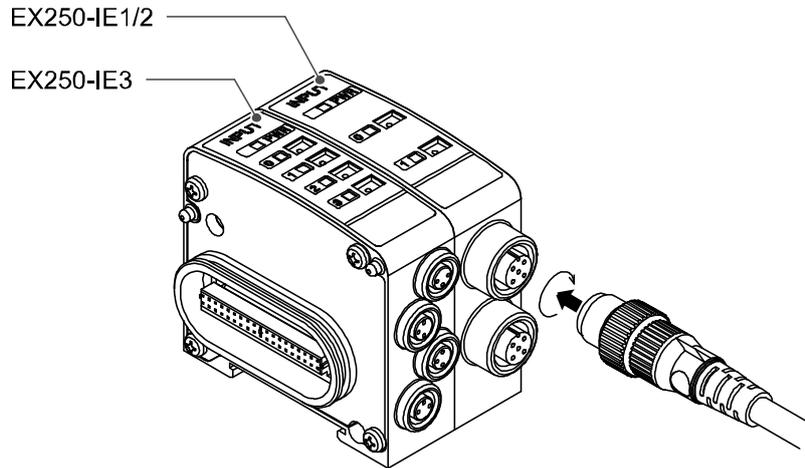
- (1) Be sure turn-off power supplies.
- (2) Be sure that there is no foreign object in any of units.
- (3) Be sure that gasket is lined properly.
- (4) Be sure that tightening torque is according to specification.

If these items are not kept, it may lead to the breakage of substrate or intrusion of liquid or dust into the units.

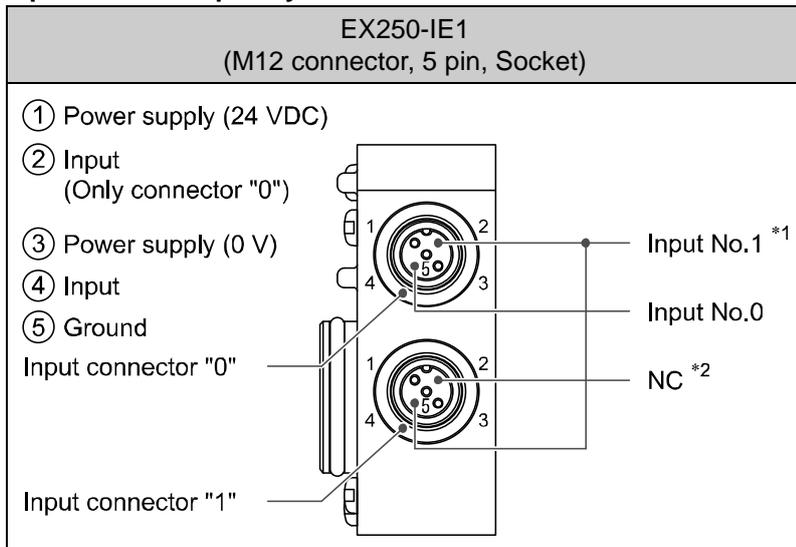
## ■Wiring

### Cable wiring

- (1) Align the key groove with the input connector (socket) of Input block and plug in the cable (plug).
- (2) Tighten the lock nut on the cable side by turning it clockwise by hand.
- (3) Confirm that the connector does not move.

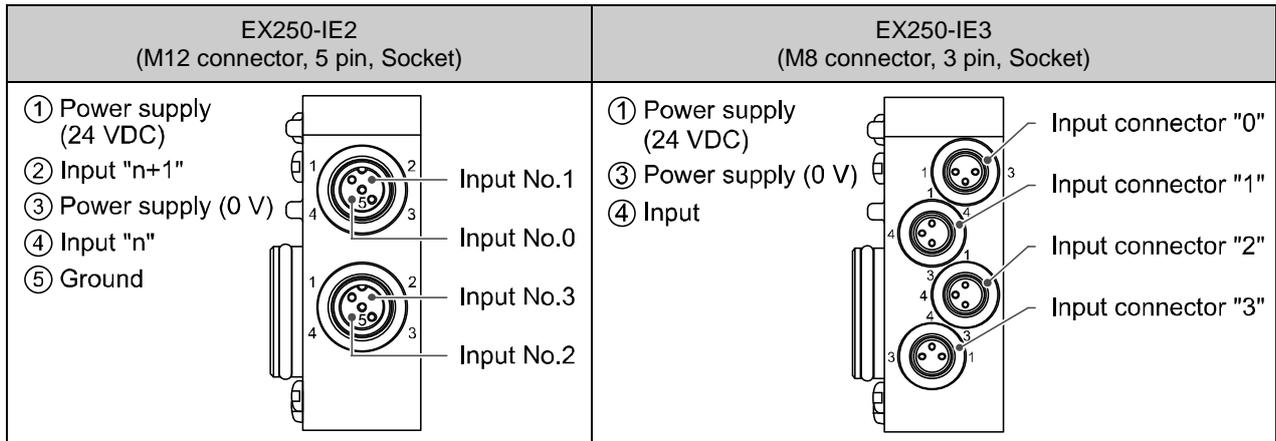


### Input connector pin layout



\*1: Input No.1 is connected to the pin No.2 of the input connector "0", 2 input signals can be directly inputted the input connector "0".

\*2: NC : Not connected



For the Cable side connector/Cable, refer to page 22.

Be sure to check the specifications of the input signal when wiring the sensor. It may cause the malfunction. Mind the position of the mounting key when selecting the sensor.

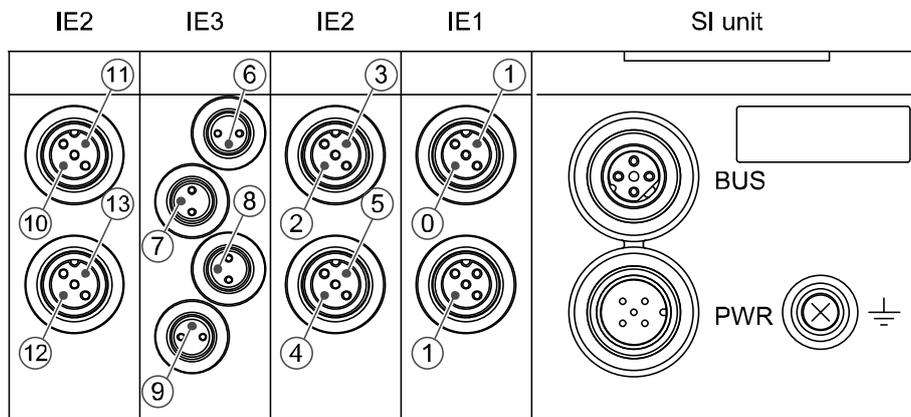
**NOTE**

Mount a waterproof cap on each unused connector of Input block. Proper use of the waterproof cap can achieve IP67 enclosure. (Tightening torque: 0.05 Nm for M8, 0.1N m for M12)  
For the waterproof cap, refer to page 22.

**Correlation between input number and Input Block**

The total number of Input and Output blocks can not exceed 10.

The maximum input point is 32.

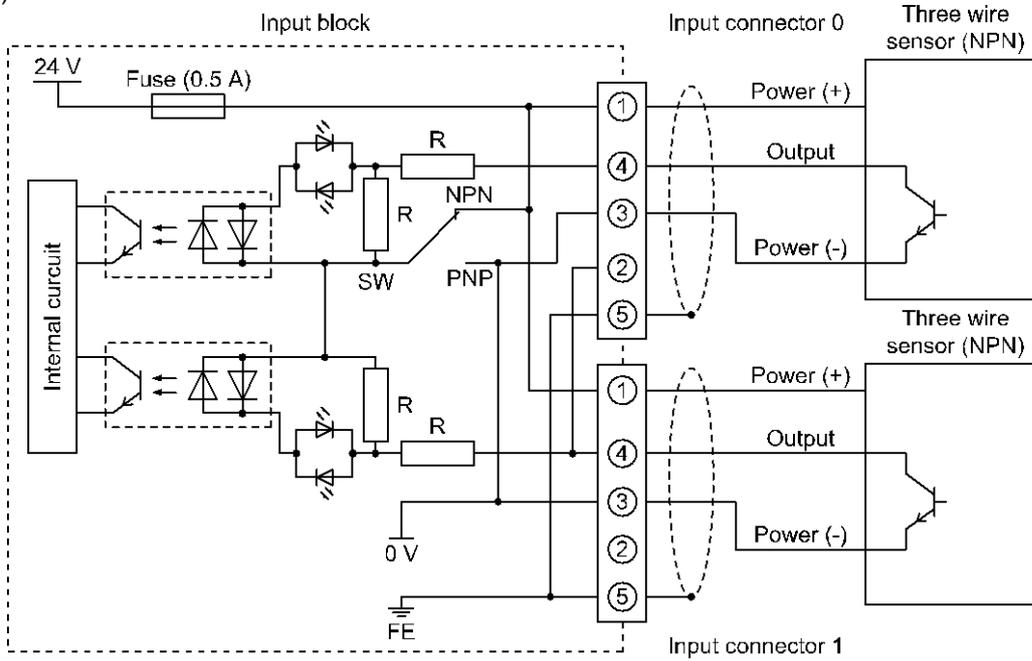


The input number is 0, 1 ...31 from the SI unit side.

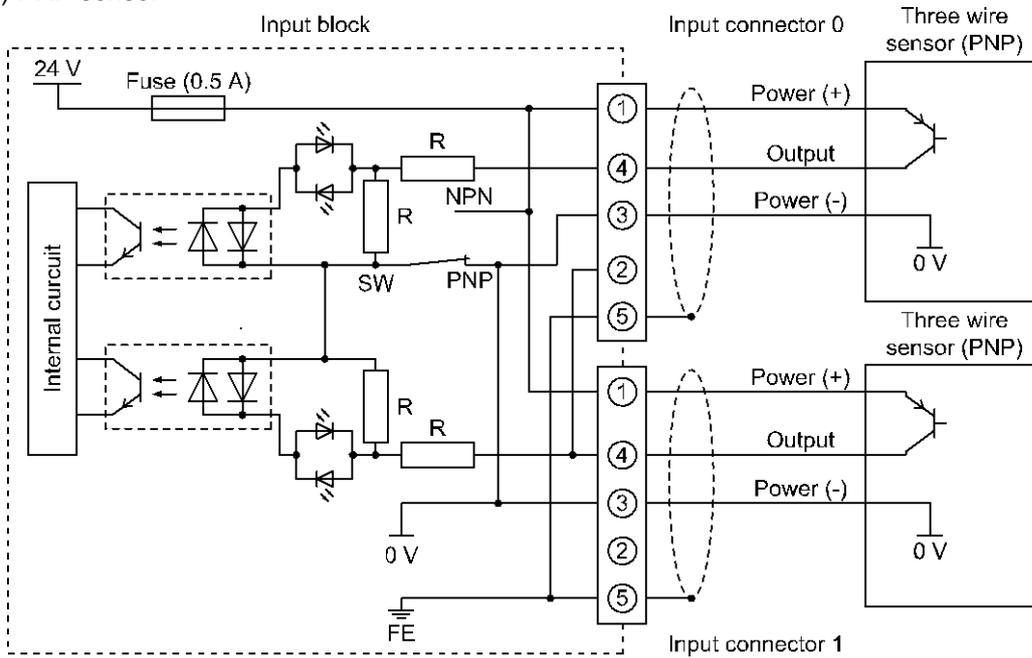
■ Internal circuit

○ EX250-IE1 input circuit construction

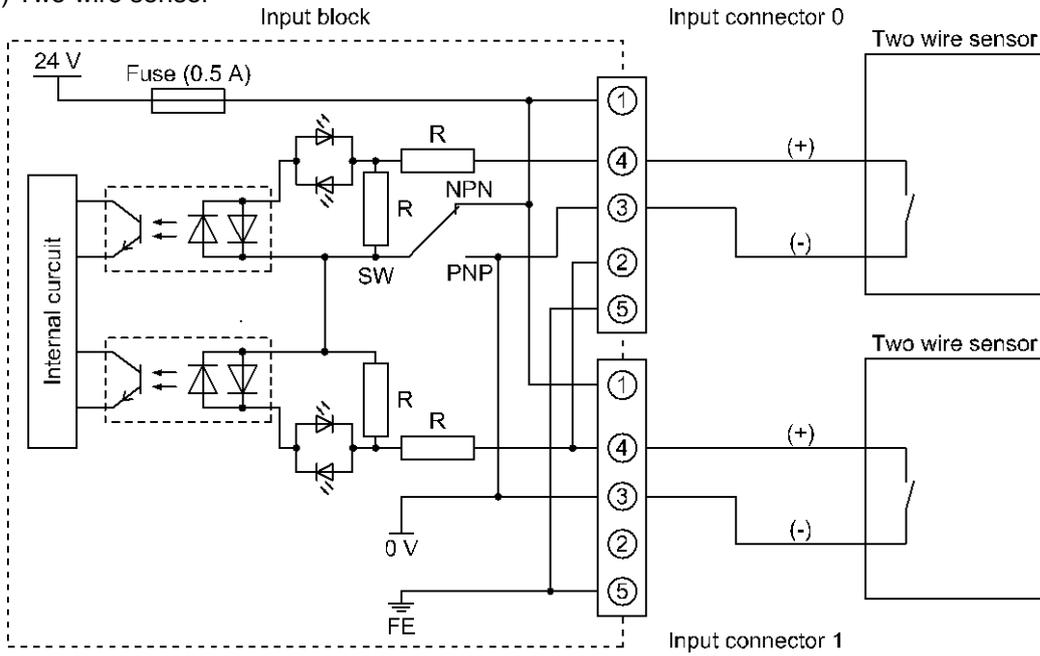
(1) NPN sensor



(2) PNP sensor

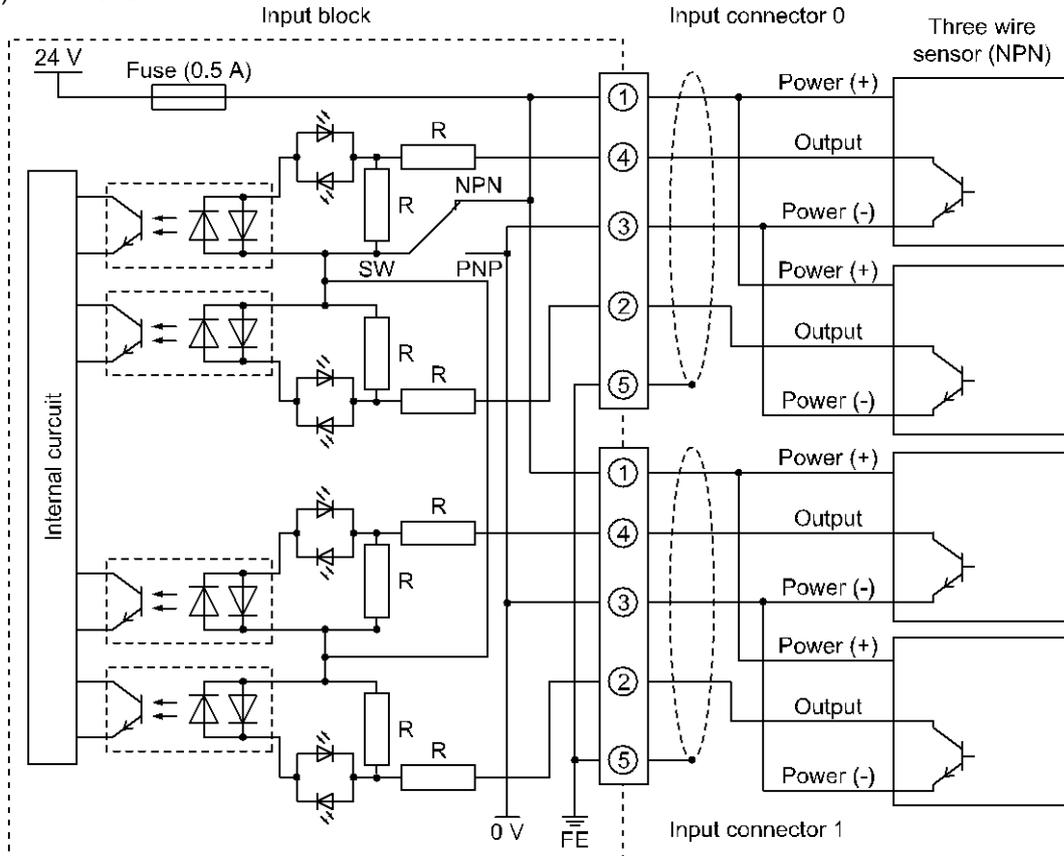


(3) Two wire sensor

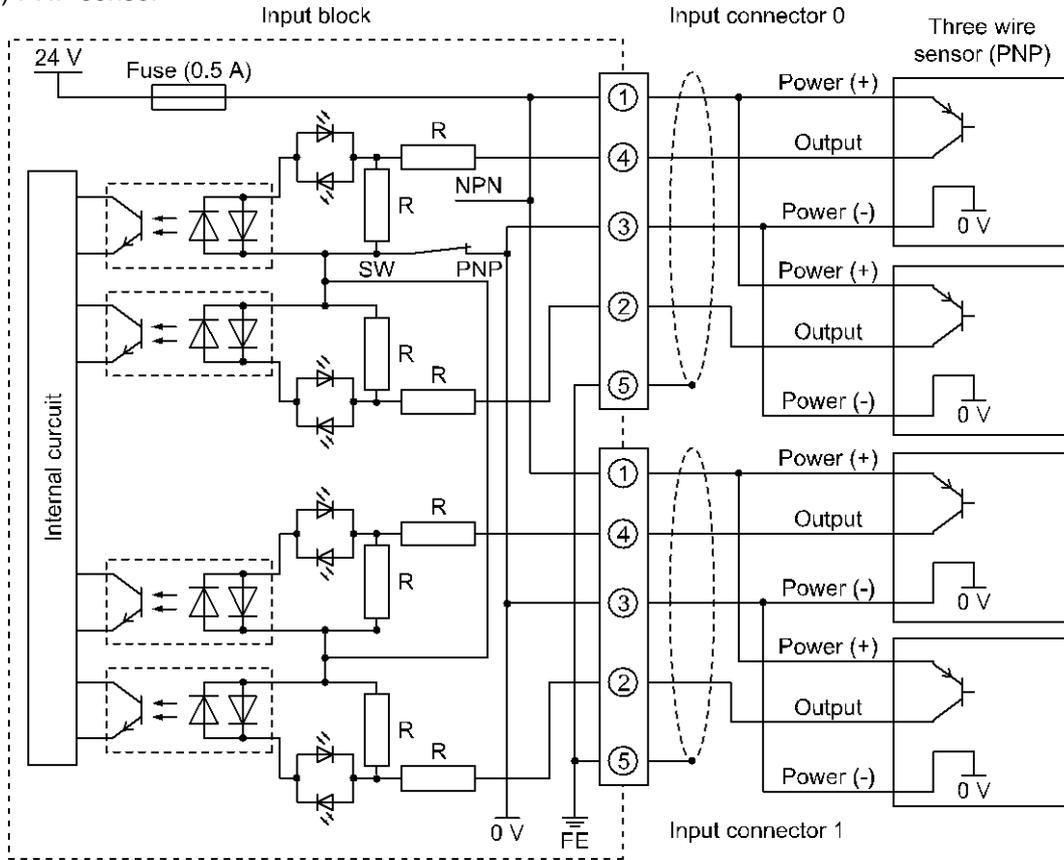


o EX250-IE2 input circuit construction

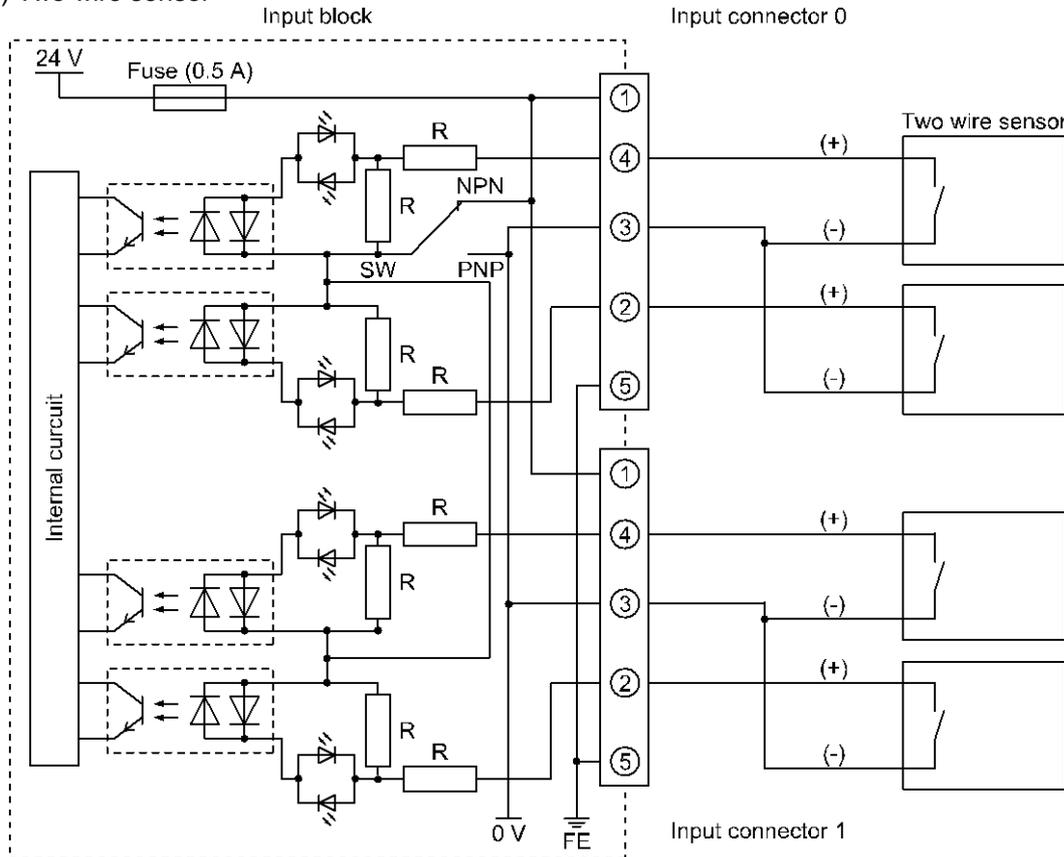
(1) NPN sensor



(2) PNP sensor

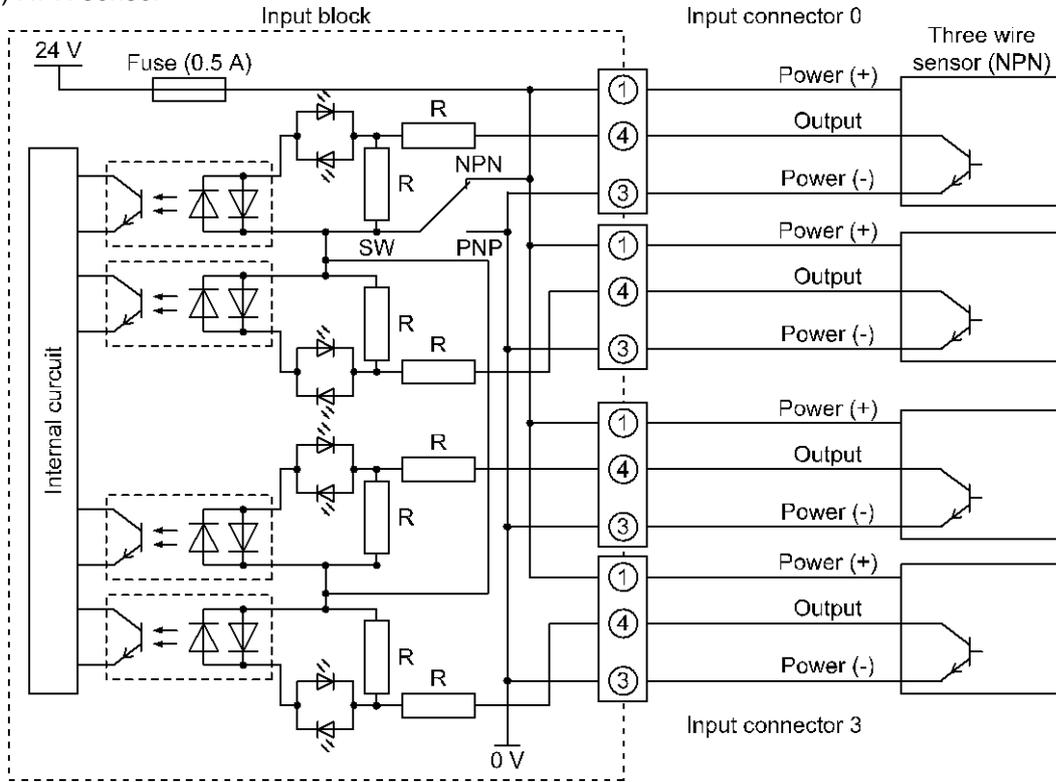


(3) Two wire sensor

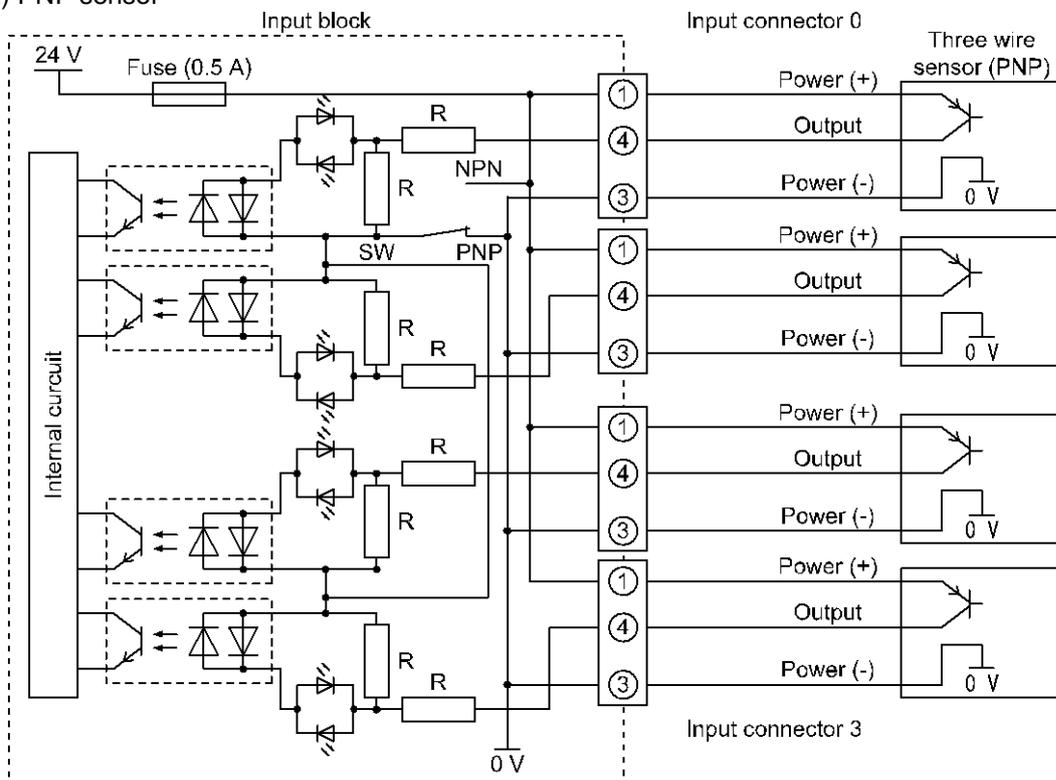


○EX250-IE3 input circuit construction

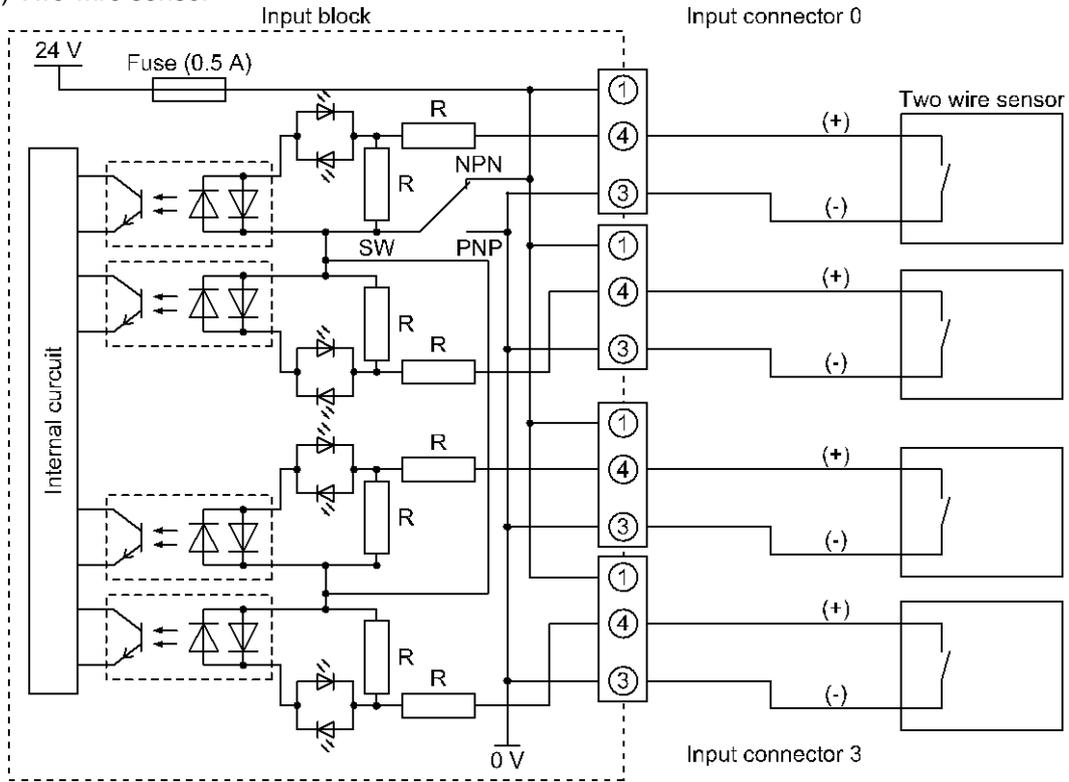
(1) NPN sensor



(2) PNP sensor



(3) Two wire sensor



○Input current

The available current to the sensor is 30 mA maximum for each input point.

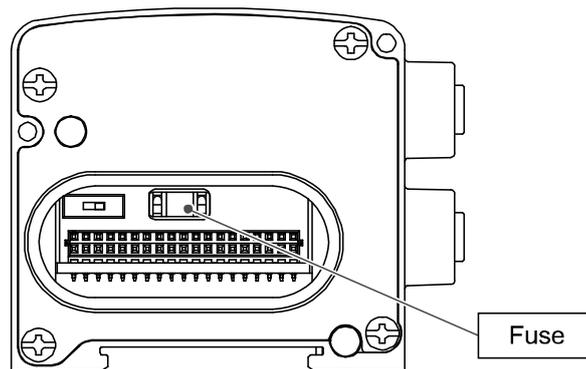
In power supply for the sensor, if an over current flows because of short circuit etc, power supply will be cut-off by the fuse cutting.

In this case, the user must fix the cause of the short circuit before exchange the fuse.

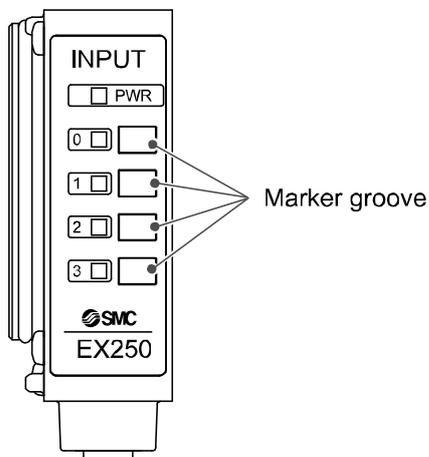
In changing, release the combination of units and perform by individual input block.

For the Mounting/Removal of the input block, refer to page 9.

Fuse model: EX9-FU05



○Mounting the marker

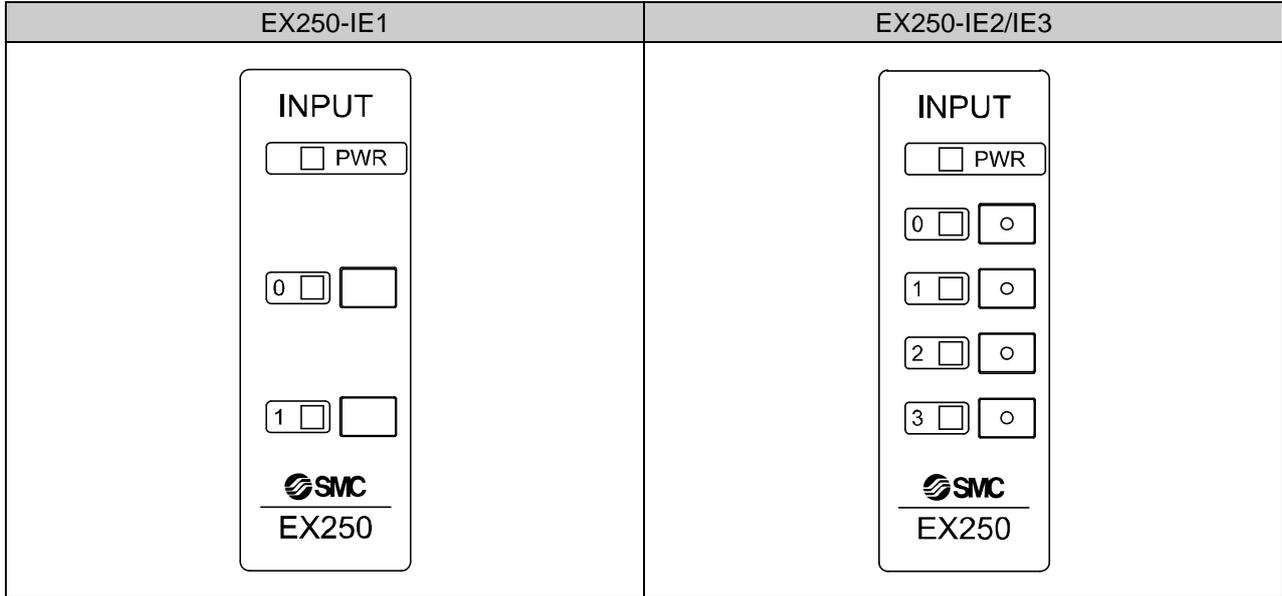


To install the marker, enable the number of input to identify the signal name etc.  
Prepare the marker by user.

Marker: BN-WH (PHOENIX CONTACT)

# Display/Setting

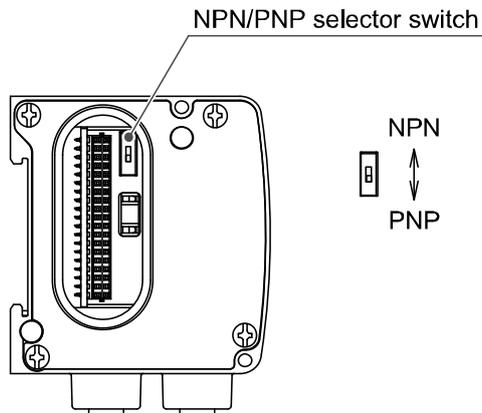
## LED Display



LED display	Description	
PWR	ON	Power supply for sensor is ON.
	OFF	Power supply for sensor is OFF.
0, 1, 2, 3	ON	Sensor signal input corresponding to the number is ON. (Logic "1")
	OFF	Sensor signal input corresponding to the number is OFF. (Logic "0")

## Switch setting

- Applicable sensor to the Input Block can be switched to NPN/PNP.
- Remove the input block, then set up the switch with a sharp-pointed watchmakers screw driver etc.
- Install the input block after the setting.
- For the Mounting/Removal of the input block, refer to page 9.
- The default switch setting of the product is PNP.



### NOTE

Be sure to disconnect the power supply before setting the switch.  
Slide the switch to the PNP or NPN position completely.  
Otherwise, the input block may be damaged.

## Troubleshooting

Fault	Countermeasures
PWR LED does not turn ON	<ul style="list-style-type: none"> <li>•Confirm fuse breakage of input block.</li> <li>•Confirm input power (24 V) of SI unit.</li> <li>•Exchange SI unit.</li> <li>•Exchange input block.</li> </ul>
0 to 3 LED does not turn ON 0 to 3 LED does not turn OFF	<ul style="list-style-type: none"> <li>•Confirm connector connecting.</li> <li>•Confirm the kind of sensors (PNP/NPN)</li> <li>•Confirm after reversing the sensors.</li> <li>•Exchange input block.</li> </ul>

# Specifications

## General specification

Item	Specification
Operating ambient temperature	-10 to +50 °C
Operating ambient humidity	35 to 85%RH (No condensation)
Storage ambient temperature	-20 to +60 °C
Operating environment	No corrosive gas
Enclosure	IP67
Weight	90 g or less

## Input specification

Item	Specification		
	EX250-IE1	EX250-IE2	EX250-IE3
Part number	EX250-IE1	EX250-IE2	EX250-IE3
Input point	2 points	4 points	4 points
Input connector	M12 connector	M12 connector	M8 connector
Corresponding sensors	Current source type (PNP output) Current sink type (NPN output) *1		
Rated voltage	19.2 to 28.8 VDC *2		
Logic"1" input voltage VH	11 to 30 V		
Logic"0" input voltage VL	-3 to +5 V		
Logic"1" input current IH	8 mA Typ.		
Two wire sensor connection	Possible		
Logic"0" allowable current IL	Max. 2.5 mA		
Input delay time	3 msec. Typ		
Sensor supply current	Max. 120 mA/input block (30 mA/sensor) *3		
Short-circuit protection	Fuse cut over 500 mA each input block		

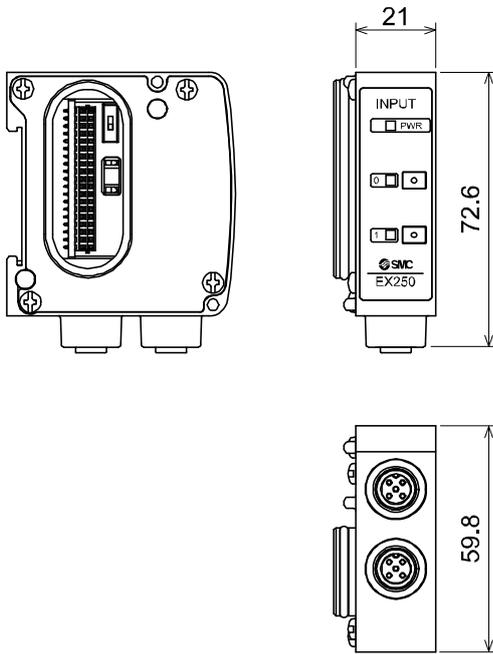
\*1: Change-over by switch (for changing the whole input block)

\*2: About 1 V of voltage drop for power supply voltage (power for SI unit and input block)

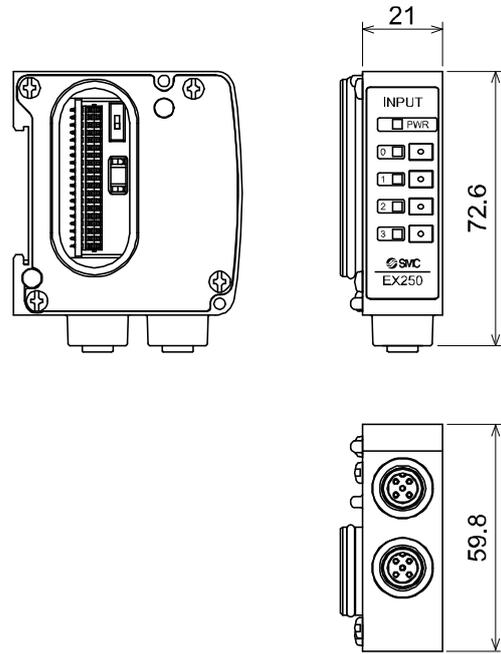
\*3: When extended input block and used 32 sensors, total of sensor supply current should not be over 1 A.

# Dimensions

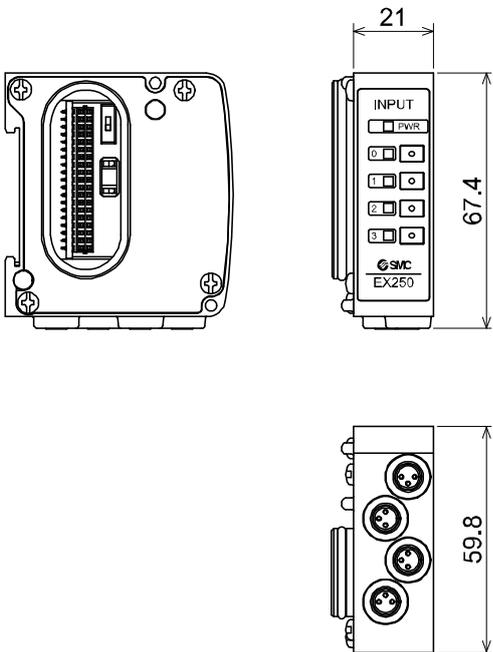
○EX250-IE1



○EX250-IE2



○EX250-IE3



## Option

### ○Cable side Connector/Cable

Description	Part number	Specifications	Manufacture
Cable with connector	PCA-1557769	M12 (4 pins) cable with connector (3 m)	SMC
	PCA-1557772	M8 (3 pins) cable with connector (3 m)	
fieldwireable connector	PCA-1557730	M8/3 pins/plug	
	PCA-1557743	M12/4 pins/plug	
	PCA-1557756		

### ○Waterproof cap

Mounted on the unused ports of the input block.

The proper use of this waterproof cap can achieve IP67 enclosure.

#### How to order

EX9-AW 

• Connector specification

ES	M8 connector (for socket) /10 pcs.
TS	M12 connector(for socket) /10 pcs.



#### NOTE

Tighten the waterproof cap by the specified tightening torque. (0.05 Nm for M8, 0.1 Nm for M12)

#### Revision history

B: All revised contents  
C: Revision  
D: Limited warranty and Disclaimer are added.  
E: Contents are added. [July 2017]  
F: Revision [February 2019]

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.  
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