**SMC**®

## Operation Manual

Fieldbus system
**EtherNet/IP$^{TM}$ compatible SI unit**

PRODUCT NAME

*EX600-SEN#*
*EX600-ED#*

MODEL/ Series

**SMC Corporation**

# Table of Contents

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No.EX##-OMN0032

## 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), Japan Industrial Standards (JIS) [*1] and other safety regulations[*2].

[*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 10218-1992: Manipulating industrial robots -Safety.
JIS B 8370: General rules for pneumatic equipment.
JIS B 8361: General rules for hydraulic equipment.
JIS B 9960-1: Safety of machinery - Electrical equipment of machines. (Part 1: General requirements)
JIS B 8433-1993: Manipulating industrial robots - Safety.
etc.
[*2] Labor Safety and Sanitation Law, 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.

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# ⚠️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 *3.
   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.

   *3 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

When the product is exported, strictly follow the laws required by the Ministry of Economy, Trade and Industry (Foreign Exchange and Foreign Trade Control Law).

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# Operator

♦ This operation manual has been written for those who have knowledge of machinery and apparatus that use pneumatic equipment and have full knowledge of assembly, operation and maintenance of such equipment.
♦ Please read this operation manual carefully and understand it before assembling, operating or providing maintenance to the product.

■Precautions

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

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# ⚠ Caution

■When handling the unit or assembling/replacing units:
 •Do not touch the sharp metal parts of the connector or plug for connecting units.
 •Take care not to hit your hand when disassembling the unit.
  The connecting portions of the unit are firmly joined with seals.
 •When joining units, take care not to get fingers caught between units.
 An injury can result.

■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 safety and noise resistance of the Fieldbus 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 UL 1310 Class2 power supply when conformity to
    UL is necessary.
   •Use the specified voltage.
    Otherwise failure or malfunction can result.
   •The power supply for the unit should be 0V as the standard for both the power supply for outputs and the
    power supply for inputs and control.
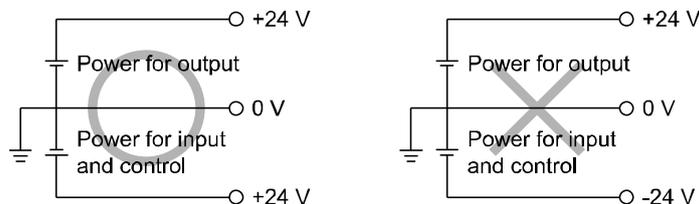


  •Reserve a space for maintenance.
   Allow sufficient space for maintenance when designing the system.
  •Do not remove any nameplates or labels.
   This can lead to incorrect maintenance, or misreading of the operation manual, which could cause damage or
   malfunction to the product.
   It may also result in non-conformity to safety standards.
  •Beware of inrush current when the power supply is turned on.
   Some connected loads can apply an initial charge current which will activate the over current protection function,
   causing the unit to malfunction.

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●Product handling

∗Installation

•Do not drop, hit or apply excessive shock to the SI unit.

 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.

•If a large manifold valve is mounted, lift the unit so that stress is not applied to the connecting part while transporting.

 The stress may cause breakage of the connecting part. The unit may become very heavy depending on the combination. Transportation/installation shall be performed by multiple operators.

•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 SI unit and/or input or output device can result, causing malfunction.

•Do not route wires and cables together with power or high voltage cables.

 Otherwise the SI unit and/or input or output 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 SI unit and/or input or output 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.

∗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.

  (3)Be sure to fit a waterproof cap on any unused connectors.

 If using in an environment that is exposed to water splashes, please take measures such as using a cover.

 Do not use in an environment where moisture or water vapor are present. Otherwise failure and malfunction can result.

•Do not use in a place where the product could be splashed by oil or chemicals.

 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 generating large surge near the unit (magnetic type lifter, high frequency inductive furnace, welding machine, motor, etc.), this can cause deterioration of the internal circuitry element of the unit or result in damage. Take measures against the surge sources, and prevent the lines from coming into close contact.

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•When a surge-generating load such as a relay, valve or lamp is driven directly, use a product with a built-in surge absorbing element.
  Direct drive of a load generating surge voltage can damage the unit.
•The product is CE marked, but not immune to lightning strikes. Take measures against lightning strikes in the system.
•Prevent foreign matter such as dust or wire debris from getting inside the product.
•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
 •Set the switches by using a sharp-pointed screwdriver etc. When setting the switch, do not touch other unrelated parts.
  This can cause parts damage or malfunction due to a short circuit.
 •Perform settings suitable for the operating conditions.
  Incorrect setting can cause operation failure.
  For details of each setting, refer to page 21 to 26 of this manual.
 •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 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.

# System Outline

•System configuration

The EX600 range of units can be connected to various types of Fieldbus to realize the reduction of input or output device wiring and the distributed control system. The unit communicates with the Fieldbus through the SI unit. One SI unit can be connected with manifold valves with up to 32 output s and the input • output • I/O units with maximum 10 units.
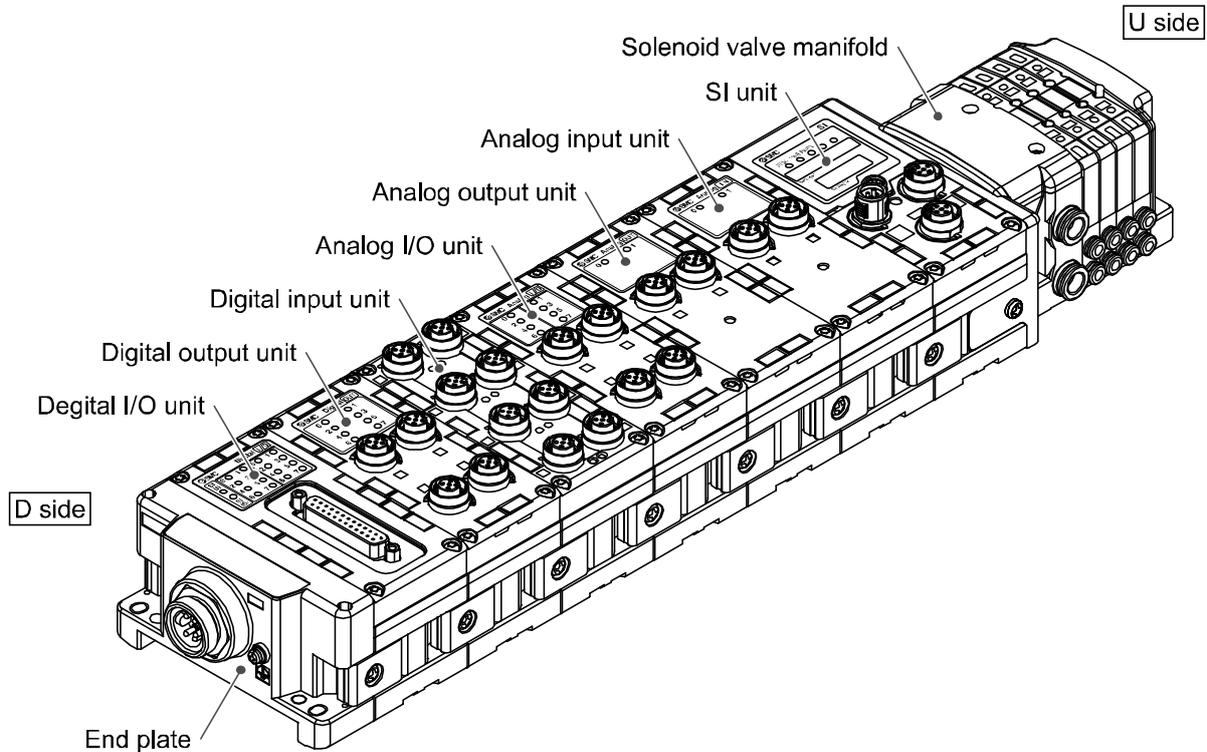


SI unit: Performs Fieldbus communication and solenoid valve manifold ON/OFF output.
Digital input unit: For connecting sensors with switch output capability. PNP and NPN types are available.
Digital output unit: For connecting output device such as solenoid valves, lamps, buzzers, etc. PNP and NPN types are available.
Digital I/O unit: This unit has both digital input and output functions. PNP and NPN types are available.
Analog input unit: For connecting sensors with analog output capability.
Analog output unit: This can be connected to the equipment which can read analog input.
Analog I/O unit: This unit has both analog input and output functions.
End plate: Connected at EX600 Manifold's D side, incorporating the power supply connection.
Solenoid valve manifold: An assembly of solenoid valves. One connector is used as the electric connection to all connected valves.

## ■Definition and terminology

| | Terminology | Definition |
|---|---|---|
| 100 | 100BASE-TX | Standard of LAN transmission line with communication speed of 100Mbps. |
| A | AD value | The signal from the analog input device is converted to digital, and displayed in decimal and hexadecimal. These hexadecimal and decimal values are also outputted to the analog output device. |
| C | Current consumption | The current necessary to operate each unit. |
| D | DHCP | The protocol which automatically set the information such as IP address which needs to be registered in order to use the network. Those information are set to each equipment which are connected to TCP/IP network. |
| | DIN rail | A metal rail conforming with DIN (German) standard. |
| | D Side | The side connected to the end plate when the product is connected to a manifold. |
| E | EDS | Settable attribute information of a device (each parameter's object address, etc.) stored on external disk. |
| | Enclosure (IP□□) | Abbreviation of international (ingress) protection. A standard related to the protection from external objects (hands, steel ball, steel wire, dust, water, etc.) applied to the product. |
| F | FE | Abbreviation of functional earth. |
| | Fieldbus | The protocol that uses digital communication to exchange signals between field equipment (instruments and actuators) running on site and a PLC. |
| | Full duplex | Communication system that can send and receive data at the same time bi-directionally. |
| H | Half duplex | Communication system that sends and receives data in one direction at a time. |
| | Handheld Terminal (H.T.) | Connected to the dedicated connector of the SI unit to adjust the internal parameters, monitor the status of all input and output signals, and turn on input and output forcedly. |
| I | Idle | Expression for PLC operation state. For details, Refer to manuals of each PLC maker. Depending on which PLC is used; the idle state might not be available. |
| | IP address | A 32 bit digit sequence which is assigned to identify devices which are connected to the network. |
| M | MAC address | A unique number inherent to all devices which are connected to EtherNet/IP$^{TM}$. |
| | Manifold | A form consisting of multiple components. A form made by combining multiple components |
| N | NPN input | Takes the sensor output that uses the NPN transistor to the signal output line. |
| | NPN output | The output type that uses an NPN transistor to operate output device. It is also known as a positive common type since a positive potential is applied to the power supply line. |
| | Number of inputs | The number of points that can receive information from input device (sensor, switch, etc.). |
| | Number of outputs | The number of points that can operate output device (solenoid valve, light, motor, etc.) |
| O | Open circuit detection | A diagnosis function to detect if the input or output device wiring is disconnected. |

| | Terminology | Definition |
|---|---|---|
| P | PLC | Abbreviation of programmable logic controller. A digital computer used for automation of electromechanical processes. |
| | PNP input | Takes the sensor output that uses the PNP transistor to the signal output part. |
| | PNP output | The output type that uses a PNP transistor to operate output device. It is also known as a negative common type since a negative potential is applied to the power supply line. |
| S | Short circuit detection | A diagnosis function to detect an over current due to the short circuit of the output and/or power supply positive line with respect to the GND line. |
| | Short circuit protection | A function to protect the internal circuit from being broken by an over current due to the short circuit of the output and/or power supply positive line with respect to the GND line. |
| | SI unit | Abbreviation of serial interface unit. A unit connected to a PLC to communicate input and output data. |
| U | U Side | The side connected to the solenoid valve when the product is connected to a manifold. |

# Assembly

• Composing the unit as a manifold

∗: If the unit was purchased as a manifold, the work described in this section is not necessary.

(1) Connect the unit to the end plate.
   The Digital unit, Analog unit can be connected in any order.
   Tighten the bracket of the joint using tightening torque 1.5 to 1.6 Nm.
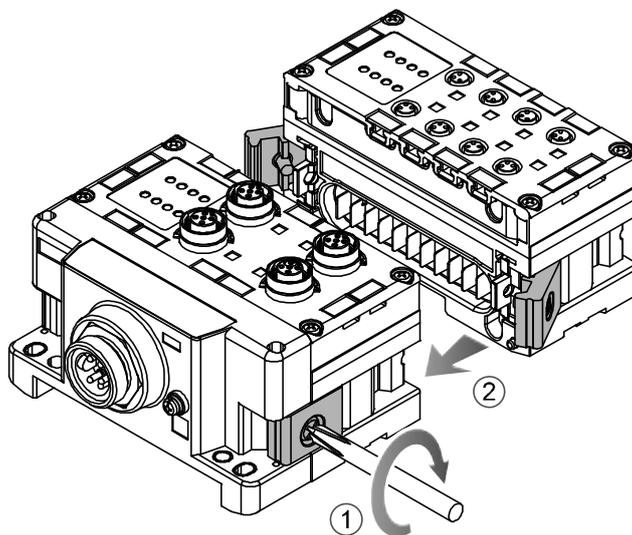


(2) Add more units.
   Up to 10 units (including the SI unit) can be connected to one manifold.
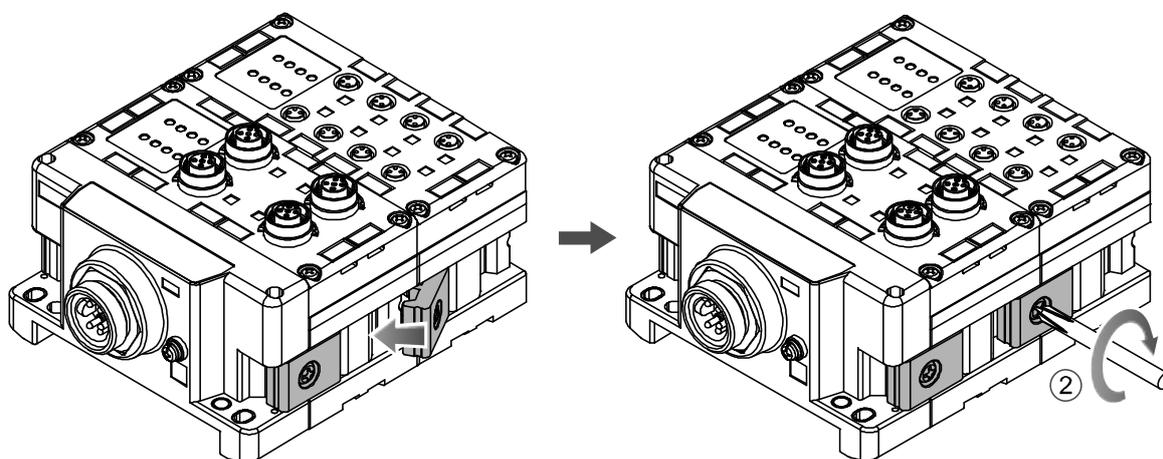


(3) Connecting the SI unit.
   After connecting the necessary units, connect the SI unit.
   Connecting method is the same as above (1), (2).

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(4) Mounting the valve plate.
    Mount the valve plate (EX600-ZMV□) to the valve manifold using the valve set screws. (M3x8)
    Apply 0.6 to 0.7 Nm tightening torque to the screws.

Screw mounting place
    SV       : 2 places
    S0700    : 2 places
    VQC1000: 2 places
    VQC2000: 3 places
    VQC4000: 4 places
    SY       : 2 places

④

Valve plate
(EX600-ZMV□)
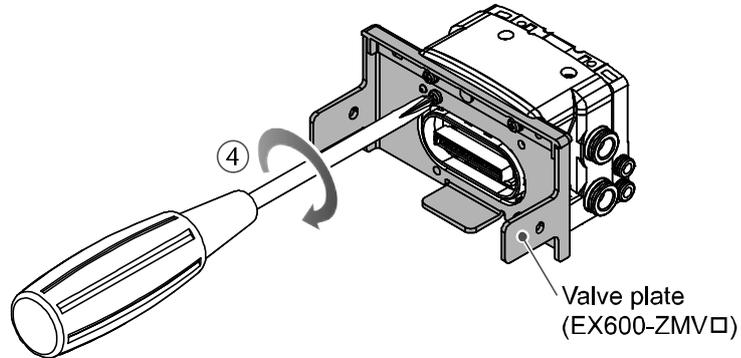
(5) Connect the SI unit and the valve manifold.
    Insert the valve plate to the valve plate set groove on the side of SI unit.
    Then, tighten it with the valve plate set screws (M4x6) to fix the plate.
    Tightening torque for set screws 0.7 to 0.8 Nm.

Valve plate
mounting groove

⑤
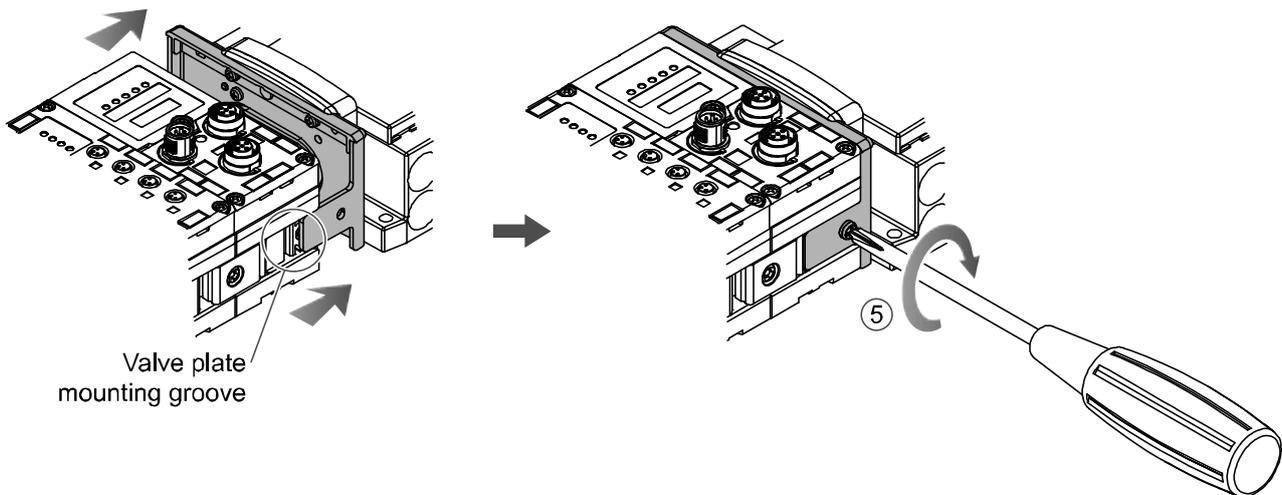
● Precautions for handling

  • Please do not connect the unit while the power supply is active. It will cause equipment
    damage.
  • Take care not to drop the nuts of Joint bracket.

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# Mounting and Installation

■Installation

•Direct mounting
(1) When joining six or more units, fix the middle part of the complete EX600 unit with an intermediate reinforcing brace (EX600-ZMB1) before mounting using 2-M4x5 screws.
Tightening torque: 0.7 to 0.8 Nm.



Intermediate reinforcing brace
(EX600-ZMB1)
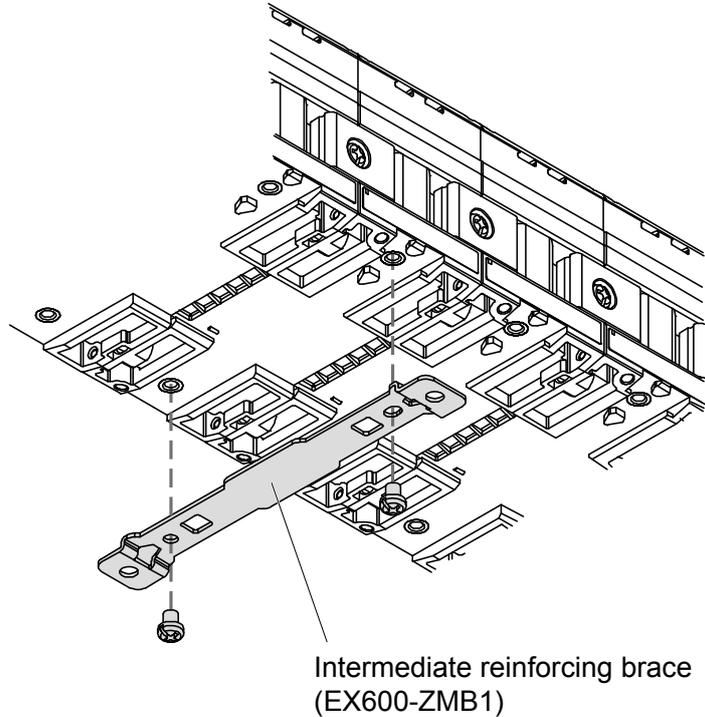
(2) Fix and tighten the end plates at one end of the unit. (M4)
Tightening torque: 0.7 to 0.8 Nm.
Fix the end plate at the valve side while referring to the operation manual of the corresponding valve manifold.
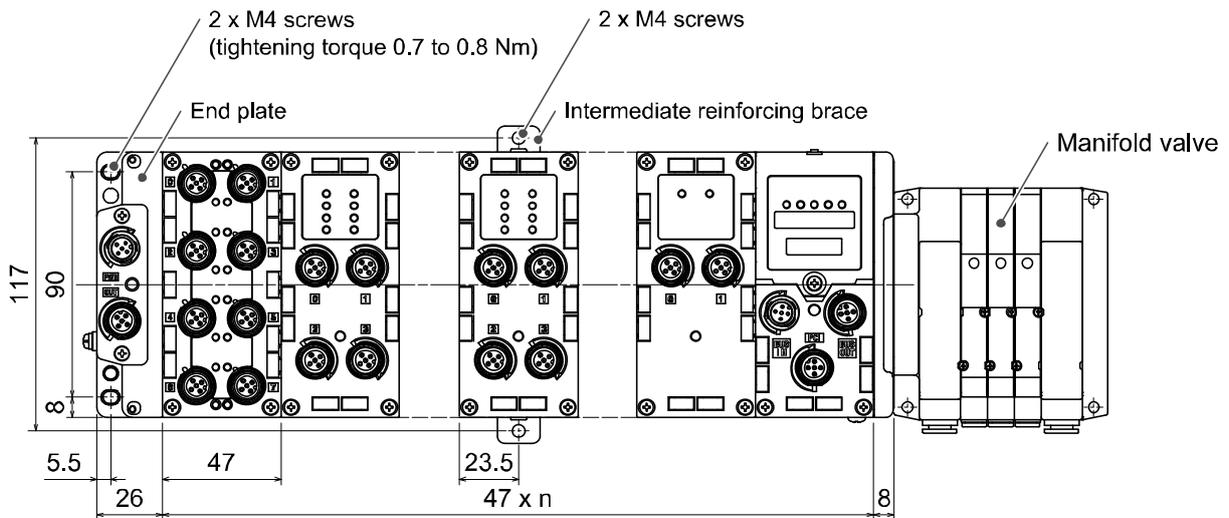


n (Number of connected units)≦10

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•DIN rail mounting
 (Available for series other than SY series. Refer to the catalog for SY series.)
 (1)When joining six or more units, fix the middle part of the complete EX600 unit with an intermediate
    reinforcing brace (EX600-ZMB2) before mounting, using 2-M4x6 screws.
    Tightening torque: 0.7 to 0.8 Nm.
 (2)Mount the end plate bracket (EX600-ZMA2) to the end plate at the opposite end to the valves, using
    2-M4x14 screws.
    Tightening torque: 0.7 to 0.8 Nm.



Intermediate reinforcing brace
(EX600-ZMB2)

End plate bracket
(EX600-ZMA2)
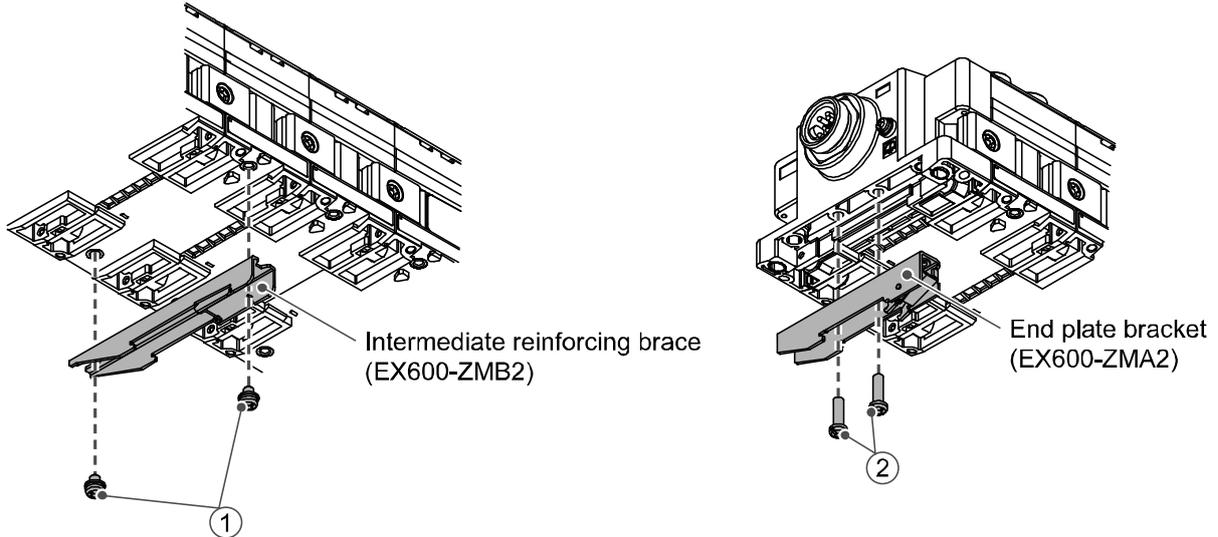
(3)Hook the DIN rail mounting groove to the DIN rail.
(4)Press the manifold using its side hooked to the DIN rail as a fulcrum until the manifold is locked.
(5)Fix the manifold by tightening the DIN rail fixing screws of the EX600-ZMA2. (M4x20)
    Tightening torque: 0.7 to 0.8 Nm.
    The tightening torque at the valve side depends on the valve type.
    Refer to the operation manual of the corresponding valve manifold.



DIN rail mounting groove

DIN rail

End plate bracket
(EX600-ZMA2)
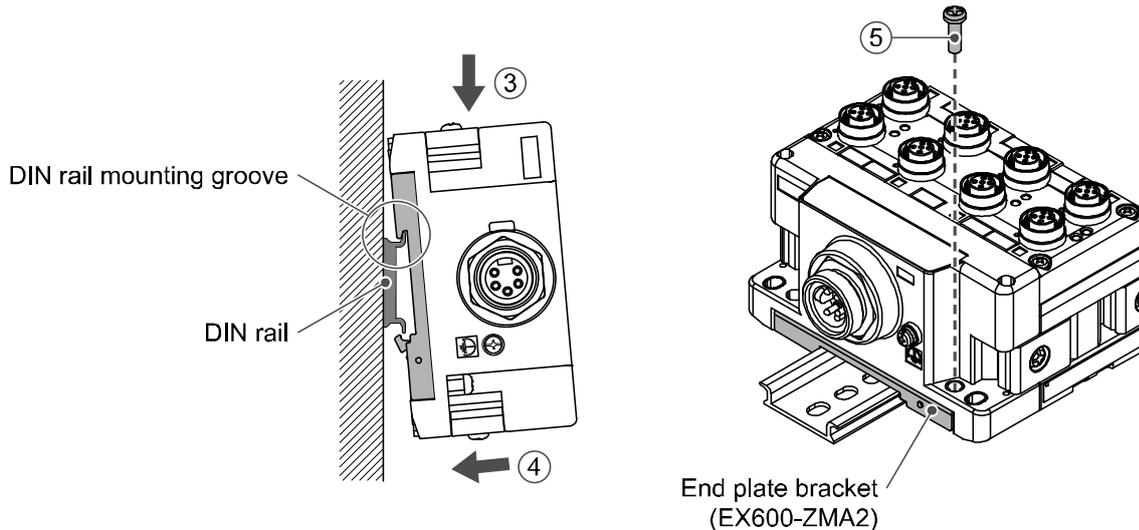
## ■Wiring

•Connect the M12 or M8 connector cable. M12 connector is applicable for SPEEDCON connector.
 SPEEDCON connector wiring method is explained below.
 (1)Align the mark B on the metal bracket of the cable side connector (plug/socket) with the mark A.
 (2)Align the mark C on the unit and insert the connector into the unit vertically.
   If they are not aligned, the connector cannot be joined properly.
 (3)When the mark B of the connector has been turned 180 degrees (1/2 turn), wiring is completed. Confirm
   that the connection is not loose. If turned too far, it will become hard to remove the connector.

| (1) | (2) | (3) |
|-----|-----|-----|
| Mark A at cable end<br>Mark B at cable end<br>Mark C on the unit | | |
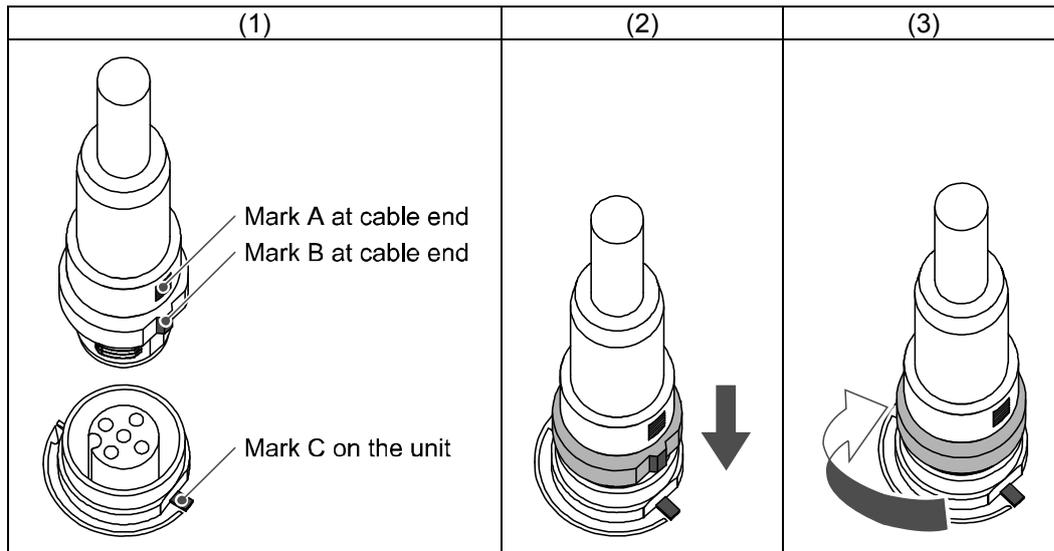
•D-sub socket connection method is explained below.
 (1)Align the D-sub socket connector of the unit and the plug connector of the cable.
 (2)Insert the plug connector of the cable into the D-sub socket connector of the unit vertically.
   If the connector is pushed forcibly, the pin will bend and the connector cannot be joined.
 (3)Fix the connector by tightening two No.4-40 UNC screws in the lock screw parts located at both ends of
   the connector of the unit. The tightening torque should be within 0.6 Nm.

Lock screw: No.4-40 UNC

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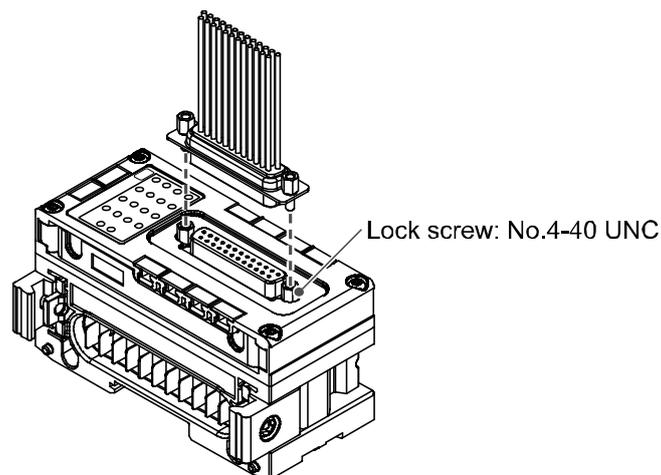
•Spring type terminal conection method is explained below.
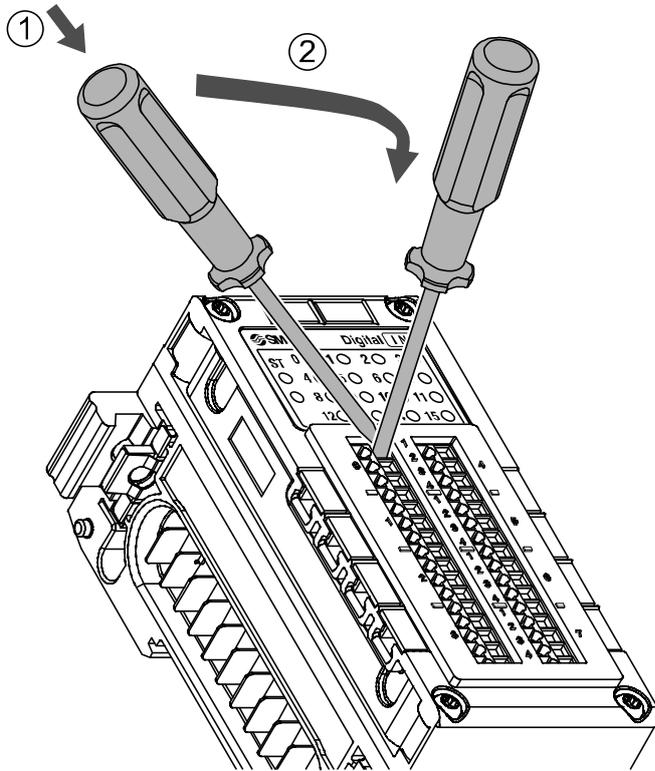


① Insert a flat blade screwdriver inclined to the left into the right hole of the two holes as shown in the figure below.

Screwdriver inlet
Cable inlet
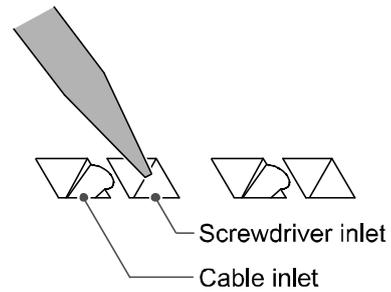
② Incline the screwdriver to the right as indicated by the arrow.
When the screwdriver is pushed downwards until it stops, the cable inlet will open.
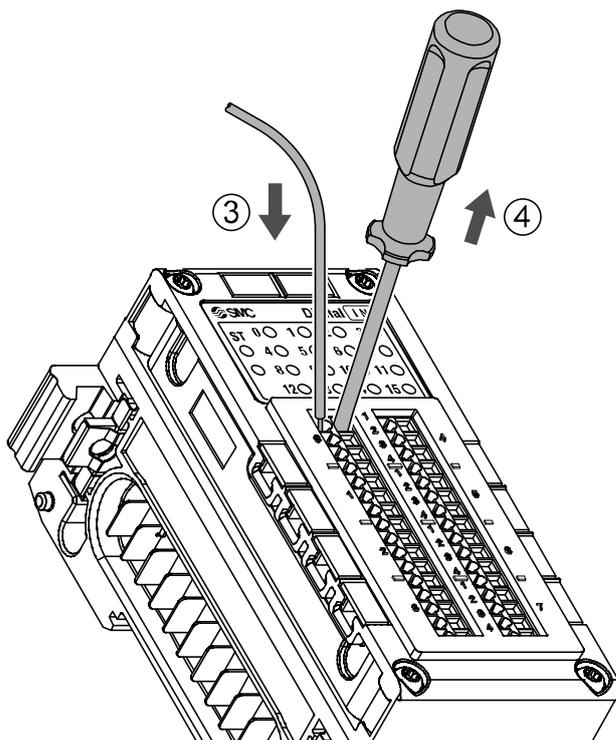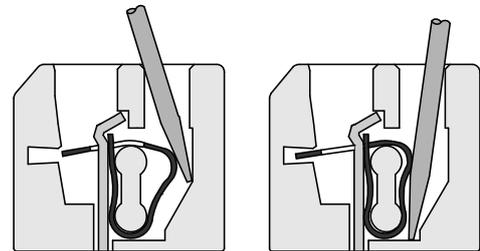
③ Insert the cable.
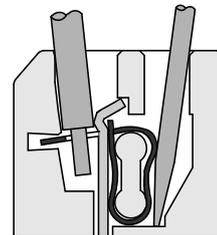
④ The spring will capture the cable when the flat blade screwdriver is pulled out. This completes the connection.

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The electric wire below can be connected to the terminal block connector.
•Single wire.
•Stranded conductor.
•Flexible stranded conductor (Stranded conductor with thin wires).
•Flexible stranded conductor with the ultrasonic welded.
•Flexible stranded conductor with crimped ferrule.

●Precautions for handling

•To open the clamp, use a flat blade screwdriver of blade width 2.5 mm, and thickness of 0.4 mm or less.
•Applicable wire should have conduction area of 0.08 to 1.5 mm$^2$ (AWG16 to 28).
•The length of the electric wire to be stripped should be 5 to 6 mm.
 If the stripped part is too long, it can cause insulation failure due to the exposure of the conductor.
 If the stripped part is too short, it can cause contact failure due to the sheath being caught, or contact failure or power failure due to insufficient clamping of the conductor.

•Mounting the marker
 Signal name of the input or output devices and unit address can be written to the marker, and it can be installed to each unit.
 Mount the marker (EX600-ZT1) into the marker groove as required.

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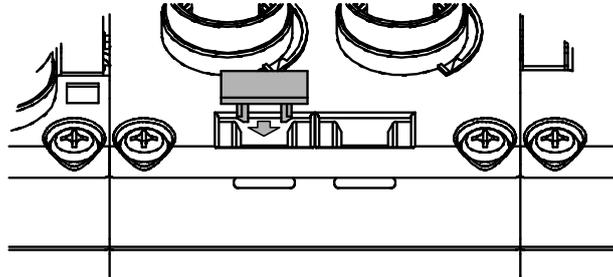
# SI unit

## Model Indication and how to Order

**EX600-S**☐☐

SI unit ─┘

Protocol ─┘

| Symbol | Content |
|--------|---------------------|
| EN | EtherNet/IP™ |

Polarity of output ─┘

| Symbol | Content |
|--------|------------------|
| 1 | PNP (-common) |
| 2 | NPN (+common) |
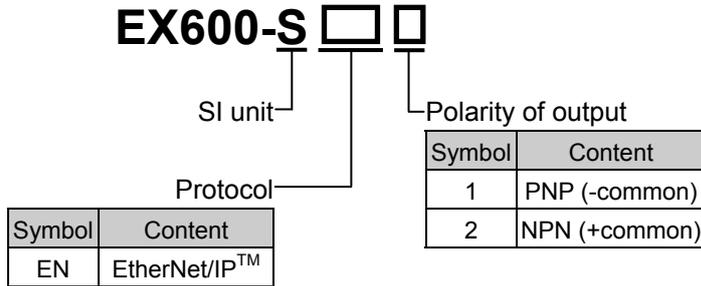
## Names and Functions of Product
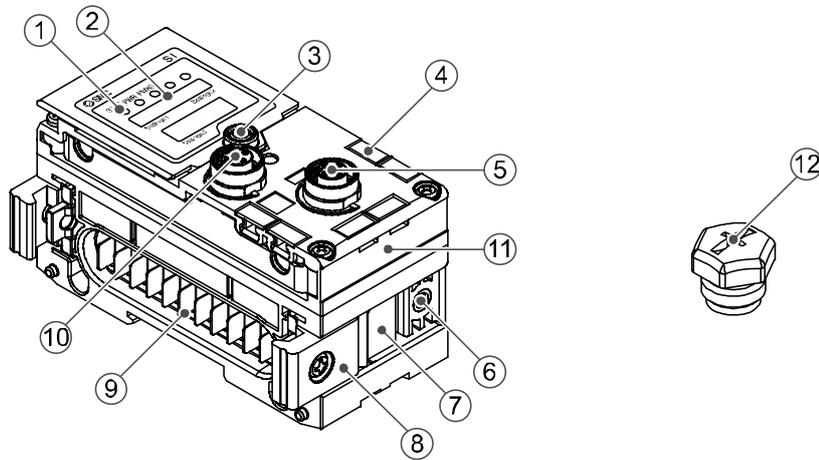
| No. | Description | Function |
|-----|-------------|----------|
| 1 | Status display LED | Displays the status of the unit. |
| 2 | Display cover | Open for the setting of switch. |
| 3 | Display cover tightening screw | Loosen to open the display cover. |
| 4 | Marker groove | Groove to mount a marker. |
| 5 | Connector (PCI) | Connects the cable of the handheld terminal*. |
| 6 | Valve plate mounting screw hole | Fixes the valve plate. |
| 7 | Valve plate mounting groove | Groove to insert the valve plate into. |
| 8 | Joint bracket | Bracket for joining to adjacent units. |
| 9 | Unit connector (Plug) | Transmits signals and power supplies to adjacent units. |
| 10 | Connector (BUS IN) | Connects the cable for fieldbus inputs. |
| 11 | MAC address label | Displays the 12 digit MAC address which is different for each SI unit. |
| 12 | Seal cap (1 pc.) | Mounted on to unused connector (PCI). |

∗: The Handheld Terminal have to use EX600-HT1A. (EX600-HT1 cannot be used.)

SMC

No.EX##-OMN0032

# Mounting and Installation

■Wiring

○Connector pin assignment

| Configuration | Pin number | Signal name |
|---|---|---|
| BUS IN | | |
|  1 2 4 3 | 1 | TX+ |
| | 2 | RX+ |
| | 3 | TX- |
| | 4 | RX- |
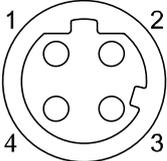
●Precautions for handling

Be sure to fit a seal cap on any unused connectors. Proper use of the seal cap enables the enclosure to achieve IP67 specification.

**SMC**

# Setting and Adjustment

•Switch setting
(1)Loosen the display cover screw.
(2)Open the display cover using a flat head screwdriver, etc.
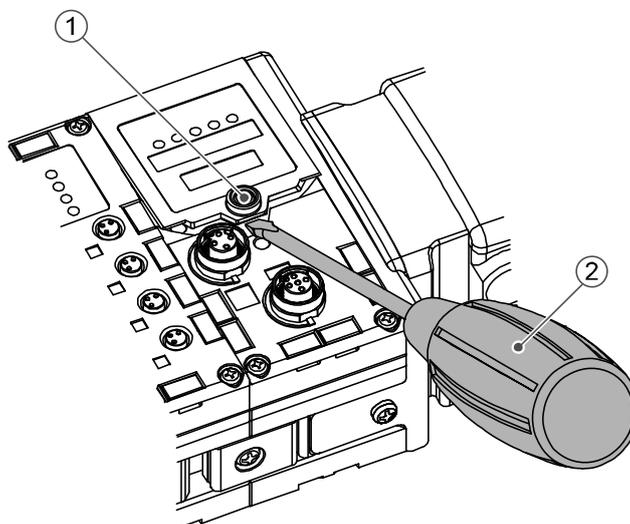


(3)Set the switch using a small watchmaker's screwdriver with a thin blade, referring to the setting of switch on the following pages.
(4)After setting the switch, tighten the display cover tightening screw in the reverse order of the above procedure. (Tightening torque: 0.3 to 0.4 Nm)

●Precautions for handling

•Turn off the power supply whilst setting the switch.
•If there is foreign matter or water droplets around the display cover, clean it off before opening the cover.
•When setting the switch, do not touch other unrelated parts. This can cause parts damage or malfunction due to a short circuit.
•All default settings are OFF. Perform the setting of the switch before using this product.
•When introducing power supply, switch setting will become effective.

•Configuration memory switch: When the manifold configuration memory switch is set ON and the power supply is switched ON, the system will compare the stored configuration with the manifold configuration. If the configuration is different, diagnostic error will be generated.
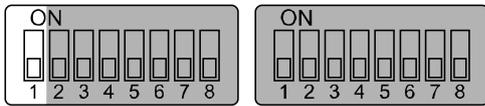


Settings1          Settings2
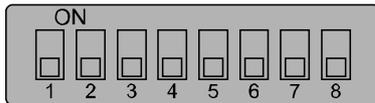


Settings3

| Settings1 | Content |
|---|---|
| 1 | |
| OFF | Normal operation mode (Default setting) |
| ON | Configuration memory mode |

Timing to memorize the configuration → When power supply for control and input is turned on, with the switch above turned OFF.

Timing to compare the configuration → When power supply for control and input is turned on, with the switch above turned ON.

•Baud Rate switch: Sets the communication speed of the internal bus of the product.
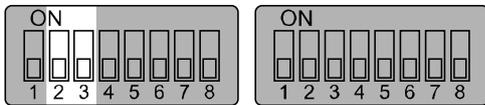


Settings1          Settings2
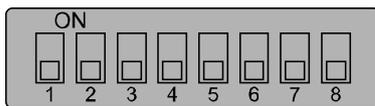


Settings3

| Settings1 | | Content |
|---|---|---|
| 2 | 3 | |
| OFF | OFF | 1 Mbps (Default setting) |
| OFF | ON | 500 kbps |
| ON | OFF | 250 kbps |
| ON | ON | 125 kbps |

∗: This function is for extension in the future. Use the product with 1 Mbps (Default setting).

• IP address setting switch
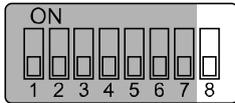


Settings1
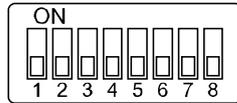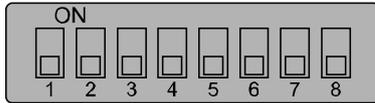


Settings2



Settings3

| Settings1 | Settings2 | | | | | | | | IP address |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| OFF | ON | OFF | OFF | OFF | OFF | OFF | OFF | OFF | 192.168.0.1 |
| OFF | OFF | ON | OFF | OFF | OFF | OFF | OFF | OFF | 192.168.0.2 |
| : | : | : | : | : | : | : | : | : | : |
| OFF | ON | OFF | ON | ON | ON | ON | ON | ON | 192.168.0.253 |
| OFF | OFF | ON | ON | ON | ON | ON | ON | ON | 192.168.0.254 |
| ON | ON | OFF | OFF | OFF | OFF | OFF | OFF | OFF | 192.168.1.1 |
| ON | OFF | ON | OFF | OFF | OFF | OFF | OFF | OFF | 192.168.1.2 |
| : | : | : | : | : | : | : | : | : | : |
| ON | ON | OFF | ON | ON | ON | ON | ON | ON | 192.168.1.253 |
| ON | OFF | ON | ON | ON | ON | ON | ON | ON | 192.168.1.254 |
| ON/OFF | ON | ON | ON | ON | ON | ON | ON | ON | DHCP mode [1] |
| ON/OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | Remote Control mode [2] |

*1: The mode to obtain IP address from DHCP server. Obtained IP address is lost when the power supply is cut.

*2: The mode to respond to the commands below of BOOTP/DHCP Server provided by Rockwell Automation.

  Enable DHCP: IP address etc. can be obtained from BOOTP/DHCP Server.

    If the power is supplied again in this state, information including IP address is obtained again.

  Disable DHCP: IP address etc. cannot be obtained from BOOTP/DHCP Server.

    If the power is supplied again with this condition, previous setting can be held.

 Refer to the manual of BOOTP/DHCP Server for a detail of the mode.

SMC

No.EX##-OMN0032

•V_SEL switch:  A function to select the number of occupied valve outputs.
The number of outputs (size) occupied by the SI unit is selected.
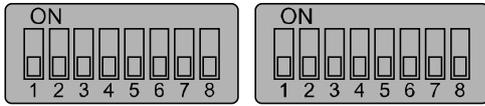
Settings1          Settings2
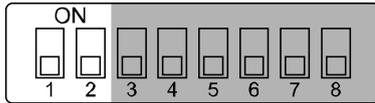
Settings3

| Settings3 | | Content | SI unit output data size |
|---|---|---|---|
| 1 | 2 | | |
| OFF | OFF | Number of occupied valve 32 outputs | 4 byte (Default setting) |
| OFF | ON | Number of occupied valve 24 outputs | 3 byte |
| ON | OFF | Number of occupied valve 16 outputs | 2 byte |
| ON | ON | Number of occupied valve 8 outputs | 1 byte |

∗: Set the number of occupied valve outputs to at least the number of valves used.


•Switch for diagnosis: Allocates the diagnostic data to the input data.
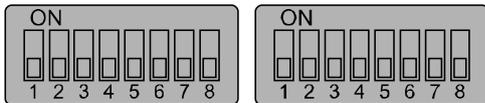
Settings1          Settings2
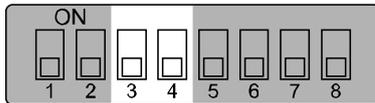
Settings3

| Settings3 | | Mode | Content | Diagnostic size set for the input |
|---|---|---|---|---|
| 3 | 4 | | | |
| OFF | OFF | 0 | Input data only (Default setting) | 0 byte |
| OFF | ON | 1 | Input data + System diagnosis | 4 byte |
| ON | OFF | 2 | Input data + System diagnosis + Unit diagnosis (Up to 10 units) | 6 byte |
| ON | ON | 3 ∗ | Input data + System diagnosis + Unit diagnosis (Up to 64 units) | 12 byte |

∗: Mode 3 is a function for extension in the future. Do not use it now.

SMC

No.EX##-OMN0032

•HOLD/CLEAR switch: Sets the output status when the fieldbus has a communication error or is in idling state.
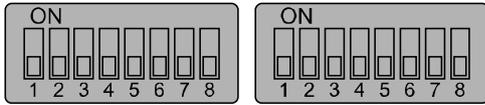


Settings1          Settings2
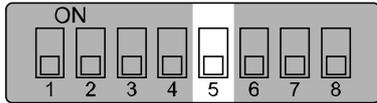


Settings3

| Settings3 | Content |
| --- | --- |
| 5 | |
| OFF | Output is off. (Default setting) |
| ON | Holds the output. |

∗: Refer to" Parameter Setting" (page 45), for the further details.


•EtherNet/IP™ communication setting switch
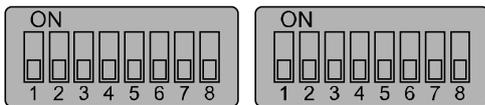


Settings1          Settings2
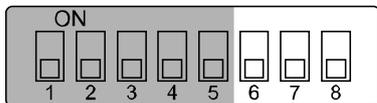


Settings3

| Settings3 | | | Communication speed and full duplex/half duplex setting |
| --- | --- | --- | --- |
| 6 | 7 | 8 | |
| OFF | ON/OFF | ON/OFF | Automatic |
| ON | OFF | OFF | 10 Mbps, half duplex |
| ON | OFF | ON | 10 Mbps, full duplex |
| ON | ON | OFF | 100 Mbps, half duplex |
| ON | ON | ON | 100 Mbps, full duplex |


●Precautions for handling

•Handle the switch with care.  Excessive force can break the switch.
•4, 5, 6, 7 of the Settings1 switch are not used.

SMC

No.EX##-OMN0032

• Setting method of IP address by BOOTP/DHCP Server
 • When BOOTP/DHCP Server starts up, the Server scans the devices connected to the network.
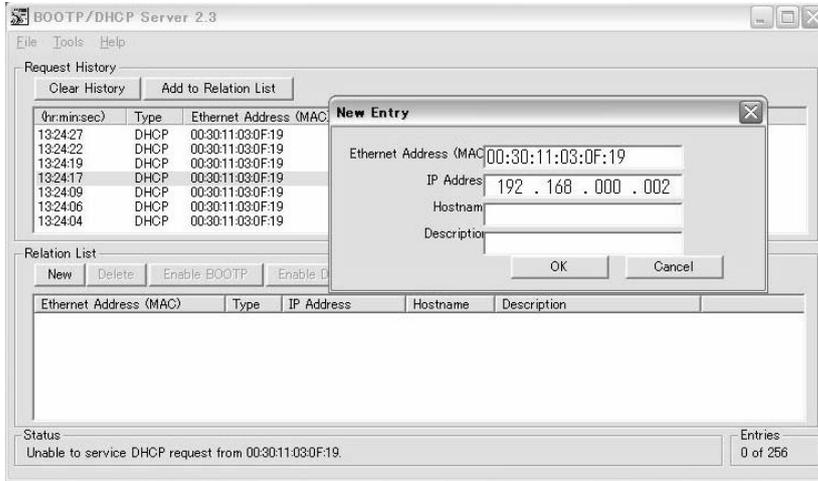


• After selecting the MAC address of EX600, IP address is set.
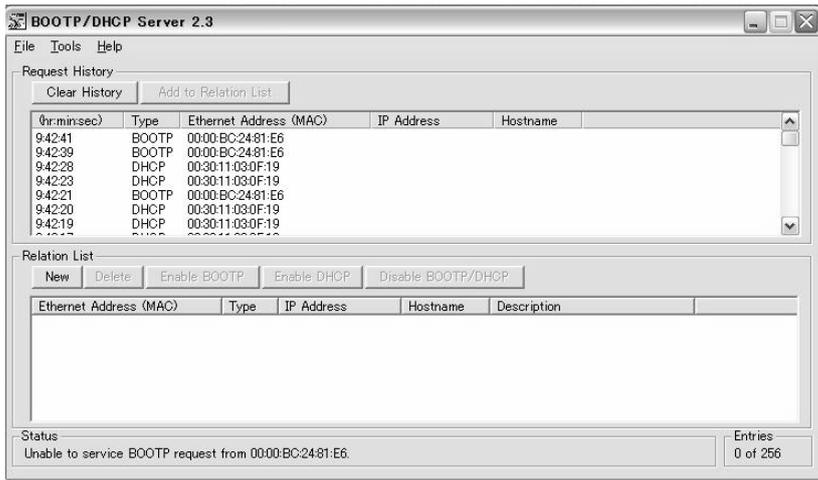


• IP address is set and added to the list.

No.EX##-OMN0032
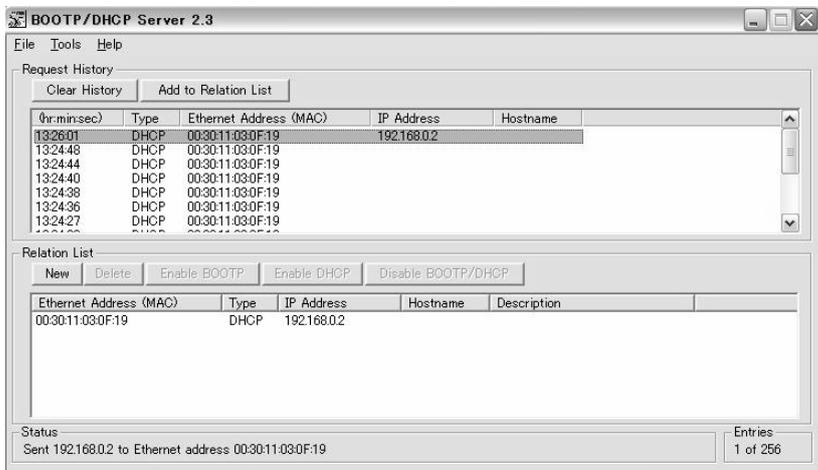
# LED Display

The status display LED displays the power supply and communication status.
Various kinds of status can be checked as follows:
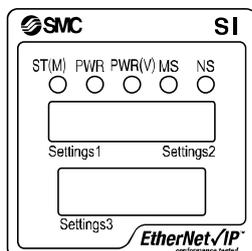
| Display | Content |
|---|---|
| ST(M) | Displays the diagnosis status of the unit. |
| PWR | Displays the status of the power supply voltage for control and input. |
| PWR(V) | Displays the status of the power supply voltage for outputs. |
| MS | Displays the module status. |
| NS | Displays the network status. |

•SI unit common status

| LED display | Content |
|---|---|
| ST(M) PWR PWR(V)<br>OFF | The power supply for control and input is OFF. |
| ST(M) PWR PWR(V)<br>Green LEDs are ON | The unit is in normal operation. |
| ST(M) PWR PWR(V)<br>Red ST(M) LED is ON | A component failure inside the SI unit. |
| ST(M) PWR PWR(V)<br>Red PWR LED is ON | The power supply voltage for control and input is abnormal. |
| ST(M) PWR PWR(V)<br>Red PWR(V) LED is ON | The power supply voltage for outputs is abnormal. |
| ST(M) PWR PWR(V)<br>Green ST(M) LED is flashing | A unit other than the SI unit has been diagnosed and detected. |
| ST(M) PWR PWR(V)<br>Red ST(M) LED is flashing | Either of the following conditions:<br>•The valve ON/OFF counter has exceeded the set value.<br>•The valve is short circuited or disconnected. |
| ST(M) PWR PWR(V)<br>Red/green ST(M) LED is flashing alternately | Either of the following conditions:<br>•Connection error between units has occurred.<br>•Configuration memory error has occurred. |

∗: Refer to"Ttroubleshooting" (page 36), for the further details of countermeasures.

• EtherNet/IP<sup>TM</sup> status

| LED display | Content |
|---|---|
| MS<br>○<br>MS LED is OFF | The power supply for control and input is OFF. |
| MS<br>◉<br>Green MS LED is flashing | Either of the following conditions:<br>•The unit has not been configured correctly.<br>•Fieldbus is idling. |
| MS<br>●<br>Green MS LED is ON | The unit is in normal operation. |
| MS<br>☀<br>Red MS LED is flashing | Recoverable error. |
| MS<br>●<br>Red MS LED is ON | The element in SI unit is broken. |
| NS<br>○<br>NS LED is OFF | The power supply for control and input is OFF, or IP address is not set. |
| NS<br>☀<br>Green NS LED is flashing | The unit received an IP address, but connection is not established. |
| NS<br>●<br>Green NS LED is ON | Connection is established. |
| NS<br>☀<br>Red NS LED is flashing | Connection timeout. |
| NS<br>●<br>Red NS LED is ON | IP address is duplicated. |

∗: Refer to"Ttroubleshooting" (page36), for the further details of countermeasures.

# Specification

## ■Specifications

| Model | | EX600-SEN1 | EX600-SEN2 |
|---|---|---|---|
| Communication | Protocol | EtherNet (IEEE802.3) | |
| | Media | 100BASE-TX | |
| | Communication speed | 10/100 Mbps (Automatic/Manual) | |
| | Communication type | Full duplex/half duplex (Automatic/Manual) | |
| | Configuration file | EDS file | |
| | Fieldbus protocol | EtherNet/IP™<br>(Conformance version: Composite6) | |
| | Occupied area<br>(Number of inputs/outputs) | (512 inputs/512 outputs) max. | |
| | IP address setting range | Setting by SI unit switch: 192.168.0 or 1.1 to 254<br>Via DHCP server : Arbitrary address | |
| | Device information | Vendor ID: 7 (SMC Corporation)<br>Product type: 12 (Communication Adapter)<br>Product code: 126 | |
| Power supply (Control and input) | | 24 VDC Class2, 2 A | |
| Internal current consumption<br>(The power supply for control and input) | | 120 mA or less | |
| Valve output | Polarity of output | PNP (-common) | NPN (+common) |
| | Output channel | 32 outputs (8/16/24/32 outputs selectable) | |
| | Connected load | Solenoid valve with lamp and circuit of protection of surge voltage<br>of 24 VDC 1.5 W (SMC) | |
| | Power supply (Output) | 24 VDC Class2, 2 A | |
| | Output for communication error | HOLD/CLEAR/Force ON | |
| | Protective function | Short circuit protection | |
| Environment | Enclosure | IP67 (With manifold assembled) [1] | |
| | Operating temperature range | -10 to 50 °C (Max. surrounding air temperature rating: 50 °C) [2] | |
| | Storage temperature range | -20 to 60 °C | |
| | Operating humidity range | 35 to 85% RH (No condensation) | |
| | Withstand voltage | 500 VAC for 1 minute between external terminals and FE | |
| | Insulation resistance | 500 VDC, 10 MΩ or more between external terminals and FE | |
| | Vibration resistance | 10 to 57 Hz: constant amplitude 0.75 mm p-p<br>57 to 150 Hz: constant acceleration 49 m/s$^2$<br>for 2 hours each in direction X, Y and Z respectively (De-energized) | |
| | Impact resistance | 147 m/s$^2$ 3 times each in directions of X, Y and Z respectively<br>(De-energized) | |
| | Pollution degree | For use in Pollution Degree 2 Environment (UL508) | |
| Standard | | CE marking, UL (CSA) , RoHS | |
| Weight | | 300 g | |

[1]: All unused connectors must have a seal cap fitted.

[2]: The UL compliant temperature is 0 to 50 °C.

## ■Dimensions

No.EX##-OMN0032
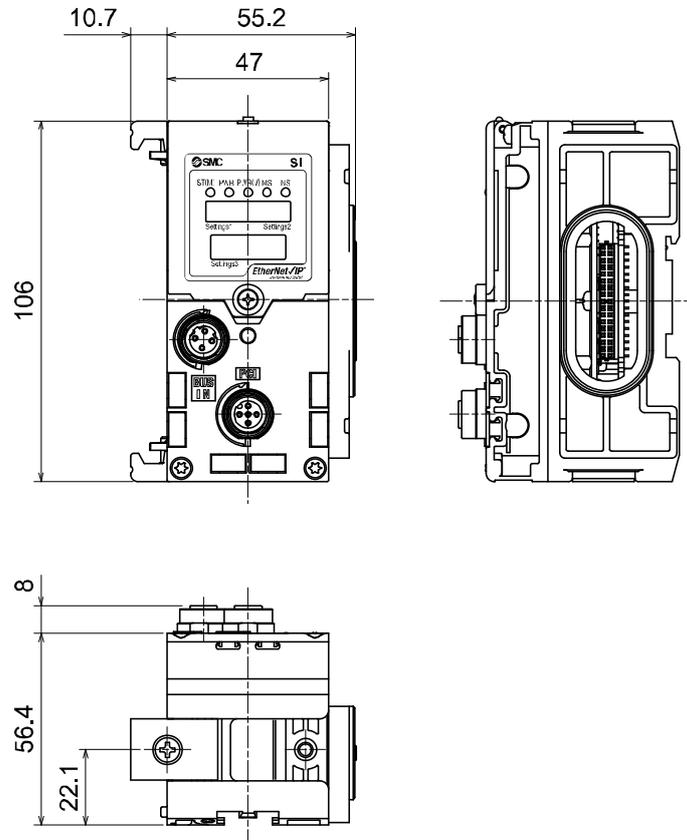
# *End plate*

## Model Indication and How to Order

# EX600-ED☐-☐

End plate at D side ⎯⎯

Mounting method

| Symbol | Content |
|---|---|
| Nil | No DIN rail bracket |
| 2 | With DIN rail bracket |
| 3 | With DIN rail bracket (Specified for SY series) |

Connector ⎯⎯

| Symbol | Content |
|---|---|
| 2 | M12 (5 pin) |
| 3 | 7/8 inch (5 pin) |

## Names and Functions of Product

•EX600-ED2-☐

•EX600-ED3-☐
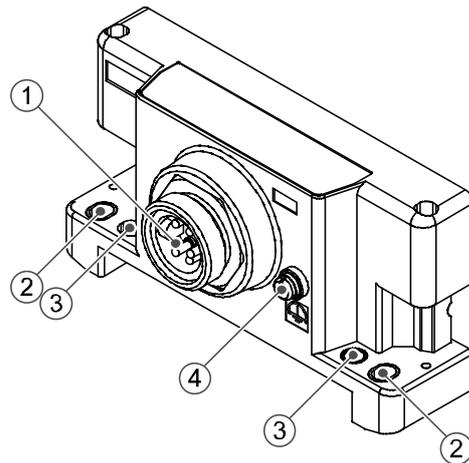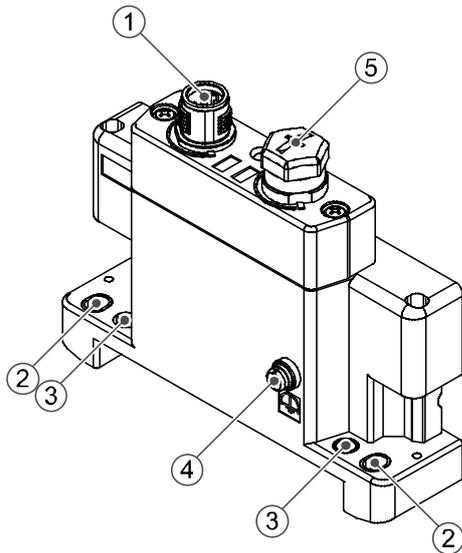


| No. | Description | Function |
|---|---|---|
| 1 | Power connector | Supplies power for each unit and input/output device. |
| 2 | Fixing hole for direct mounting | Holes used for direct mounting. |
| 3 | DIN rail fixing hole | Holes used to fix DIN rail. |
| 4 | FE terminal | Terminal used to grounding. |
| 5 | Connector (Not used) | This connector is not used. Do not take off the seal cap. |

SMC

# Mounting and Installation

## ■Wiring

### ○Connector pin assignment
(1)EX600-ED2-□

| Configuration | Pin No. | Signal name |
|---|---|---|
| | 1 | 24 V (Output) |
| | 2 | 0 V (Output) |
| | 3 | 24 V (Control and input) |
| | 4 | 0 V (Control and input) |
| | 5 | FE |

(2)EX600-ED3-□

| Configuration | Pin No. | Signal name |
|---|---|---|
| | 1 | 0 V (Output) |
| | 2 | 0 V (Control and input) |
| | 3 | FE |
| | 4 | 24 V (Control and input) |
| | 5 | 24 V (Output) |

### ○Regarding the 2 types of power supply
•Power supply for control and input: Supplying power for control of each unit's power supply for control and also for device connected to input port of digital and analog unit.

•Power supply for output: Supplying power for equipment connected to output port of digital and analog unit, and also power supply for solenoid valve manifold.
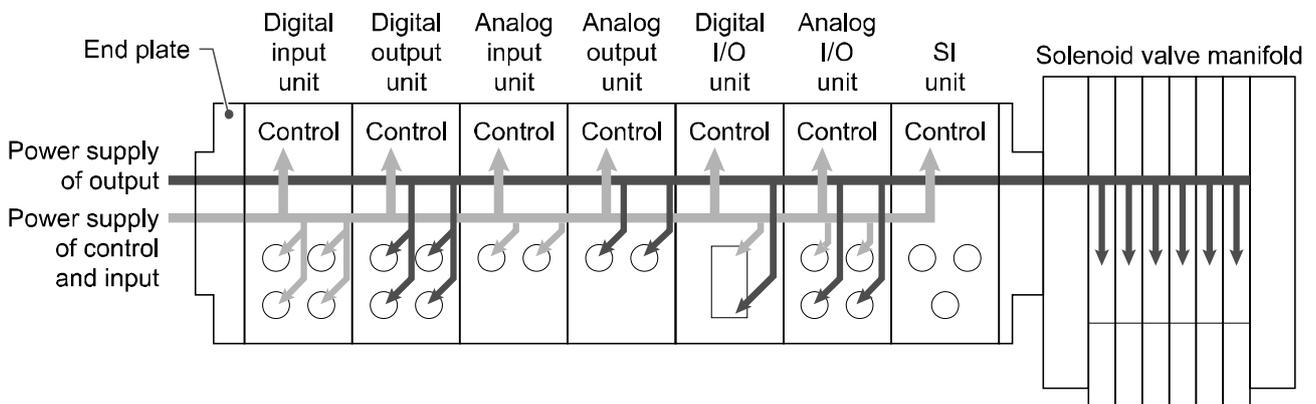


### ●Precautions for handling

Be sure to fit a seal cap on any unused connectors. Proper use of the seal cap enables the enclosure to achieve IP67 specification.

# Specification

## ■Specifications

| Model | | EX600-ED2-□ | EX600-ED3-□ |
|---|---|---|---|
| Power specifications | Power connector | M12 (5 pin) Plug | 7/8 inch (5 pin) Plug |
| | Power supply (Control and input) | 24 VDC ±10% Class2, 2 A | 24 VDC ±10%, 8 A |
| | Power supply (Output) | 24 VDC +10/-5% Class2, 2 A | 24 VDC +10/-5%, 8 A |
| Environment | Enclosure | IP67 (With manifold assembled) [*1] | |
| | Operating temperature range | -10 to 50 °C (Max. surrounding air temperature rating: 50 °C) [*2] | |
| | Storage temperature range | -20 to 60 °C | |
| | Operating humidity range | 35 to 85%RH (No condensation) | |
| | Withstand voltage | 500 VAC for 1 minute between external terminals and FE | |
| | Insulation resistance | 500 VDC, 10 MΩ min. between external terminals and FE | |
| | Vibration resistance | 10 to 57 Hz: constant amplitude 0.75 mm p-p<br>57 to 150 Hz: constant acceleration 49 m/s$^2$<br>for 2 hours each in direction X, Y and Z respectively (De-energized) | |
| | Impact resistance | 147 m/s$^2$ 3 times each in directions of X, Y and Z respectively (De-energized) | |
| | Pollution degree | For use in Pollution Degree 2 Environment (UL508) | |
| Standard | | CE marking, UL(CSA), RoHS | |
| Weight | | 170 g | 175 g |

*1: All unused connectors must have a seal cap fitted.

*2: The UL agreement temperature is 0 to 50 °C.

## ■Dimensions

•EX600-ED2-□
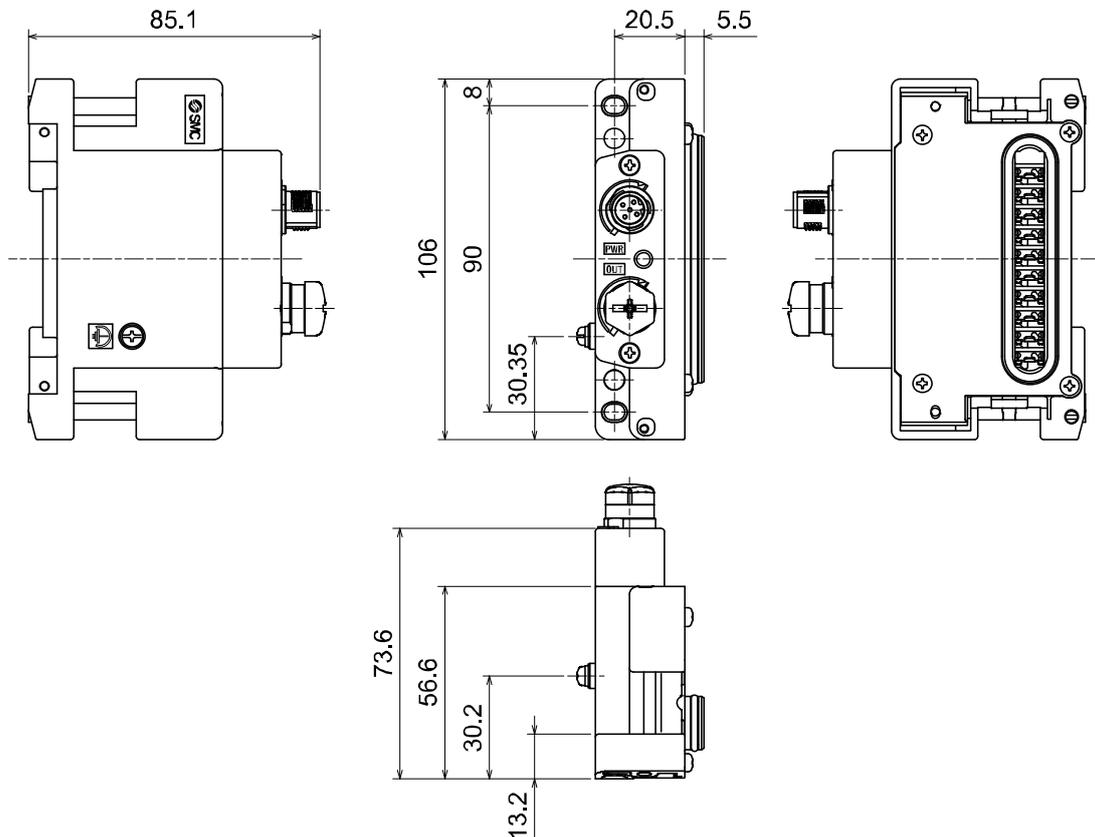
• EX600-ED3-□
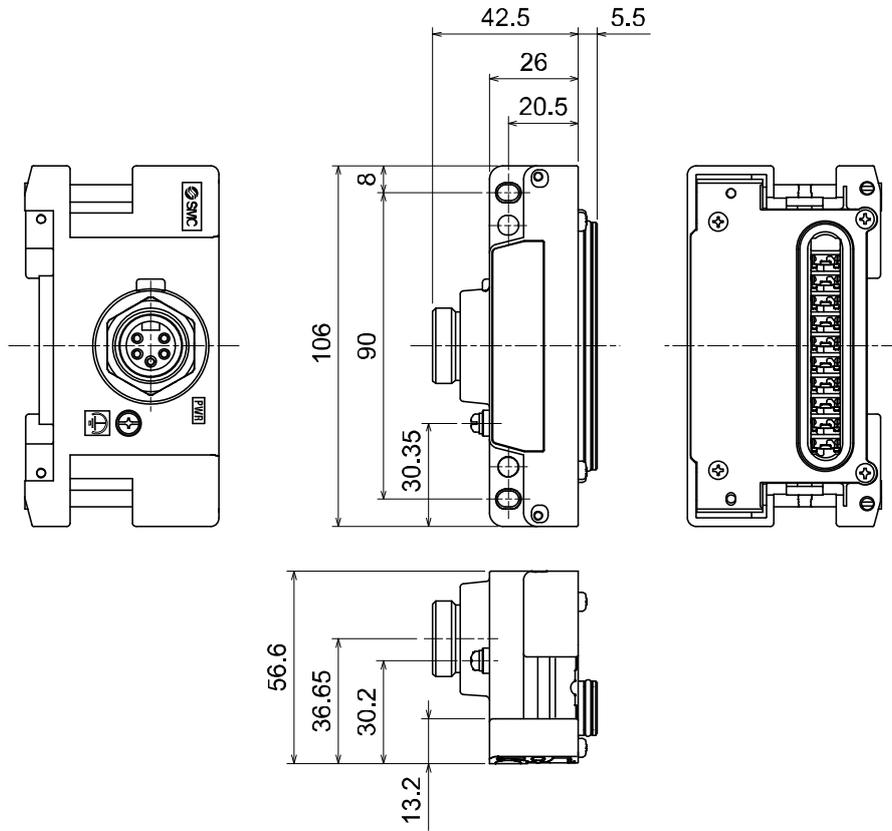
## Maintenance

Turn off the power supply, stop the supplied air, exhaust the residual pressure and verify the release of air before performing maintenance.

### Cleaning method

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.
Do not use solvents such as benzene, thinner etc. to clean each unit.

| Inspection item | Content of inspection |
| --- | --- |
| Connector/Electric wiring | Connect properly if the connection is loose. |
| Seal cap | Tighten properly if the connection is loose. |
| Thread for mounting and installation | If the thread is loose, re-tighten it to the specified torque. |
| Connection cables | If the cable is broken or any other abnormality is confirmed by appearance, replace the cable with a new one. |
| Supply source voltage | Check if source voltage within the specification range (24 VDC ±10%) is supplied. |

### How to reset the product for power cut or forcible de-energizing

Supply power to the product.
The output status just before the power failure is not maintained when power supply is recovered.
Start operation after confirming safety of the entire equipment.

# Troubleshooting

•Troubleshooting
When any failure happens with this fieldbus system, the following chart is used to identify the cause of the failure.
Error status is reflected from the parameter setting of the fieldbus system.
When a failure occurs, take the appropriate countermeasures referring to the LED display, the troubleshooting and the parameter setting.
If a cause applicable to the failure cannot be identified, it indicates that the fieldbus system itself is broken.
The fieldbus system breakage can be caused by the operating environment. Contact SMC separately to obtain countermeasures.

The system does not work correctly.

LED is OFF. → Refer to failure 1.

Yes →
No ···▶

SI unit

Green ST(M)LED is flashing.

**Digital input** unit displays error. → Refer to failure 2.

**Digital output** unit displays error. → Refer to failure 3.

**Digital I/O** unit displays error. → Refer to failure 4.

**Analog input** unit displays error. → Refer to failure 5.

**Analog output** unit displays error. → Refer to failure 6.

**Analog I/O** unit displays error. → Refer to failure 7.

Contact SMC if it does not recover after replacing the SI unit whose unit is broken.

No.EX##-OMN0032

```
SI unit

  Red ST(M) LED is flashing.  ───────────────────────────▶  Refer to failure 8.

  Red ST(M) LED is On.
  Or red/green ST(M)          ───────────────────────────▶  Refer to failure 9.
  LED is flashing alternately.

  Red PWR or PWR(V)           ───────────────────────────▶  Refer to failure 10.
  LED is On.

  MS, NS LED does not         ───────────────────────────▶  Refer to failure 11.
  light in green.


  The valve does not          ───────────────────────────▶  Refer to failure 12.
  work correctly.

  The digital input or output ───────────────────────────▶  Refer to failure 13.
  device does not work
  correctly.

  The analog input or output  ───────────────────────────▶  Refer to failure 14.
  device does not work
  correctly.

                              ···························▶  Contact SMC.
```

SMC

•Trouble counter measure method

| No. | Part No. EX600- | Problem | Presumed cause | Troubleshooting |
|---|---|---|---|---|
| 1 | - | LED is OFF. | Power supply for control and input is OFF. | Check if the power for control and input is supplied. |
| 2 | DX□B DX□C□ DX□D | Red LED is ON. (Diagnosis is activated) | Diagnosis error<br>Input device power supply is short-circuited. | Check the parts with error by using the LED display or PLC* or H.T. Re-wire the short-circuited part or check if the cable and input device are normal. |
| | | Red LED is flashing. (Diagnosis is activated) | Diagnosis error<br>(1)ON/OFF count of the input device has exceeded the set value.<br>(2)The wire of the input device is broken or disconnected. (Only EX600-DX□C1) | Check the parts with error by using the LED display or PLC* or H.T.<br>(1)Reset the ON/OFF count to zero or change the set value. Or invalidate diagnosis.<br>(2) Check if the connector is loose and if the wire is broken. |
| | | Red/green all LEDs are flashing. | Unit has failed | Stop the operation and contact SMC. |
| | DX□E DX□F | Red ST LED is ON. (Diagnosis is activated) | Diagnosis error<br>Input device power supply is short-circuited. | Check the parts with error by using the LED display or PLC* or H.T. Re-wire the short-circuited part or check if the cable and input device are normal. |
| | | Red ST LED is flashing. (Diagnosis is activated) | Diagnosis error<br>ON/OFF count of the input device has exceeded the set value. | Check the parts with error by using the LED display or PLC* or H.T. Reset the ON/OFF count to zero or change the set value. Or invalidate diagnosis. |
| | | Red/green ST LED is flashing. | Unit has failed | Stop the operation and contact SMC. |

*: Refer to "EtherNet/IP™ Object" (page 67) for details.

| No. | Part No. EX600- | Problem | Presumed cause | Troubleshooting |
|---|---|---|---|---|
| 3 | DY□B | Red LED is ON. (Diagnosis is activated) | Diagnosis error<br>Output device is short-circuited. | Check the parts with error by using the LED display or PLC* or H.T. Re-wire the short-circuited part or check if the cable and output device are normal. |
| | | Red LED is flashing. (Diagnosis is activated) | Diagnosis error<br>(1)ON/OFF count of the output device has exceeded the set value.<br>(2)The wire of the output device is broken or disconnected. | Check the parts with error by using the LED display or PLC* or H.T.<br>(1)Reset the ON/OFF count to zero or change the set value. Or invalidate diagnosis.<br>(2)Check if the connector is loose and if the wire is broken. |
| | | Red/green all LEDs are flashing. | Unit has failed | Stop the operation and contact SMC. |
| | DY□E DY□F | Red ST LED is ON. (Diagnosis is activated) | Diagnosis error<br>Output device is short-circuited. | Check the parts with error by using the LED display or PLC* or H.T. Re-wire the short-circuited part or check if the cable and output device are normal. |
| | | Red ST LED is flashing. (Diagnosis is activated) | Diagnosis error<br>(1)ON/OFF count of the output device has exceeded the set value.<br>(2)The wire of the output device is broken or disconnected. | Check the parts with error by using the LED display or PLC* or H.T.<br>(1)Reset the ON/OFF count to zero or change the set value. Or invalidate diagnosis.<br>(2)Check if the connector is loose and if the wire is broken. |
| | | Red/green ST LED is flashing. | Unit has failed | Stop the operation and contact SMC. |
| 4 | DM□E DM□F | Red ST(I) LED is ON. (Diagnosis is activated) | Diagnosis error<br>Input device power supply is short-circuited. | Check the parts with error by using the LED display or PLC* or H.T. Re-wire the short-circuited part or check if the cable and input device are normal. |
| | | Red ST(I) LED is flashing. (Diagnosis is activated) | Diagnosis error<br>ON/OFF count of the input device has exceeded the set value. | Check the parts with error by using the LED display or PLC* or H.T.<br>Reset the ON/OFF count to zero or change the set value. Or invalidate diagnosis. |
| | | Red ST(O) LED is ON. (Diagnosis is activated) | Diagnosis error<br>Output device is short-circuited. | Check the parts with error by using the LED display or PLC* or H.T. Re-wire the short-circuited part or check if the cable and output device are normal. |
| | | Red ST(O) LED is flashing (Diagnosis is activated) | Diagnosis error<br>(1)ON/OFF count of the output device has exceeded the set value.<br>(2)The wire of the output device is broken or disconnected. | Check the parts with error by using the LED display or PLC * or H.T.<br>(1)Reset the ON/OFF count to zero or change the set value. Or invalidate diagnosis.<br>(2)Check if the connector is loose and if the wire is broken. |
| | | Red/green ST LED is flashing. | Unit has failed | Stop the operation and contact SMC. |

*: Refer to "EtherNet/IP™ Object" (page 67) for details.

**SMC**

| No. | Part No. EX600- | Problem | Presumed cause | Troubleshooting |
|---|---|---|---|---|
| 5 | AXA | Red LED is ON. (Diagnosis is activated) | Diagnosis error Analog input device power supply is short-circuited. | Check the parts with error by using the LED display or PLC* or H.T. Re-wire the short-circuited part, and check if the cable and analog input device are normal. |
| | | "0 and 1" red LEDs are ON. | Input value has exceeded the upper limit when set to current input type range. | Check the following when the range of the analog input unit is set to current input. (1)Set the input value of the analog input device so that it does not exceed the upper limit. (2)Voltage is input from the analog input device.Ensure the range of the input unit matches the range of the input device. |
| | | Red LED is flashing. (Diagnosis is activated) | Diagnosis error (1)Input value has exceeded the upper or lower limit of the range. (2)Input value (value set by user) has exceeded the upper or lower limit. | (1)If the input value from the analog input device exceeds the upper or lower limit of the range, select the appropriate range so that the input value is within the range. Or invalidate diagnosis. (2)If the input value from the analog input device exceeds the upper or lower limit of the user set value, adjust it so that the input value is within the range of the user set value. Or invalidate diagnosis. |
| | | Red/green all LEDs are flashing. | Unit has failed | Stop the operation and contact SMC. |
| 6 | AYA | Red LED is ON. (Diagnosis is activated) | Diagnosis error Analog output device power supply is short-circuited. | Check the parts with error by using the LED display or PLC* or H.T. Re-wire the short-circuited part, and check if the cable and analog output device are normal. |
| | | Red LED is flashing. (Diagnosis is activated) | Diagnosis error Output value (value set by user) has exceeded the upper or lower limit. | If the output value from the analog output device exceeds the upper or lower limit of the user set value, adjust it so that the output value is within the range of the user set value. Or invalidate diagnosis. |
| | | Red/green all LEDs are flashing. | Unit has failed | Stop the operation and contact SMC. |

*: Refer to "EtherNet/IP™ Object" (page 67) for details.

SMC

| No. | Part No. EX600- | Problem | Presumed cause | Troubleshooting |
|---|---|---|---|---|
| 7 | AMB | Red LED is ON. (Diagnosis is activated) | Diagnosis error Analog input or output device power supply is short-circuited. | Check the parts with error by using the LED display or PLC* or H.T. Re-wire the short-circuited part, and check if the cable and analog input or output device are normal. |
| | | "0 and 1" red LEDs are ON. | Input value has exceeded the upper limit when set to current input type range. | Check the following when the range of the analog input unit is set to current input. (1)Set the input value of the analog input device so that it does not exceed the upper limit. (2)Voltage is input from the analog input device. Ensure the range of the input unit matches the range of the input device. |
| | | Red LED is flashing. (Diagnosis is activated) | Diagnosis error (1)Input value has exceeded the upper or lower limit of the range. (2)Input or output value (value set by user) has exceeded the upper or lower limit. | ((1)If the input value from the analog input device exceeds the upper or lower limit of the range, select the appropriate range so that the input value is within the range. Or invalidate diagnosis. (2)If the input (output) value from the analog input (output) device exceeds the upper or lower limit of the user set value, adjust it so that the input (output) value is within the range of the user set value. Or invalidate diagnosis. |
| | | Red/green all LEDs are flashing. | Unit has failed | Stop the operation and contact SMC. |
| 8 | | Red ST(M) LED is flashing. (Diagnosis is activated) | Diagnosis error (SI unit) (1)Valve is short-circuited. (2)Valve is open-circuited. (3)ON/OFF count of the valve has exceeded the set value. | Check the parts with error by using the LED display or PLC * or H.T. (1)Check the operation after replacing the valve. (2)Check the operation after replacing the valve. (3)Reset the ON/OFF count to zero or change the set value. Or invalidate diagnosis. |
| 9 | | Red ST(M) LED is ON. | SI unit has failed. | Stop the operation and contact SMC. |
| | | Red/green ST(M) LED is flashing alternately. | (1)Connection between the units is defective. (2)Configuration memory error. | (1)Confirm that there is no loose connection between the units and connect them correctly. (2)Unit layout is not the same as the unit layout when it was memorized. Return the layout to the same as when it was memorized, or update the configuration memory, or turn off the configuration memory function. |
| 10 | | Red PWR LED is ON. (Diagnosis is activated) | Power supply voltage for control and input is abnormal. | Supply 24 VDC ±10% for control and input power source. |
| | | Red PWR(V) LED is ON. (Diagnosis is activated) | Power supply voltage for output is abnormal. | Supply 24 VDC +10/-5% for output power source. |

*: Refer to "EtherNet/IP™ Object" (page 67) for details.

| No. | Problem | Presumed cause | Troubleshooting |
|---|---|---|---|
| 11 | MS: Green LED is flashing | (1)Setting error<br>(2)PLC has stopped operating, or the communication is idling. | (1)Set the configuration properly. Refer to "Hardware Configuration" (page 58) for details.<br>(2)Set the PLC to RUN status. |
| | MS: Red LED is flashing | Recoveble error | Set the configuration properly. Refer to "Hardware Configuration" (page 58) for details. |
| | MS: Red LED is ON | SI unit failure. | Stop the operation and contact SMC. |
| | NS: OFF | IP address is not setting. | Set IP address. Refer to "IP address setting switch"(page 23) for details. |
| | NS: Green LED is flashing | Communication is not established. | Check the following and restart.<br>•Signal line is connected from PLC.<br>•The communication speed of PLC and SI unit is appropriate.<br>•Wire the communication line away from the noise source. |
| | NS: Red LED is flashing | Communication timeout. | Check the following, and restart.<br>•Signal line is connected from PLC.<br>•The communication speed of PLC and SI unit is appropriate.<br>•Wire the communication line away from the noise source. |
| | NS: Red LED is ON | IP address is duplicated. | Reset IP address which has not been used yet. Refer to "IP address setting switch"(page 23) for details. |
| 12 | Abnormal valve operation | The number of connected valves is larger than the number of occupied valve outputs. | When the number of occupied valves of the V_SEL switch is smaller than the number of connected valves, set the switch so that the number of occupied valves is not smaller than the number of valves to be used. |
| | | Abnormality with program, etc. | Check if the ladder program of PLC, etc. is correct. |
| | | Abnormal power supply for output. | Check if the green PWR(V) LED of the SI unit is ON. If the LED is off, or the red LED is ON, supply 24 VDC +10/-5% to the power supply for output. |
| | | Connection between SI unit and manifold valve is defective. | Check the connectors between the SI unit and manifold valve are not damaged, such as bent pins, and connect them correctly. |
| | | Polarity of output does not match. | IF the polarity of the SI unit and the valve are different, replace one of them to make the combination match.<br>•EX600-SEN1 (PNP output)<br>  ⇒ -common type valve<br>•EX600-SEN2 (NPN output)<br>  ⇒ +common type valve |
| | | SI unit has failed. | Replace the SI unit with a normal one, and check the operation. |
| | | Valve failure. | Replace the valve with a normal one, and check the operation. Or refer to the troubleshooting of the valve used. |

**SMC**

| No. | Problem | Presumed cause | Troubleshooting |
|---|---|---|---|
| 13 | Abnormal digital input device operation | Polarity of input does not match. | If the polarity (PNP, NPN) of the input unit and the input device are different, replace one of them to make the combination match. |
| | | Power supply for control and input is abnormal. | Check if the green PWR LED of the SI unit is ON. If the LED is off, or the red LED is ON, supply 24 VDC ±10% to the power supply for control and input. |
| | | Wiring or connection is defective. | Connect the wiring correctly between the digital input device and the digital input unit. |
| | | Input unit has failed. | Replace the input unit with a normal one, and check the operation. |
| | | Input device failure. | Replace the input device with a normal one, and check the operation. Or refer to the troubleshooting of the input device used. |
| | Abnormal digital output device operation | Polarity of output does not match. | If the polarity (PNP, NPN) of the output unit and the output device are different, replace one of them to make the combination match. |
| | | Power supply for output is abnormal. | Check if the green PWR(V) LED of the SI unit is ON. If the LED is off, or the red LED is ON, supply 24 VDC +10/-5% to the power supply for output. |
| | | Wiring or connection is defective. | Connect the wiring correctly between the digital output device and the digital output unit. |
| | | Output unit has failed. | Replace the Output unit with a normal one, and check the operation. |
| | | Output device failure. | Replace the output device with a normal one, and check the operation. Or refer to the troubleshooting of the output device used. |
| | | Program etc. is defective. | Check whether the ladder program etc. of PLC are correct. |

**SMC**

No.EX##-OMN0032

| No. | Problem | Presumed cause | Troubleshooting |
|---|---|---|---|
| 14 | Abnormal analog input device operation | Power supply for control and input is abnormal. | Check if the green PWR LED of the SI unit is ON. If the LED is off, or the red LED is ON, supply 24 VDC ±10% to the power supply for control and input. |
| | | Analog input signal range setting failure. | Check the analog input device specification, and set the input signal range which satisfies the specification. |
| | | Analog data format does not match. | Check whether the data format of the analog input unit is properly set. |
| | | Wiring or connection is defective. | Connect the wiring correctly between the analog input device and the analog input unit. |
| | | Analog input unit has failed. | Replace the analog input unit with a normal one, and check the operation. |
| | | Analog input device failure. | Replace the analog input device with a normal one, and check the operation. Or refer to the troubleshooting of the analog input device used. |
| | Abnormal analog output device operation | Power supply for output is abnormal. | Check if the green PWR(V) LED of the SI unit is ON. If the LED is off, or the red LED is ON, supply 24 VDC +10/-5% to the power supply for output. |
| | | Analog output signal range setting failure. | Check the analog output device specification, and set the output signal range which satisfies the specification. |
| | | Analog data format does not match. | Check whether the data format of the analog output unit is properly set. |
| | | Wiring or connection is defective. | Connect the wiring correctly between the analog output device and the analog output unit. |
| | | Analog output unit has failed. | Replace the analog output unit with a normal one, and check the operation. |
| | | Analog output device failure. | Replace the analog output device with a normal one, and check the operation. Or refer to the troubleshooting of the analog output device used. |
| | | Program etc. is defective. | Check whether the ladder program etc. of PLC are correct. |

# Parameter Setting

The product has parameters that can be set for the system, each unit or each channel.
The parameters can be changed using the PLC and handheld terminal.
There is no order of precedence of the PLC and handheld terminal. The latest parameter settings are used.

> ● Precautions for handling
>
> •Changing parameters with the H.T. does not change the parameter settings in the PLC.
> •If parameters are downloaded from the configurator to the PLC after changing parameters
>  with the H.T., parameters will be changed to those which are set by the confiigurator.
>  Therefore, set parameters by PLC if the parameters can be changed by both PLC and H.T.
> •The H.T. have to use EX600-HT1A. (EX600-HT1 cannot be used.)

## ■Parameter definition and setting

•System parameters

| No. | Parameter (H.T. Symbol) | Definition | Item | Content | Default setting | Parameter setting By PLC | By H.T. |
|-----|------------------------|------------|------|---------|-----------------|---------|---------|
| 1 | Hold/Clear priority setting (Hold/Clear) | Switch the setting of the output during communication error or communication idling to follow the setting of the SI unit or the parameters. | Switch | Setting by SI unit switch becomes valid. OFF/Hold/Forced ON can be set per channel | ○ | ○ | ○ |
|  |  |  | Handheld | Setting by EtherNet/IP™ object or the H.T. becomes valid. OFF/Hold/Forced ON can be set per channel. |  |  |  |

No.EX##-OMN0032

• SI unit parameters

| No. | Parameter (H.T. Symbol) | Definition | Item | Content | Default setting | Parameter setting | |
|-----|------------------------|------------|------|---------|-----------------|-------------------|---|
| | | | | | | By PLC | By H.T. |
| 1 | Power supply for control and input voltage monitor (PWRC_Mon) | Generated error per unit when control and input power supply voltage goes over approx. 26V or under 21V. | Enable | Generates an error. | ○ | ○ | ○ |
| | | | Disable | Does not generate an error. | | | |
| 2 | Power supply for output voltage monitor (PWRO_Mon) | Generated error per unit when output power supply voltage goes over approx. 26V or under 20 V. | Enable | Generates an error. | ○ | ○ | ○ |
| | | | Disable | Does not generate an error. | | | |
| 3 | Short Circuit Detection (SC_MonOp) | Generates error per unit when the short circuit of the valve is detected. | Enable | Generates an error. | ○ | ○ | ○ |
| | | | Disable | Does not generate an error. | | | |
| 4 | Restart after short circuit (SC_RstOp) | Restore the setting of short circuit detection error per unit after the valve short circuit is cleared. | Auto | Error is automatically cleared when the short circuit is fixed. | ○ | ○ | ○ |
| | | | Manual | Even when the short circuit is fixed, error is not cleared until the power is supplied again. | | | |
| 5 | Open Circuit Detection (OC_Mon) | Generates error per channel when the disconnection of the valve is detected. | Enable | Generates an error. | | ○ | ○ |
| | | | Disable | Does not generate an error. | ○ | | |
| 6 | Output setting during communication fault [1] (Fault_MD) | Set output per channel when communication is abnormal. | Clear | Turn off the output | ○ | ○ | ○ |
| | | | Hold | Hold the output | | | |
| | | | ForceON | Turn on the output forcefully | | | |
| 7 | Output setting during communication idling [1][2] (Idle_MD) | Output setting per channel at the time of communication idling | Clear | Turn off the output | ○ | ○ | ○ |
| | | | Hold | Hold the output | | | |
| | | | ForceON | Turn on the output forcefully | | | |

| No. | Parameter (H.T. Symbol) | Definition | Item | Content | Default setting | Parameter setting | |
|---|---|---|---|---|---|---|---|
| | | | | | | By PLC | By H.T. |
| 8 | Valve ON/OFF counter (Counter) | Memorizes the number of times the valve is ON. Generates error per channel when the operation count exceeds the set value. [*3] | Enable | Generates an error. Val: 1 to 65000 [*4] | | ○ | ○ |
| | | | Disable | Does not generate an error. | ○ | | |

∗1: This function is valid only when "Hold/Clear priority" of the system parameter is set to Handheld.

∗2: Some PLC does not support an idle mode.

∗3: The count is memorized every 30 seconds per channel. When the power supply is turned on again, counting starts from the last value memorized.

∗4: Times for setting is set value x1000 times.

• Digital input unit parameters

| No. | Parameter (H.T. Symbol) | Definition | Item | Content | Default setting | Parameter setting | |
|---|---|---|---|---|---|---|---|
| | | | | | | By PLC | By H.T. |
| 1 | The power supply short circuit detection for control and input (SC_MonSs) | Generates error per unit when the short circuit of the power supply for the input device is detected. | Enable | Generates an error. | ○ | ○ | ○ |
| | | | Disable | Does not generate an error. | | | |
| 2 | Open circuit detection *1 (OC_Mon) | Generates error per channel when the disconnection of the input device is detected. *2 | Enable | Generates an error. | | ○ | ○ |
| | | | Disable | Does not generate an error. | ○ | | |
| 3 | Inrush current filter (Inrush) | Ignores excess current per unit for 100 msec after inrush. | Enable | Ignores excess current. | | ○ | ○ |
| | | | Disable | Does not ignore excess current. | ○ | | |
| 4 | Input filtering time (Filter_T) | Sets the time to ignore the input signal change per unit. | 0.1 ms / 1.0 ms / 10 ms / 20 ms | Selects the time for filtering. | 1.0 ms | ○ | ○ |
| 5 | Input extension time (SigExt_T) | Sets the time to hold the input signal per unit. | 1.0ms / 15 ms / 100 ms / 200 ms | Selects the time to hold the input signal. | 15 ms | ○ | ○ |
| 6 | Channel ON/OFF counter (Counter) | Memorizes the number of times the input device is ON. Generates error per channel when the operation count exceeds the set value. *3 | Enable | Generates an error. Val: 1 to 65000 *4 | | ○ | ○ |
| | | | Disable | Does not generate an error. | ○ | | |

*1: Disconnection detection is a function only available for digital unit (EX600-DXPC1, EX600-DXNC1) with disconnection detection.

*2: 2-wire type input equipment cannot be correctly detected if its leakage current is 0.5 mA or less while the equipment is in the OFF state (reed sensor, etc.).
　Ensure that all input equipment used has a leakage current above 0.5 mA in the OFF state.
　3-wire type input equipment cannot be correctly detected if its current consumption is 0.5mA or less.
　The open circuit of input signals cannot be detected.

*3: The count is memorized every hour. When the power supply is turned on again, counting starts from the last value memorized.

*4: Times for setting is set value x1000 times.

•Digital output unit parameters

| No. | Parameter (H.T. Symbol) | Definition | Item | Content | Default setting | Parameter setting By PLC | Parameter setting By H.T. |
|---|---|---|---|---|---|---|---|
| 1 | Output load short circuit detection (SC_MonOp) | Generates error per unit when the short circuit of the output device is detected. *1 | Enable | Generates an error. | ○ | ○ | ○ |
| | | | Disable | Does not generate an error. | | | |
| 2 | Restart after output load short circuit (SC_RstOp) | Restore the setting of short circuit detection error per unit after the output device short circuit is cleared. | Auto | Error is automatically cleared when the short circuit is fixed. | ○ | ○ | ○ |
| | | | Manual | Even when the short circuit is fixed, error is not cleared until the power is supplied again. | | | |
| 3 | Open circuit detection (OC_Mon) | Generates error per channel when the disconnection of the output device is detected. | Enable | Generates an error. | | ○ | ○ |
| | | | Disable | Does not generate an error. | ○ | | |
| 4 | Output setting during communication fault *2 (Fault_MD) | Set output per channel when communication is abnormal. | Clear | Turn off the output | ○ | ○ | ○ |
| | | | Hold | Hold the output | | | |
| | | | ForceON | Turn on the output forcefully | | | |
| 5 | Output setting during communication idling *2 *3 (Idle_MD) | Set output per channel during communication idling. | Clear | Turn off the output | ○ | ○ | ○ |
| | | | Hold | Hold the output | | | |
| | | | ForceON | Turn on the output forcefully | | | |
| 6 | Output ON/OFF counter (Counter) | Memorizes the number of times the output device is ON. Generates error per channel when the operation count exceeds the set value. *5 | Enable | Generates an error. Val: 1 to 65000 *5 | | ○ | ○ |
| | | | Disable | Does not generate an error. | ○ | | |

∗1: Could be incorrectly recognized as short circuit depending on used load (ex.: lamp load). If detection is incorrect, disable the parameter setting.

∗2: This function is valid only when "Hold/Clear priority" of the system parameter is set to Handheld.

∗3: Some PLC does not support an idle mode.

∗4: The count is memorized every hour. When the power supply is turned on again, counting starts from the last value memorized.

∗5: Times for setting is set value x1000 times.

•Digital I/O unit parameters

| No. | Parameter (H.T. Symbol) | Definition | Item | Content | Default setting | Parameter setting | |
|---|---|---|---|---|---|---|---|
| | | | | | | By PLC | By H.T. |
| 1 | The power supply short circuit detection for control and input (SC_MonSs) | Generates error per unit when the short circuit of the control or input power supply is detected. | Enable | Generates an error. | ○ | ○ | ○ |
| | | | Disable | Does not generate an error. | | | |
| 2 | Inrush current filter (Inrush) | Ignores excess current per unit for 100 msec. after inrush. | Enable | Ignores excess current. | | ○ | ○ |
| | | | Disable | Does not ignore excess current | ○ | | |
| 3 | Input filtering time (Filter_T) | Sets the time to ignore the input signal change per unit | 0.1 ms | Selects the time for filtering. | 1.0 ms | ○ | ○ |
| | | | 1.0 ms | | | | |
| | | | 10 ms | | | | |
| | | | 20 ms | | | | |
| 4 | Input extension time (SigExt_T) | Sets the time to hold the input signal per unit. | 1.0 ms | Selects the time to hold the input signal. | 15 ms | ○ | ○ |
| | | | 15 ms | | | | |
| | | | 100 ms | | | | |
| | | | 200 ms | | | | |
| 5 | Output load short circuit detection (SC_MonOp) | Generates error per unit when the short circuit of the output device is detected. [*1] | Enable | Generates an error. | ○ | ○ | ○ |
| | | | Disable | Does not generate an error. | | | |
| 6 | Restart after output load short circuit (SC_RstOp) | Restore the setting of short circuit detection error per unit after the output device short circuit is cleared. | Auto | Error is automatically cleared when the short circuit is fixed. | ○ | ○ | ○ |
| | | | Manual | Even when the short circuit is fixed, error is not cleared until the power is supplied again. | | | |
| 7 | Open circuit detection (OC_Mon) | Generates error per channel when the disconnection of the output device is detected. | Enable | Generates an error. | | ○ | ○ |
| | | | Disable | Does not generate an error. | ○ | | |
| 8 | Output setting during communication fault [*2] (Fault_MD) | Set output per channel when communication is abnormal. | Clear | Turn off the output | ○ | ○ | ○ |
| | | | Hold | Hold the output | | | |
| | | | ForceON | Turn on the output forcefully | | | |
| 9 | Output setting for communication idling [*2][*3] (Idle_MD) | Set output per channel during communication idling. | Clear | Turn off the output | ○ | ○ | ○ |
| | | | Hold | Hold the output | | | |
| | | | ForceON | Turn on the output forcefully | | | |

| No. | Parameter (H.T. Symbol) | Definition | Item | Content | Default setting | Parameter setting | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | By PLC | By H.T. |
| 10 | Input or Output ON/OFF counter (Counter) | Memorizes the number of times the input or output device is ON. Generates error per channel when the operation count exceeds the set value. *4 | Enable | Generates an error. Val: 1 to 65000 *5 | | ○ | ○ |
| | | | Disable | Does not generate an error. | ○ | | |

∗1: Could be incorrectly recognized as short circuit depending on used load (ex.: lamp load). If detection is incorrect, disable the parameter setting.

∗2: This function is valid only when "Hold/Clear priority" of the system parameter is set to Handheld.

∗3: Some PLC does not support an idle mode.

∗4: The count is memorized every hour. When the power supply is turned on again, counting starts from the last value memorized.

∗5: Times for setting is set value x1000 times.

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• Analog input unit parameters

| No. | Parameter (H.T. Symbol) | Definition | Item | Content | Default setting | Parameter setting By PLC | Parameter setting By H.T. |
|---|---|---|---|---|---|---|---|
| 1 | The power supply short circuit detection for the input device (SC_MonSs) | Generates error per unit when the short circuit of the power supply for the input device is detected. | Enable | Generates an error. | ○ | ○ | ○ |
| | | | Disable | Does not generate an error. | | | |
| 2 | Analog input range (Range) | Set the analog input device range per channel. | -10..10 V | Selects the analog input range. | -10..10 V | ○ | ○ |
| | | | -5..5 V | | | | |
| | | | -20..20 mA | | | | |
| | | | 0..10 V | | | | |
| | | | 0..5 V | | | | |
| | | | 1..5 V | | | | |
| | | | 0..20 mA | | | | |
| | | | 4..20 mA | | | | |
| 3 | Analog data format (D_Format) | Sets analog data type which is output to PLC per unit. | Offset binary | Offset binary. | ○ | ○ | ○ |
| | | | Sign & Magnitude | Signed binary. | | | |
| | | | 2s complement | 2's complement. | | | |
| 4 | Analog average filter (Filter) | Sets analog filtering time per channel. Sampling interval is approx. 2 sec. | None | None | | ○ | ○ |
| | | | 2AVG | 2 value average | ○ | | |
| | | | 4AVG | 4 value average | | | |
| | | | 8AVG | 8 value average | | | |
| 5 | Over range detection (Over_Rng) | Generates error per unit when the input value exceeds 0.5% of full span. | Enable | Generates an error. | ○ | ○ | ○ |
| | | | Disable | Does not generate an error. | | | |
| 6 | Under range detection (Undr_Rng) | Generates error per unit when the input value falls below 0.5% of full span. | Enable | Generates an error. | ○ | ○ | ○ |
| | | | Disable | Does not generate an error. | | | |
| 7 | User setting value upper limit error (Upr_Lmt) | Generates error per unit when the input value exceeds the set value. | Enable | Generates an error. [1] | | ○ | ○ |
| | | | Disable | Does not generate an error. | ○ | | |
| 8 | User setting value lower limit error (Lwr_Lmt) | Generates error per channel when the input value falls below the set value. | Enable | Generates an error. [1] | | ○ | ○ |
| | | | Disable | Does not generate an error. | ○ | | |

∗1: Set value shall be set per analog input range within settable range in the table below.
When the analog input range is changed, check the set value and change it to an appropriate value.

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| Analog input measurement range (Range) | Upper and lower setting limit of user setting | |
|---|---|---|
| | (Lwr_Lmt) | (Upr_Lmt) |
| -10..10 V | -10.50 to +10.45 V | -10.45 to +10.50 V |
| -5..5 V | - 5.25 to + 5.22 V | - 5.22 to +5.25 V |
| -20..20 mA | -21.00 to +20.90 mA | -20.90 to +21.00 mA |
| 0..10 V | 0.00 to +10.45 V | +0.05 to +10.50 V |
| 0..5 V | 0.00 to +5.22 V | +0.03 to +5.25 V |
| 1..5 V | +0.75 to +5.22 V | +0.78 to +5.25 V |
| 0..20 mA | 0.00 to +20.90 mA | +0.10 to +21.00 mA |
| 4..20 mA | +3.00 to +20.90 mA | +3.10 to +21.00 mA |

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•Analog output unit parameters (1)

| No. | Parameter (H.T. Symbol) | Definition | Item | Content | Default setting | Parameter setting | |
|---|---|---|---|---|---|---|---|
| | | | | | | By PLC | By H.T. |
| 1 | The power supply short circuit detection for the output device (SC_MonSs) | Generates error per unit when the short circuit of the output device is detected. | Enable | Generates an error. | ○ | ○ | ○ |
| | | | Disable | Does not generate an error. | | | |
| 2 | Analog output range (Range) | Sets the range of the analog output device per channel. | 0..10 V / 0..5 V / 1..5 V / 0..20 mA / 4..20 mA | Selects the analog output range. | 0..10 V | ○ | ○ |
| 3 | Analog data format (D_Format) | Sets analog data type which is output to PLC per unit. | Offset binary | Offset binary. | ○ | ○ | ○ |
| | | | Sign & Magnitude | Signed binary. | | | |
| | | | 2s complement | 2's complement. | | | |
| | | | Scaled | Scale conversion type. | | | |
| 4 | User setting value upper limit error (Upr_Lmt) | Generates error per channel when the output value exceeds the set value. | Enable | Generates an error. *2 | | ○ | ○ |
| | | | Disable | Does not generate an error. | ○ | | |
| | Scale upper limit setting *1 (UpLm/Scl) | Sets the scale upper limit. Generates error per channel when the output value exceeds the upper limit. | Enable | Generates an error. Val: -32766 to 32767 | | | |
| | | | Disable | Does not generate an error. Val: -32766 to 32767 | ○ Val: 1000 | | |
| 5 | User setting value lower limit error (Lwr_Lmt) | Generates error per channel when the output value exceeds the set value. | Enable | Generates an error. *2 | | ○ | ○ |
| | | | Disable | Does not generate an error. | ○ | | |
| | Scale lower limit setting *1 (LwLm/Scl) | Sets the scale lower limit. Generates error per channel when the output value falls below the lower limit. | Enable | Generates an error. Val: -32767 to 32766 | | | |
| | | | Disable | Does not generate an error. Val: -32767 to 32766 | ○ Val: 0 | | |
| 6 | Output setting for communication error *3 (Fault_MA) | Set output per channel when communication is abnormal. | Enable | Output will be user fault value. *2 | | ○ | ○ |
| | | | Disable | Output will be held last state. | ○ | | |

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•Analog output unit parameters (2)

| No. | Parameter (H.T. Symbol) | Definition | Item | Content | Default setting | Parameter setting | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | By PLC | By H.T. |
| 7 | Output setting for communication idling *3 *4 (Idle_MA) | Set output per channel during communication idling. | Enable | Output will be user idle value. *2 | | ○ | ○ |
| | | | Disable | Output will be held last state. | ○ | | |

∗1: When "Scaled" is selected as the analog data format, the display of H.T. is switched from Upr_Lmt to UpLm/Scl, from Lwr_Lmt to LwLm/Scl.

∗2: Set value shall be set per analog input range within settable range in the table below.
   When the analog input range is changed, check the set value and change it to an appropriate value.

∗3: This function is valid only when "Hold/Clear priority" of the system parameter is set to Handheld.

∗4: Some PLC does not support an idle mode.

| Analog output measurement range (Range) | Upper and lower setting limit of user setting | | Settable range during communication error or idling (Fault_MA) (Idle_MA) |
| --- | --- | --- | --- |
| | (Lwr_Lmt) | (Upr_Lmt) | |
| 0..10 V | 0.00 to +10.45 V | +0.05 to +10.50 V | 0.00 to +10.50 V |
| 0..5 V | 0.00 to + 5.22 V | +0.03 to +5.25 V | 0.00 to +5.25 V |
| 1..5 V | +0.75 to +5.22 V | +0.78 to +5.25 V | +0.75 to +5.25 V |
| 0..20 mA | 0.00 to +20.90 mA | +0.10 to +21.00 mA | 0.00 to +21.00 mA |
| 4..20 mA | +3.00 to +20.90 mA | +3.10 to +21.00 mA | +3.00 to +21.00 mA |

•Analog I/O unit parameters (1)

| No. | Parameter (H.T. Symbol) | Definition | Item | Content | Default setting | Parameter setting | |
|---|---|---|---|---|---|---|---|
| | | | | | | By PLC | By H.T. |
| 1 | The power supply short circuit detection for the input or output device (SC_MonSs) | Generates error per unit when the short circuit of the input device power supply or output device is detected. | Enable | Generates an error. | ○ | ○ | ○ |
| | | | Disable | Does not generate an error. | | | |
| 2 | Analog input or output range (Range) | Sets the analog input or output device range per channel. | 0..10 V | Selects the analog input or output range | 1..5 V | ○ | ○ |
| | | | 0..5 V | | | | |
| | | | 1..5 V | | | | |
| | | | 0..20 mA | | | | |
| | | | 4..20 mA | | | | |
| 3 | Analog data format (D_Format) | Sets analog data type which is output to PLC per unit. | Offset binary | Offset binary. | ○ | ○ | ○ |
| | | | Sign & Magnitude | Signed binary. | | | |
| | | | 2s complement | 2's complement. | | | |
| | | | Scaled | Scale conversion type. | | | |
| 4 | Analog average filter (Filter) | Sets analog filtering time per channel. Sampling interval is approx. 2 sec. | None | None | | ○ | ○ |
| | | | 2AVG | 2 value average | ○ | | |
| | | | 4AVG | 4 value average | | | |
| | | | 8AVG | 8 value average | | | |
| 5 | Over range detection (Over_Rng) | Generates error per unit when the input value exceeds 0.5% of full span. | Enable | Generates an error. | | ○ | ○ |
| | | | Disable | Does not generate an error. | ○ | | |
| 6 | Under range detection (Undr_Rng) | Generates error per unit when the input value falls below 0.5% of full span. | Enable | Generates an error. | | ○ | ○ |
| | | | Disable | Does not generate an error. | ○ | | |
| 7 | User's set value upper limit error (Upr_Lmt) | Generates error per channel when the input or output value exceeds the set value. | Enable | Generates an error. *2 | | ○ | ○ |
| | | | Disable | Does not generate an error. | ○ | | |
| | Scale upper limit setting *1 (UpLm/Scl) | Sets the scale upper limit. Generates error per channel when the input or output value exceeds the upper limit. | Enable | Generates an error. Val: -32766 to 32767 | | | |
| | | | Disable | Does not generated an error. Val: -32766 to 32767 | ○ Val: 1000 | | |

•Analog I/O unit parameters (2)

| No. | Parameter (H.T. Symbol) | Definition | Item | Content | Default setting | Parameter setting By PLC | Parameter setting By H.T. |
|---|---|---|---|---|---|---|---|
| 8 | User's set value lower limit error (Lwr_Lmt) | Generates error per channel when the input or output value falls below the lower limit. | Enable | Generates an error. *2 | | ○ | ○ |
| | | | Disable | Does not generate an error. | ○ | | |
| | Scale lower limit setting *1 (UpLm/Scl) | Sets the scale lower limit. Generates error per channel when the input or output value falls below the lower limit. | Enable | Generates an error. Val: -32767 to 32766 | | | |
| | | | Disable | Does not generate an error. Val: -32767 to 32766 | ○ Val: 0 | | |
| 9 | Output setting for communication fault *3 (Fault_MA) | Set output per channel when communication is abnormal. | Enable | Output will be user fault value. *2 | | ○ | ○ |
| | | | Disable | Output will be held last state. | ○ | | |
| 10 | Output setting for communication idling *3 *4 (Idle_MA) | Sets output per channel during communication idling. | Enable | Output will be user idle value. *2 | | ○ | ○ |
| | | | Disable | Output will be held last state. | ○ | | |

*1: When "Scaled" is selected as the analog data format, the display of H.T. is switched from Upr_Lmt to UpLm/Scl, from Lwr_Lmt to LwLm/Scl.

*2: Set value shall be set per analog output range within settable range in the table below.
   When the analog output range is changed, check the set value and change it to an appropriate value.

*3: This function is valid only when "Hold/Clear priority" of the system parameter is set to Handheld.

*4: Some PLC does not support an idle mode.

| Analog Input or output measurement range (Range) | Upper and lower setting limit of user setting | | Settable range during communication error or idling (Fault_MA) (Idle_MA) |
|---|---|---|---|
| | (Lwr_Lmt) | (Upr_Lmt) | |
| 0..10 V | 0.00 to +10.45 V | +0.05 to +10.50 V | 0.00 to +10.50 V |
| 0..5 V | 0.00 to +5.22 V | +0.03 to +5.25 V | 0.00 to +5.25 V |
| 1..5 V | +0.75 to +5.22 V | +0.78 to +5.25 V | +0.75 to +5.25 V |
| 0..20 mA | 0.00 to +20.90 mA | +0.10 to +21.00 mA | 0.00 to +21.00 mA |
| 4..20 mA | +3.00 to +20.90 mA | +3.10 to +21.00 mA | +3.00 to +21.00 mA |

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# Hardware Configuration

## ■EDS file and icon

EDS file is required to configure the EX600. Furthermore, icons are necessary for the display icon of the EX600 on the configure. The EDS File and icon can be downloaded from the URL given below.

•URL：http://www.smcworld.com

　Products Document → Instruction Manual → ex600_sen_v12.zip

•Content of ex600_sen_v12.zip　　EDS file　　　　ex600_sen_v12.eds
　　　　　　　　　　　　　　　　　　　Icon　　　　　　　ex600_1.ico

## ■Setting using RSLogix5000™

Below is an explanation of the EX600 Series connection method with a Rockwell Automation' EtherNet/IP™ module.
Refer to the manual of RSLogix5000™ for a detailed manner of operation.

∗: The screen data shown here is the English version of RSLogix5000™.

•Select [EtherNet/IP™] in [I/O Configuration] folder. Select [New Module].

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•[Select Module screen] is displayed. Select [ETHERNET MODULE Generic Ethernet Module], and click on [OK].

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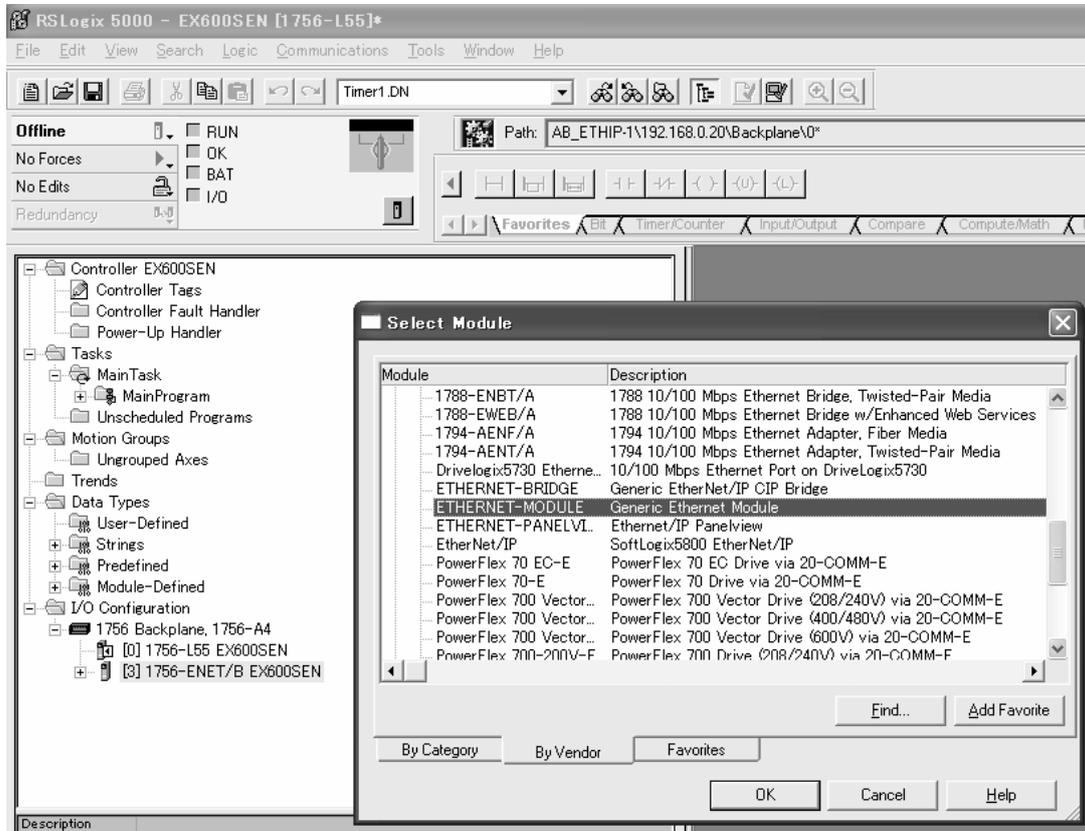
•[Module Properties screen] is displayed. Perform each setting.
(1)Name: Input the description of specific unit.
(2)Comm Format: Select the data format of Connection Parameters.
(3)IP Address: Input IP Address which is set in SI unit.
(4)Assembly Instance: Set as below.

| | |
|---|---|
| Input | =100 |
| Output | =150 |
| Configuration | = Other than 105 |

(5)Size: Set as below.

| | |
|---|---|
| Input | =Number of inputs connected. |
| Output | =Number of outputs connected. |
| Configuration | =0 |
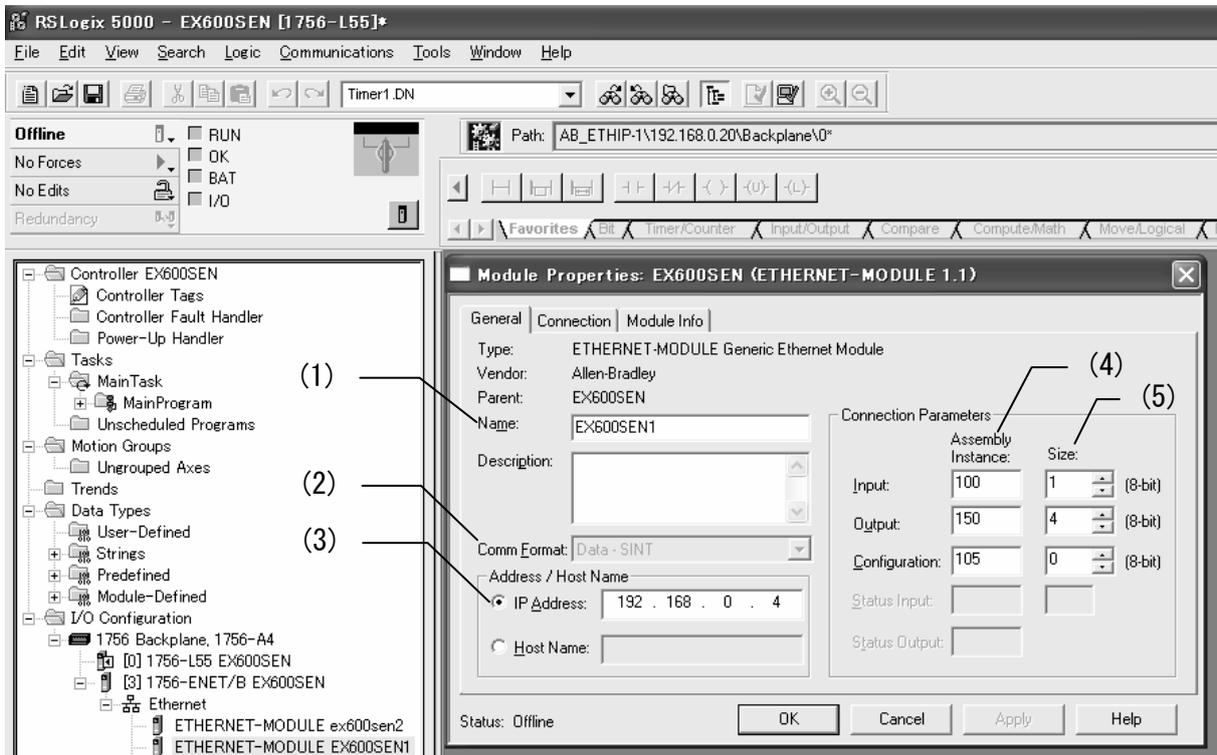
# I/O Map

Each unit of the product has its own I/O occupied byte.

| Unit | Unit part number | Occupied byte | |
| --- | --- | --- | --- |
| | | Input | Output |
| SI unit | EX600-SEN□ (32 outputs) | 0 | 4 |
| | EX600-SEN□ (24 outputs) | 0 | 3 |
| | EX600-SEN□ (16 outputs) | 0 | 2 |
| | EX600-SEN□ (8 outputs) | 0 | 1 |
| Digital input unit | EX600-DX□B (8 inputs) | 1 | 0 |
| | EX600-DX□C (8 inputs) | 1 | 0 |
| | EX600-DX□C1 (8 inputs)(with open circuit detection) | 1 | 0 |
| | EX600-DX□D (16 inputs) | 2 | 0 |
| | EX600-DX□E (16 inputs) | 2 | 0 |
| | EX600-DX□F (16 inputs) | 2 | 0 |
| Digital output unit | EX600-DY□B (8 outputs) | 0 | 1 |
| | EX600-DY□E (16 outputs) | 0 | 2 |
| | EX600-DY□E1 (24 outputs) | 0 | 3 |
| | EX600-DY□F (16 outputs) | 0 | 2 |
| Digital I/O unit | EX600-DM□E (8 inputs/8 outputs) | 1 | 1 |
| | EX600-DM□F (8 inputs/8 outputs) | 1 | 1 |
| Analog input Unit | EX600-AXA (2 channels) | 4 (2 byte/1 channel) | 0 |
| Analog output Unit | EX600-AYA (2 channels) | 0 | 4 (2 byte/1 channel) |
| Analog I/O Unit | EX600-AMB (2/2 channels) | 4 (2 byte/1 channel) | 4 (2 byte/1 channel) |

∗: EX600-SEN□ can select the output (size) which SI unit occupies by switch setting.

∗: Even when the input device is not connected, assign 1 byte or more of input data at the master device.

# Diagnostic

By changing the diagnosis switch, the diagnostic data shown below is assigned to the head of input data of the I/O map. (Refer to "Setting and adjustment" for setting the switch.)

| Mode | Diagnostic data | Diagnostic size |
|------|-----------------|-----------------|
| 0 | No diagnostic data. | 0 byte |
| 1 | System diagnosis | 4 byte |
| 2 | System diagnosis + Unit diagnosis (Up to 10 units) | 6 byte |
| 3 | System diagnosis + Unit diagnosis (Up to 64 units) | 12 byte |

∗: Diagnosis mode 3 is a function for extension in the future. Do not use it now.

∗: Channel diagnosis cannot be assigned to the diagnosis area of the input.

System diagnostic



Channel diagnostic          Unit diagnostic
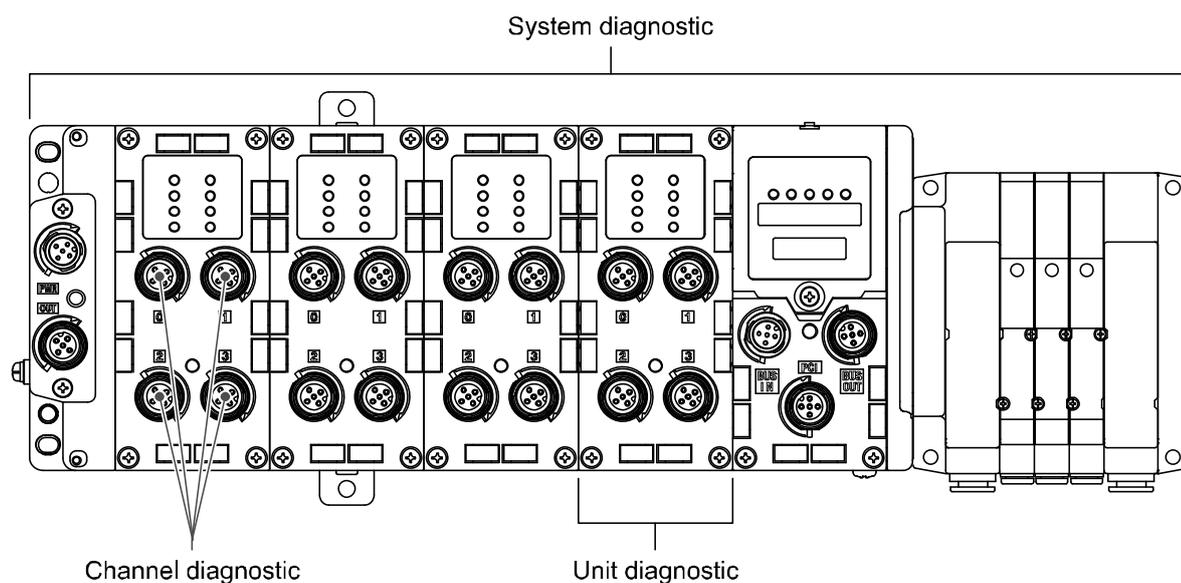
•I/O map assignment
I/O map of EX600 is assigned in order starting from the unit on the end plat side.
Taking the unit layout below as an example, the input/ output map of each diagnosis mode is shown below.

| | | Unit 0 | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | |
|---|---|---|---|---|---|---|---|---|
| End plate | | AXA | DY□B | DY□B | DX□B | DX□D | SEN□ | Valve |
| | | Analog input | Digital output | Digital output | Digital input | Digital input | SI unit (32 output) | |
| | | 4 byte Input | 1 byte Output | 1 byte Output | 1 byte Input | 2 byte Input | 4 byte Output | |

Input data: Analog input unit (EX600-AXA)_4 byte occupied (unit 0)
          Digital input unit (EX600-DX□B)_1 byte occupied (unit 3)
          Digital input unit (EX600-DX□D)_2 byte occupied (unit 4)

Output data: Digital output unit(EX600-DY□B)_1 byte occupied (unit 1)
          Digital output unit (EX600-DY□B)_1 byte occupied (unit 2)
          SI unit (EX600-SEN□)_4 byte occupied (unit 5)

•Diagnosis mode 0

| | Input data | Output data |
|---|---|---|
| Byte0 | AXA channele 0 (Unit 0) | DY□B (Uit 1) |
| Byte1 | | DY□B (Unit 2) |
| Byte2 | AXA channele 1 (Unit 0) | SEN□(Unit 5) |
| Byte3 | | |
| Byte4 | DX□B (Unit 3) | |
| Byte5 | DX□D (Unit 4) | |
| Byte6 | | |
| Total | 7 byte | 6 byte |

•Diagnosis mode 1

| | | Input data | Output data |
|---|---|---|---|
| Byte0 | | System diagnosis byte0 | DY□B (Unit 1) |
| Byte1 | | System diagnosis byte1 | DY□B (Unit 2) |
| Byte2 | | System diagnosis byte2 | SEN□ (Unit 5) |
| Byte3 | | System diagnosis byte3 | |
| Byte4 | | AXA channele 0 (Unit 0) | |
| Byte5 | | | |
| Byte6 | | AXA channele 1 (Unit 0) | |
| Byte7 | | | |
| Byte8 | | DX□B (Unit 3) | |
| Byte9 | | DX□D (Unit 4) | |
| Byte10 | | | |
| Total | | 11 byte | 6 byte |

•Diagnosis mode 2

| | | Input data | Output data |
|---|---|---|---|
| Byte0 | | System diagnosis byte0 | DY□B (Unit 1) |
| Byte1 | | System diagnosis byte1 | DY□B (Unit 2) |
| Byte2 | | System diagnosis byte2 | SEN□ (Unit 5) |
| Byte3 | | System diagnosis byte3 | |
| Byte4 | | Unit diagnosis byte0 | |
| Byte5 | | Unit diagnosis byte1 | |
| Byte6 | | AXA channele 0 (Unit 0) | |
| Byte7 | | | |
| Byte8 | | AXA channele 1 (Unit 0) | |
| Byte9 | | | |
| Byte10 | | DX□B (Unit 3) | |
| Byte11 | | DX□D (Unit 4) | |
| Byte12 | | | |
| Total | | 13 byte | 6 byte |

## ■Details of diagnostic data

### •System diagnosis

#### •System diagnosis byte0

| Bit No. | Content of diagnosis |
|---------|----------------------|
| 0 | The analog value has fallen below the user set value. |
| 1 | The analog value has exceeded the user set value. |
| 2 | The analog input value has fallen below the set range. |
| 3 | The analog input value has exceeded the set range. |
| 4 | The counter has exceeded the set value. |
| 5 | The open circuit has been detected. |
| 6 | The short circuit of the valve output or digital output has been detected. |
| 7 | The short circuit of the power supply for the input/output device has been detected. |

#### •System diagnosis byte1

| Bit No. | Content of diagnosis |
|---------|----------------------|
| 0 | The power supply voltage for output device is outside of the specification. |
| 1 | The power supply voltage for control and input device is outside of the specification. |
| 2 | Reserved |
| 3 | There is a connection failure between each unit (During operation). |
| 4 | There is a connection failure between each unit (When the power supply is applied). |
| 5 | Configuration memory error occurred. |
| 6 | System error occurred. |
| 7 | Hardware error occurred. |

#### •System diagnosis byte2

| Bit No. | Content of diagnosis |
|---------|----------------------|
| 0 | Reserved |
| : | : |
| 7 | Reserved |

#### •System diagnosis byte3

| Bit No. | Content of diagnosis |
|---------|----------------------|
| 0 | There is an error in the digital input unit. [1] |
| 1 | There is an error in the digital output unit. [1] |
| 2 | There is an error in the analog input unit. [2] |
| 3 | There is an error in the analog output unit. [2] |
| 4 | There is an error in the SI unit. |
| 5 | Reserved |
| 6 | Reserved |
| 7 | Reserved |

*1: When the error occurs in the digital I/O unit, both Bit0 and Bit1 are turned on.
*2: When the error occurs in the analog I/O unit, both Bit2 and Bit3 are turned on.

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• Unit diagnosis

• Unit diagnosis byte0

| Bit No. | Content of diagnosis |
|---------|---------------------|
| 0 | There is an error in unit 0. |
| 1 | There is an error in unit 1. |
| 2 | There is an error in unit 2. |
| 3 | There is an error in unit 3. |
| 4 | There is an error in unit 4. |
| 5 | There is an error in unit 5. |
| 6 | There is an error in unit 6. |
| 7 | There is an error in unit 7. |

• Unit diagnosis byte1

| Bit No. | Content of diagnosis |
|---------|---------------------|
| 0 | There is an error in unit 8. |
| 1 | There is an error in unit 9. |
| 2 | Reserved |
| 3 | Reserved |
| 4 | Reserved |
| 5 | Reserved |
| 6 | Reserved |
| 7 | Reserved |

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# EtherNet/IP™ Object

The EX600 series supports the object classes below.

•System object (Cass: 66h)

| Instance | Attribute | Access | Name | Type | Value |
|---|---|---|---|---|---|
| 01h | 64h | Get | Input data length | UINT | I/O mapping input data length (Byte) |
| | 65h | Get | Output data length | UINT | I/O mapping output data length (Byte) |
| | 6Dh | Get | Number of units connected | USINT | Number of units connected |
| | 79h | Get/Set | Hold/Clear | BOOL | 0: switch<br>1: H.T. or EtherNet/IP™ object |
| | 7Ah | Get | System diagnosis 1 | BYTE | Bit0: Analog user set value lower limit detection<br>Bit1: Analog user set value upper limit detection<br>Bit2: Analog range lower limit detection<br>Bit3: Analog range upper limit detection<br>Bit4: ON/OFF count upper limit detection<br>Bit5: Open circuit detection<br>Bit6: Short circuit detection (Output)<br>Bit7: Short circuit detection<br>    (Power supply for input/ output device) |
| | 7Bh | Get | System diagnosis 2 | BYTE | Bit0: Monitoring the power supply voltage<br>    (For output)<br>Bit1: Monitoring the power supply voltage<br>    (For control and input)<br>Bit2: Reserved<br>Bit3: Number of units not connected<br>Bit4: System connection error<br>Bit5: Configuration error<br>Bit6: System default error<br>Bit7: Hardware error |
| | 7Dh | Get | System diagnosis 3 | BYTE | Bit0: Digital input unit error<br>Bit1: Digital output unit error<br>Bit2: Analog input unit error<br>Bit3: Analog output unit error<br>Bit4: SI unit error<br>Bit5: Reserved<br>    :<br>Bit7: Reserved |
| | 9Ch | Get | Unit operating condition 1 | BYTE | Bit0: Error is detected in unit 0<br>    :<br>Bit1: Error is detected in unit 7 |
| | 9Dh | Get | Unit operating condition 2 | BYTE | Bit0: Error is detected in unit 8<br>Bit1: Error is detected in unit 9<br>Bit2: Reserved<br>    :<br>Bit7: Reserved |
| | AEh | Get | Unit operating condition 1 | BYTE | Bit0: Unit 0 is recognized<br>    :<br>Bit7: Unit 7 is recognized |
| | AFh | Get | Unit operating condition 2 | BYTE | Bit0: Unit 8 is recognized<br>Bit1: Unit 9 is recognized<br>Bit2: Reserved<br>    :<br>Bit7: Reserved |

• Unit/Channel diagnosis object (Class: 67h)

| Instance | Attribute | Access | Name | Type | Value |
|---|---|---|---|---|---|
| 01h to 0Ah *1 | 6Ch | Get | Unit diagnosis | BYTE | Bit0: Analog user set value lower limit detection<br>Bit1: Analog user set value upper limit detection<br>Bit2: Analog range lower limit detection<br>Bit3: Analog range upper limit detection<br>Bit4: ON/OFF count upper limit detection<br>Bit5: Open circuit detection<br>Bit6: Short circuit detection (Output)<br>Bit7: Short circuit detection<br>　　　(Power supply for input/output device) |
| | 6Eh | Get | Channel diagnosis Ch0 to Ch7 | BYTE | Bit0: Error is detected in channel 0<br>　　　　　:<br>Bit7: Error is detected in channel 7 |
| | 6Fh | Get | Channel diagnosis Ch8 to Ch15 | BYTE | Bit0: Error is detected in channel 8<br>　　　　　:<br>Bit7: Error is detected in channel 15 |
| | 70h | Get | Channel diagnosis Ch16 to Ch23 | BYTE | Bit0: Error is detected in channel 16<br>　　　　　:<br>Bit7: Error is detected in channel 23 |
| | 71h | Get | Channel diagnosis Ch24 to Ch31 | BYTE | Bit0: Error is detected in channel 24<br>　　　　　:<br>Bit7: Error is detected in channel 31 |

＊1: 01h to 0Ah indicates the unit number 0 to 9.

• Details of channel diagnosis object (Class: 77h)

| Instance | Attribute | Access | Name | Type | Value |
|---|---|---|---|---|---|
| 01h to 0Ah *1 | 64h to 83h *2 | Get | Channel diagnosis Ch0 to 31 | BYTE | Bit0: Analog user set value lower limit detection<br>Bit1: Analog user set value upper limit detection<br>Bit2: Analog range lower limit detection<br>Bit3: Analog range upper limit detection<br>Bit4: ON/OFF count upper limit detection<br>Bit5: Open circuit detection<br>Bit6: Short circuit detection (Output)<br>Bit7: Short circuit detection<br>　　　(Power supply for input/output device) |

＊1: 01h to 0Ah indicates the unit number 0 to 9.

＊2: 64h to 83h indicates the channel number 0 to 31.

•Unit parameter object (Class: 78h)

| Instance | Attribute | Access | Name | Type | Value |
|---|---|---|---|---|---|
| 01h to 0Ah *1 | 64h | Get/Set | Short circuit detection (Power supply for input device) •Digital input, I/O •Analog input, output, I/O | BOOL | 0=Disable 1=Enable |
| | 65h | Get/Set | Short circuit detection (Output) •SI •Digital output, I/O | BOOL | 0=Disable 1=Enable |
| | 66h | Get/Set | Analog range upper limit detection •Analog input, I/O | BOOL | 0=Disable 1=Enable |
| | 67h | Get/Set | Analog range lower limit detection •Analog input, I/O | BOOL | 0=Disable 1=Enable |
| | 68h | Get/Set | Measure against in-rush current •Digital input, I/O | BOOL | 0=Disable 1=Enable |
| | 69h | Get/Set | Recovery after a short circuit •SI •Digital output, I/O | BOOL | 0=Manual 1=Auto |
| | 6Ah | Get/Set | Input filtering time •Digital input, I/O | USINT | 0=0.1 ms 1=1.0 ms 2=10 ms 3=20 ms |
| | 6Bh | Get/Set | Digital input extension time •Digital input, I/O | USINT | 0=1.0 ms 1=15 ms 2=100 ms 3=200 ms |
| | 6Ch | Get/Set | Analog data format •Analog input, output, I/O | USINT | 0=Offset binary 1=Sign and Magnitude 2=2's complement 3=Scaled (Scaled cannot be set for analog input) |
| | 6Dh | Get/Set | Monitoring the power supply voltage (For control and input) •SI | BOOL | 0=Disable 1=Enable |
| | 6Eh | Get/Set | Monitoring the power supply voltage (For output) •SI | BOOL | 0=Disable 1=Enable |

＊1: 01h to 0Ah indicates the unit number 0 to 9.

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• Channel parameter object (1) (Class: 79h to 7Fh)

| Class | Instance | Attribute | Access | Name | Type | Value |
|-------|----------|-----------|--------|------|------|-------|
| 79h | 01h to 0Ah *1 | 64h to 83h *2 | Get/Set | Open circuit detection<br>•SI<br>•Digital input (DX□C1)<br>•Digital output, I/O | BOOL | 0=Disable<br>1=Enable |
| 7Ah | | | | ON/OFF count upper limit detection<br>•SI<br>•Digital input, output, I/O | BOOL | 0=Disable<br>1=Enable |
| 7Bh | | | | ON/OFF count upper limit value<br>•SI<br>•Digital input, output, I/O | UINT | 1 to 65000<br>(Times diagnosis is detected=Set value x1000) |
| 7Ch | | | | Analog user set value upper limit detection<br>•Analog input, output, I/O | BOOL | 0=Disable<br>1=Enable |
| 7Dh | | | | Analog user set value upper limit value<br>•Analog input, output, I/O | UINT | |
| 7Eh | | | | Analog user set value lower limit detection<br>•Analog input, output, I/O | BOOL | 0=Disable<br>1=Enable |
| 7Fh | | | | Analog user set value lower limit value<br>•Analog input, output, I/O | UINT | |

∗1: 01h to 0Ah indicates the unit number 0 to 9.

∗2: 64h to 83h indicates the channel number 0 to 31.

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• Channel parameter object (2) (Class: 83h to 8Ah)

| Class | Instance | Attribute | Access | Name | Type | Value |
|---|---|---|---|---|---|---|
| 83h | 01h to 0Ah *1 | 64h to 83h *2 | Get/Set | Output setting at the time of communication error<br>•SI<br>•Digital output, I/O<br>•Analog output, I/O | BOOL | 0=Disable (Hold)<br>1=Enable<br>(Clear or Force ON) |
| 84h | | | | Output setting at the time of communication error (Digital)<br>•SI<br>•Digital output, I/O | BOOL | 0=Off (Clear)<br>1=On (Force ON) |
| 85h | | | | Output setting at the time of communication error (Analog)<br>•Analog output, I/O | UINT | |
| 86h | | | | Output setting at the time of communication idling<br>•SI<br>•Digital output, I/O<br>•Analog output, I/O | BOOL | 0=Disable (Hold)<br>1=Enable<br>(Clear or Force ON) |
| 87h | | | | Output setting value at the time of communication idling (Digital)<br>•SI<br>•Digital output, I/O | BOOL | 0=Off (Clear)<br>1=On (Force ON) |
| 88h | | | | Output setting value at the time of communication idling (Analog)<br>•Analog output, I/O | UINT | |
| 89h | | | | Analog average filter<br>•Analog input, I/O | USINT | 0=None<br>1=2 value average<br>2=4 value average<br>3=8 value average |
| 8Ah | | | | Analog range<br>•Analog input, output, I/O | USINT | 0=-10…+10 V<br>(Analog input unit only)<br>1=-5…+5 V<br>(Analog input unit only)<br>2=-20…+20 mA<br>(Analog input unit only)<br>3=0…10 V<br>4=0…5 V<br>5=1…5 V<br>6=0…20mA<br>7=4…20mA |

∗1: 01h to 0Ah indicates the unit number 0 to 9.

∗2: 64h to 83h indicates the channel number 0 to 31.

# Accessories

For the selection of accessories, refer to the catalog.

(1)Valve plate
    EX600-ZMV1
        Enclosed parts: Round head screw (M4x6), 2 pcs.
                        Round head screw (M3x8), 4 pcs.
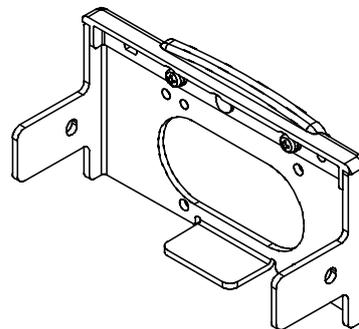
    EX600-ZMV2 (Specified for SY series)
        Enclosed parts: Round head screw (M4x6), 2 pcs.
                        Round head screw (M3x8), 4 pcs.
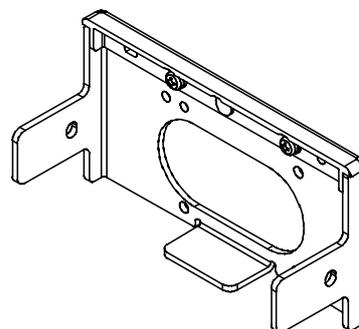
(2)End plate bracket
    EX600-ZMA2
        Enclosed parts: Round head screw (M4x20), 1 pc.
                        P tithe screw (4x14), 2 pcs.
    EX600-ZMA3 (Specified for SY series)
        Enclosed parts: Round head screw (M4x20) with washer, 1 pc.
                        P tithe screw (4x14), 2 pcs.
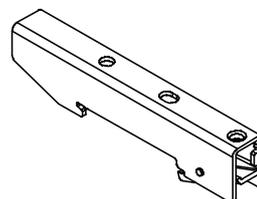
(3)Intermediate support bracket
    EX600-ZMB1…for direct mounting
        Enclosed parts: Round head screw (M4x5), 2 pcs.
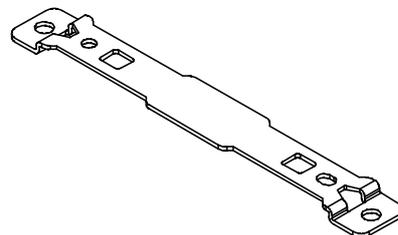
    EX600-ZMB2…for DIN rail mounting
        Enclosed parts: Round head screw (M4x6), 2 pcs.

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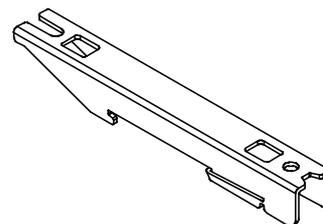
(4)Seal cap (10 pcs.)
　EX9-AWES…for M8
　EX9-AWTS…for M12
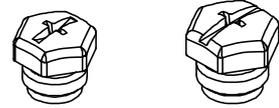
(5)Marker (1 sheet, 88 pcs.)
　EX600-ZT1

(6)Y Junction connector
　PCA-1557785 2xM12 (5 pin) – M12 (5 pin)

(7)Assembled type connector
　PCA-1578078 for power supply, 7/8 inch, Plug, Cable O.D. 12 to 14 mm
　PCA-1578081 for power supply, 7/8 inch, Socket, Cable O.D. 12 to 14 mm
　PCA-1557730 M8 (3 pin), Plug
　PCA-1557743 M12 (4 pin), Plug, for AWG26 to AWG22, SPEEDCON compatible
　PCA-1557756 M12 (4 pin), Plug, for AWG22 to AWG18, SPEEDCON compatible

(8)Power supply cable
　PCA-1558810 Cable with 7/8 inch connector, Socket, Straight 2 m
　PCA-1558823 Cable with 7/8 inch connector, Socket, Straight 6 m
　PCA-1558836 Cable with 7/8 inch connector, Socket, Right angle 2 m
　PCA-1558849 Cable with 7/8 inch connector, Socket, Right angle 6 m
　PCA-1564927 Cable with M12 connector, B code, Socket, Straight 2 m, SPEEDCON compatible
　PCA-1564930 Cable with M12 connector, B code, Socket, Straight 6 m, SPEEDCON compatible
　PCA-1564943 Cable with M12 connector, B code, Socket, Right angle 2 m, SPEEDCON compatible
　PCA-1564969 Cable with M12 connector, B code, Socket, Right angle 6 m, SPEEDCON compatible

(9)EtherNet/IP$^{TM}$ communication cable
　EX9-AC020EN-PSRJ Cable with M12 connector, D code, Socket, Straight 2 m

(10)Connector extension cable
　PCA-1557769 M12 (4 pin), Straight 3 m, SPEEDCON compatible
　PCA-1557772 M8 (3 pin), Straight 3 m

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| Revision history |
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# SMC Corporation

Akihabara UDX 15F,
4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, JAPAN
Phone: +81 3-5207-8249   Fax: +81 3-5298-5362
URL http://www.smcworld.com