



Operation Manual

PRODUCT NAME

Fieldbus system
Modbus/TCP compatible SI unit for Henrob

MODEL / Series / Product Number

EX600-SEN1-X14
EX600-ED#

SMC Corporation

Table of Contents

Safety Instructions	2
Definition and terminology	10
Assembly	12
Mounting and Installation	14
Installation	14
Wiring	16
SI unit	
Model Indication and How to Order	19
Summary of Product parts	19
Mounting and Installation	20
Wiring	20
LED Display	24
Specification	
26	
Specifications	26
Dimensions	27
End plate	
Model Indication and How to Order	28
Summary of Product parts	28
Mounting and Installation	29
Wiring	29
Specification	
30	
Specifications	30
Dimensions	30
Maintenance	32
Troubleshooting	33
Parameter Setting	42
Parameter definition and setting	42
I/O data size	53
I/O Map	54
Details of diagnostic data	55
Modbus/TCP Register	57
Function Code	58
Parameter Setting using Modbus/TCP	63
Accessories	66

Safety Instructions

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

- *1) ISO 4414: Pneumatic fluid power -- General rules relating to systems.
- ISO 4413: Hydraulic fluid power -- General rules relating to systems.
- IEC 60204-1: Safety of machinery -- Electrical equipment of machines. (Part 1: General requirements)
- ISO 10218-1992: Manipulating industrial robots -Safety.
- etc.



Caution :

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



Warning

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



Danger :

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

Warning

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

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

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

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

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

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

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

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by

using a mechanical protective function, and periodical checks to confirm proper operation.

Caution

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.^{*2)}
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

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

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

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

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Operator

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

Safety Instructions

Warning

Do not disassemble, modify (including changing the printed circuit board) or repair.
An injury or failure can result.

Do not operate or set with wet hands.
This may lead to an electric shock.

Do not operate the product outside of the specifications.
Do not use for flammable or harmful fluids.
Fire, malfunction, or damage to the product can result.
Verify the specifications before use.

Do not operate in an atmosphere containing flammable or explosive gases.
Fire or an explosion can result.
This product is not designed to be explosion proof.

If using the product in an interlocking circuit:
• Provide a double interlocking system, for example a mechanical system.
• Check the product regularly for proper operation.
Otherwise malfunction can result, causing an accident.

The following instructions must be followed during maintenance:
• Turn off the power supply.
• Stop the air supply, exhaust the residual pressure and verify that the air is released before performing maintenance.
Otherwise an injury can result.

Caution

When handling, assembling or replacing the units:
• Avoid touching any sharp metal parts of the connectors for connecting units.
• When assembling units, take care not to get any fingers caught between units. Injury can result.
• When disassembling units, take care to avoid excessive force.
The connection parts of the unit are firmly joined with seals and 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.

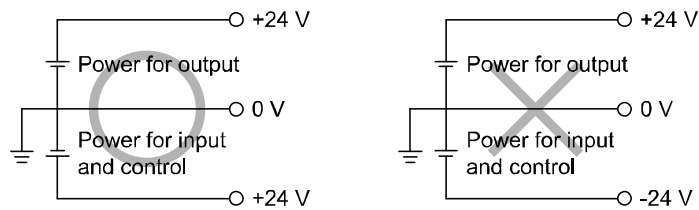
NOTE

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**

- When conformity to UL is required, the SI unit should be used with a UL1310 Class2 power supply.
- Use the specified voltage.
Otherwise failure or malfunction can result.
- The power supply for the unit should be 0 V 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.

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.

- 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 23 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.

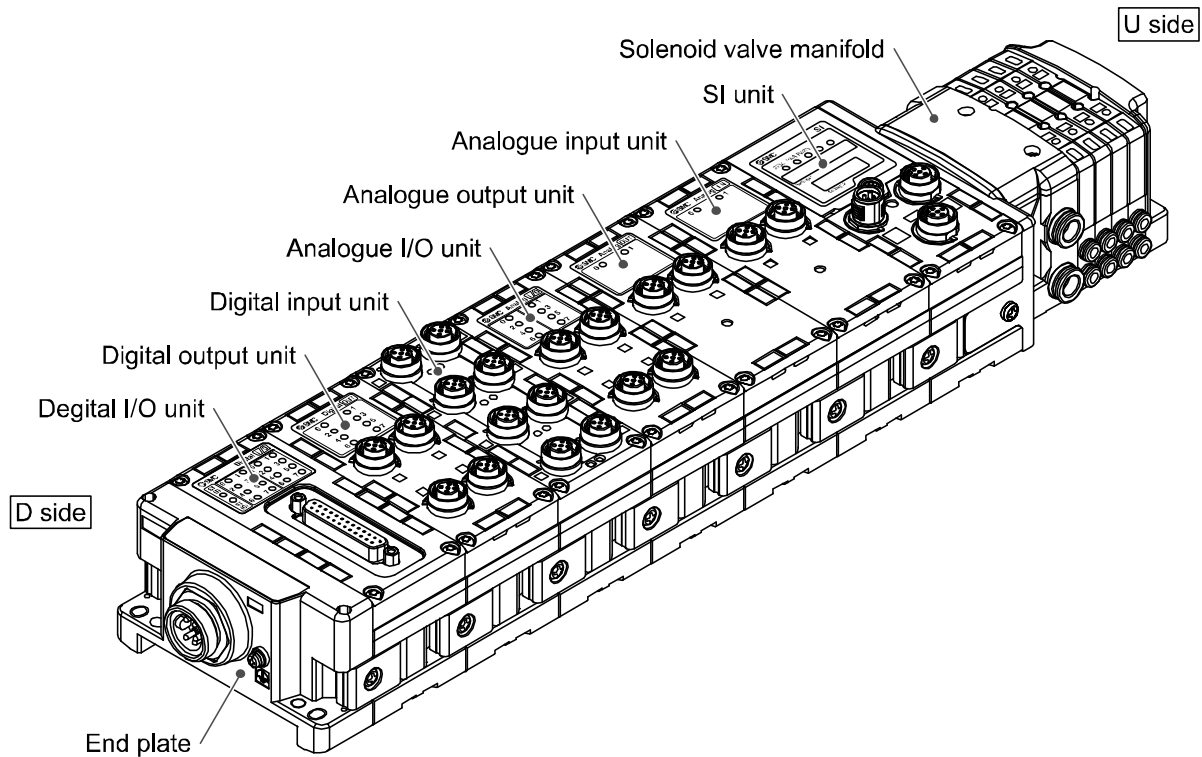
*Maintenance

- 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 outputs 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.

Analogue input unit: For connecting sensors with analogue output capability.

Analogue output unit: This can be connected to the equipment which can read analogue input.

Analogue I/O unit: This unit has both analogue 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 analogue input device is converted to digital, and displayed in decimal and hexadecimal. These hexadecimal and decimal values are also outputted to the analogue 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	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	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 Modbus/TCP.
	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.

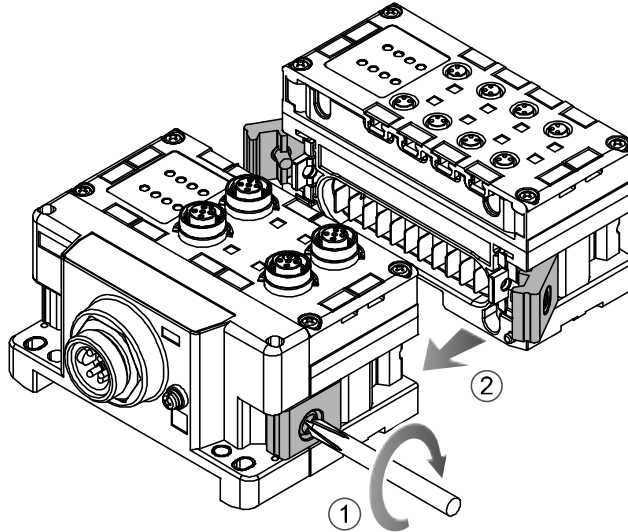
Assembly

•Assembling the unit as a manifold

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

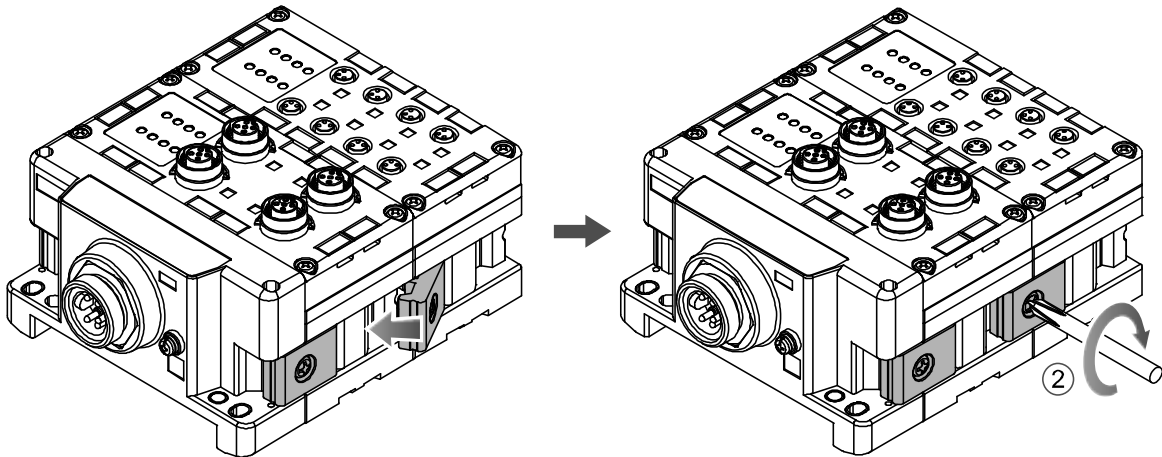
(1)Connect a unit to the End plate.

Digital and Analogue I/O units can be connected in any order.
Tighten the joint brackets to a torque of 1.5 to 1.6 Nm.



(2)Add more I/O units.

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



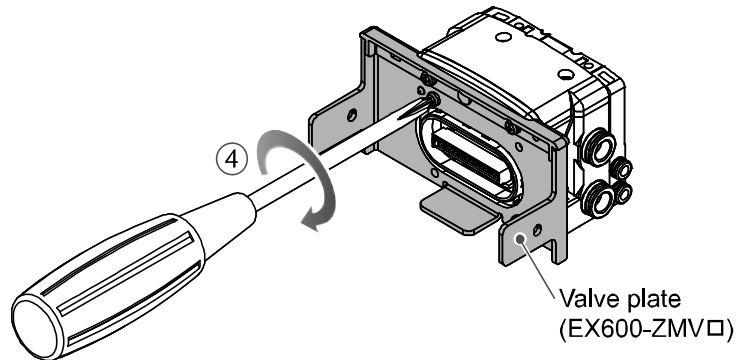
(3)Connecting the SI unit.

After connecting the required I/O units, connect the SI unit.
The method is as above in (1), (2).

(4) Mounting the valve plate.

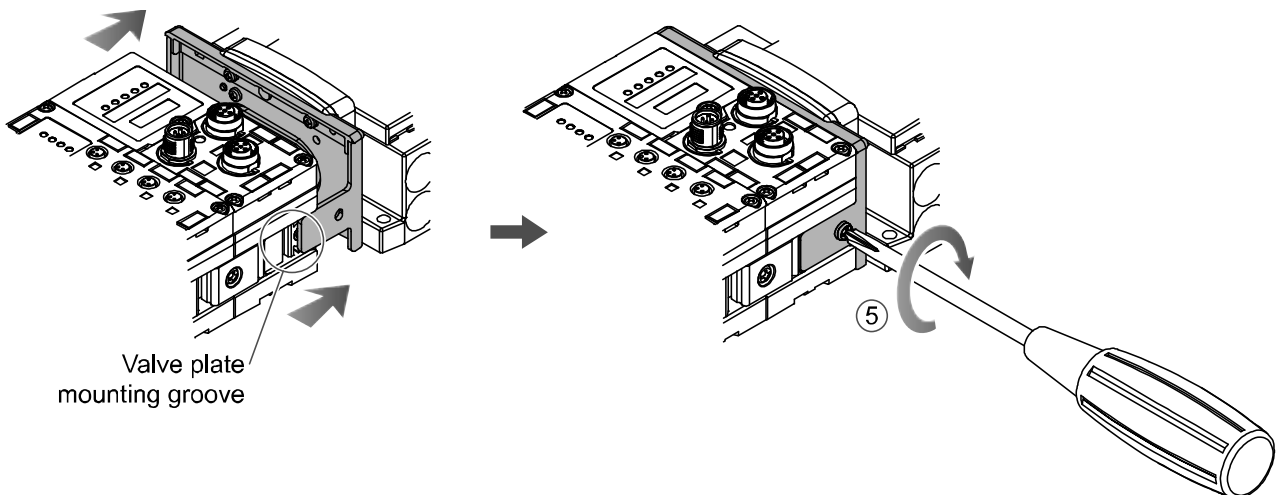
Mount the valve plate (EX600-ZMV) to the valve manifold using the valve set screws. (M3 x 8)
Apply 0.6 to 0.7 Nm tightening torque to the screws.

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



(5) Connect the SI unit to the valve manifold.

Insert the valve plate into the valve plate mounting groove on the side of the SI unit.
Fix using the valve plate screws (M4 x 6) supplied, to a torque of 0.7 to 0.8 Nm.



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.

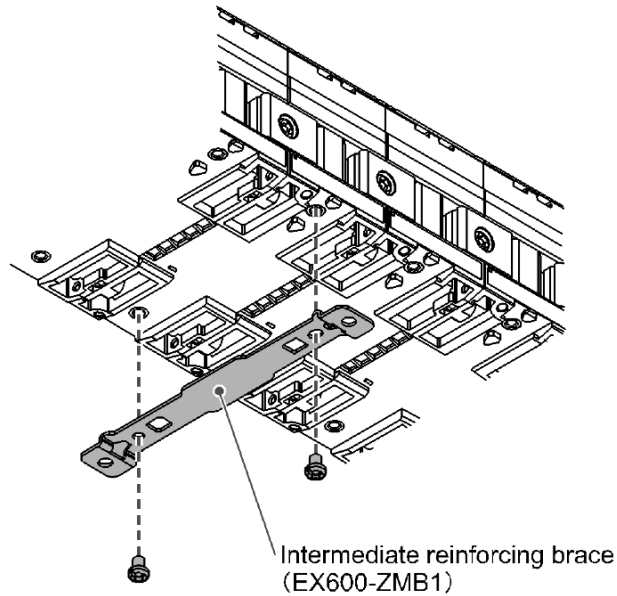
Mounting and Installation

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-M4 x 5 screws.

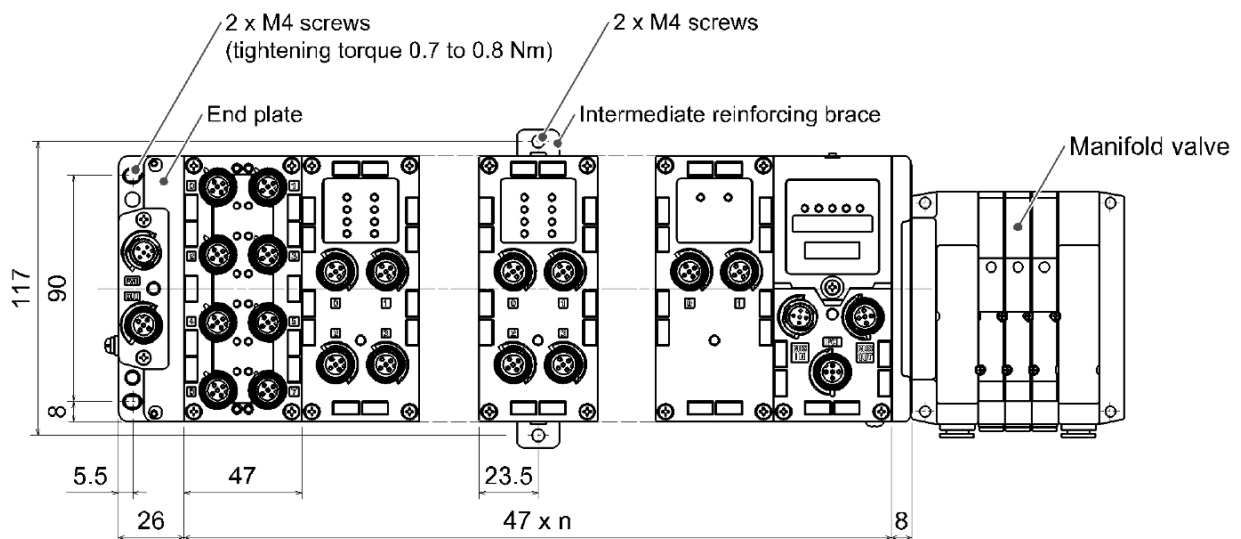
Tightening torque: 0.7 to 0.8 Nm.



(2)Mount and tighten the End plate 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

•DIN rail mounting

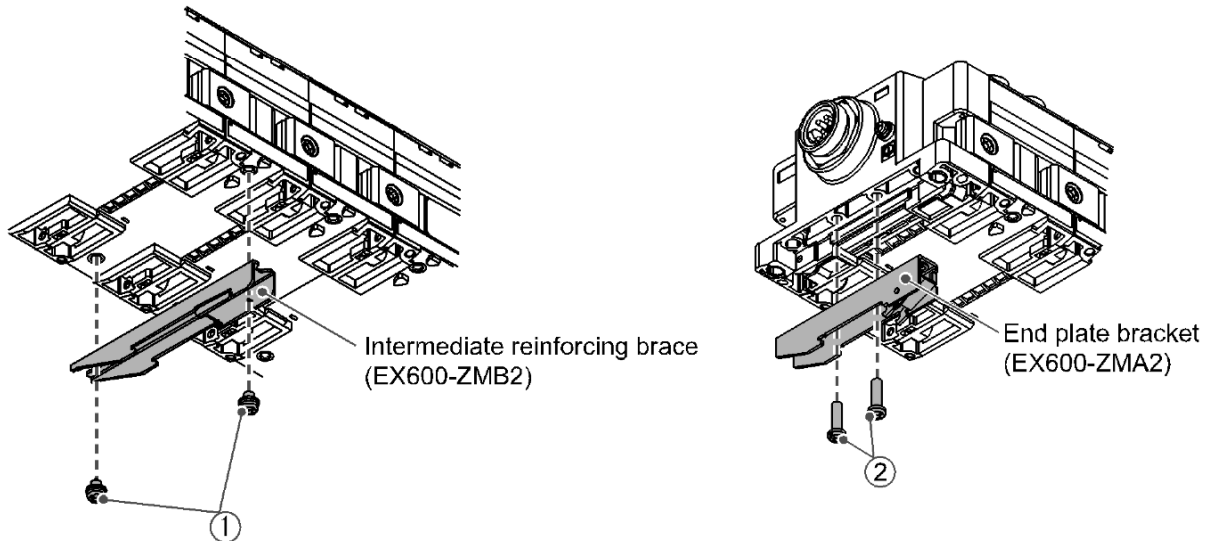
(Not available for SY series valves. Refer to the SY catalog.)

(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-M4 x 6 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-M4 x 14 screws.

Tightening torque: 0.7 to 0.8 Nm.



(3)Hook the DIN rail mounting groove on to the DIN rail.

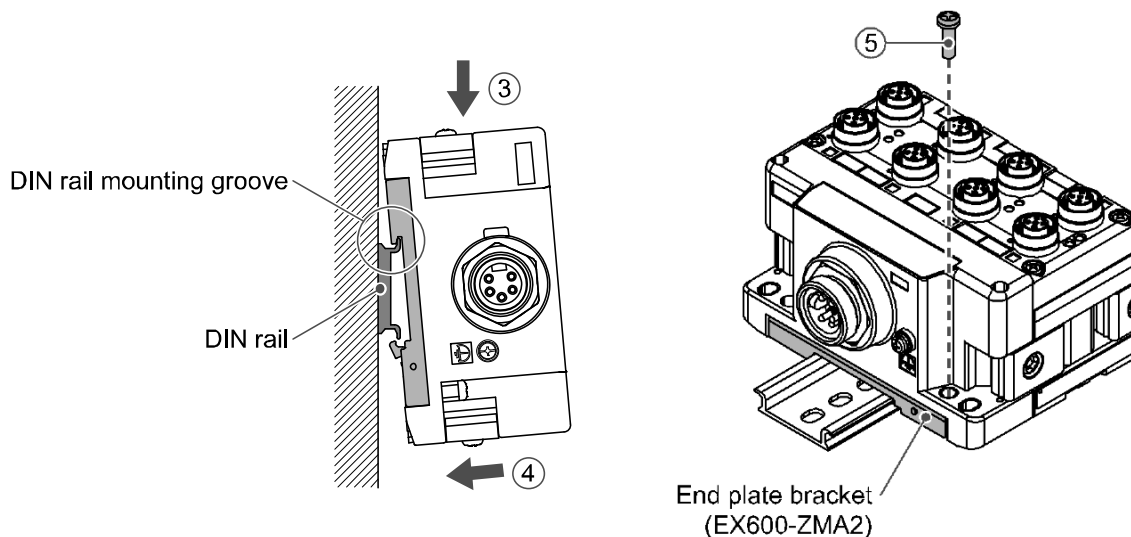
(4)Press the manifold using its side hooked to the DIN rail as a fulcrum until the manifold is locked.

(5)Fix the manifold by tightening the DIN rail fixing screws of the EX600-ZMA2. (M4 x 20)

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.



Wiring

•Connect the M12 connector cable.

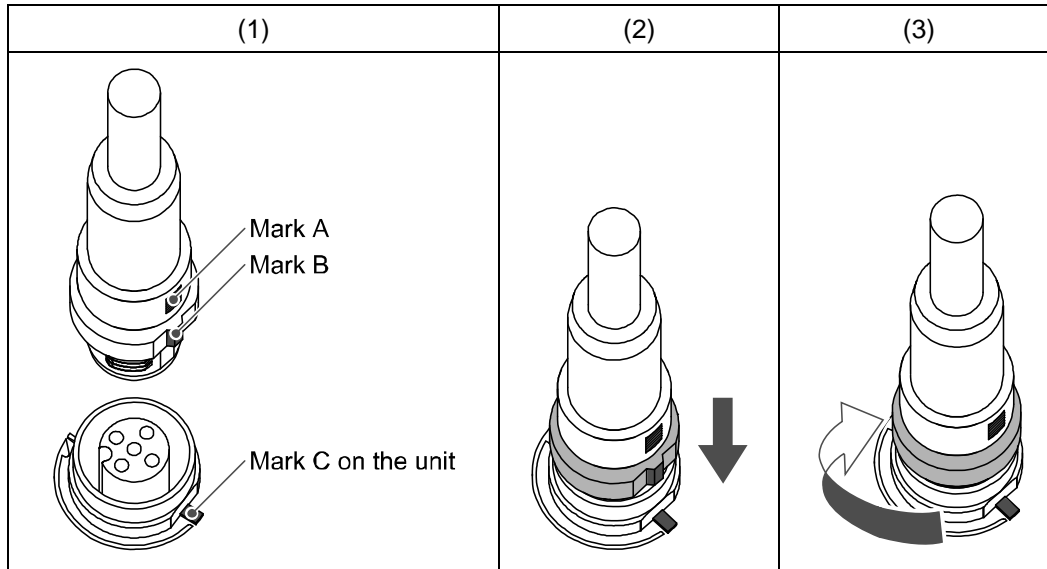
The M12 SPEEDCON connector connection method is explained below.

(1)Align mark B on the metal bracket of the cable connector (plug/socket) with mark A.

(2)Align with mark C on the unit and insert the connector vertically.

If they are not aligned, the connector cannot be connected correctly.

(3)When mark B has been turned 180 degrees (1/2 turn), wiring is complete. Confirm that the connection is not loose. If turned too far, it will become difficult to remove the connector.

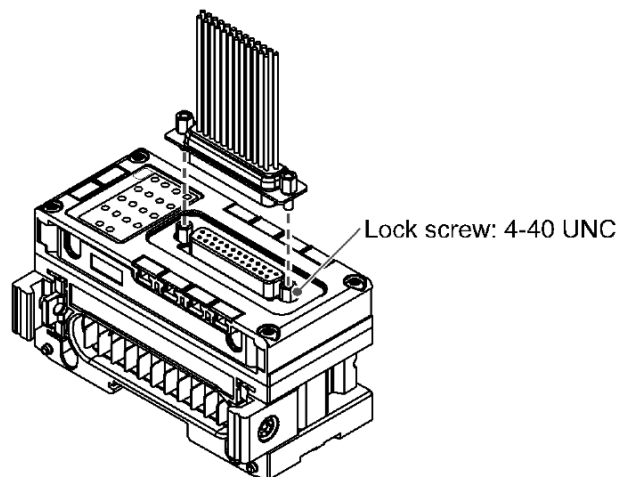


•D-sub socket connection method.

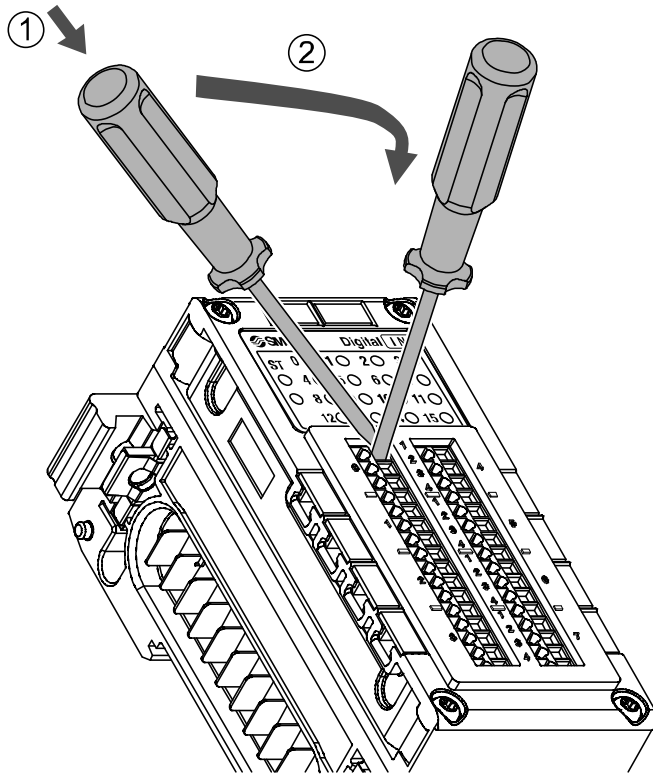
(1)Align the D-sub plug connector with the D-sub socket on the unit.

(2)Insert the connector vertically, taking care not to use excessive force or bend the pins.

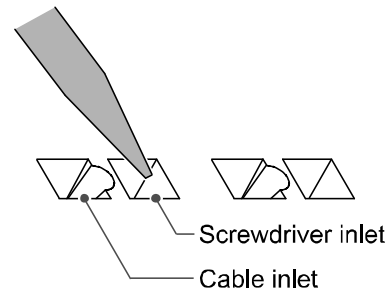
(3)Secure the connector using 2-locking screws (4-40 UNC). Maximum tightening torque is 0.6 Nm.



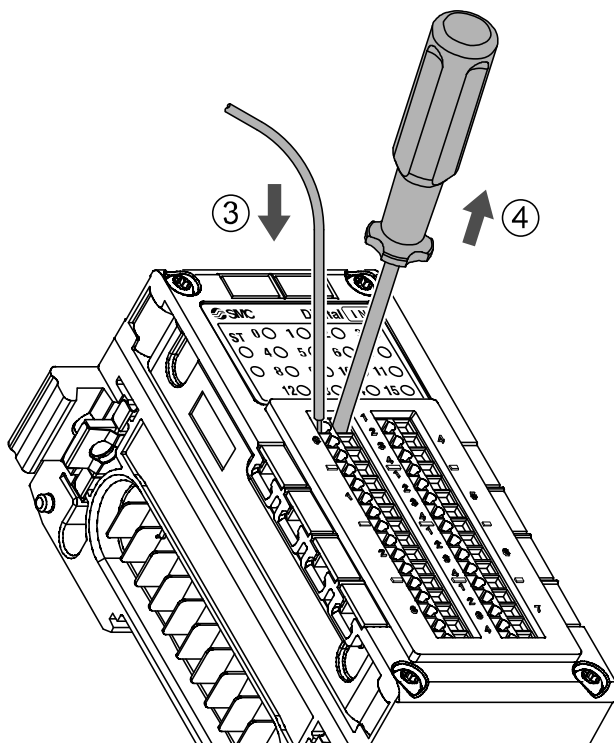
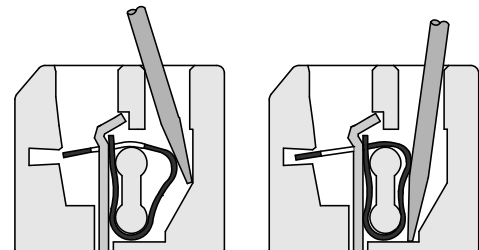
•Spring type terminal connection method.



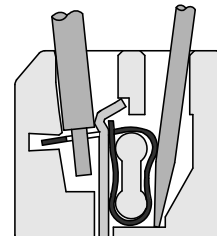
- ① Insert a flat blade screwdriver inclined to the left into the right hole of the two holes as shown in the figure below.



- 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.

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.

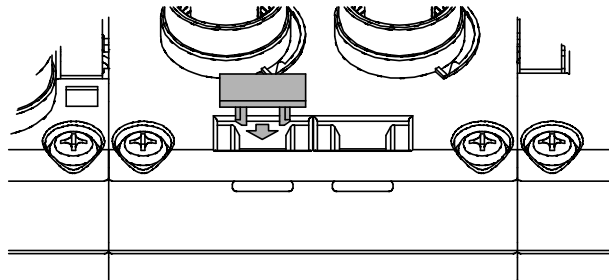
Precautions for handling

- 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 mm² (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.

•Identification marker

The signal name of the input or output devices and unit address can be written on the marker, and can be installed on each unit.

Mount the marker (EX600-ZT1) into the marker groove as required.



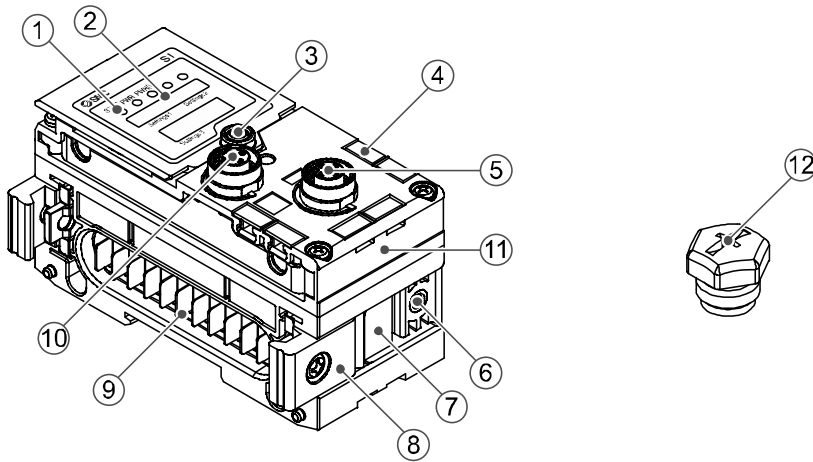
SI unit

Model Indication and How to Order

EX600-SEN1-X14

Protocol	Modbus/TCP
Polarity of output	PNP (-common)

Summary of Product parts



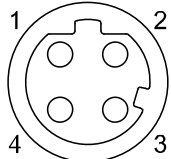
No.	Description	Function
1	Status display LED	Displays the status of the unit.
2	Display cover	Open to access the setting switches.
3	Display cover screw	Screw to open the display cover.
4	Marker groove	Groove for an identification marker.
5	Connector (PCI)	Connector for Handheld Terminal.
6	Valve plate mounting hole	Holes for fixing the valve plate.
7	Valve plate mounting groove	Groove for mounting the valve plate.
8	Joint bracket	Bracket for joining to adjacent units.
9	Unit connector (Plug)	Connector for signals and power supplies to adjacent units.
10	Connector (BUS IN)	Connector 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.)	Fitted to unused connectors (PCI).

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

Mounting and Installation

Wiring

•Connector pin assignment

Configuration	Pin number	Signal name
BUS IN		
	1	TX+
	2	RX+
	3	TX-
	4	RX-

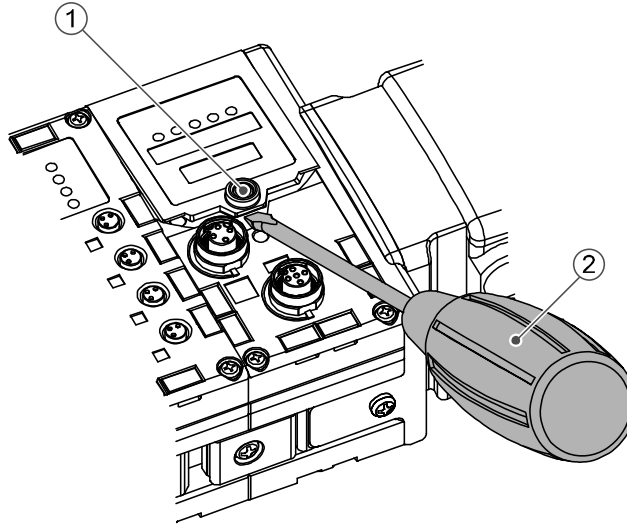
Precautions for handling

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

Setting and Adjustment

•Switch setting

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



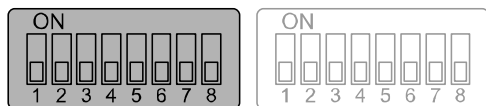
- (3) Set the switch using a small watchmaker's screwdriver with a thin blade, referring to the setting of switch on the following pages.
- (4) After setting the switch, tighten the display cover tightening screw in the reverse order of the above procedure. (Tightening torque: 0.3 to 0.4 Nm)

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.

•Setting Switch layout and functions.

Settings1: Not used.



Settings1

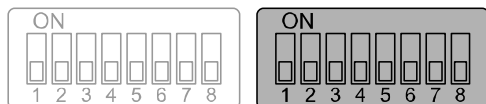
Settings2



Settings3

Bit	Content
1 - 8	
OFF	Reserved (Do not turn on.)

Settings2 (Bit1 - Bit8): IP address setting.



Settings1

Settings2



Settings3

Bit								IP address
1	2	3	4	5	6	7	8	
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	192.168.50.1
OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	192.168.50.2
:	:	:	:	:	:	:	:	:
ON	ON	ON	ON	OFF	OFF	OFF	OFF	192.168.50.15
:	:	:	:	:	:	:	:	:
ON	OFF	ON	ON	ON	ON	ON	ON	192.168.50.253
OFF	ON	ON	ON	ON	ON	ON	ON	192.168.50.254
ON	ON	ON	ON	ON	ON	ON	ON	DHCP mode ^{*1}
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Remote Control mode ^{*2}

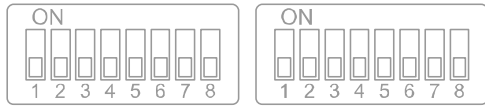
*1: The mode to obtain IP address from DHCP server. Obtained IP address is lost when the power supply is cut.

*2: 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.

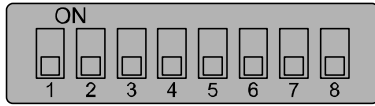
Disable DHCP: IP address etc. cannot be obtained from BOOTP/DHCP Server.

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



Settings1

Settings2



Settings3

Settings3 (Bit1): HOLD/CLEAR setting.

Sets the output status when the fieldbus has a communication error.

Bit	Content
1	
OFF	Output is OFF. (Default setting)
ON	Holds the output.

Settings3 (Bit2 – Bit4): Communication speed and full duplex/half duplex setting.

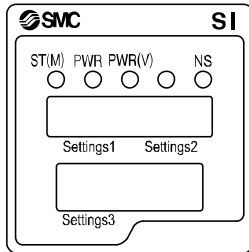
Bit			Content
2	3	4	
OFF	ON/OFF	ON/OFF	Automatic
ON	OFF	OFF	10 Mbps, half duplex
ON	OFF	ON	10 Mbps, full duplex
ON	ON	OFF	100 Mbps, half duplex
ON	ON	ON	100 Mbps, full duplex

Settings3 (Bit5 - Bit8): Not used.

Bit	Content
5 - 8	
OFF	Reserved (Do not turn on.)

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 diagnostic 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.
NS	Displays the network status.

•SI unit common status

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

•Modbus/TCP status

LED display	Content
<p style="text-align: center;">NS ○ NS LED is OFF.</p>	<p>The power supply for control and input is OFF, or IP address is not set.</p>
<p style="text-align: center;">NS  Green NS LED is flashing.</p>	<p>The unit received an IP address, but connection is not established.</p>
<p style="text-align: center;">NS ● Green NS LED is ON.</p>	<p>Connection is established.</p>
<p style="text-align: center;">NS  Red NS LED is flashing.</p>	<p>Communication time out. (when Process active time out is set.)</p>
<p style="text-align: center;">NS ● Red NS LED is ON.</p>	<p>IP address is duplicated.</p>

Specification

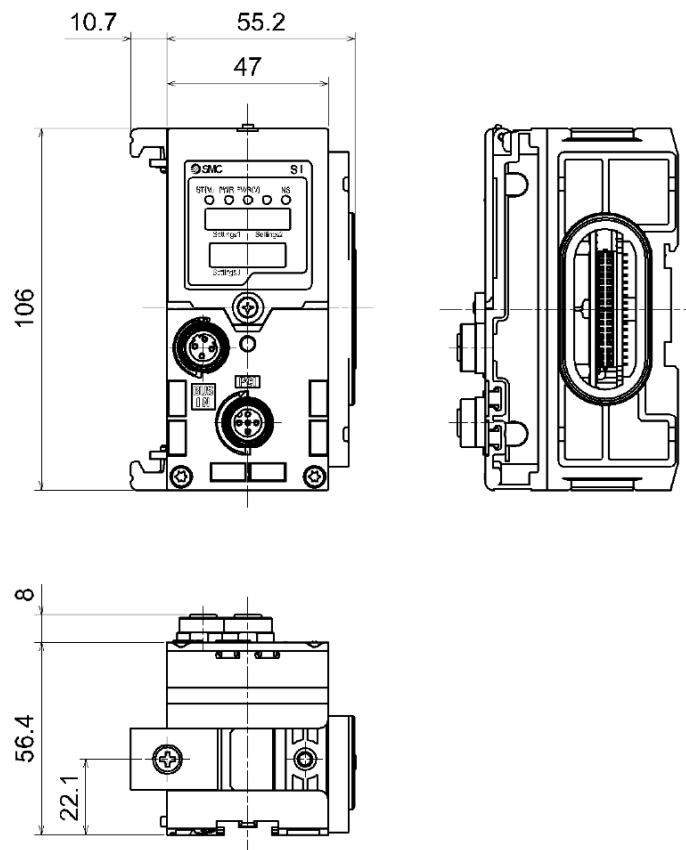
Specifications

Model		EX600-SEN1-X14	
General	Enclosure	IP67 (With manifold assembled) *1	
	Housing material	PBT	
	Weight	300 g or less	
	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)	
	Max. number of I/O Unit	9	
	Internal current consumption at 24 VDC (The power supply for control and input)	120 mA or less	
	Standard	CE marking, UL (CSA), RoHS	
Power supply (Control and input)		24 VDC, Class2, 2 A	
Power supply (Output)		24 VDC, Class2, 2 A	
Solenoid valve	Applicable series	VQC1000/2000/4000, SV1000/2000/3000, SY3000/5000, S0700	
	Max. number of solenoid valves	32 solenoid coils	
	Output type of solenoid	PNP (Negative common)	
	Connected load	24 VDC, Class2, 1.5 W or less per output	
	Short circuit protection	YES	
Fieldbus	Protocol	Modbus/TCP	
	Media	100 BASE-TX	
	Communication speed	10 Mbps/100 Mbps (Automatic/Manual)	
	Communication type	Full duplex/half duplex (Automatic/Manual)	
	IP address setting method		DHCP
			Dip switch: from 192.168.50.1 to 192.168.50.254
	Function code		Read Coils (0x01)
			Read Discrete Inputs (0x02)
			Read Holding Registers (0x03)
			Read Input Registers (0x04)
			Write Single Coil (0x05)
			Write Single Register (0x06)
			Write Multiple Coils (0x0F)
		Write Multiple Registers (0x10)	
	Read/Write Multiple Registers (0x17)		
Modbus/TCP Conformance test		Not applicable	
Pollution degree		Pollution degree 3	

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

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

Dimensions



End plate

Model Indication and How to Order

EX600-ED□-□

End plate at D side

Mounting method

Connector

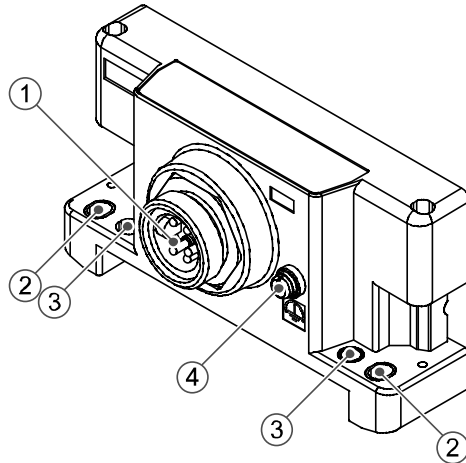
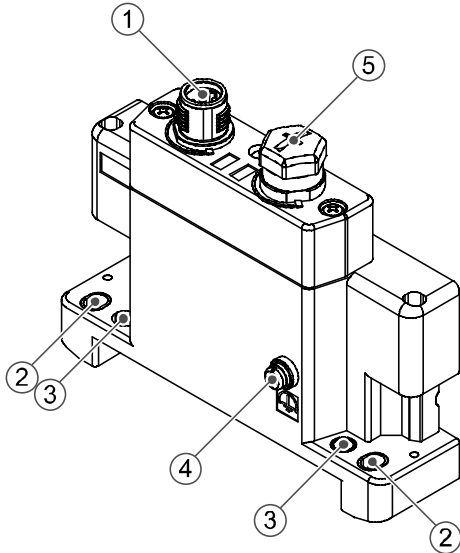
Symbol	Content
2	M12 (5 pin)
3	7/8 inch (5 pin)

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

Summary of Product parts

•EX600-ED2-□

•EX600-ED3-□



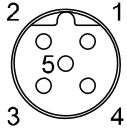
No.	Description	Function
1	Power connector	Connector for power supply to SI unit and I/O unit.
2	Fixing hole for direct mounting	Holes for direct mounting.
3	DIN rail fixing hole	Holes for DIN rail mounting.
4	FE terminal	Terminal for ground connection.
5	Connector (Not used)	Unused connector. Do not remove seal cap.

Mounting and Installation

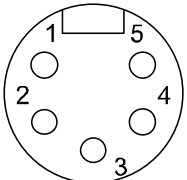
Wiring

Connector pin assignment

(1)EX600-ED2-□

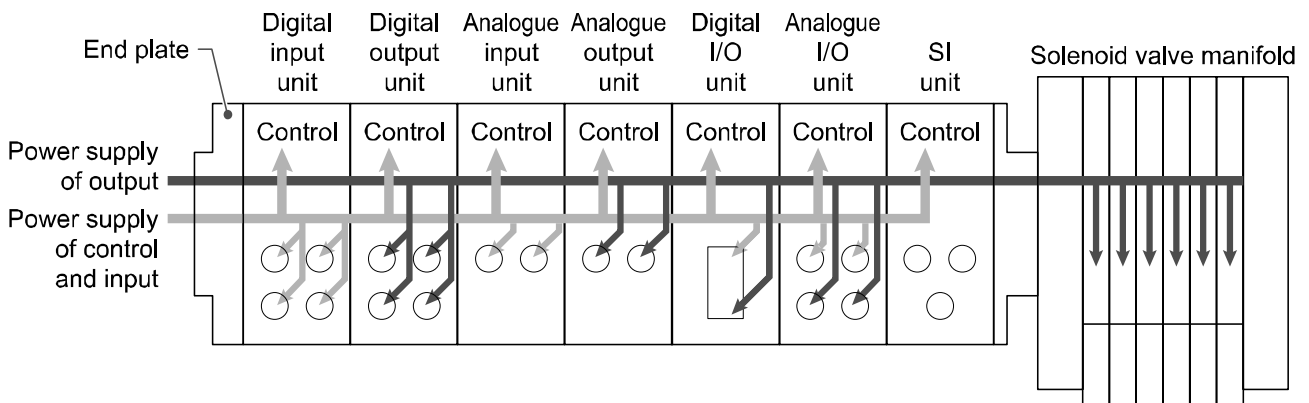
Configuration	Pin number	Signal name
	1	24 V (Output)
	2	0 V (Output)
	3	24 V (Control and input)
	4	0 V (Control and input)
	5	FE

(2)EX600-ED3-□

Configuration	Pin number	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 analogue unit.
- Power supply for output: Supplying power for equipment connected to output port of digital and analogue 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

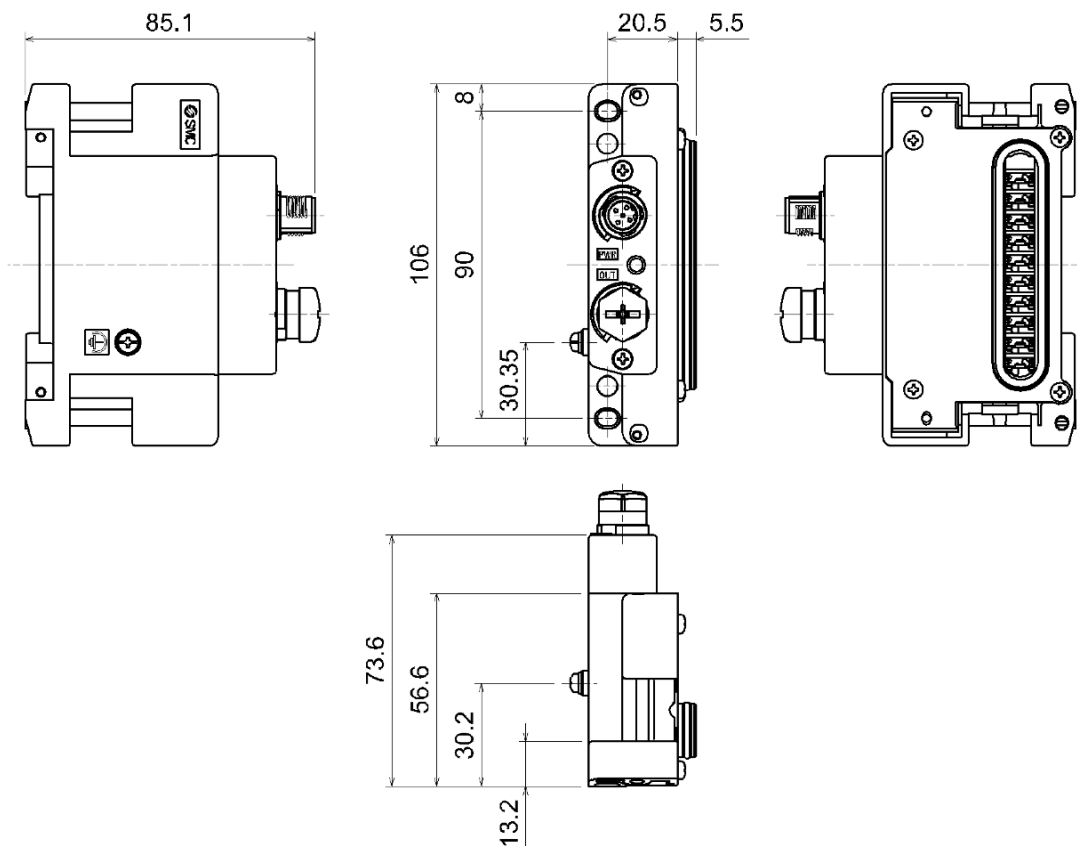
Model		EX600-ED2-□	EX600-ED3-□
Power specifications	Power connector	M12 (5 pin) Plug	7/8 inch (5 pin) Plug
	Power supply (Control and input)	24 VDC, ±10%, Class2, 2 A	24 VDC, ±10%, 8 A
	Power supply (Output)	24 VDC, +10/-5%, Class2, 2 A	24 VDC, +10/-5%, 8 A
Environment	Enclosure	IP67 (With manifold assembled) *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 M min. between external terminals and FE	
	Pollution degree	Pollution degree 3	
Standard		CE marking, UL(CSA), RoHS	
Weight		170 g	175 g

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

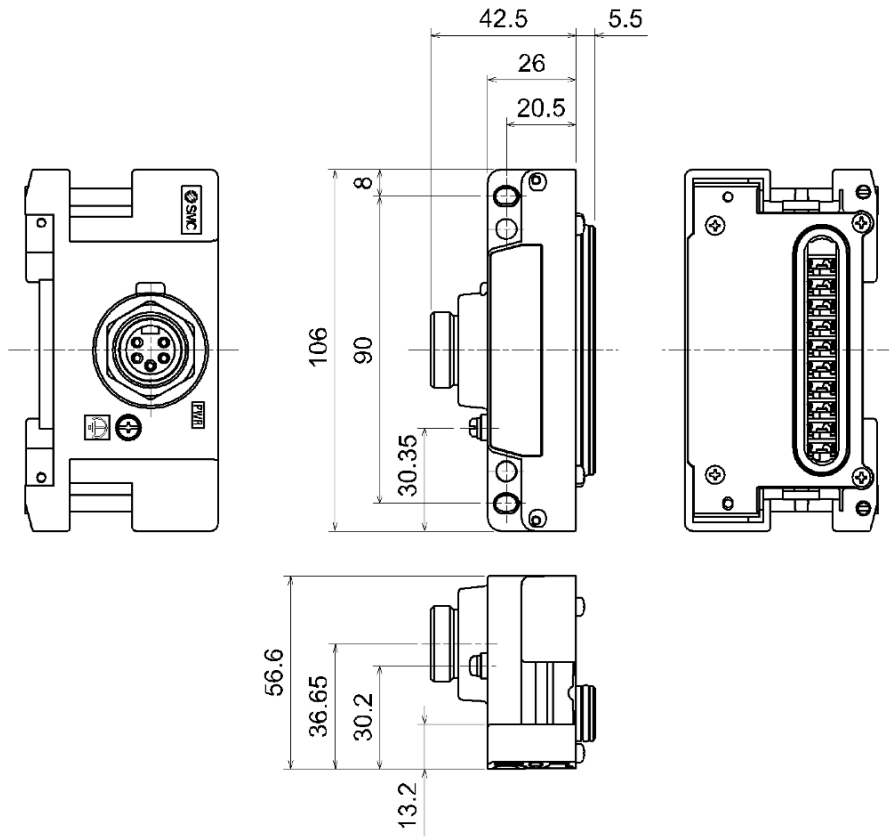
*2: The UL agreement temperature is 0 to 50 °C.

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 \pm 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

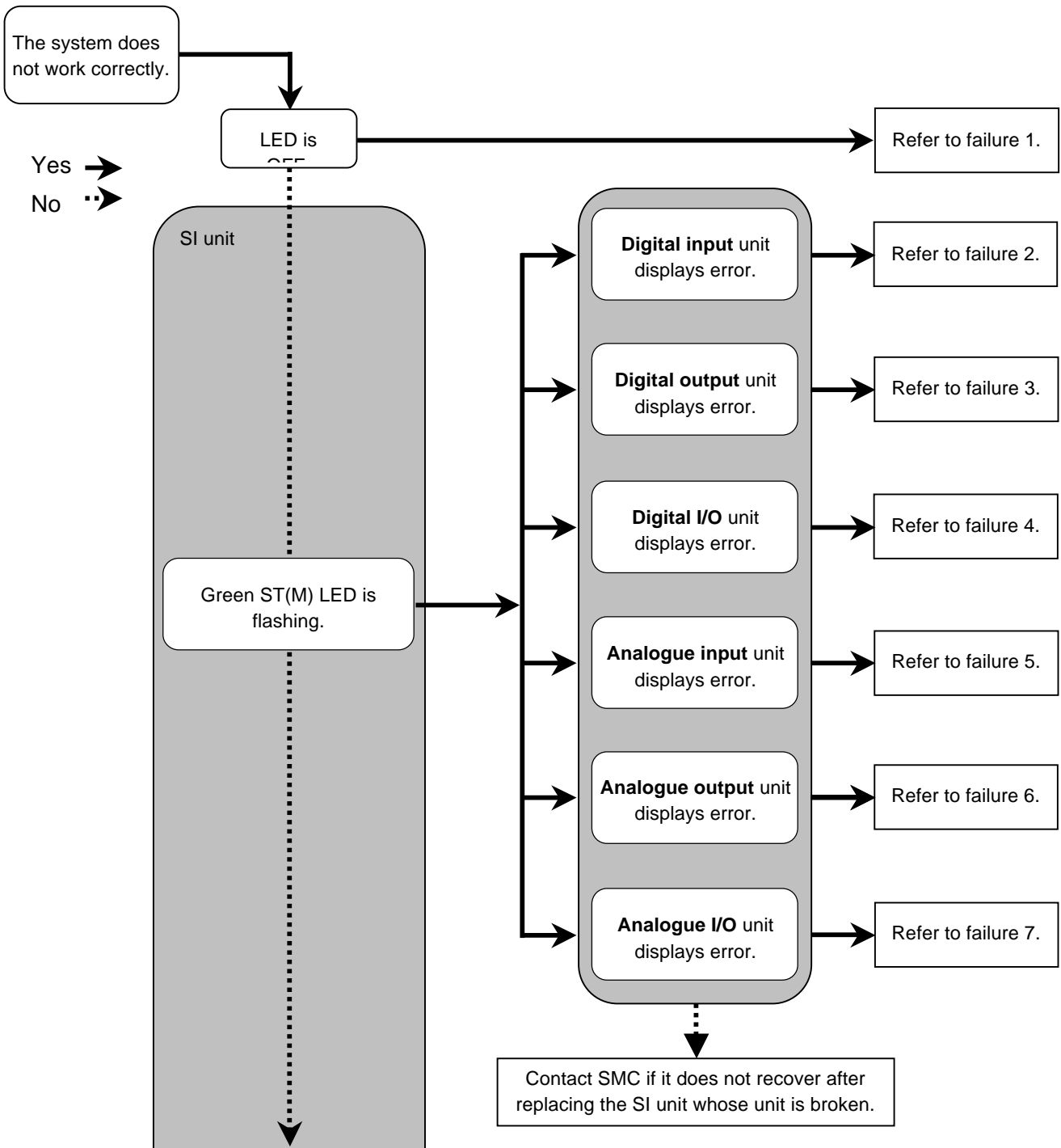
When any failure happens with this fieldbus system, the following chart is used to identify the cause of the failure.

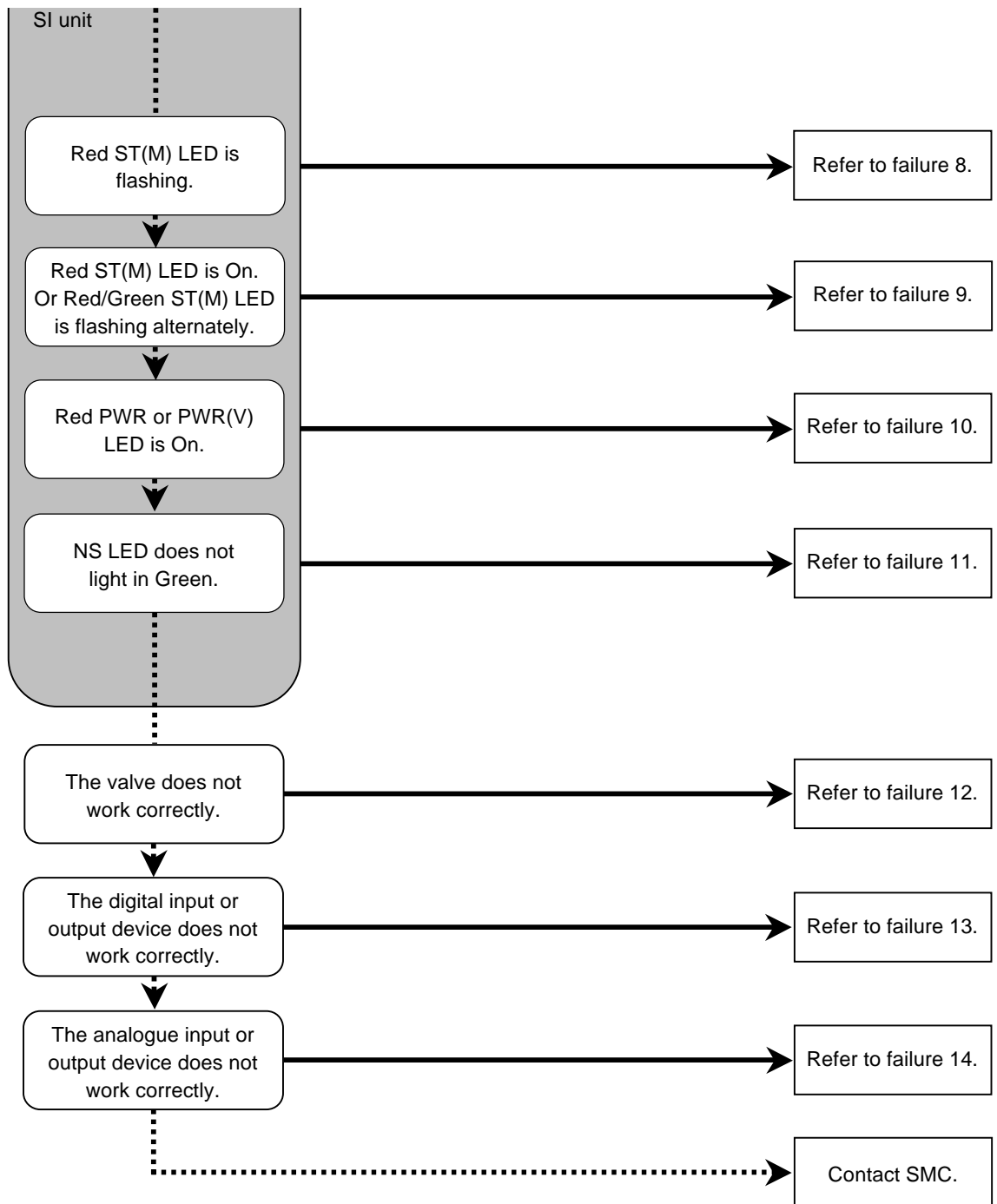
Error status is reflected from the parameter setting of the fieldbus system.

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.





•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 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 (1)ON/OFF count of the input device has exceeded the set value. (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. (1)Reset the ON/OFF count to zero or change the set value. Or invalidate diagnosis. (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 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 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.

No.	Part No. EX600-	Problem	Presumed cause	Troubleshooting
3	DY B	Red LED is ON. (Diagnosis is activated)	Diagnosis error 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 (1)ON/OFF count of the output device has exceeded the set value. (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. (1)Reset the ON/OFF count to zero or change the set value. Or invalidate diagnosis. (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 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 (1)ON/OFF count of the output device has exceeded the set value. (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. (1)Reset the ON/OFF count to zero or change the set value. Or invalidate diagnosis. (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 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 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 ST(O) LED is ON. (Diagnosis is activated)	Diagnosis error 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 (1)ON/OFF count of the output device has exceeded the set value. (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. (1)Reset the ON/OFF count to zero or change the set value. Or invalidate diagnosis. (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.

No.	Part No. EX600-	Problem	Presumed cause	Troubleshooting
5	AXA	Red LED is ON. (Diagnosis is activated)	Diagnosis error Analogue 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 analogue 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 analogue input unit is set to current input. (1)Set the input value of the analogue input device so that it does not exceed the upper limit. (2)Voltage is input from the analogue 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 analogue 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 analogue 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 Analogue 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 analogue 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 analogue 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.

No.	Part No. EX600-	Problem	Presumed cause	Troubleshooting
7	AMB	Red LED is ON. (Diagnosis is activated)	Diagnosis error Analogue 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 analogue 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 analogue input unit is set to current input. (1)Set the input value of the analogue input device so that it does not exceed the upper limit. (2)Voltage is input from the analogue 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 analogue 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 analogue 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.	Connection between the units is defective.	Confirm that there is no loose connection between the units and connect them correctly.
10		Red PWR LED is ON. (Diagnosis is activated)	Power supply voltage for control and input is abnormal.	Supply 24 VDC \pm 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.

No.	Problem	Presumed cause	Troubleshooting
11	NS: OFF	IP address is not setting.	Set IP address. Refer to "IP address setting switch" for details.
	NS: Green LED is flashing	Communication is not established.	Check the following and restart. <ul style="list-style-type: none"> •Signal line is connected from PLC. •The communication speed of PLC and SI unit is appropriate. •Wire the communication line away from the noise source.
	NS: Red LED is flashing	Communication time out.	Process active time out is generated. (when Process active time out is set.) Check the following and restart. <ul style="list-style-type: none"> •Signal line is connected from PLC. •The communication time out interval to the EX600 should be less than the set value of Process active time out. •Keep noise sources away from the communication and power supply cables.
	NS: Red LED is ON	IP address is duplicated.	Reset IP address which has not been used yet. Refer to "IP address setting switch" for details.
12	Abnormal valve operation	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. <ul style="list-style-type: none"> •EX600-SEN1-X14 (PNP output) ⇒ -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.

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 $\pm 10\%$ 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.

No.	Problem	Presumed cause	Troubleshooting
14	Abnormal analogue 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 $\pm 10\%$ to the power supply for control and input.
		Analogue input signal range setting failure.	Check the analogue input device specification, and set the input signal range which satisfies the specification.
		Analogue data format does not match.	Check whether the data format of the analogue input unit is properly set.
		Wiring or connection is defective.	Connect the wiring correctly between the analogue input device and the analogue input unit.
		Analogue input unit has failed.	Replace the analogue input unit with a normal one, and check the operation.
		Analogue input device failure.	Replace the analogue input device with a normal one, and check the operation. Or refer to the troubleshooting of the analogue input device used.
	Abnormal analogue 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.
		Analogue output signal range setting failure.	Check the analogue output device specification, and set the output signal range which satisfies the specification.
		Analogue data format does not match.	Check whether the data format of the analogue output unit is properly set.
		Wiring or connection is defective.	Connect the wiring correctly between the analogue output device and the analogue output unit.
		Analogue output unit has failed.	Replace the analogue output unit with a normal one, and check the operation.
		Analogue output device failure.	Replace the analogue output device with a normal one, and check the operation. Or refer to the troubleshooting of the analogue 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 or Handheld Terminal.
There is no order of precedence of the PLC or Handheld Terminal.
The latest parameter setting are used.

Parameter definition and setting

•System parameters

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

•SI unit parameters

No.	Parameter (H.T. Symbol)	Definition	Item	Content	Default setting
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. 26 V or under 21 V.	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. 26 V 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	

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

•Digital input unit parameters

No.	Parameter (H.T. Symbol)	Definition	Item	Content	Default setting
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	Selects the time for filtering.	1.0 ms
			1.0 ms		
			10 ms		
			20 ms		
5	Input extension time (SigExt_T)	Sets the time to hold the input signal per unit.	1.0ms	Selects the time to hold the input signal.	15 ms
			15 ms		
			100 ms		
			200 ms		

*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 0.5 mA or less.

The open circuit of input signals cannot be detected.

•Digital output unit parameters

No.	Parameter (H.T. Symbol)	Definition	Item	Content	Default setting
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	

*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.

•Digital I/O unit parameters

No.	Parameter (H.T. Symbol)	Definition	Item	Content	Default setting
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	

*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.

•Analogue input unit parameters

No.	Parameter (H.T. Symbol)	Definition	Item	Content	Default setting
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	Analogue input range (Range)	Set the analogue input device range per channel.	-10..10 V	Selects the analogue 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	Analogue data format (D_Format)	Sets analogue data type which is output to PLC per unit.	Offset binary	Offset binary.	
			Sign & Magnitude	Signed binary.	
			2s complement	2's complement.	
4	Analogue average filter (Filter)	Sets analogue 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 analogue input range within settable range in the table below.

When the analogue input range is changed, check the set value and change it to an appropriate value.

Analogue 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

•Analogue output unit parameters

No.	Parameter (H.T. Symbol)	Definition	Item	Content	Default setting
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	Analogue output range (Range)	Sets the range of the analogue output device per channel.	0..10 V	Selects the analogue output range.	0..10 V
			0.5 V		
			1..5 V		
			0..20 mA		
			4..20 mA		
3	Analogue data format (D_Format)	Sets analogue 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.	
4	Scale upper limit setting ^{*1} (UpLm/ScI)	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	Val: 1000
			Disable	Does not generate an error. Val: -32766 to 32767	
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.	
5	Scale lower limit setting ^{*1} (LwLm/ScI)	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	Val: 0
			Disable	Does not generate an error. Val: -32767 to 32766	
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.	

- *1: When "Scaled" is selected as the analogue data format, the display of H.T. is switched from Upr_Lmt to UpLm/ScI, from Lwr_Lmt to LwLm/ScI.
- *2: Set value shall be set per analogue input range within settable range in the table below.
When the analogue 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.

Analogue 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

•Analogue I/O unit parameters (1)

No.	Parameter (H.T. Symbol)	Definition	Item	Content	Default setting
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	Analogue input or output range (Range)	Sets the analogue input or output device range per channel.	0..10 V	Selects the analogue input or output range	1..5 V
			0..5 V		
			1..5 V		
			0..20 mA		
			4..20 mA		
3	Analogue data format (D_Format)	Sets analogue 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	Analogue average filter (Filter)	Sets analogue 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	Val: 1000
			Disable	Does not generated an error. Val: -32766 to 32767	

•Analogue I/O unit parameters (2)

No.	Parameter (H.T. Symbol)	Definition	Item	Content	Default setting
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/ScI)	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.	

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

*2: Set value shall be set per analogue output range within settable range in the table below.

When the analogue 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.

Analogue 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

I/O data size

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

Unit	Unit part number	Occupied byte	
		Input	Output
Diagnostic data	-	6	0
SI unit	EX600-SEN1-X14 (32 outputs)	0	4
Digital input unit	EX600-DX B (8 inputs)	2	0
	EX600-DX C (8 inputs)	2	0
	EX600-DX C1 (8 inputs)(with open circuit detection)	2	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	2
	EX600-DY E (16 outputs)	0	2
	EX600-DY F (16 outputs)	0	2
Digital I/O unit	EX600-DM E (8 inputs/8 outputs)	2	2
	EX600-DM F (8 inputs/8 outputs)	2	2
Analogue input Unit	EX600-AXA (2 channels)	4 (2 byte/1 channel)	0
Analogue output Unit	EX600-AYA (2 channels)	0	4 (2 byte/1 channel)
Analogue I/O Unit	EX600-AMB (2/2 channels)	4 (2 byte/1 channel)	4 (2 byte/1 channel)

I/O Map

I/O map of EX600 is assigned in order starting from the unit on the End plate 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	
End plate	DX B	AXA	DX D	DY B	SEN1-X14	Valve
	Digital input	Analogue input	Digital input	Digital output	SI unit	
	1 byte Input	4 byte Input	2 byte Input	1 byte Output	4 byte Output	

•Input data (for Holding Register)

Range	High byte	Low byte
0100h	System diagnosis byte 1	System diagnosis byte 0
0101h	System diagnosis byte 3	System diagnosis byte 2
0102h	Unit diagnosis byte 1	Unit diagnosis byte 0
0103h	0 *	DX B, IN0 - IN7 (Unit 0)
0104H	AXA Ch 0 (Unit 1)	
0105H	AXA Ch 1 (Unit 1)	
0106H	DX D, IN8 - IN15 (Unit 2)	DX D, IN0 - IN7 (Unit 2)

*: Register addresses are specified by the Word unit (2 bytes), so the high byte will be set to 0 in the input unit which occupies 1 byte only.

•Output data (for Holding Register)

Range	High byte	Low byte
0000h	0 *	DY B, OUT0 - OUT7 (Unit 3)
0001h	SI Unit, OUT8 - OUT15 (Unit 4)	SI Unit, OUT0 - OUT7 (Unit 4)
0002h	SI Unit, OUT24 - OUT31 (Unit 4)	SI Unit, OUT16 - OUT7 (Unit 4)

*: Register addresses are specified by the Word unit (2 bytes), so the high byte will be set to 0 in the output unit which occupies 1 byte only.

The high byte value is ignored.

Details of diagnostic data

•System diagnosis

•System diagnosis byte0

Bit No.	Content of diagnosis
0	The analogue value has fallen below the user set value.
1	The analogue value has exceeded the user set value.
2	The analogue input value has fallen below the set range.
3	The analogue input value has exceeded the set range.
4	Reserved
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	Reserved
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 analogue input unit. ^{*2}
3	There is an error in the analogue 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 analogue I/O unit, both Bit2 and Bit3 are turned on.

•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

Modbus/TCP Register

The Modbus/TCP slave occupies 4 types of registers, "Holding Registers", "Input Registers", "Coils" and "Discrete Inputs".

The Master performs "Read" and "Write" commands to the Slave registers by using Function Command for data communication.

The content of the registers assigned to EX600 is shown below.

1)Holding Registers (performs Read/Write using 16 bits (word).)

Range	Process data	Contents
0000h.....00FFh	Output data	Output data from Master to Slave
0100h.....01FFh	Input data	Input data from Slave to Master
0200h.....0202h	Reserved	-
0203h	Process active time out	If the next data is not received within the set time after the last process data was received, a time out will be generated. EX600 performs Hold/Clear of the output when a communication error has generated to a time out. * Setting range: 1 msec. (0001h) to 65535 msec. (FFFFh) 0: disable (default) Other: setting value X msec.
0204h.....FFFFh	Reserved	—

*: When Process active time out is not set (0: Disable), even if the communication cable is disconnected, Hold/Clear of the output will not be performed.

When the cable is disconnected, the output is retained.

2)Input Registers (Read using 16 bits (word).)

Range	Process data	Contents
0000h.....00FFh	Input data	Input data from Slave to Master
0100h.....FFFFh	Reserved	-

3)Coils (Read/Write using Single bit.)

Range	Process data	Contents
0000h.....0FFFh	Output data	Output data from Master to Slave

4)Discrete Inputs (Read using Single bit.)

Range	Process data	Contents
0000h.....0FFFh	Input data	Input data from Slave to Master

Function Code

EX600 supports the function codes below.

No.	Function code name	Function code
1	Read Coils	01h
2	Read Discrete Inputs	02h
3	Read Holding Registers	03h
4	Read Input Registers	04h
5	Write Single Coil	05h
6	Write Single Register	06h
7	Write Multiple Coils	0Fh
8	Write Multiple Registers	10h
9	Read/Write Multiple Registers	17h

1) Read Coils (01h)

Register type: Coils

This function code is used to read from 1 to 2000 contiguous status of coils.

•Request

Function code	1 byte	01h
Starting address	2 bytes	0000h to 0FFFh
Quantity of coils	2 bytes	0001h to 07D0h

•Response

Function code	1 byte	01h
Byte count	1 byte	N *
Coil status	n byte	n = N or N+1

*: N = Quantity of outputs / 8, if the remainder is different of 0 N = N+1

•This function is mapped to the Read Process data part of the Holding Registers as follows:

Coil #	Holding Register #	Bit #
0000h	0000h	0
0001h		1
:		:
000Fh		15
0010h	0001h	0
0011h		1
:		:
001Fh		15
:	:	:
1FF0h	01FFh	0
1FF1h		1
:		:
1FFFh		15

2) Read Discrete Inputs (02h)

Register type: Discrete Inputs

This function code is used to read from 1 to 2000 contiguous status of discrete inputs.

•Request

Function code	1 byte	02h
Starting address	2 bytes	0000h to 0FFFh
Quantity of inputs	2 bytes	0001h to 07D0h

•Response

Function code	1 byte	02h
Byte count	1 byte	N *
Input status	N * x 1 byte	

*: N = Quantity of inputs / 8, if the remainder is different of 0 N = N+1

This function is mapped to the Write Process data part of the Input Registers; the mapping is otherwise identical to the read coils function described above.

3) Read Holding Registers (03h)

Register type: Holding Registers

This function code is used to read the contents of a contiguous block of holding registers.

•Request

Function code	1 byte	03h
Starting address	2 bytes	0000h to 0203h
Quantity of registers	2 bytes	0001h to 007Dh

•Response

Function code	1 byte	03h
Byte count	1 byte	2 x N *
Register value	N * x 2 bytes	

*: N = Quantity of registers

4) Read Input Registers (04h)

Register type: Input Registers

This function code is used to read from 1 to 125 contiguous input registers.

•Request

Function code	1 byte	04h
Starting address	2 bytes	0000h to 00FFh
Quantity of input registers	2 bytes	0001h to 007Dh

•Response

Function code	1 byte	04h
Byte count	1 byte	2 x N *
Input registers	N * x 2 bytes	

*: N = Quantity of input registers

5) Write Single Coil (05h)

Register type: Coils

This function code is used to write a single output to either ON or OFF.

•Request

Function code	1 byte	05h
Output address	2 bytes	0000h to 0FFFh
Output value	2 bytes	0000h or FF00h

•Response

Function code	1 byte	05h
Output address	2 bytes	0000h to 0FFFh
Output value	2 bytes	0000h or FF00h

•This function is mapped to the Read Process data part of the Holding Registers as follows:

Coil #	Holding Register #	Bit #
0000h	0000h	0
0001h		1
:		:
000Fh		15
0010h	0001h	0
0011h		1
:		:
001Fh		15
:	:	:
1FF0h	01FFh	0
1FF1h		1
:		:
1FFFh		15

6) Write Single Register (06h)

Register type: Holding Registers

This function code is used to write a single holding register.

•Request

Function code	1 byte	06h
Register address	2 bytes	0000h to 0203h
Register value	2 bytes	0000h or FFFFh

•Response

Function code	1 byte	06h
Register address	2 bytes	0000h to 0203h
Register value	2 bytes	0000h or FFFFh

7) Write Multiple Coils (0Fh)

Register type: Coils

This function code is used to force each coil in a sequence of coils to either ON or OFF.

•Request

Function code	1 byte	0Fh
Starting address	2 bytes	0000h to 0FFFh
Quantity of outputs	2 bytes	0001h to 07B0h
Byte count	1 byte	N *
Output value	N * x 1 byte	

*: N = Quantity of outputs / 8, if the remainder is different of 0 N = N+1

•Response

Function code	1 byte	0Fh
Starting address	2 bytes	0000h to 0FFFh
Quantity of outputs	2 bytes	0001h to 07B0h

This function is mapped to the Read Process data part of the Holding Registers; the mapping is identical to that of the read coils function described above.

8) Write Multiple Registers (10h)

Register type: Holding Registers

This function code is used to write a block of contiguous registers (1 to 123 registers).

•Request

Function code	1 byte	10h
Starting address	2 bytes	0000h to 0203h
Quantity of registers	2 bytes	0001h to 007Bh
Byte count	1 byte	2 x N *
Registers value	N * x 2 bytes	value

*: N = Quantity of registers

•Response

Function code	1 byte	10h
Starting address	2 bytes	0000h to 0203h
Quantity of registers	2 bytes	0001h to 007Bh

9) Read/Write Multiple Registers (17h)

Register type: Holding Registers

This function code performs a combination of one read operation and one write operation in a single MODBUS transaction.

•Request

Function code	1 byte	17h
Read starting address	2 bytes	0000h to 0203h
Quantity to read	2 bytes	0001h to 007Dh
Write starting address	2 bytes	0000h to 0203h
Quantity to write	2 bytes	0001h to 0079h
Write byte count	1 byte	2 x N *
Write register value	N * x 2 bytes	

*: N = Quantity to write

•Response

Function code	1 byte	17h
Byte count	1 bytes	2 x N *
Read registers value	N * x 2 bytes	

*: N = Quantity to read

Parameter Setting using Modbus/TCP

It is possible to set Unit or Channel parameters using Modbus/TCP holding registers. The method of specifying the register depends on the location of the connected unit as described below.

	Unit 0	Unit 1	Unit 2	Unit 3	
End plate	DX B Digital input 1 byte Input	AXA Analogue input 4 byte Input	DX D Digital input 2 byte Input	SEN1-X14 SI unit 4 byte Output	Valve

1) Unit Parameters

Register (Holding)	Parameter	Value	Target model
1*00h	The power supply short circuit detection for control and input (SC_MonSs)	0 = Disable 1 = Enable	DX/DM AX/AY/AM
1*01h	Output load short circuit detection (SC_MonOp)	0 = Disable 1 = Enable	SI/DY/DM
1*02h	Over range detection (Over_Rng)	0 = Disable 1 = Enable	AX/AM
1*03h	Under range detection (Undr_Rng)	0 = Disable 1 = Enable	AX/AM
1*04h	Inrush current filter (Inrush)	0 = Disable 1 = Enable	DX/DM
1*05h	Restart after output load short circuit (SC_RstOp)	0 = Auto 1 = Manual	SI/DY/DM
1*06h	Power supply for control and input voltage monitor (PWRC_Mon)	0 = Disable 1 = Enable	SI
1*07h	Power supply for output voltage monitor (PWRO_Mon)	0 = Disable 1 = Enable	SI
1*08h	Input filtering time (Filter_T)	0 = 0.1 ms 1 = 1 ms 2 = 10 ms 3 = 20 ms	DX/DM
1*09h	Input extension time (SigExt_T)	0 = 1 ms 1 = 15 ms 2 = 100 ms 3 = 200 ms	DX/DM
1*0Ah	Analogue data format (D_Format)	0 = Offset binary 1 = Sign and Magnitude 2 = 2's complement 3 = Scaled (AY, AM only)	AX/AY/AM
1*0Bh	Hold/Clear priority setting (Hold/Clear)	0 = Switch 1 = Parameter	SI

*: Refers to unit number. E.g. If the input filtering time of unit 2 is to be modified, register 1208h should be modified.

2) Channel parameters (Output setting during communication fault)

Register (Holding)	Parameter	Value	Target model
1*10h	Output setting during communication fault (Fault_MD) (CH0)	0 = Disable 1 = Enable	SI/DY/DM AY/AM (Output only)
:	:		
1*2Fh	Output setting during communication fault (Fault_MD) (CH31)		
1*30h	Output setting value during communication fault (Fault_MD) (CH0)	(SI/DY/DM) 0 = Disable 1 = Enable	
:	:		
1*4Fh	Output setting value during communication fault (Fault_MD) (CH31)	(AY/AM) 0 to 65535	

*: Refers to Unit number.

3) Channel parameters (Open circuit detection)

Register (Holding)	Parameter	Value	Target model
1*90h	Open circuit detection (OC_Mon) (CH0)	0 = Disable 1 = Enable	SI/DY/DM DX1
:	:		
1*AFh	Open circuit detection (OC_Mon) (CH31)		

*: Refers to Unit number.

4) Channel parameters (User setting value upper limit error)

Register (Holding)	Parameter	Value	Target model
1*50h	User setting value upper limit error (Upr_Lmt) (CH0)	0 = Disable 1 = Enable	AX/AY/AM
:	:		
1*5Fh	User setting value upper limit error (Upr_Lmt) (CH15)		
1*60h	User setting value (CH0)	0 to 65000	
:	:		
1*6Fh	User setting value (CH15)		

*: Refers to Unit number.

5) Channel parameters (User setting value lower limit error)

Register (Holding)	Parameter	Value	Target model
1*70h	User setting value lower limit error (Lwr_Lmt) (CH0)	0 = Disable 1 = Enable	AX/AY/AM
:	:		
1*7Fh	User setting value lower limit error (Lwr_Lmt) (CH15)		
1*80h	User setting value (CH0)	0 to 65000	
:	:		
1*8Fh	User setting value (CH15)		

*: Refers to Unit number.

6) Channel parameters (Analogue average filter)

Register (Holding)	Parameter	Value	Target model
1*90h	Analogue average filter (Filter) (CH0)	0 = None 1 = 2 value average 2 = 4 value average 3 = 8 value average	AX/AM (Input only)
:	:		
1*9Fh	Analogue average filter (Filter) (CH15)		

*: Refers to Unit number.

7) Channel parameters (Analogue range)

Register (Holding)	Parameter	Value (AX)	Value (AY/AM)
1*A0h	Analogue range (Range) (CH0)	0 = -10...+10 V 1 = -5...+5 V 2 = -20...+20 mA 3 = 0...10 V 4 = 0...5 V 5 = 1...5 V 6 = 0...20 mA 7 = 4...20 mA	3 = 0...10 V 4 = 0...5 V 5 = 1...5 V 6 = 0...20 mA 7 = 4...20 mA
:	:		
1*AFh	Analogue range (Range) (CH15)		

*: Refers to Unit number.

Accessories

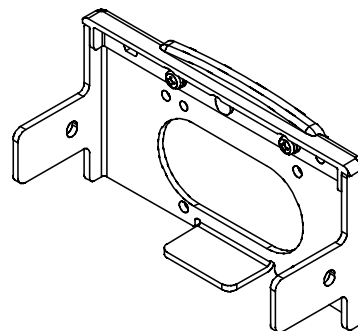
For the selection of accessories, refer to the catalog.

(1) Valve plate

EX600-ZMV1

Enclosed parts: Round head screw (M4 x 6), 2 pcs.

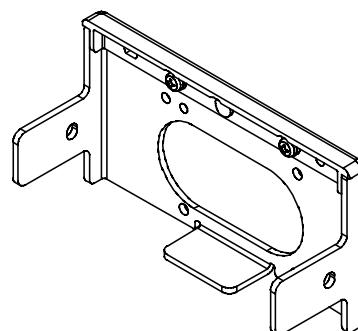
Round head screw (M3 x 8), 4 pcs.



EX600-ZMV2 (Specified for SY series)

Enclosed parts: Round head screw (M4 x 6), 2 pcs.

Round head screw (M3 x 8), 4 pcs.



(2) End plate bracket

EX600-ZMA2

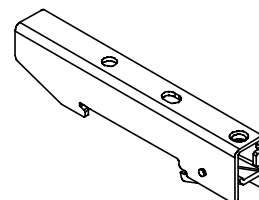
Enclosed parts: Round head screw (M4 x 20), 1 pc.

P tight screw (4 x 14), 2 pcs.

EX600-ZMA3 (Specified for SY series)

Enclosed parts: Round head screw (M4 x 20) with washer, 1 pc.

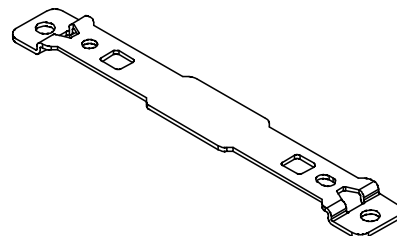
P tight screw (4 x 14), 2 pcs.



(3) Intermediate support bracket

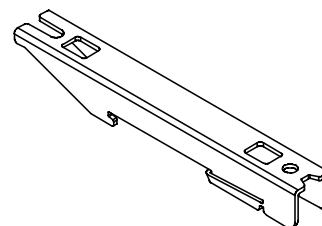
EX600-ZMB1...for direct mounting

Enclosed parts: Round head screw (M4 x 5), 2 pcs.

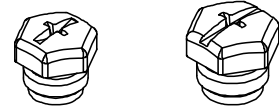


EX600-ZMB2...for DIN rail mounting

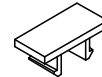
Enclosed parts: Round head screw (M4 x 6), 2 pcs.



- (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 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

Revision history
A: Revision (Parameter addition)

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