



# Operation Manual

## PRODUCT NAME

Fieldbus system  
PROFINET compatible SI unit

## MODEL / Series/ Product Number

*EX600-SPN1A-X27*  
*EX600-ED#*  
*EX600-GILB-X27*  
*EX600-DYPG1-X27*

**SMC Corporation**

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# 1. 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.

 <b>Caution :</b>	CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
 <b>Warning :</b>	WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
 <b>Danger :</b>	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 catalogue 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 catalogue.
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, whichever is first. \*2)  
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.  
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue 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 the unit or assembling/replacing units:
  - Do not touch the sharp metal parts of the connector or plug for connecting units.
  - Take care not to hit your hand when disassembling the unit.  
The connecting portions of the unit are firmly joined with seals.
  - When joining units, take care not to get fingers caught between units.  
An injury can result.
- After maintenance is complete, perform appropriate functional inspections.  
Stop operation if the equipment does not function properly.  
Safety cannot be assured in the case of unexpected malfunction.
- Provide grounding to assure the safety and noise resistance of the Fieldbus system.  
Individual grounding should be provided close to the product with a short cable.

## ■ NOTE

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

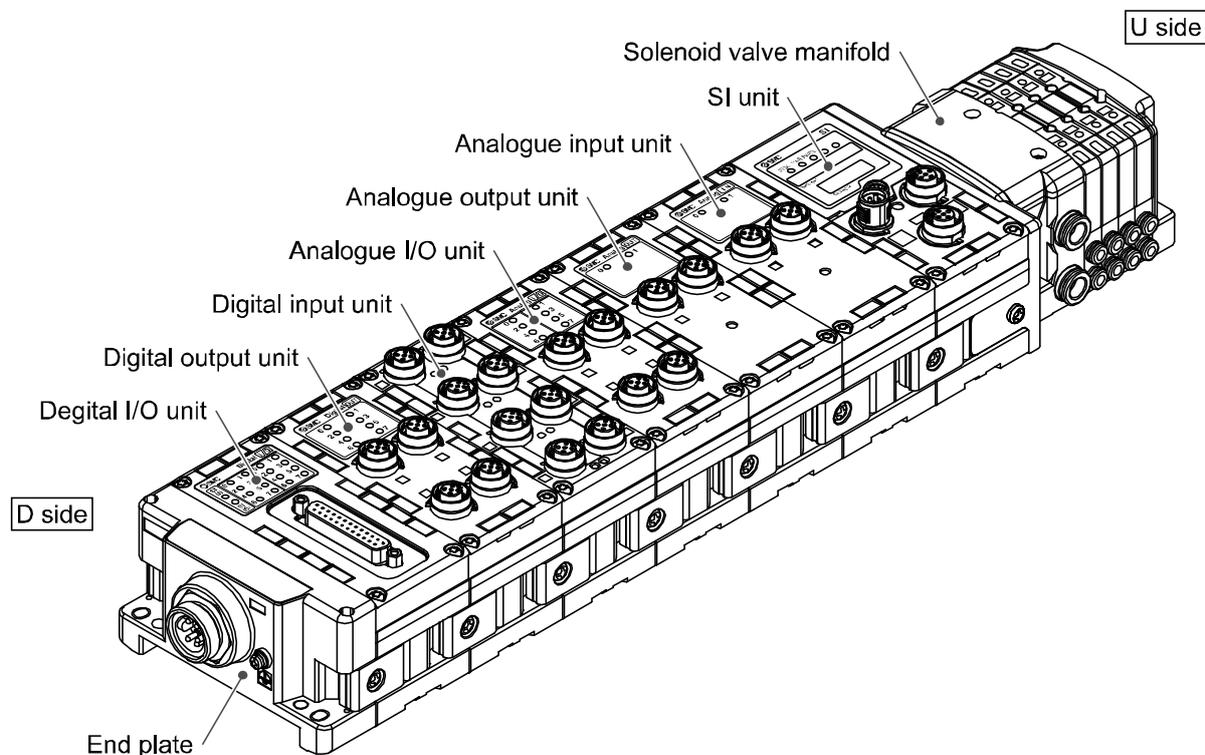
\*Maintenance

- 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
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	Communication speed	A speed at which data is sent and received in fieldbus etc. It depends on an equipment (PLC etc.) at high side and is indicated by bps (bit per second).
	Current consumption	The current necessary to operate each unit.
D	Diagnostic information	Consists of standard diagnostic information specified by PROFINET and specific diagnostic information for the EX600.
	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	F.E.	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.
G	GSDML file	File describes the product master data.
H	Handheld Terminal (H.T.)	Abbreviation of handheld terminal. It is possible to monitor the input/output data and diagnostic data and set parameters.
I	Idle	PLC is in an idle state. EX600 system output will be constantly cleared.
	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 PROFINET.
	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.
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

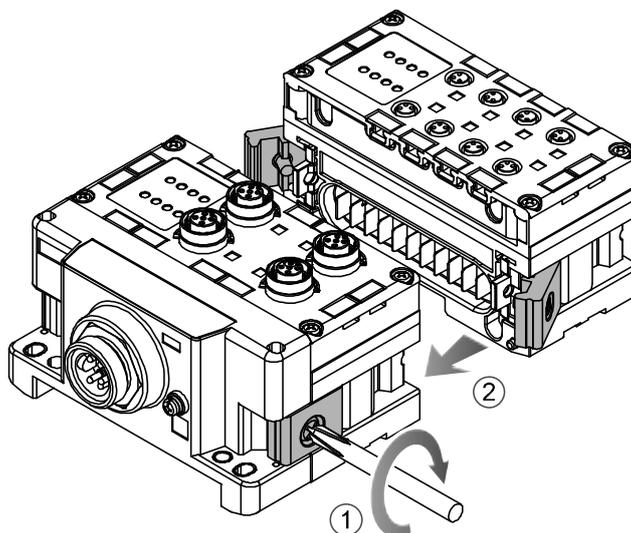
### •Assembling the unit as a manifold

\*: 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.

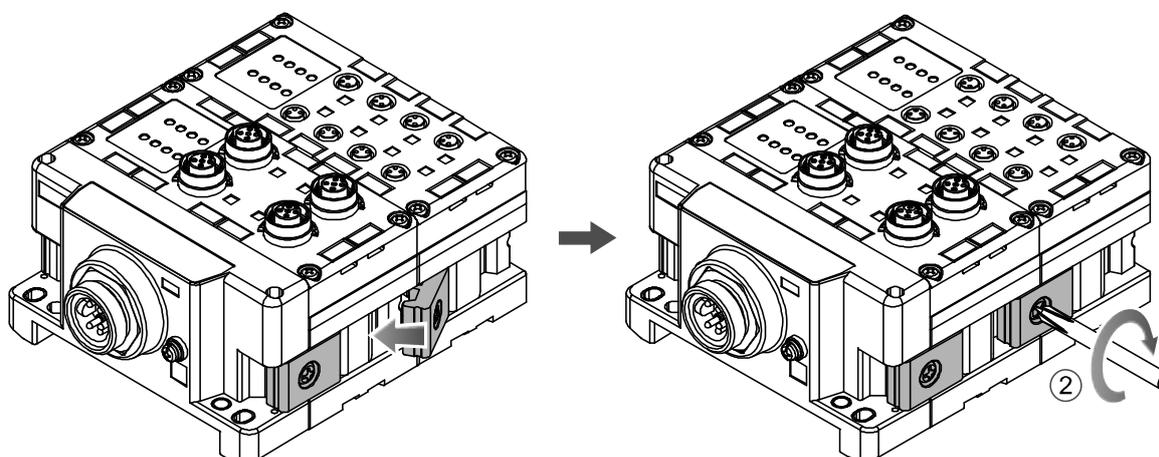
Digital and Analogue I/O units can be connected in any order.

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.

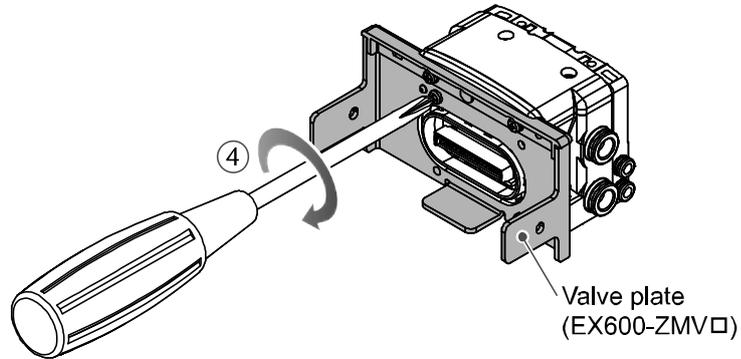
After connecting the required I/O units, connect the SI unit.

The method is as above in (1), (2).

(4) Mounting the valve plate.

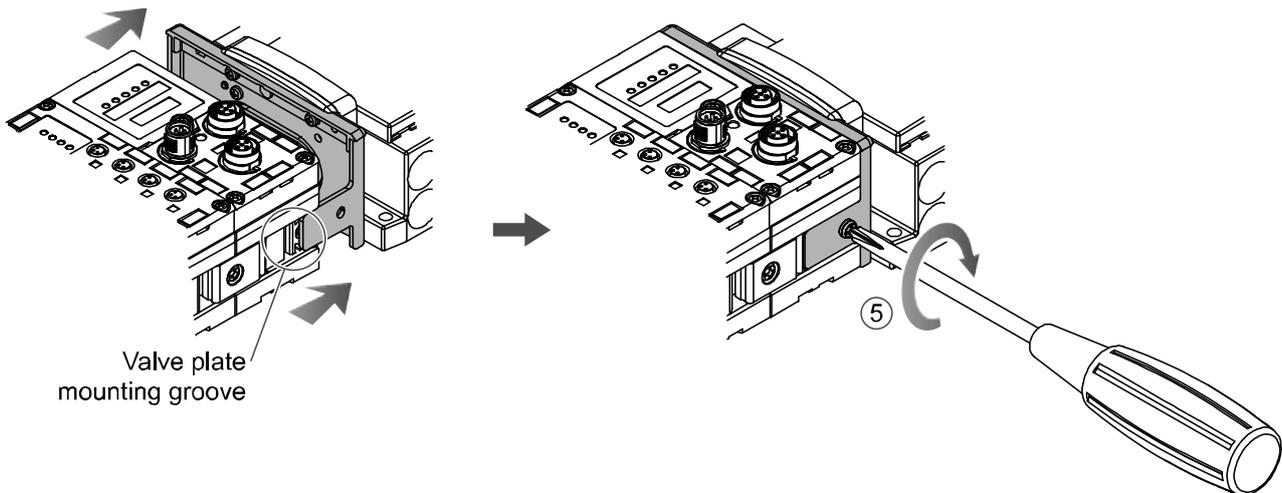
Mount the valve plate (EX600-ZMV□) to the valve manifold using the valve set screws. (M3 x 8)  
Apply 0.6 to 0.7 Nm tightening torque to the screws.

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

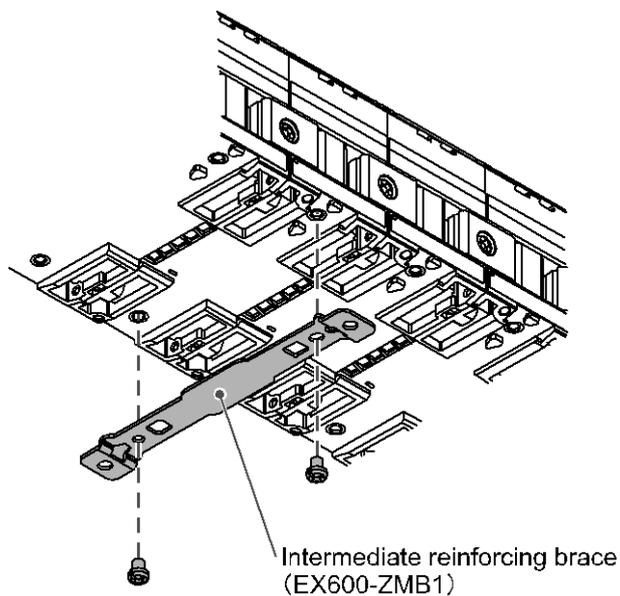
- Please do not connect the unit while the power supply is active. It will cause equipment damage.
- Take care not to drop the nuts of Joint bracket.

# Mounting and Installation

## ■ Installation

### • Direct mounting

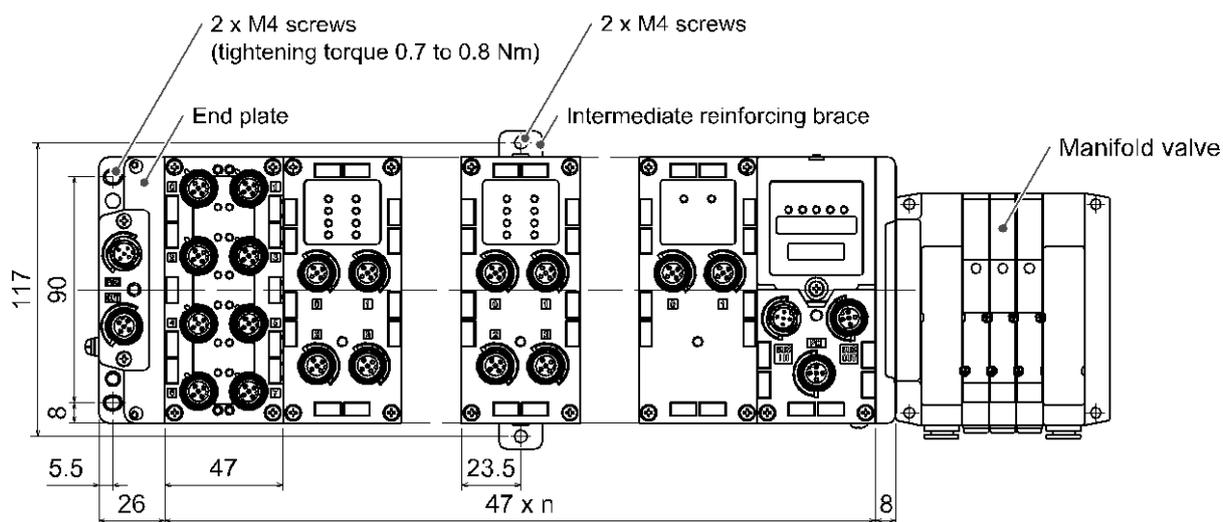
- (1) When joining six or more units, fix the middle part of the complete EX600 unit with an intermediate reinforcing brace (EX600-ZMB1) before mounting, using 2-M4 x 5 screws.  
Tightening torque: 0.7 to 0.8 Nm.



- (2) Mount and tighten the end plate and the solenoid valve at one end of the unit. (M4)

Tightening torque: 0.7 to 0.8 Nm.

The tightening torque at the manifold solenoid valve side depends on the valve type. Refer to the operation manual of the corresponding valve manifold.



n (Number of connected units)  $\leq 10$

•DIN rail mounting

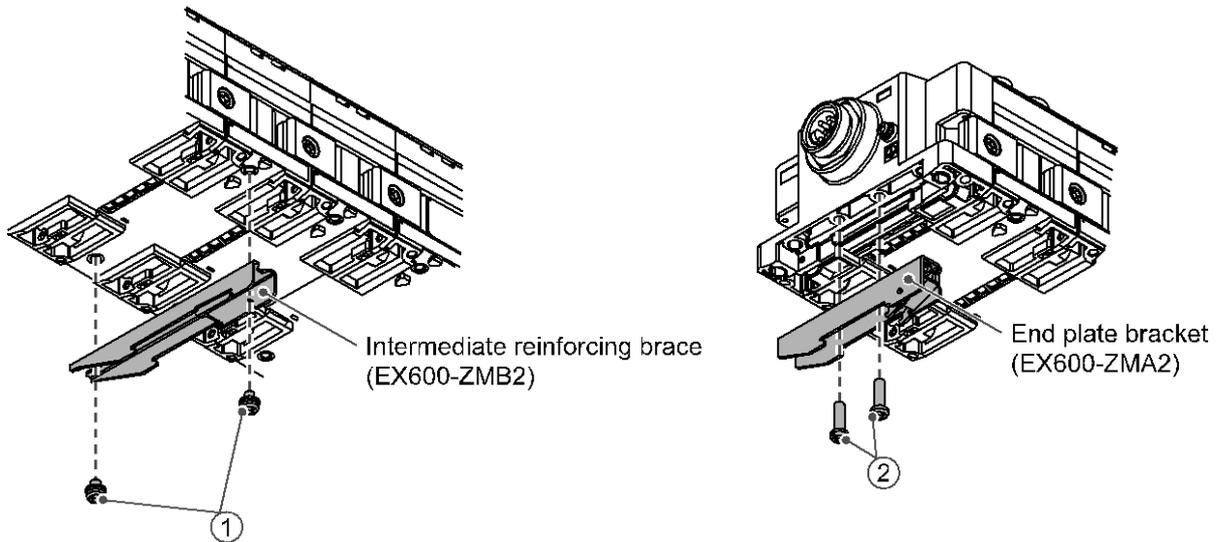
(Not available for SY series valves. Refer to the SY catalog.)

(1)When joining six or more units, fix the middle part of the complete EX600 unit with an intermediate reinforcing brace (EX600-ZMB1) 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 using 2- M4 x 14 screws.

Tightening torque: 0.7 to 0.8 Nm.



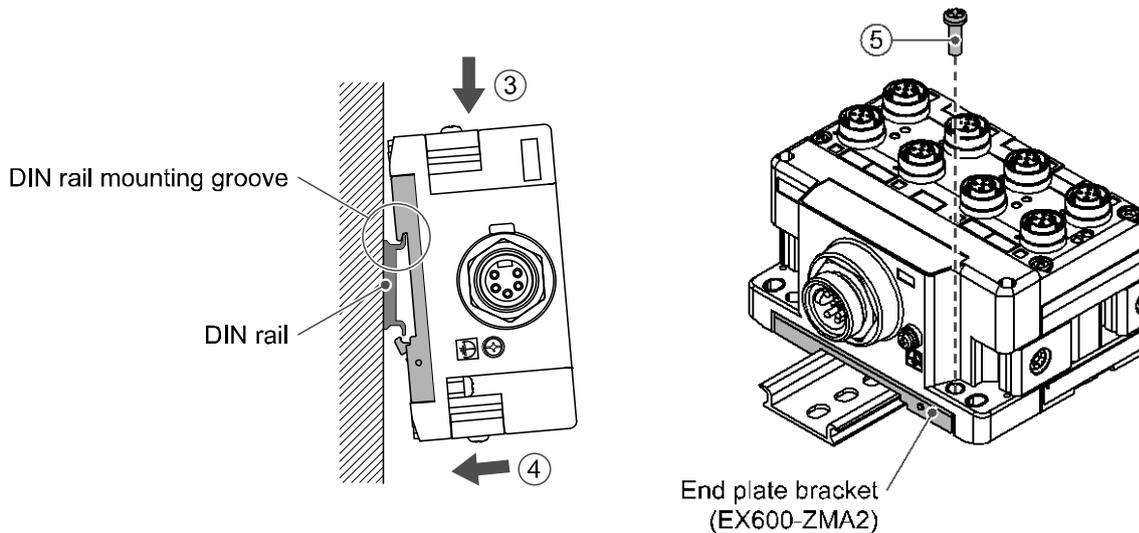
(3)Hook the DIN rail mounting groove on to the DIN rail.

(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 manifold solenoid valve side depends on the valve type. Refer to the operation manual of the corresponding valve manifold.



## ■Wiring

- Connect the M12 or M8 connector cable.

The M12 SPEEDCON connector connection method is explained below.

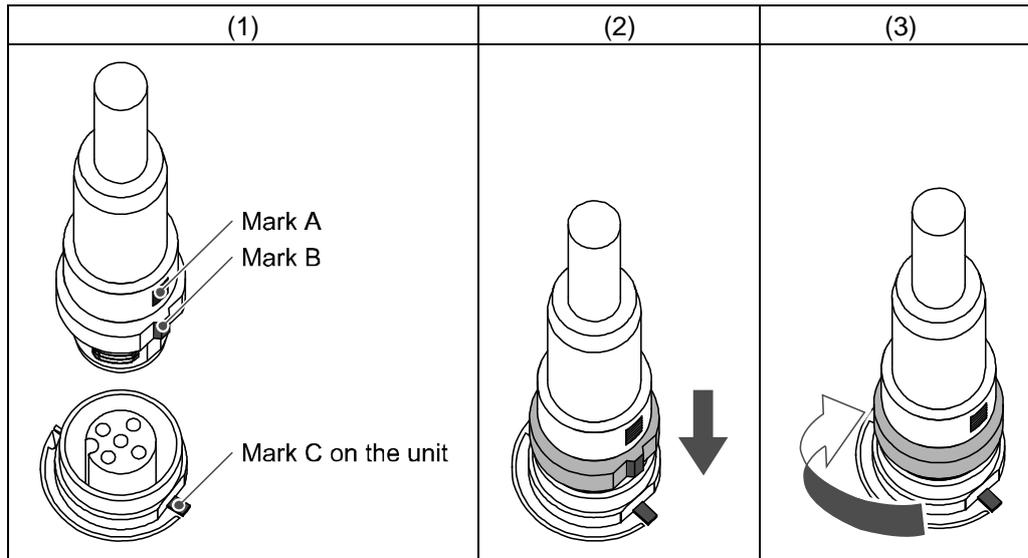
(1)Align mark B on the metal bracket of the cable connector (plug/socket) with mark A.

(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.

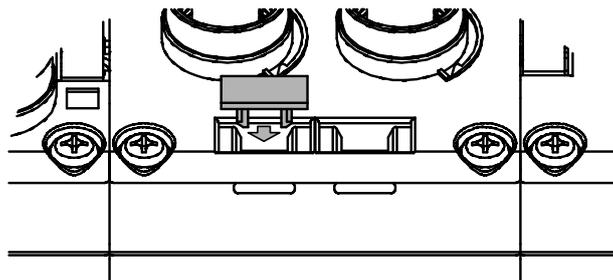
If turned too far, it will become hard to remove the connector.



- Mounting the 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-S**   - **X27**

SI unit

Protocol

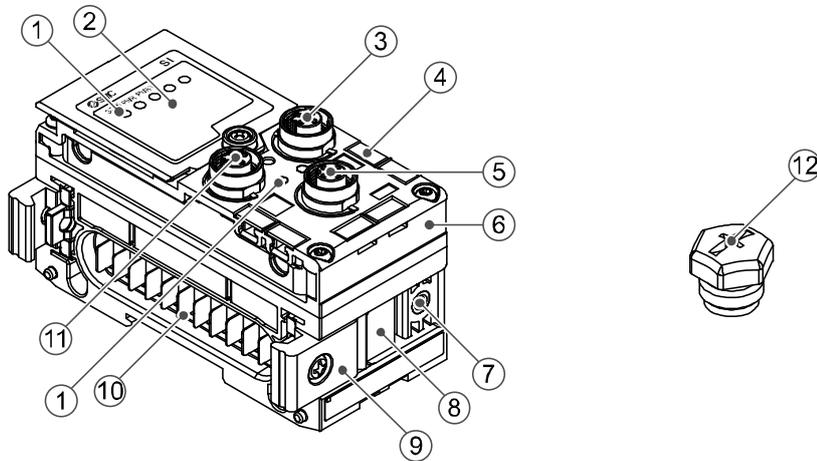
Polarity of output

EX600-GILB-X27 and EX600-DYPG1-X27 are supported.

Symbol	Content
PN	PROFINET

Symbol	Content
1	Source / PNP (Negative common)

### Summary of Product parts

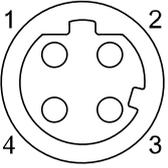
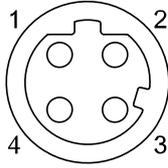


No.	Description	Function
1	Status display LED	Displays the status of the unit.
2	Display cover	The display cover should not be opened.
3	Connector (BUS OUT)	Connector for fieldbus outputs.
4	Marker groove	Groove for an identification marker.
5	Connector (PCI)	Connector for Handheld Terminal.
6	MAC address label	Displays the 12 digit MAC address which is different for each SI unit.
7	Valve plate mounting hole	Holes for fixing the valve plate.
8	Valve plate mounting groove	Groove for mounting the valve plate.
9	Joint bracket	Bracket for joining to adjacent units.
10	Unit connector (Plug)	Connector for signals and power supplies to adjacent units.
11	Connector (BUS IN)	Connector for fieldbus inputs.
12	Seal cap (2 pcs.)	Fitted to unused connectors. (BUS OUT and PCI)

## Mounting and Installation

### ■Wiring

#### •Connector pin assignment (EX600-SPN1-X27)

Configuration		Pin number	Signal name
BUS IN	BUS OUT		
		1	TD+
		2	RD+
		3	TD-
		4	RD-

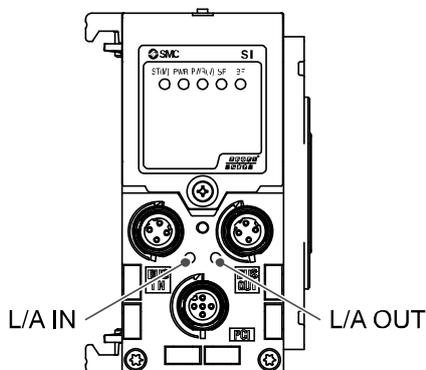
#### •Precautions for handling

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

## 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.
SF	Displays the system status.
BF	Displays the communication status.

Display	Content
L/A IN	Displays the communication status of the BUS IN side.
L/A OUT	Displays the communication status of the BUS OUT side.

### •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.	An internal memory error has occurred in the SI unit.
ST(M) PWR PWR(V) ○ ● ○ Red PWR LED is ON.	The power supply voltage for control and input is abnormal. (Control and input power supply voltage monitoring parameter is valid)
ST(M) PWR PWR(V) ○ ○ ● Red PWR(V) LED is ON.	The power supply voltage for outputs is abnormal. (Output power supply voltage monitoring parameter is valid)
ST(M) PWR PWR(V) ● (flashing) ○ ○ Green ST(M) LED is flashing.	A unit other than the SI unit has been 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.	Communication error between units has occurred.

•PROFINET status

LED display		Content
 OFF.		The communication with the PLC has been established normally, or the power supply for control and input is OFF.
 Red SF LED is ON.		The communication with the PLC has been established, but a diagnosis error has occurred.
 Red BF LED is flashing.		The configuration data of the PLC and EX600 are not consistent.
 Red BF LED is ON.		Either of the following conditions: •Power supply for the PLC is OFF. •The cable between the PLC and SI unit is not connected. •The PLC or the SI unit has broken. •The configuration data of the PLC and the Device Name of the SI unit are not consistent.
 Green SF LED is flashing.		The SI unit received a Node flashing test command.
(L/A IN)  (Green)	OFF	BUS IN side : No Link, No Activity
	ON	BUS IN side : Link, No Activity
	Flashing	BUS IN side : Link, Activity
(L/A OUT)  (Green)	OFF	BUS OUT side: No Link, No Activity
	ON	BUS OUT side: Link, No Activity
	Flashing	BUS OUT side: Link, Activity

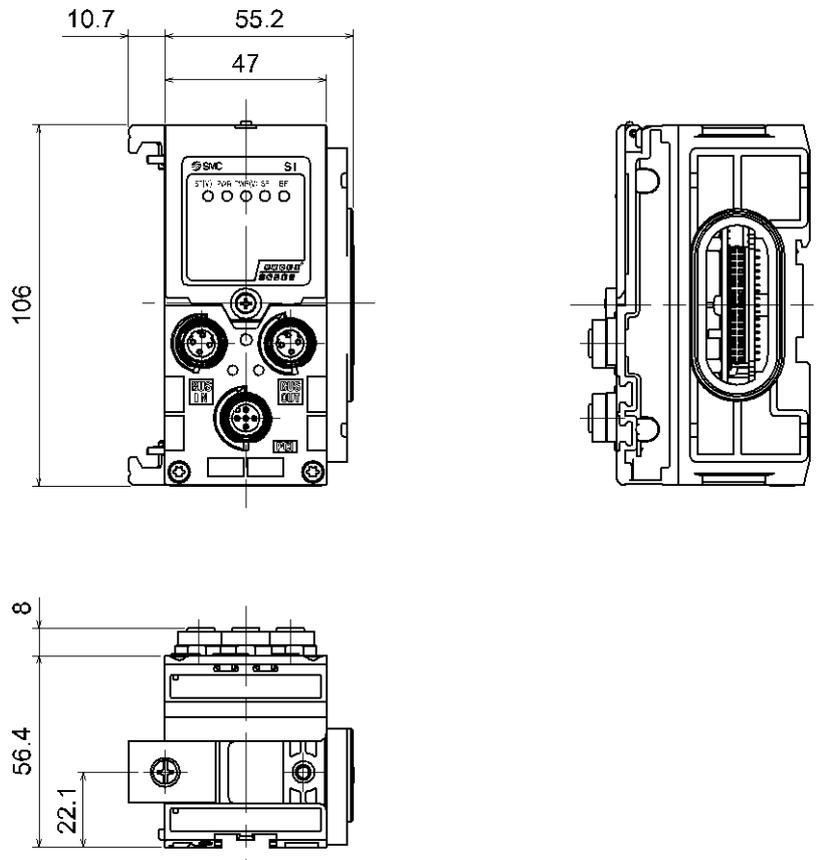
# Specification

## ■ Specifications

Model		EX600-SPN1A-X27
Communication	Protocol	PROFINET IO
	Communication speed	100 Mbps
	Configuration file	GSDML file
	Conformance class	Class C (only for IRT switch function)
	Occupied area (Number of inputs/outputs)	(512 inputs/512 outputs) Max.
Internal current consumption (The power supply for control and input)		120 mA or less
Output	Polarity of output	Source / PNP (Negative common)
	Number of Outputs	32 outputs
	Connected load	Solenoid valve with lamp and circuit of protection of surge voltage of 24 VDC 1.0 W (SMC)
	Output condition at the time of communication error	HOLD/CLEAR/Force ON
	Protective function	Short circuit protection
Environment	Enclosure	IP67 (With manifold assembled) *
	Operating temperature range	-10 to 50 °C
	Storage temperature range	-20 to 60 °C
	Operating humidity range	35 to 85%R.H. (No condensation)
	Withstand voltage	500 VAC for 1 minute between external terminals and F.E.
Insulation resistance	500 VDC, 10 MΩ or more between external terminals and F.E.	
Standard		CE marking, UL (CSA), RoHS
Weight		300 g

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

■Dimensions (in mm)



# End plate

## Model Indication and How to Order

**EX600-ED□-□**

End plate at D side

Mounting method

Connector

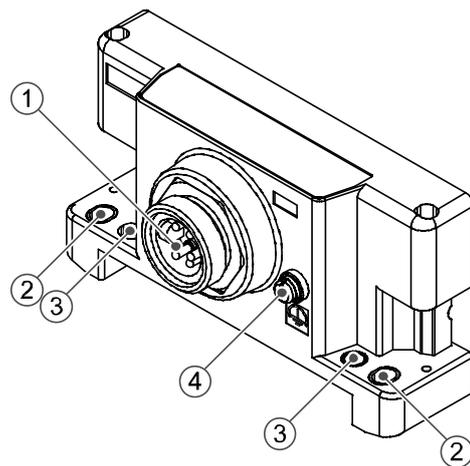
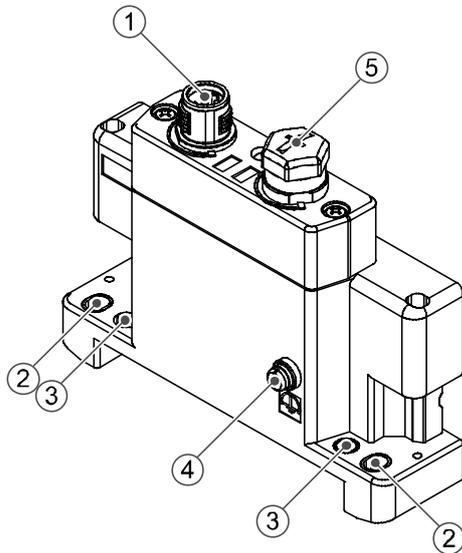
Symbol	Content
2	M12 (5 pin)
3	7/8 inch (5 pin)

Symbol	Content
Nil	No DIN rail bracket
2	With DIN rail bracket (Except SY series)
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 fix DIN rail mounting.
4	F.E. terminal	Functional Earth terminal - must be connected directly to system earth (ground).
5	Connector (Not used)	Unused connector. Do not remove seal cap.

\*: Individual grounding should be provided close to the product with a short cable.

# Mounting and Installation

## ■Wiring

### ○Connector pin assignment

#### (1)EX600-ED2-□

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

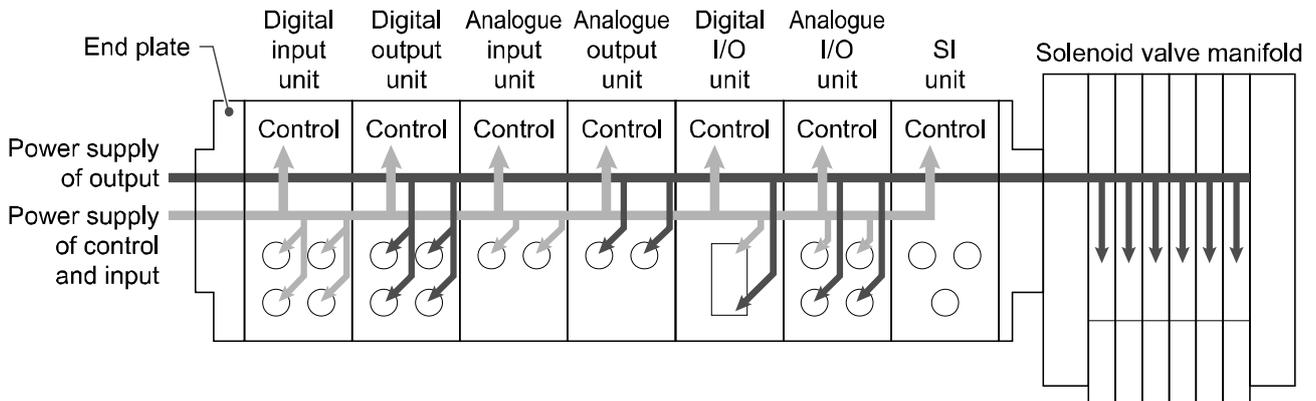
#### (2)EX600-ED3-□

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

### ○Regarding the 2 types of power supply

The power supply consists of two power supply systems as follows:

- 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

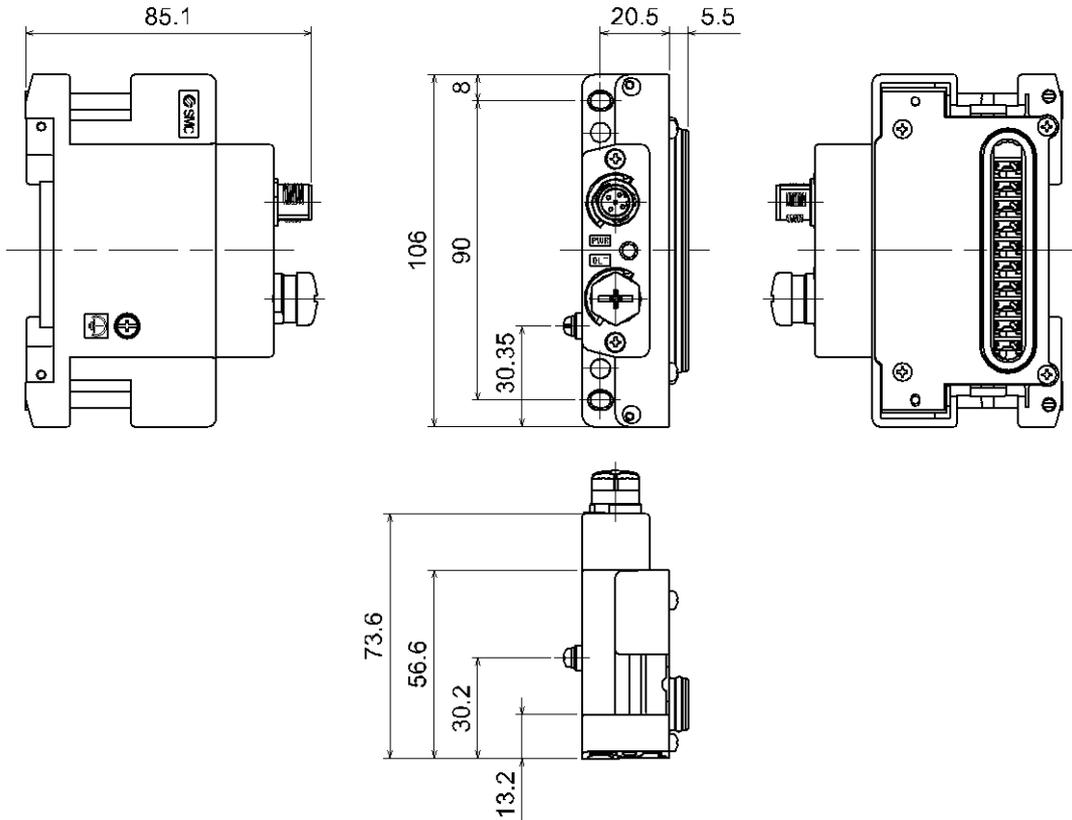
## ■ Specifications

Model		EX600-ED2-□	EX600-ED3-□
Power	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) *	
	Operating temperature range	-10 to 50 °C	
	Storage temperature range	-20 to 60 °C	
	Operating humidity range	35 to 85%R.H. (No condensation)	
	Withstand voltage	500 VAC for 1 minute between external terminals and F.E.	
	Insulation resistance	500 VDC, 10 MΩ min. between external terminals and F.E.	
Standard		CE marking, UL (CSA), RoHS	
Weight		170 g	175 g

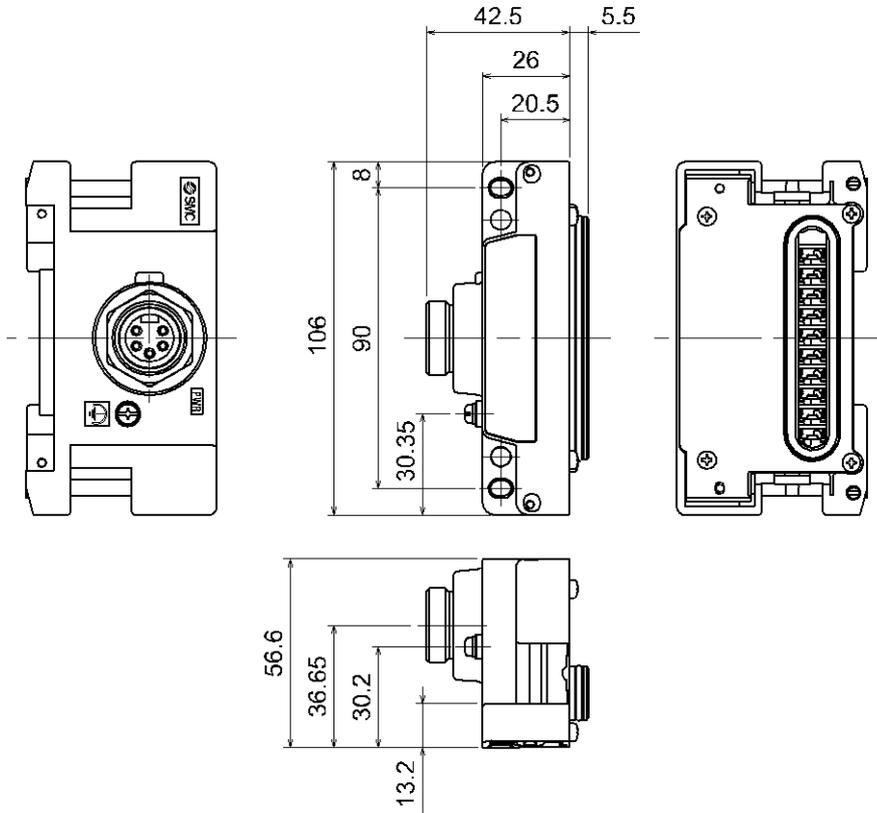
\*: All unused connectors must have a seal cap fitted.

## ■ Dimensions (in mm)

### •EX600-ED2-□



•EX600-ED3-□



# IO-Link Master unit

## Model Indication and How to Order

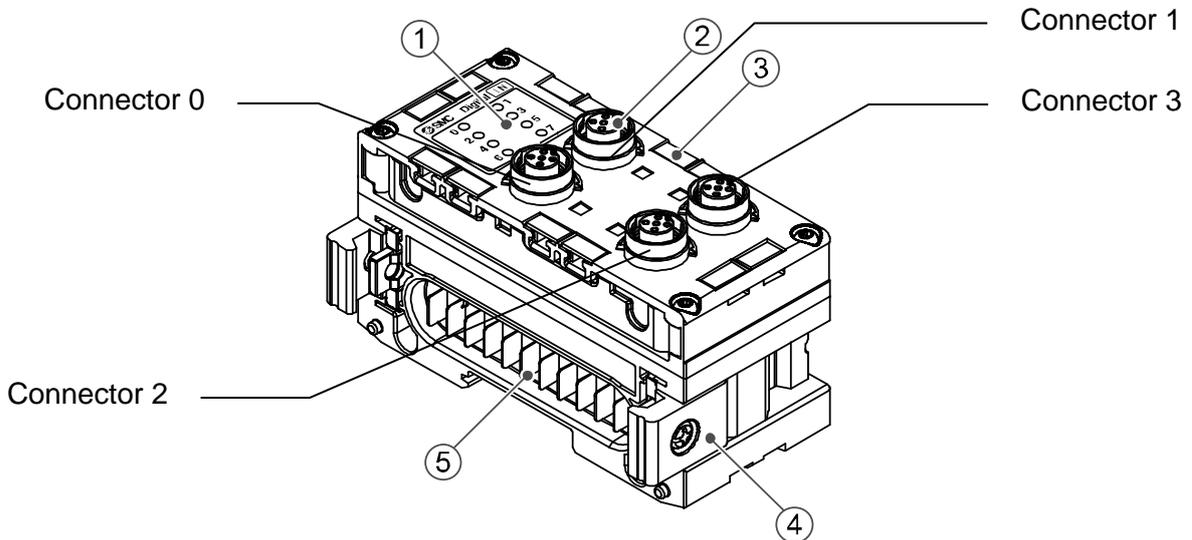
### EX600-GILB-X27

IO-Link Master      Symbol

Symbol	Connector	Number of IO-Link
B	4 × M12 connector (4pin)	4CH

## Summary of Product parts

•EX600-GILB-X27



No.	Description	Function	
1	Status display LED	Displays the status of the unit	
2	Connector (IO-Link)	Connect with the IO-Link device	Connector 0: IO-Link Port 1 Connector 1: IO-Link Port 2 Connector 2: IO-Link Port 3 Connector 3: IO-Link Port 4
3	Marker groove	Groove for a marker	
4	Joint bracket	Bracket for joining to adjacent units	
5	Unit connector (Plug)	Transmits signals and power supplies to adjacent units	

# Mounting and Installation

## ■Wiring

### ○Connector pin assignment (EX600-GILB-X27)

Configuration	Pin No.	Signal name
	1	L+ (24 V for US1)
	2	DI
	3	L- (0 V for US1)
	4	C/Q *1)
	5	n.a.

\*1) IO-Link / SIO (Standard Input and Output)

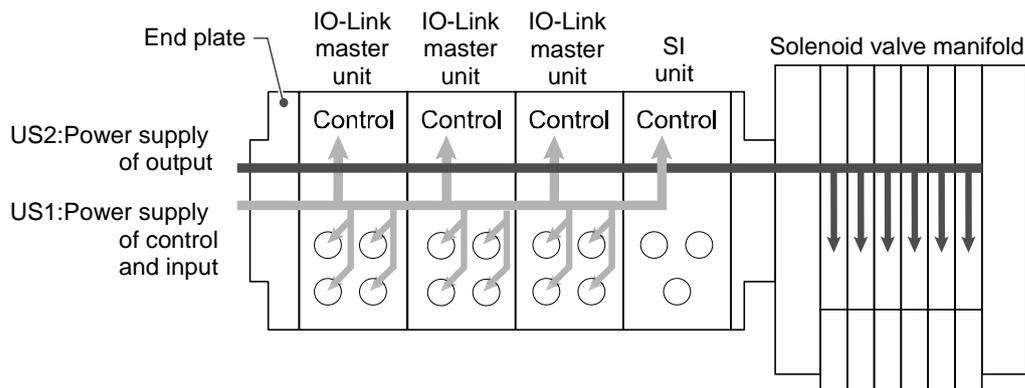
### ●Precautions for handling

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

### ○Regarding the 2 types of power supply

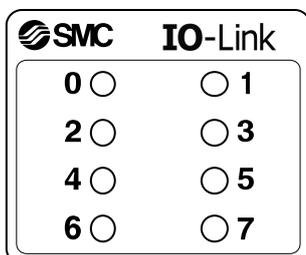
The power supply consists of two power supply systems as follows:

- US1:Power supply for control and input: Supplying power for control of each unit's power supply for control and also for device connected to input port of Digital and Analog unit.
- US2:Power supply for output: Supplying power for equipment connected to output port of Digital and Analog unit, and also power supply for solenoid valve manifold.



## LED Display

The status display LED displays the power supply and communication status.  
Various kinds of status can be checked as follows:



LED #	Connector #	Pin #	Function	LED #	Connector #	Pin #	Function
<b>LED 0</b>	Connector 0	Pin 2	DI	<b>LED 1</b>	Connector 1	Pin 2	DI
<b>LED 2</b>	Connector 2	Pin 2	DI	<b>LED 3</b>	Connector 3	Pin 2	DI
<b>LED 4</b>	Connector 0	Pin 4	C/Q, SIO	<b>LED 5</b>	Connector 1	Pin 4	C/Q, SIO
<b>LED 6</b>	Connector 2	Pin 4	C/Q, SIO	<b>LED 7</b>	Connector 3	Pin 4	C/Q, SIO

### ■ LED 0,1,2,3

Display	Content
OFF	The power supply for control and input, or the input device, is OFF
Orange	Digital input is ON

### ■ LED 4,5,6,7

Display	Content		
	IO-Link mode	Standard Input mode	Standard Output mode
OFF	Power is OFF	Power is OFF or Digital input is OFF	Power is OFF off or Digital output is OFF
Orange	—	Digital input is ON	Digital output is ON
Green	IO-Link connection active	—	—
flashing Green (2Hz)	No IO-Link connection or wrong IO-Link device	—	—
flashing Red (2Hz)	Validation failed / wrong configuration of IO-Link data length	—	—
Red	IO-Link short circuit, pin4 against pin3/ Short circuit at sensor power supply between pin 1 and pin3	Short circuit at sensor power supply between pin 1 and pin3	Output short circuit, pin4 against pin3/ Short circuit between pin 1 and pin3

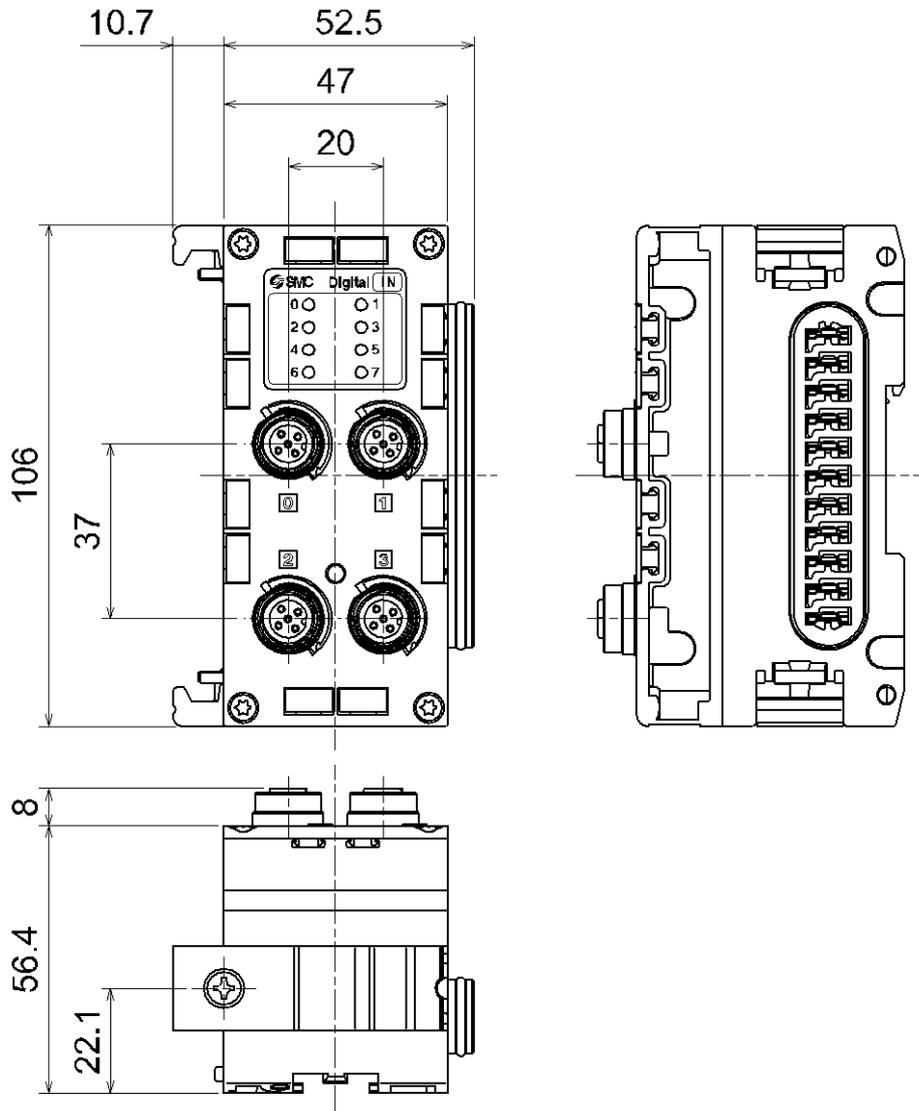
# Specification

## ■ Specifications

Model		EX600-GILB-X27	
IO-Link version		Version 1.1	
IO-Link port type		Type A	
Communication mode		COM1( 4.8kBaud) COM2( 38.4kBaud) COM3(230.4kBaud) Depending on connected sensor / actuator	
Number of IO-Link ports		4	
Input specifications	Pin No	Pin2 Input	Pin4 Input
	Input type	PNP	
	Max. device supply current	0.5 A/ connector (2 A/unit) (Supplied from US1)	
	Protective function	Short circuit protection	
	Input resistance	4.7k $\Omega$	—
	Rated input current	5mA or less	12mA or less
	ON voltage	17 V or more (PNP input: between input terminal and 0 V)	13V or more (PNP input: between input terminal and 0 V)
	OFF voltage	5 V or less (PNP input: between input terminal and 0 V)	8V or less (PNP input: between input terminal and 0 V)
Output specifications	Output type	PNP	
	Max. load current (C/Q line)	0.25 A/output (Supplied from US1)	
	Protective function	Short circuit protection	
Applicable SI Unit		EX600-SPN1-X27	
Enclosure		IP67 (Manifold assembly)	
Standards		CE Marking, RoHS Compliant	
Weight		300g	

## ■Dimensions

•EX600-GILB - X 27



## Digital Output unit

### Model Indication and How to Order

#### EX600-DYPG1- X27

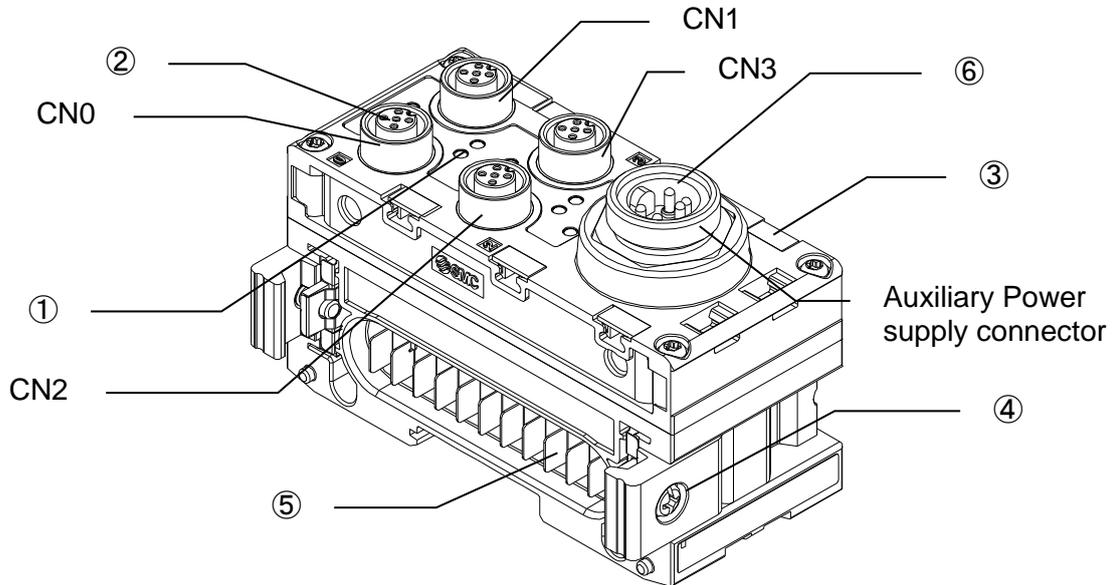
Digital Output

Symbol

Symbol	Content
P	PNP
G1	4 × M12 connector(5 pin) / 4 Outputs / AUX power

### Summary of Product parts

•EX600-DYPG1-X27



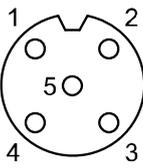
No.	Description	Function
1	Status display LED	Displays the status of the unit.
2	Connector (Output)	Connector for digital outputs.
3	Marker groove	Groove to mount a marker.
4	Joint bracket	Bracket for joining to adjacent units.
5	Unit connector (Plug)	Transmits signals and power supplies to adjacent units.
6	Connector(AUX Power)	Connector for AUX Power.

# Mounting and Installation

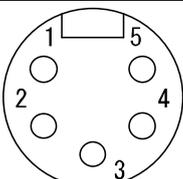
## ■Wiring

### ○Connector pin assignment (EX600-DYPG1-X27)

#### •Digital output connector

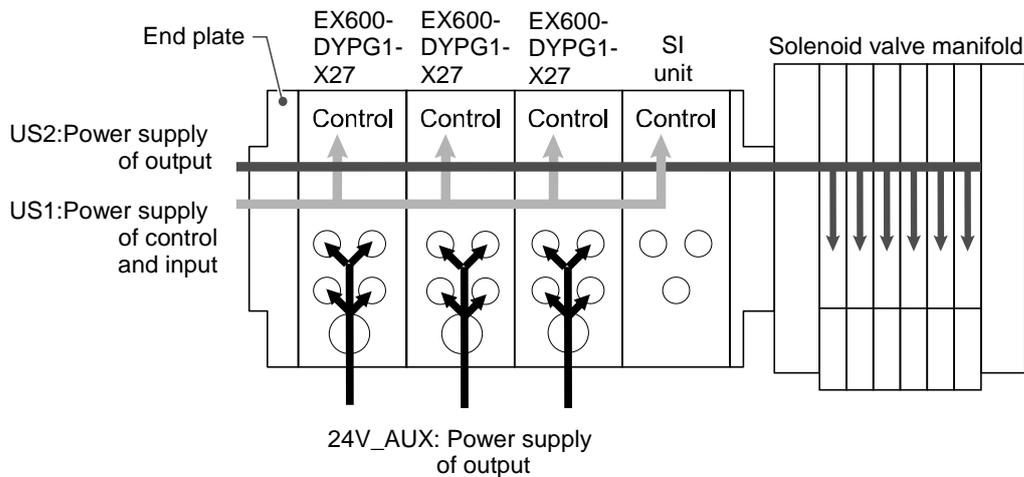
M12(5-pin) socket	Pin number	Signal			
		CN0	CN1	CN2	CN3
	1	NC	NC	NC	NC
	2	OUT1	NC	OUT3	NC
	3	0V_AUX	0V_AUX	0V_AUX	0V_AUX
	4	OUT0	OUT1	OUT2	OUT3
	5	FE	FE	FE	FE

#### •AUX(Auxiliary) power supply connector

7/8 inch(5-pin) plug	Pin number	Signal
	1	24 V_AUX
	2	0 V_AUX
	3	NC
	4	NC
	5	FE

#### ●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.



## LED Display

The status display LED displays the power supply and communication status.  
Various kinds of status can be checked as follows:

•EX600-DYPG1-X27



### ■ LED 0, 1, 2, 4, 5, 6

Display	Content
OFF	The power supply for AUX, or the output device, is OFF.
Green LED is ON	The output device is ON.
Red LED is ON	The output device has a short circuit.

### ■ ST, PWR (AUX)

Display	Content
ST OFF	The power supply for control and input is OFF.
ST Green LED is ON	Normal operation
ST Red LED is ON	The output device has a short circuit.
PWR(AUX) OFF	Auxiliary power supply is OFF.
PWR(AUX) Green LED is ON	Auxiliary power supply is ON.
PWR(AUX) Red LED is ON	Auxiliary power supply is OFF. (When the parameter of auxiliary power supply voltage monitor is set to enable.)

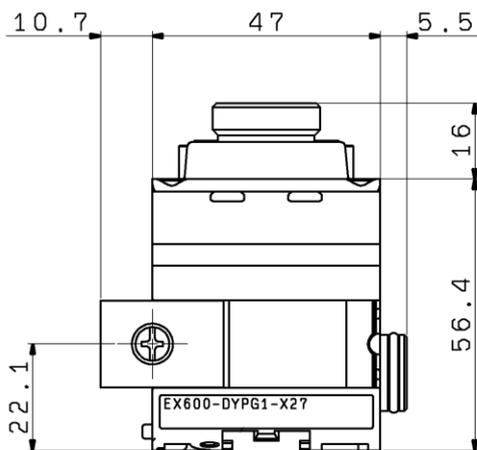
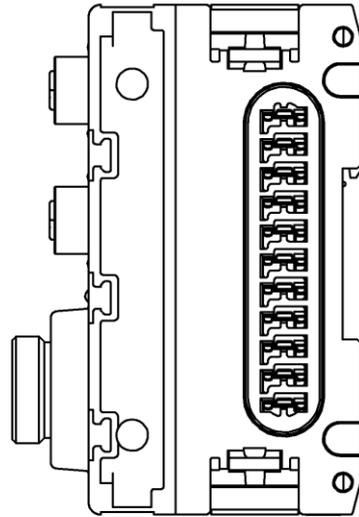
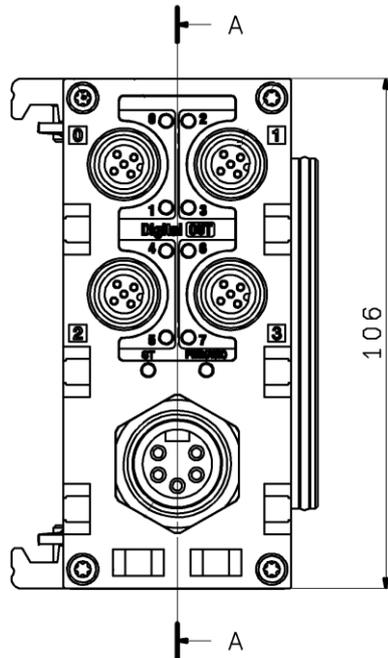
# Specification

## ■ Specifications

Model		EX600-DYPG1-X27
Output specifications	Output type	PNP
	Output connector	4 x M12 (5 - pin) socket
	Number of outputs	4 outputs
	Max. load current	1.5 A/output
	Protection	Short circuit protection
Auxiliary power supply	Power connector	7/8 inch (5 - pin) socket
	Operating voltage	24VDC±10%
	Max.current	6A

## ■Dimensions

•EX600-DYPG1-X27



## 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.

## Parameter Setting

The EX600 parameters can be configured for each unit and channel. Parameters can be changed by the PLC or handheld terminal (hereafter referred to as H.T.).

- **Precautions for handling**

- Changing parameters with the H.T. does not change the parameter settings in the PLC.
- If PROFINET communication is cut after changing parameters with the H.T. and then communication is connected again, the parameters will be changed to those set in the PLC.

- **Parameter definition and setting**

- With EX600 series, parameters can be set for each unit. The table below shows settable parameters for the SI unit and input/ output units.

•SI unit parameters (1)

No.	Parameter [H.T. display] [GSDML display]	Definition	Item	Content	Default setting	Parameter setting	
						By PLC	By H.T.
1	Power supply for control and input voltage monitor [PWRC_Mon] [Monitor 24V_C]	Generates error when control and input power supply voltage is above approx. 29 V or below 18 V.	Enable	Generates an error.		x	x
			Disable	Does not generate an error.	x		
2	Power supply for output voltage monitor [PWRO_Mon] [Monitor 24V_D]	Generates error when output power supply voltage is above approx. 29 V or below 19 V.	Enable	Generates an error.		x	x
			Disable	Does not generate an error.	x		
3	Short Circuit Detection [SC_MonOp] [Monitor Short Circuit(Out)]	Generates error when the short circuit of the valve is detected.	Enable	Generates an error.	x	x	x
			Disable	Does not generate an error.			
4	Restart after short circuit [SC_RstOp] [Restart After Short Circuit]	Restores the status after the short circuit of the valve is cleared.	Auto	Error is automatically cleared when the short circuit is fixed.	x		
			Manual	Even when the short circuit is fixed, error is not cleared until the power is supplied again.		x	x
5	Open Circuit Detection [OC_Mon] [Monitor Open Circuit]	Generates error per channel when the disconnection of the valve is detected.	Enable	Generates an error.		x	x
			Disable	Does not generate an error.	x		
6	Output setting during communication fault *1 [Fault_MD] [Fault Mode]	Set output per channel when communication is abnormal.	Clear	Turn OFF the output	x		
			Hold	Hold the output		x	x
			ForceON	Turn ON the output forcefully			
7	Output setting during communication idling *1 [Idle_MD] [None]	Output setting per channel at the time of communication idling	Clear	Turn OFF the output	x		
			Hold	Hold the output		-	x
			ForceON	Turn ON the output forcefully			

•SI unit parameters (2)

No.	Parameter [H.T. display] [GSDML display]	Definition	Item	Content	Default setting	Parameter setting	
						By PLC	By H.T.
8	Valve ON/OFF counter [Counter] [None]	Memorizes the number of times the output device is ON. Generates error per channel when the operation count exceeds the set value. *2	Enable	Generates an error. Val: 1 to 65000 *3		-	x
			Disable	Does not generate an error.	x		

\*1: The Handheld terminal can change the set value (for Clear, Hold and Force ON), but the output is OFF when the PLC communication is in an idle state.

\*2: The count is memorized every 30 seconds per channel. When the power supply is turned ON again, counting starts from the last value memorized.

\*3: Times for setting is set value x1000 times.

•Digital input unit parameters

No.	Parameter [H.T. display] [GSDML display]	Definition	Item	Content	Default setting	Parameter setting	
						By PLC	By H.T.
1	The power supply short circuit detection for control and input [SC_MonSs] [Monitor Short Circuit(Power)]	Generates error per unit when the short circuit of the power supply for the input device is detected.	Enable	Generates an error.	x	x	x
			Disable	Does not generate an error.			
2	Open circuit detection *1 [OC_Mon] [Monitor Open Circuit]	Generates error per channel when the disconnection of the input device is detected. *2	Enable	Generates an error.		x	x
			Disable	Does not generate an error.	x		
3	Inrush current filter [Inrush] [Inrush Current Filter]	Ignores excess current per unit for 100 msec. after inrush.	Enable	Ignores excess current.		x	x
			Disable	Does not ignore excess current.	x		
4	Input filtering time [Filter_T] [Input Filtering Time]	Sets the time to ignore the input signal change per unit.	0.1 ms	Selects the time for filtering.	1.0 ms	x	x
			1.0 ms				
			10 ms				
			20 ms				
5	Input extension time [SigExt_T] [Input Extension Time]	Sets the time to hold the input signal per unit.	1.0ms	Selects the time to hold the input signal.	15 ms	x	x
			15 ms				
			100 ms				
			200 ms				
6	Channel ON/OFF counter [Counter] [None]	Memorizes the number of times the input device is ON. Generates error per channel when the operation count exceeds the set value. *3	Enable	Generates an error. Val: 1 to 65000 *4		-	x
			Disable	Does not generate an error.	x		

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

\*2: 2-wire type input equipment cannot be correctly detected if its leakage current is 0.5 mA or less while the equipment is in the OFF state (reed sensor, etc.).

Ensure that all input equipment used has a leakage current above 0.5 mA in the OFF state.

3-wire type input equipment cannot be correctly detected if its current consumption is 0.5mA or less.

The open circuit of input signals cannot be detected.

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

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

•Digital output unit parameters (except EX600-DYPG1-X27)

No.	Parameter [H.T. display] [GSDML display]	Definition	Item	Content	Default setting	Parameter setting	
						By PLC	By H.T.
1	Output load short circuit detection [SC_MonOp] [Monitor Short Circuit(Out)]	Generates error per unit when the short circuit of the output device is detected. *1	Enable	Generates an error.	x	x	x
			Disable	Does not generate an error.			
2	Restart after output load short circuit [SC_RstOp] [Restart After Short Circuit]	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.	x	x	x
			Manual	Even when the short circuit is fixed, error is not cleared until the power is supplied again.			
3	Open circuit detection [OC_Mon] [Monitor Open Circuit]	Generates error per channel when the disconnection of the output device is detected.	Enable	Generates an error.		x	x
			Disable	Does not generate an error.	x		
4	Output setting during communication fault *2 [Fault_MD] [Fault Mode]	Set output per channel when communication is abnormal.	Clear	Turn OFF the output	x	x	x
			Hold	Hold the output			
			ForceON	Turn ON the output forcefully			
5	Output setting during communication idling *2 [Idle_MD] [None]	Set output per channel during communication idling.	Clear	Turn OFF the output	x	-	x
			Hold	Hold the output			
			ForceON	Turn ON the output forcefully			
6	Output ON/OFF counter [Counter] [None]	Memorizes the number of times the output device is ON. Generates error per channel when the operation count exceeds the set value. *3	Enable	Generates an error. Val: 1 to 65000 *4		-	x
			Disable	Does not generate an error.	x		

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

\*2: Handheld terminal can change the set value (for Clear, Hold and Force ON), but the output is OFF when the PLC communication is in an idle state.

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

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

•Digital output unit parameters (EX600-DYPG1-X27)

No.	Parameter [H.T. display] [GSDML display]	Definition	Item	Content	Default setting	Parameter setting	
						By PLC	By H.T.
1	Output load short circuit detection [SC_MonOp] [Monitor Short Circuit(Out)]	Generates error per unit when the short circuit of the output device is detected. *1	Enable	Generates an error.	x	x	-
			Disable	Does not generate an error.			
2	Restart after output load short circuit [SC_RstOp] [Restart After Short Circuit]	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.	x	x	-
			Manual	Even when the short circuit is fixed, error is not cleared until the power is supplied again.			
3	Output setting during communication fault *2 [Fault_MD] [Fault Mode]	Set output per channel when communication is abnormal.	Clear	Turn OFF the output	x	x	-
			Hold	Hold the output			
			ForceON	Turn ON the output forcefully			
4	Output setting during communication idling *2 [Idle_MD] [None]	Set output per channel during communication idling.	Clear	Turn OFF the output	x	-	-
			Hold	Hold the output			
			ForceON	Turn ON the output forcefully			
5	Monitor 24V_AUX [None] [Monitor 24V_AUX]	Generated error per unit when AUX power supply voltage goes under approx 17V.	Enable	Generates an error.		x	-
			Disable	Does not generate an error.	x		

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

\*2: Handheld terminal can change the set value (for Clear, Hold and Force ON), but the output is OFF when the PLC communication is in an idle state.

•Digital I/O unit parameters (1)

No.	Parameter [H.T. display] [GSDML display]	Definition	Item	Content	Default setting	Parameter setting	
						By PLC	By H.T.
1	The power supply short circuit detection for control and input [SC_MonSs] [Monitor Short Circuit (Power)]	Generates error per unit when the short circuit of the control or input power supply is detected.	Enable	Generates an error.	x	x	x
			Disable	Does not generate an error.			
2	Inrush current filter [Inrush] [Inruch Current Filter]	Ignores excess current per unit for 100 msec. after inrush.	Enable	Ignores excess current.		x	x
			Disable	Does not ignore excess current	x		
3	Input filtering time [Filter_T] [Input Filtering Time]	Sets the time to ignore the input signal change per unit	0.1 ms	Selects the time for filtering.	1.0 ms	x	x
			1.0 ms				
			10 ms				
			20 ms				
4	Input extension time [SigExt_T] [Input Extention Time]	Sets the time to hold the input signal per unit.	1.0 ms	Selects the time to hold the input signal.	15 ms	x	x
			15 ms				
			100 ms				
			200 ms				
5	Output load short circuit detection [SC_MonOp] [Monitor Short Circuit (Out)]	Generates error per unit when the short circuit of the output device is detected. *1	Enable	Generates an error.	x	x	x
			Disable	Does not generate an error.			
6	Restart after output load short circuit [SC_RstOp] [Restart After Short Circuit]	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.	x	x	x
			Manual	Even when the short circuit is fixed, error is not cleared until the power is supplied again.			
7	Open circuit detection [OC_Mon] [Monitor Open Circuit]	Generates error per channel when the disconnection of the output device is detected.	Enable	Generates an error.		x	x
			Disable	Does not generate an error.	x		
8	Output setting during communication fault *2 [Fault_MD] [Fault Mode]	Set output per channel when communication is abnormal.	Clear	Turn OFF the output	x	x	x
			Hold	Hold the output			
			ForceON	Turn ON the output forcefully			

•Digital I/O unit parameters (2)

No.	Parameter [H.T. display] [GSDML display]	Definition	Item	Content	Default setting	Parameter setting	
						By PLC	By H.T.
9	Output setting for communication idling *2 [Idle_MD] [None]	Set output per channel during communication idling.	Clear	Turn OFF the output	x	-	x
			Hold	Hold the output			
			ForceON	Turn ON the output forcefully			
10	Input or Output ON/OFF counter [Counter] [None]	Memorizes the number of times the input or output device is ON. Generates error per channel when the operation count exceeds the set value. *3	Enable	Generates an error. Val: 1 to 65000 *4		-	x
			Disable	Does not generate an error.	x		

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

\*2: The Handheld terminal can change the set value (for Clear, Hold and Force ON), but the output is OFF when the PLC communication is in an idle state.

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

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

•Analogue input unit parameters (1)

No.	Parameter [H.T. display] [GSDML display]	Definition	Item	Content	Default setting	Parameter setting	
						By PLC	By H.T.
1	Monitor power supply short circuit of input equipment. [SC_MonSs] [Monitor Short Circuit(Power)]	Generates error per unit when a short circuit of the power supply for input equipment is detected.	Enable	Generates an error.	x	x	x
			Disable	Does not generate an error.			
2	Analogue input range [Range] [Measurement Range]	Set the analogue input device range per channel.	-10..10 V	Selects the analogue input range.	-10..10 V	x	x
			-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] [Data Format]	Configure analog data format per unit.	Offset binary	Offset binary.	x	x	x
			Signed Magnitude	Signed binary.			
			2's Complement	2's complement.			
4	Analogue average filter [Filter] [Filtering Mode]	Sets analogue filtering time per channel. Sampling interval is approx. 2 sec.	None	None	x	x	x
			2 Value Average	2 value average			
			4 Value Average	4 value average			
			8 Value Average	8 value average			
5	Over range detection [Over_Rng] [Monitor Over Range]	Generates error per unit when the input value has exceeded the "Range upper limit +0.5% of full span"	Enable	Generates an error.	x	x	x
			Disable	Does not generate an error.			
6	Under range detection [Undr_Rng] [Monitor Lower Range]	Generates error per unit when the input value is below the "Range lower limit - 0.5% of full span"	Enable	Generates an error.	x	x	x
			Disable	Does not generate an error.			
7	User setting value upper limit error [Upr_Lmt] [Monitor Upper Limit]	Generates error per channel when the input value has exceeded the upper set value.	Enable	Generates an error. *1	x	x	x
			Disable	Does not generate an error.			
	User setting value upper limit [Upr_Lmt] [Upper Limit Value]	Set the user set upper limit.	*1	-	1000	x	x

•Analogue input unit parameters (2)

No.	Parameter [H.T. display] [GSDML display]	Definition	Item	Content	Default setting	Parameter setting	
						By PLC	By H.T.
8	User setting value lower limit error [Lwr_Lmt] [Monitor Lower Limit]	Generates error per channel when the input value exceeds the lower set value.	Enable	Generates an error. *1			
			Disable	Does not generate an error.	x	x	
	User setting value lower limit [Lwr_Lmt] [Lower Limit Value]	Set the user set lower limit.	*1	-	0	x	x

\*1: The Set value should be set per channel within the settable range given in the following table. When the range is changed, check the set value and change it to an appropriate value.

Refer to the following table for the settable range for user when setting the values by PLC.

Table. Settable range of user set value

Range	Settable value range	
	Lower limit	Upper limit
-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

Table. User set values

Analogue input range	Settable value by PLC	Expected value
-10..+10 V	0 to 1050 32768 to 33818	+0.00 to +10.50 V -0.00 to -10.50 V
-5..+5 V	0 to 525 32768 to 33293	+0.00 to +5.25 V -0.00 to -5.25 V
-20..+20 mA	0 to 2100 32768 to 34868	+0.00 to +21.00 mA -0.00 to -21.00 mA
0..10 V	0 to 1050	+0.00 to +10.50 V
0..5 V	0 to 525	+0.00 to +5.25 V
1..5 V	75 to 525	+0.75 to +5.25 V
0..20 mA	0 to 2100	+0.00 to +21.00 mA
4..20 mA	300 to 2100	+3.00 to +21.00 mA

\*: Follow the methods below when assigning the user set upper and lower limit by PLC.

•Assigning positive value: Input the desired data x 100 in decimal system.

Example: +10.50 V is assigned --- Assign  $10.50 \times 100 = 1050$  by PLC.

•Assigning negative value: Convert the absolute value x 100 that you desire to assign in 16bit binary. Then, change the most significant bit to "1" before inputting.

Example: -10.50 V is assigned --- Assign  $10.50 \times 100 = 1050 \rightarrow 10000011010b \rightarrow 1000010000011010b \rightarrow 33818$  by PLC.

•Analogue output unit parameters (1)

No.	Parameter [H.T. display] [GSDML display]	Definition	Item	Content	Default setting	Parameter setting	
						By PLC	By H.T.
1	Monitor power supply short circuit of output equipment. [SC_MonSs] [Monitor Short Circuit(Power)]	Generates error per unit when the short circuit of the output device is detected.	Enable	Generates an error.	x		
			Disable	Does not generate an error.		x	x
2	Analogue output range [Range] [Measurement Range]	Sets the range of the analogue output device per channel.	0..10 V	Selects the analogue output range.	0..10 V	x	x
			0..5 V				
			1..5 V				
			0..20 mA				
3	Analogue data format [D_Format] [Data Format]	Configure analogue data format per unit.	Offset binary	Offset binary.	x		
			Signed Magnitude	Signed binary.		x	x
			2's Complement	2's complement.			
			Scaled	Scale conversion type.			
4	User setting value upper limit error [Upr_Lmt / UpLm/Sc] [Monitor Upper Limit]	Generates error per channel when the output value has exceeded the user set upper limit or scale upper limit.	Enable	Generates an error. *2 *3		x	x
			Disable	Does not generate an error.	x		
	User set upper limit/ scale upper limit *1 [Upr_Lmt / UpLm/Sc] [Upper Limit Value]	Set the user set upper limit or scale upper limit per channel.	*2	-	1000	x	x
5	User setting value lower limit error [Lwr_Lmt / LwLm/Sc] [Monitor Lower Limit]	Generates error per channel when the output value is below the user set lower limit or scale lower limit.	Enable	Generates an error.		x	x
			Disable	Does not generate an error.	x		
	User set lower limit/ scale lower limit *1 [Lwr_Lmt / LwLm/Sc] [Lower Limit Value]	Set the user set lower limit or scale lower limit per channel.	*2	-	0	x	x

•Analogue output unit parameters (2)

No.	Parameter [H.T. display] [GSDML display]	Definition	Item	Content	Default setting	Parameter setting	
						By PLC	By H.T.
6	Output setting for communication error *3 [Fault_MA] [Fault Mode]	Set output per channel when communication is abnormal.	Enable	Output will be user fault value.			
			Disable	Output will be held last state.	x	x	
	Fault Value [Fault_MA] [Fault Value]	Set the output value per channel when a communication error occurs.	*2	—	0	x	x
7	Output setting for communication idling *3 [Idle_MA] [None]	Set output per channel during communication idling.	Enable	Output will be set to the lower limit.		-	x

\*1: When "Scaled" is selected as the analogue data format, the display of H.T. is switched from Upr\_Lmt to UpLm/Scl, from Lwr\_Lmt to LwLm/Scl.

\*2: The Set value should be set per channel within the settable range in the following table. When the range is changed, check the set value and change it to an appropriate value.

\*3: The Handheld terminal can change the parameters, but when the the PLC communication is in an idle state, the lower limit value is output.

Table. Settable range for user set upper or lower limit and Fault Value

Range	User set output value Settable range		Fault Value Settable range
	Lower limit	Upper limit	
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

Table. User set values (PLC)

Range	Settable value by PLC (Offset Binary Signed Magnitude 2's Complement)	Expected value
0..10 V	0 to 1050	0.00 to +10.50 V
0..5 V	0 to 525	0.00 to +5.25 V
1..5 V	75 to 525	+0.75 to +5.25 V
0..20 mA	0 to 2100	0.00 to +21.00 mA
4..20 mA	300 to 2100	+3.00 to +21.00 mA

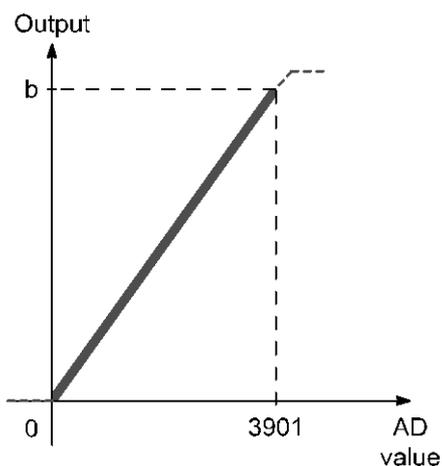
\*: If the data format is scaled data format, set the data as follows, regardless of the range setting.  
(Refer to page 53 for scaled data format.)

- PLC set value: 0 to 32767 → Converted value +0 to +32767
- PLC set value: 32768 to 65535 → Converted value -0 to -32767

- Output value during communication error (Fault Value)  
Refer to the tables below for setting the Fault value via PLC.
- Set in decimal number.
- Conversion value varies depending on the assigned analogue data format and the analogue output range.

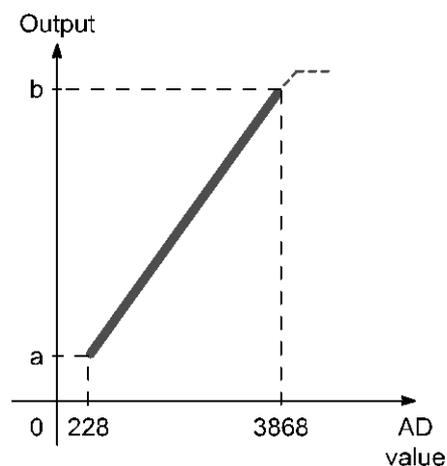
(1)Offset binary data format

•Range: 0 to 10 V, 0 to 5 V, 0 to 20 mA



Settable value by PLC (AD value)	Output signal range (0 to b)		
	Voltage [V]		Current [mA]
	0 to 10	0 to 5	0 to 20
4095	10.5	5.25	21
3901	10	5	20
2048	5.25	2.625	10.5
0	0	0	0

•Range: 1 to 5V, 4 to 20 mA



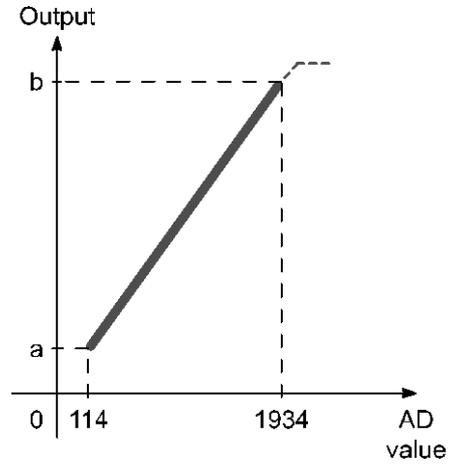
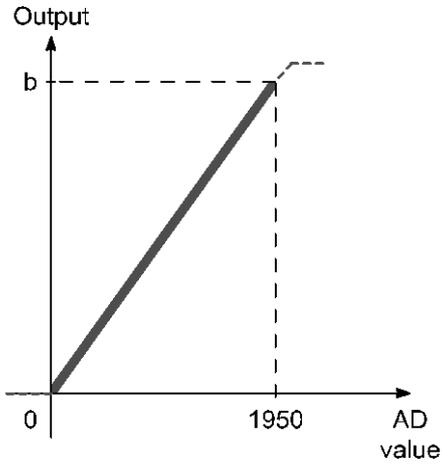
Settable value by PLC (AD value)	Output signal range (a to b)	
	Voltage [V]	Current [mA]
	1 to 5	4 to 20
4095	5.25	21
3868	5	20
2048	3	12
228	1	4
0	0.75	3

Example: To set the Fault value to 10 V when offset binary data format (analogue data format) and range 0 to 10 V (analogue output range) are set, the value set to PLC is "3901" from the table on the left.

(2) Signed binary data format & 2's complement data format

•Range: 0 to 10 V, 0 to 5 V, 0 to 20 mA

•Range: 1 to 5 V, 4 to 20 mA



Settable value by PLC (AD value)	Output signal range (0 to b)		
	Voltage [V]		Current [mA]
	0 to 10	0 to 5	0 to 20
2047	10.5	5.25	21
1950	10	5	20
1024	5.25	2.625	10.5
0	0	0	0

Settable value by PLC (AD value)	Output signal range (a to b)	
	Voltage [V]	Current [mA]
	1 to 5	4 to 20
2047	5.25	21
1934	5	20
1024	3	12
114	1	4
0	0.75	3

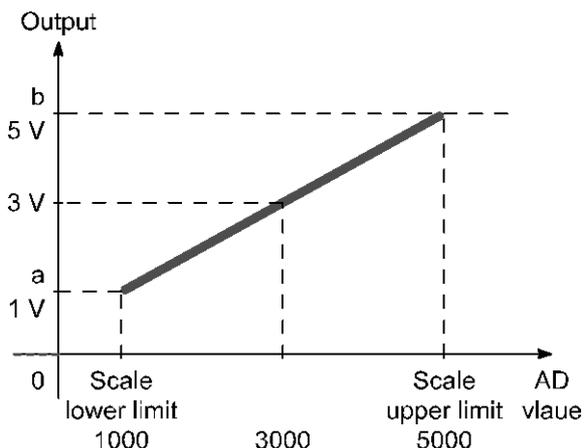
Example: To set the Fault value to 10 V when signed binary data format (analogue data format) and range 0 to 10 V (analogue output range) are set, the value set to PLC is "1950" from the table on the left.

(3) Scaled data format

Function to set any value between "-32767 to 32767" as the AD value for output signal range. Resolution is determined by specifying the upper and lower scale limit.

$$\text{Resolution} = \frac{\text{Upper limit value of the range} - \text{Lower limit value of the range}}{\text{Upper limit value of the scale} - \text{Lower limit value of the scale}}$$

Example: when the range is 1 to 5 V



- (1) Set the range to 1 to 5 V.
- (2) When the upper limit of the scale is set to 5000, and the lower limit of the scale is set to 1000, the result will be as follows.
  - 1000 ··· 1 V output
  - 2000 ··· 2 V output
  - 3000 ··· 3 V output
  - 4000 ··· 4 V output
  - 5000 ··· 5 V output
- (3) The resolution from 1 to 5 V is 1/1000 based on the calculation.
 
$$(5 \text{ V} - 1 \text{ V}) / (5000 - 1000) = 1/1000$$

Settable value by PLC (AD value)		Output signal range (a to b)				
	Decimal number	Voltage [V]			Current [mA]	
		0 to 10	1 to 5	0 to 5	0 to 20	4 to 20
Scale upper limit	-32766 to 32767	10	5	5	20	20
Scale lower limit	-32767 to 32766	0	1	0	0	4

If the data format is scaled data format, set the Fault Value as follows, regardless of the range setting.

- PLC settable value: 0 to 32767 → Converted value +0 to +32767
- PLC settable value: 32768 to 6553 → Converted value -0 to -32767

Example: To set the Fault Value to 4 V when range is 1 to 5 V (analogue output range), scale upper limit 5000, and scale lower limit 1000, set 4000 to Fault Value by PLC.

•Analogue I/O unit parameters (1)

No.	Parameter [H.T. display] [GSDML display]	Definition	Item	Content	Default setting	Parameter setting	
						By PLC	By H.T.
1	The power supply short circuit detection for the input or output device [SC_MonSs] [Monitor Short Circuit(Power)]	Generates error per unit when the short circuit of the input device power supply or output device is detected.	Enable	Generates an error.	x		
			Disable	Does not generate an error.		x	x
2	Analogue range [Range] [Measurement Range]	Sets the analogue input or output device range per channel.	0..10 V	Selects the analogue input or output range	0..10 V	x	x
			0..5 V				
			1..5 V				
			0..20 mA				
			4..20 mA				
3	Analogue data format [D_Format] [Data Format]	Configure analogue data format per unit.	Offset binary	Offset binary.	x		
			Signed Magnitude	Signed binary.		x	x
			2's Complement	2's complement.			
			Scaled	Scale conversion type.			
4	Analogue average filter [Filter] [Filtering Mode]	Sets analogue filtering time per channel. Sampling interval is approx. 2 sec.	None	None			
			2 Value Average	2 value average	x		
			4 Value Average	4 value average		x	x
			8 Value Average	8 value average			
5	Over range detection [Over_Rng] [Monitor Over Range]	Generates error per unit when the input value has exceeded the "Range upper limit +0.5% of full span"	Enable	Generates an error.		x	x
			Disable	Does not generate an error.	x		
6	Under range detection [Undr_Rng] [Monitor Lower Range]	Generates error per unit when the input value is below the "Range lower limit +0.5% of full span"	Enable	Generates an error.		x	x
			Disable	Does not generate an error.	x		
7	User's set value upper limit error [Upr_Lmt / UpLm/Scl] [Monitor Upper Limit]	Generates error per channel when the input or output value has exceeded the user set upper limit or scale upper limit.	Enable	Generates an error.		x	x
			Disable	Does not generate an error.	x		
	User set upper limit/ scale upper limit *1 [Upr_Lmt / UpLm/Scl] [Upper Limit Value]	Assign user set upper limit or scale upper limit per channel.	*2	-	1000	x	x

•Analogue I/O unit parameters (2)

No.	Parameter [H.T. display] [GSDML display]	Definition	Item	Content	Default setting	Parameter setting	
						By PLC	By H.T.
8	User's set value lower limit error [Lwr_Lmt / LwLm/Scl] [Monitor Lower Limit]	Generates error per channel when the input or output value is below the user set lower limit or scale lower limit.	Enable	Generates an error. *2		x	x
			Disable	Does not generate an error.	x		
	User set lower limit/ Scale lower limit *1 [Lwr_Lmt / LwLm/Scl] [Lower Limit Value]	Set the user set lower limit or scale lower limit per channel.	*2	—	0	x	x
9	Output setting for communication fault [Fault_MA] [Fault Mode]	Set output per channel when communication is abnormal.	Enable	Output will be user fault value.		x	x
			Disable	Output will be held last state.	x		
	Fault Value [Fault_MA] [Fault Value]	Set output value per channel when communication error occurs.	*2	-	0	x	x
10	Output setting for communication idling *3 [Idle_MA] [None]	Sets output per channel during communication idling.	Enable	Output will be set to the lower limit.		-	x
			Disable		x		

- \*1: When "Scaled" is selected as the analogue data format, the display of H.T. is switched from Upr\_Lmt to UpLm/Scl, from Lwr\_Lmt to LwLm/Scl.
- \*2: Set value shall be set per range within the settable range in the following table. When the range is changed, check the set value and change it to an appropriate value.
- \*3: The Handheld terminal can change the parameters, but when the the PLC communication is in an idle state, the lower limit value is output.

Table. Settable range for user set upper or lower limit and Fault Value

Range	User set output value Settable range		Fault Value Settable range
	Lower limit	Upper limit	
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

Table. User set values (PLC)

Range	Settable value by PLC (Offset Binary Signed Magnitude 2's Complement)	Expected value
0..10 V	0 to 1050	0.00 to +10.50 V
0..5 V	0 to 525	0.00 to +5.25 V
1..5 V	75 to 525	+0.75 to +5.25 V
0..20 mA	0 to 2100	0.00 to +21.00 mA
4..20 mA	300 to 2100	+3.00 to +21.00 mA

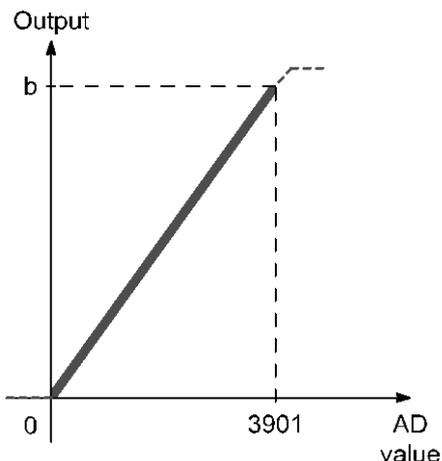
\*: If the data format is scaled data format, set the data as follows, regardless of the range setting.  
(Refer to page 53 for scaled data format.)

- PLC set value: 0 to 32767 → Converted value +0 to +32767
- PLC set value: 32768 to 65535 → Converted value -0 to -32767

- Output value during communication error (Fault Value)  
Refer to the tables below for setting the Fault value via PLC.
- Set as a decimal number.
- Conversion value varies depending on the assigned analogue data format and the analogue output range.

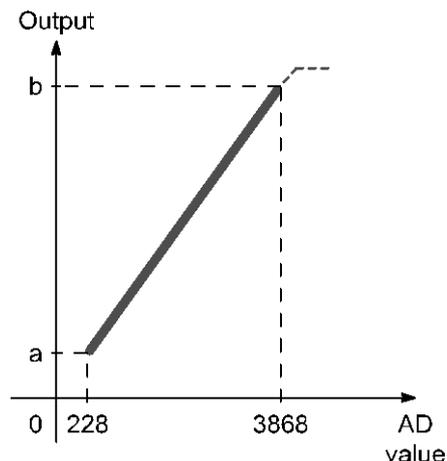
(1) Offset binary data format

•Range: 0 to 10 V, 0 to 5 V, 0 to 20 mA



Settable value by PLC (AD value)	Output signal range (0 to b)		
	Voltage [V]		Current [mA]
	0 to 10	0 to 5	0 to 20
4095	10.5	5.25	21
3901	10	5	20
2048	5.25	2.625	10.5
0	0	0	0

•Range: 1 to 5 V, 4 to 20 mA



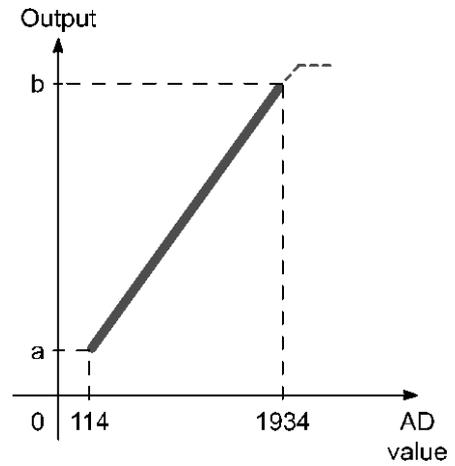
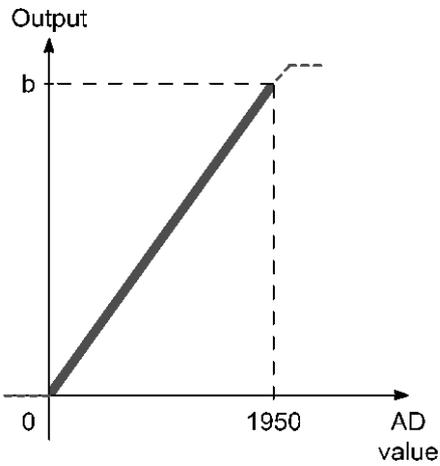
Settable value by PLC (AD value)	Output signal range (a to b)	
	Voltage [V]	Current [mA]
	1 to 5	4 to 20
4095	5.25	21
3868	5	20
2048	3	12
228	1	4
0	0.75	3

Example: To set the Fault value to 10 V when offset binary data format (analogue data format) and range 0 to 10 V (analogue output range) are set, the value set to PLC is "3901" from the table on the left.

(2) Signed binary data format & 2's complement data format

•Range: 0 to 10 V, 0 to 5 V, 0 to 20 mA

•Range: 1 to 5 V, 4 to 20 mA



Settable value by PLC (AD value)	Output signal range (0 to b)		
	Voltage [V]		Current [mA]
	0 to 10	0 to 5	0 to 20
2047	10.5	5.25	21
1950	10	5	20
1024	5.25	2.625	10.5
0	0	0	0

Settable value by PLC (AD value)	Output signal range (a to b)	
	Voltage [V]	Current [mA]
	1 to 5	4 to 20
2047	5.25	21
1934	5	20
1024	3	12
114	1	4
0	0.75	3

Example: To set the Fault value to 10 V when signed binary data format (analogue data format) and range 0 to 10 V (analogue output range) are set, the value set to PLC is "1950" from the table on the left.

(3) Scaled data format

If the data format is scaled data format, set the data as follows, regardless of the range setting. (Refer to page 53 for scaled data format.)

- PLC set value: 0 to 32767 → Converted value +0 to +32767
- PLC set value: 32768 to 65535 → Converted value -0 to -32767

•IO-Link Unit Parameter

No.	Parameter	Definition	Item	Content	Default setting
1	Monitor Short Circuit	Generates error per unit when the short circuit of the power supply for the sensor is detected.	Enable	Generates an error	X
			Disable	Does not generate an error	

\*The parameter can be set only by PLC.

•Port Parameter (When Standard I/O is selected)

No.	Parameter	Definition	Item	Content	Default setting
1	Pin4 Function	Pin4 function	Input	Standard Input mode	X
			Output	Standard Output mode	

\*The parameter can be set only by PLC.

•Port parameters (When IO-Link Device is selected)

No.	Parameter	Definition	Item	Content	Default setting
1	Time Base (*1)	Cycle time for polling of devices	Multiplier x 0.1ms	Multiplier x 0.1ms	X
			6.4ms + Multiplier x 0.4ms	6.4ms + Multiplier x 0.4ms	
			32.0ms + Multiplier x 1.6ms	32.0ms + Multiplier x 1.6ms	
2	Multiplier		0..63	Set multiplier	Value: 0
3	Validation mode	To set whether or not to check the Device ID and Vendor ID of Device to be connected	No Check	Regardless of the ID, all the devices can be connected	X
			Compatible	can be connected only device ID matches	
4	Vendor ID 1 to 2 (*2)	Set the Vendor ID of the device to be connected	0..255	Enter a numeric value (dec)	Value: 0
5	Device ID 1 to 3 (*2)	Set the Device ID of the device to be connected	0..255	Enter a numeric value (dec)	Value: 0
6	Data Storage	The setting of the Data Storage mechanism, save and restore the Device parameters	Disable	The DS mechanism is disabled and the stored parameter set of the respective port is cleared. Any change of active parameters within the Device will not be copied/saved.	X
			Restore	The DS mechanism is active. Changes of active parameters within the Device will not be copied/saved.	
			Backup / Restore	The DS mechanism is active. Changes of active parameters within the Device will be copied/saved.	

\*The parameter can be set only by PLC.

(\*1) Became when setting Time Base is shorter than capable of handling the cycle time of the IO-Link Device to which you want to connect and communicate in a corresponding possible cycle time of the Device.

(\*2) Vendor ID and Device ID can be set as follows

Ex. Vendor ID = 0x1234    Device ID = 0x567890

Vendor ID 1 = 0x12 = 18 (dec)

Vendor ID 2 = 0x34 = 52 (dec)

Device ID 1 = 0x56 = 86 (dec)

Device ID 2 = 0x78 = 120 (dec)

Device ID 3 = 0x90 = 144 (dec)

# Hardware Configuration

## ■GSDML file and symbol file

In order to configure the EX600 with your PROFINET master's software the appropriate GSD file (in GSDML format) is required. The GSDML file contains all of necessary information to configure the EX600 on your PROFINET master's software.

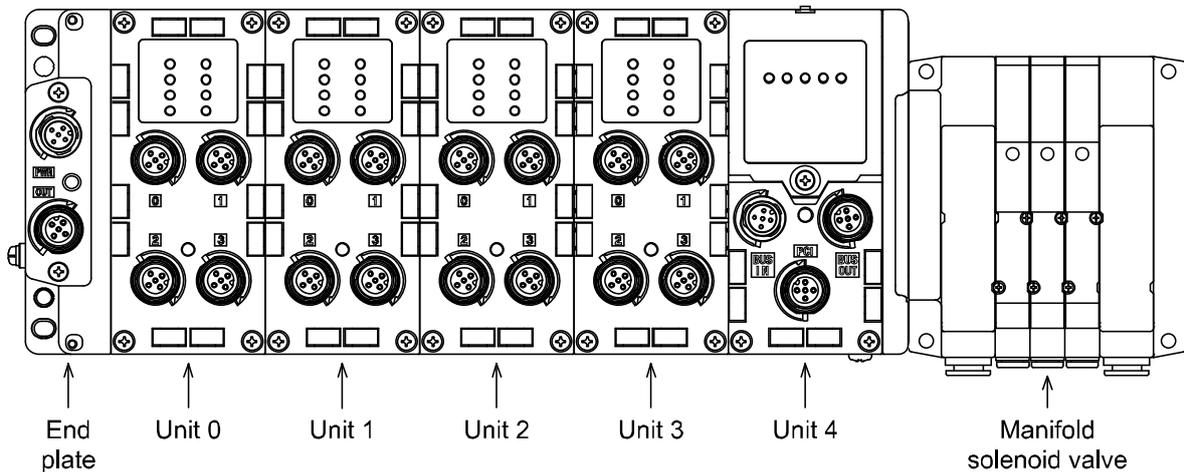
In order to represent the EX600 in your PROFINET master's software the appropriate symbol files are required.

- GSDML file : GSDML-V2.3-SMC-EX600-X27-\*\*\*.xml
- Symbol file : GSDML-0083-000A-EX600\_N.bmp

## ■Configuration layout

The unit numbers of the EX600 are assigned in order, starting from the end plate side. Unless the units are assigned in the order of the actual product, communication with the PLC will not be established.

- Example of unit number



- Example of Configuration

Unit number	Unit 0	Unit 1	Unit 2	Unit 3	Unit 4
Unit part number	EX600-GILB-X27	EX600-GILB-X27	EX600-DXPB	EX600-DXPB	EX600-SPN1-X27

The following explanation is based on this example configuration.

## ■ SIEMENS PLC S7™ connection method

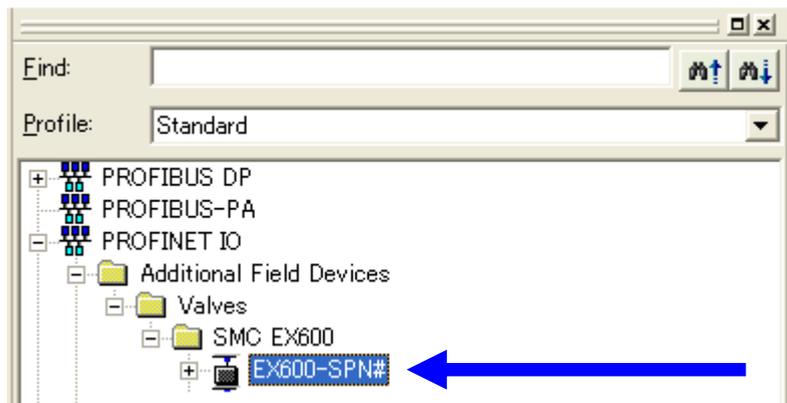
Below is an explanation of the EX600 Series connection method with a SIEMENS' PLC STEP7™. Refer to the manual of STEP7™ for a detailed manner of operation.

### •GSD File Installation

The GSDML file for the EX600 must be installed into "STEP 7".

- (1) Open [HW Configuration] window.
- (2) Select [Option] → [Install New GSD...] From the menu bar.
- (3) Select GSDML File, and click the [Open] button.

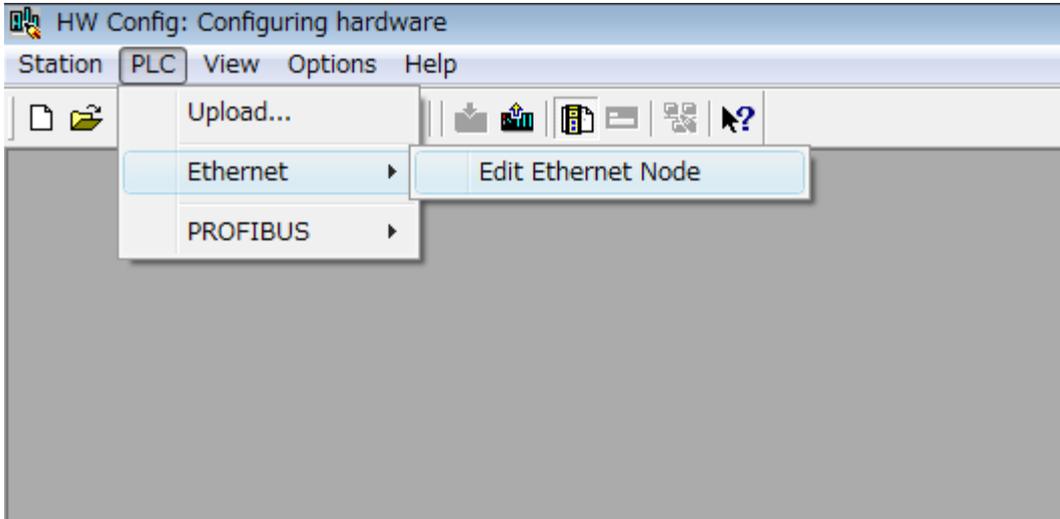
After completing the above steps, the "EX600-SPN#" will automatically be added to the STEP7™ [PROFINET IO/Additional Field Devices/Valves/SMC EX600] Folder on [Hardware Catalogue] window.



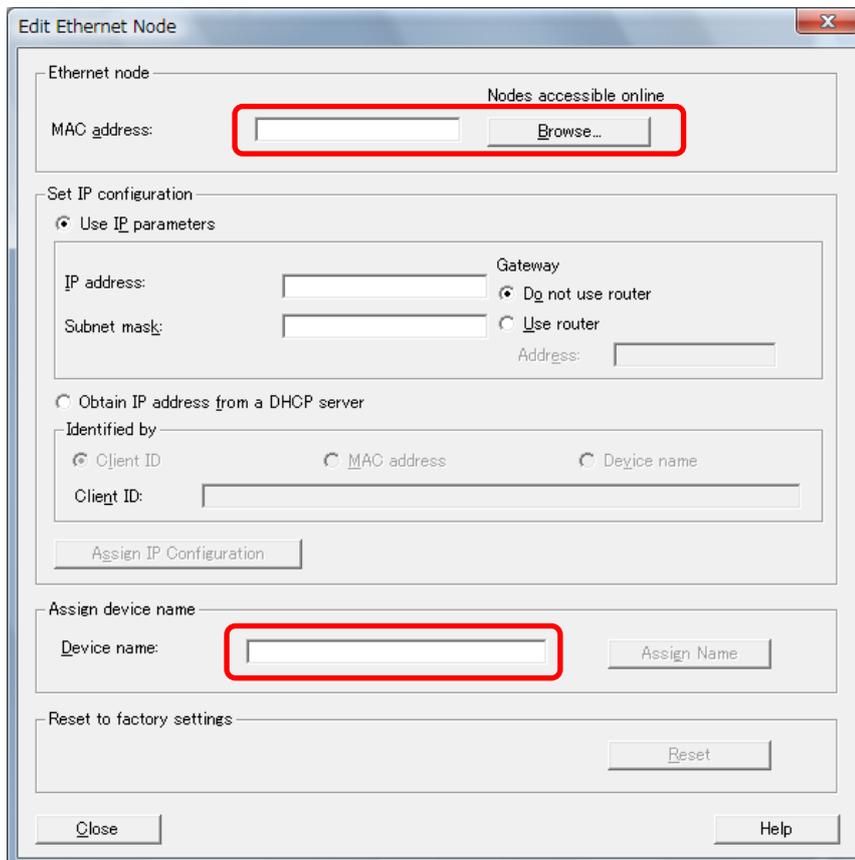
After GSD File has been installed

•Assignment “Device Name” on the EX600

(1) Connect an EX600 and start “Edit Ethernet Node” in “HW Config” on the STEP7.



(2) Enter MAC address for the connected EX600 if it is known. Or use “Browse” to find the connected unit. After finding the unit, assign its “Device name”.



## •Adding Stations

- (1) Drag and drop EX600-SPN# from [Hardware Catalogue] window to the line of [PROFINET-IO-System].
- (2) Double click on the symbol of the EX600, or choose its "Object property" after right click on the symbol. Edit its "Device name" according to what the unit has been assigned before.

The screenshot illustrates the process of adding a station to a SIMATIC 300 station configuration. The main window shows the hardware rack configuration for the IM151-8F PN/DP CPU. A red box highlights the EX600 symbol in the rack, with a blue arrow pointing to it from the Hardware Catalogue. The Hardware Catalogue shows the EX600-SPN# device. A 'Properties - EX600-SPN' dialog box is open, showing the 'Device name' field set to 'EX600-SPN'.

**Properties - EX600-SPN**

General | Identification

Short description: EX600-SPN  
This Device Access Point supports RT communication

Order No./ firmware: EX600-SPN#

Family: SMC EX600

Device name: **EX600-SPN**

GSD file: GSDML-V2.25-SMC-EX600-20121003.xml  
Change Release Number...

Node in PROFINET IO System

Device number: 1 | PROFINET-IO-System (100)

IP address: 192.168.0.3 | Ethernet...

Assign IP address via IO controller

Comment:

OK Cancel Help

## •Adding Units

- (1) Select [EX600-SPN#] from [HW Config] window.
- (2) An empty slot for [EX600-SPN#] will be displayed on [Configuration table] window.
- (3) Drag and drop the connected unit from [Hardware Catalogue] window to slot 1. Please make sure to add the unit as the real system's order of connecting.
- (4) Add the other units, according to the connected order, to the [Configuration table] window, ending with the SI unit.

Unit number 0 = slot 1

Unit number 1 = slot 2

:

Unit number 8 = slot 9

Unit number 9 = slot 10

- (5) Drag and drop the SI unit.

Two type of SI unit selectable.

Type1 : EX600-SPN (32 coils) --- output byte only

Type2 : EX600-SPN (32 coils , Status) --- output byte and diagnostic data

The screenshot shows the SIMATIC HW Config software interface. The main window displays a hardware rack configuration for an IM151-8 PN/DP CPU. The rack is divided into slots 1 through 4. Slot 1 contains the IM151-8 PN/DP CPU. Slot 2 contains an EX600-SPN unit. Slot 3 contains an EX600-GILB unit. Slot 4 contains a PM-E DC24V power supply. The rack is connected to an Ethernet (1) PROFINET-IO-System (100). The configuration table below the rack shows the following units:

SL	Module	Order number	I address	Q address	Diagnostic address	Comment
0	ex600-spn	EX600-SPN#			2042*	
X1	Interface				2041*	
P1	Port 1				2040*	
P2	Port 2				2039*	
1	EX600-GILB	EX600-GILB			0*	
(Fix)	IO-Link Master In1/Out1		0	0		
CN1	IO-Link Device In2/Out2		2.3	6.7		
CN1	Standard I/O				2036*	
CN2	Standard I/O				2035*	
CN3	Standard I/O				2034*	
2	EX600-GILB	EX600-GILB			1*	
(Fix)	IO-Link Master In1/Out1		1	1		
CN1	IO-Link Device In2/Out2		4.5	8.9		
CN1	Standard I/O				2037*	
CN2	Standard I/O				2031*	
CN3	Standard I/O				2030*	
3	EX600-SPN (32 coils)	EX600-SPN		2.5		

The hardware catalogue on the right shows the EX600-SPN unit selected. The configuration table shows the EX600-SPN unit in slot 3. The hardware catalogue shows the EX600-SPN unit in slot 3. The hardware catalogue shows the EX600-SPN unit in slot 3.

Note) Maximum data size of I address and Q address must be 64Bytes

## ■ IO-Link Master parameter setting at PLC

### •Parameter Setting

- (1) Click the [EX600-SPN#] icon on the line of [PROFINET-IO-System].  
Double click slot 1 / Ch# in the bottom window. The window “Properties” with its device name appears.
- (2) Select the [Parameters] tab, the available Parameter setting list will be displayed.
- (3) Change the parameter value by clicking on the [Value] column of the selected parameter.
- (4) Press the [OK] Button, after the configuration data is downloaded to the PLC, the setting will be completed.

The screenshot shows the SIMATIC Manager HW Config interface. The main window displays a rack configuration for a SIMATIC 300 station. A 'Properties - IO-Link Device In2/Out2' dialog box is open, showing the 'Parameters' tab with a list of parameters and their values. Callouts (1) through (4) indicate the steps: (1) selecting the EX600-SPN# icon in the rack, (2) selecting the Parameters tab, (3) clicking on the value field of a parameter, and (4) clicking the OK button.

SL	M.	Order number	I address	Q address
0		EX600-SPN#		
X1		Interf		
P1		Port 1		
P2		Port 2		
1		EX600-EX600-GILB		
(Fdx)		IO-Link	0	0
CN0		IO-Link	2..3	6..7
CN1		Stand		2036*
CN2		Stand		2035*
CN3		Stand		2034*
2		EX600-EX600-GILB		1*
(Fdx)		IO-Link	7	7
CN0		Stand		2033*
CN1		Stand		2032*
CN2		Stand		2031*
CN3		Stand		2030*
3		EX600-EX600-SPN	2..5	
4				

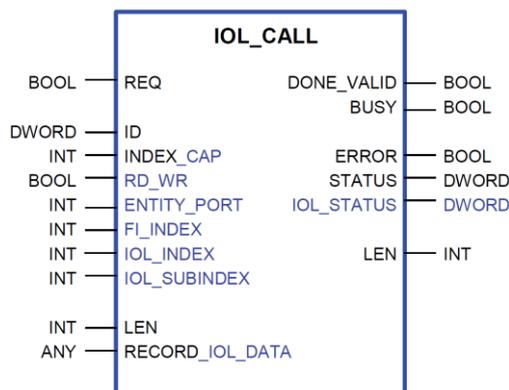
## ■ IO-Link Device parameter setting with the IO-Link function block “IOL\_CALL”

### •General

The IO-Link function block “IOL\_CALL” is specified in the IO-Link specification “IO-Link Integration Part1-Technical Specification for PROFIBUS and PROFINET”.

### •IOL\_CALL in accordance with IO-Link specification

The following figure shows the function block as it is defined in the specification.



### •Usage of the function block in Step7

Example accesses with IOL\_CALL

#### Read access

Variable	Value	Meaning
RD_WR	0	Read access
ID	4 (*1)	Start address of the EX600 IO-Link master unit's input data according to the configuration in HW Config
CAP (INDEX_CAP)	255	Access point of the IOL_CALL function
PORT (ENTITY_PORT)	1	The IO-Link device is connected to port 1 (connector 0)
IOL_INDEX	0x13	Index for product ID

#### Write access

Variable	Value	Meaning
RD_WR	1	Write access
ID	4 (*1)	Start address of the EX600 IO-Link master unit's input data according to the configuration in HW Config
CAP (INDEX_CAP)	255	Access point of the IOL_CALL function
PORT (ENTITY_PORT)	1	The IO-Link device is connected to port 1 (connector 0)
IOL_INDEX	0x xx	Index for set value of IOL device, for example (specified by the IOL device manufacture)
LEN	2	2 byte is written, for example (specified by the IOL device manufacture)

(\*1) Value:2 is for the case of second IO-Link master shown in the HW Configuration example in page 65.

### •Fast Start Up (FSU) setup

The EX600 supports the FSU function.

To enable the FSU function, it is necessary to change the FSU setting of the connected PLC.

PLC set up

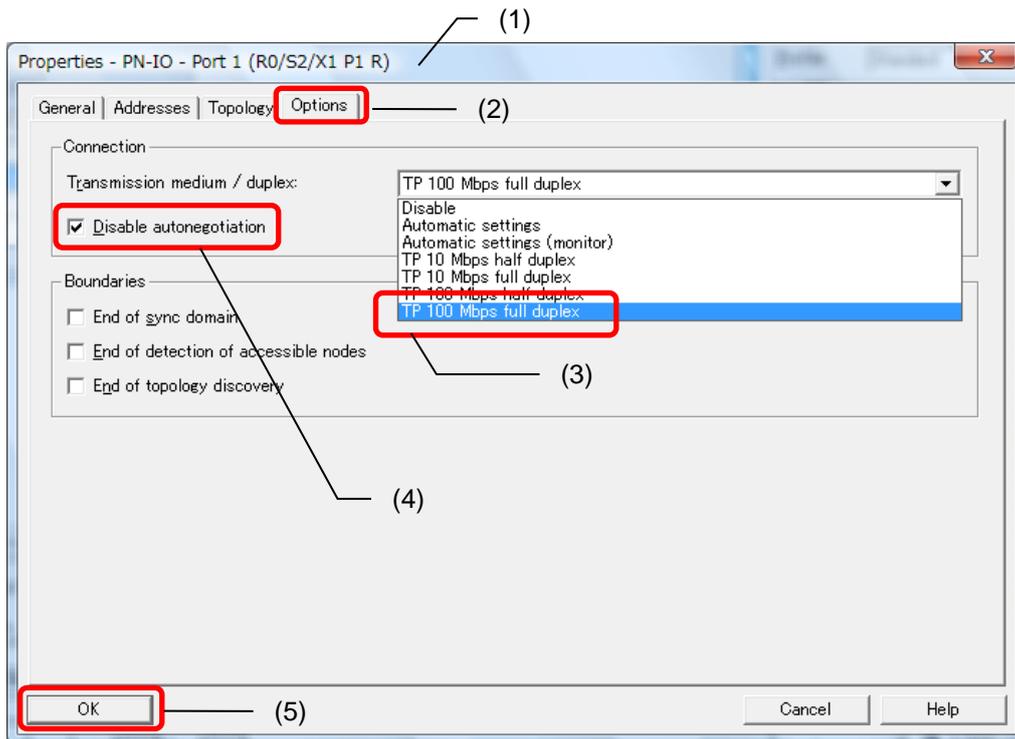
(1)The [Properties] screen will be displayed by double-clicking the PLC PROFINET port in the [HW Config] screen, which is connected to the EX600.

(2)Select the [Options] tab.

(3)Select [TP 100Mbps full duplex] in the Connection screen.

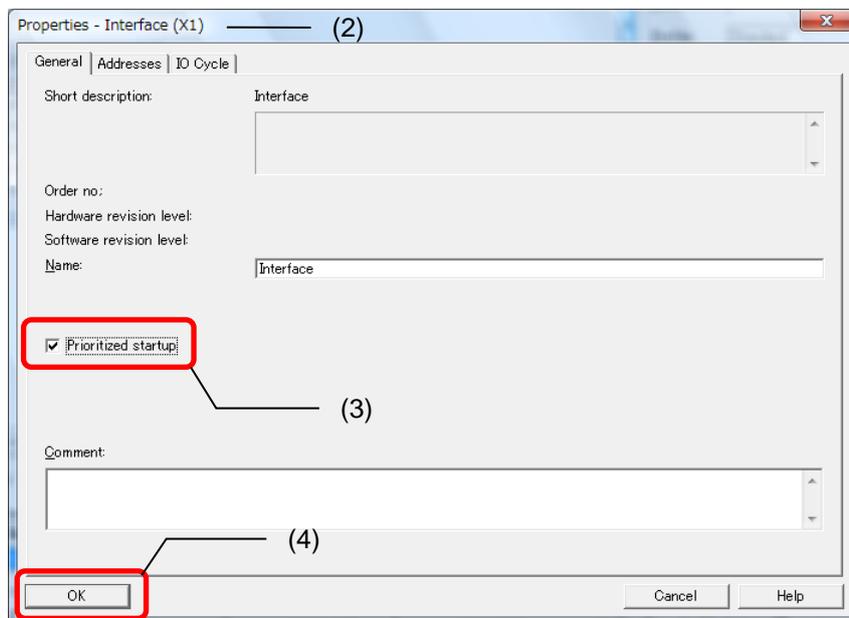
(4)Tick the box for [Disable autonegotiation].

(5)Press the [OK] button.

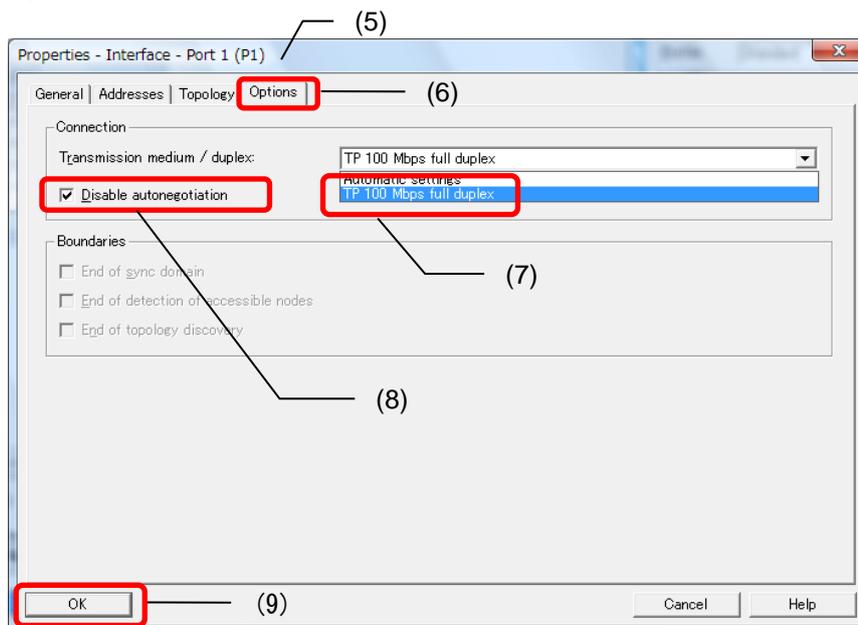


## EX600 setup

- (1) Click the EX600-SPN# icon in the [HW Config] screen.
- (2) The [Properties] screen will be displayed by double-clicking the [Interface] of the [Configuration table] window [Slot X1].
- (3) Tick the box for [Prioritized startup] in the [General] tab.
- (4) Press the [OK] button.



- (5) The [Properties] screen will be displayed by double-clicking the Slot1 P1 or P2 (communication port using the FSU function) in the [HW Config] screen.
- (6) Select the [Options] tab.
- (7) Select [TP 100Mbps full duplex] in the [Connection] screen.
- (8) Tick the box for [Disable autonegotiation].
- (9) Press the [OK] button.



## I/O Map

The table below shows the input/ output byte number which is occupied by each unit of the EX600 series.

Unit	Unit part number	Occupied byte	
		Input	Output
SI unit	EX600-SPN□ (32 outputs)	0	4
	EX600-SPN□ (32 outputs diagnostic)	4	4
Digital input unit	EX600-DX□B (8 inputs)	1	0
	EX600-DX□C (8 inputs) (with open circuit detection)	1	0
	EX600-DX□D (16 inputs)	2	0
	EX600-DX□E (16 inputs)	2	0
	EX600-DX□F (16 inputs)	2	0
Digital output unit	EX600-DY□B (8 outputs)	0	1
	EX600-DY□E (16 outputs)	0	2
	EX600-DY□F (16 outputs)	0	2
	EX600-DYPG1-X27 (8 outputs)	0	1
Digital I/O unit	EX600-DM□E (8 inputs/8 outputs)	1	1
	EX600-DM□F (8 inputs/8 outputs)	1	1
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)

The table below shows the input/ output byte number which is occupied by each unit of the EX600 series.

Unit	Unit part number		Occupied byte	
			Input	Output
IO-Link unit	EX600-GILB	DI/DO	1 DI / Standard input data	1 Standard output data
		Connector 0	Selectable from the following configuration (Input / Output )  0byte/0byte (Standard I/O mode selected) 1byte / 1byte 2byte / 2byte 4byte / 4byte	
		Connector 1	Selectable from the following configuration (Input / Output )  0byte/0byte (Standard I/O mode selected) 1byte / 1byte 2byte / 2byte 4byte / 4byte	
		Connector 2	Selectable from the following configuration (Input / Output )  0byte/0byte (Standard I/O mode selected) 1byte / 1byte 2byte / 2byte 4byte / 4byte	
		Connector 3	Selectable from the following configuration (Input / Output )  0byte/0byte (Standard I/O mode selected) 1byte / 1byte 2byte / 2byte 4byte / 4byte	

●Precautions for handling

The EX600 system has the following limitation.

- The IO data size of EX600-GILB-X27 changes from 1 byte to 17 bytes with the setting.
- The total IO data size of EX600 system is maximum 64 bytes.
- It is necessary to set the total IO data size of EX600 system to 64 bytes or less.

## ■ I/O Map allocation method of IO-Link unit

The following table shows configuration example.

○EX600-GILB (Connector 0: 0/0, Connector 1: 0/0, Connector 2: 0/0, Connector 3: 0/0) configuration

Byte No.	Input Map	Output Map
0	DI / Standard input data (*1)	Standard output data (*1)

○EX600-GILB (Connector 0: 0/0, Connector 1: 1/1, Connector 2: 2/2, Connector: 4/4) configuration

Byte No.	Input Map	Output Map
0	DI / Standard input data (*1)	Standard output data (*1)
1	Process Data of Connector 1 (Input)	Process Data of Connector 1 (Output)
2 to 3	Process Data of Connector 2 (Input)	Process Data of Connector 2 (Output)
4 to 7	Process Data of Connector 3 (Input)	Process Data of Connector 3 (Output)

○EX600-GILB (Connector 0: 1/1, Connector 1: 2/2, Connector 2: 4/4, Connector 3: 4/4) configuration

Byte No.	Input Map	Output Map
0	DI / Standard input data (*1)	Standard output data (*1)
1	Process Data of Connector 0 (Input)	Process Data of Connector 0 (Output)
2 to 3	Process Data of Connector 1 (Input)	Process Data of Connector 1 (Output)
4 to 7	Process Data of Connector 2 (Input)	Process Data of Connector 2 (Output)
8 to 11	Process Data of Connector 3 (Input)	Process Data of Connector 3 (Output)

○EX600-GILB (Connector 0: 4/4, Connector 1: 4/4, Connector 2: 4/4, Connector 3: 4/4) configuration

Byte No.	Input Map	Output Map
0	DI / Standard input data (*1)	Standard output data (*1)
1 to 4	Process Data of Connector 0 (Input)	Process Data of Connector 0 (Output)
5 to 8	Process Data of Connector 1 (Input)	Process Data of Connector 1 (Output)
9 to 12	Process Data of Connector 2 (Input)	Process Data of Connector 2 (Output)
13 to 16	Process Data of Connector 3 (Input)	Process Data of Connector 3 (Output)

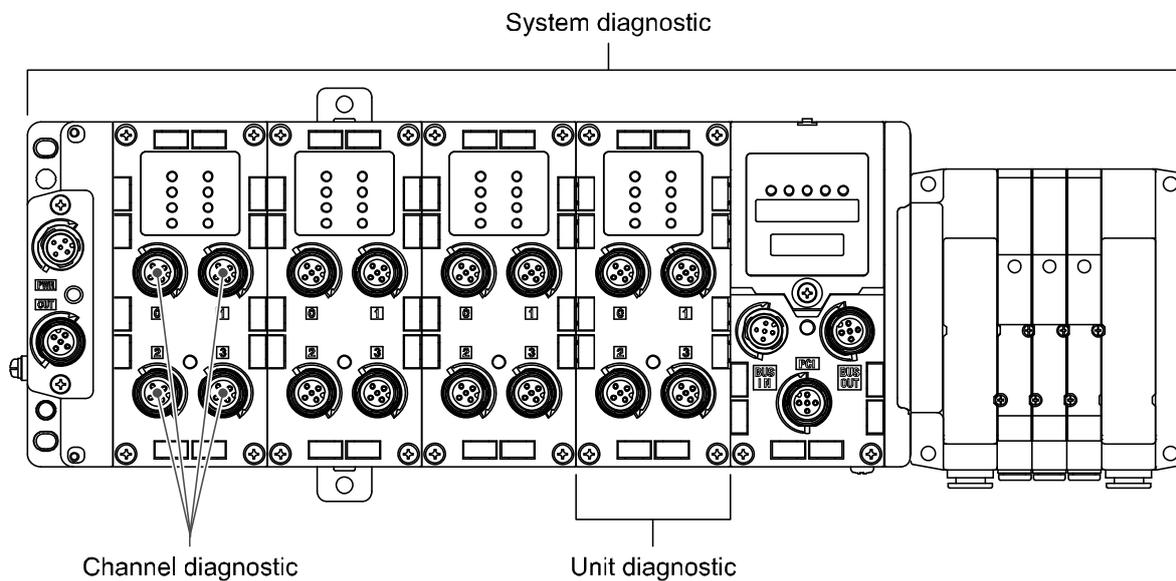
(\*1) DI / Standard input data and Standard output data is allocated as follows.

Bit No.	Input Map	Output Map
0	Pin 4 of Connector 0	Pin 4 of Connector 0
1	Pin 2 of Connector 0	NC
2	Pin 4 of Connector 1	Pin 4 of Connector 1
3	Pin 2 of Connector 1	NC
4	Pin 4 of Connector 2	Pin 4 of Connector 2
5	Pin 2 of Connector 2	NC
6	Pin 4 of Connector 3	Pin 4 of Connector 3
7	Pin 2 of Connector 3	NC

## Diagnostic

### ■Diagnostics assignment to input map

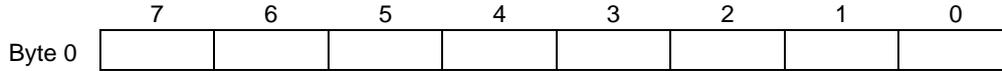
4 bytes of diagnostic information can be assigned to the input by selecting "EX600-SPN# (32 coils, Status)" when adding the SI unit in hardware configuration.



### •Diagnostics map

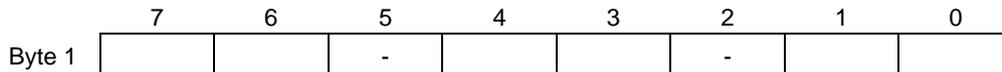
Byte No.	Diagnostics name	Diagnostics type
Byte 0	System diagnostic status 0	System diagnostic
Byte 1	System diagnostic status 1	
Byte 2	Unit diagnostic status 0	Unit diagnostic
Byte 3	Unit diagnostic status 1	

•System diagnostic status0



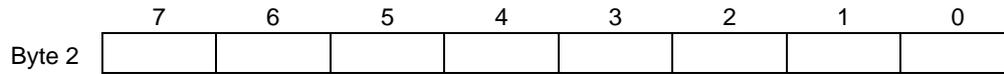
Bit No.	Content
0	1: The analogue input or output value has fallen below the user's set value.
1	1: The analogue input or output value has exceeded the user's set value.
2	1: The analogue input value has fallen below the set range.
3	1: The analogue input value has exceeded the set range.
4	1: The counter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

•System diagnostic status1



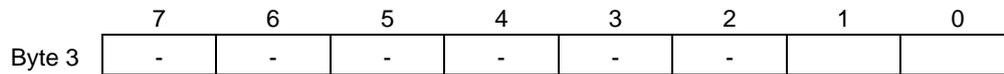
Bit No.	Content
0	1: The power supply for output device is outside of the specification.
1	1: The power supply for control and input device is outside of the specification.
2	Reserved
3	1: There is a connection failure between each unit (during operation).
4	1: There is a connection failure between each unit (when the power supply is applied).
5	Reserved
6	1: System error occurred.
7	1: Hardware error occurred.

•Unit diagnostic status 0



Bit No.	Content
0	1: There is an error in unit 0.
1	1: There is an error in unit 1.
2	1: There is an error in unit 2.
3	1: There is an error in unit 3.
4	1: There is an error in unit 4.
5	1: There is an error in unit 5.
6	1: There is an error in unit 6.
7	1: There is an error in unit 7.

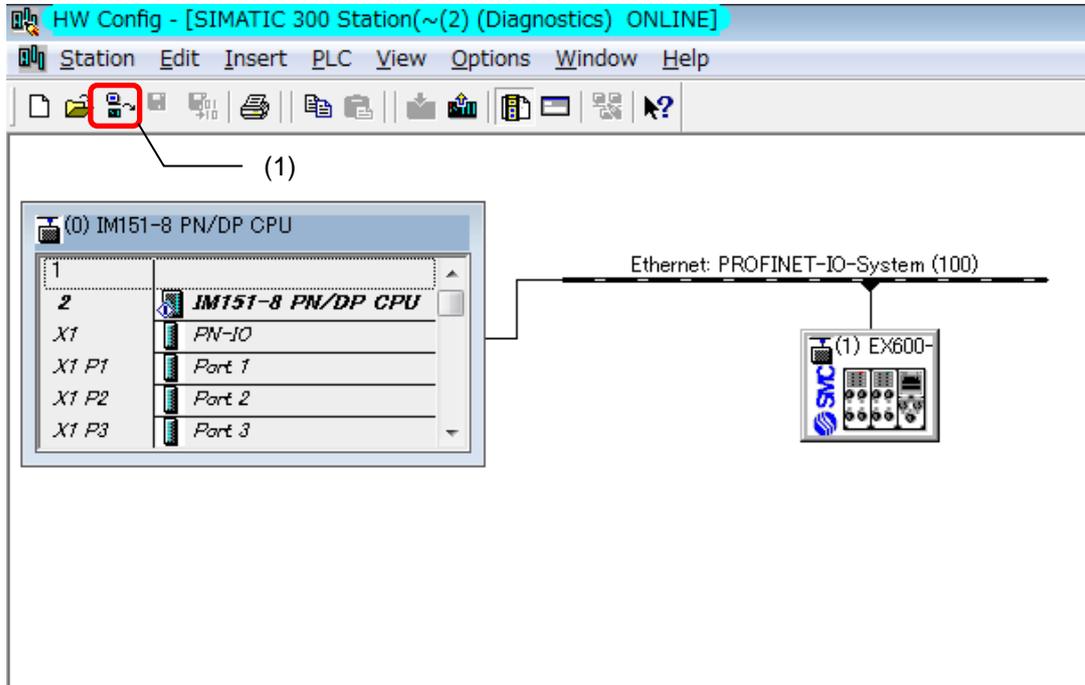
•Unit diagnostic status 1



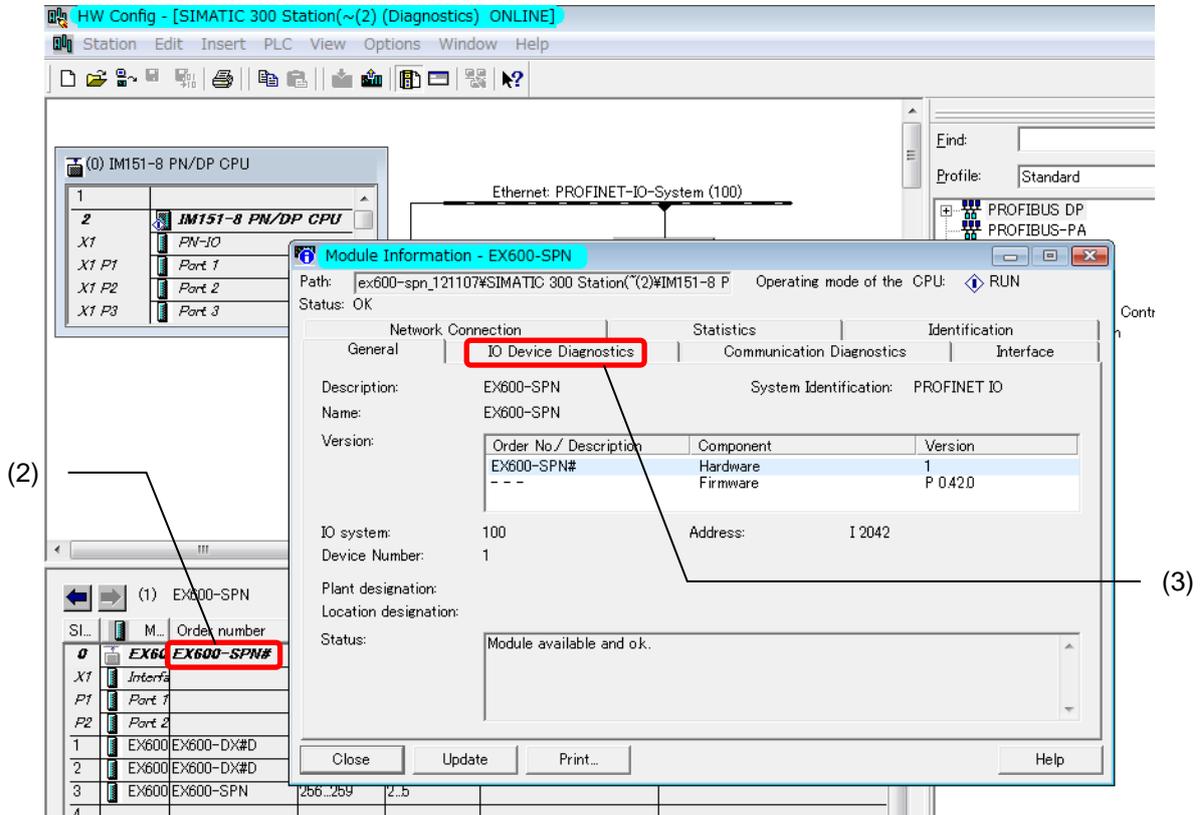
Bit No.	Content
0	1: There is an error in unit 8.
1	1: There is an error in unit 9.
2	Reserved
3	Reserved
4	Reserved
5	Reserved
6	Reserved
7	Reserved

•Channel diagnostic information

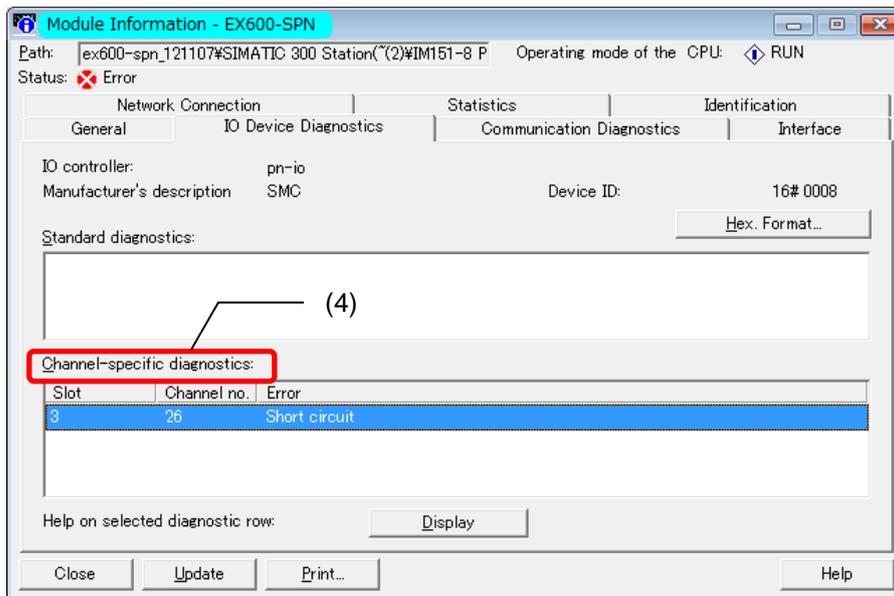
The drawing below shows the procedure for on-line diagnostics using the Siemens STEP7 PLC.  
(1) Press the button in the [HW Config] screen to change from OFFLINE to ONLINE.



- (2) Double-click the unit to check the diagnostics data in the [Configuration table].
- (3) The [Module Information] window will be displayed. Click the [IO Device Diagnostics] tab.



(4) [Channel-specific diagnostics] information can be monitored.



## Accessories

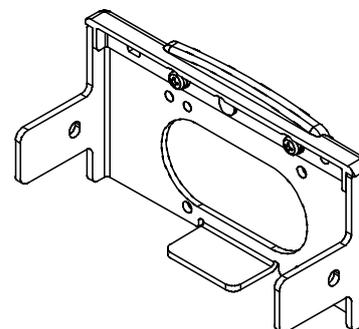
For the selection of accessories, refer to the catalog.

### (1) Valve plate

#### EX600-ZMV1

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

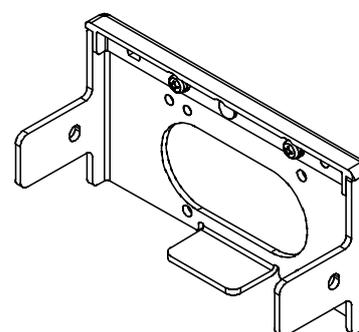
Round head screw (M3 x 8), 4 pcs.



#### 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

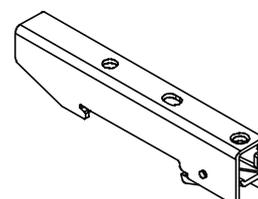
Enclosed parts: Round head screw (M4 x 20), 1 pc.

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.

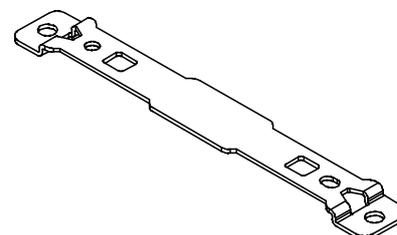
P tight screw (4 x 14), 2 pcs.



### (3) Intermediate reinforcing brace

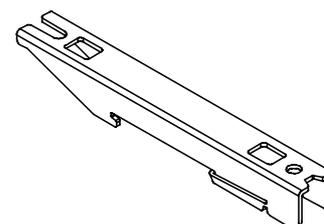
#### EX600-ZMB1...for direct mounting

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

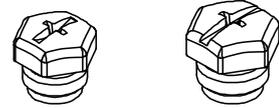


#### EX600-ZMB2...for DIN rail mounting

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 2 x M12 (3 pin) – M12 (5 pin)

- (7) Assembled type connector  
PCA-1446553 for PROFINET communication, M12 (4 pin) Plug, D code  
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) PROFINET communication cable  
PCA-1446566 Cable with M12 connector, D code, Plug, Straight 5 m, SPEEDCON compatible  
EX9-AC010EN-PSRJ Cable with M12 connector, D code-RJ45, Plug, Straight 1 m  
EX9-AC020EN-PSRJ Cable with M12 connector, D code-RJ45, Plug, Straight 2 m  
EX9-AC030EN-PSRJ Cable with M12 connector, D code-RJ45, Plug, Straight 3 m  
EX9-AC050EN-PSRJ Cable with M12 connector, D code-RJ45, Plug, Straight 5 m  
EX9-AC100EN-PSRJ Cable with M12 connector, D code-RJ45, Plug, Straight 10 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

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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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