Doc. No. DOC1121211

Operation Manual

PRODUCT NAME

Fieldbus system
EtherNet/IP™ compatible Fieldbus module

MODEL / Series / Product Number

EX600-BEN1
EX600-ED#

SMC Corporation

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Safety Instructions

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

*1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1:Robots
etc.

⚠ **Danger**	**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
⚠ **Warning**	**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
⚠ **Caution**	**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

⚠ Warning

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

2. Only personnel with appropriate training should operate machinery and equipment.
The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.
1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. SMC products cannot be used beyond their specifications. They are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not allowed.
1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, combustion equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

Safety Instructions

⚠ Caution

SMC develops, designs, and manufactures products to be used for automatic control equipment, and provides them for peaceful use in manufacturing industries.
Use in non-manufacturing industries is not allowed.
Products SMC manufactures and sells cannot be used for the purpose of transactions or certification specified in the Measurement Act of each country.
The new Measurement Act prohibits use of any unit other than SI units in Japan.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.
Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
   Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

***2) Vacuum pads are excluded from this 1 year warranty.**
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations 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 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

- For the power supply, use SELV or PELV circuits that guarantee a reliable electric disconnection from the MAINS.
- 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 product.
  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.
  The ingress protection cannot be guaranteed if the screws are not tightened to the specified torque.
- If a large valve module is assembled, lift the manifold so that stress is not applied to the connecting part while transporting.
  The stress may cause breakage of the connecting part. The manifold may become very heavy depending on the module 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 product 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 product 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 product 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.
  The ingress protection is achieved when the following conditions are met.
  (1) The modules are connected properly with cable with M12/M8 connector.
  (2) Suitable mounting of each module.
  (3) Be sure to fit a seal 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 module 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 module.
- The product is CE/UKCA 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.
- Use with caution at altitudes above 2000 m, as the reduction in atmospheric pressure reduces withstand voltage performance and noise immunity (lightning surge, electro-static discharge).

*Adjustment and Operation
- Do not press the setting buttons with a sharp pointed object.
  It may damage the setting buttons.
- 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.

Fieldbus System/ Industrial IoT Cybersecurity

In recent years, factories have introduced industrial IoT, building up complex networks of production machines. These systems mya be subject to a new threat, cyberattack. To protect the industrial IoT from cyberattacks, it is important to take multiple measures (multi-layer protection) for IoT devices, networks and clouds.
For this purpose, SMC recommends that the following measures are always taken into consideration. For further details of the following measures, please see security information published by your countries security agencies.

1. Do not connect the devices via a public network.
• If you unavoidably need to access the device or cloud via a public network, ensure to use a secure, private network such as VPN.
• Do not connect an office IT network and factory IoT network.

2. Build a firewall to prevent a threat from entering the device and system.
• Set up a router or firewall at network boundaries to allow minimum required communications.
• Disconnect from the network or turn off the device, if no continuous connection is required.

3. Physically block access to unused communication ports or disable them.
• Inspect regularly each port if any unnecessary device is connected to the network system.
• Operate necessary services (SSH, FTP, SFTP, etc.) only.
• Set a transmission range of the device using a wireless LAN or other radio system to the minimum required and use only devices approved according to the radio act in the country concerned.
• Install a device generating radio waves in such place as there is no interference from indoor or outdoor.

4. Set up a secure communication method such as data encryption.
• Encrypt data in every environment, including IoT networks, secure gate-way connections, for secure communications.

5. Grant access permissions by user accounts and limit the number of users.
• Regularly review accounts and delete all unused accounts or permissions.
• Establish an account lockout system to block an access to the account for a certain period if log-in fails more than the given threshold.

6. Protect passwords.
• Change the default password when you first use the device or system.
• Choose a long password (minimum 8 characters) using a mix of different letters and characters to make the password more secure and harder to hack.

7. Use the latest security software.
•Install antivirus software on all computers to detect and remove viruses.
• Keep the antivirus software up to date.

8. Use the latest version of the device and system software.
• Apply patches to keep the OS and applications up to date.

9. Monitor and detect abnormalities in the network.
• Keep monitoring the network for any abnormalities to take a prompt measure and issue an alert if any abnormality is detected.
Install an intrusion detection system (IDS) and intrusion prevention system (IPS).

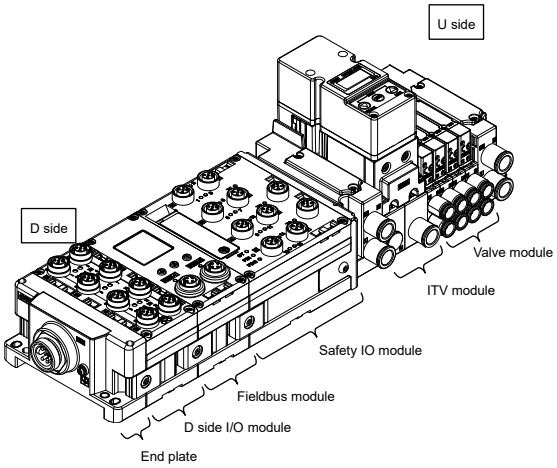
10. Delete data from devices when disposed of.
• Before disposing of any IoT devices, delete stored data or physically destruct media to prevent any misuse of the data.

2 System overview

2.1 System configuration

The EX600 fieldbus system is connected to EtherNet/IP networks and makes reduced-wiring and distribute control of standard I/O devices (such as sensors, indicator lights, IO-Link devices, etc.) and safety I/O devices (such as laser curtains, residual pressure relief valves, etc.).

The EX600 valve manifold system operates by combining various modules. The system can be expanded by connecting additional I/O modules to the fieldbus module (EX600-BEN1).
Up to 9 modules can be connected in no particular order to the D side of Fieldbus module likes input, output, and IO-Link master modules.
Safety IO module can be connected to the U side of the fieldbus module and can be turned off a power supply for valves without installing another safety output device. The safety IO module can connect to additional devices such as safety input devices, safety output devices, and plug-in electro-pneumatic regulators.



Components	Overview
End plate	The module supplies a power supply to the valve manifold system. The power cable is connected to this module
Digital input module	The module gets the output from an external input device (e.g. Pressure switch, Auto switch).
Digital output module	The module operates an external actuate device (e.g. Lamp, solenoid coil).
IO-Link master module	The module communicates with an external IO-Link device via IO-Link communication.
Fieldbus module	The module communicates with the upper controller via a fieldbus.
Safety IO module	The module controls safe input, safe output, valve modules and ITV modules.
Valve module	The module operates pneumatic devices via Safety IO module.
ITV module	The module controls the output pressure via electrical signal through Safety IO module.

⚠ Important:
- The safety IO module (EX600-FVC#) can connect to the fieldbus module (EX600-BEN1). See the safety manual of the safety IO module for detail regarding the safety functions.
- The original language of the Safety Manual is English. Manuals that have been translated into other languages should be used for reference only.

2.2 Specify Module No. and Channel No.

The EX600 system assigns Module No. and Channel No. to each module to specify the location of diagnostics and the parameters to be set.

Module No. is assigned as follows according to the module connection order at startup.

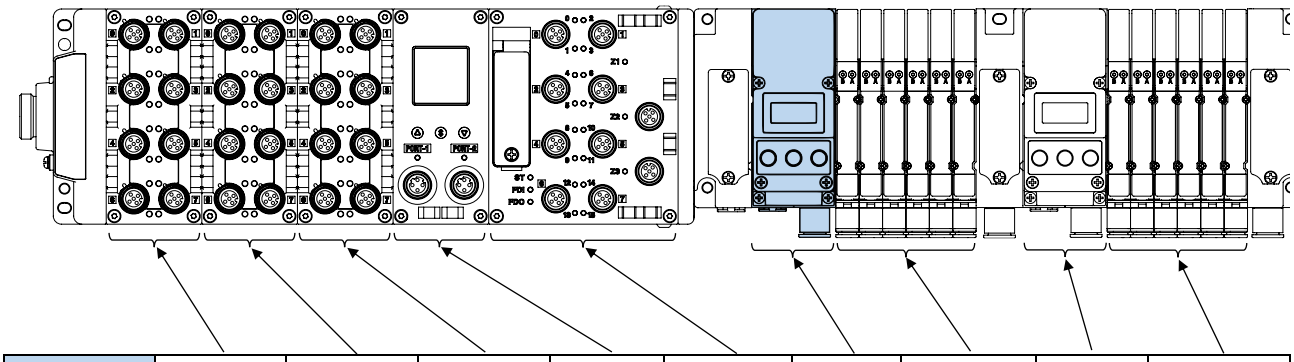
- Fieldbus module is fixed as Module No. 0.
- Modules on the D side are assigned Module No. 1, 2, and so on in order.

Channel No. is assigned according to the specifications of each module.

- Channel No. for D side I/O modules are assigned according to connector order.
- Valve outputs of Safety IO module is assigned in order from the solenoid on the A side of the next to Safety IO module valve, starting with channel 0, 1, 2, and so on.
- ITV module is assigned in order from the D side, starting with 128, 129, 130, and 131.
- Safety inputs and safety outputs are not assigned to Channel No.

Assignment example: Module No.4, and Channel No.128 is the highlighted ITV module in the configuration below.

D side U side



Product number	EX600-DXPD-A	EX600-DXPD-A	EX600-DXPD-A	EX600-BEN1	EX600-FVC2	ITV23	SY3000	ITV23	SY3000
Module No.	1	2	3	0	4	Module No. is same as FVC2			
Channel No.	0...15	0...15	0...15	-	-	128	0...7	129	8...15

2.3 Glossary

	Terminology	Description
100	100BASE-TX	Standard of LAN transmission line with communication speed of 100 Mbps.
D	DHCP	The protocol which automatically set the information such as IP address which needs to be registered in order to use the network. This information is set for all equipment which are connected to TCP/IP network.
	DIN rail	A metal rail conforming with the DIN (German) standard.
	DLR	An abbreviation for Device Level Ring: Performs a fast switching of the communication route when any problem occurs with the Ring network, to maintain communication.
	D Side	The side connected to the end plate when the product is connected to a manifold.
E	EDS file	A file that describes product information and is used on engineering tools.
F	FE	An abbreviation for functional earth.
	Fieldbus	The protocol that uses digital communication to exchange signals between field equipment (instruments and actuators) running on site and a PLC.
	Full duplex	Communication system that can send and receive data at the same time bi-directionally.
H	Half duplex	Communication system that sends and receives data in one direction at a time.
I	Idle	Expression for PLC operation state. For details, Refer to the manuals of each PLC maker. Depending on which PLC is used; the idling state might not be available.
	Internal current consumption	The current required to operate each module. Does not include inrush current and current supplied to external devices.
	IP address	A 32-bit digit sequence which is assigned to identify devices which are connected to the network
	IP##	An abbreviation for International (or Ingress) Protection. A standard related to the protection from external objects (hands, steel ball, steel wire, dust, water, etc.) applied to the product. The protection rating is indicated by a two-digit code.
	ISDU	An abbreviation for Index Service Data Unit, a command executed when performing non-periodic service data via IO-Link communication.
M	MAC address	A unique number inherent to all devices which are connected to EtherNet/IP.
	Manifold	A form made by combining multiple components.
N	NPN input	Receives the sensor output that uses the NPN transistor for the signal output line.
	NPN output	The output type that uses an NPN transistor to operate an output device. It is also known as a positive common type since a positive potential is applied to the power supply line.
O	On request data	This is the parameter data or event data of IO-Link communication sent and received via ISDU.
	Open circuit detection	A diagnostic function to detect if the output device wiring is disconnected.
P	PLC	An abbreviation for programmable logic controller. A digital computer used for automation of electromechanical processes.
	PNP input	Receives the sensor output that uses the PNP transistor for the signal output part.
	PNP output	The output type that uses a PNP transistor to operate output devices. It is also known as a negative common type since a negative potential is applied to the power supply line.
Q	QuickConnect™	The function that reduces the time from the power being supplied to the equipment operating and communication starting.
S	Short circuit detection	A diagnostic 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.
U	U Side	The side connected to the SUP/EXH block assembly when the product is connected to a manifold.

3 Assembly

Follow the assembly procedure below to assemble each module into a manifold.

Important

- All power supply to the modules should be turned OFF (de-energized) before the modules are installed or removed, to prevent damage.
- All screws should be tightened to the specified torque. Insufficient tightening may be cause of the equipment malfunction, injury, or equipment damage.

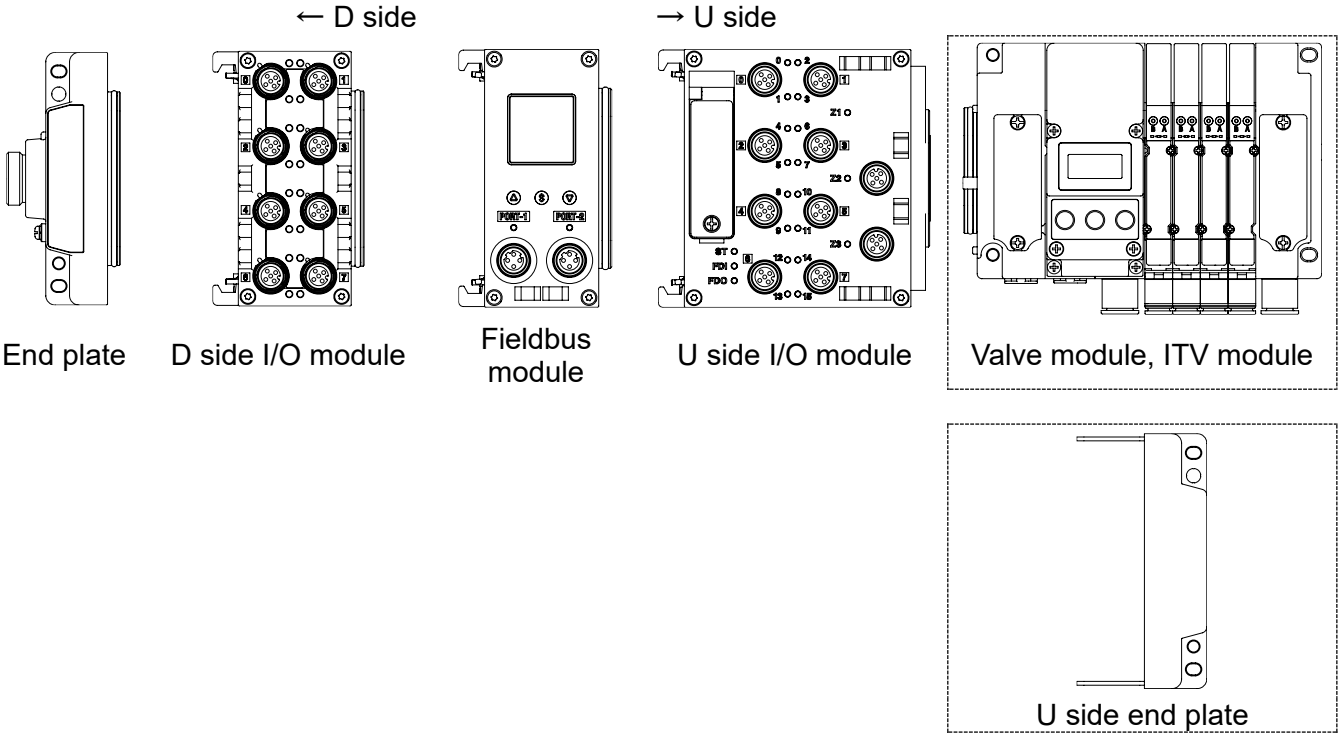
Note:

- For a list of connectable modules, refer to the catalog that lists the fieldbus module (EX600-BEN1).

(1) Module arrangement

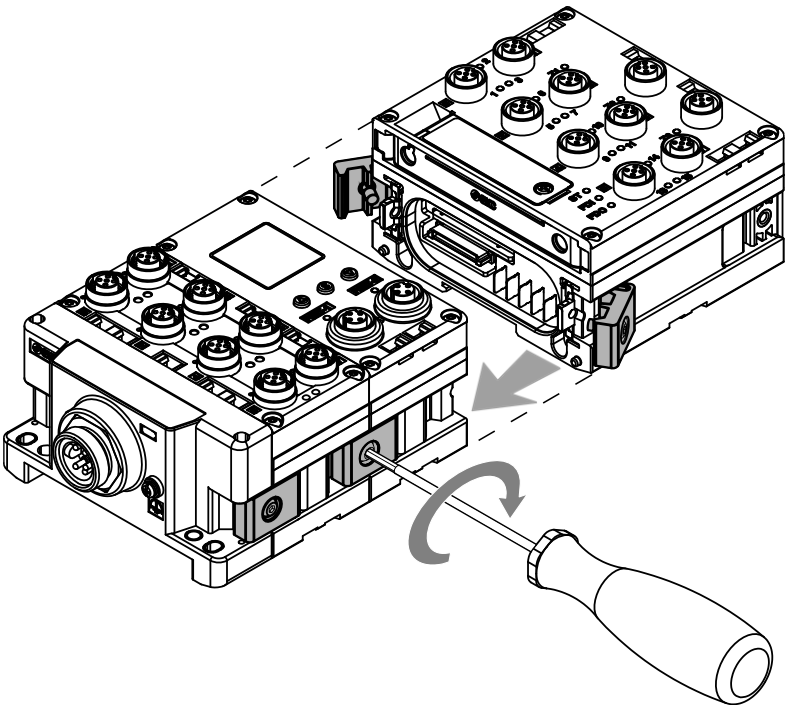
The EX600 manifold is assembled in the following arrangement:
D side End plate, D side I/O modules, Fieldbus module, U side I/O modules (Safety I/O module), and Valve/ITV module with supply/exhaust block.

- Up to 9 modules can be connected to D side to the fieldbus module.
- D side I/O modules can be connected in any order. The I/O map is automatically determined based on the connection order.
- If the valve module doesn't connect on the valve manifold, the U side end plate should be installed instead of the supply/exhaust block.



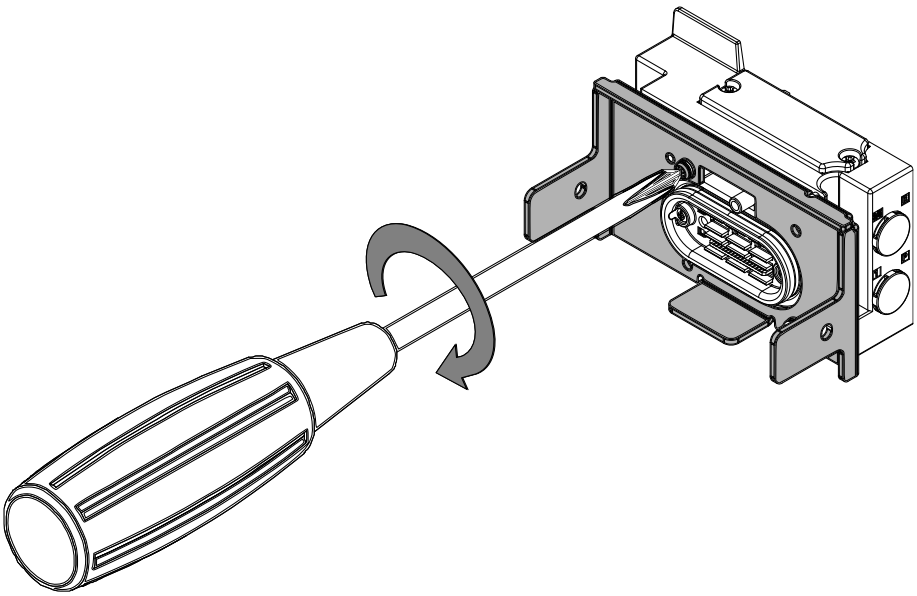
(2) Module connection

Align the connector positions of each module and connect them. After connecting the module, tighten the hexagonal socket screws (width across flats 2.5 mm) in the joint fittings. Specified tightening torque: 1.5 to 1.6 N•m.



(3) Assemble valve plate (EX600-ZMV4)

Connect the valve plate (EX600-ZMV4) to the valve module using the attached Phillips screws (M3 x 8 mm). Specified tightening torque is 0.6 to 0.7 N•m

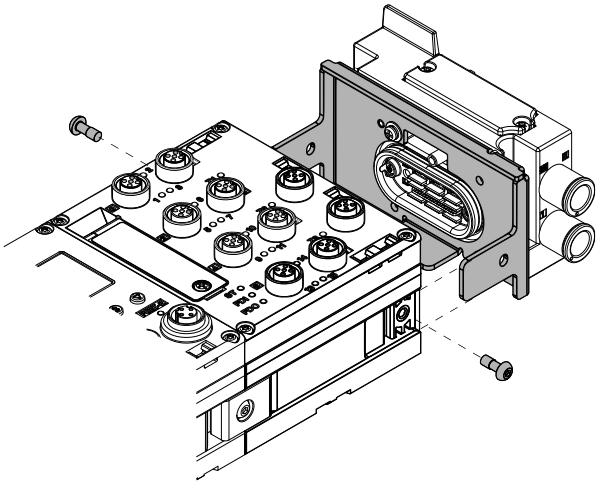


Note:

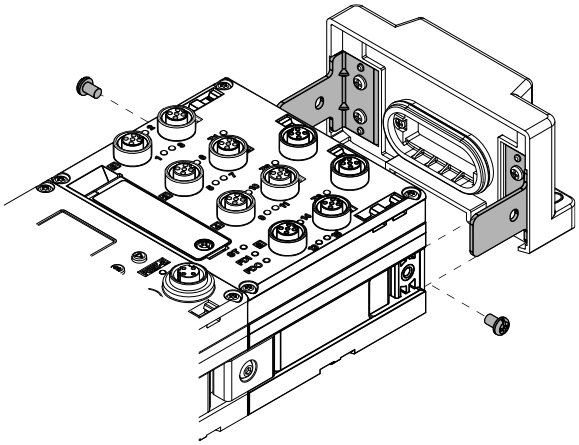
- If the valve module does not connect to the valve manifold, EX600-ZMV4 does not install. In this case, the U side end plate should be connected to the valve manifold to satisfy the ingress protection.

(4) Assemble Safety IO module and the valve plate

Assemble the Safety I/O module to the valve plate (or U side End plate). Insert the valve plate into the mounting grooves on the module and fasten using the screws provided. Specified tightening torque is 0.7 to 0.8 N•m



Hexagonal socket screws (width across flats 2.5 mm)



Phillips screws (M4 x 6mm)

Important:

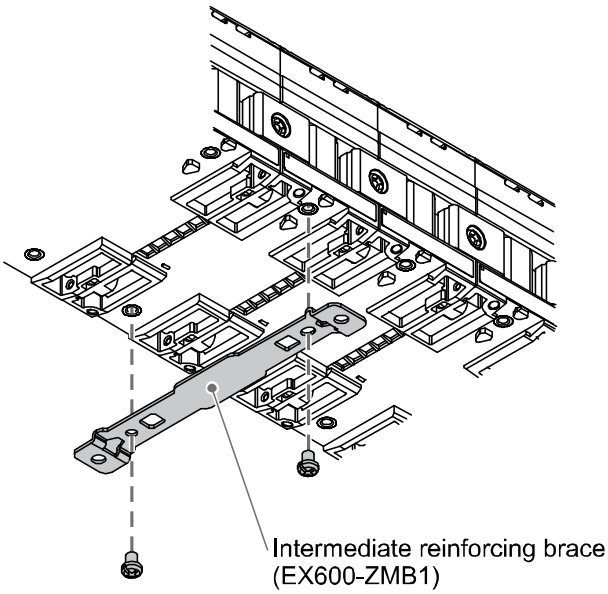
- When connecting five or more modules, you should be installed intermediate reinforcing brace (EX600-ZMB#) to prevent connection failure between modules due to deflection. See 4 Installation (Direct mounting: page 18, DIN rail mounting: page 21) for detail of intermediate reinforcing brace.

4 Installation

4.1 Direct mounting

(1) Install intermediate reinforcing brace

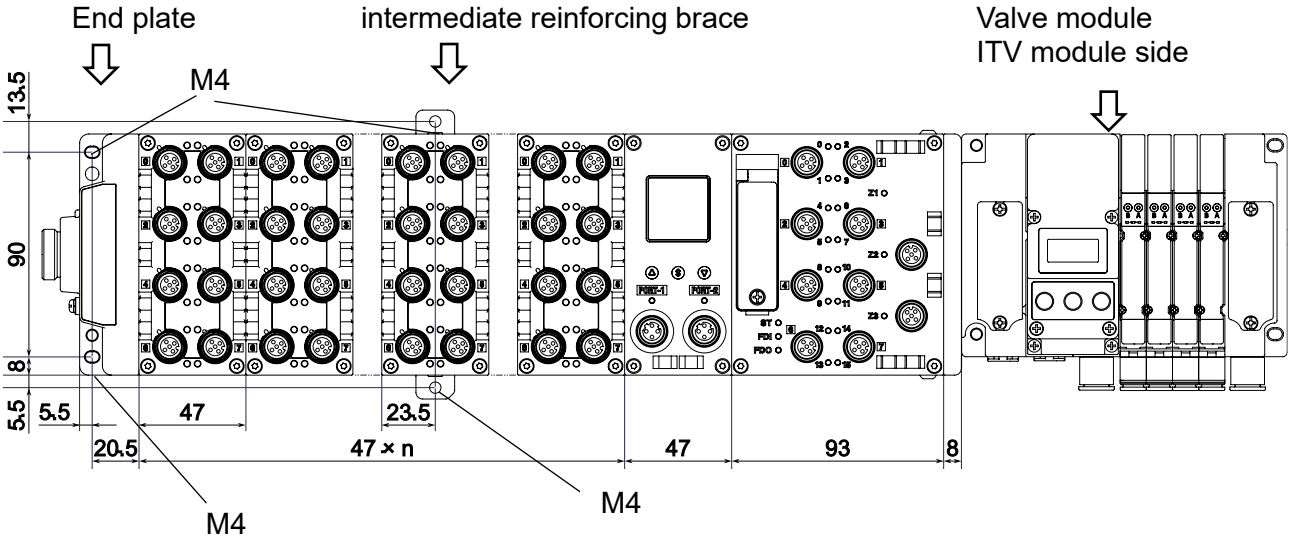
When joining five or more modules, fix an intermediate reinforcing brace (EX600-ZMB1) using supplied screws (2pcs M4 x 5) to the middle part of the entire manifold assembly before mounting.
Also, add one intermediate reinforcing brace for every five modules to be joined, and fix in a well-balanced manner. Recommended tightening torque: 0.7 to 0.8 N•m.



(2) Installation

Mount valve manifold and secure the intermediate reinforcing brace if required using M4 screws.
Specified tightening torque is 0.7 to 0.8 N•m.
Fix the SUP/EXH block assembly while referring to the operation manual for the corresponding valve module or ITV module.
If using the U side End plate tighten the mounting M4 screws with a specified tightening torque of 0.7 to 0.8 N•m.

- **In case of connecting valve modules**

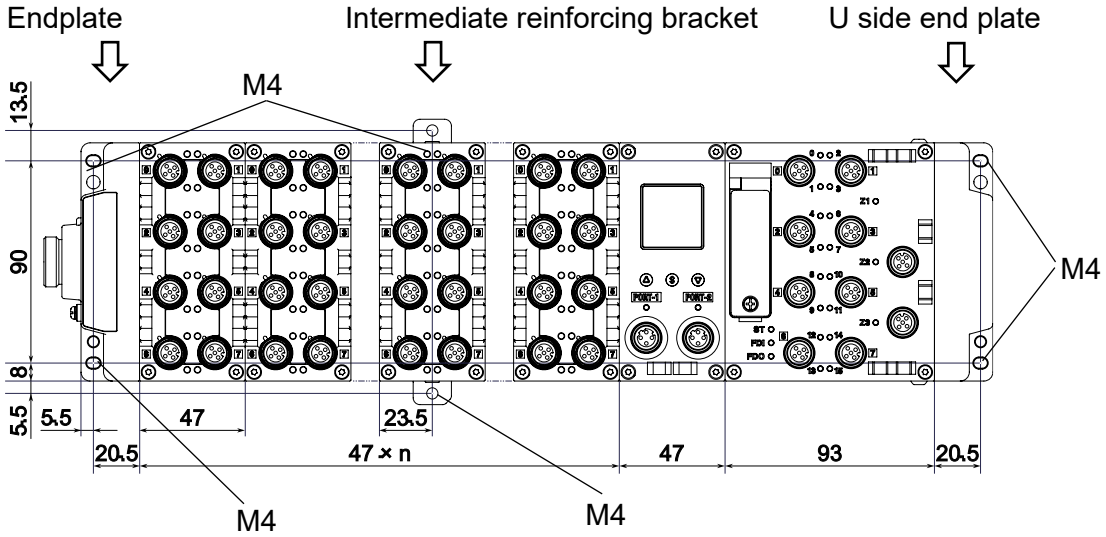


n = Number of the D side modules

Important:

- When connecting five or more modules, you should be installed intermediate reinforcing brace (EX600-ZMB#) to prevent connection failure between modules due to deflection.

・ **In case of connecting U side end plate**



n = Number of the D side modules

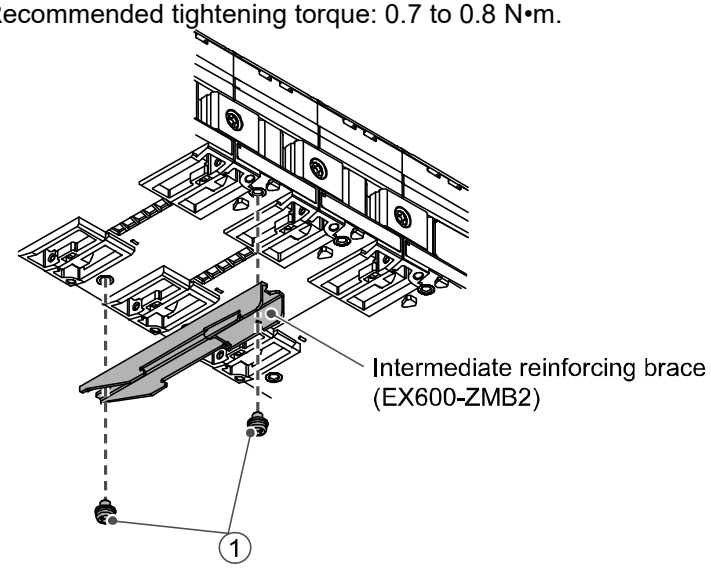
Important

- When connecting five or more modules, you should be installed intermediate reinforcement brackets (EX600-ZMB#) to prevent connection failure between modules due to deflection.

4.2 DIN rail mounting

(1) Assemble intermediate reinforcing brace

When joining five or more modules, fix an intermediate reinforcing brace (EX600-ZMB2) using supplied 2-M4 x 6 screws to the middle part of the entire manifold assembly before mounting.
Also, add one intermediate reinforcing brace for every five modules to be joined, and fix in a well-balanced manner. Recommended tightening torque: 0.7 to 0.8 N•m.

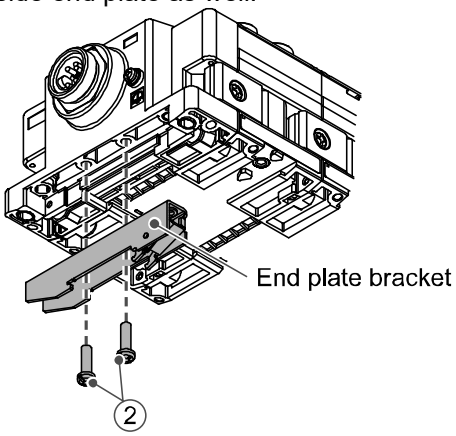


(2) Installation bracket for end plate

Attach the End plate bracket to the End plate using the screws (2-M4 x 14 mm) supplied. Recommended tightening torque: 0.7 to 0.8 N•m. The end plate vary depending on connected the valve module. See following table for detail.

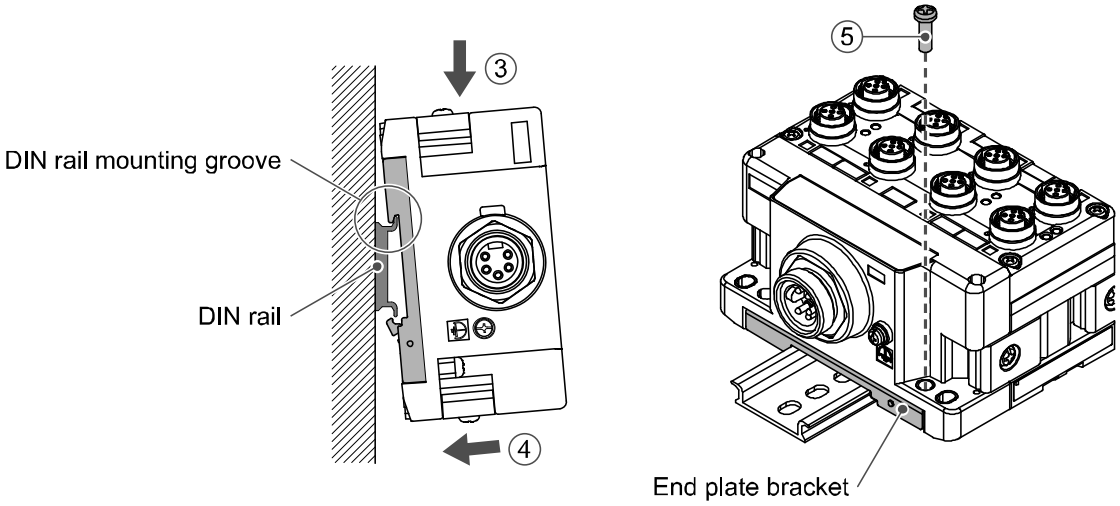
Valve module series	End plate bracket part number
VQC series	EX600-ZMA2
JSY, SY series	EX600-ZMA3

Refer to the instruction manual for the valve module to be used for the DIN rail mounting bracket on the supply/exhaust block side. If the intake/exhaust block is not used and the U side end plate is used, install the end plate bracket on the U side end plate as well.



(3) Installation DIN rail

Hook the DIN rail mounting groove on to the DIN rail.
Press the manifold using its side hooked on to the DIN rail as a fulcrum until the manifold is locked onto the DIN rail.
Fix the manifold by tightening the DIN rail fixing screws (M4 x 20 mm) on the End plate bracket (Tightening torque: 0.7 to 0.8 N•m).
Fix the SUP/EXH block assembly while referring to the operation manual for the corresponding valve module or ITV module.

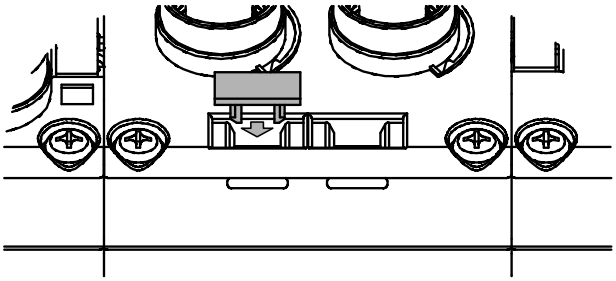


Important

- When connecting five or more modules, you should be installed intermediate reinforcing brace (EX600-ZMB#) to prevent connection failure between modules due to deflection.

4.3 Identification marker

The signal name of the input or output devices can be written on the marker and can be installed on each module. Mount a marker (EX600-ZT1) into the marker groove as required.



5 Fieldbus module

5.1 Product type and product number

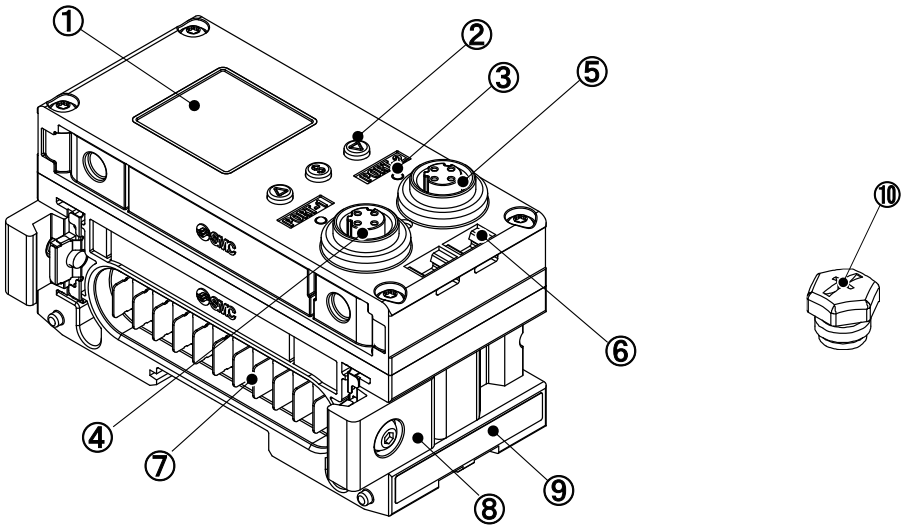
EX600- B EN 1

Fieldbus module — B

Protocol — EN

Symbol	Meaning
EN	EtherNet/IP

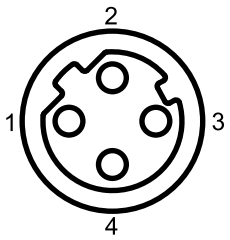
5.2 Component name and function



No.	Component	Function
1	LCD display	Displays the module status and display screens for pushbutton settings
2	Pushbuttons	Buttons to operate when changing module parameters or for displaying diagnostics.
3	Link/Act LED	Displays fieldbus communication status.
4	Communication connector (PORT1)	Connection for Fieldbus cable.
5	Communication connector (PORT2)	Connection for Fieldbus cable.
6	Marker groove	For attaching identification markers.
7	Connector for module connection	Transmits control signals and power to adjacent modules.
8	Joint bracket	For connecting module together.
9	Product label	Displays the 12-digit MAC address, which is unique for each fieldbus module.
10	Seal cap (1 pc.)	Seal cap for all unused connectors. Factory installed on PORT2.

5.3 Wiring

- **Communication connector**

Connector Port1 / Port2	Pin No.	Signal
 M12 4pin, socket D-code connector	1	TX+
	2	RX+
	3	TX-
	4	RX-

- **Port type when auto-negotiation is disabled**

If the “Port* Interface” parameter is set to anything other than “Autonegotiation,” the port type will be fixed as follows.

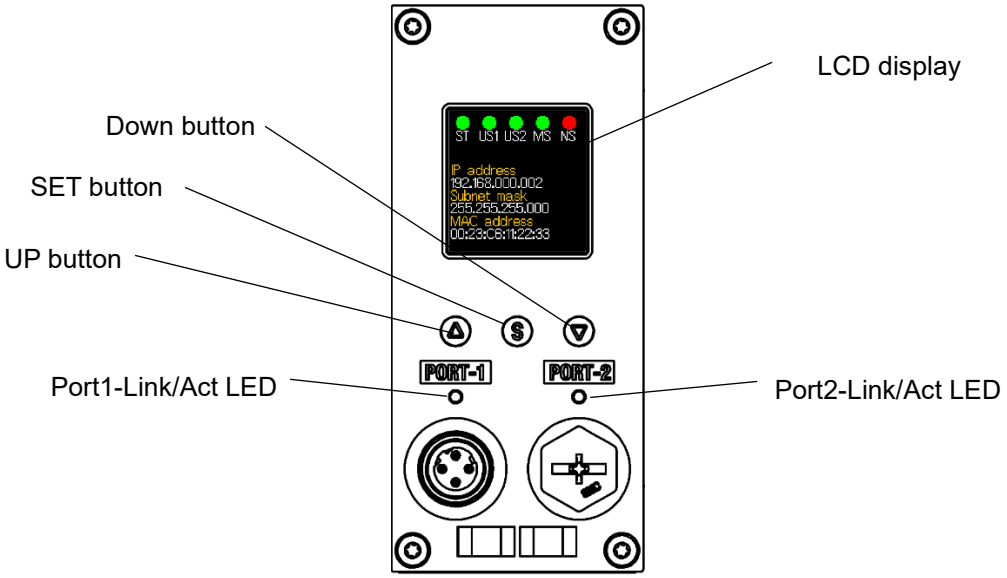
Pin No.	Signal	
	Port1 Port type: MDI	Port2 Port type: MDI-X
1	TX+	RX+
2	RX+	TX+
3	TX-	RX-
4	RX-	TX-

⚠ Important:

- Be sure to fit a waterproof seal cap on ALL unused M12 connectors. Proper use of the seal cap enables the enclosure to maintain the ingress protection.

5.4 LCD Display setting

5.4.1 Outline



Items	Function
LCD display	After power ON, various indicators are displayed at the top of the display. The user can change parameters and check diagnostic details at the press of a button. See 5.4.3 LCD display setting (page 30) for detail.
UP button / DOWN button	Switches between items or increases / decreases the set value. Simultaneous pressing of the buttons will change the menu screen. In the menu screen, simultaneous presses are also used to cancel operations.
SET button	Make an operation decision.
PORT1 Link/Act LED	Displays the communication status of each communication connector.
PORT2 Link/Act LED	

Important:
- If the button is pressed while the power is turned on, the module will not start normally.

5.4.2 Indicators

- **ST**

Displays diagnostics status on the module.

Display		Description
	Green ON	Normal operation is in progress.
	Green flashing (2Hz)	Diagnostics is detected on any modules. Follow the troubleshooting steps to remove the cause of the error.
	Red flashing (2Hz)	The following errors have been detected. Change the manifold configuration to within the specifications and restart. ・ The I/O size exceeds the specifications. ・ The number of connected I/O modules exceeds the specifications.
	Red/Green flashing alternately (2Hz)	An internal communication error has occurred. Check the connections between each module.
	Red ON	The power needs to be turned off and on again. Failed to initialize the fieldbus module or failed to establish communication with the safety IO module.

- **US1**

Displays US1 (for control) power supply status on the module.

Display		Description
	OFF	US1 supply voltage is less than 19 V (when US1 voltage monitoring parameter is disabled).
	Green ON	US1 supply voltage is within specification.
	Green flashing (2Hz)	US1 supply voltage is less than 19 V (when US1 voltage monitoring parameter is enabled).

- **US2**

Displays US2 (for drive) power supply status on the module.

Display		Description
	OFF	US2 supply voltage is less than 19 V.
	Green ON	US2 supply voltage is within specification.

- **MS**

Displays module status on the module.

Display		Description
	OFF	Initialization of Fieldbus module in progress.
	Green flashing (2Hz)	Communication with the PLC has not been established or the PLC is idle.
	Green ON	Normal operation is in progress.
	Red flashing (2Hz)	One of the following conditions exists. - Diagnosis is being detected. Check for any indications other than MS. - The IP address of the fieldbus module does not match the TUNID setting of the safety IO module. Perform a safety reset to initialize the TUNID.
	Red ON	The fieldbus module detected a fault.
	Red/Green flashing alternately (2Hz)	The TUNID has not yet been set for the Safety IO module.

- **NS**

Displays communication status on the module.

Display		Description
	OFF	Either the IP address is not set or the Fieldbus module is initializing.
	Green flashing (2Hz)	EtherNet/IP communication has not been established.
	Green ON	At least one EtherNet/IP connection has been established.
	Red flashing (2Hz)	At least one EtherNet/IP connection has timed out.
	Red ON	Duplicate IP address.
	Red/Green flashing alternately (4Hz)	Propose_TUNID request has been received, but Apply_TUNID has not been completed.

- **PORT-1**

Displays PORT-1 communication status on the module.

Display		Description
	OFF	PORT-1: No Link/No Activity
	Green ON	PORT-1: Link/No Activity (100 Mbps)
	Green flickering (20Hz)	PORT-1: Link/Activity (100 Mbps)
	Orange ON	PORT-1: Link/No Activity (10 Mbps)
	Orange flickering (20Hz)	PORT-1: Link/Activity (10 Mbps)

- **PORT-2**

Displays PORT-2 communication status on the module.

Display		Description
	OFF	PORT-2: No Link/No Activity
	Green ON	PORT-2: Link/No Activity (100 Mbps)
	Green flickering (20Hz)	PORT-2: Link/Activity (100 Mbps)
	Orange ON	PORT-2: Link/No Activity (10 Mbps)
	Orange flickering (20Hz)	PORT-2: Link/Activity (10 Mbps)

5.4.3 LCD display setting

LCD display supports the following functions.

- Monitoring communication status with upper controller.
- Monitoring current I/O data
- Display diagnostic status on the valve manifold.
- Monitoring and setting the parameter.

Important:

- A password is required to change parameters on the LCD display. The default password is "0000".
  To change the password, use the Option menu (page 43) or the Explicit message communication (page 132).

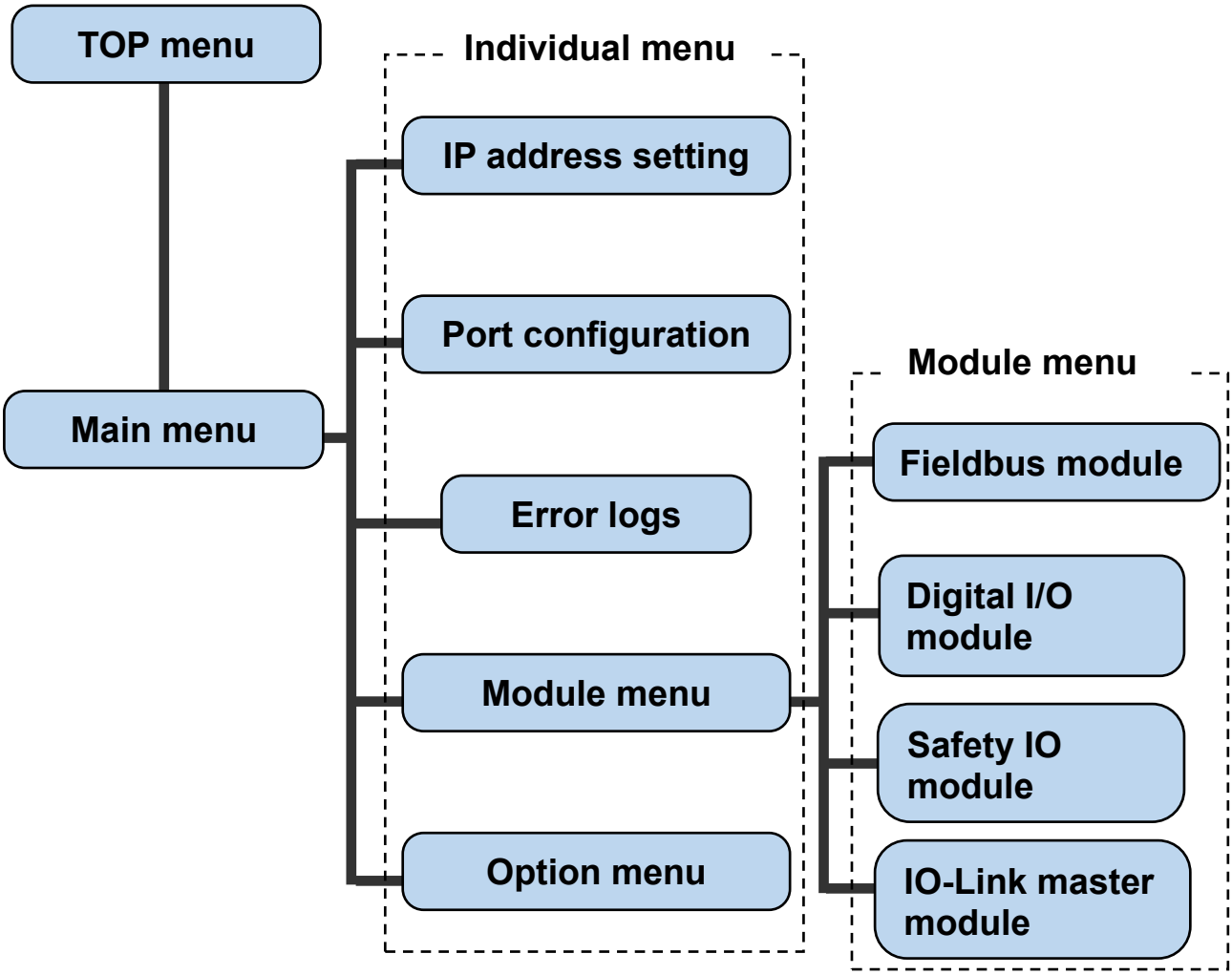
Note:

- Once you enter the screen operation password, you will not need to enter the password again.
- Once you enter the password, you will not need to enter it again until return to the TOP menu. Please refer to the following page for the screen layout.
- The typefaces included herein are solely developed by DynaComware Taiwan Inc.

・Explanation for the icon

Button operation	Meaning
△/▽	Press the UP or DOWN button. Similarly, this operation can refer to a long press action.
S	Press SET button.
△+▽	Press and hold the UP and DOWN buttons simultaneously.

Overall screen layout map



Power ON

After power is turned on, MS and NS will turn off → red → green in that order.

TOP menu:

This screen displays information about the manifold after the power is turned on.

Total I/O data size:

Display IP address and MAC address

Display diagnostic status

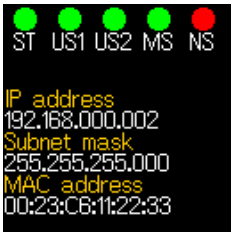
TOP menu may be displayed above message. In that case, please follow the instructions on the screen.

△ + ▽

Shift Main menu

S

Shift the simple Help menu how to operate LCD display.

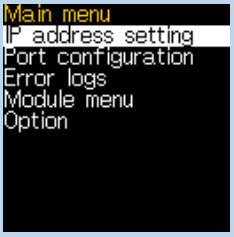


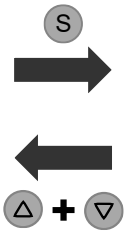
Back to the TOP menu

Main menu

Shift to the individual menu from this menu.

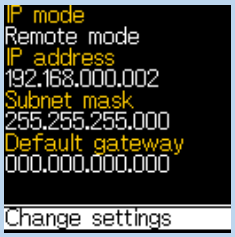
- Press ▲ or ▼ and select destination, and press S shift to the selected menu.
- Press ▲+▼ back to the TOP menu.



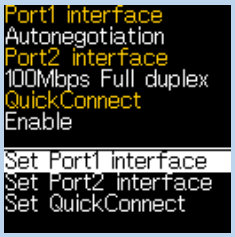


Individual menu:

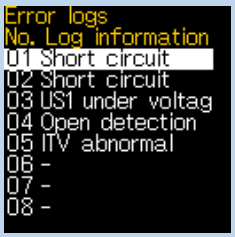
The overview of each menu, see related section.



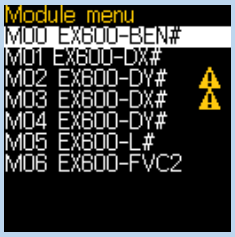
IP address setting: Page 34



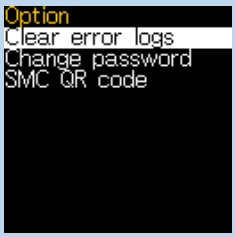
Port configuration: Page 36



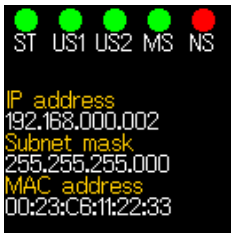
Error logs: Page 36



Module menu: Page 37



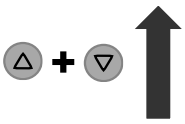
Option: page 43



TOP menu

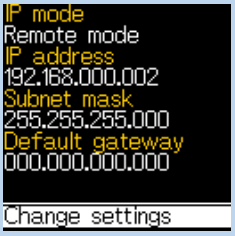
Main menu

Back to Main menu from Individual menu



IP address setting menu

This menu provides checking/changing the IP address settings. Only “IP mode” is set to “Hardware mode” the IP address can set on the screen.

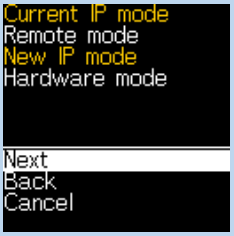


Show the current setting

S

The password is requested when changing settings. Press △/▽ change value and press S shift to the next digit.

S



Select IP mode:

- **Next**
  Shift to the next setting menu
- **Back**
  Resetting the current mode
- **Cancel**
  Return to the IP address setting menu.

Next

Restart later

The IP address is set into the module after restart.

- **Restart later**
  The IP address will display the previous value until the system is restarted.
- **Restart now**
  The system restarts immediately.

“Remote mode”:
After the settings are applied, configure the settings using the IP address settings tool. For details, see 11.1.1 IP addressing procedure by the IP Address Setting Tool (page 96).

“Hardware mode”:
See the next page for detail.

IP address setting menu (continued)

Next

Current IP address
192.168.000.002
New IP address
192.168.000.100

Next
Back
Cancel

Set “IP address”, “Subnet mask” and “Default gateway”.
Press △/▽ change the value, and press Ⓢ move next octet.

Next

Current Subnet mask
255.255.255.000
New Subnet mask
255.255.000.000

Next
Back
Cancel

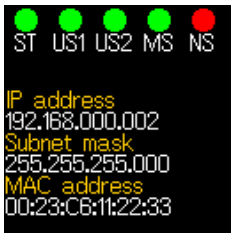
Next

Current Gateway
000.000.000.000
New Gateway
000.000.000.000

Next
Back
Cancel

Important:

- If a safety IO module with TUNID settings is connected, the IP address cannot be changed. If you want to reset the IP address of the fieldbus module, delete the TUNID using Safety reset. For details on how to perform Safety reset, refer to the Safety manual of the safety IO module.
- The IP address cannot be changed while EtherNet/IP communication is established.

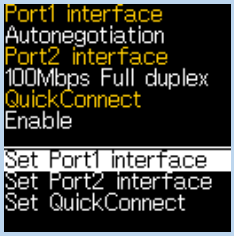


TOP menu

Main menu

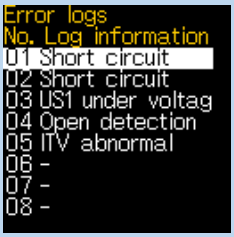
Back to Main menu from Individual menu

Port configuration

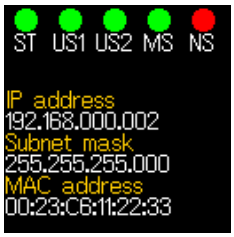


Monitoring and setting the parameter for the communication port.
Press ▲/▼ select the parameter, and press S set the selected parameter.
Password will be requested to set parameter.

Error logs



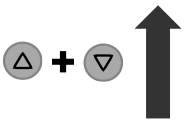
Display up to 30 diagnostic error logs.
Press ▲/▼ and select the error number you want to check to view the details.
See 9.3 Diagnostic logs (page 85) for detail.



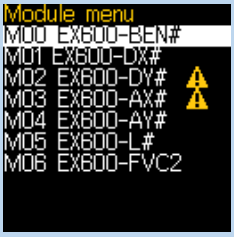
TOP menu

Main menu

Back to Main menu to Individual menu



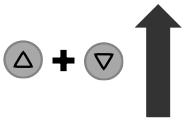
Module menu



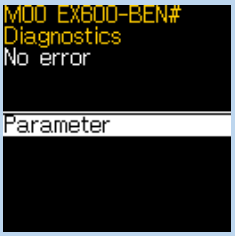
Display the module menu in order of the module number. See 2.2 Specify Module No. and Channel No. (page 13) for the detail of the module number.
Press △/▽ select the module, and press S shift to the related module setting menu.

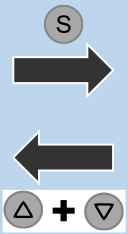
S

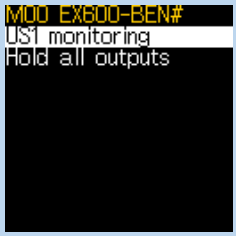
Back to Module menu



Fieldbus module

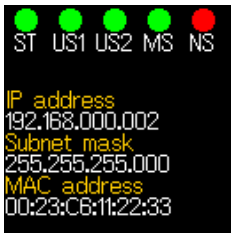






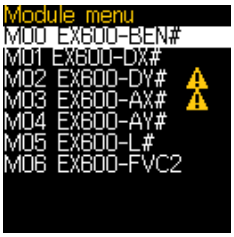
Display the diagnostics status for Fieldbus module.

Parameter:
Display the configurable parameters. The current setting value is displayed select related parameter and the password is requested when chang the parameter.



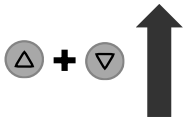
TOP menu

Main menu

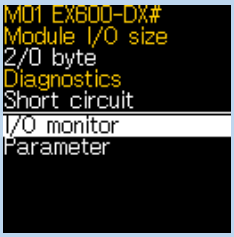


Module menu

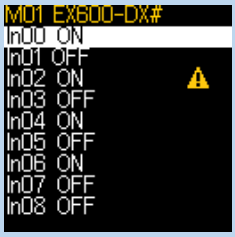
Back to Module menu



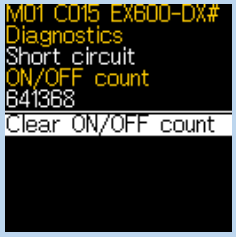
Digital input/output module



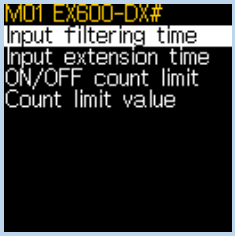
Display the I/O size of related module and diagnostic status.



I/O monitor:
Display the current input/output status.
Channels that are not displayed can be viewed by scrolling the screen with press △/▽.
The channel detecting diagnostics is displayed ⚠ mark. Press Ⓢ in related channel, shift to the detail of the diagnostic.



Display the status of the channel diagnostic. The password is requested when clear ON/OFF count value.



Parameter:
Display the configurable parameters.
The current setting value is displayed select related parameter and the password is requested when chang the parameter.

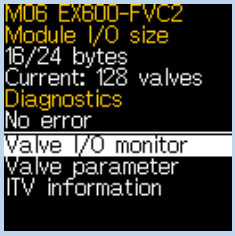
TOP menu

Main menu

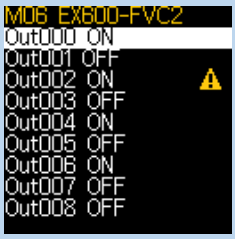
Module menu

Back to Module menu

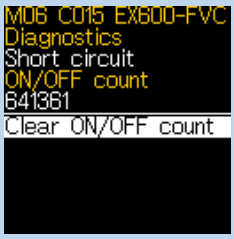
Safety IO module



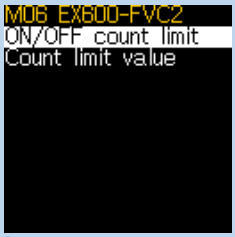
Display the I/O size of the non-safety function and diagnostic status.



Valve I/O monitor:
Display the current ON/OFF operation from upper controller. Channels that are not displayed can be viewed by scrolling the screen with press △/▽.
The channel detecting diagnostics is displayed ⚠ mark.
Press Ⓢ in related channel, shift to the detail of the diagnostic.

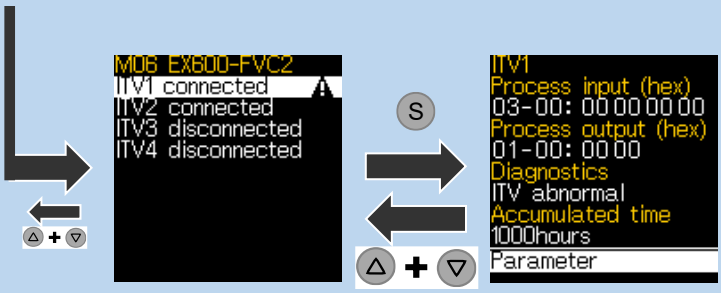


Display the status of the channel diagnostic. The password is requested when clear ON/OFF count value.



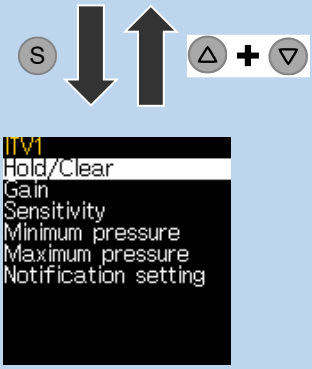
Valve parameter:
Display the configurable parameters.
The current setting value is displayed select related parameter and the password is requested when chang the parameter.

Safety IO module



ITV information:
Display the “ITV connection” status.
The channel detecting diagnostics is displayed ⚠ mark.
Press Ⓢ in the channel displays “connected”, shift to the detail.

Display the process data and diagnostic status.
Press Ⓢ shift to the parameter setting menu.



Parameter:
Display the configurable parameters. The current setting value is displayed select related parameter and the password is requested when chang the parameter.

⚠ Important:

- The password to set the parameter is different from to reset TUNID.
- LCD display can not display the safety related status (safety IO status, safety related parameter, etc.).
- When the safety output is in the safe state, the valve doesn’t operate even if the “Valve I/O monitor” is ON.

TOP menu

Main menu

Module menu

Back to module menu

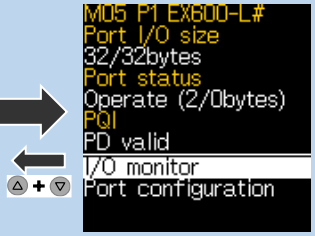
S

△ + ▽

IO-Link master module

Display the assigned I/O size and diagnostic status.

S



S

Port* information

・Port I/O size

Display the IO size set in “Process data size”.

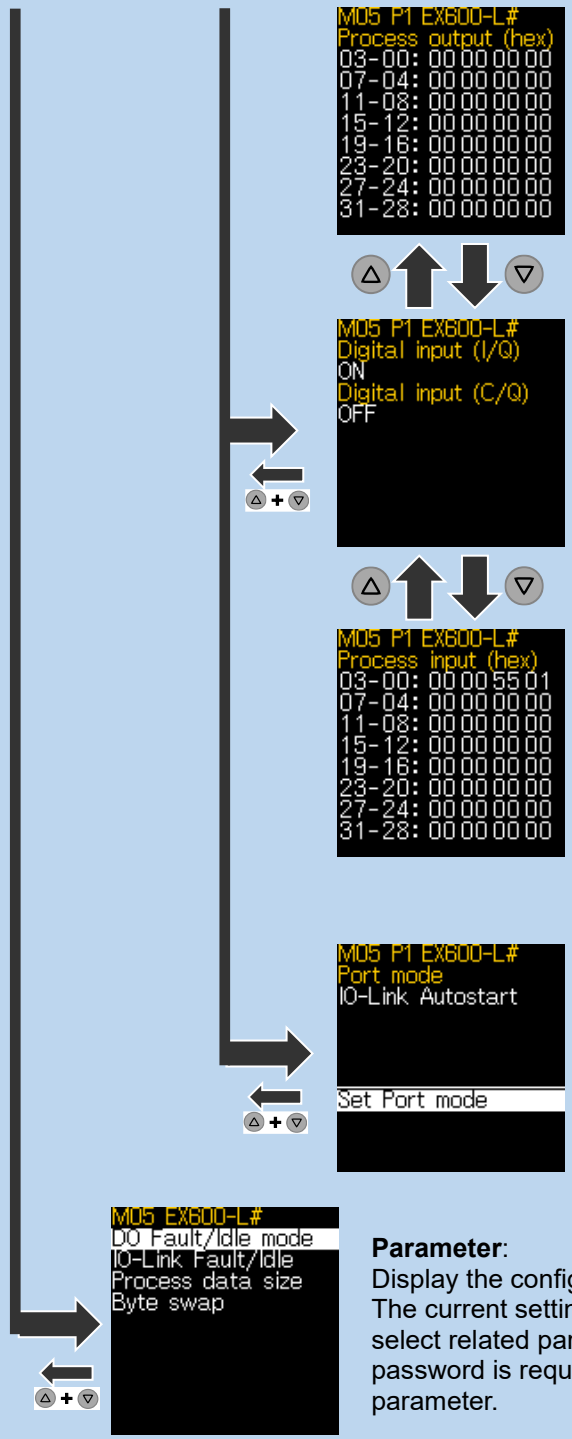
・Port status

Display the IO-Link communication status. If an IO-Link device is connected, the data size of the connected device is also displayed.

・PQI

Display event status of related port and data storage function.

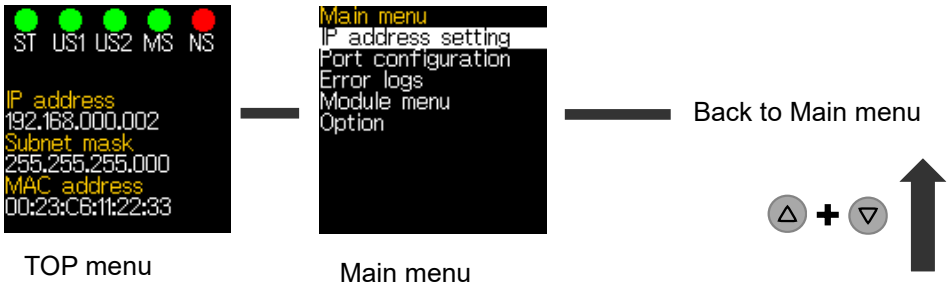
IO-Link master module



I/O monitor:
Display the current input/output status.
Press △/▽ shift to the Standard IO data, Input process data and Output process data menu.

Port configuration
Display the setting of the “Port mode”.
The password is requested when change IO-Link operation mode.

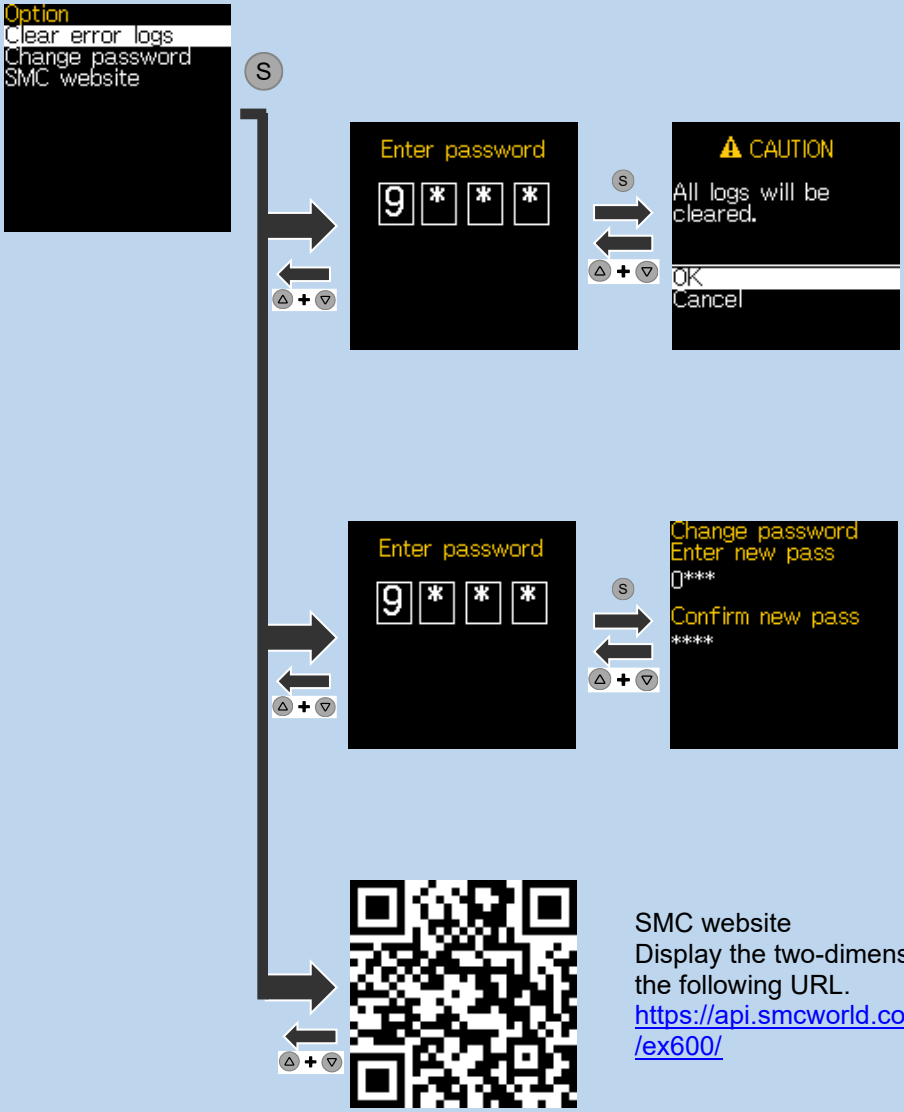
Parameter:
Display the configurable parameters.
The current setting value is displayed select related parameter and the password is requested when chang the parameter.



TOP menu

Main menu

Option menu



Clear error logs
Delete error logs after entering the password.

Change password
After entering latest password, change current password. Changing to the latest password, should be enter the password twice. Please enter your desired password twice.

SMC website
Display the two-dimensional code of the following URL.
https://api.smcworld.com/smcqr/-/ex600/

Note:

- Once you enter the password, you will not need to enter it again until return to the TOP menu. Even after changing your password by clicking Change password, you will not be prompted to enter your password again until you return to the top screen.

5.5 Specification

・Specification table

Model		EX600-BEN1
Communication	Protocol	EtherNet/IP™
	Conformance test revision	CT21
	Communication speed	10/100 Mbps
	Communication method	Full duplex/Half duplex
	Communication cable length	Up to 100 m
	Supported function	QuickConnect™ *1) DLR(Beacon-based ring node)
	Configuration file	EDS
	Vendor ID	7(SMC Corporation)
	Device type	12(Communications Adapter)
	Product code	271 *2)
	Data size	Standard input: Up to 1308 byte Standard output: Up to 1308 byte Safety input: 10 byte *3) Safety output: 6 byte *3)
Number of connectable I/O modules		D side: Up to 9 modules U side: Safety IO module
Power	US1 (for logic/input)	DC24V +20%/-15%
	Internal current consumption (US1)	Up to 150 mA
	US2 (for output)	DC24 V +20%/-15%
	Internal current consumption (US2)	Up to 10 mA
	Reverse polarity protection	Yes
Environment	Enclosure rating	IP65/IP67 (With manifold assembled) *4)
	Operating temperature range	-10°C to 50°C
	Storage temperature range	-20°C to 60°C
	Operating humidity range	35% to 85%RH (No condensation and no icing)
	Withstand voltage	AC500 V, for 1 minute (between external terminals and FE)
	Insulation resistance	10 MΩ or more (when 500 VDC is applied between terminals and FE)
	Vibration resistance	10 to 57 Hz: constant amplitude 0.75 mm p-p 57 to 150 Hz: constant acceleration 49 m/s^2 for 2 hours in each direction X, Y, and Z respectively (De-energized)
	Impact resistance	147 m/s^2 3 times in each directions of X, Y, and Z respectively (De-energized)
Standard		CE/UKCA, UL(CSA)
Housing material		PBT
Weight		310 g

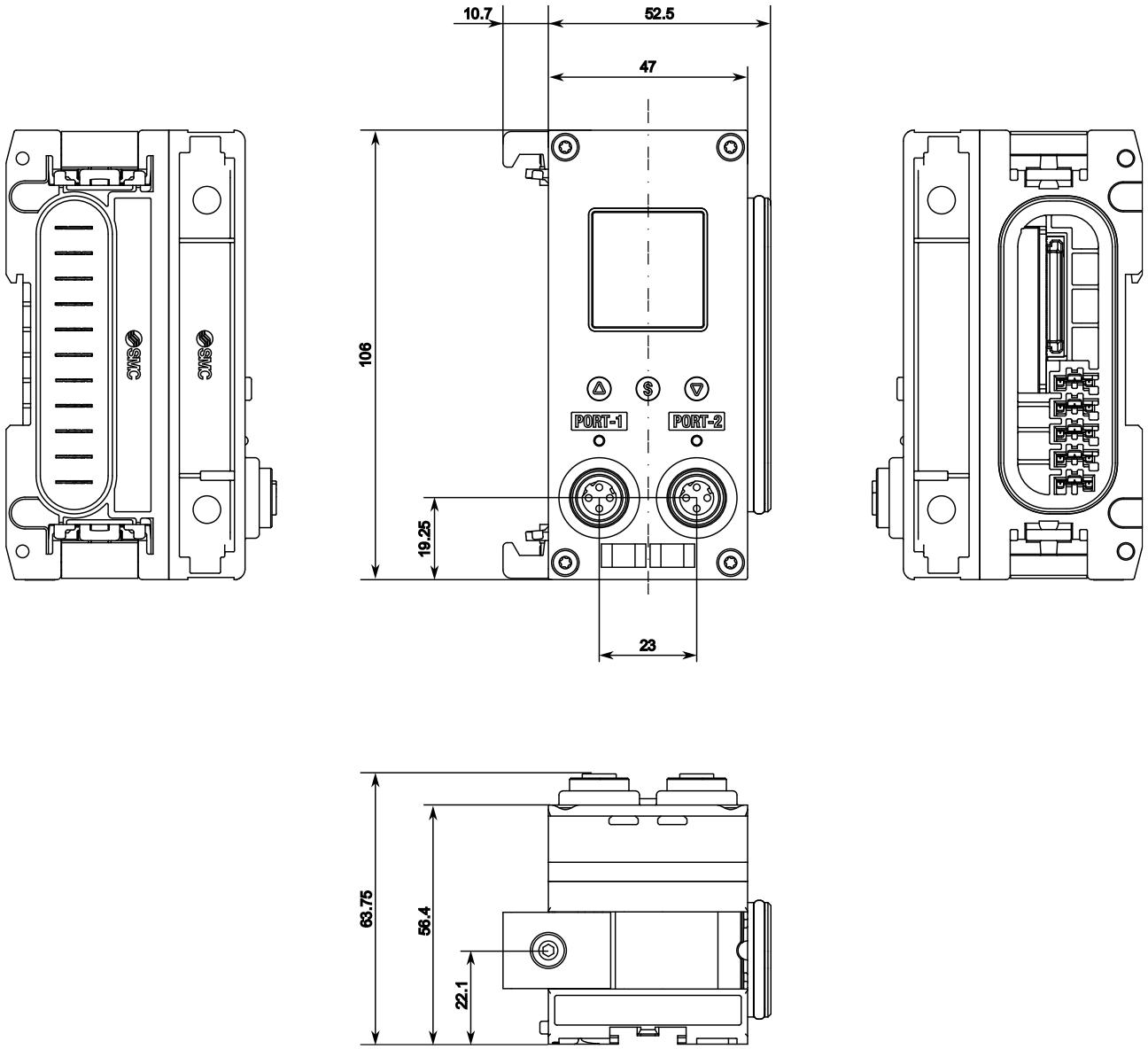
*1) QuickConnect can not be activated when Safety IO module connected to the valve manifold.

*2) The product code is 271 when the safety IO module is connected and 270 when the safety IO module is not connected.

*3) Safety input/output data is occupied only when connected to a safety IO module.

*4) All unused connectors must have a seal cap fitted to maintain the ingress protection.

5.6 Dimension



6 End plate

6.1 Product type and product number

6.1.1 End plate (D side)

EX600- ED 3 - #

D side end plate

Connector

Symbol	Connector
3	7/8inch (5pins)

Mounting method

Symbol	Description
Nil	No DIN rail bracket
2	With DIN rail bracket (VQC valve)
3	With DIN rail bracket (SY/JSY valve)

6.1.2 End plate (U side)

EX600- EU 1 - #

U side end plate

Mounting method

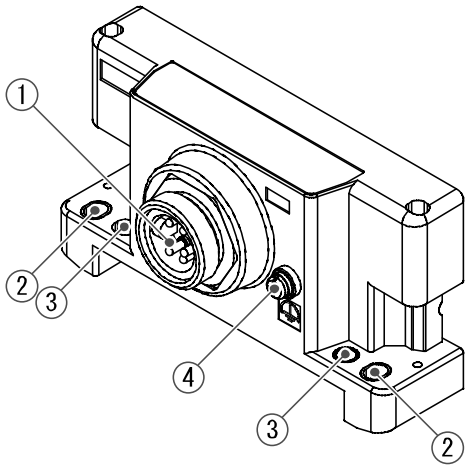
Symbol	Description
Nil	No DIN rail bracket
2	With DIN rail bracket (EX600-ED3-2)
3	With DIN rail bracket (EX600-ED3-3)

Important

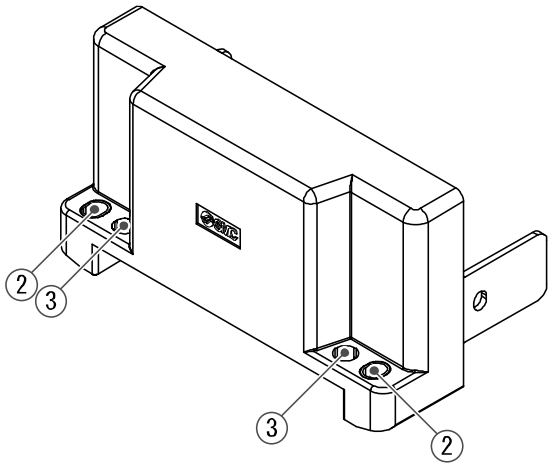
- When using the EX600-EU1-#, it cannot be assembled with the safety IO module EX600-FVC2. Please select the safety IO module EX600-FVC1.

6.2 Component name and function

- **EX600-ED3-#**



- **EX600-EU1-#**

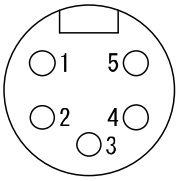


No.	Component	Function
1	Power connector	Connector for power supply to each module.
2	Fixing hole for direct mounting	Holes for direct mounting.
3	Fixing hole for DIN rail mounting	Holes for fix DIN rail mounting.
4	FE terminal (M3)	Functional Earth terminal

Note:
- FE terminal should be connected directly to system earth (ground), and individual grounding should be provided close to the product with a short cable.

6.3 Wiring

- **Power connector**

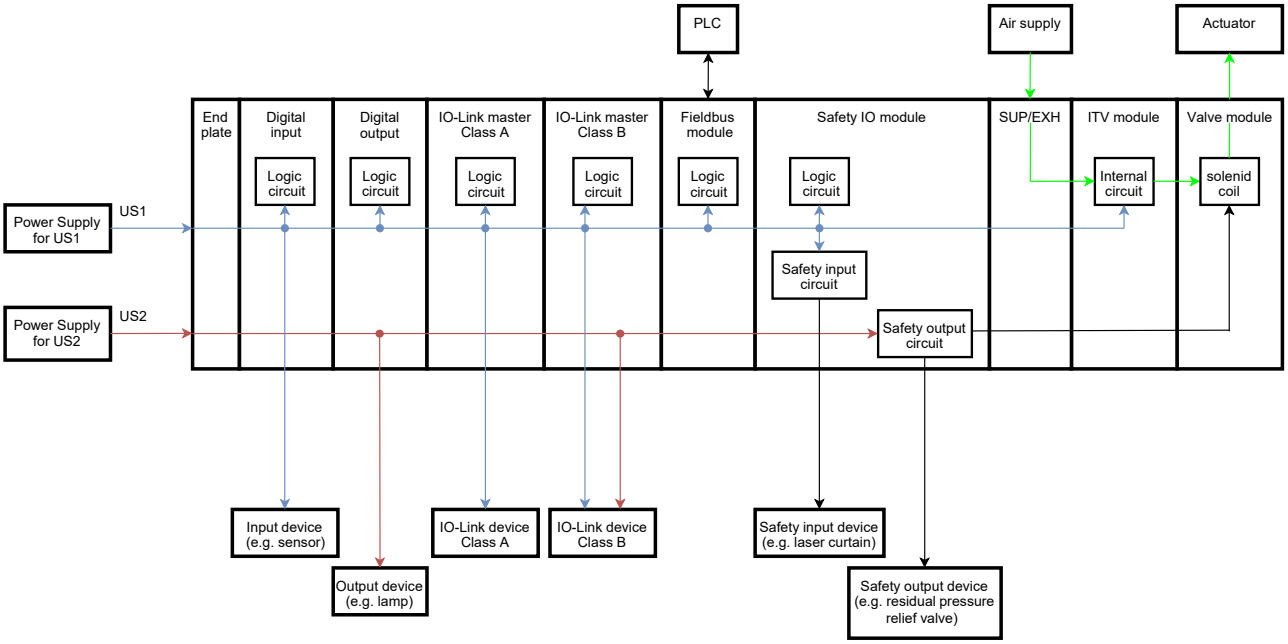
View of connector 7/8inch, 5pins, plug	Pin No.	Allocation
	1	0V_US2 (for output)
	2	0V_US1 (for logic/input)
	3	FE
	4	24V_US1 (for logic/input)
	5	24V_US2 (for output)

6.4 US1 and US2 power supply

EX600 series has 2 types of power supply system, one is US1 and the other is US2. The power supply system is electrically insulated inside the product.

・US1 (for logic/input):
Control of each module, input devices, power supply for IO-Link devices, and power supply for safety inputs.

・US2 (for output):
Power supply for output devices connected to the digital output module, for P24 of IO-Link master with port class B, and power supply for safety output circuit.



Note:
- See the safety manual of safety IO module for the detail of the block diagram of safety IO module.

6.5 Specification

・Specification table

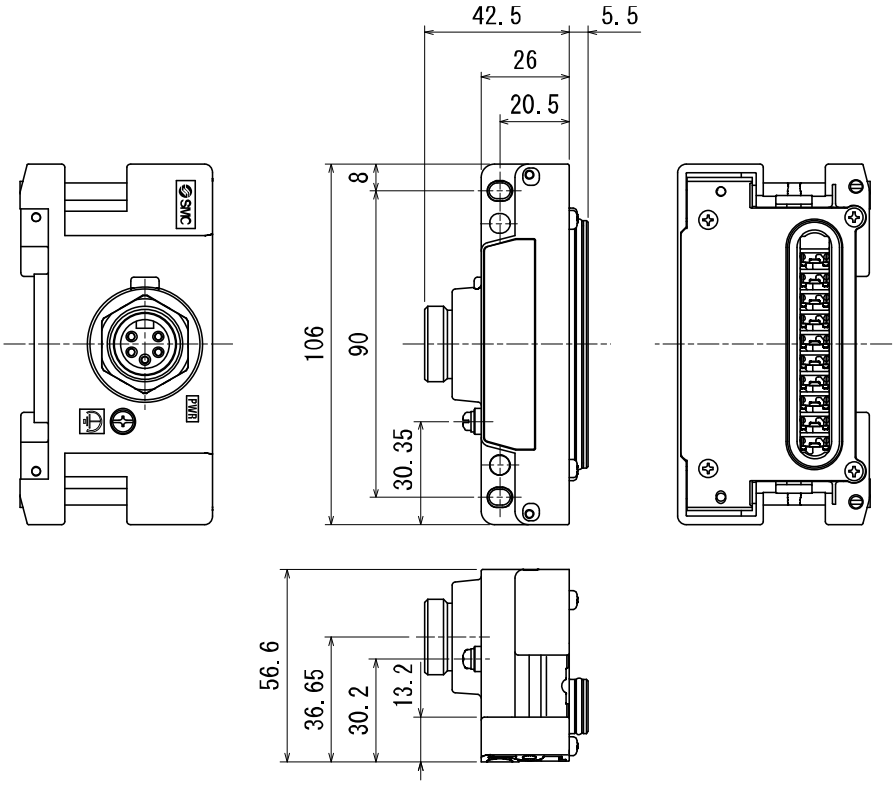
Items		EX600-ED3-#	EX600-EU1-#
Power	Connector	7/8 inch (5-pin), plug	-
	Power supply for US1	DC24V +20%/-15%, 8A	-
	Power supply for US2	DC24V +20%/-15%, 8A	-
Environment	Enclosure rating	IP65/IP67 (With manifold assembled) *1)	
	Operating temperature range	-10°C to 50°C	
	Storage temperature range	-20°C to 60°C	
	Operating humidity range	35% to 85%RH (No condensation and no icing)	
	Withstand voltage	AC500 V, for 1 minute (between external terminals and FE)	
	Insulation resistance	10 MΩ or more (when 500 VDC is applied between terminals and FE)	
Standards		CE/UKCA, UL(CSA)	
Housing material		PBT	
Weight *2)		175 g	240g

*1) All unused connectors must have a seal cap fitted to maintain the ingress protection.

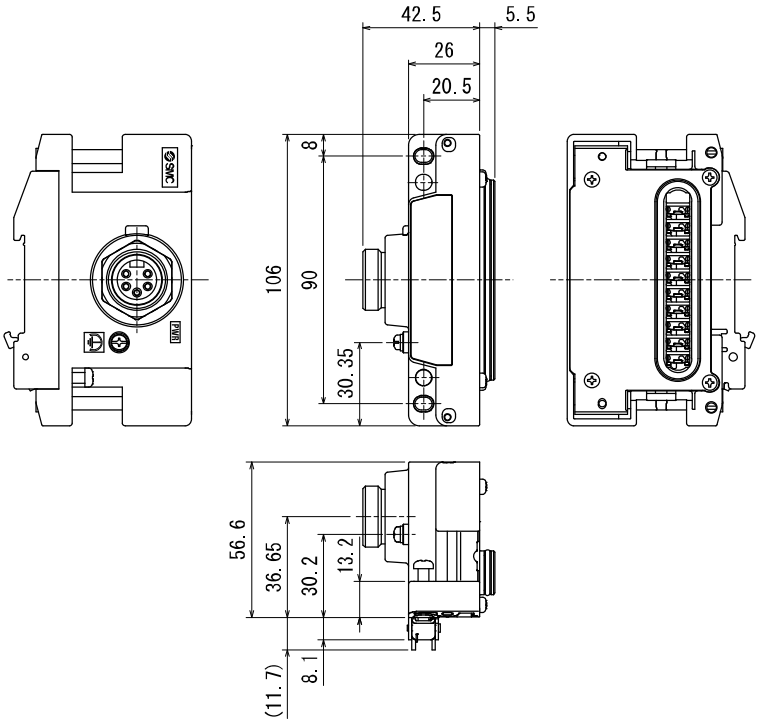
*2) The weight of End plate bracket is not included.

6.6 Dimension

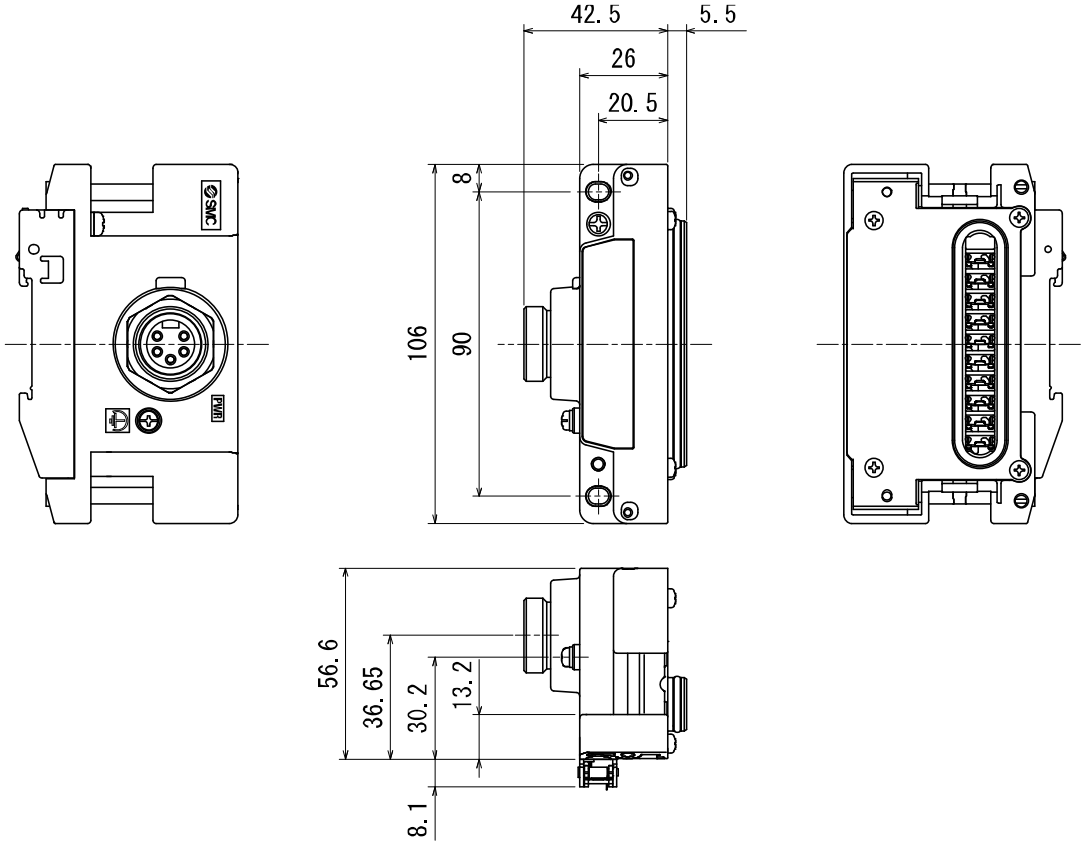
6.6.1 EX600-ED3



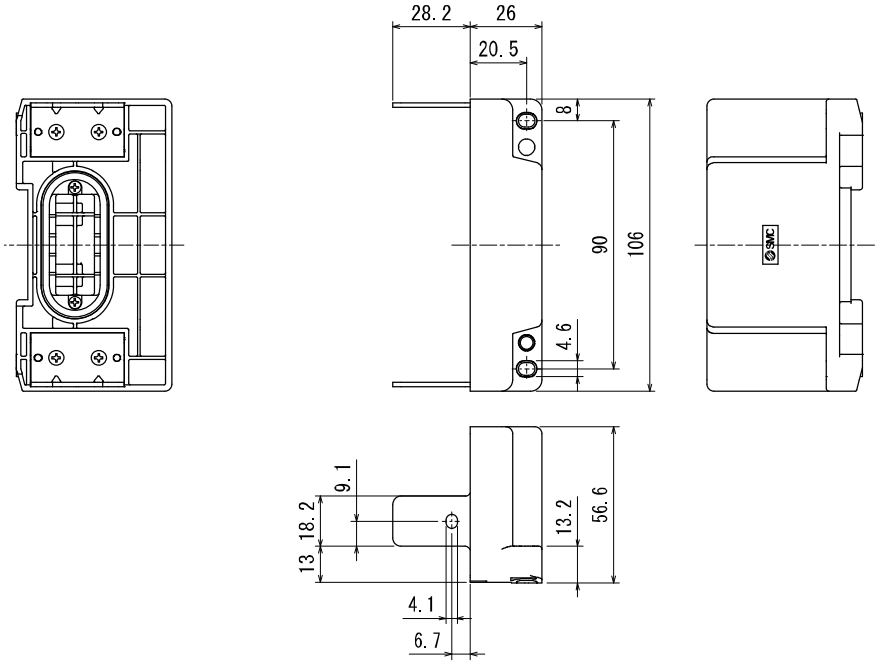
6.6.2 EX600-ED3-2



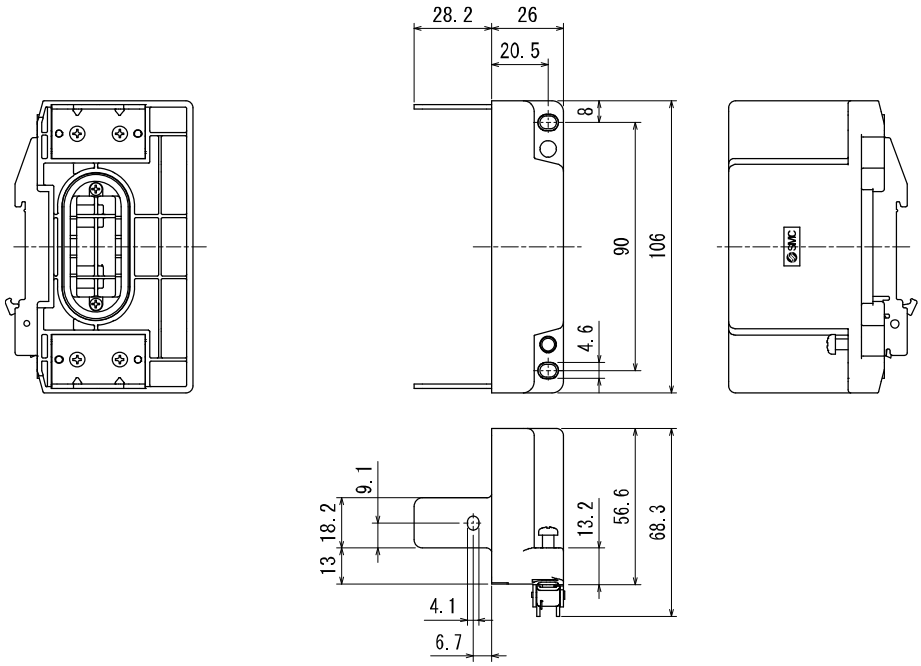
6.6.3 EX600-ED3-3



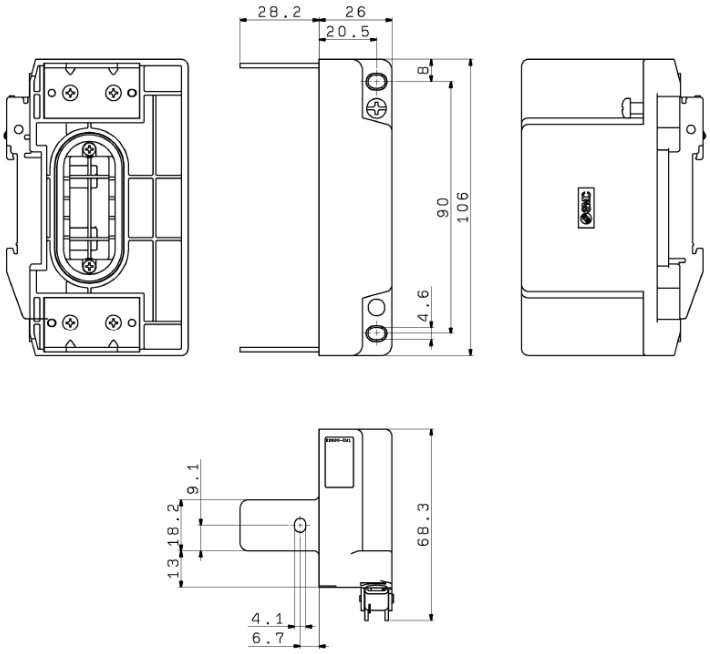
6.6.4 EX600-EU1



6.6.5 EX600-EU1-2



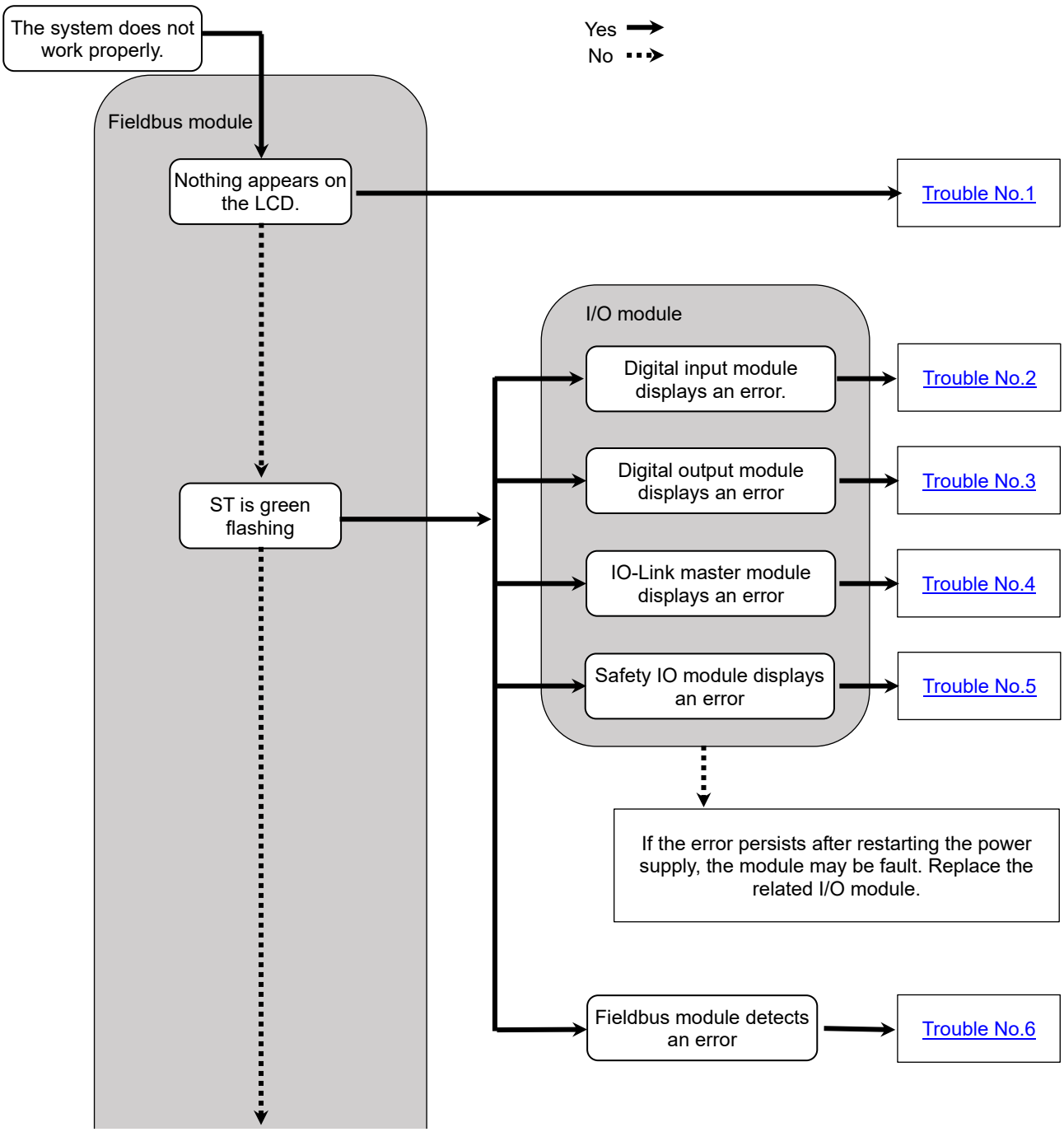
6.6.6 EX600-EU1-3

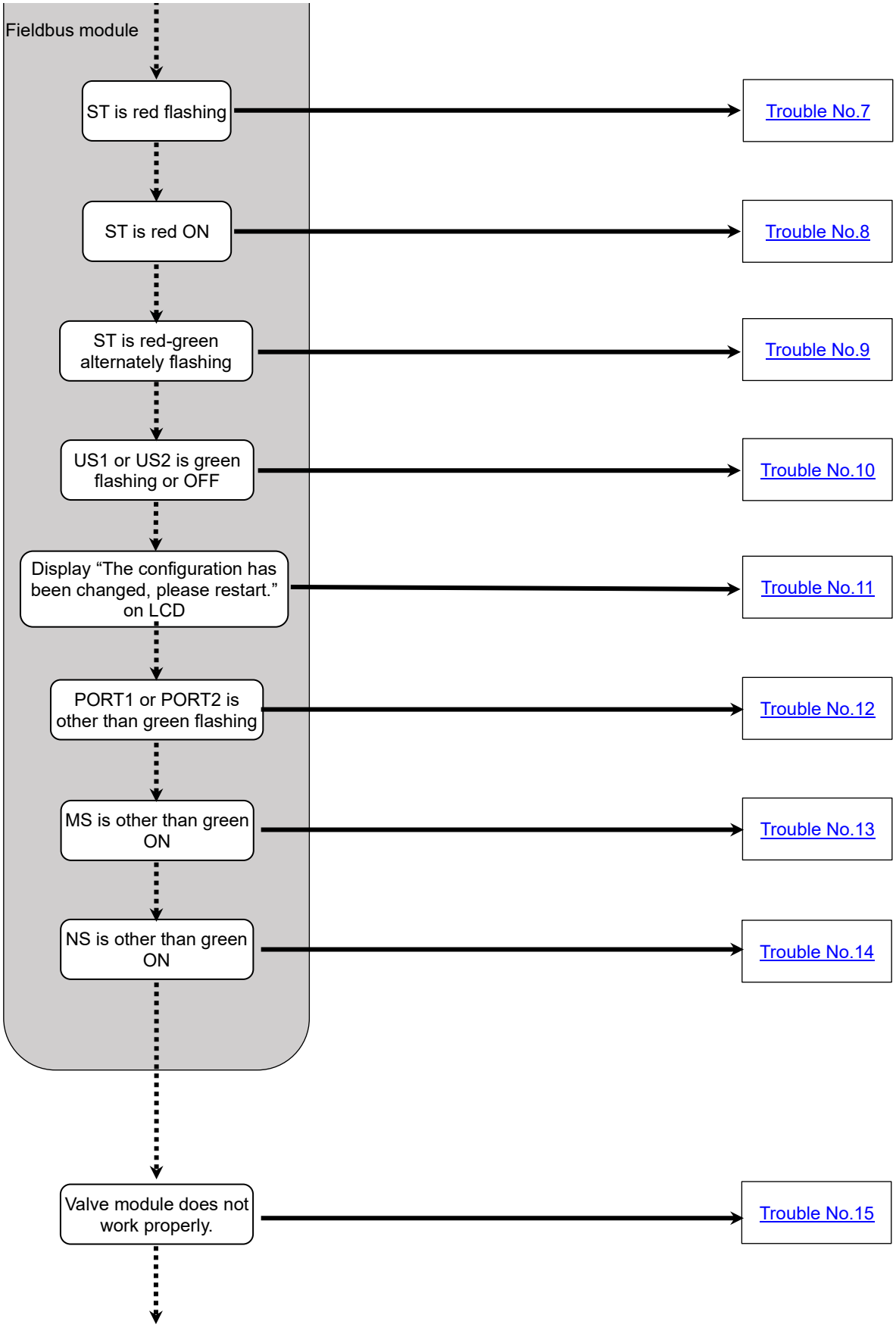


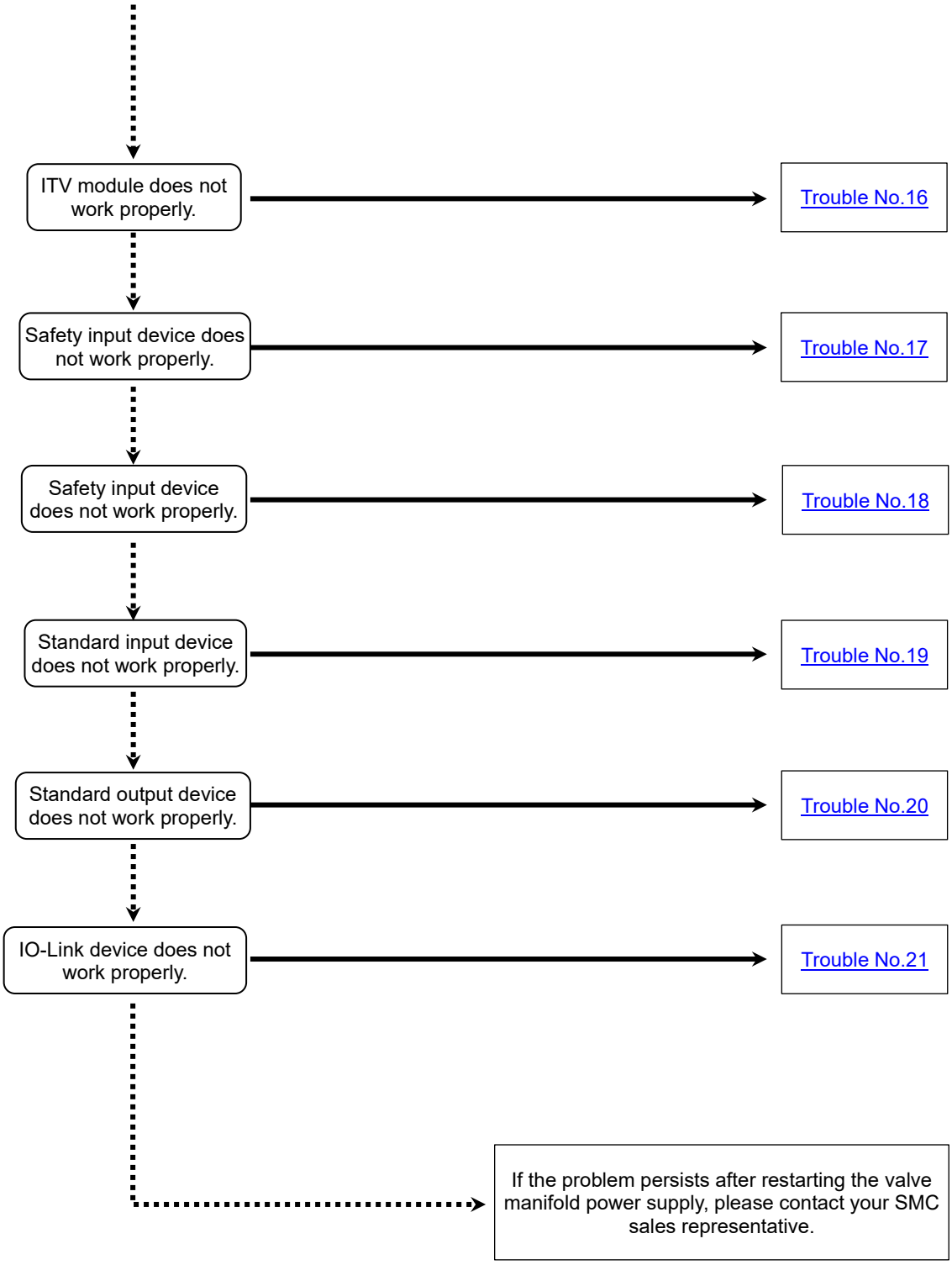
7 Troubleshooting

7.1 Troubleshooting chart

If a problem occurs on this fieldbus system, you can use the following chart to troubleshoot. The state of Fieldbus module is indicated by the LED and LCD indication and diagnostic data.
If a cause applicable to the failure cannot be identified, this indicates that the equipment itself is broken. The fieldbus system damage can be caused by the operating environment. Contact SMC to obtain countermeasures.




Fieldbus module
ST is red flashing
Trouble No.7
ST is red ON
Trouble No.8
ST is red-green alternately flashing
Trouble No.9
US1 or US2 is green flashing or OFF
Trouble No.10
Display “The configuration has been changed, please restart.” on LCD
Trouble No.11
PORT1 or PORT2 is other than green flashing
Trouble No.12
MS is other than green ON
Trouble No.13
NS is other than green ON
Trouble No.14
Valve module does not work properly.
Trouble No.15


ITV module does not work properly.
Trouble No.16
Safety input device does not work properly.
Trouble No.17
Safety input device does not work properly.
Trouble No.18
Standard input device does not work properly.
Trouble No.19
Standard output device does not work properly.
Trouble No.20
IO-Link device does not work properly.
Trouble No.21
If the problem persists after restarting the valve manifold power supply, please contact your SMC sales representative.

7.2 Troubleshooting table

Trouble No.1 LCD display is OFF

Part No. EX600-	Trouble	Possible cause	Action
BEN	LCD display is OFF	US1 is OFF	Supply power within the specifications of US1
		Incorrect wiring	Check the wiring and pin numbers.

Trouble No.2 Digital input module displays an error

Part No. EX600-	Trouble	Possible cause	Action
DXPC DXPD	Red ON	Power supply for input device has a short circuit.	Identify the location of the error using the LED or LCD display. You can also investigate using diagnostic data and EtherNet/IP objects. Check the following items: ・Check the wiring and cable ・Check the connected device is property. ・Check the connected device current consumption specification.
	Red flashing	ON/OFF count value exceeds the setting value.	Identify the location of the error using the LED or LCD display. You can also investigate using diagnostic data and EtherNet/IP objects. Check the following items: ・Execute “Clear ON/OFF count value” ・Change “Count limit value” parameter greater than the current value ・Change “ON/OFF count limit” parameter to “Disable”. ・Check the wiring and loose connectors or damaged cables. ・Check the connected device setting is property.
	All LED is red/green alternately flashing	Detect an internal memory error in the module.	Restarting the power supply. If the problem persists, turn the power OFF and replace the module that is causing the error.

Trouble No.3 Digital output module displays an error

Part No. EX600-	Trouble	Possible cause	Action
DYPB	Red ON	Output has a short circuit	Identify the location of the error using the LED or LCD display. You can also investigate using diagnostic data and EtherNet/IP objects. Check the following items: ・Check the wiring and cable ・Check the connected device is property. ・Check the connected device current consumption specification.
	Red flashing	ON/OFF count value exceeds the setting value.	Identify the location of the error using the LED or LCD display. You can also investigate using diagnostic data and EtherNet/IP objects. Check the following items: ・Execute “Clear ON/OFF count value” ・Change “Count limit value” parameter greater than the current value ・Change “ON/OFF count limit” parameter to “Disable”.
		Output has an open circuit	Identify the location of the error using the LED or LCD display. You can also investigate using diagnostic data and EtherNet/IP objects. Check the following items: ・Check the wiring and loose connectors or damaged cables. ・Check the connected device is property. ・Change “Open circuit” parameter to “Disable”
	All LED is red/green alternately flashing	Detect an internal memory error in the module.	Restarting the power supply. If the problem persists, turn the power OFF and replace the module that is causing the error.

Trouble No.4 IO-Link master module displays an error

Part No. EX600-	Trouble	Possible cause	Action
L*B1	C/Q: Red ON	L+ has a short circuit	Identify the location of the error using the LED or LCD display. You can also investigate using diagnostic data and EtherNet/IP objects. Check the following items: ・Check the wiring and cable ・Check the connected device is property. ・Check the connected device current consumption specification
		C/Q has a short circuit	
	P24: Red ON	P24 has a short circuit	
	All LED is red/green alternately flashing	Detect an internal memory error in the module.	Restarting the power supply. If the problem persists, turn the power OFF and replace the module that is causing the error.

Trouble No.5 Safety IO module displays an error

Part No. EX600-	Trouble	Possible cause	Action
FVC*	Any of the following errors -ST: Red ON -FDI: Other than Green ON -FDO: Other than Green ON -INx: Red ON -Zx: Red ON	The module has a safety related error	Safety related errors aren't displayed on LCD and standard diagnostic data. See the safety manual of Safety IO module for detail.
	ST: Red/green alternately flashing	Valve module has a short circuit	Identify the location of the error using the LCD display. You can also investigate using diagnostic data and EtherNet/IP objects. Refer to the instruction manual for the valve you are using and check/replace the valve module. Short circuit diagnosis will remain until the following method is performed. ・Turn OFF the valve output command for the relevant location ・Turn OFF all safety outputs ・Restart the module
		ITV module has a short circuit	Identify the location of the error using the LCD display or 7-seg display on ITV module. Power supply for ITV modules is common in all ITV modules. Refer to the instruction manual for the ITV module you are using and check/replace the module.
		ON/OFF count value exceeds the setting value.	Identify the location of the error using the LCD display. You can also investigate using diagnostic data and EtherNet/IP objects. Check the following items: ・Execute "Clear ON/OFF count value" ・Change "Count limit value" parameter greater than the current value ・Change "ON/OFF count limit" parameter to "Disable".
		Communication breaks between safety IO module and valve module or the number of the connected valve modules is changed after power ON.	Identify the location of the error using the LCD display or EtherNet/IP objects. When detect "Changed valves" (Diagnostic data: Byte2 bit0), restart the valve manifold. If the problem persists, turn the power OFF and refer to the valve module instruction manual and reassemble the manifold correctly. Note: The number of the connected valve module can confirm the following method. ・EtherNet/IP object: See page 134 for detail ・LCD display: See page 39 for detail.

Part No. EX600-	Trouble	Possible cause	Action
FVC*	ST: Red/green alternately flashing	Communication breaks between safety IO module and ITV module after power ON.	Identify the location of the error using the LCD display. You can also investigate using diagnostic data and EtherNet/IP objects. Refer to the instruction manual for the ITV module you are using and check/replace the module. If the problem persists, after turn the power OFF, reassemble the manifold correctly. Note: The communication status with ITV module can confirm the following method. ・EtherNet/IP object: See page 134 for detail ・LCD display: See page 40 for detail
		ITV module detects "*Abnormal*"	Identify the location of the error using the LCD display or 7-seg display on ITV module. You can also investigate using diagnostic data and EtherNet/IP objects. Refer to the instruction manual for the ITV module you are using and check/replace the module.
		Detect an internal memory error in the module.	Restarting the power supply. If the problem persists, turn the power OFF and replace the module that is causing the error.

Trouble No.6 Fieldbus module detects an error

Part No. EX600-	Trouble	Possible cause	Action
BEN1	ST: Green flashing	Added/removed modules while power was supplied to the valve manifold.	Identify the location of the error using the LCD display. You can also investigate using diagnostic data and EtherNet/IP objects. If you have performed a hot swap of the safety IO module, please turn the manifold power back on.
		Detect an internal memory error in the fieldbus module.	Restarting the power supply. Also, perform a factory reset (page 134). If the problem persists, turn the power OFF and replace the module that is causing the error.

Trouble No.7 ST is red flashing

Trouble	Possible cause	Action
ST: Red flashing	The number of connected I/O modules exceed specification.	The number of connected modules should be within specification. See the specification table (page 44) for detail. Turn the power OFF and refer to 3 Assembly (page 15) to remove the I/O modules.
	The IO data size exceeds specification.	The IO data size should be within specification. See specification table (page 44) for detail. Please review the following and reduce the I/O data size. ・Change the “Process data size” parameter ・Reduce the number of connected I/O modules

Trouble No.8 ST is red ON

Trouble	Possible cause	Action
ST: Red ON	Communication breaks between fieldbus module and safety IO module.	Restarting the power supply. Turn the manifold power back on. If the problem persists even after powering it back on, the following may be causing a failure in safety communication inside the manifold. ・ An error has occurred that the safety IO module cannot recover from. ・The internal safety communication path of the fieldbus module is damaged. Replace the safety IO module and check if that improves the situation. If replacing the safety IO module does not improve the situation, replace the fieldbus module as well and check if that improves the situation.
	Detect an initialize error in Fieldbus module.	Restarting the power supply. If the problem persists, turn the power OFF and replace Fieldbus module that is causing the error.

Trouble No.9 ST is Red/green alternately flashing

Trouble	Possible cause	Action
ST: Red/green alternately flashing	Connection errors between modules	Turn off the power and check the installation of the manifold. ・Check the module connection connectors are not damaged. ・Check the joint brackets are not loose and are tightened to the correct torque. ・Check the intermediate reinforcement brackets are used correctly. ・Check the module connection connectors are not subjected to excessive loads on installation. If the problem persists, replace the module that is causing the error.
	I/O module failure	Identify the location of the error using the LCD display. You can also investigate using diagnostic data and EtherNet/IP objects. If the problem persists, turn the power OFF and replace the module that is causing the error.

Trouble No.10 US1/US2 is green flashing or OFF

Trouble	Possible cause	Action
US1: Green flashing	US1 detects under voltage	・Supply voltage within specifications ・Disable ”US1 monitoring” parameter
US1: OFF	US1 detects under voltage	Supply voltage within specifications
US2: OFF	US2 detects under voltage	Supply voltage within specifications

Trouble No.11　LCD displays “The configuration has been changed, please restart.”

Trouble	Possible cause	Action
LCD displays “The configuration has been changed, please restart.”	Change “IO-Linik master process data size” parameter.	Please try one of the following: ・Restarting the power supply ・Execute “Restart” via EtherNet/IP object (page 133) ・Execute reset service that supports EtherNet/IP.
	Change “IP address setting mode”.	Please try one of the following: ・Restarting the power supply ・Execute “Restart” via EtherNet/IP object (page 133) ・Execute reset service that supports EtherNet/IP.

Trouble No.12　PORT1/PORT2 LED is other than green flashing

Trouble	Possible cause	Action
PORT1 or PORT2: OFF	Ethernet link does not establish.	Please try one of the following: ・Check that the power supply to the upper EtherNet/IP device is turned on. ・Check for loose connectors or broken wires on the PORT1 and PORT2 communication cables.
PORT1 or PORT2: Green ON	Ethernet link establishes, however does not receive EtherNet/IP data.	Please try one of the following: ・Check the status of the PLC and set the PLC to RUN mode. ・Check for loose connectors or broken wires

Trouble No.13 MS is other than green

Trouble	Possible cause	Action
MS: Green flashing	Configuration is not completely.	Please complete the settings correctly. See 11 Hardware Configuration (page 96) for the detail.
	PLC is in Idle mode	Set PLC to RUN mode
MS: Red flashing	Detect diagnostics on related module.	Confirm the display for each module. Please refer to Troubleshooting No.2 to 10 in the display for countermeasures.
	Only applicable when Safety IO module is connected. The current IP address of the fieldbus module and the IP address of the safety IO module when TUNID is set are different.	Clear TUNID in Safety IO module by the safety reset. See the safety manual of Safety IO module. After clearing the TUNID, set the TUNID again in the safety IO module. See 11 Hardware Configuration (page 96) for the detail.
MS: Red ON	Detect an unrecoverable error	Check the LCD display and refer to trouble No. 7 to 9 based on the display contents to take appropriate measures. If the problem persists, turn the power OFF and replace the module that is causing the error.
MS: Red/green alternately flashing	TUNID does not set in Safety IO module	Set TUNID in Safety IO module. See 11 Hardware Configuration (page 96) for the detail.

Trouble No.14　NS is other than green ON

Trouble	Possible cause	Action
NS: OFF	The IP address does not set in Fieldbus module.	Set IP address in Fieldbus module. See 11.1 IP Address Settings (page 96) for detail.
	Communication cable disconnection	Check the communication status for EtherNet/IP ・Check the communication cable is broken. ・Check the power supply for upper connected device.
	The IP address setting is incorrect.	If the “IP mode” parameter is set to “Hardware mode,” check that a valid value is set, and it if an invalid value is set, correct valid value. Example of the invalid value, see 11.1.2 Set the IP address from the LCD display.(page 99) for detail
NS: Green flashing	EtherNet/IP communication is not established.	Please try one of the following: ・Check the IO data size is same as set on PLC and displayed on LCD. ・The Configuration Signature of Safety IO module is set in PLC. ・TUNID is set in Safety IO module ・Check the communication cable. ・Check ”Port* Interface” parameter is correctly. ・Communication cables are routed away from noise sources.
NS: Red/green alternately flashing	The TUNID does not set in Safety IO module.	Complete the TUNID setup.
NS: Red flashing	EtherNet/IP communication is timeout	Please try one of the following: ・Check the communication cable. ・Check ”Port* Interface” parameter is correctly. ・The amount of communication data on the communication line shouldn't be excessive. ・Communication cables are routed away from noise sources.
NS: Red ON	Duplicate the IP address.	Please set the IP address that is not yet in use on the network. For setting IP address, see 11.1 IP Address Settings (page 96) for detail.

Trouble No.15　The valve module connected to the safety IO module is not functioning properly.

Trouble	Possible cause	Action
Valve module does not operate correctly	The setting with PLC is not correctly.	Check the PLC configuration and make sure that all connections for non-safety data, safety inputs, and safety outputs are set correctly. The safety IO module will not operate even if settings are configured for only some connections. Also, check that the TUNID settings for the safety IO module are correct. See 11 Hardware Configuration (page 96) for the detail. of setting.
	The safety parameter for Safety IO module is not correctly.	Check the ST, FDI, FDO LED on Safety IO module. These LEDs are green flashing, Safety IO module will be detected the safety parameter does not set correctly. See the safety manual of Safety IO module for the detail for setting safety parameter.
	Safety IO module is in safe state.	Check the ST, FDO LED on Safety IO module. These LEDs are red flashing, Safety IO module will be detected some diagnostics. See troubleshooting in the safety manual of Safety IO module for the detail.
	US2 power supply is out of the specified range.	Supply voltage within the specified range to the US2 power supply. If the power supply takes a long time to start up, diagnostics may be detected before the power supply has fully started up. See troubleshooting in the safety manual of Safety IO module for the detail.
	Safety output will not be turn ON.	To turn the valve ON, not only the valve output but also the safety output should be turned ON.
	PLC will be in Idle mode, or Address errors in PLC control programs, etc.	Check the PLC status and settings is correctly.
	Valve module polarity mismatch.	Check that the polarity of the valve module in use (positive common/negative common) matches the valve output polarity of the safety IO module. See the safety manual of Safety IO module for detail of the specification.
	Mistaking addresses in control programs, etc.	Monitor the PLC status and check that the valve output signal address assignments and control program, etc. are correct.
	Connection errors between modules	Turn off the power and check the installation of the manifold. ・Check the module connection connectors are not damaged. ・Check the module connection connectors are not subjected to excessive loads on installation.
	Number of valve modules connected exceeds specifications	Check the number of valve modules connected to Safety IO module. See the safety manual for safety IO module for detail.
	Valve module failure	Replace the valve module and check the operation. heck the troubleshooting for the valve you are using.
	Safety IO module failure	Turn off the manifold power supply, replace Safety IO module, then turn the power back on and check the operation.

Trouble No.16　The ITV module connected to the safety IO module is not functioning properly.

Trouble	Possible cause	Action
ITV module does not operate correctly	The parameter for pressure is out of range.	Change the parameter so that the difference between “Maximum pressure” and “Minimum pressure” is greater than 410.
	US1 power supply is out of specified range.	Supply voltage within the specified range to the US1 power supply.
	Mistaking addresses in control programs, etc.	Monitor the PLC status and check that the output signal address assignment, endian, control program, etc. are correct.
	PLC will be in Idle mode, or Address errors in PLC control programs, etc.	Check the PLC status and settings is correctly.
	Connection errors between modules	Check the “ITV connection” status (page 134) in the EtherNet/IP object, or check the connection status on the ITV information menu (page 40) of the LCD display. If there is an ITV module in the “disconnect” state, check the following and confirm that there are no problems with the connection between the safety IO module and the ITV module. ・Check the module connection connectors are not damaged. ・Check the module connection connectors are not subjected to excessive loads on installation.
	ITV module detects *Abnormal*	See the instruction manual of ITV module for detail and replace ITV module.
	Number of ITV modules connected exceeds specifications	Check the number of ITV modules connected to Safety IO module. See the safety manual for safety IO module for detail.
	ITV module failure	Replace the ITV module and check the operation. Check the troubleshooting for the ITV module.
	Safety IO module failure	Turn off the manifold power supply, replace Safety IO module, then turn the power back on and check the operation.

Trouble No.17　Safety input device connected to the safety IO module is not functioning properly.

Trouble	Possible cause	Action
Safety input device does not operate correctly.	The setting with PLC is not correctly.	Check the PLC configuration and make sure that all connections for non-safety data, safety inputs, and safety outputs are set correctly. The safety IO module will not operate even if settings are configured for only some connections. Also, check that the TUNID settings for the safety IO module are correct. See 11 Hardware Configuration (page 96) for the detail. of setting.
	The safety parameter for Safety IO module is not correctly.	Check the ST, FDI, FDO LED on Safety IO module. These LEDs are green flashing, Safety IO module will be detected the safety parameter does not set correctly. See the safety manual of Safety IO module for the detail for setting safety parameter.
	Safety IO module is in safe state.	Check the FDI LED on Safety IO module. These LEDs are red flashing, Safety IO module will be detected some diagnostics. See troubleshooting in the safety manual of Safety IO module for the detail.
	US1 power supply is out of the specified range.	Supply voltage within the specified range to the US1 power supply. If the power supply takes a long time to start up, diagnostics may be detected before the power supply has fully started up. See troubleshooting in the safety manual of Safety IO module for the detail.
	PLC will be in Idle mode, or Address errors in PLC control programs, etc.	Check the PLC status and settings is correctly.
	Safety input device polarity mismatch.	Check that the polarity of the safety input device in use (PNP/NPN) matches the safety input polarity of the safety IO module. See the safety manual of Safety IO module for detail of the specification.
	Mistaking addresses in control programs, etc.	Monitor the PLC status and check that the safety input address assignments and control programs, etc. are correct.
	Miss-wiring, faulty connection	Check the connectors for looseness, wiring errors, and cable damage at locations where the safety input device is not working.
	Safety input device failure	Replace the connected safety input device.
	Safety IO module failure	Turn off the manifold power supply, replace Safety IO module, then turn the power back on and check the operation.

Trouble No.18 Safety output device connected to the safety IO module is not functioning properly.

Trouble	Possible cause	Action
Safety output device does not operate correctly.	The setting with PLC is not correctly.	Check the PLC configuration and make sure that all connections for non-safety data, safety inputs, and safety outputs are set correctly. The safety IO module will not operate even if settings are configured for only some connections. Also, check that the TUNID settings for the safety IO module are correct. See 11 Hardware Configuration (page 96) for the detail. of setting.
	The safety parameter for Safety IO module is not correctly.	Check the ST, FDI, FDO LED on Safety IO module. These LEDs are green flashing, Safety IO module will be detected the safety parameter does not set correctly. See the safety manual of Safety IO module for the detail for setting safety parameter.
	Safety IO module is in safe state.	Check the FDO LED on Safety IO module. These LEDs are red flashing, Safety IO module will be detected some diagnostics. See troubleshooting in the safety manual of Safety IO module for the detail.
	US2 power supply is out of the specified range.	Supply voltage within the specified range to the US2 power supply. If the power supply takes a long time to start up, diagnostics may be detected before the power supply has fully started up. See troubleshooting in the safety manual of Safety IO module for the detail.
	PLC will be in Idle mode, or Address errors in PLC control programs, etc.	Check the PLC status and settings is correctly.
	Safety output device polarity mismatch.	Check that the polarity of the safety output device in use (PNP/NPN) matches the safety output polarity of the safety IO module. See the safety manual of Safety IO module for detail of the specification.
	Mistaking addresses in control programs, etc.	Monitor the PLC status and check that the safety output address assignments and control programs are correct.
	Miss-wiring, faulty connection	Check the connectors for looseness, wiring errors, and cable damage at locations where the safety output device is not working.
	Safety output device failure	Replace the connected safety output device.
	Safety IO module failure	Turn off the manifold power supply, replace Safety IO module, then turn the power back on and check the operation.

Trouble No.19 Digital input device connected to the digital input module is not functioning properly.

Trouble	Possible cause	Action
Digital input device does not operate correctly.	Digital input device polarity mismatch.	Check that the polarity of the digital input device in use (PNP/NPN) matches the digital input polarity of the digital input module.
	US1 power supply is out of the specified range.	Supply voltage within the specified range to the US1 power supply.
	Miss-wiring, faulty connection	Check the connectors for looseness, wiring errors, and cable damage at locations where the digital input device is not working.
	Digital input device failure	Replace the connected digital input device.
	Digital input module failure	Replace the connected digital input module.

Trouble No.20 Digital output device connected to the digital output module is not functioning properly.

Trouble	Possible cause	Action
Digital output device does not operate correctly.	Digital output device polarity mismatch.	Check that the polarity of the digital output device in use (PNP/NPN) matches the digital output polarity of the digital output module.
	US2 power supply is out of the specified range.	Supply voltage within the specified range to the US2 power supply.
	Miss-wiring, faulty connection	Check the connectors for looseness, wiring errors, and cable damage at locations where the digital output device is not working.
	PLC will be in Idle mode, or Address errors in PLC control programs, etc.	Check the PLC status and settings is correctly.
	Digital output does not turn OFF during Communication error or idle mode.	Check that the “Hold all outputs” parameter of the fieldbus module is not set to “Hold all modules”. Also, check that the “DO Fault/Idle mode” parameter of each module is not set to “Hold” or “Force ON”.
	Mistaking addresses in control programs, etc.	Monitor the PLC status and check that the output address assignments, control program, etc. are correct.
	Digital output device failure	Replace the connected digital output device.
	Digital output module failure	Replace the connected digital output module.

Trouble No.21 IO-Link device connected to the IO-Linik master module is not functioning properly.

Trouble	Possible cause	Action
The C/Q LED on the IO-Link master module is off or orange.	The port setting is not in IO-Link communication mode.	When performing IO-Link communication, set the “Port mode” parameter to “IO-Link Manual” or “IO-Link Autostart”.
The C/Q LED on the IO-Link master module is flashing green (1 Hz).	IO-Link device not connected	Connect the IO-Link device.
The C/Q LED on the IO-Link master module is flashing green (2 Hz).	Data size is not correctly	Check the “Process data size” parameter of the IO-Link master. Set the process data size for each port to be greater than the process data size of the connected IO-Link device.
	Connection IO-Link device matching error	Please check the following parameters of the IO-Link master. - Check the "Port mode" parameter and change it to “IO-Link Autostart” if the device matching function is not required. - Check that the vendor ID and device ID of the connected IO-Link device are set in the “Vendor ID” and “Device ID” parameters. - Check that the IO-Link version determined by the “Validation & Backup” parameter matches the version of the connected IO-Link device.
	Data storage write error	Please write to the data storage again. For details about the data storage function, see 8.5.2 Data storage function (page 82).
The C/Q LED on the IO-Link master module is green ON, but the IO-Link device is not operating.	US1 power supply is out of the specified range.	Supply voltage within the specified range to the US1 power supply.
	P24 power supply is out of the specified range.	Supply voltage within the specified range of EX600-LBB1-A to the P24 power supply.
	Miss-wiring, faulty connection	Check the connectors for looseness, wiring errors, and cable damage at locations where the digital output device is not working.
	PLC will be in Idle mode, or Address errors in PLC control programs, etc.	Check the PLC status and settings is correctly.
	Mistaking addresses in control programs, etc.	Please check that the address allocation, data endianness, control program, etc. are correct. The data endianness can be swapped using the “Byte swap” parameter of the IO-Link master module.
	IO-Link device failure	Replace the connected IO-Link device.
	IO-Link master module failure	Replace the connected IO-Link master module.

8 Parameter setting

Each module has parameters that can be set for each module and channel.
Various parameters can be changed using the LCD display (page 30), explicit messages (page 132), or configuration assembly (page 121). The following table describes the parameters that can be set for each module.

> ⚠ Important:
> - When reusing modules that have already been modified with different protocols or other parameters, please reset them to factory default settings before use.
> - The safety parameters of the safety IO module are set in the process data. For details on how to set the safety parameters, refer to the Safety manual.

8.1 Fieldbus module parameters

No.	Name	Parameter description	settings	settings	factory default settings	parameter valid range
1	IP mode	Decide whether to assign IP addresses using software or by pressing buttons on the fieldbus module.	Remote mode	Set the IP address on the IP address setting software.	Remote mode	Module
			Hardware mode	Set the IP address using the buttons on the fieldbus module.		
			DHCP mode	Always obtains an IP address from the DHCP server. Cannot be selected while the safety IO module is connected.		
2	IP address	This is the IP address value for connecting to the EtherNet/IP network.	0.0.0.0 to 255.255.255.255	Set according to the PLC configuration. Refer to the page 96 for the setting method. When setting in "Hardware mode," settings that do not meet the IP address requirements will be disabled and will operate with the factory default values.	0.0.0.0	Module
3	Subnet mask		0.0.0.0 to 255.255.255.255		0.0.0.0	
4	Default gateway		0.0.0.0 to 255.255.255.255		0.0.0.0	
5	Port1 Interface	Set the communication speed and communication method for PORT1.	Autonegotiation	Select the communication speed and communication method appropriate for the link destination.	Autonegotiation	Module
			10Mbps Half duplex			
			10Mbps Full duplex			
			100Mbps Half duplex			
			100Mbps Full duplex			
6	Port2 Interface	Set the communication speed and communication method for PORT2.	Autonegotiation	Select the communication speed and communication method appropriate for the link destination.	Autonegotiation	Module
			10Mbps Half duplex			
			10Mbps Full duplex			
			100Mbps Half duplex			
			100Mbps Full duplex			

No.	Name	Parameter description	settings	settings	factory default settings	parameter valid range
7	QuickConnect	Configure the QuickConnect function. This parameter cannot be enabled if a safety IO module is connected.	Disable	Disable.	Disable	Module
			Enable	Enable. Cannot be set if a safety IO module is connected.		
8	US1 monitoring	Select whether to generate a diagnostic error when the US1 power supply voltage is approximately 19V or less.	Disable	No diagnostic errors occur.		Module
			Enable	Causes a diagnostic error.	Enable	
9	Hold all outputs	You can hold all output data for the entire system at once when there is a communication error or during communication idle time. However, this setting is not reflected in the ITV module, so you must set the parameters for the ITV module individually when holding data.	Depends on modules	Each module operates according to the settings of its “DO Fault/Idle mode” and “IO-Link Fault/Idle” parameters.	Depends on modules	Module
			Hold all modules	Holds the output data of all modules except the ITV module.		

8.2 Safety IO module parameters

8.2.1 Safety-related parameters

Safety parameters are set using safety output data. For details, refer to the Safety manual for the safety IO module.

8.2.2 Valve module related parameters

No.	Name	definition	settings	settings	factory default settings	parameter valid range
1	ON/OFF count limit	A diagnostic error occurs when the number of valve ON/OFF operations exceeds the set value.	Enable	A diagnostic error has occurred.		Module
			Disable	No diagnostic errors occur.	Disable	
2	Count limit value	When the “ON/OFF count limit” parameter is set to “Enable,” this determines the maximum number of ON/OFF operations that will cause a diagnostic error.	1 to 65535	The upper limit is determined by multiplying the set value by 1000. A diagnostic error occurs when the number of ON/OFF operations exceeds the upper limit.	65535	Channel

Important:

- The safety IO module detects short circuits in valves and turns off the valve output at the short-circuited location. It does not automatically reset. To turn it back on, turn off the corresponding valve output once or turn off all safety outputs.
- Regardless of the “Hold all outputs” parameter setting of the fieldbus module, the valve output will turn OFF when a communication error occurs or when the system is idle.

Note:

- The number of ON/OFF operations immediately after power is turned on is stored in the internal memory of each I/O module.
  Counting is restarted from the read value, and the value is stored in the internal memory every hour.

8.2.3 ITV module related parameters

No.	Name	definition	settings	settings	factory default settings	parameter valid range
1	Hold/Clear	Sets the output pressure control status during EtherNet/IP communication failure and idle time.	Pressure Clear	All exhaust is discharged.	Pressure Clear	Channel
			Pressure Hold	Maintains output pressure.		
2	Gain	Adjust the gain. You can change the responsiveness.	0 to 15	The gain can be adjusted from 0 to 15.	9	Channel
3	Sensitivity	Change sensitivity. The pressure correction operation near the set pressure will change.	0 to 7	Sensitivity can be adjusted from 0 to 7.	2	Channel
4	Minimum pressure	Set the minimum pressure (F_1).	0 to 3686	The value cannot be set to a value where maximum pressure - minimum pressure is less than 410. The following settings are available. ・Minimum pressure: 0% to 90% ・Maximum pressure: 10% to 120%	0	Channel
5	Maximum pressure	Set the maximum pressure (F_2).	410 to 4914		4095	Channel
6	Notification setting	When the set time is reached, a notification is displayed on the input data of the ITV module.	0 to 4294967295	0: Notification disabled, no notifications will be sent. 1 to 4294967295: Set in units of 1 hour.	0	Channel

Note:
- The “Hold all outputs” parameter setting of the fieldbus module is not reflected in the ITV module. To hold the outputs, use the “Hold/Clear” parameter.
- For details on parameters related to the ITV module, refer to the ITV module instruction manual.

8.3 Digital input module parameters

No.	Name	definition	settings	settings	factory default settings	parameter valid range
1	Input filtering time	Sets the time to ignore changes in the input signal.	0.1 ms 1.0 ms 10 ms 20 ms	Select the filtering time.	1.0 ms	Module
2	Input extension time	Sets the time to hold the input signal.	1.0 ms 15 ms 100 ms 200 ms	Select the time to hold the input signal.	15 ms	Module
3	ON/OFF count limit	An error occurs when the number of ON/OFF operations of the input signal exceeds the set value. *3	Enable	A diagnostic error has occurred.		Module
			Disable	No diagnostic errors occur.	Disable	
4	Count limit value	When “ON/OFF operation count monitoring” is enabled, this determines the upper limit for the number of ON/OFF operations that will cause a diagnostic error.	1 to 65000	The upper limit is determined by multiplying the set value by 1000. A diagnostic error occurs when the number of ON/OFF operations exceeds the upper limit.	65000	Channel

Note:

- The number of ON/OFF operations immediately after power is turned on is stored in the internal memory of each I/O module.
  Counting is restarted from the read value, and the value is stored in the internal memory every hour.

8.4 Digital output module parameters

No.	Name	definition	settings	settings	factory default settings	parameter valid range
1	Open circuit	A diagnostic error occurs when a disconnection is detected in the output device.	Disable	No diagnostic errors occur.	Disable	channel
			Enable	A diagnostic error has occurred.		
2	DO Fault/Idle mode	Determines the output status during communication abnormalities and communication idle states.	Clear	Turns the output OFF.	Clear	module
			Hold	Maintains output.		
			Force ON	Forces the output to ON.		
3	ON/OFF count limit	A diagnostic error occurs when the number of ON/OFF operations of the output device exceeds the set value.	Enable	A diagnostic error has occurred.		module
			Disable	No diagnostic errors occur.	Disable	
4	Count limit value	When “ON/OFF operation count monitoring” is enabled, this determines the upper limit for the number of ON/OFF operations that will cause a diagnostic error.	1 to 65000	The upper limit is determined by multiplying the set value by 1000. A diagnostic error occurs when the number of ON/OFF operations exceeds the upper limit.	65000	channel

Note:

- When the “Hold all outputs” parameter of the fieldbus module is set to “Hold all modules,” the “DO Fault/Idle mode” parameter settings of each module are disabled and always hold. Depending on the PLC model, the above settings may not be reflected during communication idle.
- The number of ON/OFF operations immediately after power is turned on is stored in the internal memory of each I/O module.
  Counting is restarted from the read value, and the value is stored in the internal memory every hour.

8.5 IO-Link master module parameters

8.5.1 Parameter List

No.	Name	definition	settings	settings	factory default settings	parameter valid range
1	Port mode	Set the operating mode of the IO-Link port.	Deactivated	Set as unused port.	Deactivated	Port (Channel)
			IO-Link Manual	IO-Link communication is started based on the IO-Link device matching function settings.		
			IO-Link Autostart	Start IO-Link communication without matching IO-Link devices.		
			Digital input C/Q	This is a port for digital input.		
			Digital output C/Q	This port is for digital output.		
2	Process data size	Set the process data size for each port of the IO-Link master.	2/2/2/2 byte : 32/32/32/32 byte	Determines the input/output process data size for ports 1, 2, 3 and 4. Available sizes: ・2 byte ・4 byte ・8 byte ・16 byte ・32 byte	2/2/2/2 byte	Module
3	Byte swap	Reorder the byte order of process data sent and received between EtherNet/IP communication and IO-Link communication.	No Swap	The data order will not be sorted. IO-Link device size: 10 bytes IO-Link master port size: 16 bytes In this case 0xJIHG FEDC BA98 7654 3210 ↓ 0x0000 0000 0000 JIHG FEDC BA98 7654 3210	No Swap	Port (Channel)
			Swap 16 bit	Sort by word. IO-Link device size: 10 bytes IO-Link master port size: 16 bytes In this case 0xJIHG FEDC BA98 7654 3210 ↓ 0x0000 0000 0000 HGJI DCFE 98BA 5476 1032		
			Swap 32 bit	Sorts by double words. IO-Link device size: 10 bytes IO-Link master port size: 16 bytes In this case 0xJIHG FEDC BA98 7654 3210 ↓ 0x0000 0000 HGJI 0000 98BA DCFE 1032 5476		
			Swap All	Sorts all bytes. IO-Link device size: 10 bytes IO-Link master port size: 16 bytes In this case 0xJIHG FEDC BA98 7654 3210 ↓ 0x1032 5476 98BA DCFE HGJI 0000 0000 0000		

Note:
- If the port size setting is 2 bytes, byte swapping will not occur even if Swap 32 bit is set.

No.	Name	definition	settings	settings	factory default settings	parameter valid range
4	IO-Link Fault/Idle	Decides how to handle IO-Link communication output process data when EtherNet/IP communication is abnormal or idle.	Clear/ PD Out valid	Clears the output of IO-Link devices. Output data value: Turn off all points Process data: Remains valid		Module
			Hold	Holds the output of IO-Link devices. Output data value: Retain Process data: Remains valid		
			Clear/ PD Out invalid	Operates according to the output settings for when IO-Link communication is invalid on the IO-Link device side. Output data value: Turn all points OFF. Process data: Invalid	Clear/ PD Out invalid	
5	DO Fault/Idle mode	This parameter sets the digital output signal for ports whose “IO-Link port operation mode” parameter is set to DO_C/Q during EtherNet/IP communication errors and communication idle times.	Clear	Turn off digital output.	Clear	Module
			Hold	Keeps digital output.		
			Force ON	Forces digital output to ON.		
6	Cycle time	Sets the communication interval with IO-Link devices. The minimum value for the configurable communication interval varies depending on the following factors. ・Minimum cycle time of IO-Link devices ・IO-Link communication speed ・Process data size	As fast as possible (AFAP)	Communicates at the fastest interval among the configurable communication intervals.	As fast as possible (AFAP)	Port (Channel)
			0.4ms to 132.8ms	Communicates at the set interval. If the parameter is set below the minimum value, the actual communication interval will be extended to the fastest value that can be set.		
7	Vendor ID	Set the vendor ID to be used when the IO-Link device matching function is enabled.	0x0000 to 0xFFFF	Set the vendor ID of the device to be connected	0x0001	Port (Channel)
8	Device ID	Set the device ID to be used when the IO-Link device matching function is enabled.	0x000000 to 0xFFFFFF	Set the device ID of the device to connect to.	0x000001	Port (Channel)

Note:
- When the “Hold all outputs” parameter of the fieldbus module is set to “Hold all modules,” the “IO-Link Fault/Idle” and “DO Fault/Idle mode” parameter settings of each module are disabled and always hold.
  Depending on the PLC model, the above settings may not be reflected during communication idle.

No.	Name	definition	settings	settings	factory default settings	parameter valid range
9	L+ control	When using only the P24 power supply, the L+ power supply can be turned off.	L+ ON	Turn the L+ power ON.	L+ ON	Port (Channel)
			L+ OFF	Turn off the L+ power supply.		
10	Validation & Backup	Perform matching with connected IO-Link devices (matching of vendor ID and device ID) and set the data storage (DS) function. Enabling the matching function allows you to detect when an incorrect IO-Link device is connected, and enabling the data storage function allows you to save the parameters of connected IO-Link devices in the internal memory of the IO-Link master. For details, refer to page 82.	No Device Check	Matching function: Disabled DS function: Disabled	No Device Check	Port (Channel)
			Type compatible Device V1.0	Connected device: V1.0 Matching function: Enabled DS function: Disabled		
			Type compatible Device V1.1	Connected devices: V1.1 Matching function: Enabled DS function: Disabled		
			Type compatible Device V1.1, Backup + Restore	Connected devices: V1.1 Matching function: Enabled DS function: Enabled (Backup & Restore)		
			Type compatible Device V1.1, Restore	Connected devices: V1.1 Matching function: Enabled DS function: Enabled (restore only)		

Important:

- When using the matching function, set the following parameters in advance.
  Set “Port mode” to “IO-Link Manual.”
  Set “Vendor ID” to the vendor ID value of the connected IO-Link device.
  Set “Device ID” to the device ID value of the connected IO-Link device.
- If you change “Port mode” to a setting other than “IO-Link Manual,”
  the parameter will automatically switch to “No Device Check.”

8.5.2 Data storage function

Set “IO-Link port operation mode” to IOL_Manual, and then set “IO-Link device matching settings/data storage function settings” to Type compatible, Device V1.1, Backup + Restore or Type compatible, Device V1.1, Restore to enable the data storage function.

- **Backup and Restore Overview**

  You can save the parameter setting data within each IO-Link device to the IO-Link master (referred to as “backup”).
  Additionally, when replacing an IO-Link device with one of the same type, you can transfer the parameter setting data backed up on the IO-Link master from the IO-Link master to the IO-Link device (referred to as “restore”).

- **Conditions for backup/restore operation when starting IO-Link communication**

  The operation of the data storage function is based on the data storage status in the IO-Link master and the parameter change status of the IO-Link device, as follows.

Validation & Backup	conditions			Data storage operation
	Data storage status	Backup request from device	Checksum comparison of data storage and device parameters	
No Device Check	–	–	–	clear
Type compatible, Device V1.0	–	–	–	clear
Type compatible, Device V1.1	–	–	–	clear
Type compatible, Device V1.1, Backup +Restore	with data	Upon request	–	backup
	with data	no requirements	discrepancy	restore
	with data	no requirements	match	do nothing
	no data	–	–	backup
Type compatible, Device V1.1, Restore	with data	Upon request	–	do nothing
	with data	no requirements	discrepancy	restore
	with data	no requirements	match	do nothing
	no data	–	–	do nothing

Important:

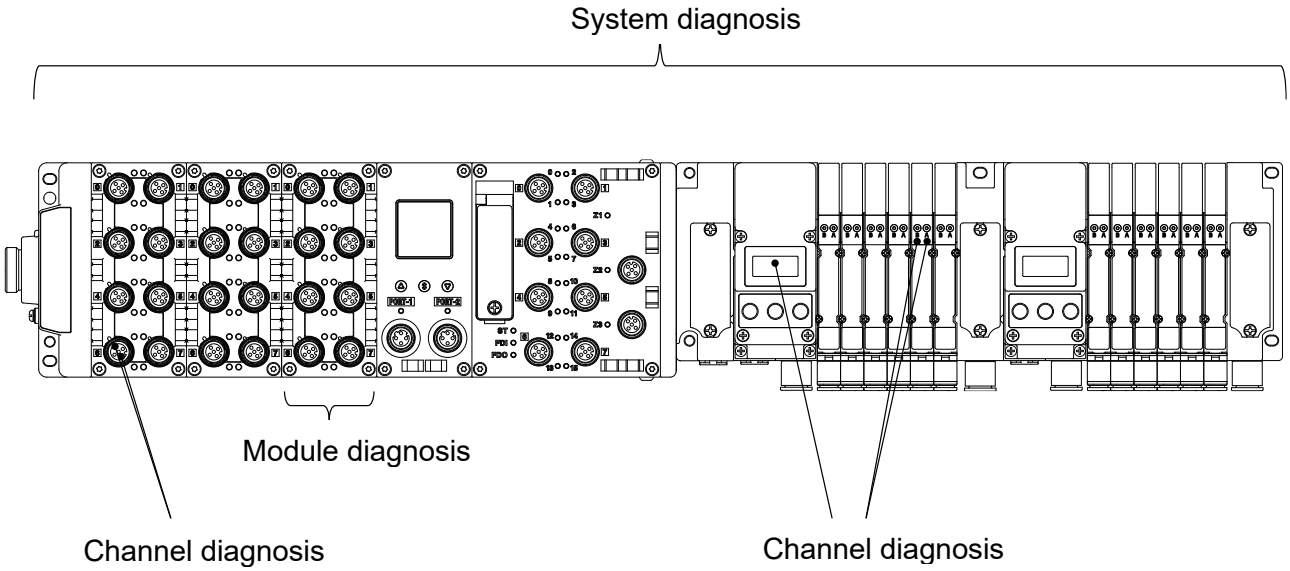
- If you change the vendor ID or device ID, the data storage will be cleared.
- Changing the IO-Link port operation mode to anything other than “IOL_Manual” will automatically switch the Validation & Backup value to “No Device Check.” As a result, the data storage will be cleared.

9 Diagnostics

9.1 Overview

The fieldbus module assigns the following diagnostic data to the beginning of the input process data.
The diagnostic input data is 0 during normal operation, but when a diagnostic error occurs, the data for the corresponding diagnostic location becomes 1.

input data byte	diagnostic data	Contents
0...1	system diagnosis	EX600 Error affecting the entire manifold (power supply voltage drop, etc.)
2	Module diagnosis	Errors that occur in each module (module failure, etc.)
3	Channel diagnosis	Errors occurring on each channel (output short circuit, etc.)
4...5	Diagnosis location	Among the above diagnostics, you can check which module the module diagnostics and channel diagnostics were generated in.



9.2 Diagnostic data

Byte	bit	Contents	range
0	0	1: The US1 power supply voltage has dropped below 19V.	system
	1	Reserved	
	2	1: Connection to the D side I/O module failed during startup.	
	3	1: Internal communication with the D side I/O module failed during startup.	
	4	1: Connection to the U side I/O module failed during startup.	
	5	1: Internal communication with the U side I/O module failed during startup.	
	6	1: The I/O size of the entire manifold exceeds the specifications.	
	7	1: The number of I/O modules connected exceeds the specifications.	
1	0	1: An I/O module was added or removed while the power was on.	
	1	1: Safe communication with the safe IO module has been lost.	
	2...7	Reserved	
2	0	1: The number of valve blocks in the valve module has changed.	module
	1	1: Some internal module functions are not working.	
	2	1: Internal communication with the corresponding I/O module has failed.	
	3	1: Module initialization failed.	
	4...7	Reserved	
3	0	1: The number of ON/OFF operations of the digital signal has exceeded the upper limit setting value.	channel
	1	1: Short circuit detected.	
	2	1: An abnormal diagnosis was detected in the ITV module.	
	3	1: Disconnection detected.	
	4...7	Reserved	
4	0	1: An error has occurred in module 0 (fieldbus module).	location of occurrence
	1	1: An error has occurred in Module 1.	
	2	1: An error has occurred in Module 2.	
	3	1: An error has occurred in Module 3.	
	4	1: An error has occurred in Module 4.	
	5	1: An error has occurred in Module 5.	
	6	1: An error has occurred in Module 6.	
	7	1: An error has occurred in Module 7.	
5	0	1: An error has occurred in Module 8.	
	1	1: An error has occurred in Module 9.	
	2	1: An error has occurred in Module 10.	
	3...7	Reserved	

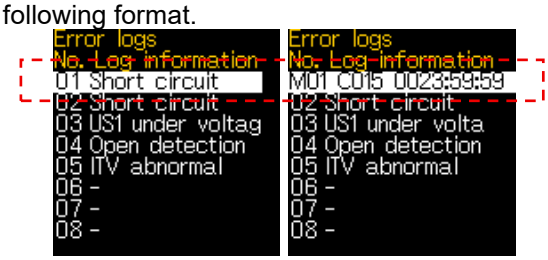
Note:
- When each bit of the diagnostic data is *0*, no diagnosis has occurred, and when it is *1*, a diagnosis has occurred.
- The diagnostic content and occurrence location are simultaneously set to *1*. In addition, if multiple diagnostic errors occur, all diagnostic contents are set to *1*.
  Example: If a short circuit is detected in Module No. 2 and Module No. 3, the following will be set to *1*.
  Byte 3 – bit 1
  Byte 4 – bit 2
  Byte 4 – bit 3

9.3 Diagnostic logs

The fieldbus module saves up to 30 diagnostic logs in its internal non-volatile memory each time a diagnostic occurs on the EX600 system. When the maximum number of logs is exceeded, the oldest logs are overwritten.
There are two ways to check the diagnostic logs. For detailed procedures, refer to the operation manual for each operation.

9.3.1 LCD display Check on LCD display

You can check the diagnostic log by switching to the error log screen of the LCD display.
You can check it in the following format.



- **Screen display contents**

display items	Contents
No.	This is the order in which diagnostic errors were recorded. No. 01 is the most recent. The No. is incremented each time an error occurs. When an error occurs with 30 errors recorded, No. 30 is deleted.
Error details	The text corresponding to the diagnostic error shown in the table below will be displayed.
M**	If the diagnostic error is a module diagnosis or channel diagnosis, the module number where the error occurred is recorded.
C***	If the diagnostic error is a channel diagnosis, the channel number where it occurred will be recorded.
****:**:**	This is the time when the diagnostic error was recorded. Measurement starts when the system is turned on, and when the power is turned off, the count starts again from 0000:00:00.

- **log content**

Contents	text
The US1 power supply voltage has dropped below 19V.	US1 under voltage
Connection to the D side I/O module failed during startup.	D Connection fault
Internal communication with the D side I/O module failed during startup.	D COM fault
Connection to the U side I/O module failed during startup.	U Connection fault
Internal communication with the U side I/O module failed during startup.	U COM fault
The I/O size of the entire manifold exceeds the specifications.	Too large I/O map
The number of I/O modules connected to the manifold exceeds the specifications.	Too many modules
An I/O module was added or removed while the power was on.	Hot swapping
Safe communication with the safe IO module has been lost.	Black channel fault
The number of valve blocks in the valve module has changed.	Changed valves
Some internal module functions are not working.	Hardware failure
Internal communication with the corresponding I/O module has failed.	Communication fault
Module initialization failed.	Initialization failure
The ON/OFF counter has exceeded the user-set limit value.	Over counter limit
A short circuit has been detected.	Short circuit
An *abnormal* diagnosis was detected in the ITV module.	ITV abnormal
A disconnection has been detected.	Open detection

9.3.2 Verification with EtherNet/IP objects

When you execute the error log acquisition (15.3 List of vendor-specific objects, page 133) using a vendor-specific EtherNet/IP object that can be read using Explicit Message Communication, you can check the log contents of the selected log number in the following format.

- **Error log acquisition format**

Byte	data	Contents
0...3	Error occurrence time [sec]	Displays the time in seconds when the diagnostic error was recorded. Measurement begins when the system is started, and restarts from 0 sec when the power is turned off.
4	module number	If the diagnostic error is a module diagnosis or channel diagnosis, the module number where the error occurred is recorded. In the case of a system diagnosis, 0x00 is read.
5	channel number	If the diagnostic error is a channel diagnosis, the channel number where the error occurred is recorded. In the case of system diagnosis or module diagnosis, 0x00 is read.
6	error code	An error code corresponding to the diagnostic error is read. Please refer to the table below for the corresponding codes.

- **Error Code Table**

Error code	Contents
0x00	No diagnostic errors have been recorded.
0x01	The US1 power supply voltage has dropped below 19V.
0x03	Connection to the D side I/O module failed during startup.
0x04	Internal communication with the D side I/O module failed during startup.
0x05	Connection to the U side I/O module failed during startup.
0x06	Internal communication with the U side I/O module failed during startup.
0x07	The I/O size of the entire manifold exceeds the specifications.
0x08	The number of I/O modules connected to the manifold exceeds the specifications.
0x09	An I/O module was added or removed while the power was on.
0x0A	Safe communication with the safety IO module has been lost.
0x11	The number of valve blocks in the valve module has changed.
0x12	Some internal module functions are not working.
0x13	Internal communication with the corresponding I/O module has failed.
0x14	Module initialization failed.
0x19	The ON/OFF counter has exceeded the user-set limit value.
0x1A	A short circuit has been detected.
0x1B	An *abnormal* diagnosis was detected in the ITV module.
0x1C	A disconnection has been detected.

9.4 Diagnosis of IO-Link master modules

The EX600 IO-Link master module has a diagnostic function for each port. The diagnostic contents are displayed by the LEDs and the PQI and event codes assigned to the process data inputs.
The LED display, PQI, and event codes for each diagnosis are as follows:

diagnostic error	Contents	Port LED status	PQI bit No. (Bit name)	event code
L+short circuit	Short circuit diagnosis of pins 1-3	red light	2 (PwrShort)	0x1806
P24 short circuit	Short circuit diagnosis of pins 2-5	red light	2 (PwrShort)	0x180F
C/Q short circuit	Short circuit diagnosis of pins 1-4 or 3-4	red light	3 (CQShort)	0x1804 0x1813
Connection device matching error	In a communication port with the "Port mode" parameter set to "IO-Link Manual" and the "Validation & Backup" parameter set to "Type compatible", the "Vendor ID" and "Device ID" parameters are compared with the read values from the connected IO-Link device, and an abnormality is diagnosed if there is a mismatch.	Green flashing 2Hz	0 (ID Mismatch)	0x1803
Device process data mapping error	When the “IO-Link Port mode” parameter is set to “IO-Link Manual” or “IO-Link Autostart”, if an IO-Link device with process data larger than the process data size mapped by the “Process data size” parameter is connected, an abnormality is diagnosed.	Green flashing 2Hz	1 (PDmapping-Mismatch)	0x1F01
Device not connected	Detects when no IO-Link device is connected when the “Port mode” parameter is “IO-Link Manual” or “IO-Link Autostart”.	Green flashing 1Hz	5 (DevCom)	0x1800
P24 voltage drop	Diagnoses power drop on pins 2-5 of EX600-LBB1-A (Class B type)	lights out (P24 LED)	–	0x180E

Note:
- Diagnosis other than short circuit detection (L+, P24, C/Q) is not reflected in the diagnostic data of the fieldbus module. For diagnosis other than short circuit detection, check the LED display or PQI of the IO-Link master module.
- When a process data mapping error occurs, all process data input and output values become zero.
- When no IO-Link device is connected, all process data input values are set to zero.

10 Input/output process data

10.1 Data size

The input/output process data used by the EX600 system when configuring upper-level communication varies depending on the connected modules and parameter settings. Calculate the total value of the input data size and output data size for each module and perform the configuration.

10.1.1 Byte count occupied by input/output of each module

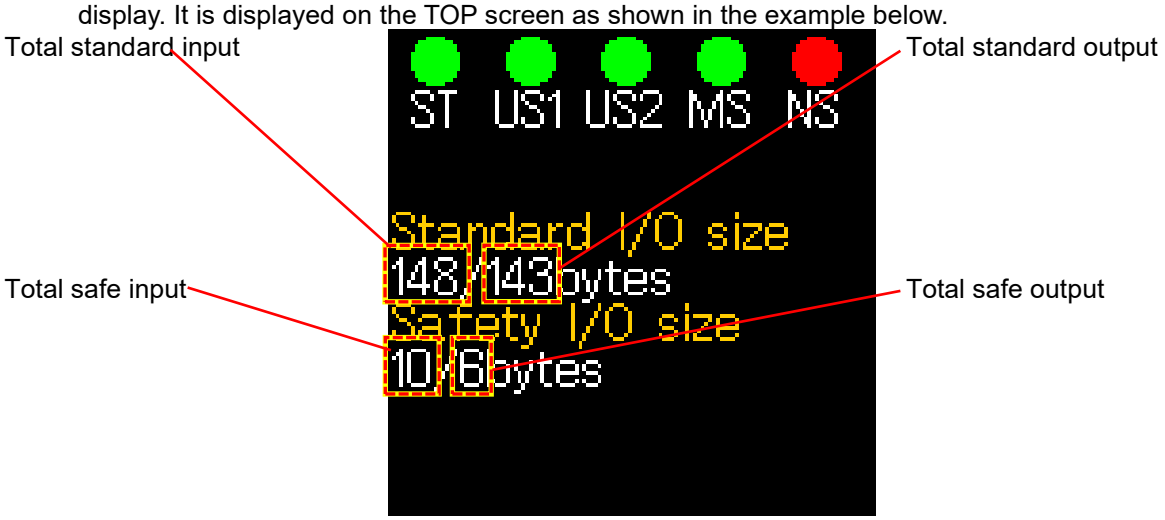
module name	Module part number	Number of bytes occupied [byte]			
		standard input	standard output	safe input	safe output
fieldbus module	EX600-BEN1	6	0	0	0
Safety IO module	EX600-FVC1	0	4	10	6
	EX600-FVC2	16	8 + Number of connection valve modules × 1	10	6
digital input module	EX600-DXPC-A	1	0	0	0
	EX600-DXPD-A	2	0	0	0
digital output module	EX600-DYPB-A	0	1	0	0
IO-Link master module	EX600-LAB1-A	IO-Link process data + 6 bytes of fixed data	IO-Link process data	0	0
	EX600-LBB1-A	IO-Link process data + 6 bytes of fixed data	IO-Link process data	0	0

Important:
- If the input or output data size exceeds 505 bytes, the PLC must support Large Forward Open. Check the data size that your PLC can handle.

Note:
- The fieldbus module occupies six bytes of standard input data for diagnostic data.
- For details on the input/output data of each ITV module, refer to the ITV module instruction manual.
- For details on the IO-Link master module input/output map, refer to page 90.
- When setting configuration assembly data, you need to create a configuration assembly data list according to the parameters you want to set. For details, refer to page 121. If you are not using configuration assemblies, set the data size to zero.

10.1.2 How to check the total input/output data size

The input/output process data size calculated by the fieldbus module can be checked on the LCD display. It is displayed on the TOP screen as shown in the example below.



10.2 IO-Link master module input/output map

The input/output map for the IO-Link master module (EX600-LAB1-A, EX600-LBB1-A) is shown below.
The input/output map consists of fixed data (StandardIO + PQI) and variable IO-Link process data.

constituent elements	Contents
StandardIO	This is the digital signal when the "Port mode" parameter is set to “Digital input C/Q” or “Digital output C/Q” and the digital input signal data assigned to pin 2 of the EX600-LAB1-A.
PQI	This is diagnostic data for each port. Port number × 1 byte is used. For details on the data, see 10.2.2 Port Status (PQI) Details (page 91).
IO-Link process data	Data size for each port determined by “IO-Link master process data size settings” parameter.

10.2.1 Input/Output Map

Example) IO-Link master process data size setting: 2/4/8/32 bytes

Byte	input map								output map							
	Bit 7							Bit 0	Bit 7							Bit 0
0 (StandardIO)	X2	X4	X2	X4	X2	X4	X2	X4		Y4		Y4		Y4		Y4
	port 4		port 3		port 2		port 1		port 4		port 3		port 2		port 1	
	digital input								digital output							
1 (StandardIO)	Reservation (fixed value: 0)								Reservation (fixed value: 0)							
2...3	Port 1 input process data (2 bytes)								Port 1 output process data (2 bytes)							
4...7	Port 2 process data (4 bytes)								Port 2 output process data (4 bytes)							
8...15	Port 3 input process data (8 bytes)								Port 3 output process data (8 bytes)							
16...47	Port 4 input process data (32 bytes)								Port 4 output process data (32 bytes)							
48	Port 1 Status (PQI)															
49	Port 2 Status (PQI)															
50	Port 3 Status (PQI)															
51	Port 4 Status (PQI)															

X2: Input signal for pin 2 (EX600-LAB1 only)
X4: Input signal on pin 4 when the IO-Link port operation mode is set to digital input mode (DI_C/Q).
Y4: Output signal of pin 4 when the IO-Link port operation mode is set to digital output mode (DO_C/Q).

Note:
- When no IO-Link device is connected, all port # input process data will be 0.
- When the received input process data becomes invalid (Process Data Invalid), the previous input process data value will be retained.

10.2.2 Port Status (PQI) Details

Input byte n	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	PQ	DevErr	DevCom	DSStatus	CQShort	PwrShort	PDmapping-Mismatch	ID-Mismatch

Bit	Name	Contents	value
0	ID-Mismatch	Connection device matching error	0: Match 1: Matching inconsistencies
1	PDmapping-Mismatch	Process data mapping size abnormality	0: Less than the set size 1: Size exceeded
2	PwrShort	L+ short circuit or P24 short circuit	0: No short circuit 1: Short circuit present
3	CQShort	C/Q short circuit	0: No short circuit 1: Short circuit present
4	DSStatus	Data storage (DS) storage status	0: DS save data error/No DS data 1: DS save data enabled
5	DevCom	port communication status	0: Device not connected 1: Operating or preoperative state
6	DevErr	Event status (Device or master event status)	0: No event or notification 1: Warning or Error
7	PQ	Received input process data valid/invalid	0: Invalid 1: Valid

10.3 Input/output map on EtherNet/IP communication

I/O data assigned to the EX600 system on EtherNet/IP communication is mapped in order starting from module No. 0. For the definition of module No., refer to 2.2 Specify Module No. and Channel No. (page 13).

The mapping has the following specifications.

・The fieldbus module occupies six bytes of diagnostic data.
・If the standard output data is zero bytes in total, two bytes of padding data will be added to the end of the map.
・If the total number of bytes in standard input or standard output data is odd, one byte of padding data is added to the end of the map.

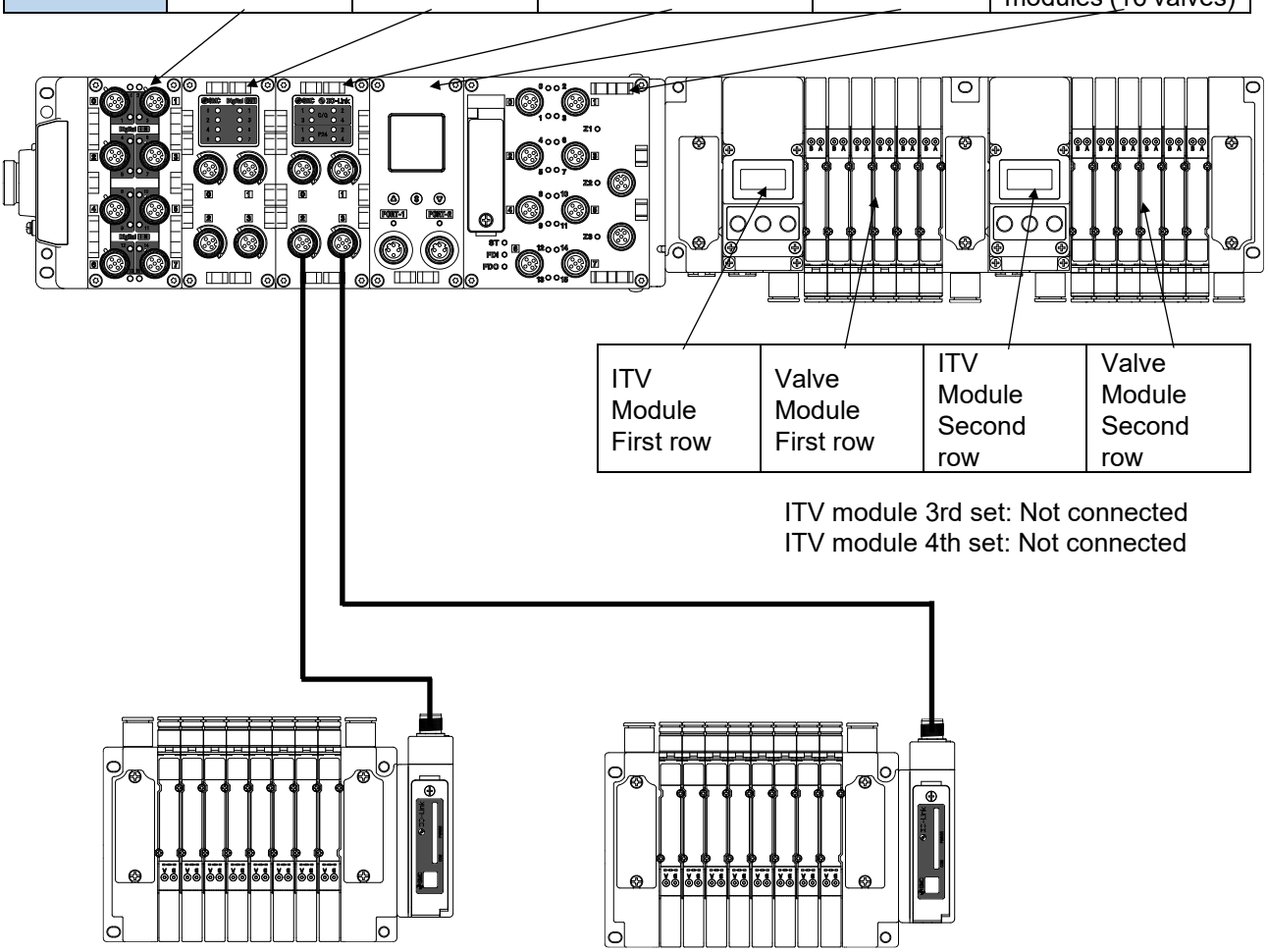
Important:

- The I/O map of the EX600 system is determined when the system is started up.
  When using an IO-Link master module, the number of occupied bytes can be changed with the “Process data size” parameter, but the I/O map will not change until the system is restarted.
  In addition, the I/O map will not change even if the U-side module is connected with its power turned on.
- The “Process data size” parameter of the IO-Link master module cannot be changed while EtherNet/IP communication is established.

10.3.1 Example of I/O map configuration

The following configuration is used as an example to explain the input/output map for EtherNet/IP communication.
The safety input/output map for the EX600-FVC2 safety IO module has been omitted. For details on the safety input/output map, refer to the Safety Manual for the safety IO module.

No.	module 1	module 2	module 3	module 0	module 4
product number	EX600-DXPD-A	EX600-DYPB-A	EX600-LBB1-A	EX600-BEN1	EX600-FVC2
input size	2 byte	0 byte	20 byte	6 byte	16 byte
output size	0 byte	1 byte	16 byte	0 byte	10 byte
parameter	-	-	“Process data size”: 2/0/4/8 byte settings	-	Number of valve modules connected: 2 modules (16 valves)



port 1	unconnected
	Process data not used

port 2	unconnected
	Process data not used

port 3	EX260-SIL1
	process data Input: 2 bytes Output: 4 bytes

port 4	EX260-SIL1
	process data Input: 2 bytes Output: 4 bytes

10.3.2 Input map example

EtherNet/IP	EX600 module internal map						
Byte 0	Module 0 BEN1	Byte 0	Diagnosis	Byte 0			
Byte 1		Byte 1		Byte 1			
Byte 2		Byte 2		Byte 2			
Byte 3		Byte 3		Byte 3			
Byte 4		Byte 4		Byte 4			
Byte 5		Byte 5		Byte 5			
Byte 6	Module 1 DXPD	Byte 0	input	bit 0 to 7			
Byte 7		Byte 1		bit 8 to 15			
Byte 8	Module 3 LBB1	Byte 0	StandardIO		**IO-Link communication**	**Internal map of connected devices**	
Byte 9		Byte 1					
Byte 10		Byte 2	Port 1 process data		Byte 0	0 (not connected)	
Byte 11		Byte 3			Byte 1		
Byte 12		Byte 4	Port 3 process data		Byte 0	EX260-SIL1 input process data	Byte0
Byte 13		Byte 5			Byte 1		Byte1
Byte 14		Byte 6			Byte 2	0 (no allocation)	
Byte 15		Byte 7			Byte 3		
Byte 16		Byte 8	Port 4 process data		Byte 0	EX260-SIL1 input process data	Byte0
Byte 17		Byte 9			Byte 1		Byte1
Byte 18		Byte 10			Byte 2	0 (no allocation)	
Byte 19		Byte 11			Byte 3		
Byte 20		Byte 12			Byte 4		
Byte 21		Byte 13			Byte 5		
Byte 22		Byte 14			Byte 6		
Byte 23		Byte 15			Byte 7		
Byte 24		Byte 16	Port 1 PQI				
Byte 25		Byte 17	Port 2 PQI				
Byte 26		Byte 18	Port 3 PQI				
Byte 27		Byte 19	Port 4 PQI				
Byte 28	Module 4 FVC2	Byte 0	ITV module 1st set	bitoffset 0 to 7			
Byte 29		Byte 1		bitoffset 8 to 15			
Byte 30		Byte 2		bitoffset 16 to 23			
Byte 31		Byte 3		bitoffset 24 to 31			
Byte 32		Byte 4	Second ITV module	bitoffset 0 to 7			
Byte 33		Byte 5		bitoffset 8 to 15			
Byte 34		Byte 6		bitoffset 16 to 23			
Byte 35		Byte 7		bitoffset 24 to 31			
Byte 36		Byte 8	ITV module 3rd set	0 (not connected)			
Byte 37		Byte 9					
Byte 38		Byte 10					
Byte 39		Byte 11					
Byte 40		Byte 12	ITV module 4th row	0 (not connected)			
Byte 41		Byte 13					
Byte 42		Byte 14					
Byte 43		Byte 15					

10.3.3 Output map example

EtherNet/IP	EX600 module internal map						
Byte 0	Module 2	Byte 0	output	bit 0 to 7			
Byte 1	Module 3	Byte 0	StandardIO		IO-Link communication	Internal map of connected devices	
Byte 2		Byte 1					
Byte 3		Byte 2	Port 1 process data		Byte 0	0 (not connected)	
Byte 4		Byte 3			Byte 1		
Byte 5		Byte 4	Port 3 process data		Byte 0	EX260-SIL1 output process data	Byte 0
Byte 6		Byte 5			Byte 1		Byte 1
Byte 7		Byte 6			Byte 2		Byte 2
Byte 8		Byte 7			Byte 3		Byte 3
Byte 9		Byte 8	Port 4 process data		Byte 0	EX260-SIL1 output process data	Byte 0
Byte 10		Byte 9			Byte 1		Byte 1
Byte 11		Byte 10			Byte 2		Byte 2
Byte 12		Byte 11			Byte 3		Byte 3
Byte 13		Byte 12			Byte 4	0 (unused)	
Byte 14		Byte 13			Byte 5		
Byte 15		Byte 14			Byte 6		
Byte 16		Byte 15			Byte 7		
Byte 17	Module 4	Byte 0	First row of valve modules				
Byte 18		Byte 1	Second valve module				
Byte 19		Byte 2	ITV module 1st set	bitoffset 0 to 7			
Byte 20		Byte 3		bitoffset 8 to 15			
Byte 21		Byte 4	Second ITV module	bitoffset 0 to 7			
Byte 22		Byte 5		bitoffset 8 to 15			
Byte 23		Byte 6	ITV module 3rd row	0 (not connected)			
Byte 24		Byte 7					
Byte 25		Byte 8	ITV module 4th set	0 (not connected)			
Byte 26		Byte 9					
Byte 27	padding	Byte 0	0 (unused)				

Note:
- For details on the input/output data of the ITV module, refer to the ITV module instruction manual.

11 Hardware Configuration

11.1 IP Address Settings

An IP address must be configured to connect to the EtherNet/IP network.
There are two methods for configuring the IP address of the EX600-BEN1 fieldbus module: using IP address configuration software or using the LCD display.
The following describes each configuration method.

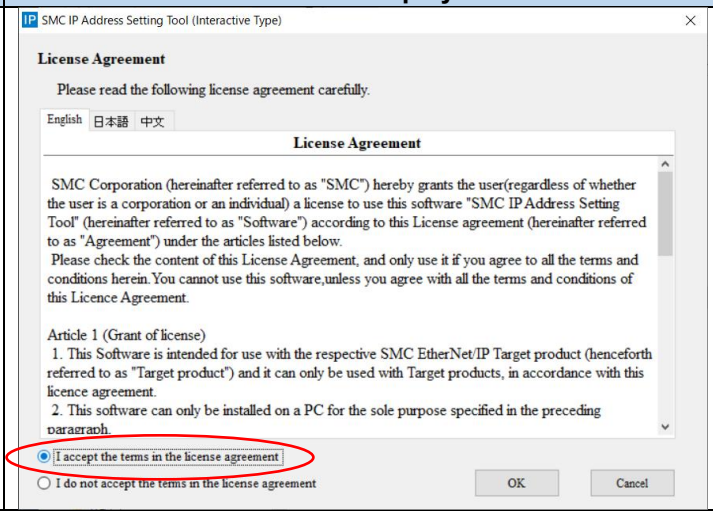
11.1.1 IP addressing procedure by the IP Address Setting Tool

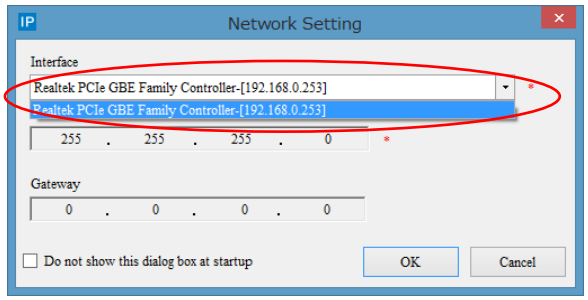
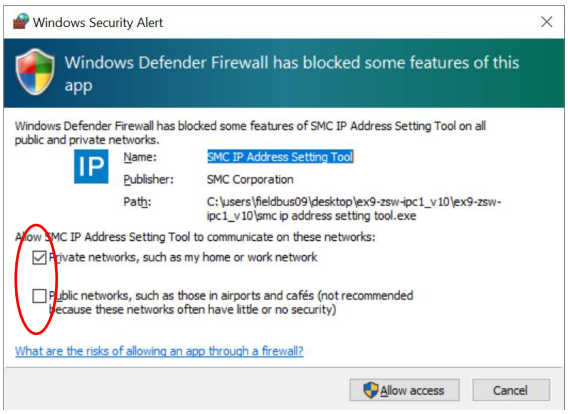
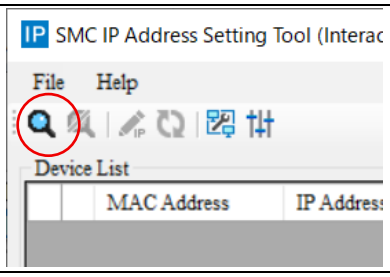
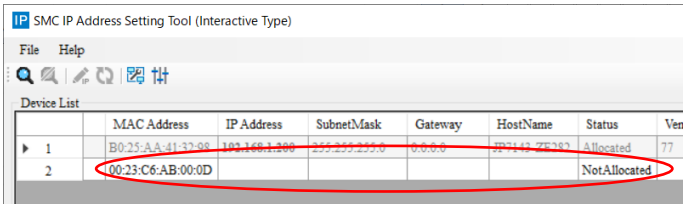
When “IP Address Setting Mode” is set to the default Remote Control mode, you can set the IP address using the setting software from your PC.
As an example, we will describe how to set the IP address using the IP address setting software (EX9-ZSW-IPC1) available for download from our website (Tool Download Page).

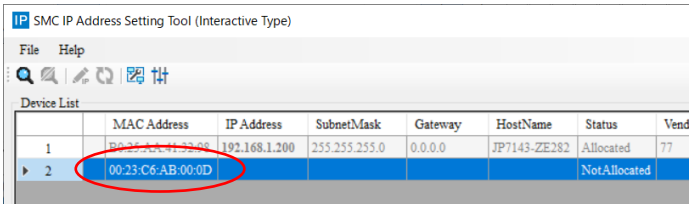
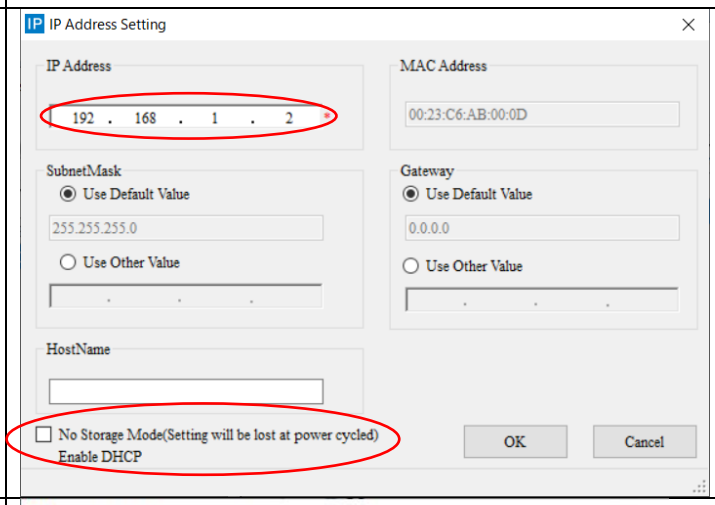
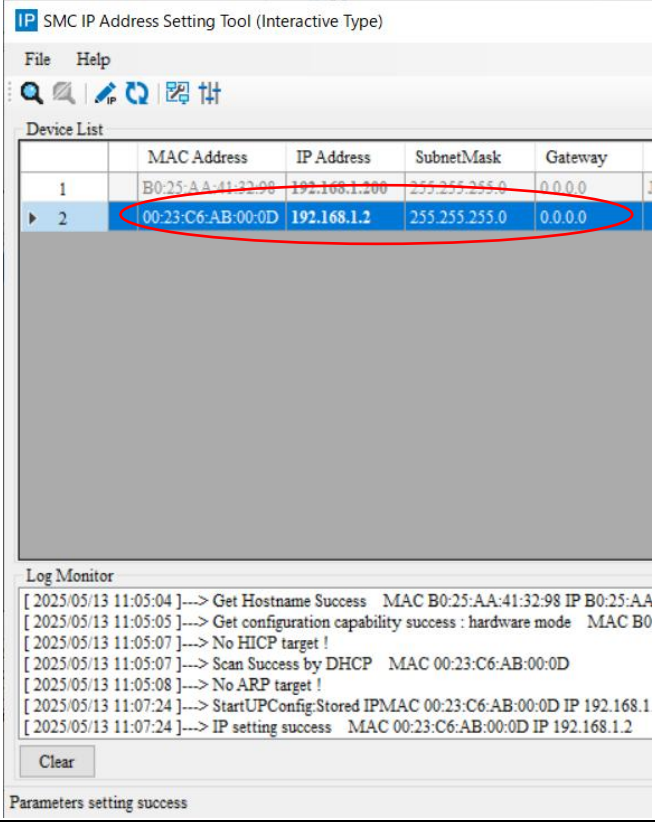
Follow steps (1) to (8) below to configure the IP address settings.

Important:

- If a safety IO module with TUNID settings is connected, the IP address cannot be changed. If you want to reset the IP address of the fieldbus module, delete the TUNID using Safety reset. For details on how to perform Safety reset, refer to the Safety manual of the safety IO module.
- The IP address cannot be changed while EtherNet/IP communication is established.

No.	screen display	Procedure details
1		When you start EX9-ZSW-IPC1, the license agreement screen will appear. If you agree to the terms, select **I accept the terms in the license agreement** and click **OK**.

No.	screen display	Procedure details
2		The Network Setting dialog box appears. Select the network interface to which the communication cable is connected. After selecting the interface, click **OK**.
3		When you first start the app, Windows security features may display an “Important Windows Security warning” related to the firewall. In this case, make sure that **Private networks** or **Public networks** is checked, then select **Allow access**.
4		The main screen will be displayed. Click 🔍 to check the Ethernet devices connected to the network.
5		The scanned Ethernet devices are displayed. If the IP address has not been set, only the MAC address is displayed. At this time, if any of the following products are detected, they will be grayed out. - Fieldbus modules with the “IP mode” parameter set to “Hardware mode” - Products with IP addresses set by switches - Products not supported by the tool

No.	screen display	Procedure details
6		Double-click the row displaying the MAC address on the product label of the device (page 24) for which you want to set the IP address.
7		The IP address settings screen will appear. After entering the settings, click the **OK**. *: When setting the remote control mode, uncheck **No Storage Mode** to retain the IP address.
8		Once the setting is complete, the IP address value will be displayed on the main screen. “Parameters setting success” will also be displayed in the bottom left. If an IO module with TUNID configured is connected, “Some parameters setting failed” may be displayed. The IP address will be set, but the IP address will not be retained when the power is turned off.

11.1.2 Set the IP address from the LCD display.

You can set the IP address without using any tools by operating the LCD display. Follow the steps (1) to (8) below to operate the screen.

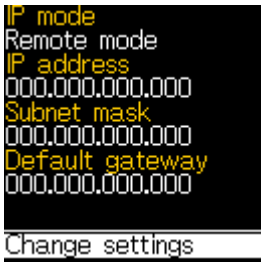
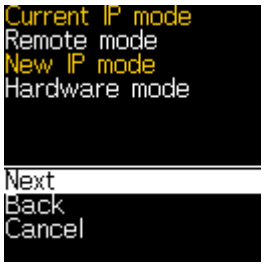
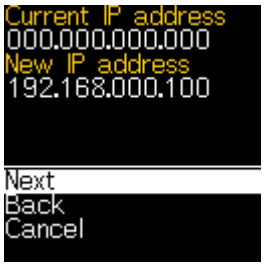
Important:

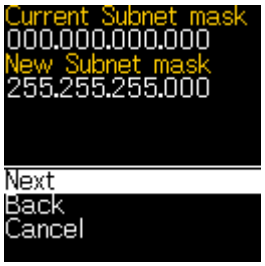
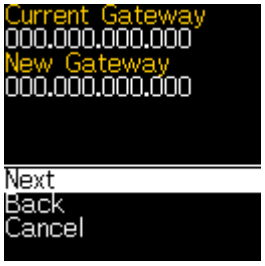
- If a safety IO module with TUNID settings is connected, the IP address cannot be changed. If you want to reset the IP address of the fieldbus module, delete the TUNID using Safety reset. For details on how to perform Safety reset, refer to the Safety manual for the safety IO module.
- The IP address cannot be changed while EtherNet/IP communication is established.

Note:

- Changing the IP address from the LCD display will take effect after the system is restarted.
- Do not set invalid IP addresses, subnets, or gateways as shown below.
  If an invalid setting is made, the system will operate with the factory default IP address.
  -The host part of the IP address is all 0 (network address) or all 1 (broadcast address).
  -The first octet of the IP address is 0, 127, or 224 or higher.
  - Subnet mask values are discontinuous, such as 254.255.255.0.
  - Specify the broadcast address or network address as the gateway address.

No.	screen display	Procedure details
1		Press and hold △+▽ on the TOP screen to move to the next screen.
2		With “IP address setting” selected, press Ⓢ.

No.	screen display	Procedure details
3		The current value is displayed. (Factory default settings: IP mode: Remote mode, IP address: 0.0.0.0) Press Ⓢ to start settings.
4		A screen operation password is required to change the P address. Select a number with △/▽ and enter it with Ⓢ. Factory default setting: 0000
5		The “IP Settings Mode” selection screen will appear. Switch to “Hardware mode” with ▽ and confirm with Ⓢ. After confirming, select **Next** and press Ⓢ to proceed to the next parameter.
6		The “IP Address” settings screen will appear. Decide on the first octet, then proceed in order. Select a number for △/▽, then press Ⓢ to move to the next octet. Once you have decided on all octets, press Ⓢ while selecting **Next** to proceed to the next parameter.

No.	screen display	Procedure details
7		The “Subnet Mask” settings screen will appear. Decide on a number in the same way as for the IP address.
8		The “Gateway Address” settings screen will appear. Decide on a number in the same way as for the IP address. Once you have decided on a number for the gateway address, all IP address settings will be finalized.
9		Once the IP address settings are complete, restart the device to apply the settings. Select **Restart now** to restart the device and apply the settings. If you select **Reset later**, please restart the device yourself.

11.2 Configuration to PLC

To configure the EX600 manifold for a PLC, use the configuration software provided by each PLC manufacturer (e.g., Rockwell Automation's Studio 5000 Logix Designer®).
For detailed operating procedures, refer to the manual for each configuration software.
The following explanation of the configuration process uses the screen of Studio 5000 Logix Designer® Version 37 as an example.

11.2.1 Configuration using EDS files

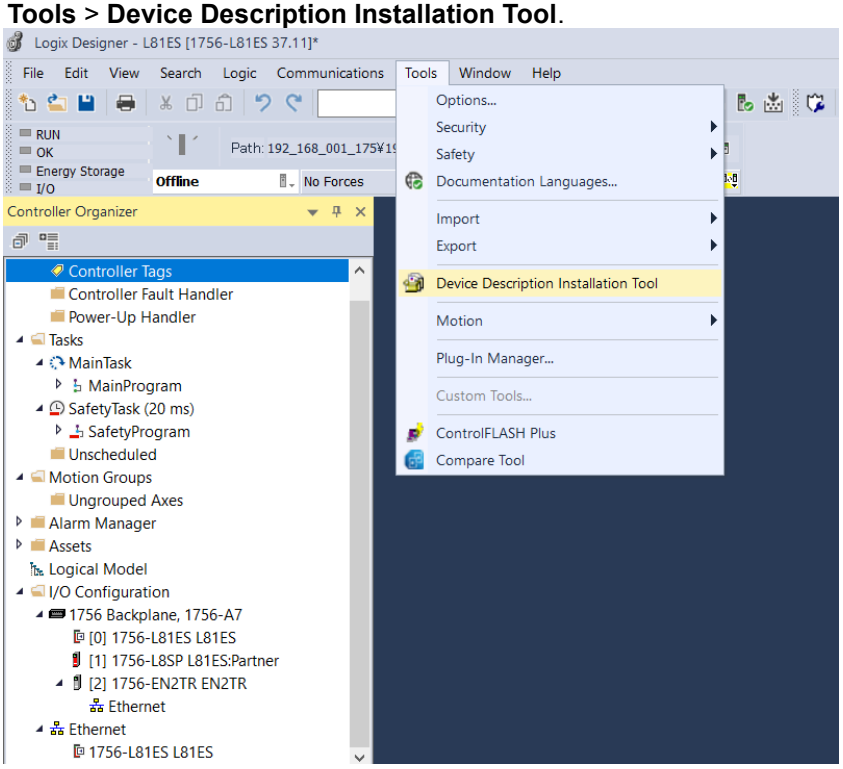
- **Obtaining the configuration file (EDS file)**

When configuring the EX600 system to a PLC, you can use a dedicated EDS file.
In addition, to display the EX600 icon on the configuration software, you must use a dedicated icon file.
The EDS file and icon can be downloaded from the URL below.
URL: https://www.smcworld.com/manuals/en-jp/

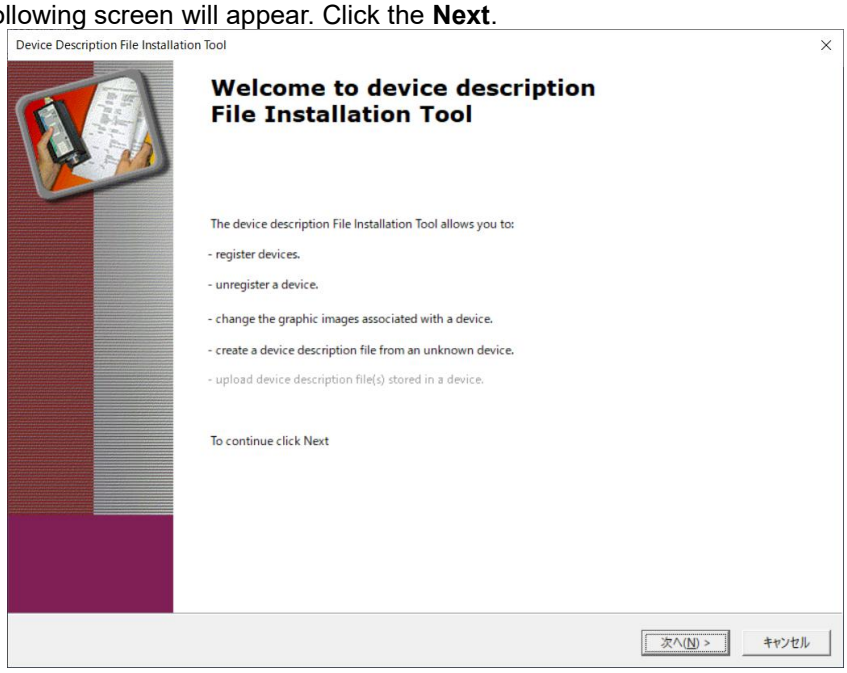
item	file name
EDS file with safety connection	ex600_fvc_v11.eds
icon file	ex600-fvc.ico

- **Install EDS file**

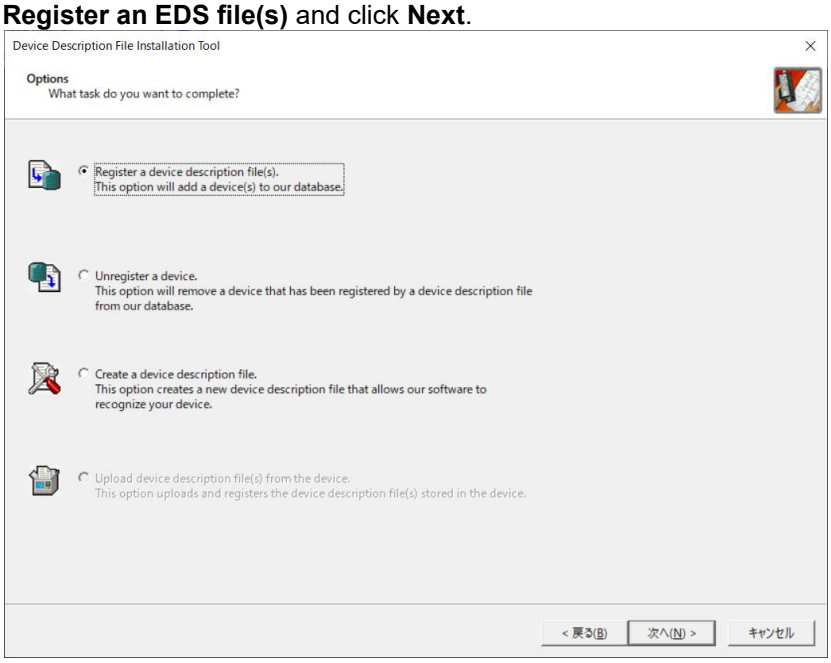
1) Select **Tools** > **Device Description Installation Tool**.



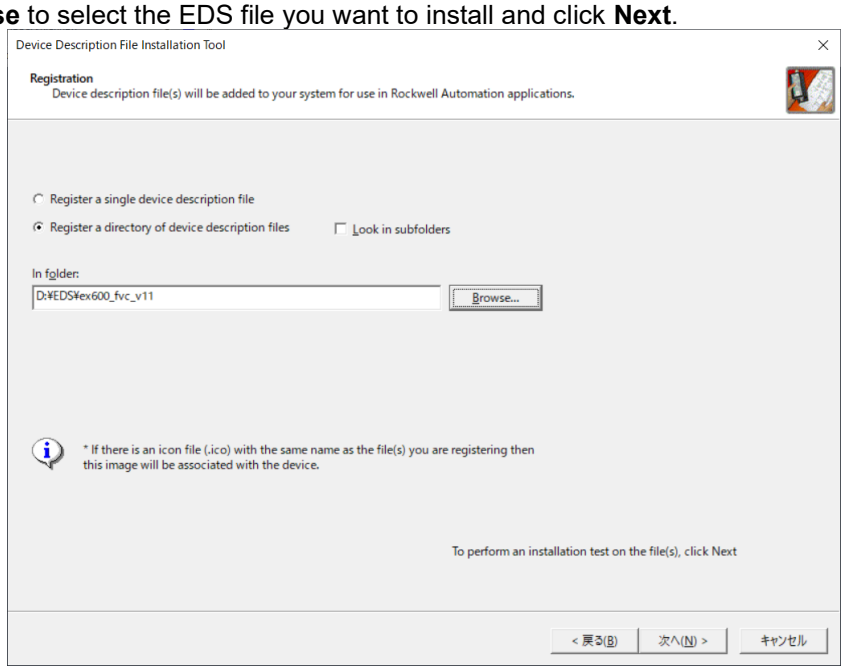
2) The following screen will appear. Click the **Next**.



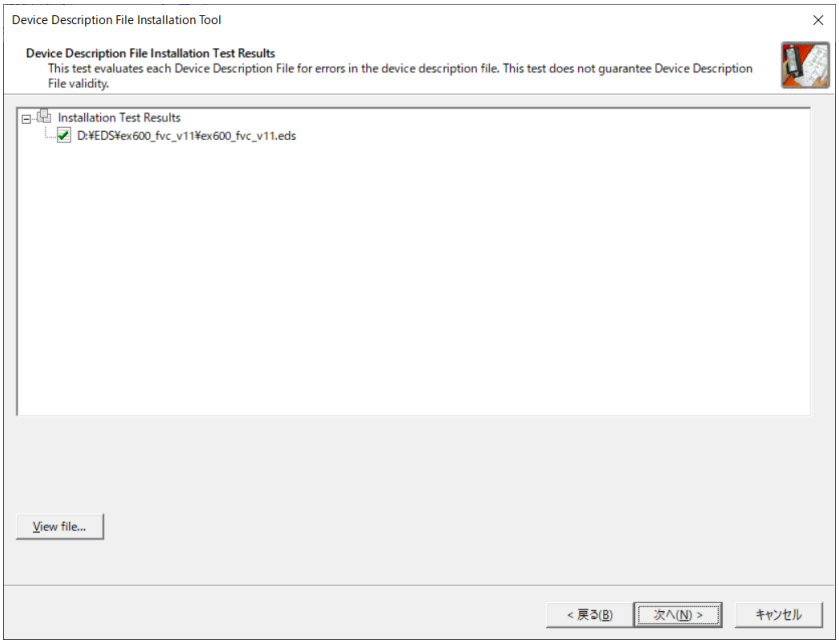
3) Select **Register an EDS file(s)** and click **Next**.



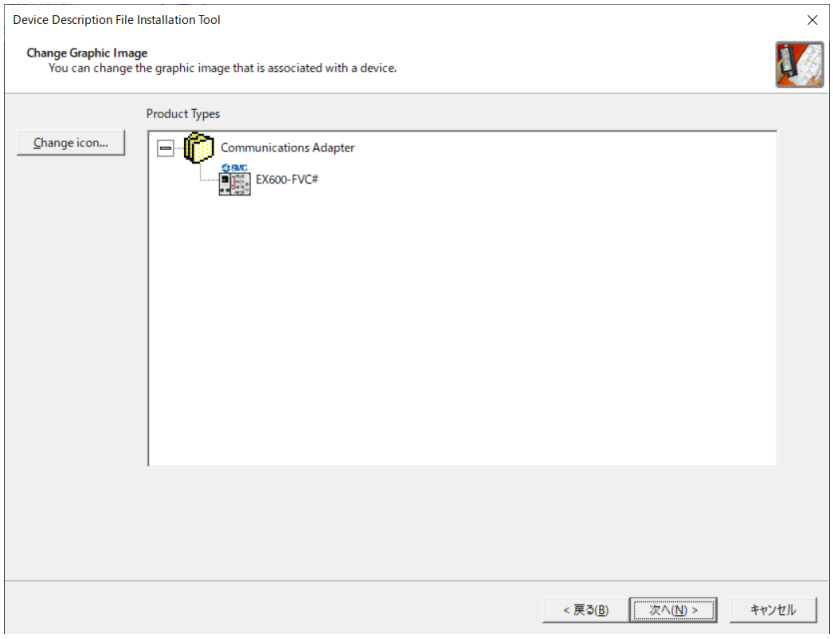
4) **Browse** to select the EDS file you want to install and click **Next**.



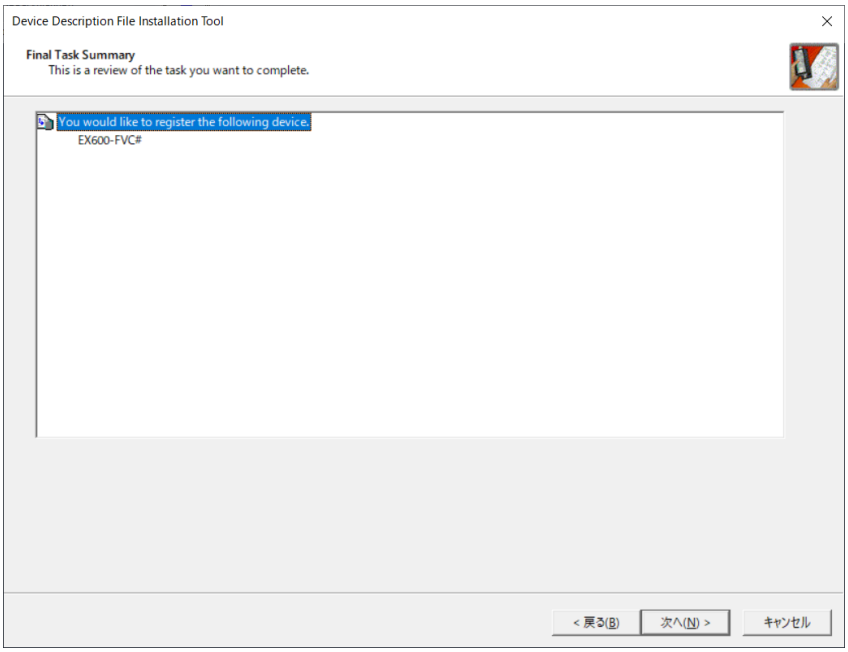
5) The installation test results will be displayed, so click **Next**.



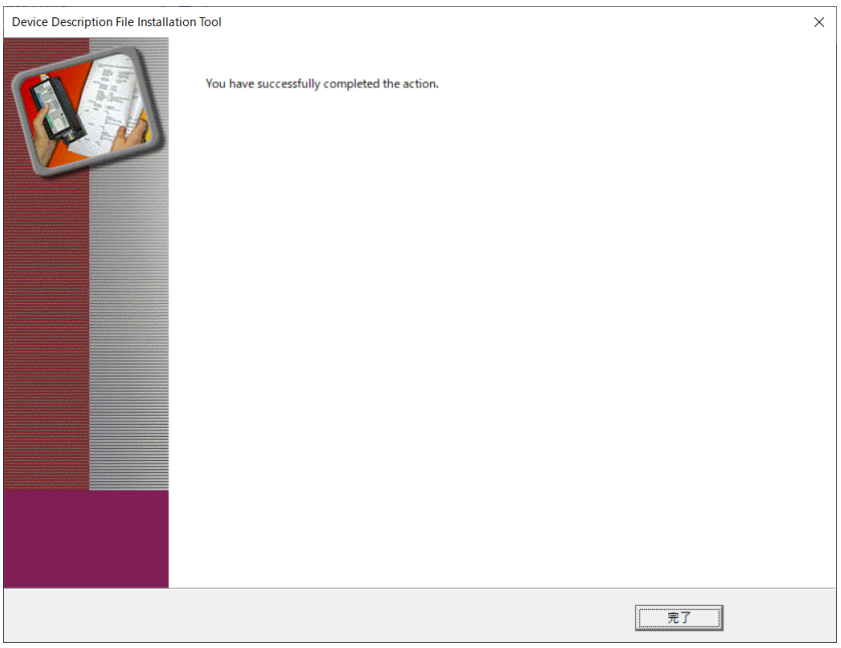
6) Check the icon you want to use and click Next.



7) Final Task Summary will be displayed, so click **Next**.

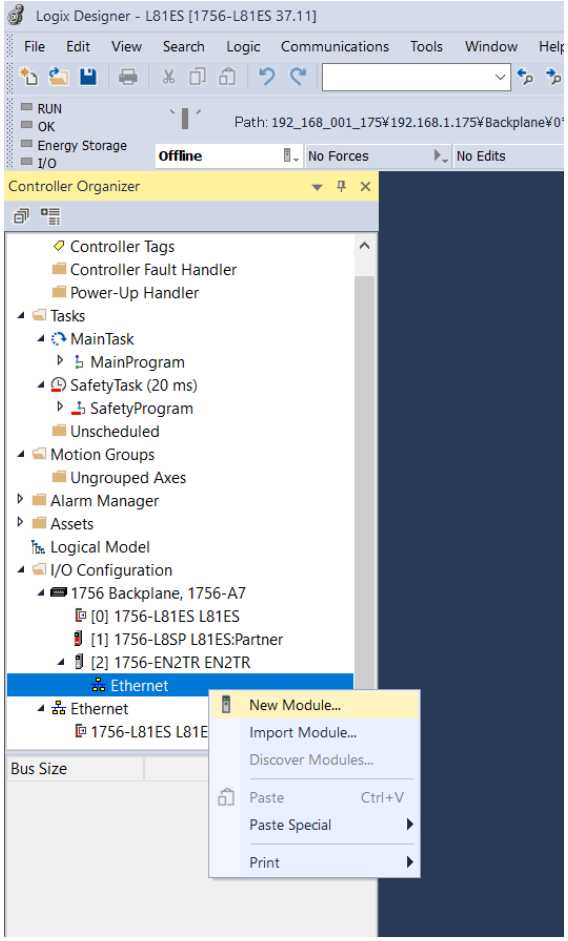


8) When the following screen appears, the EDS installation is complete.

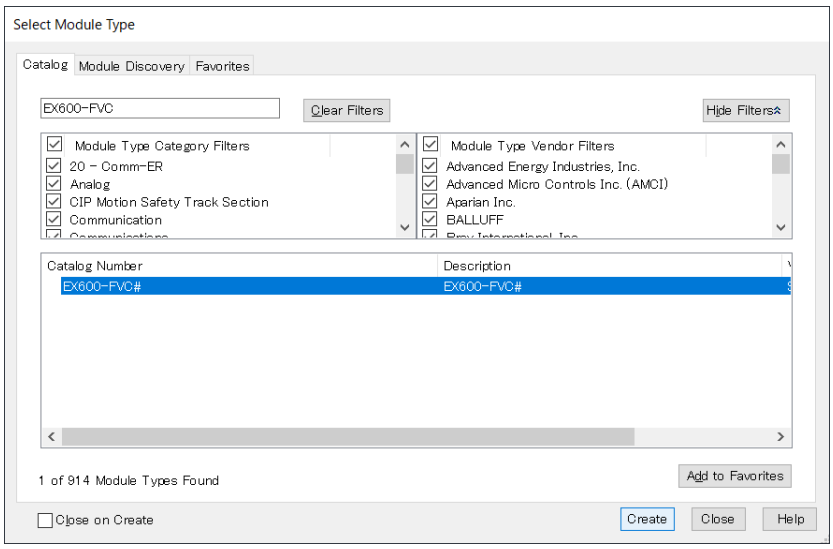


- **Module configuration**

1) After registering EDS, select **Ethernet** in the **I/O Configuration** folder, right-click, and select **New Module**.

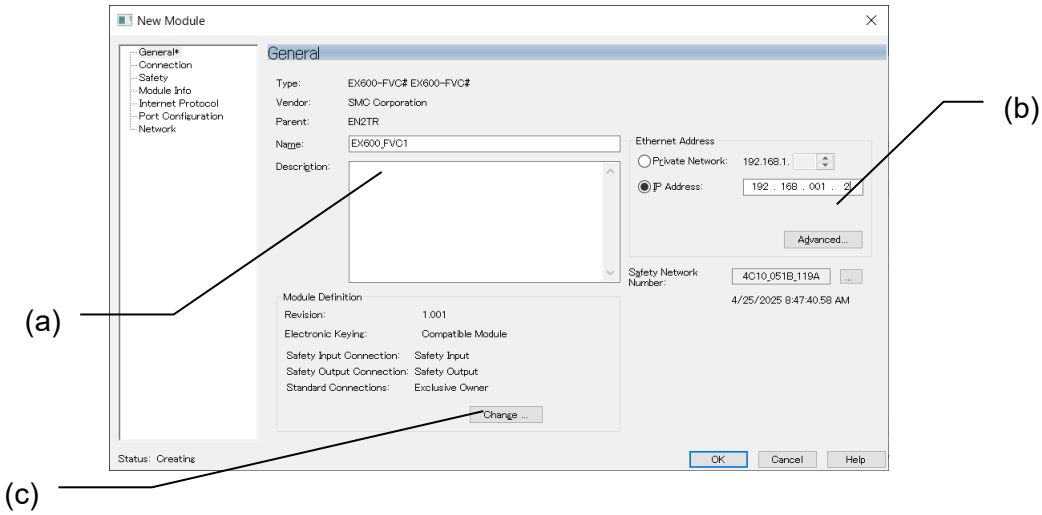


2) Search for **EX600-FVC#** on the **Select Module Type** dialog. Once you find it, click **Create**.

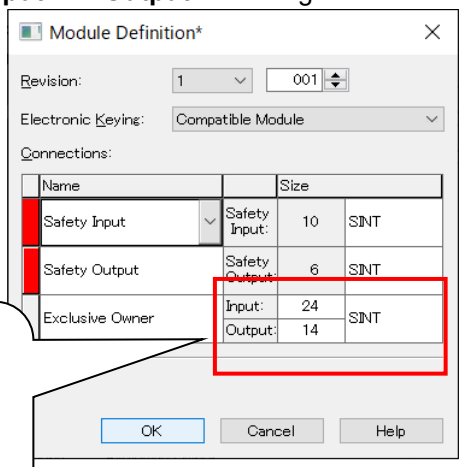


3) The **New Module** screen will appear. Please configure the following settings.

(a) **Name** : Any manifold name (e.g., *EX600_FVC1*)
(b) **IP Address** : The IP address set for the fieldbus module (e.g., *192.168.1.2*)
(c) **Module Definition** : Click the **Change** button.

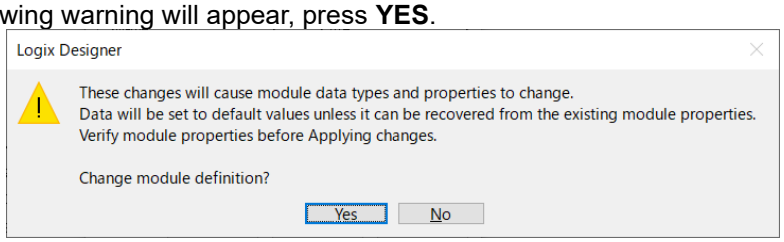


(d) Module Definition: Click **Change** to display the **Module Definition** dialog. Set the standard input and output data sizes for **Input** and **Output** according to the manifold configuration, and click OK.

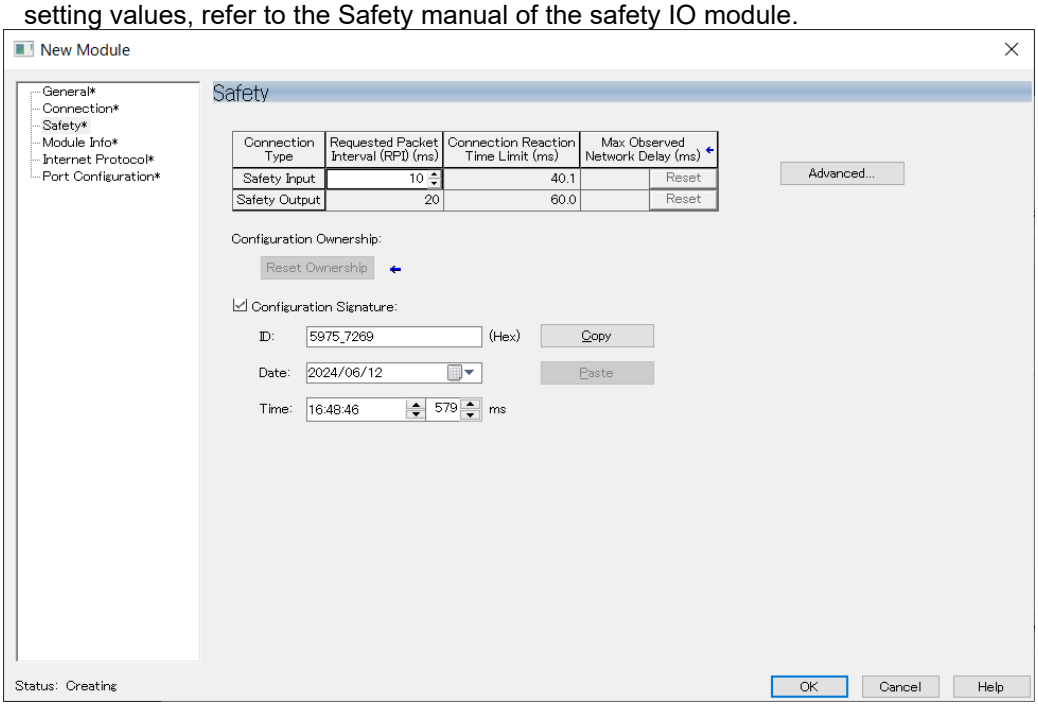


For information on how to calculate the standard input and output data size, see 10.1.1 Byte count occupied by input/output of each module (page 88), and for information on how to check on the actual manifold, see 10.1.2 How to check the total input/output data size (page 89).page).

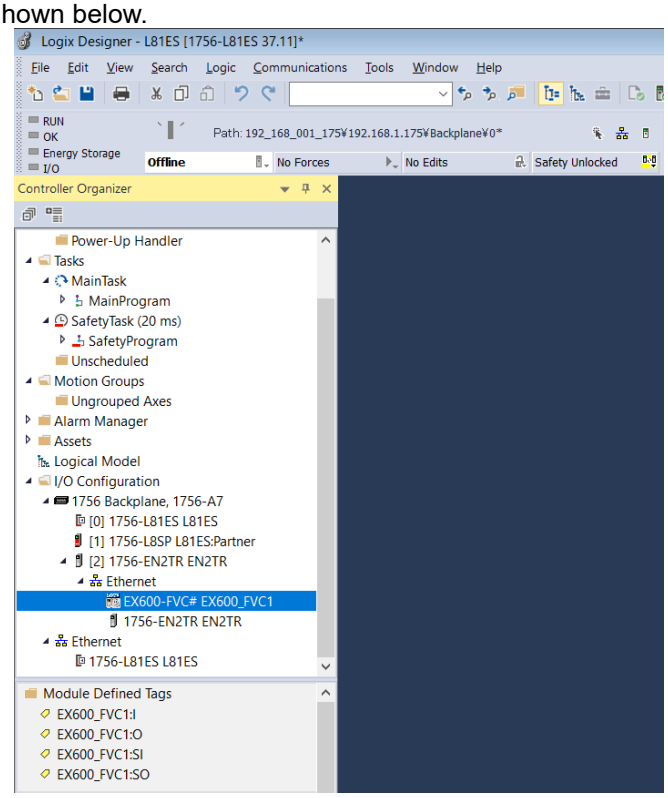
4) The following warning will appear, press **YES**.



5) After completing the Module Definition settings, enter the **Configuration Signature** of the safety IO module in the Safety menu on the **New Module** screen.
For details on the **Configuration Signature**, **ID** (SCCRC), **Date and Time** (SCTS) and the setting values, refer to the Safety manual of the safety IO module.

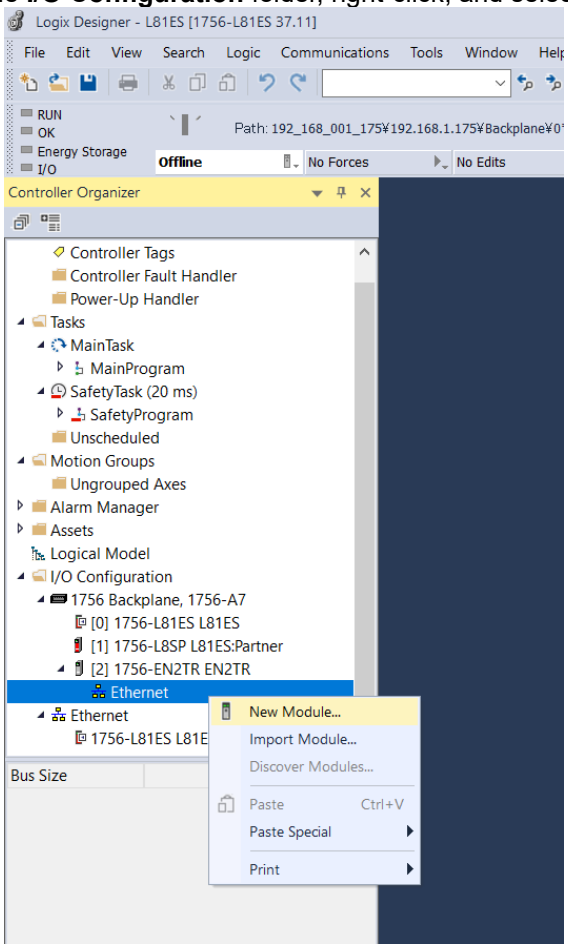


6) After completing all the settings, close the screen by clicking **OK** and the device settings will be reflected as shown below.

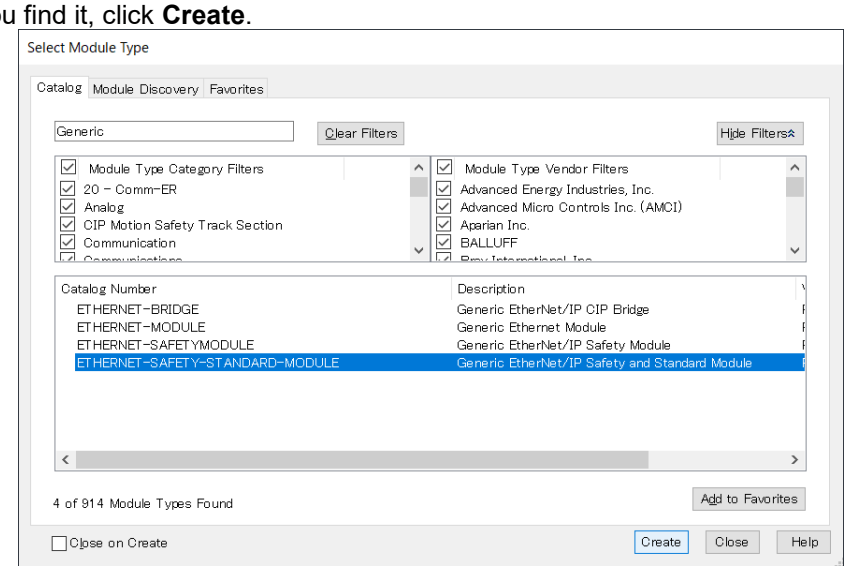


11.2.2 Configuration using Generic Module

1) Select **Ethernet** in the **I/O Configuration** folder, right-click, and select **New Module**.



2) Search for **Generic EtherNet/IP Safety and Standard Module** on the **Select Module Type** dialog. Once you find it, click **Create**.

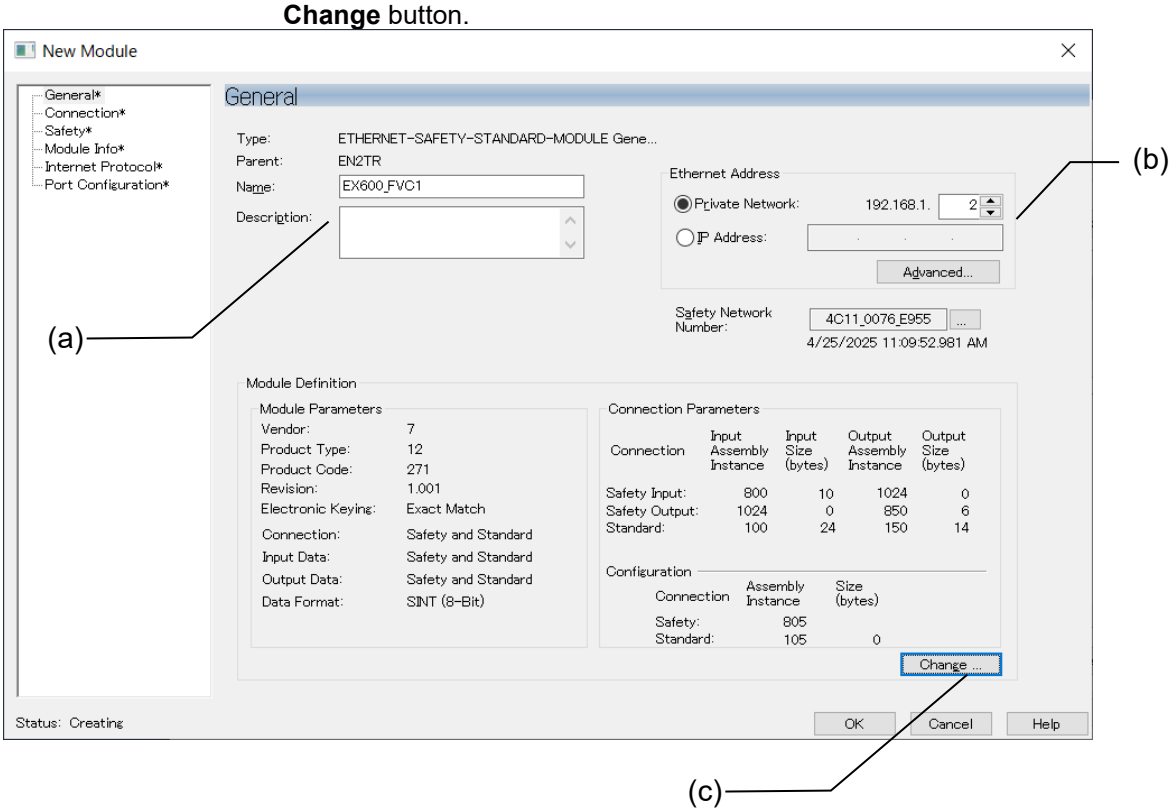


3) The [New Module] screen will appear. Set the following in the [General] tab.

(a) **Name** : Any manifold name (e.g., *EX600_FVC1*)

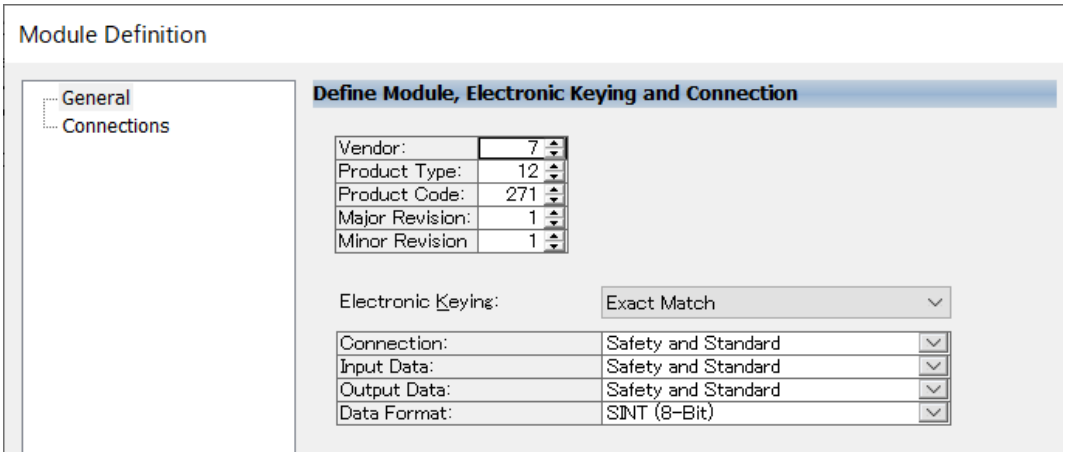
(b) **IP Address** : The IP address set for the fieldbus module (e.g., *192.168.1.2*)

(c) **Module Definition** : To set the **Module Parameters** and **Connection Parameters**, Click the **Change** button.



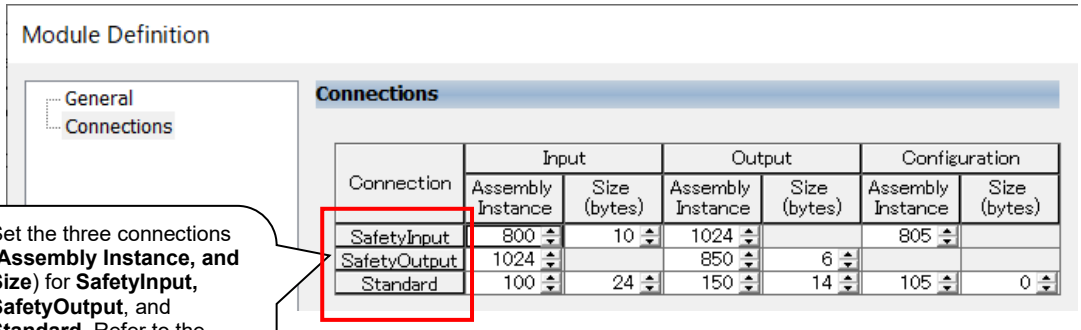
4) Define the following information in the **Module Definition** dialog. Use the **General** menu item to define the module's communication parameters, and the **Connections** menu item to configure the CIP connection.

・ General menu



parameter name	set value	remarks
Vendor	7	The values for the communication parameters to be set for each item are those specified in the Safety manual for the safety IO module. For details, refer to the Safety manual.
Product Type	12	
Product Code	271	
Major Revision	1	
Minor Revision	1	
Connection	Safety and Standard	The EX600 system requires standard connections and safety connections.
Input Data	Safety and Standard	
Output Data	Safety and Standard	
Data Format	SINT(8-Bit)	-

- Connections menu



Set the three connections (**Assembly Instance, and Size**) for **SafetyInput, SafetyOutput**, and **Standard**. Refer to the table below for the **Assembly Instance** values.

The **Size** of **SafetyInput** and **SafetyOutput** are fixed values based on the safety input and safety output data sizes of the safety IO module.

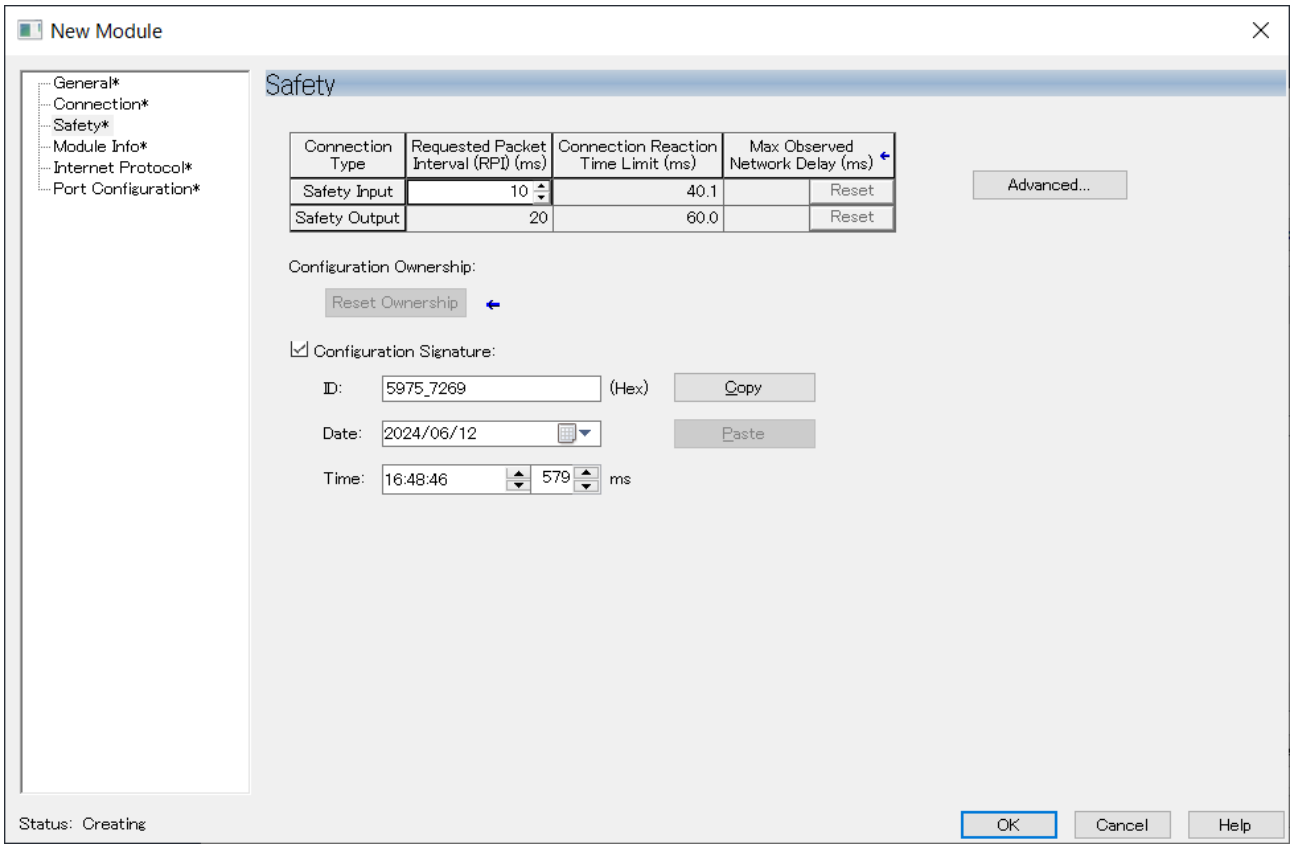
Connection	Input		Output		Configuration	
	Assembly Instance	Size (bytes)	Assembly Instance	Size (bytes)	Assembly Instance	Size (bytes)
SafetyInput	800	10	1024	-	805	-
SafetyOutput	1024	-	850	6	-	-
Standard	100	*	150	*	105	*

In the **Size** of **Standard** field, enter the standard input and standard output data size determined by the manifold configuration.
For calculation methods, see 10.1.1 Byte count occupied by input/output of each module(page 88), and for checking on the actual manifold, see 10.1.2 How to check the total input/output data size (page 89).

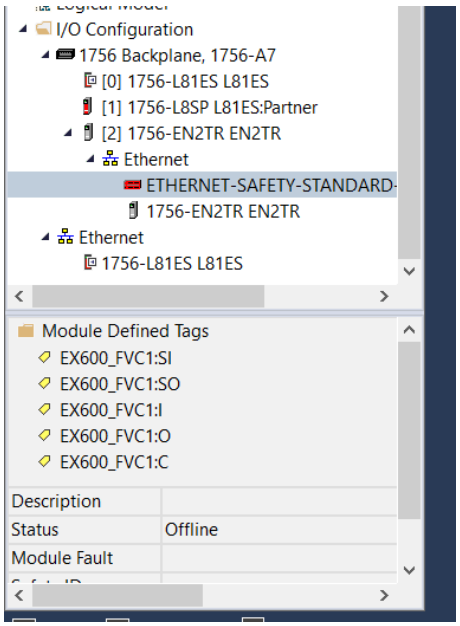
If you do not use a configuration assembly, set it to zero.
If you have a module or IO-Link device for which you want to change the parameters, set the appropriate size according to the module type and number of parameters.
For details about the configuration assembly, see 12 Parameter settings using configuration assemblies (page 121)

Note:
- Depending on the PLC, the maximum size of the configurable Input/Output/Configuration may be smaller than the above. Please check the specifications of the PLC you are using.

5) After completing the Module Definition settings, enter the **Configuration Signature** of the safety IO module in the Safety menu on the **New Module** screen.
For details on the **Configuration Signature**, **ID** (SCCRC), **Date and Time** (SCTS) and the setting values, refer to the Safety manual of the safety IO module.



6) After completing all settings, close the screen with **OK**, and the settings for the device will be reflected as shown below.



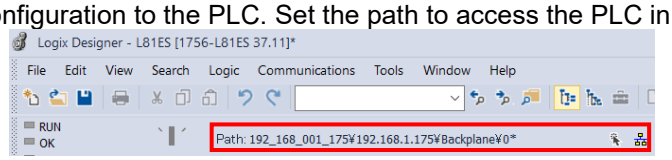
11.3 TUNID settings

After completing the configuration of the PLC, you must set the TUNID in the internal memory of the safety IO module to establish communication. The TUNID is generated by combining the Safety Network Number and IP address and is set using the configuration tool.
For details on TUNID, Safety Network Number, and how to read and initialize the values set in the safety IO module, refer to the Safety Manual for the safety IO module.

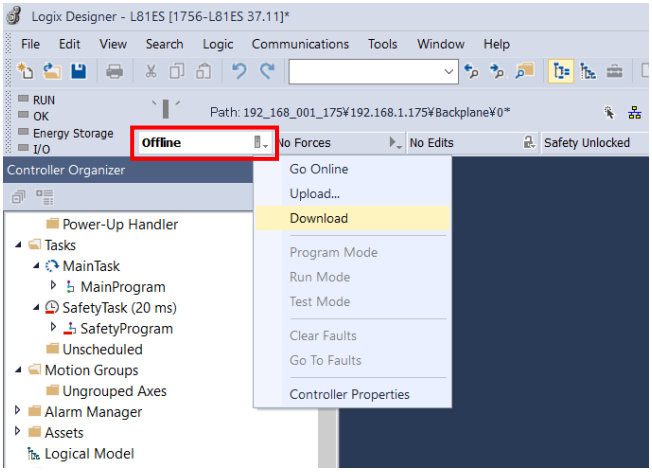
The following explains how to configure TUNID using Rockwell Automation's Studio 5000 Logix Designer® Version 37 as an example.

1) Connect the EX600 manifold with the IP address already set and the PLC with a communication cable, and turn on the power.

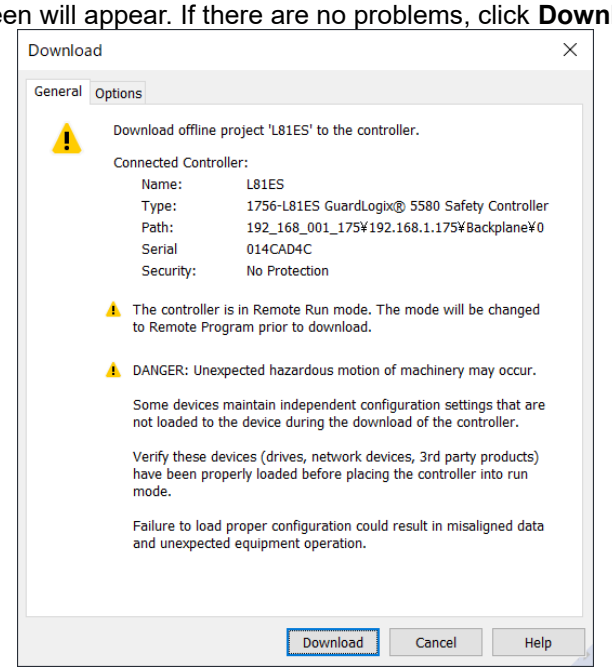
2) Download the configuration to the PLC. Set the path to access the PLC in **Path**.



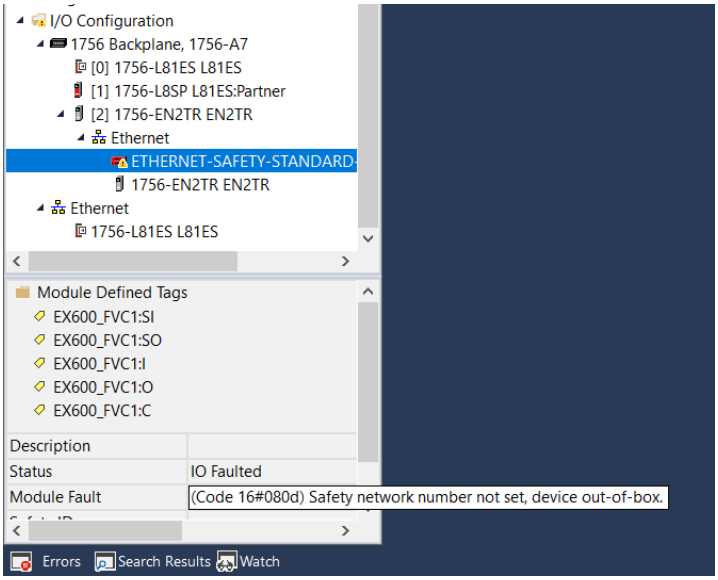
3) Select **Download** from the controller status menu.



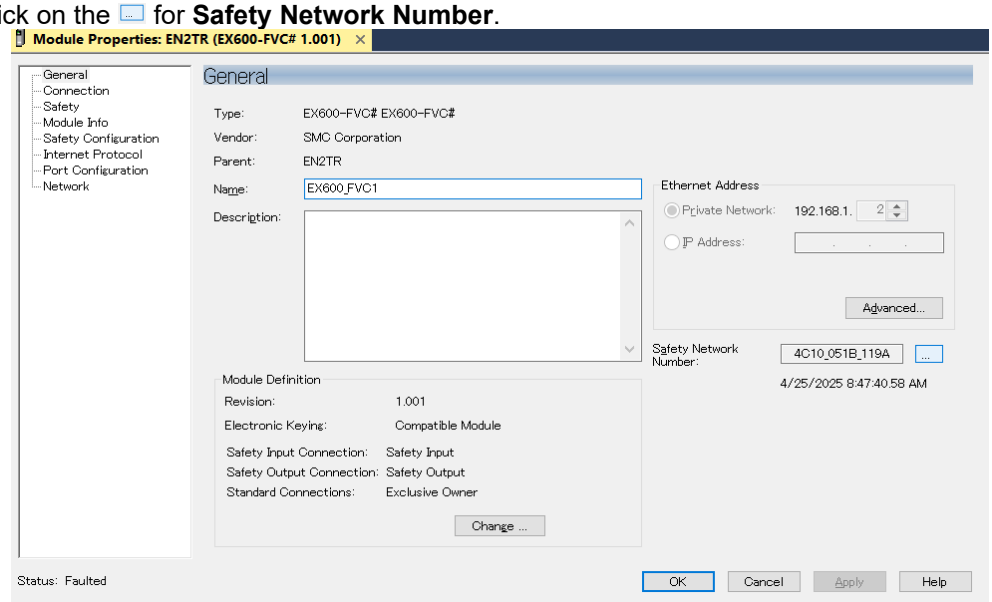
4) The download screen will appear. If there are no problems, click **Download**.



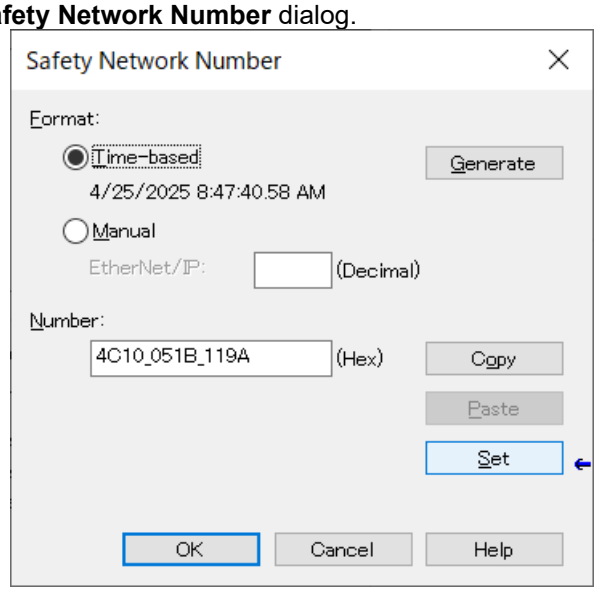
5) After downloading, go online and check the communication status of the EX600 manifold. Select the module and confirm that “(Code 16#080d) Safety network number not set, device out-of box.” is displayed. Double-click on the module to display its properties.



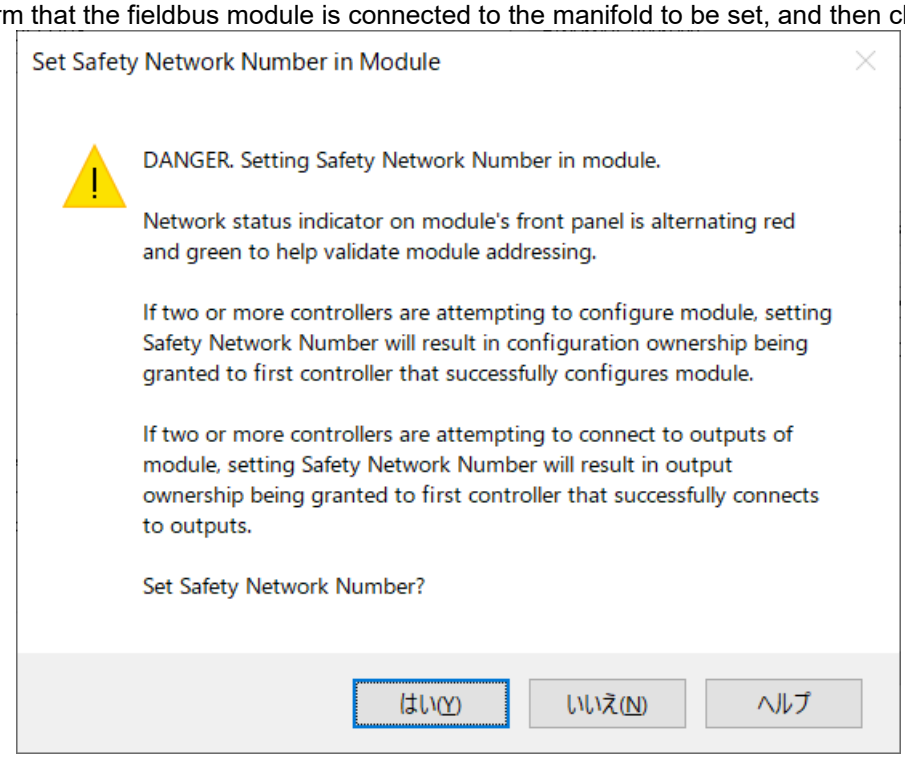
6) Click on the ... for **Safety Network Number**.



7) Click **Set** on the **Safety Network Number** dialog.



8) A confirmation screen appears and the NS indicator on the EX600-BEN1 fieldbus module flashes red and green alternately.
Confirm that the fieldbus module is connected to the manifold to be set, and then click **Yes**.



9) TUNID is set in the safety IO module and the NS indication of the fieldbus module (EX600-BEN1) will return to flashing red and green alternately.

11.4 Setting safety parameters using safety outputs

Setting TUNID enables the transmission and reception of process data for safe input and safe output. However, the safe I/O module does not start operating in a safe state. To enable the safe I/O module, you must set the safe parameters via the safe output process data. Refer to the Safety Manual for the safe I/O module and configure the safe parameters accordingly.
Even when the safe I/O module is in a safe state, it is possible to control D side modules or ITV modules.

11.5 Replacing modules

Below are precautions to take when replacing a single module, such as when a module has broken down or when replacing a module from equipment with unstable operation with one from equipment that is operating stably to check operation.
Always turn the power OFF before replacing the module. Also, refer to page 15 for assembly instructions and page 18 for installation instructions. For instructions on replacing the ITV and valve modules, refer to the respective instruction manuals.

- **D side module**

If the parameters set before replacement have been changed, record them.
After replacing with the new module, reset the recorded parameters.

- **Fieldbus module**

Record the parameter values such as the IP address and communication port settings.
After replacing the module with a new one, reset the parameters you recorded.
If a safety IO module with a TUNID setting is connected, some parameters cannot be changed, so you need to initialize the safety IO module with a safety reset.
For details on how to perform a safety reset, refer to the Safety Manual for the safety IO module.

- **Safety IO Module**

After replacement, TUNID must be reset. If you replace a module with a TUNID-configured module, you must initialize the safety IO module with a safety reset.
For details on how to perform a safety reset, refer to the Safety Manual for the safety IO module.
For instructions on how to set TUNID, see 11.3 TUNID settings (page 117) in Hardware Configuration.

12 Parameter settings using configuration assemblies

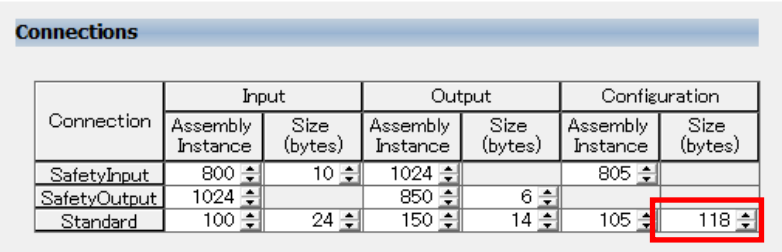
When configuring hardware, in addition to setting the Input and Output connections, you should also set the Configuration connections and enter the parameter settings on the PLC. This allows the PLC to send parameters to the EtherNet/IP devices when an EtherNet/IP communication connection is established.

Note:
- Some types of PLCs may not support this function.
- The maximum data size that can be received by the fieldbus module (EX600-BEN1) in the configuration assembly is 456 bytes. Depending on the PLC, the maximum size that can be set may be smaller than 456 bytes, so please check the specifications of the PLC you are using.
- Some parameters cannot be set in the configuration assembly. Parameters that cannot be set must be set using explicit messages (page 132) or LCD operations (page 30).
- The safety parameters of the safety IO module are set with safety output data. Do not set them in the configuration assembly.

12.1 Example of configuration assembly settings for PLC

This section explains the procedure for setting up a configuration assembly using the screen of Rockwell Automation's Studio 5000 Logix Designer® Version 37 as an example.

1) Change the **Size** of **Configuration** set in 11 Hardware Configuration (page 96). **Size** is the size of the parameters to be set in the PLC. For information on how to calculate the parameter size, see 12.2 Configuration data size (page 123).
After setting the **Size**, download the settings to the PLC.

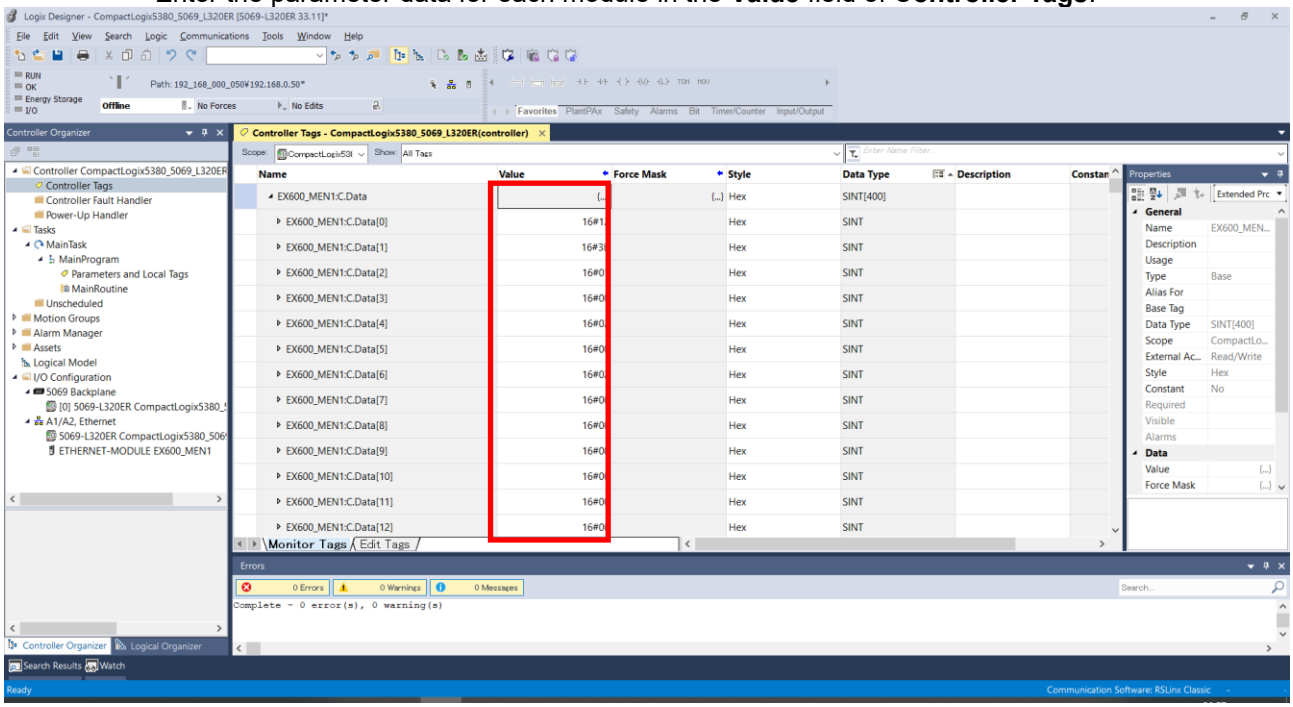


Connections

Connection	Input		Output		Configuration	
	Assembly Instance	Size (bytes)	Assembly Instance	Size (bytes)	Assembly Instance	Size (bytes)
SafetyInput	800	10	1024		805	
SafetyOutput	1024		850	6		
Standard	100	24	150	14	105	118

2) Create parameter data to be set in the PLC. For details on parameter data for each module, refer to 12.2.2 List of configuration data by module type (page 124).

3) Set the created parameter data in the PLC.
Enter the parameter data for each module in the **Value** field of **Controller Tags**.



4) If all data is entered correctly, the parameters set when EtherNet/IP communication is established will be reflected in the EX600 system.

12.2 Configuration data size

Each module has configuration assembly data in the data format shown in the table below. The configuration assembly data consists of a fixed value of 4 bytes and the parameters that the module has, and the size is determined for each module. Add up the data sizes of the modules for which you want to set parameters, and set this total in the PLC.

For a list of module sizes, see 12.2.1 ID, data size list (page 123),
and for details on the data content, see 12.2.2 List of configuration data by module type(page 124).

Byte	Name	Contents
0	Module No.	Specify the module number of the target module. When entering a value, perform the following calculation. 0x80 + Module No. For details about module numbers, see 2.2 Specify Module No. and Channel No.(page 13).
1	Parameter type specification	Enter the following values to specify the parameter settings. 0x01: EX600 module parameters 0x02: ITV module parameters 0x03: IO-Link device parameters
2...3	ID	Enter the ID corresponding to the part number of the module to be replaced.
4 and later	parameter setting value	Specifies all parameter settings for the module.

12.2.1 ID, data size list

Module types	Module part number	parameter type	ID	Data size [bytes]
fieldbus module	EX600-BEN1	0x01	0x00E0	5
digital input	EX600-DXPC-A	0x01	0x0003	5
	EX600-DXPD-A	0x01	0x0005	5
digital output	EX600-DYPB-A	0x01	0x0008	7
IO-Link master module	EX600-LAB1-A	0x01	0x003B	59
		0x03	0x003B	Fixed value 6 bytes + IO-Link device parameters
	EX600-LBB1-A	0x01	0x003C	59
		0x03	0x003C	Fixed value 6 bytes + IO-Link device parameters
Safety IO module	EX600-FVC2	0x02	0x6700	48

Note:
- There are no parameters that can be set in the configuration assembly for the EX600-FVC1 safety IO module.

12.2.2 List of configuration data by module type

- **Configuration data for EX600-BEN1**

Byte	Bit	parameter	set value
0	-	Module No.	0x80 (Module No. 0 fixed)
1	-	parameter type	0x01
2	-	ID (LSB)	0xE0
3	-	ID (MSB)	0x00
Module parameter			
4	0...4	Reserved	-
	5	Hold all outputs	0: Depends on modules 1: Hold all modules
	6	Reserved	-
	7	US1 monitoring	0: Disable 1: Enable

- **Configuration data for EX600-DXPC-A and EX600-DXPD-A**

Byte	Bit	parameter	set value
0	-	Module No.	0x80 + 0x01...0x09
1	-	parameter type	1
2	-	ID (LSB)	EX600-DXPC-A: 0x03 EX600-DXPD-A: 0x05
3	-	ID (MSB)	0x00
Module parameter			
4	0...3	Reserved	-
	4	input filtering time	0: 0.1 ms 1: 1 ms 2: 10 ms 3: 20 ms
	5		
	6	input hold time	0: 1 ms 1: 15 ms 2: 100 ms 3: 200 ms
	7		

- **Configuration data for EX600-DYPB-A**

Byte	Bit	parameter	set value
0	-	Module No.	0x80 + 0x01...0x09
1	-	parameter type	1
2	-	ID (LSB)	0x08
3	-	ID (MSB)	0x00
Module parameter			
4	-	Reserved	-
5	1...0	DO Fault/Idle mode	0: Clear 1: Hold 2: Force ON
	2...7	Reserved	-
Channel parameter			
6	0	(Out 0) Open circuit	0: Disable 1: Enable
	:	:	:
	7	(Out 7) Open circuit	0: Disable 1: Enable

- **Configuration data for EX600-LAB1 / EX600-LBB1**

Byte	Bit	parameter	set value
0	-	Module No.	0x80 + 0x01...0x09
1	-	parameter type	1
2		ID (LSB)	EX600-LAB1-A: 0x3B EX600-LBB1-A: 0x3C
3	-	ID (MSB)	0x00
Module parameter			
4	-	Reserved	-
5	0...1	DO Fault/Idle mode	0: Clear 1: Hold 2: Force ON
	2...3	Reserved	-
	4...5	IO-Link Fault/Idle	0: Clear/PD Out valid 1: Hold 2: Clear/PD Out invalid
	6...7	Reserved	-

Port (Channel) parameter			
Port 1			
6	0...1	Byte swap	0: No Swap 1: Swap 16 bit 2: Swap 32 bit 3: Swap All
	2...6	Reserved	-
	7	L+ control	0: L+ ON 1: L+ OFF
7	-	PortMode	0: Deactivated 1: IO-Link Manual 2: IO-Link Autostart 3: Digital input C/Q 4: Digital output C/Q
8	-	Validation & Backup	0: No Device Check 1: Type compatible Device V1.0 2: Type compatible Device V1.1 3: Type compatible Device V1.1, Backup + Restore 4: Type compatible Device V1.1, Restore
9	-	Reserved	-
10	-	Cycle time	0 : As fast as possible 1...3: 0.4 ms 4...63: 0.4 to 6.3 ms in 0.1 ms increments 64...127: 6.4 to 31.6 ms in 0.4 ms increments 128...191: 32 to 132.8 ms in 1.6 ms increments 192...255: 132.8 ms
11	-	VendorID [0] (MSB)	0x0000 ... 0xFFFF
12	-	VendorID [1] (LSB)	
13	-	Reserved	0x000000 ... 0xFFFFFF
14	-	DeviceID [0] (MSB)	
15	-	DeviceID [1]	
16	-	DeviceID [2] (LSB)	
Port 2			
17...27	-	See Port 1.	
Port 3			
28...38	-	See Port 1.	
Port 4			
39...49	-	See Port 1.	-

- **IO-Link device configuration data**

Byte	Bit	parameter	set value
0	-	Module No.	0x80 + 0x01...0x09
1	-	parameter type	3: Parameter setting of IO-Link device
2	-	ID (LSB)	EX600-LAB1-A: 0x3B EX600-LBB1-A: 0x3C
3	-	ID (MSB)	0x00
4	-	Target IO-Link port	1...4
5	-	The total number of parameters to be sent	N
IO-Link device parameters			
Parameter 1			
6	-	Data size n*)	up to 232
7	-	Index [0] (MSB)	Set the index, subindex, and data of the parameters to be changed according to the IO-Link device instruction manual.
8	-	Index [1] (LSB)	
9	-	Subindex	
9 + 1	-	Data byte 1 (MSB)	
9 + 2	-	Data byte 2	
:	:	:	
9 + n	-	Data byte n*) (LSB)	
After that, add according to the setting of “The total number of parameters to be sent.”			
Parameter 2			
9 + n + 1	-	Data size m*)	up to 232
9 + n + 2	-	Index [0] (MSB)	Follow the IO-Link device manual to set the Index, Subindex, and Data for the parameters you want to change.
9 + n + 3	-	Index [1] (LSB)	
9 + n + 4	-	Subindex	
9 + n + 4 + 1	-	Data byte 1 (MSB)	
9 + n + 4 + 2	-	Data byte 2	
:	:	:	
9 + n + 4 + m	-	Data byte m*) (LSB)	
Parameter 3			
:	:	:	:
Parameter N			
:	:	:	:

*) *n* and *m* are the data lengths of the parameters. The data lengths are determined by the parameter specifications of the IO-Link device.

- **ITV module configuration data**

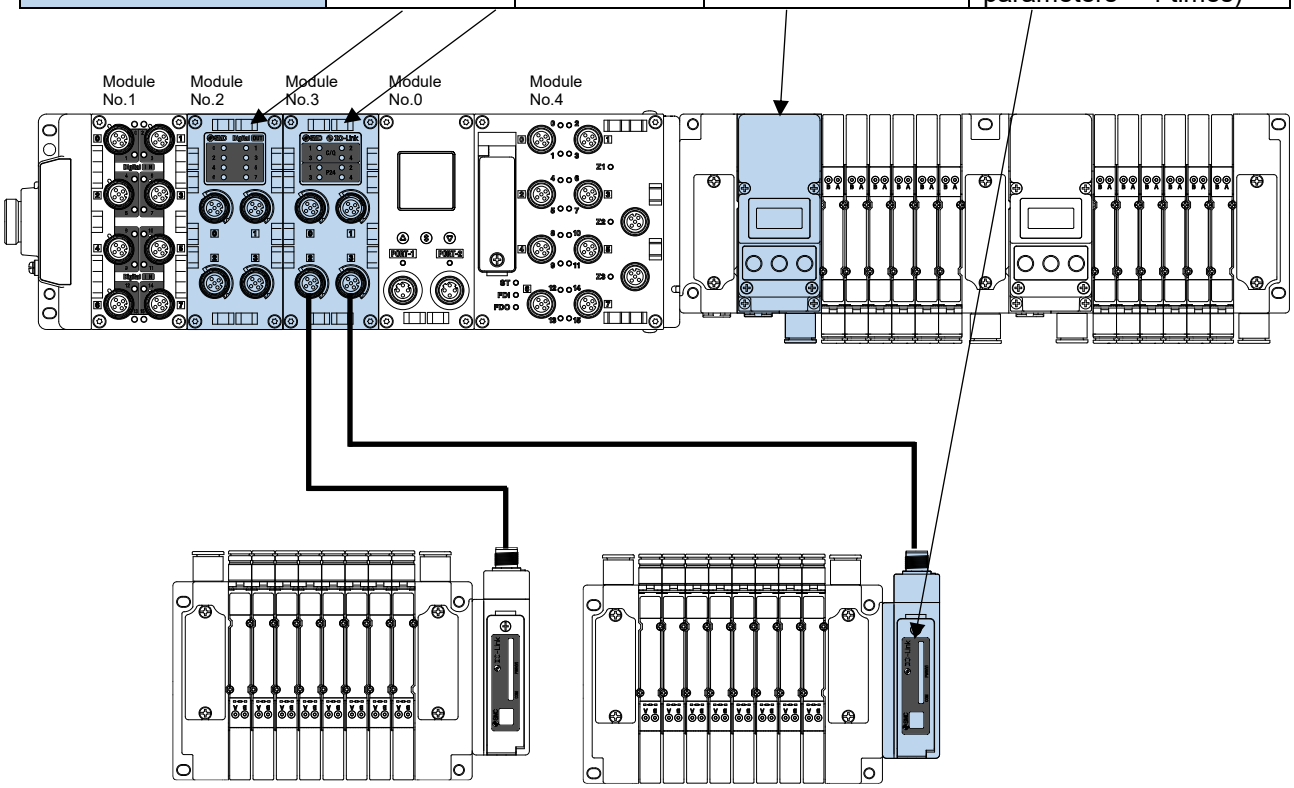
Byte	Bit	parameter	set value
0	-	Module No.	0x80 + 0x01...0x10
1	-	parameter type	2
2		ID (LSB)	0x00
3	-	ID (MSB)	0x67
4	-	Target ITV module position	0: 1st station (ch.128) : 3: 4th station (ch.131)
Parameter for ITV module			
5	-	Hold/Clear	0: Pressure Clear 1: Pressure Hold
6	-	Gain	0...15
7	-	Sensitivity	0...7
8	-	Minimum pressure [0] (MSB)	0x0000...0x0E66
9	-	Minimum pressure [1] (LSB)	
10	-	Maximum pressure [0] (MSB)	0x019A...0x1332
11	-	Maximum pressure [1] (LSB)	
12	-	Notification setting [0] (MSB)	0x00000000: Notification disabled 0x00000001: 1 hour : 0xFFFFFFFF: 4,294,967,295 hours
13	-	Notification setting [1]	
14	-	Notification setting [2]	
15	-	Notification setting [3] (LSB)	

12.2.3 Example of configuration assembly data creation

The following is an example of data creation when setting parameters for the equipment configuration below.

- **Parameters to be set**

Module No.	Module 2	Module 3	Module 4 position: 1st station	Module 3 Connection point: Port 4
Module part number	EX600-DYPB-A	EX600-LBB1-A	EX600-FVC2	EX600-LBB1-A
parameter type	1	1	2	3
ID	0x0008	0x003C	0x6700	0x003C
Configuration Data size	7 byte	50 byte	16 byte	26 byte (6 bytes of fixed values + 5 bytes of IO-Link device parameters × 4 times)



IO-Link device part number: EX260-SIL1
Parameter name: “Output Fault Action”
Index: 0x0054
Subindex: 1,2,3,4
Data length: 1 byte

- **Creating parameter data**

Refer to 12.2.2 List of configuration data by module type (page 124) and create the configuration data shown in the table below.
As shown in the table below, the size of the configuration data will be 99 bytes.

Parameter Setting target	Byte	Parameter	set value	remarks
EX600-DYPB-A Module No. 2 7 byte	0	Module No.	0x82	When setting “DO Fault/Idle mode” to “Hold” and “Open circuit” for all channels to “Enable”. For details on each parameter, see page 125.
	1	parameter type	0x01	
	2...3	ID	0x0008	
	4	Module parameter (Reserved)	0x00	
	5	Module parameter (DO Fault/Idle mode)	0x01	
	6	Channel parameter (Open circuit)	0xFF	
EX600-LBB1-A Module No. 3 50 byte	7	Module No.	0x83	For details on Module parameter and Port# parameter, see page 125.
	8	parameter type	0x01	
	9...10	ID	0x003C	
	11...12	Module parameter	:	
	13...23	Port1 parameter	:	
	24...34	Port2 parameter	:	
	35...45	Port3 parameter	:	
	46...56	Port4 parameter	:	
ITV module 16 byte	57	Module No.	0x84	For details on the Parameter for ITV module, see page 128.
	58	parameter type	0x02	
	59...60	ID	0x6700	
	61	Target ITV module position (1st station)	0x00	
	62...72	Parameter for ITV module	:	
IO-Link devices 26 byte	73	Module No.	0x83	- Since one parameter can specify one index and subindex for an ISDU, four parameter settings are required to switch the subindex from 1 to 2 to 3 to 4. - Byte 78 is set to 0x04 as the parameter setting is executed four times. - Data is the parameter setting value for the ISDU “Output Fault Action” specified this time (Data size = 1 byte)
	74	parameter type	0x03	
	75...76	ID	0x003C	
	77	Target IO-Link port	0x04	
	78	The total number of parameters to be sent	0x04	
	IO-Link Device Parameter 1			
	79	Data size of parameter 1	0x01	
	80	Index (MSB)	0x00	
	81	Index (LSB)	0x54	
	82	Subindex	0x01	
	83	Data	0xFF	
	IO-Link Device Parameter 2			
	84	Data size of parameter 2	0x01	
	85	Index (MSB)	0x00	
	86	Index (LSB)	0x54	
	87	Subindex	0x02	
	88	Data	0xFF	
	IO-Link Device Parameter 3			
	89...93	Parameter 3	:	
	IO-Link Device Parameter 4			
	94...98	Parameter 4	:	

13 Device Level Ring (DLR) function

Enabling the DLR function allows communication to continue even if a single communication cable is disconnected in an EtherNet/IP network configured in a ring topology, and enables the PLC to identify the location of the disconnection.
The fieldbus module (EX600-BEN1) can be used as a Ring Node compatible with the DLR function.

Note:
- To enable DLR functionality for the entire EtherNet/IP network, all Ring Nodes must support DLR functionality.
- All DLR function settings are configured in Ring Supervisor, so no settings are required in the fieldbus module. For detailed configuration instructions, refer to the manual for your Ring Supervisor.

14 QuickConnect™ function

Enabling the QuickConnect function reduces the time required from power-on to EtherNet/IP communication connection.
However, due to CIP Safety™ specifications, CIP Safety devices cannot enable the QuickConnect function.
The EX600 fieldbus module is a device that supports the QuickConnect function, but if a safety IO module is connected, it operates as a CIP Safety device, so the QuickConnect function is automatically disabled.

15 Explicit message communication

By using EtherNet/IP Explicit messages (non-periodic transmission) communication, you can read/write data (EtherNet/IP objects) from EtherNet/IP devices on an ad-hoc basis.
Explicit message communication allows you to access device data by specifying the IP address, even if an EtherNet/IP communication connection has not been established.

15.1 Explicit message format

The following settings are required to issue explicit messages.

- Target IP address
- Service code (read, write, reset, vendor-specific services, etc.)
- Data ID (Class, Instance, Attribute)
- Data contents

How to set each message when issuing messages varies depending on the tool or program, so please refer to the manual provided by each company.
The service codes used hereafter are shown below.

service code	Name	Contents
0x0E	Get Attribute Single	Reading EtherNet/IP objects
0x10	Set Attribute Single	Writing EtherNet/IP objects
0x32	IO-Link SMI Read Service	Reading data related to IO-Link masters
0x33	IO-Link SMI Write Service	Writing data to IO-Link masters

15.2 Input objects, output objects

You can access 10 Input/output process data (page 88) via explicit message communication and check the current input and output values. In addition, if the system is not being controlled by a PLC as described below, you can change the standard output values.

- No connection between the PLC and EtherNet/IP has been established since power was turned on.
- All EtherNet/IP communication connections with the PLC have been successfully terminated.

Even after changing the standard output value by explicit message communication, control will immediately switch to the PLC as soon as the connection between the PLC and EtherNet/IP communication is established.

- **Input/Output Object List**

Class	Instance	Attribute	Access	Name	Description
0x04	0x64	0x03	Get	standard input value	-
	0x96		Get/Set	standard output value	When controlling the valve output of a safety IO module, it is necessary to establish EtherNet/IP communication and turn the safety output ON.
	0x320		Get	safe input value	The safe input/safe output values obtained through explicit message communication are reference values. Do not use them for control.
	0x352		Get	safe output value	

Get: Service code 0x0E Get Attribute Single
Set: Service code 0x10 Set Attribute Single

15.3 List of vendor-specific objects

The EX600 system has the following vendor-specific objects, and can check diagnostic data and read and change various parameters via explicit message communication.
- Mod. in Instance indicates the module number, and Ch. in Attribute indicates the channel number. For definitions of module numbers and channel numbers, refer to 2.2 Specify Module No. and Channel No. (page 13).
- Get in Access represents service code 0x0E Get Attribute Single, and Set represents service code 0x10 Set Attribute Single.
- Type represents the data size and display format. For details, refer to page 137.
- For the log number to specify when retrieving the error log, refer to 9.3 Diagnostic logs (page 85).

15.3.1 System information and commands

Class	Instancee	Attribute	Access	Name	Type	Description
0x64	0x01	0x64	Get	standard input data length	UINT	Standard input data byte size for the entire EX600 system
	0x02	0x64	Get	standard output data length	UINT	Standard output data byte size for the entire EX600 system
	0x03	0x64	Get	safe input data length	UINT	EX600 Total safety input data size in bytes for the entire system
	0x04	0x64	Get	safe output data length	UINT	EX600 Total safety output data size in bytes for the entire system
	0x05	0x64	Get	Number of connection modules	USINT	Number of connection modules
	0x06	0x64	Get	System Ver.	STRUCT 3byte	Reads the version value of the EX600 system. Byte 0: Major Byte 1: Minor Byte 2: Build
	0x07	0x64 + Log No.	Get	error log retrieval	STRUCT 7 byte	Error log data with the following configuration Byte 0...3: Error occurrence time [sec] Byte 4: Module number Byte 5: Channel number Byte 6: Error code For details on the log, see 9.3.2 Verification with EtherNet/IP objects(page 86).
0x65	0x01	0x64	Set	Clear error log	BOOL	1: Execute Set to a state where there are no error logs.
0x66	0x01	0x64	Set	System restart	BOOL	1: Execute Restart the fieldbus module.

15.3.2 Module information and command objects

Class	Instance	Attribute	Access	Name	Module	Type	Description
0x6A	Mod. + 0x64	0x64	Get	Number of connection valve modules	• FVC#	USINT	0...128 (Number of valve modules × 8)
		0x65	Get	Lot No.	• BEN1 • FVC#	STRING 2 byte	The lot number printed on the product can be read.
		0x66	Get	Product Ver.	• BEN1 • FVC#	STRUCT 2 byte	The FW/HW version printed on the product can be read. Byte 0: Firmware Ver. Byte 1: Hardware Ver.
		0x67	Get	Software information	• BEN1 • FVC#	STRUCT 4 byte	You can read the software information of the product. Byte 0...1: Software number Byte 3...4: Software version
		0x68	Get	Serial No.	• BEN1 • FVC#	STRING 16 byte	You can read the serial number of the product.
0x6E	Mod. + 0x64	0x64	Set	factory reset	• BEN1 • FVC#	BOOL	1: Execute Resets the parameters of the target module to factory default settings. IP addresses, safety-related data, and ITV module parameters are not initialized.

15.3.3 Channel information and command objects

Class	Instance	Attribute	Access	Name	Module	Type	Description
0x72	Mod. + 0x64	Ch. + 0x64	Get	ON/OFF operation count readout	• DXP# • DYPB • FVC#	UDINT	0: 0 times 1: 1 times : 4294967295: 4,294,967,295 times Reads the number of ON/OFF operations for the target channel.
0x73	Mod. + 0x64	Ch. + 0x64	Get	ITV connection status	• FVC2	BOOL	0: No ITV connection 1: Connecting to ITV
0x74	Mod. + 0x64	Ch. + 0x64	Get	cumulative operating time	• FVC2	UDINT	0: 0 hours 1: 1 hours : 4294967295: 4,294,967,295 hours Reads the power-on time stored in the ITV module.
0x78	Mod. + 0x64	Ch. + 0x64	Set	Clear ON/OFF operation count	• DXP# • DYPB • FVC#	BOOL	1: Execute Sets the number of ON/OFF operations for the target channel to 0.

15.3.4 Diagnostic objects

Class	Instance	Attribute	Access	Name	Type	Description
0x82	0x01	0x64	Get	System diagnostic information	WORD	Obtain the system diagnosis. The data structure is the same as the system diagnosis in byte 0...1 of the 9.2 Diagnostic data (page 84). 0: Normal 1: Diagnosis occurred
		0x65	Get	Module diagnosis location	STRUCT 2 byte	You can check the module number for which a module diagnosis or channel diagnosis has occurred. The data structure is the same as byte 4...5 in the 9.2 Diagnostic data (page 84). 0: Normal 1: Diagnosis occurrence module
0x86	Mod. + 0x64	0x64	Get	Module diagnostic information	BYTE	Obtains the module diagnosis for the module specified in Instance. The data structure is the same as byte 2 in the 9.2 Diagnostic data (page 84). 0: Normal 1: Diagnosis occurred
		0x65	Get	Channel diagnosis location	STRUCT 17 byte	You can check the channel numbers for which channel diagnostics have occurred in the module specified in Instance. Byte 0 – bit 0: Channel No. 0 Byte 0 – bit 1: Channel No. 1 : Byte 17 – bit 3: Channel No. 131 0: Normal 1: Diagnostic occurrence channel
0x8A	Mod. + 0x64	Ch. + 0x64	Get	Channel diagnostic information	BYTE	Obtains the channel diagnosis for the channel specified by the attribute in the module specified by the instance. The data structure is the same as byte 3 in the 9.2 Diagnostic data (page 84). 0: Normal 1: Diagnosis occurred

15.3.5 Module parameter objects

Class	Instance	Attribute	Access	Name	Module	Type	Description
0x8E	Mod. + 0x64	0x64	Get/Set	US1 Power Monitoring	• BEN1	BOOL	0: Invalid 1: Valid
0x90				screen operation password	• BEN1	UINT	0000 (0x0000) to 9999 (0x270F).
0x91				All output hold setting	• BEN1	BOOL	0: Depends on each module 1: Hold all modules
0x93				input filtering time	• DXP#	USINT	0: 0.1 ms 1: 1 ms 2: 10 ms 3: 20 ms
0x94				input hold time	• DXP#	USINT	0: 1 ms 1: 15 ms 2: 100 ms 3: 200 ms
0x95				ON/OFF operation count monitoring	• DXP# • DYPB • FVC#	BOOL	0: Invalid 1: Valid
0x96				Communication error/Output settings during idle mode	• DYPB • L#B1	USINT	0: Clear 1: Hold 2: Force ON
0x97				Upper communication error/output settings during idle time (in IO-Link mode)	• DYPB • L#B1	USINT	0: Clear/PD Out valid 1: Hold 2: Clear/PD Out invalid
0x98				Process data size of IO-Link master	• L#B1	STRUCT 4 byte	0: 0 byte 1: 2 byte 2: 4 byte 3: 8 byte 4: 16 byte 5: 32 byte The above size settings are applied to each port. The correspondence between bytes and ports is as follows. Byte 0: Port1 Byte 1: Port2 Byte 2: Port3 Byte 3: Port4 This can only be set if no EtherNet/IP communication connections have been established. After setting, restart the system (Class: 0x66) to reflect the parameters.

15.3.6 Channel parameter objects

Class	Instance	Attribute	Access	Name	Module	Type	Description
0xA0	Mod. + 0x64	Ch. + 0x64	Get/Set	ON/OFF operation limit setting (×1000 times)	• DXP# • DYPB • FVC#	UINT	1: 1000 times 2: 2000 times : 65535: 65,535,000 times The setting range varies depending on the module part number.
0xA1				break detection	• DYPB	BOOL	0: Disable 1: Enable
0xA2				IO-Link port operating mode	• L#B1	USINT	0: Deactivated 1: IOL_Manual 2: IOL_Autostart 3: DI_C/Q 4: DO_C/Q
0xA3				Byte swap of process data	• L#B1	USINT	0: No Swap 1: Swap 16 bit 2: Swap 32 bit 3: Swap All
0xA4				Hold/Clear Settings	• FVC2	BOOL	0: Pressure Clear 1: Pressure Hold
0xA5				gain	• FVC2	USINT	0: gain 0 : 15: gain F
0xA6				sensitivity	• FVC2	USINT	0: Sensibility - : 7: Sensibility 5
0xA7				minimum pressure	• FVC2	UINT	0...3686 Values that do not meet the settings conditions will be invalid.
0xA8				maximum pressure	• FVC2	UINT	410...4914 Values that do not meet the settings conditions will be invalid.
0xA9				Cumulative power-on time notification settings	• FVC2	UDINT	0: Notification disabled 1: 1 hour : 4294967295: 4,294,967,295 hours

The data size for each type is shown below.

Type	Data length	Description
BOOL	1 byte	1-bit data
BYTE	1 byte	8-bit data
WORD	2 byte	16-bit data
USINT	1 byte	Unsigned integer data
UINT	2 byte	
UDINT	4 byte	
STRUCT n byte	n byte	n bytes of data
STRING n byte	n byte	ASCII code data of n characters

15.3.7 Safety command objects

Safety commands are assigned to Class 0xC7. Class 0xC7 is used to change the safety password for the safety IO module. For details, refer to the Safety manual.

15.4 IO-Link SMI service

Execute SMI services on the IO-Link master using explicit message communication.
The SMI service enables reading and writing data to and from the IO-Link master and IO-Link devices.
The following five types of SMI services can be executed using explicit message communication.

No.	Name	Data type	Access
1	SMI_MasterIdentification	IO-Link master information	Read only
2	SMI_PortConfiguration	IO-Link master port parameters	Read/Write
3	SMI_PortStatus	IO-Link master port status	Read only
4	SMI_DeviceRead	Receiving ISDU from IO-Link devices	Read only
5	SMI_DeviceWrite	ISDU transmission to IO-Link devices	Write only

The Mod. listed in the Instance of the explicit message indicates the module number. For the definition of the module number, refer to the 2.2 Specify Module No. and Channel No.(page 13).

15.4.1 SMI_MasterIdentification (IO-Link master information)

- **Read Service for IO-Link master information**

[Request]

Data	Value	備考　remarks
Service code	0x32	IO-Link SMI Read Service
Class	0x7E	
Instance	Mod. + 0x64	Specify module number
Attribute	0x64	
Data[0]	0x00	fixed value
Data[1]	0x01	fixed value

[Response]

Data	Value	備考　remarks
Ack[0]...[3]	0xB2000000	Read successful: 0xB2000000
Data[0]...[1]	VendorID	IO-Link master vendor ID SMC: 0x0083
Data[2]...[5]	MasterID	IO-Link master ID EX600-LAB1-A: 0x0000003B EX600-LBB1-A: 0x0000003C
Data[6]	Master type	IO-Link master type (0x02)
Data[7]...[8]	Feature	Functions supported by IO-Link master (0x0400)
Data[9]	Max. number of ports	Maximum number of IO-Link ports on IO-Link master (0x04)
Data[10]	Port 1 type	port type 0: Class A (EX600-LAB1-A) 2: Class B (EX600-LBB1-A)
Data[11]	Port 2 type	
Data[12]	Port 3 type	
Data[13]	Port 4 type	

15.4.2 SMI_PortConfigList (IO-Link master port parameters)

- **Read Service for IO-Link master port parameters**

[Request]

Data	Value	remarks
Service code	0x32	IO-Link SMI Read Service
Class	0x7E	
Instance	Mod. + 0x64	Specify module number
Attribute	0x65...0x68	Specify ports 1 to 4.
Data[0]	0x80	fixed value
Data[1]	0x00	fixed value

[Response]

Data	Value	remarks
Ack[0]...[3]	0xB2000000	Read successful: 0xB2000000
Data[0]	Port mode	0: Deactivated 1: IO-Link Manual 2: IO-Link Autostart 3: Digital input C/Q 4: Digital output C/Q
Data[1]	Validation & Backup	0: No Device Check 1: Type compatible Device V1.0 2: Type compatible Device V1.1 3: Type compatible Device V1.1, Backup+Restore 4: Type compatible Device V1.1, Restore
Data[2]	I/Q behavior	Pin 2 function 1: Digital input (when using EX600-LAB1-A) 5: Power 2 (when using EX600-LBB1-A)
Data[3]	Port cycle time	0 : As fast as possible 1 to 3 : 0.4 ms 4 to 63 : 0.4 to 6.3 ms (in 0.1 ms increments) 64 to 127 : 6.4 to 31.6 ms (in 0.4 ms increments) 128 to 191 : 32.0 to 132.8 ms (in 1.6 ms increments) 192 to 255 : 132.8 ms
Data[4]	VendorID [0] (MSB)	Vendor ID for device matching function
Data[5]	VendorID [1] (LSB)	
Data[6]	0x00	Reserved
Data[7]	DeviceID [0] (MSB)	Device ID for device matching function
Data[8]	DeviceID [1]	
Data[9]	DeviceID [2] (LSB)	

- **IO-Link master port parameter write service**

[Request]

Data	Value	remarks
Service code	0x33	IO-Link SMI Write Service
Class	0x7E	
Instance	Mod. + 0x64	Module No.
Attribute	0x65...0x68	Ports 1 to 4
Data[0]	0x80	fixed value
Data[1]	0x00	fixed value
Data[2]	Port mode	0: Deactivated 1: IOL_Manual 2: IOL_Autostart 3: DI_C/Q 4: DO_C/Q
Data[3]	Validation & Backup	0: No Device Check 1: Type compatible Device V1.0 2: Type compatible Device V1.1 3: Type compatible Device V1.1, Backup+Restore 4: Type compatible Device V1.1, Restore
Data[4]	0x00	fixed value
Data[5]	Port cycle time	0 : As fast as possible 1 to 3 : 0.4 ms 4 to 63 : 0.4 to 6.3 ms (in 0.1 ms increments) 64 to 127 : 6.4 to 31.6 ms (in 0.4 ms increments) 128 to 191 : 32.0 to 132.8 ms (in 1.6 ms increments) 192 to 255 : 132.8 ms
Data[6]	Vendor ID [0] (MSB)	Set the vendor ID for the device matching function.
Data[7]	Vendor ID [1] (LSB)	
Data[8]	0x00	fixed value
Data[9]	Device ID [0] (MSB)	Set the device ID for the device matching function.
Data[10]	Device ID [1]	
Data[11]	Device ID [2] (LSB)	

[Response]

Data	Value	remarks
Ack[0]...[3]	0xB3000000	Write success: 0xB3000000

15.4.3 SMI_PortStatusList (IO-Link master port status)

- **Read Service for IO-Link master port status**

[Request]

Data	Value	remarks
Service code	0x32	IO-Link SMI Read Service
Class	0x7E	
Instance	Mod. + 0x64	Module No.
Attribute	0x65...0x68	Ports 1 to 4
Data[0]	0x90	fixed value
Data[1]	0x00	fixed value

[Response]

Data	Value	remarks
Ack[0]...[3]	0xB2000000	Read successful: 0xB2000000
Data[0]	PortStatusInfo	IO-Link communication status 0: NO_DEVICE 1: DEACTIVATED 2: PORT_DIAG 3: PREOPERATE 4: OPERATE 5: DI_C/Q 6: DO_C/Q
Data[1]	PortQualityInfo	Process data status 0: Input valid, output valid 1: Input invalid, output valid 2: Input valid, output invalid 3: Input invalid, output invalid
Data[2]	RevisionID	IO-Link version of IO-Link devices 0x10: V1.0 0x11: V1.1
Data[3]	TransmissionRate	communication speed 0: NOT_DETECTED 1: COM1 2: COM2 3: COM3
Data[4]	MasterCycleTime	actual cycle time 4 to 63 : 0.4 to 6.3 ms (in 0.1 ms increments) 64 to 127 : 6.4 to 31.6 ms (in 0.4 ms increments) 128 to 191 : 32.0 to 132.8 ms (in 1.6 ms increments)
Data[5]	InputDataLength	Input process data length
Data[6]	OutputDataLength	Output process data length
Data[7]	VendorID [0] (MSB)	Vendor ID of connected IO-Link devices
Data[8]	VendorID [0] (LSB)	
Data[9]	0x00	Reserved

Data	Value	remarks
Data[10]	DeviceID [0] (MSB)	Device ID of connected IO-Link devices
Data[11]	DeviceID [1]	
Data[12]	DeviceID [2] (LSB)	
Data[13]	NumberOfDiags	Number of events
Data[14]	EventQualifier1	Display event types. See table below for details.
Data[15]	EventCode1 [0] (MSB)	Event code of IO-Link master or device
Data[16]	EventCode1 [1] (LSB)	
Data[17]	EventQualifier2	See EventQualifier1 and EventCode1.
Data[18]	EventCode2 [0] (MSB)	
Data[19]	EventCode2 [1] (LSB)	
:	:	:

[EventQualifier Specifications]

bit							
7	6	5	4	3	2	1	0
mode		type		source	instance		
0: Reserved 1: Event single shot 2: Event disappears 3: Event appears		0: Reserved 1: Notification 2: Warning 3: Error		0: Device 1: Master	0: Unknown 1-3: Reserved 4: Application 5-7: Reserved		

Note:

- When NumberOfDiags is **0**, data after Data[14] is not appended.
  Data is added in 3-byte increments according to the value of NumberOfDiags.
- For details on IO-Link master event codes, refer to 9.4 Diagnosis of IO-Link master modules (page 87).
- For details on IO-Link device event codes, refer to the IO-Link device instruction manual.

15.4.4 SMI_DeviceRead (Receive ISDU from IO-Link device)

- **Read service for ISDU reception from IO-Link devices**

[Request]

Data	Value	remarks
Service code	0x32	IO-Link SMI Read Service
Class	0x7E	
Instance	Mod. + 0x64	Module No.
Attribute	0x65...0x68	Ports 1 to 4
Data[0]	0x30	fixed value
Data[1]	0x00	fixed value
Data[2]	Index[0](MSB)	Refer to the IO-Link Device manual.
Data[3]	Index[1](LSB)	
Data[4]	Subindex	Refer to the IO-Link Device manual.

[Response]

Data	Value	remarks
Ack[0]...[3]	0xB2000000	Read successful: 0xB2000000
Data[0]	On request data[0] (MSB)	Refer to the IO-Link device manual.
Data[1]	On request data[1]	
:	:	

15.4.5 SMI_DeviceWrite (ISDU transmission to IO-Link device)

- **Write service for ISDU transmission to IO-Link devices**

[Request]

Data	Value	remarks
Service code	0x33	IO-Link SMI Write Service
Class	0x7E	
Instance	Mod. + 0x64	Module No.
Attribute	0x65...0x68	Ports 1 to 4
Data[0]	0x30	fixed value
Data[1]	0x00	fixed value
Data[2]	Index[0](MSB)	Refer to the IO-Link Device manual.
Data[3]	Index[1](LSB)	
Data[4]	Subindex	Refer to the IO-Link Device manual.
Data[5]	On request data[0] (MSB)	Refer to the IO-Link Device manual.
Data[6]	On request data[1]	
:	:	

[Response]

Data	Value	remarks
Ack[0]...[3]	0xB3000000	Write success: 0xB3000000

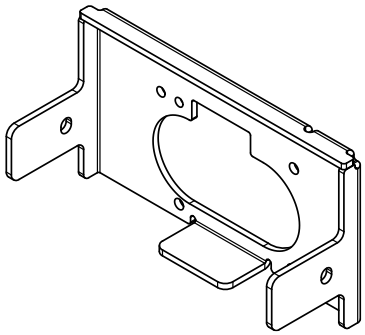
16 Accessories

For the selection of accessories, refer to the catalog.

(1) Valve plate

EX600-ZMV4

Enclosed parts: Hexagon socket screws (M4 × 6) 2 pcs.
Round head screw (M3 × 8) 4 pcs.



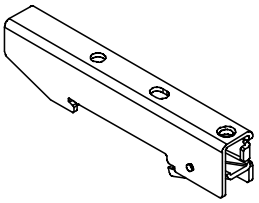
(2) End plate bracket

EX600-ZMA2

Enclosed parts: Round head screw (M4 × 20), 1 pc.
P tight screw (4 × 14), 2 pcs.

EX600-ZMA3

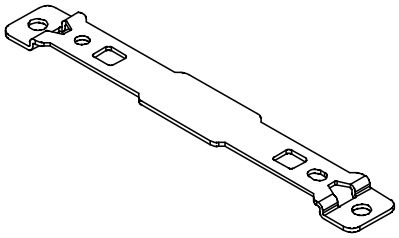
Enclosed parts: Round head screw (M4 × 20) with washer, 1 pc.
P tight screw (4 × 14), 2 pcs.



(3) Intermediate reinforcing brace

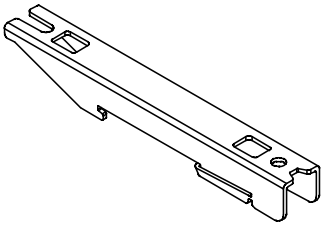
EX600-ZMB1: For direct mounting

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

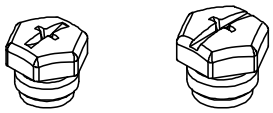


EX600-ZMB2: For DIN rail mounting

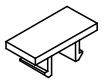
Enclosed parts: Round head screw (M4 × 6), 2 pcs.



(4) Seal cap (10 pcs.)
EX9-AWES: For M8
EX9-AWTS: For M12



(5) Marker (1 sheet, 88 pcs.)
EX600-ZT1



(6) Field-wireable connector
PCA-1446553 For EtherNet/IP communication, M12 (4-pin) Plug, D code
PCA-1578081 For power supply, 7/8 inch, Socket, Cable O.D. 12 to 14 mm

(7) 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

(8) EtherNet/IP 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
EX9-AC005EN-PSPS: Cable with M12 connector, dual-side D code Plug, Straight 0.5 m
EX9-AC010EN-PSPS: Cable with M12 connector, dual-side D code Plug, Straight 1 m
EX9-AC020EN-PSPS: Cable with M12 connector, dual-side D code Plug, Straight 2 m
EX9-AC030EN-PSPS: Cable with M12 connector, dual-side D code Plug, Straight 3 m
EX9-AC050EN-PSPS: Cable with M12 connector, dual-side D code Plug, Straight 5 m
EX9-AC100EN-PSPS: Cable with M12 connector, dual-side D code Plug, Straight 10 m
EX9-AC005EN-PAPA: Cable with M12 connector, dual-side D code Plug, Angle 0.5 m
EX9-AC010EN-PAPA: Cable with M12 connector, dual-side D code Plug, Angle 1 m
EX9-AC020EN-PAPA: Cable with M12 connector, dual-side D code Plug, Angle 2 m
EX9-AC030EN-PAPA: Cable with M12 connector, dual-side D code Plug, Angle 3 m
EX9-AC050EN-PAPA: Cable with M12 connector, dual-side D code Plug, Angle 5 m
EX9-AC100EN-PAPA: Cable with M12 connector, dual-side D code Plug, Angle 10 m

(9) IO-Link communication cable

EX9-AC005-SSPS: Cable with M12 connector, Socket, Plug, Straight 0.5 m
EX9-AC010-SSPS: Cable with M12 connector, Socket, Plug, Straight 1 m
EX9-AC020-SSPS: Cable with M12 connector, Socket, Plug, Straight 2 m
EX9-AC030-SSPS: Cable with M12 connector, Socket, Plug, Straight 3 m
EX9-AC050-SSPS: Cable with M12 connector, Socket, Plug, Straight 5 m
EX9-AC100-SSPS: Cable with M12 connector, Socket, Plug, Straight 10 m

Revision history

SMC Corporation

URL https://www.smcworld.com

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