B-2431(1)

SX8R Series Bus Coupler Module
User’ s Manual

IDEC CORPORATION

SAFETY PRECAUTIONS

- Read the "SX8R Series User's Manual" to ensure correct operation before starting installation, wiring, operation, maintenance, and inspection of the SX8R Series.
- All SX8R Series modules are manufactured under IDEC's rigorous quality control system, but users must add a backup or failsafe provision to the control system when using the SX8R Series in applications where heavy damage or personal injury may be caused, in case the SX8R Series should fail.
- Implement security measures, such as those for unauthorized access to this product from external devices, on the network system side. IDEC Corporation bears no responsibility for losses, damages, and/or other expenses that occur directly or indirectly as a result of unauthorized access or other security failures.
- In this manual, safety precautions are categorized in order of importance:

⚠Warning **Warning notices are used to emphasize that improper operation may cause severe personal injury or death.**

- The SX8R Series is not designed for use in applications requiring a high degree of reliability and safety. The SX8R Series should not be used for such applications.
- When using the SX8R Series in applications (not described above) that require a high degree of reliability in terms of functionality and precision, appropriate measures such as failsafe mechanisms and redundant mechanisms must be taken for the system containing the SX8R Series. The following are specific examples.
  - Emergency stop and interlocking circuits must be configured outside the SX8R Series.
  - The SX8R Series self-diagnostic function may detect internal circuit or user setting errors, and turn outputs off. Configure circuits so that the system containing the SX8R Series is not jeopardized when outputs turn off.
- Turn off power to the SX8R Series before installation, removal, wiring, maintenance, and inspection of the SX8R Series. Failure to turn power off may cause damage, electrical shocks or fire hazard.
- Special expertise is required to install, wire, create a project and operate the SX8R Series. People without such expertise must not use the SX8R Series.
- Install the SX8R Series according to the instructions described in the "SX8R Series User's Manual". Improper installation will result in falling, failure, or malfunction of the SX8R Series.

⚠Caution **Caution notices are used where inattention might cause personal injury or damage to equipment.**

- The SX8R Series is designed for installation in a cabinet. Do not install the SX8R Series outside a cabinet.
- Install the SX8R Series in environments described in the "SX8R Series User's Manual". If the SX8R Series is used in places where the SX8R Series is subjected to high-temperature, high-humidity, condensation, corrosive gases, excessive vibrations, or excessive shocks, then electrical shocks, fire hazard, or malfunction will result.
- The environment for using the SX8R Series is "Pollution degree 2." Use the SX8R Series in environments of pollution degree 2 (according to IEC 60664-1).
- Prevent the SX8R Series from falling while moving or transporting the SX8R Series, otherwise damage or malfunction of the SX8R Series will result.
- Wiring must use lead sizes that are appropriate for the applied voltage and current. Terminal screws must be tightened with the prescribed tightening torque.
- Prevent metal fragments and pieces of wire from dropping inside the SX8R Series housing. Put a cover on the SX8R Series modules during installation and wiring. Ingress of such fragments and chips may cause fire hazard, damage, or malfunction.
- Use a power supply of the rated value. Use of a wrong power supply may cause fire hazard.
- Use an IEC 60127-approved fuse on the power line outside the SX8R Series. This is required when equipment containing the SX8R Series is destined for Europe.
- Use an IEC 60127-approved fuse on the output circuit. This is required when equipment containing the SX8R Series is destined for Europe.
- Use an EU-approved circuit breaker. This is required when equipment containing the SX8R Series is destined for Europe.
- This product cannot be directly connected to the communication lines (including public wireless LAN) of telecommunication carriers (mobile communication companies, fixed-line communication companies, Internet providers, etc.). When connecting this product to the Internet, be sure to connect via a device, such as a router.
- Do not connect the ground wire directly to the SX8R Series. Connect a protective ground to the cabinet containing the SX8R Series using an M4 or larger screw. This is required when equipment containing the SX8R Series is destined for Europe.
- Do not disassemble, repair, or modify the SX8R Series modules.
- The SX8R Series contains electronic parts and batteries. When disposing of the SX8R Series, do so in accordance with national and local regulations.

INTRODUCTION

This manual describes the functions, installation, and configuration methods of the SX8R series bus coupler module and the SX8R Configurator configuration software.

Read this manual to ensure the correct understanding of the functions and performance of the SX8R series bus coupler module and the SX8R Configurator configuration software.

Related Manuals

Refer to the following manuals according to your purpose.

Manual Name	Description
SX8R Series Bus Coupler Module User's Manual (this manual)	Describes product specifications, installation and wiring instructions, basic operations for creating a project, communication functions, device list, and troubleshooting for the SX8R series bus coupler module.
FC6A Series MICROSmart User's Manual	Describes product specifications, installation and wiring instructions, and configuration methods for I/O modules to be connected to the SX8R series bus coupler module.

IDEC Corporation makes the latest product manual PDFs available on our website at no additional cost.

Please download the latest product manual PDFs from our website.

Publication history

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Caution

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- The contents of this manual are subject to change without notice.
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- Microsoft and Windows are registered trademarks or trademarks of Microsoft Corporation in the United State and other countries.
- CC-Link, CC-Link IE Field Basic is a registered trademark of Mitsubishi Electric Corporation.
- EtherNet/IP is a registered trademark of ODVA, Inc.
- Other company names and product names used in this manual are the trademarks or registered trademarks of their respective companies.

Regarding laws and compatible standards

This product adheres to the laws and compatible standards of all countries involved, as shown below.

European laws and standards

This product complies with the following EU directives.

- EMC Directive
- RoHS Directive

To comply with these directives, this product has been designed and evaluated on the basis of the following international and European standard.

- IEC 61131-2
- EN 61131-2
- EN IEC 63000: 2018

North America laws and standards

This product complies with the following standards.

- UL61010-2-201
- CSA C22.2 No.61010-2-201
- ANSI/UL 121201
- CSA C22.2 No.213

For details on applicable standards and EU directives, please contact the dealer where purchased or check the IDEC website.

IMPORTANT INFORMATION

Under no circumstances shall IDEC Corporation be held liable or responsible for indirect or consequential damages resulting from the use of or the application of IDEC components, individually or in combination with other equipment.

All persons using these components must be willing to accept responsibility for choosing the correct component to suit their application and for choosing an application appropriate for the component, individually or in combination with other equipment.

All diagrams and examples in this manual are for illustrative purposes only. In no way does including these diagrams and examples in this manual constitute a guarantee as to their suitability for any specific application. To test and approve all projects, prior to installation, is the responsibility of the end user.

NAMES AND ABBREVIATIONS USED IN THIS MANUAL

Item	Description
SX8R	Generic term used to refer to SX8R series bus coupler module.
FC6A	Generic term used to refer to I/O module, expansion interface module.
I/O module	Generic term used to refer to digital I/O module, analog I/O module.
Digital I/O module	Generic term used to refer to digital input module, digital output module, digital mixed I/O module.
Digital input module	Generic term used to refer to digital I/O modules with input terminals. (FC6A-N****)
Digital output module	Generic term used to refer to digital I/O modules with output terminals. (FC6A-R***, FC6A-T****)
Digital mixed I/O module	Generic term used to refer to digital I/O modules with input and output terminals. (FC6A-M*****)
Analog I/O module	Generic term used to refer to analog input module, analog output module, analog mixed I/O module.
Analog input module	Generic term used to refer to analog I/O modules with input terminals. (FC6A-J***, FC6A-J4CN*, FC6A-J4CH**, FC6A-J8CU*)
Analog output module	Generic term used to refer to analog I/O modules with output terminals. (FC6A-K***)
Analog mixed I/O module	Generic term used to refer to analog I/O modules with input and output terminals. (FC6A-L03CN*, FC6A-L06A*)
Expansion interface module (Expander)	Generic term used to refer to FC6A-EXM2, FC6A-EXM24.
SX8R Configurator	This software is used to create ladder programs for the FC6A.
User program	It refers to the data that combines user data and other settings configured by the SX8R Configurator .
User data	Generic term used to refer to module configuration, basic settings and shared memory list.

SYMBOLS USED IN THIS MANUAL

This manual uses the following symbols to facilitate explanation.

Symbols	Description
Warning	Warning notices are used to emphasize that improper operation may cause severe personal injury or death.
Caution	Caution notices are used where inattention might cause personal injury or damage to equipment.
	Information that requires special attention. Failure to operate the product in accordance with the information provided can lead to serious injury or damage.
	Information relating to requests or material to reference in the use of a function.

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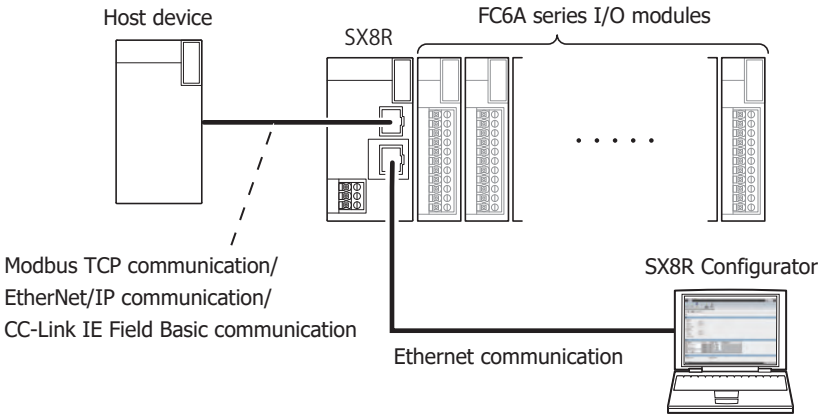
1: GENERAL INFORMATION

This chapter describes an overview, features, and functions of the SX8R series bus coupler module.

About the SX8R

The SX8R has a communication function and can connect FC6A series I/O modules. The SX8R can communicate with PLCs and various devices via various communications (Modbus TCP communication (server), EtherNet/IP communication (adapter), CC-Link IE Field Basic communication (slave station)) and can read and write input and output data of I/O modules connected to the SX8R. Up to 15 FC6A series I/O modules of IDEC can be connected to the SX8R to increase the number of inputs and outputs.

Configuration of the SX8R is done on a PC using the application software SX8R Configurator. The SX8R is connected to a PC via Ethernet.



Type Numbers

The notation for SX8R part numbers is as follows.

For details on the product specifications, see Chapter 2 "Product Specifications" on page 2-1.

SX8R - EC B 1

- 1: Terminal specification
  - 1: Removable terminal block (Screw)
  - 4: Removable terminal block (Push-in)
- B: Industrial Network Coverage
  - B: Basic type
- EC: Module type
  - EC: Ethernet coupler

Type Numbers and Functions

Type Number	Power Supply	Terminal Specification	Communication Protocol	
			Ethernet port 1	Ethernet port 2
SX8R-ECB1	DC24V	Removable terminal block (Screw)	Modbus TCP communication (server), EtherNet/IP communication (adapter), CC-Link IE Field Basic communication (slave station), Maintenance communication (server)	Maintenance communication (server)
SX8R-ECB4	DC24V	Removable terminal block (Push-in)		

For details on the product specifications, see Chapter 2 "Product Specifications" on page 2-1.

Features of the SX8R

■ **Various I/O modules that can be connected**
The I/O module best suited for the system configuration (number of points and types) can be selected from various I/O modules without waste. For I/O modules that can be connected to the SX8R, see Chapter 2 "I/O modules that can be Connected to SX8R" on page 2-4.

■ **Reduces Installation Space and Wiring man-hours**
The SX8R can be easily installed on a DIN rail to save space. Also, selecting the SX8R with Removable terminal block (Push-in) reduces wiring man-hours.

■ **Various Communication Functions**
The SX8R can be connected to programmable displays, PLCs, and other host devices to build a multi-vendor network between hots devices. In addition, the SX8R can be connected to a PC on which the SX8R Configurator is installed. The SX8R supports the following communication functions.

Communication with Host Device

Modbus TCP communication (server)	Data can be sent and received between host devices that support Modbus TCP client protocol and the SX8R. For details, see Chapter 5 "Modbus TCP Communication (Server)" on page 5-1.
EtherNet/IP communication (adapter)	Data can be sent and received between host devices that support EtherNet/IP communication (scanner) and the SX8R. For details, see Chapter 5 "EtherNet/IP Communication (Adapter)" on page 5-16.
CC-Link IE Field Basic communication (slave station)	Data can be sent and received between host devices that support CC-Link IE Field Basic communication (Master) and the SX8R. For details, see Chapter 5 "CC-Link IE Field Basic (Slave Station)" on page 5-36.

Maintenance

Maintenance communication (Server)	You can download and upload user data, readout of the configuration of I/O modules connected to the SX8R, search and initialization of SX8R, update system software for SX8R and I/O Modules. For details, see Chapter 5 "Maintenance Communication (Server)" on page 5-43.

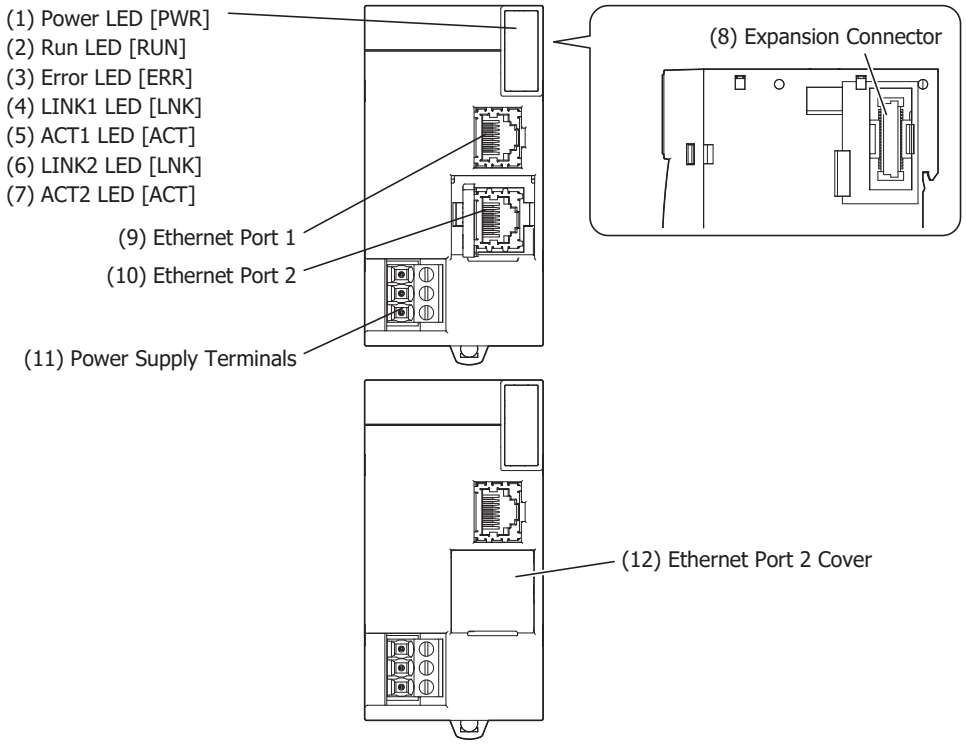
■ **Easy configuration with SX8R Configurator**
Communication functions and I/O modules can be easily configured with the application software "SX8R Configurator" for PC.

2: PRODUCT SPECIFICATIONS

This chapter describes the part names and specifications of the modules that make up the SX8R.

Part Names and Functions

SX8R-ECB1, SX8R-ECB4



(1) Power LED [PWR]

This LED turns on when the power is supplied to the SX8R.

(2) Run LED [RUN]

This LED turns on when the SX8R is operating.

(3) Error LED [ERR]

This LED turns on when the following cases.

- When the SX8R fails to receive a request from the host device (connection number 1) for a time longer than the time configured by the Communication Timeout.
  For example, the cable may be disconnected or broken, or the host device or router may be malfunctioning.
- When a general error occurs.
- When the following occurs for a connected I/O module:
  - An unsupported module was connected.
  - Exceeded seven modules (without expansion interface expander module).
  - Exceeded 15 modules (when using expansion interface expander module).

(4) LINK1 LED [LNK]

This LED turns on when a host device is connected to Ethernet port 1 using an Ethernet cable. It also turns on when connected to a hub.

(5) ACT1 LED [ACT]

When the LINK1 LED is on, this LED flashes when the SX8R is communicating with the host device or a device in the same network.

(6) LINK2 LED [LNK]

This LED turns on when a PC is connected to Ethernet port 2 using an Ethernet cable. It also turns on when connected to a hub.

(7) ACT2 LED [ACT]

When the LINK2 LED is on, this LED flashes when the SX8R is communicating with the PC or a device in the same network.

(8) Expansion Connector

This connector is used to connect an I/O module.

(9) Ethernet Port 1

This port is used to connect the host device to the SX8R using an Ethernet cable.

(10) Ethernet Port 2

This port is used to communicate the SX8R to the SX8R Configurator using an Ethernet cable.

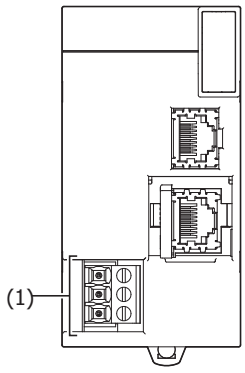
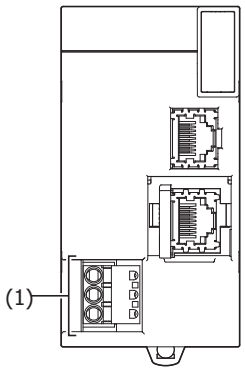
(11) Power Supply Terminals

These terminals supply 24V DC power to the SX8R.

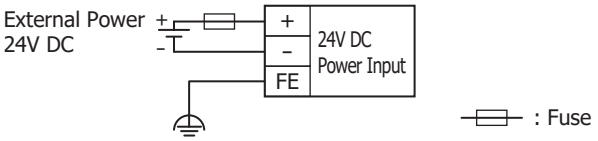
(12) Ethernet Port 2 Cover

A removable cover that protects Ethernet port 2. When using Ethernet port 2, remove the Ethernet port 2 cover.

Terminal Arrangement and Wiring Examples

Model Number	SX8R-ECB1	SX8R-ECB4
Power Supply Terminal	Screw fastened type	Push-in type
Applicable Connector	FC6A-PMTB03PN02	FC6A-PMSB03PN02
Terminal Arrangement		

(1) Power Supply Terminals



For wiring precautions, see Chapter 3 "Power Supply and Power Supply Wiring" on page 3-7.

Specifications

Environmental Specifications

Ambient Operating Temperature		-25 to +65°C (no freezing)
Ambient Storage Temperature		-25 to +70°C (no freezing)
Relative Humidity		10 to 95%, no condensation
Storage Humidity		10 to 95%, no condensation
Pollution Degree		2 (IEC60664-1)
Degree of Protection		IP20 (IEC60529)
Atmosphere		No corrosive gas
Altitude or Air Pressure		1,013 to 795 hPa (0 to 2,000 m) during operation
		1,013 to 701 hPa (0 to 3,000 m) during transport
Installation Location		Inside cabinet
Device Class		Open equipment
Vibration Resistance	**DIN Rail Mounted**	5 to 8.4 Hz half amplitude 3.5 mm, 8.4 to 150 Hz, acceleration 9.8 m/s^2 (1 G), each direction XYZ, 2 hours (IEC61131-2, EN61131-2)
	Panel Mounted	
Shock Resistance		147 m/s^2 (15 G), 11 ms, XYZ, 3 axes, 6 directions, 3 times each (IEC 61131-2)
EMC Immunity		IEC61131-2, EN61131-2, Zone B compatibility

Electrical Specifications

Type No.		**SX8R-ECB1, SX8R-ECB4**	
Rated Operating Voltage		24V DC (supplied from external power)	
Voltage Fluctuation Range		20.4 to 28.8V DC (including ripple)	
Current Draw	**Internal Power**	—	
	External Power	When maximum number of modules is connected 0.85 A (24V DC)	
Allowable Momentary Power Interruption		10 ms or longer (when rated power supply voltage)	
Isolation between Internal Circuit		Not isolated	
Withstand Voltage		Between power and FE terminals: 500V AC, 1 minute	
Insulation Resistance		Between power and FE terminals: 100 MΩ or higher (500V DC insulation resistance tester)	
Inrush Current		35 A maximum	
Ground		D-type ground (Class 3 ground)	
Ground Wire		See Chapter 3 "Recommended Ferrule List" on page 3-12	
Power Supply Wire		See Chapter 3 "Recommended Ferrule List" on page 3-12	
Power Supply Connector	**Insertion/ Removal Durability**	100 times minimum	
Effect of Improper Power Supply Connection		Reverse polarity:	No operation, no damage
		Improper voltage:	Permanent damage may be caused
		Improper lead connection:	Permanent damage may be caused
Weight		165 g	

Ethernet Communication Specifications

Communication Type		IEEE 802.3 compliant
Communication Speed		10BASE-T and 100BASE-TX (Auto MDI/MDI-X compatible)
Communication Functions	**Ethernet Port 1**	Modbus TCP communication (server), EtherNet/IP communication (adapter), CC-Link IE Field Basic communication (slave station), and maintenance communication (server) are supported.
	Ethernet Port 2	Maintenance communication (server) is supported.
Connector		RJ-45
Cable		Category 5 or higher rated twisted pair cable with a maximum length of 100 m
Isolation		Pulse transformer isolated

I/O modules that can be Connected to SX8R

Up to 15 of the following IDEC FC6A series I/O modules can be connected to the SX8R.

- For specifications of each I/O module, see the following manuals.
  Digital I/O module: Chapter 2 "Digital I/O Modules" in the FC6A Series MICROSmart User's Manual
  Analog I/O module: Chapter 2 "Analog I/O Modules" in the FC6A Series MICROSmart User's Manual
- For details on the installation and wiring of each I/O module, see Chapter 3 "Installation and Wiring" in the FC6A Series MICROSmart User's Manual.

Digital I/O Modules

■ **Digital Input Modules**

Type No.	Points	Input Type	Terminal Block Type	Dimensions (L x W x H (mm))	Internal Current Draw (mA)	
					5V	24V
FC6A-N08A11	8	AC	Screw fastened type	90.0×23.6×73.0	40	0
FC6A-N08B1	8	DC		90.0×23.6×73.0	30	0
FC6A-N16B1	16	DC		90.0×23.6×73.0	40	0
FC6A-N08A14	8	AC	Push-in type	90.0×23.6×73.0	40	0
FC6A-N08B4	8	DC		90.0×23.6×73.0	30	0
FC6A-N16B4	16	DC		90.0×23.6×73.0	40	0
FC6A-N16B3	16	DC	MIL connector	90.0×17.6×73.0	40	0
FC6A-N32B3	32	DC		90.0×30.2×73.0	65	0

■ **Digital Output Modules**

Type No.	Points	Output Type	Terminal Block Type	Dimensions (L x W x H (mm))	Internal Current Draw (mA)	
					5V	24V
FC6A-R081	8	Relay output	Screw fastened type	90.0×23.6×73.0	35	50
FC6A-R161	16			90.0×23.6×73.0	50	100
FC6A-R084	8		Push-in type	90.0×23.6×73.0	35	50
FC6A-R164	16			90.0×23.6×73.0	50	100
FC6A-T08K1	8	Transistor sink output	Screw fastened type	90.0×23.6×73.0	25	15
FC6A-T16K1	16			90.0×23.6×73.0	30	25
FC6A-T08K4	8		Push-in type	90.0×23.6×73.0	25	15
FC6A-T16K4	16			90.0×23.6×73.0	30	25
FC6A-T16K3	16		MIL connector	90.0×17.6×73.0	30	25
FC6A-T32K3	32			90.0×30.2×73.0	45	50
FC6A-T08P1	8	Transistor protection source output	Screw fastened type	90.0×23.6×73.0	25	15
FC6A-T16P1	16			90.0×23.6×73.0	30	25
FC6A-T08P4	8		Push-in type	90.0×23.6×73.0	25	15
FC6A-T16P4	16			90.0×23.6×73.0	30	25
FC6A-T16P3	16		MIL connector	90.0×17.6×73.0	30	25
FC6A-T32P3	32			90.0×30.2×73.0	45	50

■ **Digital mixed I/O Modules**

Type No.	Points		Input/Output Type	Terminal Block Type	Dimensions (L x W x H (mm))	Internal Current Draw (mA)	
	Input	Output				5V	24V
FC6A-M08BR1	4	—	DC input	Screw fastened type	90.0×23.6×73.0	30	25
	—	4	Relay output				
FC6A-M24BR1	16	—	DC input		90.0×39.2×73.0	55	50
	—	8	Relay output				
FC6A-M08BR4	4	—	DC input	Push-in type	90.0×23.6×73.0	30	25
	—	4	Relay output				
FC6A-M24BR4	16	—	DC input		90.0×39.2×73.0	55	50
	—	8	Relay output				

Analog I/O Modules

■ Analog Input Modules

Type No.	Points	Input Type						Terminal Block Type	Dimensions (L x W x H (mm))	Internal Current Draw (mA)	
		Voltage	Current	Thermocouple	Resistance Thermometer	Thermistor	Resistance measurement			5V	24V
FC6A-J2C1	2	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA	—	—	—	—	Screw fastened type	90.0×23.6×73.0	40	0
FC6A-J4A1	4	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA	—	—	—	—		90.0×23.6×73.0	45	0
FC6A-J8A1	8	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA	—	—	—	—		90.0×23.6×73.0	40	0
FC6A-J4CN1	4	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA	K/ J/ R/ S/ B/ E/ T/ N/ C	Pt100/ Pt1000/ Ni100/Ni1000	—	—		90.0×23.6×73.0	50	0
FC6A-J4CH1Y	4	—	—	K/ J/ R/ S/ B/ E/ T/ N/ C	—	—	—		90.0×23.6×73.0	50	0
FC6A-J8CU1	8	—	—	K/ J/ R/ S/ B/ E/ T/ N/ C	—	NTC/PTC	100 to 32000Ω		90.0×23.6×73.0	45	0
FC6A-J2C4	2	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA	—	—	—	—	Push-in type	90.0×23.6×73.0	40	0
FC6A-J4A4	4	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA	—	—	—	—		90.0×23.6×73.0	45	0
FC6A-J8A4	8	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA	—	—	—	—		90.0×23.6×73.0	40	0
FC6A-J4CN4	4	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA	K/ J/ R/ S/ B/ E/ T/ N/ C	Pt100/ Pt1000/ Ni100/Ni1000	—	—		90.0×23.6×73.0	50	0
FC6A-J4CH4Y	4	—	—	K/ J/ R/ S/ B/ E/ T/ N/ C	—	—	—		90.0×23.6×73.0	50	0
FC6A-J8CU4	8	—	—	K/ J/ R/ S/ B/ E/ T/ N/ C	—	NTC/PTC	100 to 32000Ω		90.0×23.6×73.0	45	0

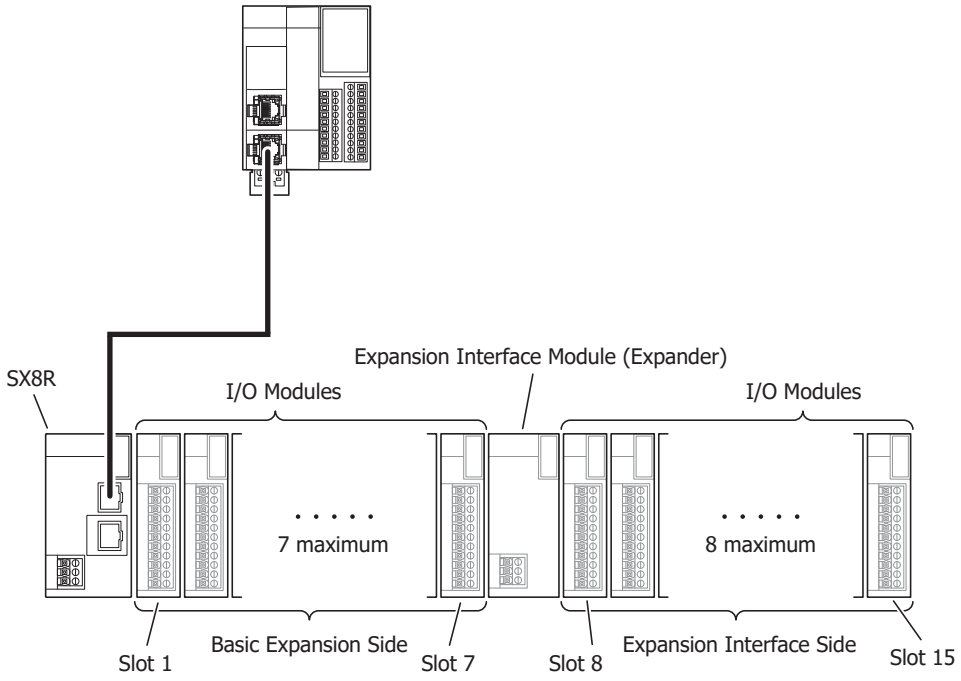
■ Analog Output Modules

Type No.	Points	Output Type		Terminal Block Type	Dimensions (L x W x H (mm))	Internal Current Draw (mA)	
		Voltage	Current			5V	24V
FC6A-K2A1	2	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA	Screw fastened type	90.0×23.6×73.0	40	0
FC6A-K4A1	4	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA		90.0×23.6×73.0	50	0
FC6A-K2A4	2	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA	Push-in type	90.0×23.6×73.0	40	0
FC6A-K4A4	4	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA		90.0×23.6×73.0	50	0

■ **Analog mixed I/O Modules**

Type No.	Points		Input Type				Output Type		Terminal Block Type	Dimensions (L x W x H (mm))	Internal Current Draw (mA)	
	Input	Output	Voltage	Current	Thermocouple	Resistance Thermometer	Voltage	Current			5V	24V
FC6A-L06A1	4	—	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA	—	—	—	—	Screw fastened type	90.0×23.6×73.0	55	0
	—	2	—	—	—	—	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA				
FC6A-L03CN1	2	—	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA	K/ J/ R/ S/ B/ E/ T/ N/ C	Pt100/Pt1000/ Ni100/Ni1000	—	—		90.0×23.6×73.0	60	0
	—	1	—	—	—	—	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA				
FC6A-L06A4	4	—	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA	—	—	—	—	Push-in type	90.0×23.6×73.0	55	0
	—	2	—	—	—	—	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA				
FC6A-L03CN4	2	—	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA	K/ J/ R/ S/ B/ E/ T/ N/ C	Pt100/Pt1000/ Ni100/Ni1000	—	—		90.0×23.6×73.0	60	0
	—	1	—	—	—	—	0 to 10V/ -10 to +10V	0 to 20mA/ 4 to 20mA				

The number of I/O modules that can be connected to the SX8R (basic expansion side) is seven modules. When installing the expansion interface module (expander), additional eight I/O modules can be connected on the right side (expansion interface side) of the expansion interface module (expander). Slot numbers (1 to 15) are assigned in the order of connection starting from the I/O module connected to the SX8R.



- The number of connected modules does not include expansion interface module (expander).
- Slot numbers are not assigned to expansion interface module (expander).
- For details on expansion interface module (expander), see Chapter 2 "Expansion Interface Modules" in the FC6A Series MICROSmart User's Manual.

Maximum Input/Output Points

The maximum number of I/O points when the maximum number of I/O modules are connected to the SX8R is as follows.

I/O module	Input/Output	Maximum input/output points
Digital I/O module	Input	480
	Output	480
Analog I/O module	Input	120
	Output	60

The scan time of the SX8R is stored in D8023 (Scan Time Current Value). When the inputs/outputs are changed in a shorter time than the SX8R scan time, they may not be reflected. Make sure that the inputs/outputs are controlled in a longer time than the SX8R scan time.

Size of Device to Occupy

Expansion inputs (I) and expansion outputs (Q) are assigned to devices of the size occupied by the I/O module in order of slot number from the beginning of each device. The data register (D) occupies the data register for 20 words from address ((slot number - 1) x 20) th, and the device is allocated ((total number of input/output points) x 2) words.

The size of the device occupied by each I/O module is as follows.

I/O module	Points		Size of Device to Occupy		
	Actual Inputs	Actual Outputs	Expansion inputs	Expansion Outputs	Data Registers
Digital input module	8	—	8 bits	—	—
	16	—	16 bits	—	—
	32	—	32 bits	—	—
Digital output module	—	8	—	8 bits	—
	—	16	—	16 bits	—
	—	32	—	32 bits	—
Digital mixed I/O module	4	4	8 bits	8 bits	—
	16	8	16 bits	8 bits	—
Analog input module	2	—	—	—	20 words
	4	—	—	—	20 words
	8	—	—	—	20 words
Analog output module	—	2	—	—	20 words
	—	4	—	—	20 words
Analog mixed I/O module	4	2	—	—	20 words
	2	1	—	—	20 words

For details on devices, see Chapter 4 "Devices" on page 4-1.

Example: When seven I/O modules are connected to the SX8R as shown in the table below

The device assignment is as follows.

Slot No.	I/O module		Points		Devices		
	Type No.	Module Type	Inputs	Outputs	Expansion Inputs	Expansion Outputs	Data Registers
1	FC6A-N16B1	Digital input module	16	—	I0 to I17	—	—
2	FC6A-T16P1	Digital output module	—	16	—	Q0 to Q17	—
3	FC6A-M08BR1	Digital mixed I/O module	4	4	I20 to I23*1	Q20 to Q23*1	—
4	FC6A-J4A1	Analog input module	4	—	—	—	D0060 to D0067*2
5	FC6A-K4A1	Analog output module	—	4	—	—	D0080 to D0087*2
6	FC6A-L06A1	Analog mixed I/O module	4	2	—	—	D0100 to D0111*2
7	FC6A-M08BR1	Digital mixed I/O module	4	4	I30 to I33 *1	Q30 to Q33*1	—

*1 FC6A-M08BR1 has 4 inputs and 4 outputs. They each occupy 8 bits of expansion inputs and expansion outputs.

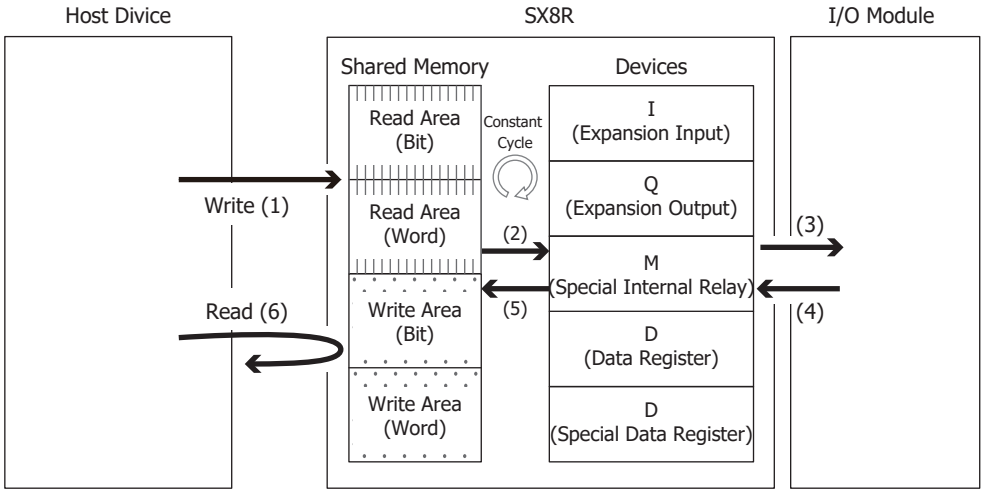
*2 Each analog I/O module occupies 20 words from address ((slot number - 1) x 20) th and is allocated ((total number of I/O points) x 2) words.

The devices assigned to each I/O module can be viewed in the Module Configuration tab of the SX8R Configurator by clicking on the I/O module.

Internal Processing of SX8R

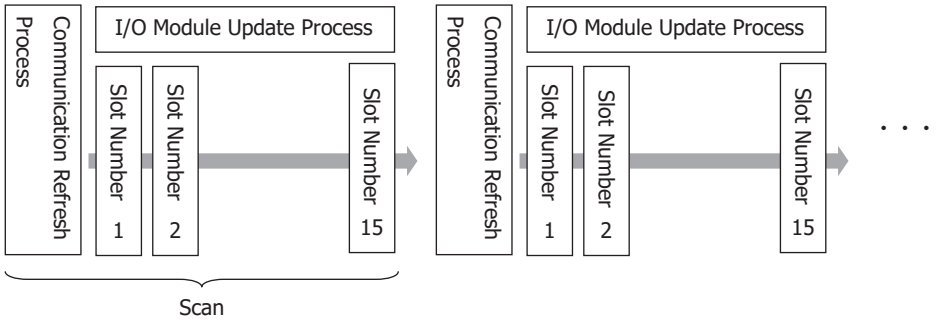
Shared memory is the memory inside the SX8R that is accessed by the host device. Reads (6) and writes (1) from the host device are performed to the shared memory. Devices are the memory inside the SX8R for storing the values of the I/O modules to be read/written. The SX8R periodically repeats data exchange between shared memory and devices (2), (5) and between devices and I/O modules (3), (4). The data exchange between the shared memory and the devices is called the communication refresh process, and the data exchange between the devices and the I/O modules is called the I/O module update process.

Data received from the host device is written to shared memory (1) and reflected in the I/O module through the communication refresh process (2) and I/O module update process (3). I/O module data is written to shared memory and read back to the host device (6) through the I/O module update process (4) and the communication refresh process (5).



The I/O module update process is performed in order of slot number.

One cycle of communication refresh process and I/O module update process is called a scan, and the time required for one cycle is called scan time.



The maximum time for the communication refresh process is 1 ms. The I/O module update process time varies depending on the I/O module model and number of I/O modules connected. For details on the I/O module update process time, see "Calculation Method of I/O Data Refreshing Time" on page 2-14.

Maximum and Minimum Update Times for I/O Data

External output of I/O module

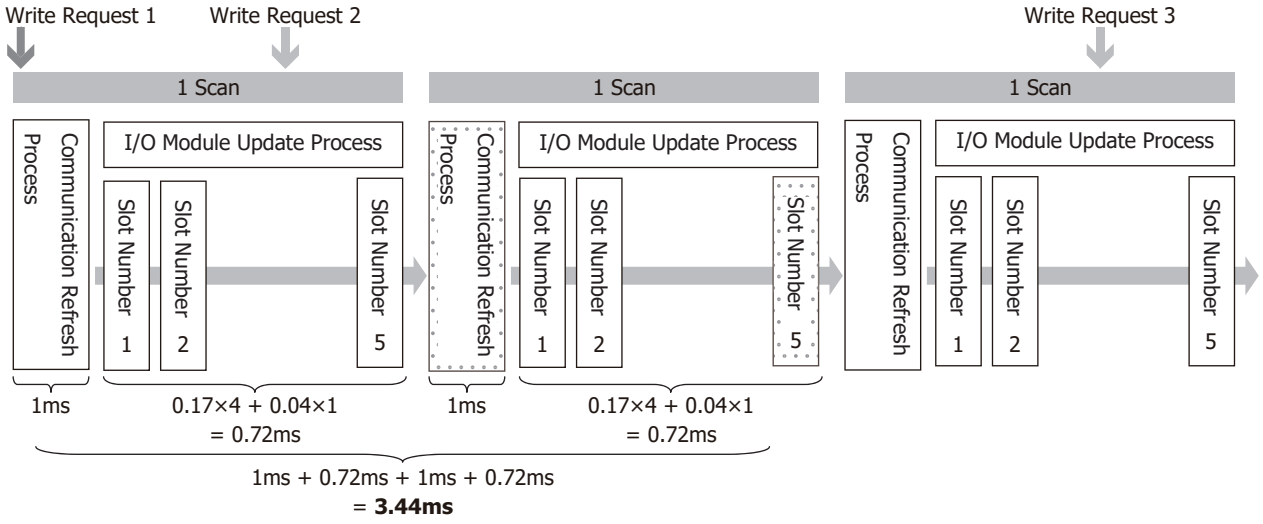
The time from when the SX8R receives a write request until it is actually reflected in the I/O module's external output is called the output update time.

Calculate the maximum and minimum output update times for the following module configurations.

Module configuration: Analog I/O module: 3 modules (Slot numbers 1 to 4)
Digital mixed I/O module: 1 module (Slot number 5)

■ **Maximum Output Update Time**

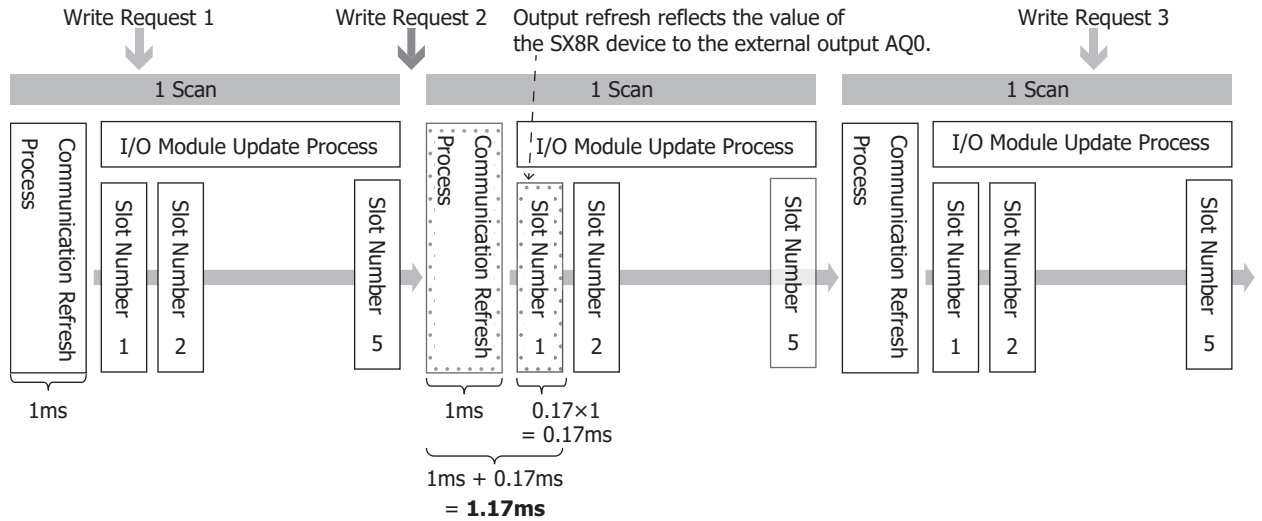
For example, consider the output refresh time from receipt of write request 1 (to turn on external output Q0 of the digital mixed I/O module (Slot number 5)) during the communication refresh process until external output Q0 is turned on. In this case, the maximum output update time is 3.44 ms (2 scans).



It takes up to 2 scans from the time the SX8R receives a write request until it is reflected on the external output.

■ **Minimum Output Update Time**

For example, consider the output refresh time from the time the SX8R receives write request 2 (to change AQ0 of the analog I/O module (Slot number 1)) immediately before the communication refresh process until the actual AQ0 value is changed. In this case, the minimum output update time is 1.77 ms.



The I/O module update process time varies depending on the I/O module model and number of I/O modules connected. For details on the I/O module update process time, see "Calculation Method of I/O Data Refreshing Time" on page 2-14.

External input of I/O module

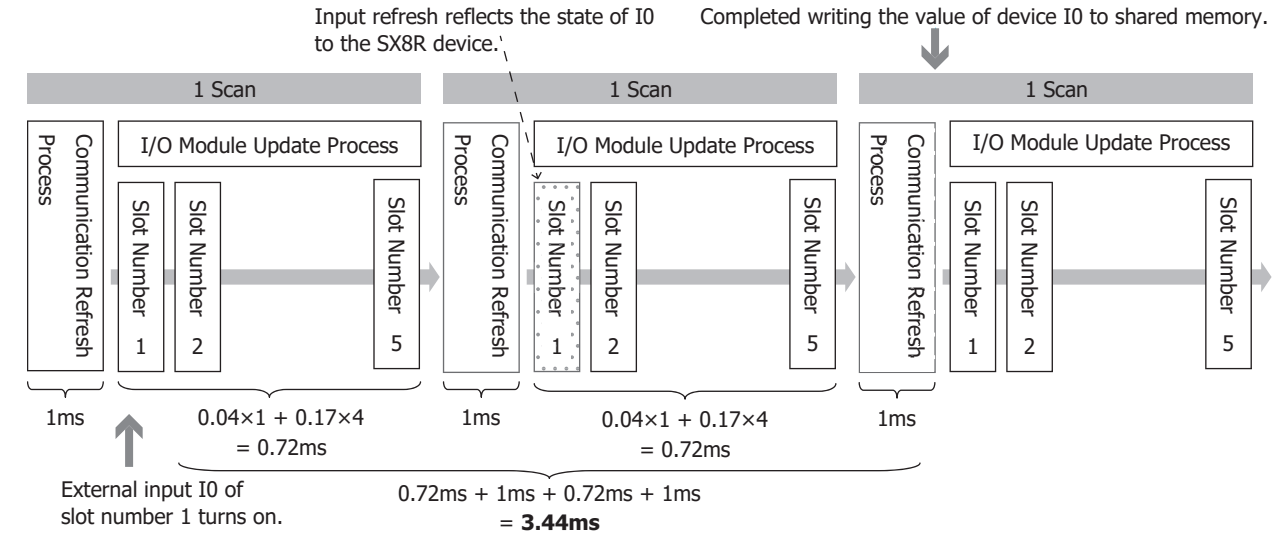
The time from when the I/O module's external input is turned on until the shared memory of the SX8R is updated is called the input update time.

Calculate the maximum and minimum input update times for the following module configurations.

Module configuration: Digital mixed I/O module: 1 module (Slot number 1)
Analog I/O module: 4 modules (Slot numbers 2 to 5)

■ **Maximum Input Update Time**

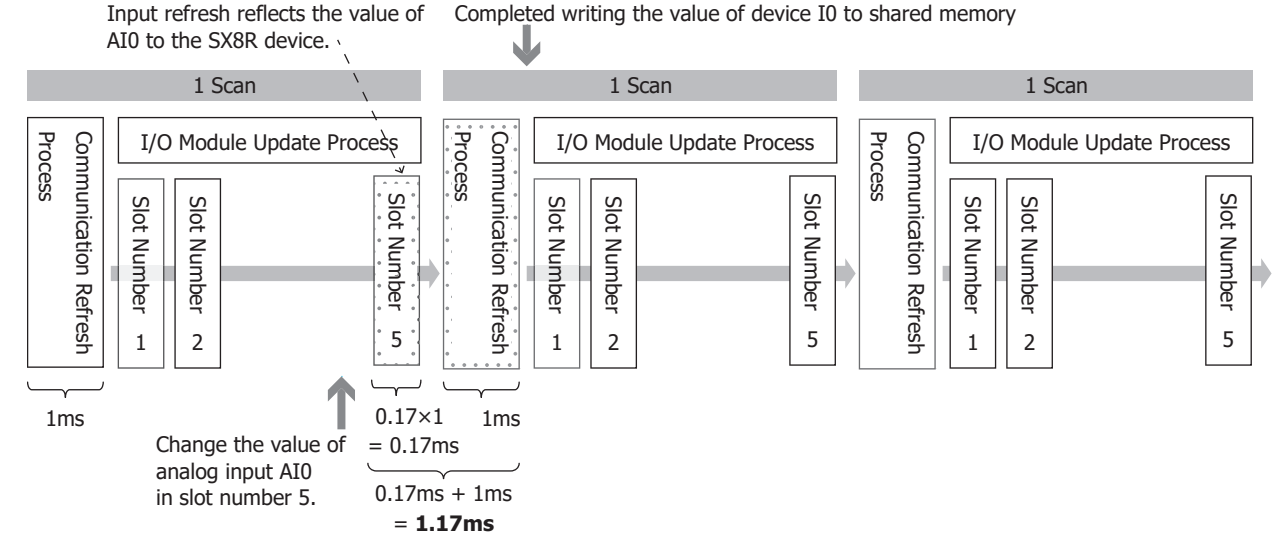
For example, consider the case where the external input I0 of the digital mixed I/O module (Slot number 1) turns on during the I/O module update process of the digital mixed I/O module (Slot number 1). In this case, the maximum input update time is 3.44 ms (2 scans).



- To ensure that the status of the external inputs are reflected in the shared memory, the external inputs should be turned on or off for at least one scan.
- It takes up to 2 scans to write the status of the external inputs to the shared memory.

■ **Minimum Input Update Time**

For example, consider the case where the AI0 value of the analog I/O module (Slot number 5) is changed just before the I/O module update process of the analog I/O module (Slot number 5). In this case, the minimum input update time is 1.17 ms.



The I/O module update process time varies depending on the I/O module model and number of I/O modules connected. For details on the I/O module update process time, see "Calculation Method of I/O Data Refreshing Time" on page 2-14.

Calculation Method of I/O Data Refreshing Time

The SX8R repeats the communication refresh process and I/O module update process.

The sum of the communication refresh processing time and the I/O module refresh processing time is called the I/O data refreshing time. The I/O data refreshing time can be roughly calculated by the following calculation.

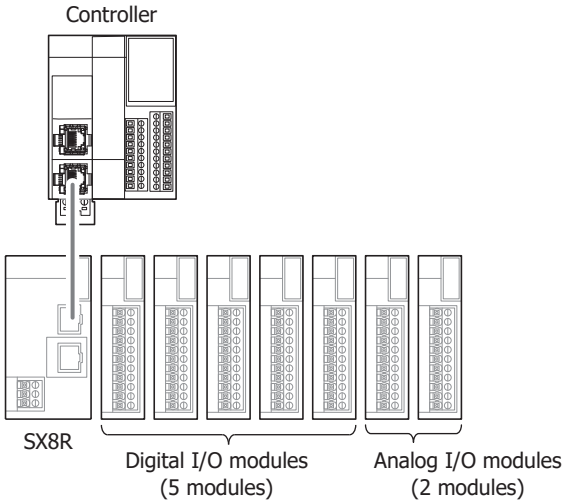
■ **When Not Using an Expansion Interface Module (Expander)**

I/O data refresh time = I/O module refresh processing time + Communication refresh processing time

= ( ) module(s) × 0.04 ms + ( ) module(s) × 0.17 ms + 1ms

Digital I/O module Analog I/O module

Example:



I/O data refreshing time = 5×0.04ms + 2×0.17ms + 1ms

= 0.54ms + 1ms

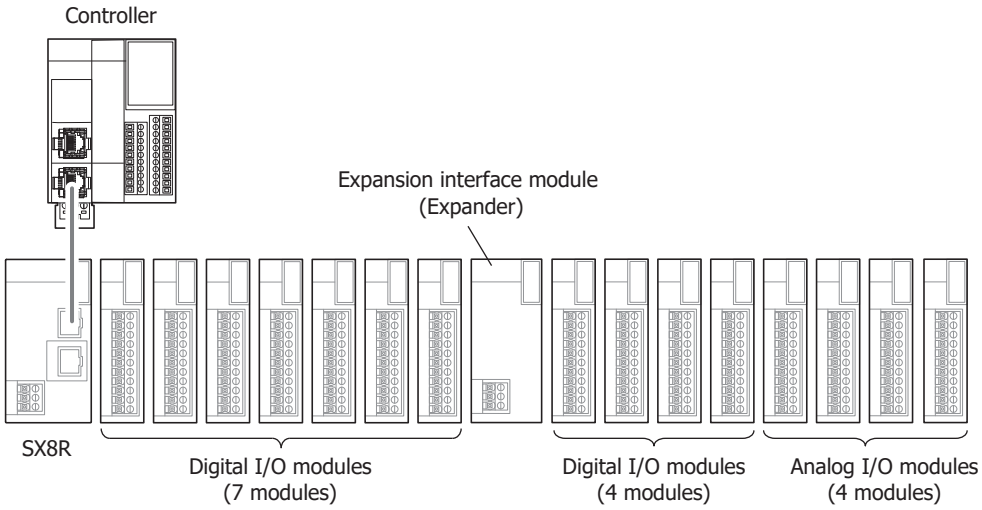
■ **When Using an Expansion Interface Module (Expander)**

I/O data refresh time = I/O module refresh processing time + Communication refresh processing time

= ( ) module(s) × 0.08 ms + ( ) module(s) × 0.29 ms + 1ms

Digital I/O module Analog I/O module

Example:

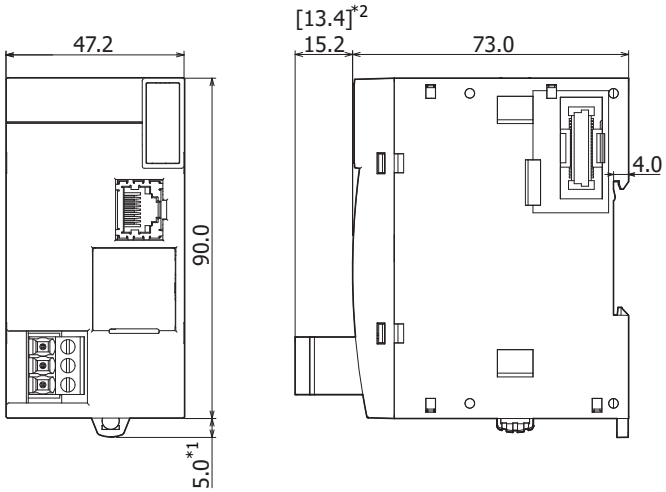


I/O data refreshing time = 11×0.08ms + 4×0.29ms + 1ms

= 2.04ms + 1ms

Dimensions

SX8R-ECB1, SX8R-ECB4

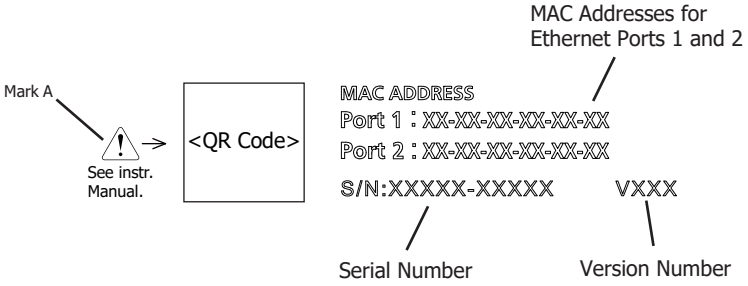


All dimensions in mm.

*1 9.3 mm when the hook is pulled out.
*2 The above drawing is for the screw fastened type. Dimensions for the push-in type are given in [ ].

■ **About the Print Contents of the SX8R Module**

The "Mark A" indicates that the user can refer to the instruction manual via QR code.



3: INSTALLATION AND WIRING

Introduction

This chapter describes the methods and precautions for installing and wiring the SX8R module.

Before starting installation and wiring, be sure to read "Safety Precautions" in the beginning of this manual and understand precautions described under Warning and Caution.

Installation and wiring precautions

⚠ Warning

- Turn off the power to the SX8R before starting installation, removal, wiring, maintenance, and inspection of the SX8R. Failure to turn power off may cause electrical shocks or fire hazard.
- Avoid use in the environments below, as doing so may cause electric shock, fire, or malfunction:
  Places where there is a lot of dust, salt, iron powder, or soot.
  Places exposed to direct sunlight.
  Places where the SX8R may be exposed to vibration or shock, either directly or indirectly.
  Atmospheres of corrosive or flammable gases.
  Places where condensation may form.
  Places where the SX8R may be directly exposed to water.
  Around high-voltage lines, high-voltage equipment, motor lines, or motor equipment.
  Places near where a large switching surge may occur.
  Places subject to a strong magnetic or electrical field.
- Emergency stop and interlocking circuits must be configured outside the SX8R. If such a circuit is configured inside the SX8R, failure of the SX8R may cause disorder of the control system, damage, or accidents.
- Special expertise is required to install, wire, program, and operate the SX8R. People without such expertise must not use the SX8R.

⚠ Caution

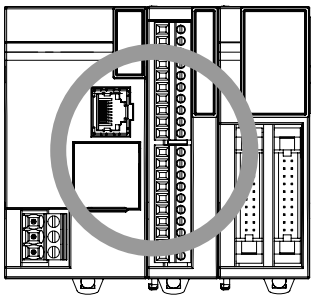
- Prevent metal fragments and pieces of wire from dropping inside the SX8R housing. Put a cover on the SX8R modules during installation and wiring. Ingress of such fragments and chips may cause fire hazard, damage, or malfunction.
- Do not touch the connector pins with your hand. Electrostatic discharge may damage the internal elements.
- When handling the SX8R, take measures to discharge static electricity.
- Keep the SX8R wiring away from motor lines.
- Wire the connectors and terminal blocks so that no force is applied to them.

Installation Location

- The SX8R is designed to be installed in control panels and similar locations.
- Install the SX8R within product specifications.
- Mount the SX8R as follows. To provide ample ventilation, ensure that there is sufficient space between the SX8R and other devices, heat sources, and panel surfaces.

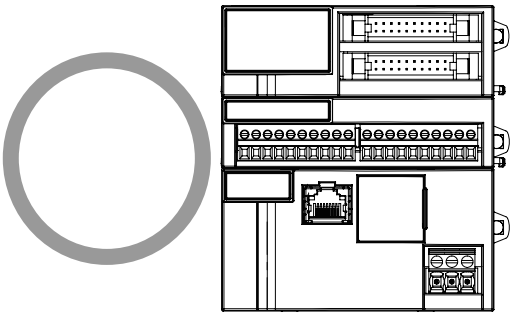
Normal Installation State

SX8R I/O modules

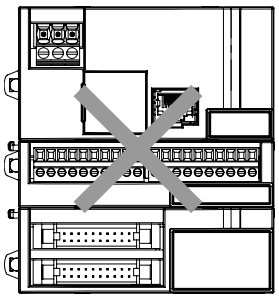


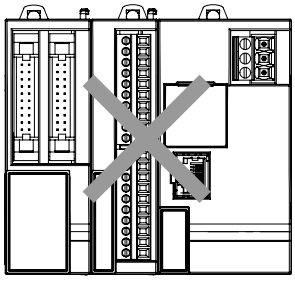
The SX8R can be mounted with the following orientation when the operating temperature is 35°C or lower.

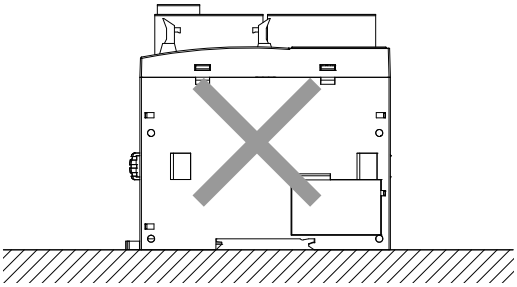
Side Orientation (Use this orientation with an operating temperature of 35°C or lower.)

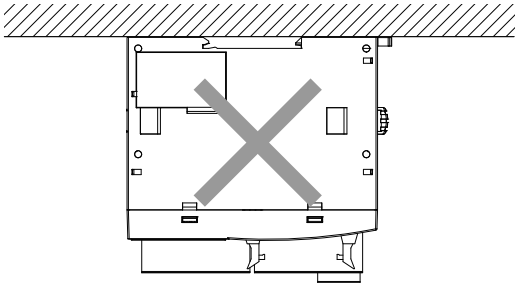


The SX8R cannot be mounted with the following orientations.



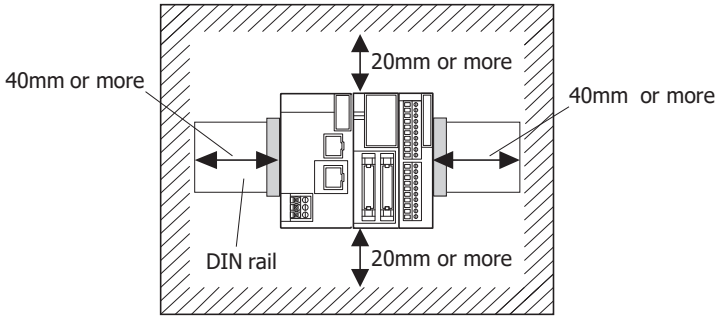




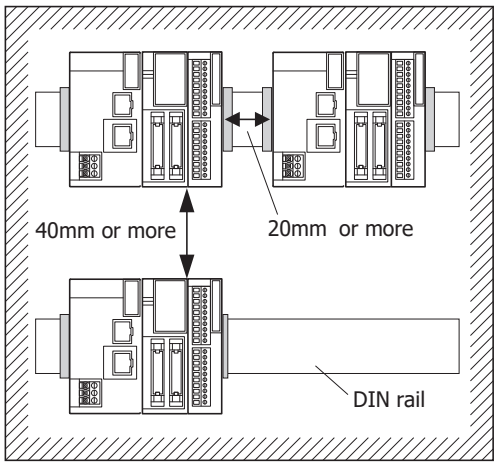


Mounting Space

To allow for heat dissipation and facilitate replacement, ensure that there are at least 20 to 40 mm between the SX8R and surrounding equipment and ducts.



Mounting Two or More Units



Assembly Methods

This section describes how to assemble the SX8R.

> **Caution** Assemble the SX8R before mounting it to a DIN rail or directly mounting it. When mounting the SX8R to a DIN rail, if it is assembled after being mounted to the DIN rail, there is a risk of damage.

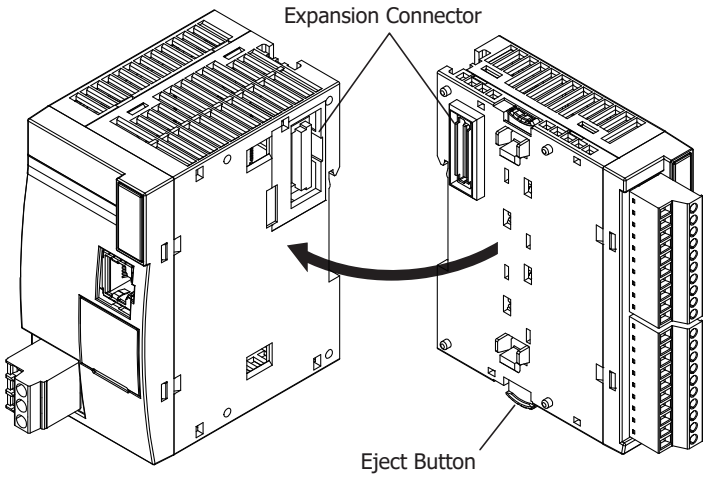
Assembling the SX8R and I/O Modules

The following procedure describes the assembly of the SX8R and a I/O module.

1. Line up the I/O module alongside the SX8R.

> The SX8R and the I/O module are easier to line up if you use the position of the expansion connector as a guide.

2. Confirm that the I/O module eject button is depressed and push the I/O module until it clicks while taking care with the position of the expansion connector. If the eject button is not depressed, push in the eject button until it clicks after the I/O module has been pushed onto the SX8R.
The I/O module is now locked on the SX8R.



> **Caution** Do not perform this work when the SX8R is powered. Otherwise there is a risk of damage.

> The assembly of I/O module is the same, first peel off the expansion connector protection sticker on the I/O module and then mount it.

Mounting on DIN Rail

This section describes how to mount the SX8R.

The SX8R can be mounted on a DIN rail or directly to a panel inside a cabinet.

⚠ Caution

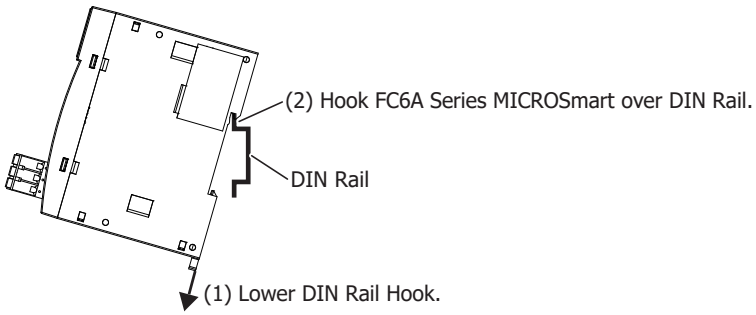
- Install the SX8R modules according to instructions described in this manual. Improper installation will result in falling, failure, or malfunction of the SX8R.
- Do not install the SX8R when it is powered up. Doing so may result in electric shock and may damage the product.

DIN Rail Mounting and Removal

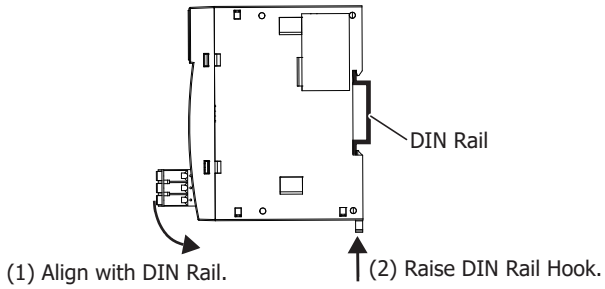
The following procedure describes how to mount and remove the SX8R to and from a DIN rail.

Mounting on DIN Rail

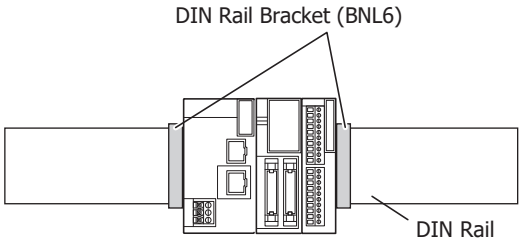
1. Firmly fasten the DIN rail to a panel using screws.
2. Using a flat head screwdriver, lower the DIN rail hook (1) and hang the SX8R on the DIN rail (2).



3. Align the SX8R with the DIN rail (1) and raise the DIN rail hook (2).



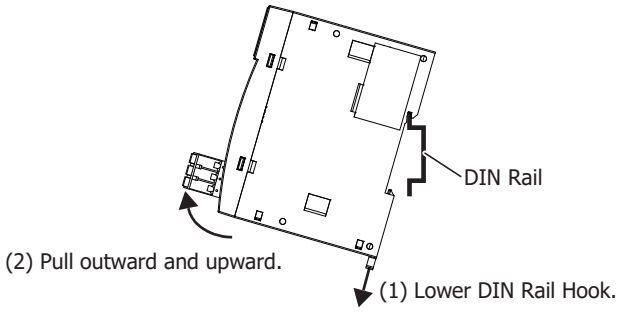
4. Secure both ends of the SX8R using the DIN rail brackets.



- The SX8R supports 35 mm wide DIN rails.
  Supported rails: IDEC BAA1000PN10 (Length: 1,000 mm)
  Rail bracket: BNL6PN10
- The SX8R can also be mounted by hooking it onto the DIN rail when the DIN rail hook is raised and pushing it on until it clicks.

Removing from DIN Rail

1. Lower the SX8R's DIN rail hook with a flathead screwdriver (1) and lift it up while pulling forward (2).

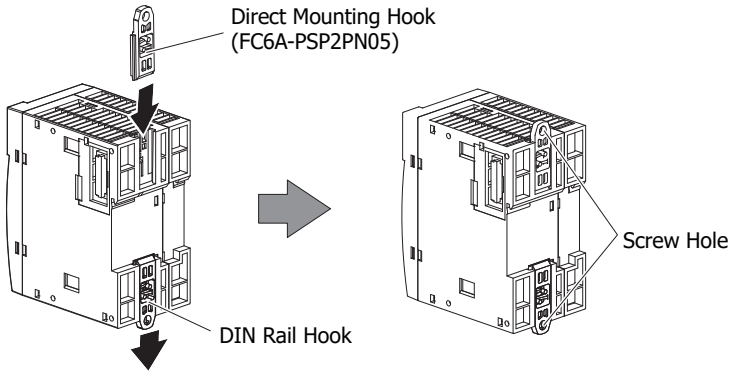


Direct Mounting on Panel Surface

This section describes how to mount the SX8R directly onto a mounting plate for installation in a control panel.

Direct Mounting Methods

Pull out the DIN rail hook on the back of the module, attach the direct mounting hook (FC6A-PSP2PN05), and then mount the module to the mounting plate using the screw holes.

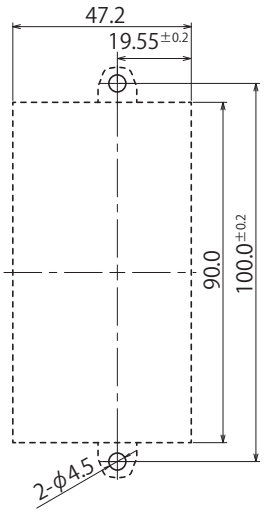


Mounting Hole Layout for Direct Mounting on Panel Surface

As shown in the following diagram, mount the SX8R to the mounting plate with M4 pan head screws.

Always give sufficient consideration to operability, ease-of-maintenance, and environmental resistance when deciding on the mounting position.

> **Caution** When directly mounting the SX8R, tighten mounting screws with torque of 1 N·m (kgf·cm).



All dimensions in mm.

Power Supply and Power Supply Wiring

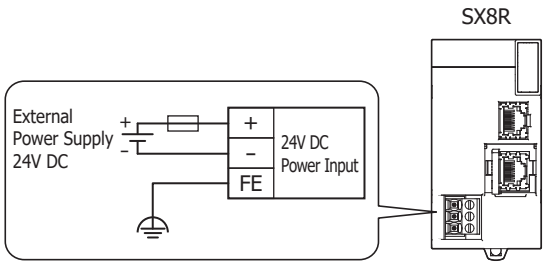
This section describes how to connect a power supply to the SX8R.

Power Supply

⚠ Caution

- Use a power supply of the rated value. Use of the wrong power supply may cause fire or malfunction.
- Ensure that the power voltage to the SX8R does not exceed the allowable power voltage range described in the power supply specifications. The SX8R may run and stop repeatedly within this voltage range, particularly if the power voltage turns on or off very slowly.
- Use an IEC 60127-approved fuse on the power line outside the SX8R. This is required when equipment containing the SX8R is destined for Europe.

The power supply specification of the SX8R is the 24V DC power type only.



■ **Power Supply Voltage**

- The power supply voltage that can be used with the SX8R is 20.4 to 28.8V DC.

⚠ Warning

Do not use the SX8R outside of the power supply voltages listed above.
When external devices that carry the risk of causing a serious accident are connected to the I/O modules input/output, implement measures in the external circuit (such as voltage monitoring) so that the device will function safely when there is a failure.

- The power failure detection voltage varies depending on the usage conditions of the inputs and outputs, but a power failure is normally detected when the power supply voltage is less than 20.4V DC.
- For all power supply types, a momentary power interruption of 10 ms or less is not recognized as a power failure when the power voltage is at the rated voltage.

■ **Inrush Current at Powerup**

An inrush current of 35 A or less flows through the SX8R when powered up. Use a power supply with sufficient capacity.

Power Supply Wiring

- Make the power line as short as possible.
- Run the power line as far away as possible from motor lines.

Review the following items when there is a risk of malfunction due to electric shock and noise.

- Ground the PE and FE terminals with D-type ground (type 3: ground resistance of 100 Ω or lower).
- Do not use a shared ground wire for the SX8R and motor equipment.
- For ground wire details, see "Recommended Ferrule List" on page 3-12.

Using the Ethernet Port

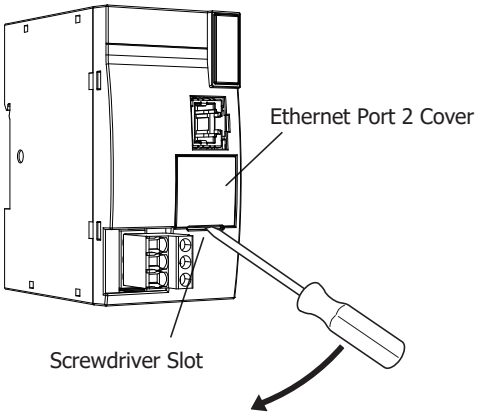
Removing and Attaching the Ethernet Port 2 Cover

The following procedure describes how to remove and attach the Ethernet port 2 cover.

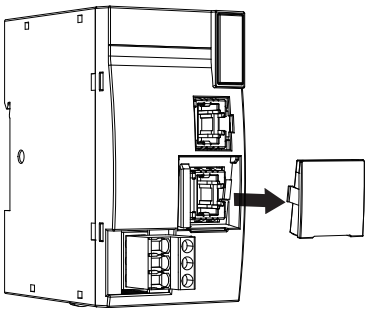
The Ethernet port 1 does not have the port cover.

Removing the Ethernet Port 2 Cover

1. Insert a flathead screwdriver into the screwdriver slot on the Ethernet port 2 cover and slowly move the screwdriver in the direction of the arrow to unlock the lower lock.



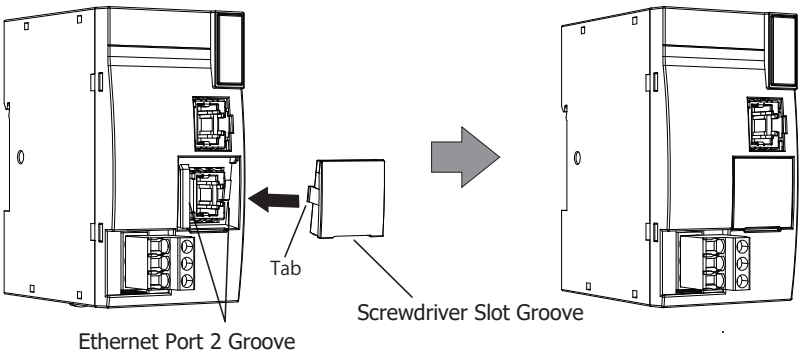
2. Lift the Ethernet port 2 cover straight up in the direction of the arrow to remove it.



Attaching the Ethernet Port 2 Cover

When not using Ethernet port 2, attach the Ethernet port 2 cover.

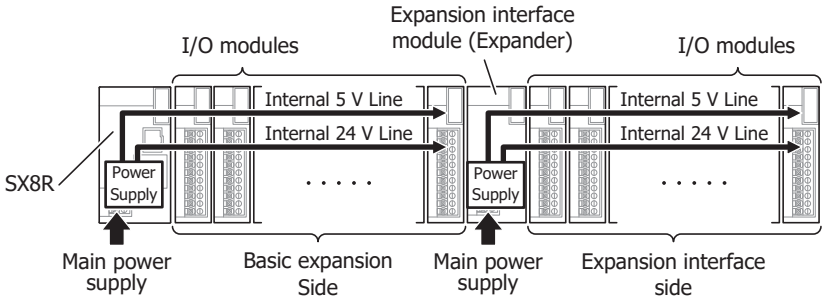
1. Insert the Ethernet port 2 cover tabs into the grooves on the left and right sides of Ethernet port 2 and push the cover straight in to attach it.



Take care with the orientation of the Ethernet port 2 cover. The groove to insert the screwdriver goes on the bottom.

Connection Restrictions When Expanding I/O Modules

I/O modules on the basic expansion side operate with the internal power supply that is supplied from the SX8R. I/O modules on the expansion interface side operate with the internal power supply that is supplied from the expansion interface module (expander).



- Up to seven I/O modules can be connected on the basic expansion side.
- Up to eight I/O modules can be connected on the expansion interface side.
- I/O modules require an I/O external power supply. For product specifications of I/O modules, see the following manuals.
  Digital I/O module: Chapter 2 "Digital I/O Modules" in the FC6A Series MICROSmart User's Manual
  Analog I/O module: Chapter 2 "Analog I/O Modules" in the FC6A Series MICROSmart User's Manual

Calculating the Power Consumed by the Main Power Supply

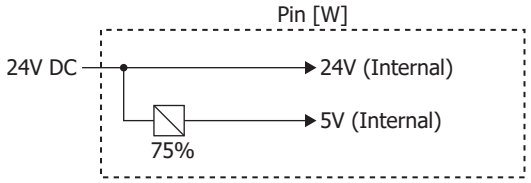
Calculate the power by referring to the values of the modules given in the table in Chapter 2 "I/O modules that can be Connected to SX8R" on page 2-4.

■ **Examples of Calculating the Power Consumed by I/O Modules**

When the FC6A-R081 is connected to the SX8R

Calculate the voltage conversion in the SX8R with the following efficiencies.

SX8R (SX8R-ECB1, SX8R-ECB4)



For the FC6A-R081

$$P_{R081} = \frac{\overbrace{(I_{out} \times V_{out})}^{5\ V}}{0.75} + \overbrace{(I_{out} \times 24\ V)}^{24\ V}$$

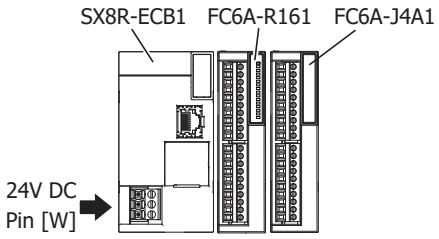
$$= \frac{\left(\frac{0\ A \times 3.3\ V}{0.9 \times 5\ V}\right) + (0.035\ A \times 5\ V)}{0.75} + (0.006\ A \times 8\ points \times 24\ V)$$

$$\approx 1.39\ [W]$$

■ **Example of Calculating the Power Consumed by the Main Power Supply**

This example shows how to calculate the power consumed by the main power supply when I/O modules in the below diagram are connected to the SX8R.

Example:



SX8R-ECB1 : 1.32 [W] when alone

FC6A-R161 : $\frac{0.05\ A \times 5\ V}{0.75} + (\ 0.006\ A \times 16\ points \times 24\ V\ ) \approx$

FC6A-J4A1 : $\frac{0.045\ A \times 5\ V}{0.75} = 0.3\ [W]$

$P_{in} \approx 1.32 + 2.64 + 0.3$

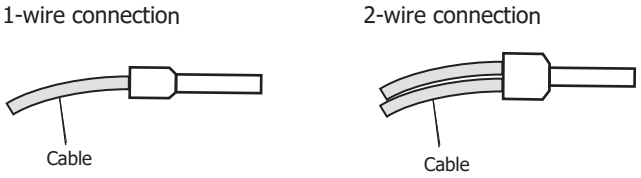
$\approx 4.26\ [W]$

Terminal Connection

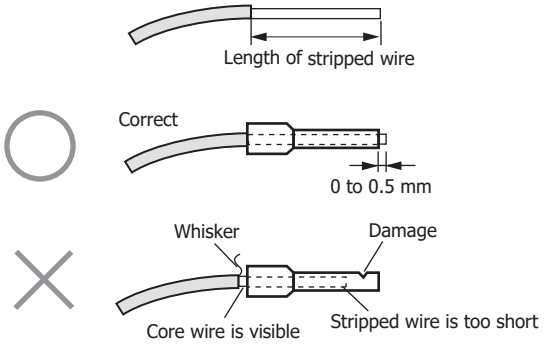
This section describes types of terminals and how to use them.

Terminals for Terminal Blocks

- When connecting stranded wire or multiple solid wires to a terminal block, use appropriate ferrule for the terminal block. For details, see "Recommended Ferrule List" on page 3-12.
- 1-wire and 2-wire ferrules can be used with the SX8R.



- Crimp ferrules using an appropriate tool according to the size of ferrules. Cut the end of the wire to the same length or about 0.5 mm longer than the ferrule.
  Ensure that the core wire does not protrude at the end of the shield and there are no whiskers.



- The thickness and stripping length of stranded wire and single wire differs according to the connectors that will be used. For wire thickness, see "Recommended Ferrule List" on page 3-12.
- Single wire assumes the use of one wire. Do not attach two or more wires to the one connector hole.
- When using single wires, you do not need to use ferrules.

Recommended Ferrule List

The following ferrules can be used with the SX8R.

The recommended ferrules are manufactured by IDEC (top), Weidmüller (middle) or Phoenix Contact (bottom).

■ **SX8R, I/O Modules, and Expansion Interface Module (Expander)**

SX8R Terminal Block Types				**5.08 mm Pitch**	
Model				**SX8R-ECB1, SX8R-ECB4**	
Wire Type				**UL1007 UL2464 Equivalent**	**UL1015 Equivalent**
Stripping length (mm)				10	
Wire thickness (mm^2)				0.2 to 2.5	
Wire gauge	AWG 24	1-wire usage	— — AI 0,25-10 (3241128)	Yes	—
	AWG22	1-wire usage	— — AI 0,34-10 (3241129)	Yes	—
	AWG20	1-wire usage	S3TL-H05-16WA (S3TL-H05-16WA) H0.5/16D W (9019020000) H0.5/16 OR (9025870000) AI 0,5-10 (3201275)	Yes	—
			— H0.5/16 DS W (9202910000) AI 0,5-10 GB (3203150)	—	Yes
		2-wire usage	S3TL-J05-16WA (S3TL-J05-16WA) H0.5/16D ZH W (9037390000) H0.5/16 ZH OR (9037210000) AI-TWIN 2 x 0,5-10 (3203309)	Yes	—
	AWG18	1-wire usage	S3TL-H075-16WW (S3TL-H075-16WW) H0.75/16D GR (9019050000) H0.75/16 W (9025860000) AI 0,75-10 (3201288)	Yes	—
			S3TL-H10-16WY (S3TL-H10-16WY) H1.0/16D R (9019100000) H1.0/16 GE (9025950000) AI 1-10 (3200182)	—	Yes
		2-wire usage	S3TL-J075-16WW (S3TL-J075-16WW) H0.75/16D ZH GR (9037420000) H0.75/16 ZH W (9037240000) AI-TWIN 2 x 0,75-10 (3200975)	Yes	—
	AWG16	1-wire usage	S3TL-H15-16WR (S3TL-H15-16WR) H1.5/16D SW (9019130000) H1.5/16 R (0635100000) AI 1,5-10 (3200195)	Yes	Yes
Screwdriver			S3TL-D06-35-100 (S3TL-D06-35-100) SDIS 0.6×3.5×100 (2749810000) SZS 0.6×3.5 (1205053)	Yes	
Tightening torque (N·m)				0.49	

Crimping Tool

The following crimping tool can be used with SX8R.

Tool Name	Model Number (Order Number)		
	IDEC	Weidmüller	Phoenix Contact
Crimping tool	S3TL-CR06D (S3TL-CR06D) S3TL-CR04T (S3TL-CR04T)	PZ 6 Roto L (1444050000)	CRIMPFOX 6 (1212034)

⚠ Caution

- Do not touch live terminals. There is a risk of electric shock.
- When powered, the terminals that are connected to external devices may become hot. Do not touch the terminals immediately after turning the power off.
- Do not touch the power supply terminals immediately after turning the power off. There is a risk of electric shock.
- Insert the wire all the way to the tip of the ferrule and crimp it.
- When connecting stranded wire or multiple wires to a terminal block, use a ferrule. Otherwise there is a risk of wires becoming disconnected.
- When using single wires, you do not need to use ferrules.
- Single wire assumes the use of one wire. Do not attach two or more wires to the one connector hole.

4: DEVICES

Introduction

This chapter provides detailed descriptions of the allocations of various devices, as well as details about the allocations of special internal relays and special data registers.

The operation of SX8R requires specialist knowledge.
Take the time to develop a thorough understanding of the contents in this manual before using the SX8R.

Device Addresses

Device	Symbol	Unit	Range (Points)
Expansion Inputs*1*2	I	Bit	I0 - I597 (480 points)
Expansion Outputs*1*2	Q	Bit	Q0 - Q597 (480 points)
Special Internal Relay*1	M	Bit	M8000 - M8177 (144 points)
Data Register	D	Word	D0000 - D0299 (300 points)
Special Data Register	D	Word	D8000 - D8299 (300 points)

*1 The least significant digit of the device address is an octal number (0 to 7).
*2 The expansion inputs and outputs are inputs and outputs of the digital I/O module.

Device Names and Symbols

- **Expansion Inputs (I)**
  Devices that input on/off information from external devices to the I/O module.
- **Expansion Outputs (Q)**
  Devices that output on/off information from the I/O module to external devices.
- **Special Internal Relays (M)**
  Bit devices used internally on the SX8R. Special functions are assigned to each bit.
- **Data Registers (D)**
  Word devices that are used for writing numerical data internally in the SX8R.
- **Special Data Registers (D)**
  Word devices that are used for writing numerical data internally in the SX8R. Special functions are assigned to each data register.

Although the device symbol for the data registers and special data registers is the same ("D"), the device characteristics are different. Special functions are assigned to each special data register.

Special Internal Relay

Warning Do not write to data in the area marked as reserved in the special internal relays list. Otherwise the system may not operate correctly.

R/W is an abbreviation for read/write.
The notation for the R/W field is as follows.
R/W: The device can be both read from and written to
R: Read-only
W: Write-only

Device Address	Description		Power OFF	R/W
M8000 to M8017	**— Reserved —**		**—**	**—**
M8020	Connection Status (ON: Connected, OFF: Not Connected)	Connection 1	Cleared	R
M8021		Connection 2	Cleared	R
M8022		Connection 3	Cleared	R
M8023		Connection 4	Cleared	R
M8024 to M8124	**— Reserved —**		**—**	**—**
M8125	In-operation Output		Cleared	R
M8126 to M8177	**— Reserved —**		**—**	**—**

Supplementary Descriptions of the Special Internal Relays

■ **M8020 to M8023: Connection Status**

While connected to a network device via the maintenance communication (server), Modbus TCP communication (server), the connection status is turned on. While not connected to a network device, the connection status is turned off.

M8020 = Connection 1

M8021 = Connection 2

M8022 = Connection 3

M8023 = Connection 4

■ **M8125: In-operation Output**

M8125 is on during the SX8R is in operation. It is off during the SX8R is in stopped.

The SX8R enters the operation state after the initialization process is completed. The SX8R stops while user data or system software is being downloaded.

Special Data Register

Warning Do not write to data in the area marked as reserved in the special data registers list. Otherwise the system may not operate correctly.

R/W is an abbreviation for read/write.
The notation for the R/W field is as follows.
R/W: The device can be both read from and written to
R: Read-only
W: Write-only

Device Address	Description		Update Timing	R/W
D8000	Quantity of Digital Inputs		When I/O initialized	R
D8001	Quantity of Digital Outputs		When I/O initialized	R
D8002	SX8R Type Information		Power-up	R
D8003 D8004	**— Reserved —**		—	—
D8005	General Error Code		When error occurred	R
D8006 to D8014	**— Reserved —**		—	—
D8015	Quantity of Analog Inputs		When I/O initialized	R
D8016	Quantity of Analog Outputs		When I/O initialized	R
D8017 to D8019	**— Reserved —**		—	—
D8020	System Software Status		When error occurred	R
D8021	Host Device Control Register		—	R/W
D8022	**— Reserved —**		—	—
D8023	Scan Time	Scan Time Current Value (ms)	Every scan	R
D8024		Scan Time Maximum Value (ms)	At occurrence	R
D8025		Scan Time Minimum Value (ms)	At occurrence	R
D8026	**— Reserved —**		—	—
D8027	System Software Version	Major version	Power-up	R
D8028		Minor version	Power-up	R
D8029 to D8036	**— Reserved —**		—	—
D8037	Number of Connected I/O Modules		When I/O initialized	R
D8038 to D8069	**— Reserved —**		—	—
D8070	I/O Module Slot 1 Information	Status / Type ID	Every scan	R
D8071		Position Information / System Software Version	When I/O initialized	R
D8072	I/O Module Slot 2 Information	Status / Type ID	Every scan	R
D8073		Position Information / System Software Version	When I/O initialized	R
D8074	I/O Module Slot 3 Information	Status / Type ID	Every scan	R
D8075		Position Information / System Software Version	When I/O initialized	R
D8076	I/O Module Slot 4 Information	Status / Type ID	Every scan	R
D8077		Position Information / System Software Version	When I/O initialized	R
D8078	I/O Module Slot 5 Information	Status / Type ID	Every scan	R
D8079		Position Information / System Software Version	When I/O initialized	R

Device Address	Description		Update Timing	R/W
D8080	I/O Module Slot 6 Information	Status / Type ID	Every scan	R
D8081		Position Information / System Software Version	When I/O initialized	R
D8082	I/O Module Slot 7 Information	Status / Type ID	Every scan	R
D8083		Position Information / System Software Version	When I/O initialized	R
D8084	I/O Module Slot 8 Information	Status / Type ID	Every scan	R
D8085		Position Information / System Software Version	When I/O initialized	R
D8086	I/O Module Slot 9 Information	Status / Type ID	Every scan	R
D8087		Position Information / System Software Version	When I/O initialized	R
D8088	I/O Module Slot 10 Information	Status / Type ID	Every scan	R
D8089		Position Information / System Software Version	When I/O initialized	R
D8090	I/O Module Slot 11 Information	Status / Type ID	Every scan	R
D8091		Position Information / System Software Version	When I/O initialized	R
D8092	I/O Module Slot 12 Information	Status / Type ID	Every scan	R
D8093		Position Information / System Software Version	When I/O initialized	R
D8094	I/O Module Slot 13 Information	Status / Type ID	Every scan	R
D8095		Position Information / System Software Version	When I/O initialized	R
D8096	I/O Module Slot 14 Information	Status / Type ID	Every scan	R
D8097		Position Information / System Software Version	When I/O initialized	R
D8098	I/O Module Slot 15 Information	Status / Type ID	Every scan	R
D8099		Position Information / System Software Version	When I/O initialized	R
D8100	Ethernet Port 1 MAC Address (Current Value Read-only)		Power-up	R
D8101			Power-up	R
D8102			Power-up	R
D8103			Power-up	R
D8104			Power-up	R
D8105			Power-up	R
D8106	Ethernet Port 1 IP Address (Current Value Read-only)		Power-up	R
D8107			Power-up	R
D8108			Power-up	R
D8109			Power-up	R
D8110	Ethernet Port 1 Subnet Mask (Current Value Read-only)		Power-up	R
D8111			Power-up	R
D8112			Power-up	R
D8113			Power-up	R
D8114	Ethernet Port 1 Default Gateway (Current Value Read-only)		Power-up	R
D8115			Power-up	R
D8116			Power-up	R
D8117			Power-up	R
D8118 D8119	**— Reserved —**		—	—

Device Address	Description	Update Timing	R/W
D8120	Ethernet Port 2 MAC Address (Current Value Read-only)	Power-up	R
D8121		Power-up	R
D8122		Power-up	R
D8123		Power-up	R
D8124		Power-up	R
D8125		Power-up	R
D8126	Ethernet Port 2 IP Address (Current Value Read-only)	Power-up	R
D8127		Power-up	R
D8128		Power-up	R
D8129		Power-up	R
D8130	Ethernet Port 2 Subnet Mask (Current Value Read-only)	Power-up	R
D8131		Power-up	R
D8132		Power-up	R
D8133		Power-up	R
D8134	Ethernet Port 2 Default Gateway (Current Value Read-only)	Power-up	R
D8135		Power-up	R
D8136		Power-up	R
D8137		Power-up	R
D8138 D8139	**— Reserved —**	—	—
D8140	Connection 1 Connected IP Address	During communication	R
D8141		During communication	R
D8142		During communication	R
D8143		During communication	R
D8144	**— Reserved —**	—	—
D8145	Connection 2 Connected IP Address	During communication	R
D8146		During communication	R
D8147		During communication	R
D8148		During communication	R
D8149	**— Reserved —**	—	—
D8150	Connection 3 Connected IP Address	During communication	R
D8151		During communication	R
D8152		During communication	R
D8153		During communication	R
D8154	**— Reserved —**	—	—
D8155	Connection 4 Connected IP Address	During communication	R
D8156		During communication	R
D8157		During communication	R
D8158		During communication	R
D8159 to D8299	**— Reserved —**	—	—

Supplementary Descriptions of the Special Data Registers

■ **D8000: Quantity of Digital Inputs**
The total number of digital inputs for I/O modules connected to SX8R is read.

■ **D8001: Quantity of Digital Outputs**
The total number of digital outputs for I/O modules connected to SX8R is read.

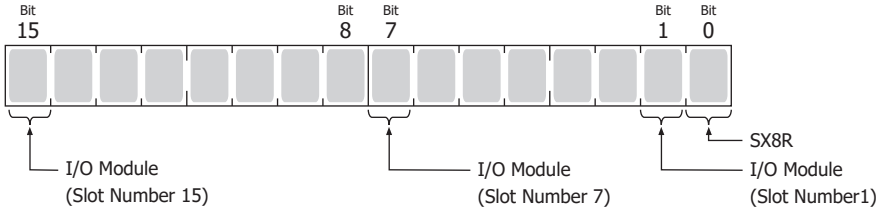
■ **D8002: SX8R Type Information**
SX8R type information is written this register.
172 (ACh): SX8R

■ **D8005: General Error Code**
General error information is written to this register. For details on general error codes, see Chapter 7 "General Error" on page 7-1.

■ **D8015: Quantity of Analog Inputs**
The total number of analog inputs for I/O modules connected to SX8R is read.

■ **D8016: Quantity of Analog Outputs**
The total number of analog outputs for I/O modules connected to SX8R is read.

■ **D8020: System Software Status**
System Software Status indicates the connection and error status of SX8R and I/O modules.
The SX8R is assigned to bit 0, and I/O modules are assigned to bits 1 to 15 in order of slot number. The allocation of bits in the device (bit assignment) is as follows.

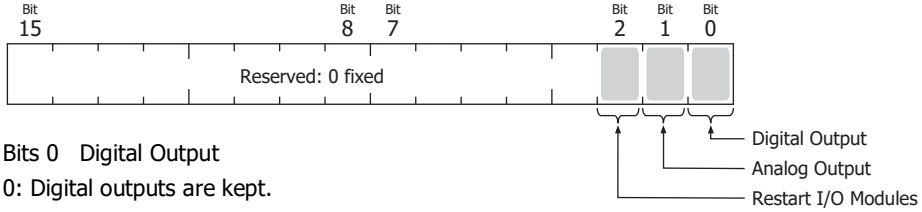


0: Module is connected and it has an error, or module is not connected.
1: Module is not connected and it has no error.

■ **D8021: Host Device Control Register**

The host device controls the SX8R. Each bit is assigned a function.

Bits 0 and 1 control the digital and analog outputs of I/O modules. Bit 2 restarts the I/O modules connected to the right side of the expansion interface module (expander). The allocation of bits in the device (bit assignment) is as follows.



- Bits 0 Digital Output
  0: Digital outputs are kept.
  1: Digital outputs are forced off.
- Bits 1 Analog Output
  0: The analog value corresponding to the data register for writing analog output data is output.
  1: Analog outputs are forced off.*1
- Bit 2 Restart I/O Modules
  Writing 1 to bit 2 restarts the I/O modules connected to the right side of the expansion interface module (expander). After restarting, bit 2 automatically returns to 0.

*1 The SX8R writes 0 to the data register that stores analog output data, and the I/O module outputs an analog value equivalent to 0.

■ **D8023: Scan Time Current Value (ms)**

The most recent scan time is read. For information on scan time, see Chapter 2 "Internal Processing of SX8R" on page 2-11.

■ **D8024: Scan Time Maximum Value (ms)**

The maximum scan time is read. For information on scan time, see Chapter 2 "Internal Processing of SX8R" on page 2-11.

■ **D8025: Scan Time Minimum Value (ms)**

The minimum scan time is read. For information on scan time, see Chapter 2 "Internal Processing of SX8R" on page 2-11.

■ **D8027, D8028: System Software Version**

The SX8R system software version is read. The system software version is read out as follows.

Device Address	Upper	Lower
D8027	First Digit of Version (Hexadecimal)	Second Digit of Version (Hexadecimal)
D8028	Third Digit of Version (Hexadecimal)	**— Reserved —**

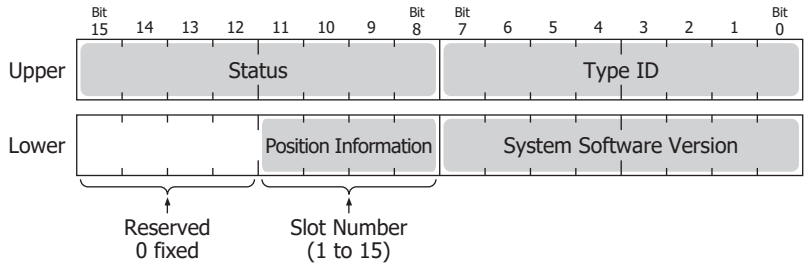
Example) When the system software version of the SX8R is 2.5.1, 0205h is read in D8027 and 0100h is read in D8028.

■ **D8037: Number of Connected I/O Modules**

The number of I/O modules connected to the SX8R is read.

■ **D8070 to D8099: I/O Module Slot Information**

I/O module type information is read. The allocation of bits in the device (bit assignment) is as follows.



Upper Lower

D8070, D8071 = I/O Module Slot 1 Information
D8072, D8073 = I/O Module Slot 2 Information
D8074, D8075 = I/O Module Slot 3 Information
D8076, D8077 = I/O Module Slot 4 Information
D8078, D8079 = I/O Module Slot 5 Information
D8080, D8081 = I/O Module Slot 6 Information
D8082, D8083 = I/O Module Slot 7 Information
D8084, D8085 = I/O Module Slot 8 Information
D8086, D8087 = I/O Module Slot 9 Information
D8088, D8089 = I/O Module Slot 10 Information
D8090, D8091 = I/O Module Slot 11 Information
D8092, D8093 = I/O Module Slot 12 Information
D8094, D8095 = I/O Module Slot 13 Information
D8096, D8097 = I/O Module Slot 14 Information
D8098, D8099 = I/O Module Slot 15 Information

The system software version written in the I/O module is read out for the system software version.

For details on type IDs and statuses, see "List of Type IDs and Status" on page 4-10.

■ **D8100 to D8105: Ethernet Port 1 MAC Address (Current Value Read-only)**

The MAC address of Ethernet port 1 of the SX8R is written to each special data register as follows.

Example) MAC address: ①①-②②-③③-④④-⑤⑤-⑥⑥

D8100=①①, D8101=②②, D8102=③③, D8103=④④, D8104=⑤⑤, D8105=⑥⑥

■ **D8106 to D8109: Ethernet Port 1 IP Address (Current Value Read-only)**

The IP address of Ethernet port 1 of the SX8R is written to each special data register as follows.

Example) The SX8R's own IP address: aaa.bbb.ccc.ddd

D8106=aaa, D8107=bbb, D8108=ccc, D8109=ddd

■ **D8110 to D8113: Ethernet Port 1 Subnet Mask (Current Value Read-only)**

The subnet mask value of Ethernet port 1 of the SX8R is written to each special data register as follows.

Example) Subnet mask: aaa.bbb.ccc.ddd

D8110=aaa, D8111=bbb, D8112=ccc, D8113=ddd

■ **D8114 to D8117: Ethernet Port 1 Default Gateway (Current Value Read-only)**

The default gateway address of Ethernet port 1 of the SX8R is written to each special data register as follows.

Example) Default gateway: aaa.bbb.ccc.ddd

D8114=aaa, D8115=bbb, D8116=ccc, D8117=ddd

■ **D8120 to D8125: Ethernet Port 2 MAC Address (Current Value Read-only)**

The MAC address of Ethernet port 2 of the SX8R is written to each special data register as follows.

Example) MAC address: ①①-②②-③③-④④-⑤⑤-⑥⑥

D8120=①①, D8121=②②, D8122=③③, D8123=④④, D8124=⑤⑤, D8125=⑥⑥

■ **D8126 to D8129: Ethernet Port 2 IP Address (Current Value Read-only)**
The IP address of Ethernet port 2 of the SX8R is written to each special data register as follows.
Example) The SX8R's own IP address: aaa.bbb.ccc.ddd
D8126=aaa, D8127=bbb, D8128=ccc, D8129=ddd

■ **D8130 to D8133: Ethernet Port 2 Subnet Mask (Current Value Read-only)**
The subnet mask value of Ethernet port 2 of the SX8R is written to each special data register as follows.
Example) Subnet mask: aaa.bbb.ccc.ddd
D8130=aaa, D8131=bbb, D8132=ccc, D8133=ddd

■ **D8134 to D8137: Ethernet Port 2 Default Gateway (Current Value Read-only)**
The default gateway address of Ethernet port 2 of the SX8R is written to each special data register as follows.
Example) Default gateway: aaa.bbb.ccc.ddd
D8134=aaa, D8135=bbb, D8136=ccc, D8137=ddd

■ **D8140 to D8143: Connection 1 Connected IP Address**
The IP address of the connected device that is being accessed through a connection is written as follows.
Example) Connection 1 Connected IP Address: aaa.bbb.ccc.ddd
D8140=aaa, D8141=bbb, D8142=ccc, D8143=ddd

■ **D8145 to D8148: Connection 2 Connected IP Address**
The IP address of the connected device that is being accessed through a connection is written as follows.
Example) Connection 2 Connected IP Address: aaa.bbb.ccc.ddd
D8145=aaa, D8146=bbb, D8147=ccc, D8148=ddd

■ **D8150 to D8153: Connection 3 Connected IP Address**
The IP address of the connected device that is being accessed through a connection is written as follows.
Example) Connection 3 Connected IP Address: aaa.bbb.ccc.ddd
D8150=aaa, D8151=bbb, D8152=ccc, D8153=ddd

■ **D8155 to D8158: Connection 4 Connected IP Address**
The IP address of the connected device that is being accessed through a connection is written as follows.
Example) Connection 4 Connected IP Address: aaa.bbb.ccc.ddd
D8155=aaa, D8156=bbb, D8157=ccc, D8158=ddd

List of Type IDs and Status

Type ID

The type ID is written in the I/O Module Slot Information (D8070 to D8099). For details on I/O Module Slot Information, see "D8070 to D8099: I/O Module Slot Information" on page 4-8.

Type ID		Type No.
Hexadecimal	Binary	
00h	0000 0000	FC6A-N16B1, FC6A-N16B4, FC6A-N16B3
01h	0000 0001	FC6A-R161, FC6A-R164, FC6A-T16K1, FC6A-T16K4, F6A-T16P1, FC6A-T16P4, F6A-T16K3, FCA-T16P3
02h	0000 0010	FC6A-N32B3
03h	0000 0011	FC6A-T32K3, FC6A-T32P3
04h	0000 0100	FC6A-N08B1, FC6A-N08B4, FC6A-N08A11, FC6A-N08A14
05h	0000 0101	FC6A-R081, FC6A-R084, FC6A-T08K1, FC6A-T08K4, FC6A-T08P1, FC6A-T08P4
06h	0000 0110	FC6A-M08BR1, FC6A-M08BR4
07h	0000 0111	FC6A-M24BR1, FC6A-M24BR4
19h	0001 1001	FC6A-EXM2, FC6A-EXM24
20h	0010 0000	FC6A-J2C1, FC6A-J2C4
21h	0010 0001	FC6A-J4A1, FC6A-J4A4
22h	0010 0010	FC6A-J8A1, FC6A-J8A4
23h	0010 0011	FC6A-K2A1, FC6A-K2A4
24h	0010 0100	FC6A-K4A1, FC6A-K4A4
25h	0010 0101	FC6A-L06A1, FC6A-L06A4
26h	0010 0110	FC6A-L03CN1, FC6A-L03CN4
27h	0010 0111	FC6A-J4CN1, FC6A-J4CN4
28h	0010 1000	FC6A-J8CU1, FC6A-J8CU4
2Bh	0010 1011	FC6A-J4CH1Y, FC6A-J4CH4Y
FFh	1111 1111	Not connected

Status

Status		Description
Hexadecimal	Binary	
00h	0000 0000	Normal
81h	1000 0001	Communication error (An error has occurred in the communication between the SX8R and an I/O module.)
82h	1000 0010	Unknown device detected (An unsupported I/O module is connected.)
83h	1000 0011	Device setting error (No I/O module is connected or an I/O module different from that configured in the SX8R Configurator is connected.)
84h	1000 0100	Device writing error (The attempt to set the operation of the I/O module failed.)
85h	1000 0101	System update error (The system update failed.)

5: COMMUNICATION FUNCTIONS

This chapter describes the communication functions.

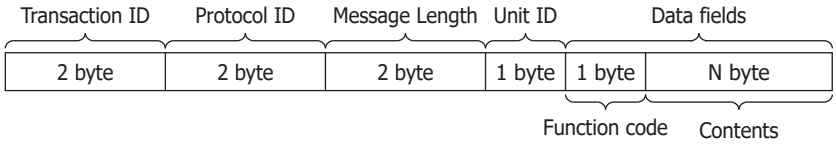
The SX8R has internal memory for storing data to be sent to and received from the host device. In Modbus TCP communication, this memory is called Modbus TCP communication shared memory. In EtherNet/IP communication, this memory is called EtherNet/IP communication shared memory, and in CC-Link IE Field Basic communication, this memory is called CC-Link IE Field Basic communication shared memory.

Modbus TCP Communication (Server)

Communication Specifications

Item	Specifications
Supported protocol	Modbus TCP Server
Supported port	Ethernet port 1
Port No.	502, 503, and 504
Unit ID (station number)	Unused (If a station number must be specified on the Modbus TCP client side, specify 1.)
Access control	1 IP address can be specified per port.
Supported function codes	01: Read Coils/ Read the values of coils (000001 to 000480) 02: Read Discrete Inputs/ Read the values of inputs (100001 to 100480) 03: Read Holding Registers/ Read the values of holding registers (400001 to 400061) 04: Read Input Registers/ Read the values of input registers (300001 to 300241) 05: Write Single Coil/ Write a value to a coil (000001 to 000480) 06: Write Single Register/ Write a value to a holding register (400001 to 400061) 15: Write Multiple Coils/ Write values to multiple coils (000001 to 000480) 16: Write Multiple registers/ Write values to multiple holding registers (400001 to 400061)
Function	• Read status information (D8020) of SX8R • Control of I/O module outputs and restart of I/O modules (D8021) • Read values from I/O modules • Write values to I/O modules

Communication data format



■ **Transaction ID**
The Modbus TCP Server returns the transaction ID from the client as is. The client can see which transaction the server is responding to. Set it to 0 if you do not want to check.

■ **Protocol ID**
The Modbus TCP protocol is identified by the value 0.

■ **Message Length**
Indicates the size of the Unit ID and data fields in bytes.

■ **Unit ID**
An ID for identifying the device. Stores the slave number of the Modbus TCP Server. The Modbus TCP Server of the SX8R accepts and processes requests regardless of the Unit ID of the received request. The Unit ID of the request is stored in the Unit ID of the response.

■ **Data Fields**

Function Code
The number indicating the function.

Function Code	Description
01(01h)	Read Coils/ Read the values of coils
02(02h)	Read Discrete Inputs/ Read the values of inputs
03(03h)	Read Holding Registers/ Read the values of holding registers
04(04h)	Read Input Registers/ Read the values of input registers
05(05h)	Write Single Coil/ Write a value to a coil
06(06h)	Write Single Register/ Write a value to a holding register
15(0Fh)	Write Multiple Coils/ Write values to multiple coils
16(10h)	Write Multiple registers/ Write values to multiple holding registers

In the case of an OK response, the function code of the request is stored in the function code. In the case of an NG response, the value obtained by adding 80h to the function code is stored.

Contents
This is the data required for the processing specified by the function code.

The address on the communication is a four-digit number that goes into the address section of the communication frame. Stores the last 5 digits of the slave address minus 1 in hexadecimal. The slave address is the address of the Modbus TCP communication shared memory. The slave address range varies depending on the device.

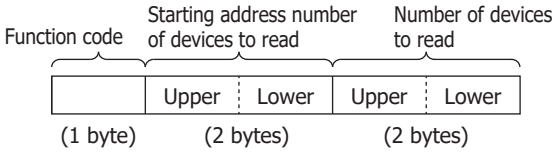
Communication Format of Data Fields

■ Read the Values of Coils or Inputs

The host device (Modbus TCP client) reads the values of coils or inputs of the SX8R (Modbus TCP Server). The number of continuous read bits is 1 to 480 bits.

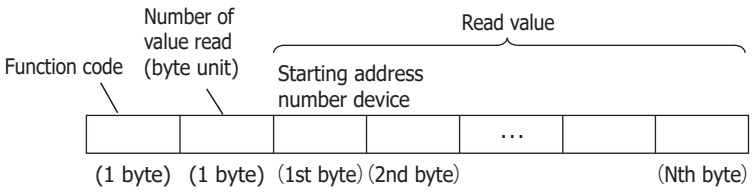
Request

The function code is "01h" for the coils and "02h" for the inputs. The starting address number of devices to read and the number of devices to read are each specified in 2 bytes, and sent in order from the upper byte.



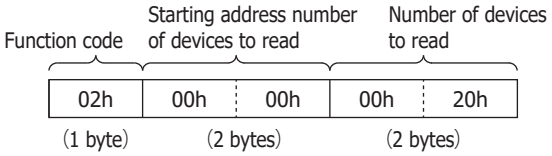
Response

In case of error, the function code is "81h" (01h + 80h) for the coils and "82h" (02h + 80h) for the inputs. The number of value read in bytes is specified. The SX8R reads the status of its own device, appends the read value and sends it. Read values are sent in byte units of arbitrary length, starting in order from the device at the starting address number.



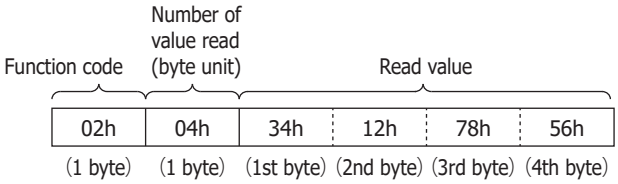
Example: Read 32-bit (4 bytes) of data from input 0001.

Request



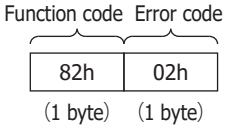
Inputs 0001 to 0016 are "1234h" and inputs 0017 to 0032 are "5678h"

ACK Reply



Example: Try to access inputs with a slave address outside the range

NAK Reply



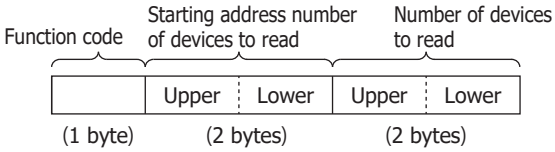
For details on the error code, see "Error Code" on page 5-8.

■ **Read the Values of Holding Registers or Input Registers**

The host device (Modbus TCP client) reads the values of holding registers or input registers of the SX8R (Modbus TCP server). The number of continuous read words is 1 to 61 words.

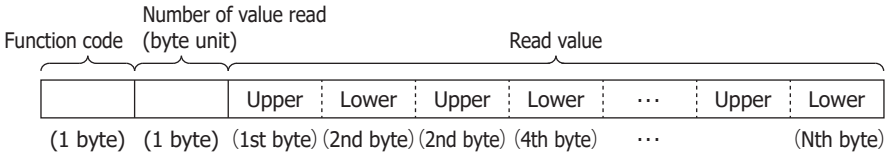
Request

The function code is "03h" for the holding registers and "04h" for the input registers. The starting address number of devices to read and the number of devices to read are each specified in 2 bytes, and sent in order from the upper byte.



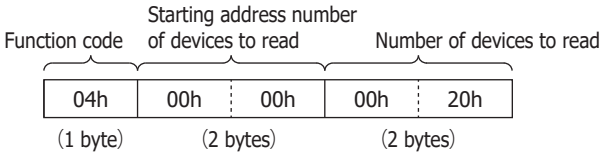
Response

In case of error, the function code is "83h" (03h + 80h) for the holding registers and "84h" (04h + 80h) for the input registers. The number of values read (byte unit) are specified in 1 byte. The SX8R reads the values of its own registers, appends the results (read value) and sends them. The read values are sent in word units (within 1 word, starting in order from the upper byte), starting in order from the device at the starting address number, and of arbitrary length.



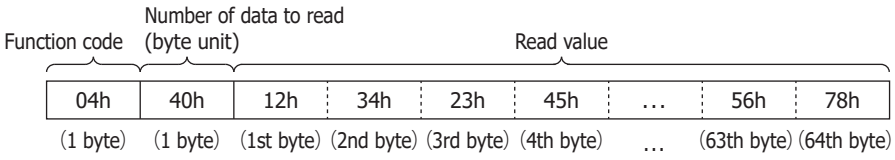
Example: Read data for 32 words from input register 0001

Request



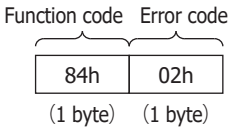
The value of input register 0001 is "1234h", the value of input register 0002 is "2345h", ..., the value of input register 0032 is "5678h".

ACK Replay



Example: Try to access input registers of a slave address outside the range

NAK Replay



For details on the error code, see "Error Code" on page 5-8.

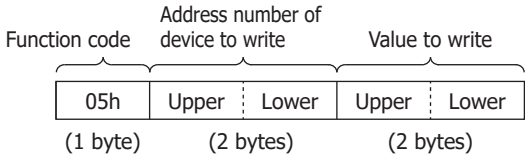
■ **Write the Value to Coils.**

The host device (Modbus TCP client) can write to the coils of the SX8R (Modbus TCP Server).

When Writing a Value to One Address Number

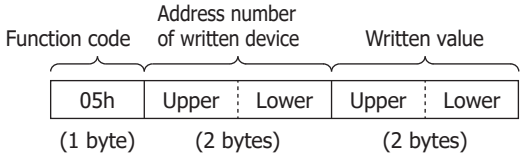
Request

The function code is "05h". The address number of device to write and the value to write are each specified in 2 bytes and stored in order from the upper byte. When 0 is written, the value to write will be "0000h", and when 1 is written, it will be "FF00h".



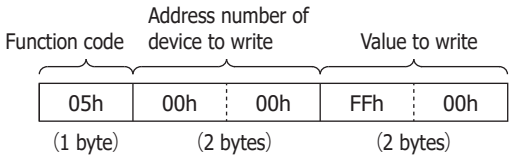
Response

The function code for error is "85h" (05h+80h). The address number of written device is specified in 2 bytes. The SX8R writes a value to its own device, appends the written value (2 bytes), and sends it. The address number of written device and the written value are sent in order from the upper byte.

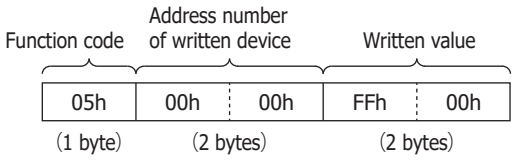


Example: Write 1 to coil 0001

Request

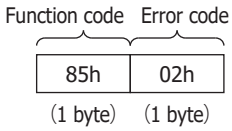


ACK Reply



Example: Try to access one coil with a slave address outside the range.

NAK Reply

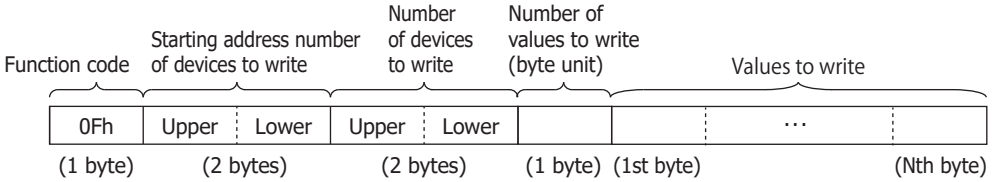


For details on the error code, see "Error Code" on page 5-8.

When Writing Values to Multiple Consecutive Address Numbers

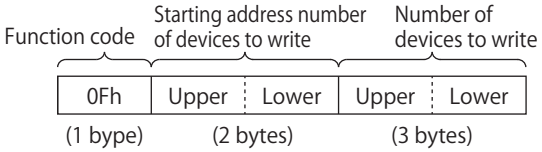
Request

The function code is "0Fh". The starting address number of devices to write and the number of devices to write are each specified in 2 bytes and stored in order from the upper byte. The number of values to write and the value to write are each specified in 1 byte. The number of continuous devices to write is 1 to 480 bits. The values to write are stored in byte units of arbitrary length, starting in order from the device at the starting address number.



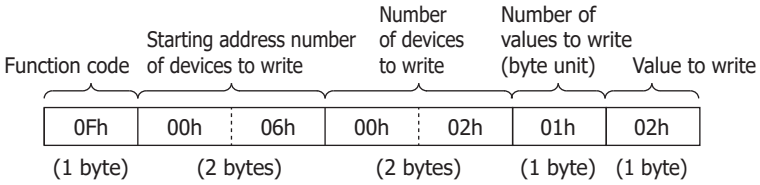
Response

The function code for error is "8Fh" (0Fh+80h). The starting address number of devices to write and the number of devices to write are each specified in 2 bytes and stored in order from the upper byte.

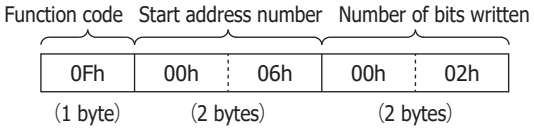


Example: Write 0 to coil 0007 and 1 to coil 0008.

Request

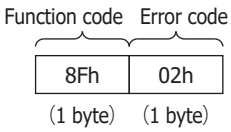


ACK Reply



Example: Try to access multiple coils of the slave address outside the range

NAK Reply



For details on the error code, see "Error Code" on page 5-8.

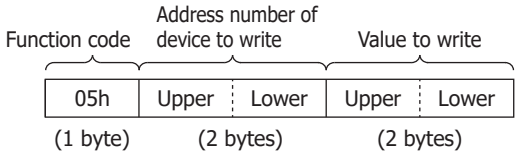
■ **Write the Value to Holding Registers.**

The host device (Modbus TCP client) can write to the holding registers of the SX8R (Modbus TCP Server).

When Writing a Value to One Address Number

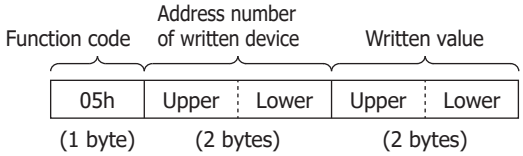
Request

The function code is "06h". The address number of device to write and the value to write are each specified in 2 bytes and stored in order from the upper byte.



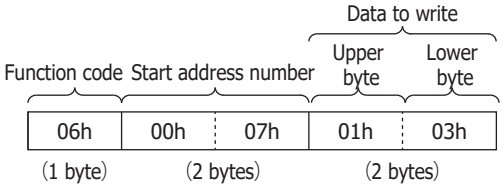
Response

The function code for error is "86h" (06h+80h). The address number of written device is specified in 2 bytes. The SX8R writes a value to its own device, appends the written value (2 bytes), and sends it. The address number of written device and the written value are sent in order from the upper byte.

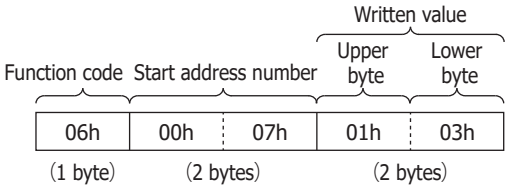


Example: Write "0103h" to holding register 0008

Request

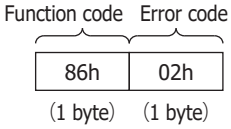


ACK Reply



Example: Try to access one holding register with a slave address outside the range.

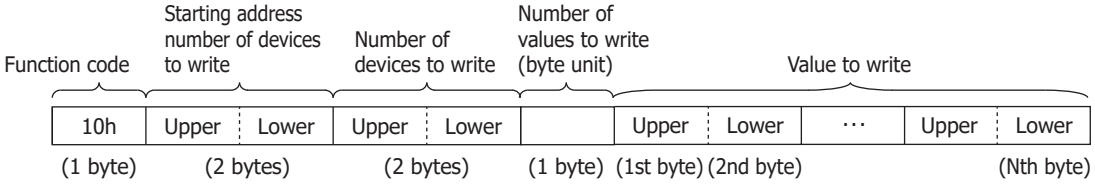
NAK Reply



For details on the error code, see "Error Code" on page 5-8.

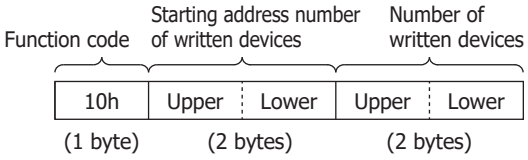
When Writing Values to Multiple Consecutive Address Numbers

The function code is "10h". The starting address number of devices to write, the number of devices to write, and the value to write are each specified in 2 bytes and stored in order from the upper byte. The number of values to write is specified in 1 byte and stored in bytes. The values to write are sent in word units (within a word, starting with the upper byte) of arbitrary length, starting in order from the device at the starting address number.



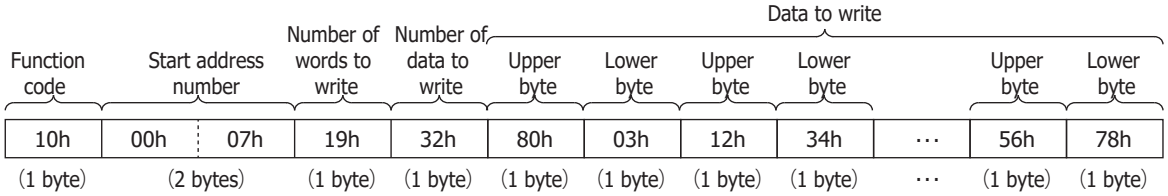
Response

The function code for error is "90h" (10h+80h). The starting address number of written device and the number of written devices are each specified in 2 bytes and sent in order from the upper byte.

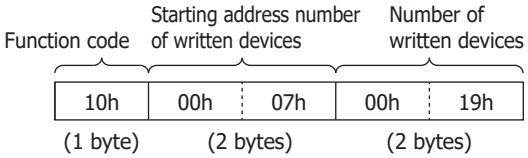


Example: Write "8003h", "1234h", ..., "5678h" to the holding registers 0008 to 0032 (25 words).

Request

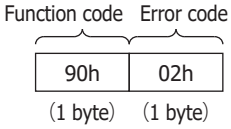


ACK Reply



Example: Try to access multiple holding registers for slave addresses that are out of range

NAK Reply



For details on the error code, see "Error Code" on page 5-8.

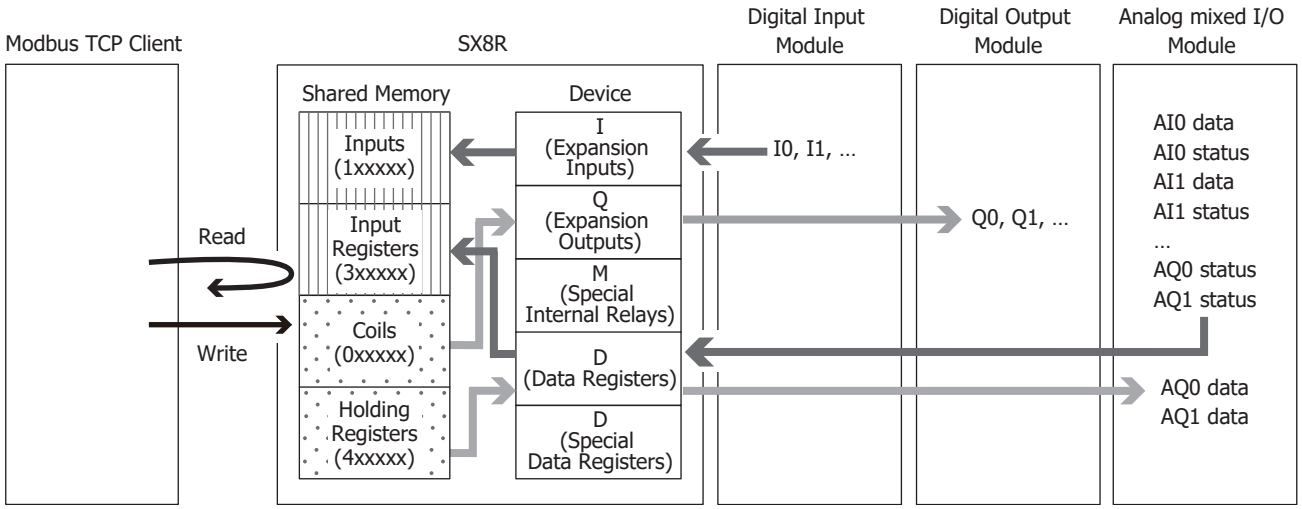
Error Code

The error code stored in the NG response is as follows.

Error code	Contents	Details
01h	Function code error	Received an unsupported function code.
02h	Access destination error	An attempt was made to read or write a slave address outside the range.
03h	Number of data error 1-bit write data error	The number of data, or 1-bit write data is incorrect.

Modbus TCP Communication Shared Memory

Modbus TCP communication shared memory is a memory that can be accessed by Modbus TCP clients. Modbus TCP communication shared memory is used to read and write values of devices of I/O modules connected to SX8R.



The Modbus TCP communication shared memory (inputs/ coils/ input registers/ holding registers) allocated to devices varies depending on the I/O module type and connection configuration.

When an I/O module is configured in the **Module Configuration** tab of the SX8R Configurator and "Modbus TCP Server" is configured under **Communication Mode** in the **Basic Settings** tab, Modbus TCP communication shared memory is automatically assigned. Modbus TCP communication shared memory can be found on the **Modbus TCP Server** tab.

Occupied Memory

The I/O module occupies the Modbus TCP communication shared memory as follows.

I/O Module	Points		Size of Shared Memory to be Occupied			
	Actual Input	Actual Output	Inputs (1xxxxx)	Coils (0xxxxx)	Input Registers (3xxxxx)	Holding Registers (4xxxxx)
Digital input module	8	—	8 bits	—	—	—
	16	—	16 bits	—	—	—
	32	—	32 bits	—	—	—
Digital output module	—	8	—	8 bits	—	—
	—	16	—	16 bits	—	—
	—	32	—	32 bits	—	—
Digital mixed I/O module	4	4	8 bits*1	8 bits*1	—	—
	16	8	16 bits	8 bits	—	—
Analog input module	2	—	—	—	4 words	—
	4	—	—	—	8 words	—
	8	—	—	—	16 words	—
Analog output module	—	2	—	—	2 words	2 words
	—	4	—	—	4 words	4 words
Analog mixed I/O module	2	1	—	—	5 words	1 words
	4	2	—	—	10 words	2 words

*1 Inputs and coils are occupied in 1-byte increments.

The Modbus TCP communication shared memory allocated to the analog I/O module parameters differs depending on its contents.

- Analog input data is assigned to input registers.
- Analog output data is assigned to holding registers.
- Analog input status and analog output status are assigned to input registers. However, when the **Analog I/O Module Status** check box in the **Basic Settings** tab of the SX8R Configurator is cleared, analog status is not assigned to input registers. Input registers can be saved. For details, see Chapter 6 "(6) Analog I/O Module Status" on page 6-11.

Inputs

The host device can read the values of expansion inputs of the I/O modules connected to the SX8R via the inputs of the Modbus TCP server.

Modbus TCP Communication Shared Memory		Address on Communication*1	Expansion Input*2	Function Code
Device	Slave Address			
Inputs (1xxxxx)	100001 to 100480	0000h to 01DFh	I0 to I597	2

*1 The address on communication is a four-digit number that goes into the address section of the communication frame. Stores the last 5 digits of the slave address minus 1 in hexadecimal.
*2 Access expansion inputs within the device range of the I/O modules connected to the SX8R.

Memory Allocation

Starting from the beginning of the inputs, inputs are occupied in order of slot number by the size of the memory occupied by the I/O module, and expansion inputs are assigned to them. For the size of memory occupied by I/O modules, see "Occupied Memory" on page 5-9.

Example

See "Memory Allocation Example" on page 5-13.

When "EtherNet/IP Adapter" is configured to **Communication Mode** for connection number 1 and "Modbus TCP Server" is configured to **Communication Mode** for connection number 3, expansion inputs are assigned to input registers. In this case, Modbus TCP communication can read the values of expansion inputs of the I/O modules connected to the SX8R via input registers.

Coils

The host device can write values to expansion outputs of the I/O modules connected to the SX8R via coils of the Modbus TCP server.

Modbus TCP Communication Shared Memory		Address on Communication*1	Expansion Output*2	Function Code
Device	Slave Address			
Coils (0xxxxx)	000001 to 000480	0000h to 01DFh	Q0 to Q597	1,5,15

*1 The address on communication is a four-digit number that goes into the address section of the communication frame. Stores the last 5 digits of the slave address minus 1 in hexadecimal.
*2 Access expansion outputs within the device range of the I/O modules connected to the SX8R.

Memory Allocation

Starting from the beginning of coils, coils are occupied in order of slot number by the size of the memory occupied by the I/O module, and expansion outputs are assigned to them. For the size of memory occupied by I/O modules, see "Occupied Memory" on page 5-9.

Example

See "Memory Allocation Example" on page 5-13.

When "EtherNet/IP Adapter" is configured to **Communication Mode** for connection number 1 and "Modbus TCP Server" is configured to **Communication Mode** for connection number 3, expansion outputs are assigned to holding registers. In this case, Modbus TCP communication can write values to expansion outputs of the I/O modules connected to the SX8R via holding registers.

Input Registers

The host device can read the values of data registers and System Software Status (D8020) of the SX8R via the input registers of the Modbus TCP server.

Modbus TCP Communication Shared Memory		Address on Communication*1	Data Register*2	Function Code
Device	Slave Address			
Input Registers (3xxxxx)	300001 to 300241	0000h to 00F0h	D0000 to D0299, D8020	4

*1 The address on communication is a four-digit number that goes into the address section of the communication frame. Stores the last 5 digits of the slave address minus 1 in hexadecimal.
*2 Access data registers within the device range of the I/O modules connected to the SX8R.

Memory Allocation

Starting from the slave address 300002, input registers are occupied in order of slot number by the size of the memory occupied by the I/O module, and data registers are assigned to them. For the size of memory occupied by I/O modules, see "Occupied Memory" on page 5-9.

Slave Address	Address on Communication	Item	Description	R/W
300001	0000h	System Software Status	System Software Status reads whether or not there is an error in SX8R and I/O modules.	R
300002 to 300241	0001h to 00F0h	Data Registers	Data Registers read the values of data registers used by the I/O modules connected to the SX8R.	R

Example

See "Memory Allocation Example" on page 5-13.

Holding Registers

The host device can write values to data registers and Host Device Control Register (D8021) of the SX8R via the holding registers of the Modbus TCP server.

Modbus TCP Communication Shared Memory		Address on Communication*1	Data Register*2	Function Code
Device	Slave Address			
Holding Registers (4xxxxx)	400001 to 400061	0000h to 003Ch	D0000 to D0299, D8021	3,6,16

*1 The address on communication is a four-digit number that goes into the address section of the communication frame. Stores the last 5 digits of the slave address minus 1 in hexadecimal.
*2 Access data registers within the device range of the I/O modules connected to the SX8R.

Memory Allocation

Starting from the slave address 400002, holding registers are occupied in order of slot number by the size of the memory occupied by the I/O module, and data registers are assigned to them. For the size of memory occupied by I/O modules, see "Occupied Memory" on page 5-9.

Slave Address	Address on Communication	Item	Description	R/W
400001	0000h	Host Device Control Register	Host Device Control Register controls the digital and analog outputs of I/O modules.	R/W
400002 to 400061	0001h to 003Ch	Data Registers	Data Registers read the values of data registers used by the I/O modules connected to the SX8R.	R/W

Example

See "Memory Allocation Example" on page 5-13.

Memory Allocation Example

As shown in the table below, the device assignment when seven I/O modules are connected to the SX8R is as follows.

Slot No.	I/O Module		Digital Points		Analog Points		SX8R		
	Type No.	Module Type	Inputs	Outputs	Inputs	Outputs	Expansion Inputs*1	Expansion Outputs*1	Data Registers
1	FC6A-N16B1	Digital input module	16	—	—	—	I0 to I17	—	—
2	FC6A-T16P1	Digital output module	—	16	—	—	—	Q0 to Q17	—
3	FC6A-M08BR1	Digital mixed I/O module	4	4	—	—	I20 to I23*2	Q20 to Q23*3	—
4	FC6A-J4A1	Analog input module	—	—	4	—	—	—	D0060 to D0067*4
5	FC6A-K4A1	Analog output module	—	—	—	4	—	—	D0080 to D0087*4
6	FC6A-L06A1	Analog mixed I/O module	—	—	4	2	—	—	D0100 to D0111*4
7	FC6A-M08BR1	Digital mixed I/O module	4	4	—	—	I30 to I33*2	Q30 to Q33*3	—

*1 Expansion inputs and expansion outputs are assigned in 1-byte increments in order of slot number from the beginning of each device.
*2 FC6A-M08BR1 occupies 8 bits of expansion inputs and uses 4 bits of its expansion inputs. I20 to I27 and I30 to I37 are occupied, and I20 to I23 and I30 to I33 are assigned to expansion inputs. I24 to I27 and I34 to I37 are reserved.
*3 FC6A-M08BR1 occupies 8 bits of expansion outputs and uses 4 bits of its expansion outputs. Q20 to Q27 and Q30 to Q37 are occupied, and Q20 to Q23 and Q30 to Q33 are assigned to expansion outputs. Q24 to Q27 and Q34 to Q37 are reserved.
*4 Data registers occupy 20 words from address ((slot number - 1) x 20) th, and ((total number of I/O points) x 2) words are used.

- For details on device allocation, see Chapter 2 "Size of Device to Occupy" on page 2-9.
- The devices assigned to each I/O module can be viewed in the **Module Configuration** tab of the SX8R Configurator by clicking on the I/O module.

The devices of SX8R are assigned to the Modbus TCP communication shared memory as follows.

SX8R		Modbus TCP communication Shared Memory			
Device	**Device Address**	**Inputs (1xxxxx)**	**Coils (0xxxxx)**	**Input Registers (3xxxxx)**	**Holding Registers (4xxxxx)**
Expansion Input	I0 to I7	100001 to 100008	—	—	—
	I10 to I17	100009 to 100016	—	—	—
	I20 to I27	100017 to 100024*1	—	—	—
	I30 to I37	100025 to 100032*1	—	—	—
Expansion Output	Q0 to Q7	—	000001 to 000008	—	—
	Q10 to Q17	—	000009 to 000016	—	—
	Q20 to Q27	—	000017 to 000024*2	—	—
	Q30 to Q37	—	000025 to 000032*2	—	—
Data Register	D0060 to D0067	—	—	See "Data Register Memory Allocation" on page 5-15.	
	D0080 to D0087	—	—		
	D0100 to D0111	—	—		
Special Data Register	D8020	—	—	300001	—
	D8021	—	—	—	400001

*1 FC6A-M08BR1 occupies 8 bits of inputs. 100021 to 100024 and 100029 to 100032 are reserved. When the reserved input is read, its value is 0.

*2 FC6A-M08BR1 occupies 8 bits of coils. 000021 to 000024 and 000029 to 000032 are reserved. Do not write to data in the reserved area. Otherwise the FC6A-M08BR1 may not operate correctly.

Data Register Memory Allocation

The Modbus TCP communication shared memory allocated to data registers differs depending on its contents.

- Analog input data is assigned to input registers.
- Analog output data is assigned to holding registers.
- Analog input status and analog output status are assigned to input registers.

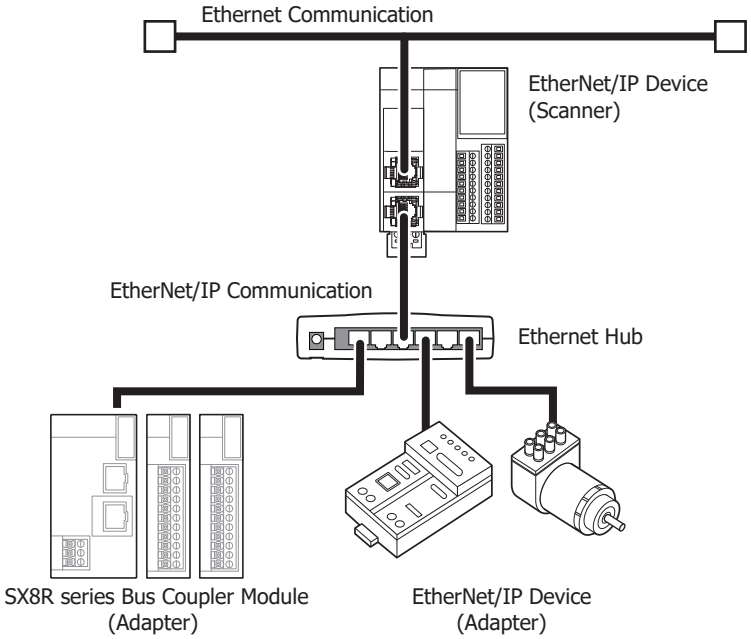
Slot No.	I/O Module	SX8R		Shared Memory	
		Device Address	Contents	Input Registers (3xxxxx)	Holding Registers (4xxxxx)
4	FC6A-J4A1	D0060	Analog Input Data (AI0)	300002	—
		D0061	Analog Input Status (AI0)	300003	—
		…	…	…	…
		D0066	Analog Input Data (AI3)	300008	—
		D0067	Analog Input Status (AI3)	300009	—
5	FC6A-K4A1	D0080	Analog Output Data (AQ0)	—	400002
		D0081	Analog Output Status (AQ0)	300010	—
		…	…	…	…
		D0086	Analog Output Data (AQ3)	—	400005
		D0087	Analog Output Status (AQ3)	300013	—
6	FC6A-L06A1	D0100	Analog Input Data (AI0)	300014	—
		D0101	Analog Input Status (AI0)	300015	—
		…	…	…	…
		D0106	Analog Input Data (AI3)	300020	—
		D0107	Analog Input Status (AI3)	300021	—
		D0108	Analog Output Data (AQ0)	—	400006
		D0109	Analog Output Status (AQ0)	300022	—
		D0110	Analog Output Data (AQ1)	—	400007
		D0111	Analog Output Status (AQ1)	300023	—

- Modbus TCP communication shared memory can be viewed in the **Modbus TCP Server** tab of the SX8R Configurator.
- When the **Analog I/O Module Status** check box in the **Basic Settings** tab of the SX8R Configurator is cleared, analog status is not assigned to input registers. Input registers can be saved. For details, see Chapter 6 "(6) Analog I/O Module Status" on page 6-11.

When "EtherNet/IP Adapter" or "CC-Link IE Field Basic Slave" is configured to Communication Mode for connection number 1, and "Modbus TCP Server" is configured to Communication Mode for connection number 2 or 3, even if the values of holding registers are rewritten in Modbus TCP communication, the value is overwritten because of the periodic communication of connection number 1.

EtherNet/IP Communication (Adapter)

The SX8R works as an adapter in EtherNet/IP communication and communication can be performed with devieces such as programmable display, PLC, that are compatible with EtherNet/IP communication. Input values and parameters of I/O modules connected to SX8R can be read to PLCs and written to parameters of I/O modules from PLCs.



When EtherNet/IP communication and other Ethernet communications are performed simultaneously on the same network, data may no longer be transmitted or received at the intended timing, depending on the load status. In this situation, build the network using an Ethernet switch that supports the QoS function and adjust the priority of data that flows on the network.

Communication Specifications

Items			Specifications
Supported protocols			EtherNet/IP communication (adapter)
Supported ports			Ethernet port
Action			Targeted equipment
Port number			44818 (Class 3), 2222 (Class 1)
Vendor ID			159
I/O message communication functions	Number of CIP connections		3*1
	CIP connection points	Number of settings	4
		IN	Instance ID: 100 (Maximum 482 bytes)
		OUT	Instance ID: 200 (Maximum 122 bytes)
			Instance ID: 198 (for Input Only)
			Instance ID: 199 (for Listen Only)
	RPI (communication cycle)		2 ms to 10 s (in 1 ms increments)
	CIP connection type		Exclusive Owner/ Input Only/ Listen Only
	Trigger of send		Cyclic/ COS (change of state)*2
Explicit message communication function	Class 3 (connection type)	Server	Support (number of CIP connections: 3*3)
		Clients	Unsupported
	UCMM	Server	Support (number of CIP connections: 3*3)
		Clients	Unsupported

*1 The maximum number of connections is 3 in total with the CIP connections used in the class 3 (connection type) explicit message communication function.

*2 Communication can be performed with EtherNet/IP devices that output data with the Change Of State (transmit data when there is a change of state) method.

*3 The maximum number of connections is 3 in total with the CIP connections used in I/O message communication function.

Functions

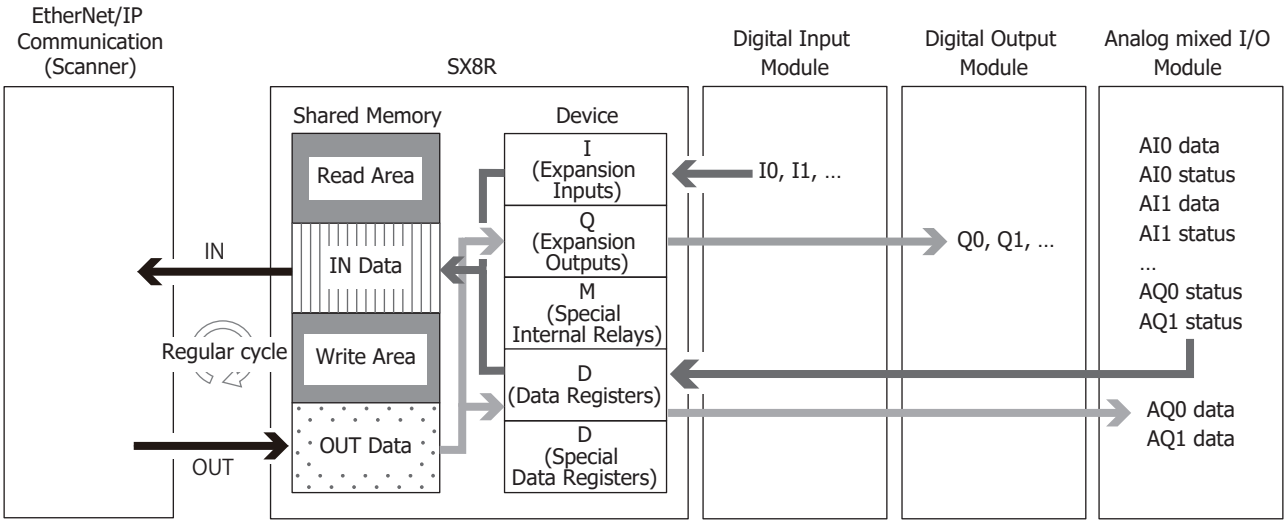
The SX8R provides the following functions as an adapter for EtherNet/IP devices.

- I/O message communication (target) function (Class 1 communication)
  For details, see "I/O Message Communication (Target) Function" on page 5-22.
- Class3/UCMM communication
  For details, see "Class 3/UCMM Communication" on page 5-23.

EtherNet/IP Communication Shared Memory

The EtherNet/IP communication shared memory is the memory that can be accessed from an EtherNet/IP scanner.

When "EtherNet/IP Adapter" is selected in **Communication Mode** of **Connection** group on **Basic Settings** tab, the devices of the SX8R can be read and written via the EtherNet/IP communication shared memory.



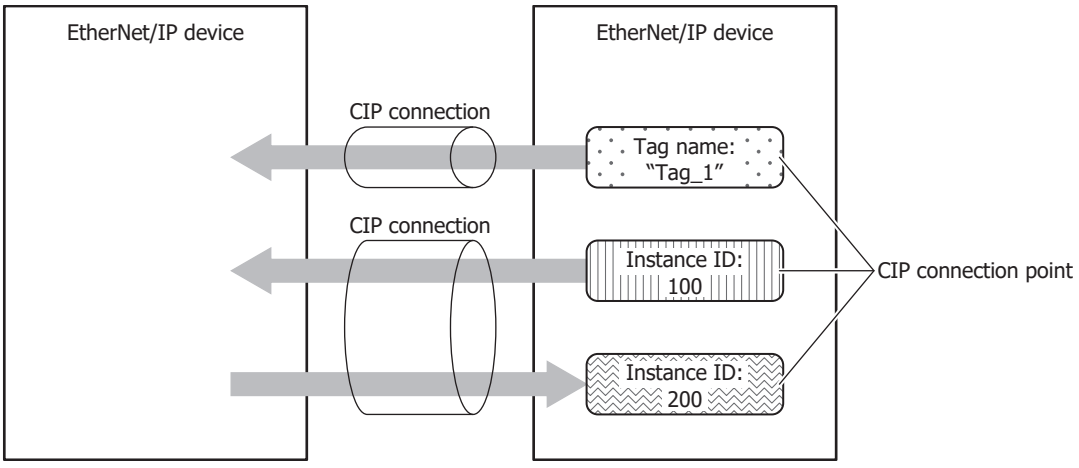
For shared memory allocation, see "Memory Allocation for I/O Message Communication" on page 5-31.

I/O Message Communication

What is I/O Message Communication?

I/O message communication is a function that allows EtherNet/IP devices to cyclically read and write data with each other. The target unit for reading/writing data is called a CIP connection point. CIP tag names and instance IDs are assigned to CIP connection points. In I/O message communication, an EtherNet/IP device reads/writes data by specifying the CIP tag name or instance ID of a CIP connection point.

The SX8R can read and write data by specifying an instance ID. The SX8R cannot read and write data by specifying a CIP tag name.



What is a CIP connection?

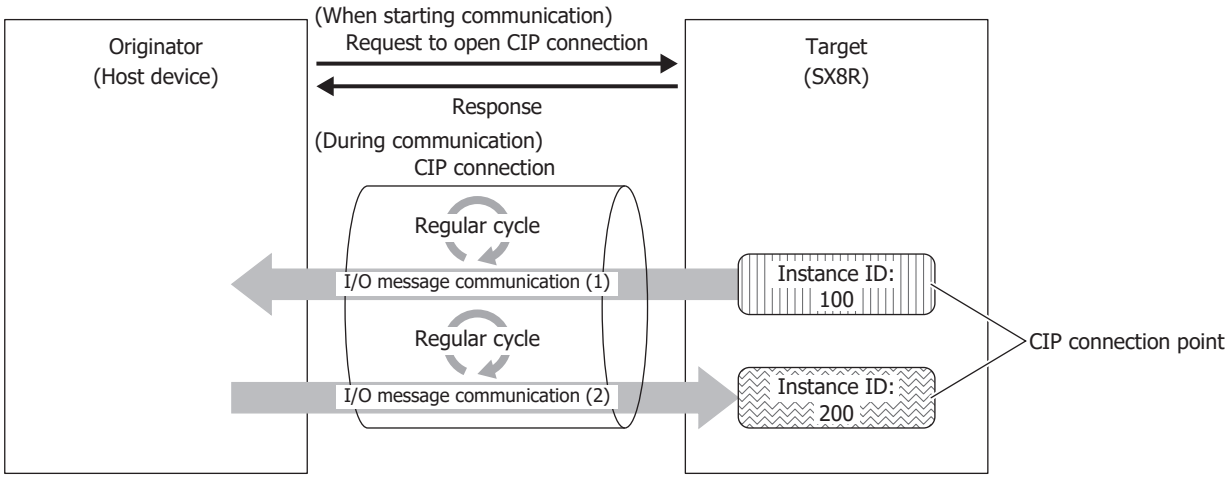
A CIP connection is a virtual communication line between EtherNet/IP devices. In I/O message communication, one device sends a request to open a CIP connection to the CIP connection point of the other device, and when successful, data is read and written.The side that sends the request to open the CIP connection is called the originator. The side that receives the request is called the target. The SX8R can be the target. The SX8R can open 3 CIP connections at the same time.

Types of CIP Connections

There are the following three types of CIP connections. Exclusive Owner can transmit and receive data. Input Only and Listen Only can only receive data.

(1) Exclusive Owner

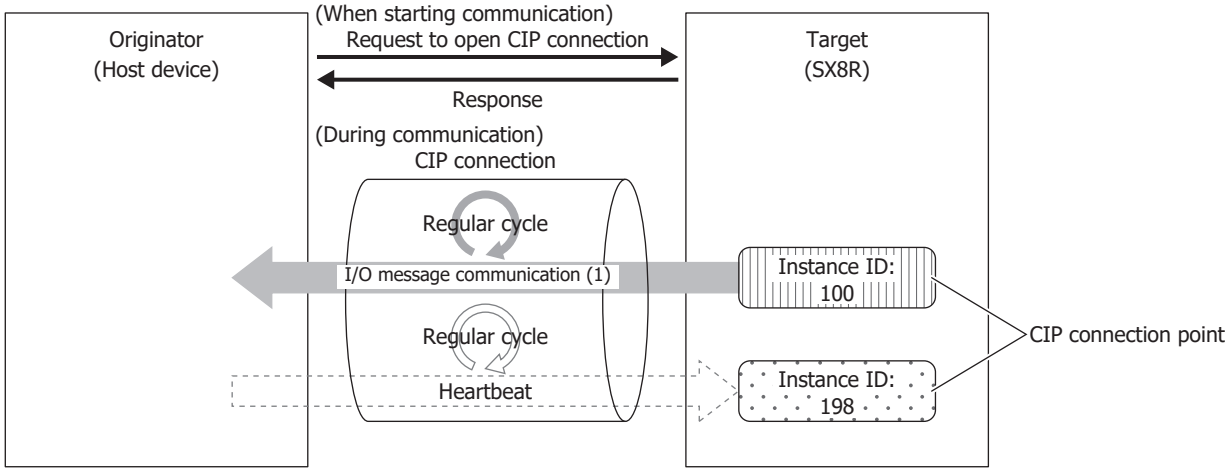
This CIP connection cyclically transmits data from the target to the originator (1) and cyclically transmits data from the originator to the target (2). The CIP connection point is specified as a CIP tag name or an instance ID. Communication is performed at the cycle (RPI) specified when the CIP connection is opened*1. Data can be transmitted and received when the originator opens*2 the connection.



*1 Class 1 communication (cyclic communication) is performed.
*2 Request a ForwardOpen service from the originator for Class 3 communication and open a connection.

(2) Input Only

This CIP connection cyclically transmits data from the target to the originator (①). The CIP connection point is specified as an instance ID. Communication is performed at the cycle (RPI) specified when the CIP connection is opened. In order for the target to perform alive monitoring of the originator, a heartbeat that does not include data is cyclically transmitted from the originator to the target. The originator specifies the Input Only instance ID (198) on the target as the destination for the heartbeat. The heartbeat is transmitted at the specified cycle (RPI).

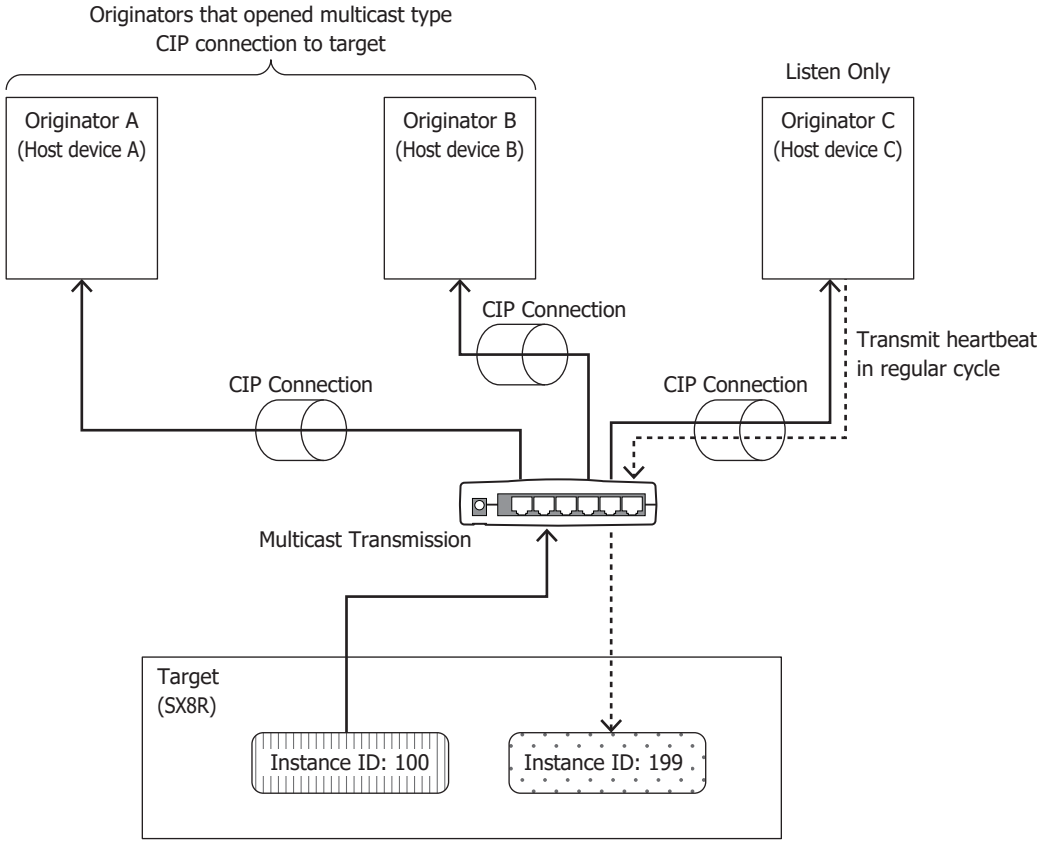


- For Input Only, please set the heartbeat of the CIP connectionpoint as an instance ID too.
- The heartbeat is always performed in Input Only.

(3) Listen Only

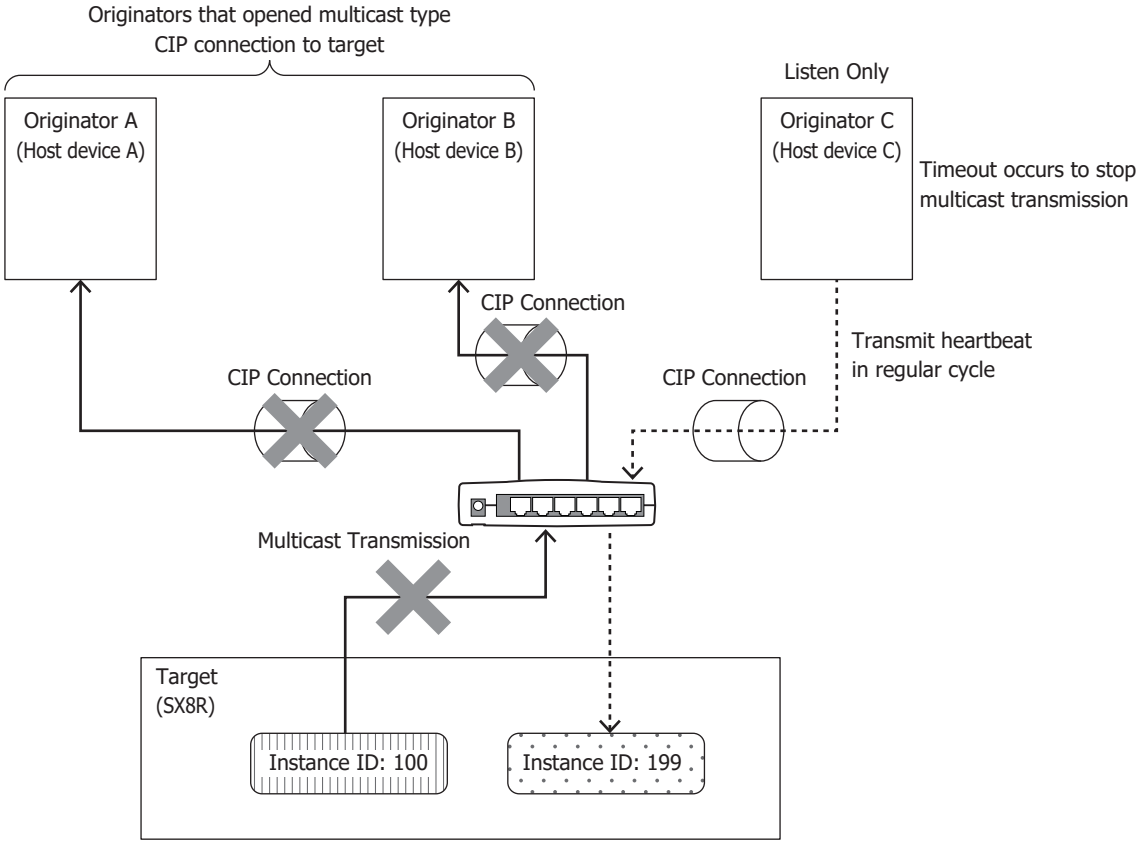
This CIP connection cyclically receives data for originators from a target that already has a multicast type CIP connection using Exclusive Owner or Input Only opened. Set this connection type to simultaneously receive data when the target transmits that data by multicast to other originators. The CIP connection point is specified as an instance ID. Communication is performed at the cycle (RPI) specified when the CIP connection is opened. In order for the target to perform alive monitoring of the originator, a heartbeat that does not include data is cyclically transmitted from the originator to the target.

The originator specifies the Listen Only instance ID (199) on the target as the destination for the heartbeat. The heartbeat is transmitted at the specified cycle (RPI).



- For Listen Only, please set the CIP connection point of the input data to receive from the target as an instance ID.
- The heartbeat is always performed in Listen Only.

A Listen Only CIP connection can be opened only when a multicast type CIP connection is opened. When the CIP connection between the target and originator that opened a multicast type CIP connection using Exclusive Owner or Input Only is disconnected, the multicast transmissions from the target to originators that opened Listen Only CIP connections are stopped.



Transmit Trigger Type

There are two types of transmission triggers for SX8R.

■ **Cyclic**

Send data from the originator to the target or from the target to the originator at every regular cycle in the RPI.

■ **Change Of State**

Send data when there is a change from originator to target or from target to originator. If there is no change in data, it will send data at every regular cycle in the RPI.

Types of connections

There are two types of SX8R with the following connection types.

■ **Point To Point**

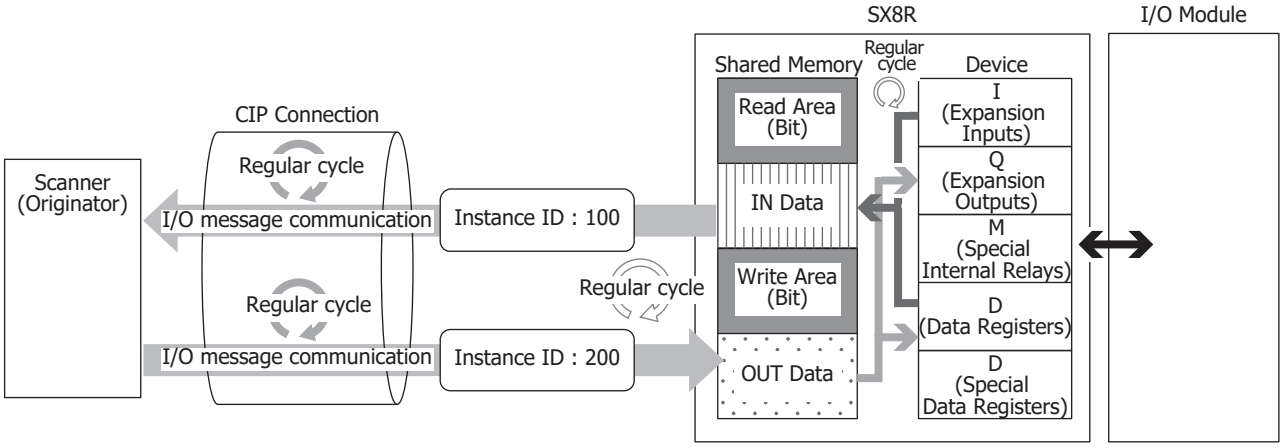
Send data from the originator to the target or from the target to the originator by one-to-one.

■ **Multicast**

Sends data from the target to the multicast addresses of multiple originators. The direction of the target from the originator is not supported.

I/O Message Communication (Target) Function

SX8R uses devices to control I/O modules. The SX8R cyclically reads and writes data between the device and the shared memory. The scanner reads and writes values of the shared memory. The SX8R is the target with CIP connection points. A maximum of 3 CIP connection points can be defined. The originator sends a request to open a CIP connection to the CIP connection point of the SX8R, and when successful, the CIP connection point data is read and written. The SX8R first writes the values of devices to the EtherNet/IP communication shared memory*1 and then transmits the data to the originator. Data received from the originator is also first written to the EtherNet/IP communication shared memory and then stored in devices.

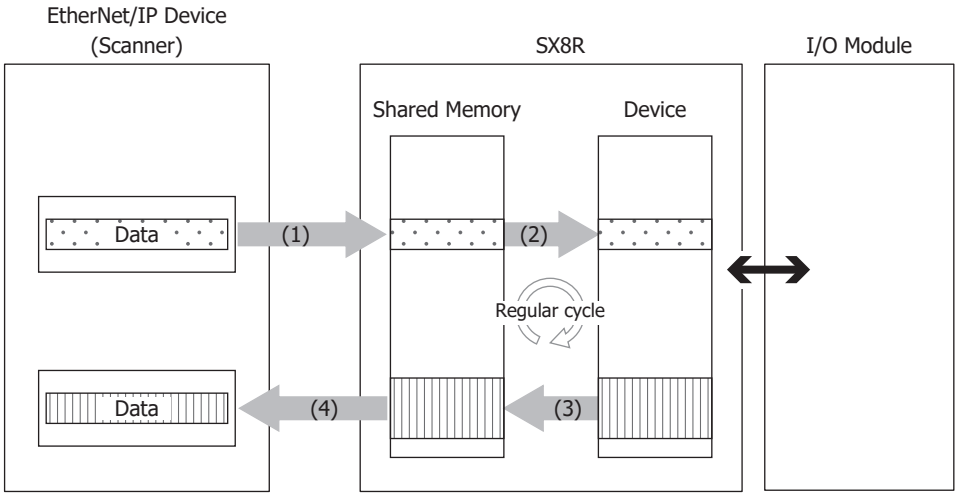


*1 The EtherNet/IP communication shared memory is a memory inside the SX8R that stores the data to transmit and receive in I/O message communication. For details on the EtherNet/IP communication shared memory and device binding, see "Data and Device Binding Function" on page 5-22.

Data and Device Binding Function

The SX8R assigns IN data*1 and OUT data*2 set on the scan list and in CIP connection points to the EtherNet/IP communication shared memory in the SX8R.

The SX8R first writes the data received from the other device via I/O message communication to the EtherNet/IP communication shared memory (1) and then stores the data in devices (2). The values stored in devices are also first written to the EtherNet/IP communication shared memory (3) and then transmitted to the other device (4). The processing to reflect data between the EtherNet/IP communication shared memory and devices is performed at a fixed cycle.



*1 IN data is received by the originator from the target in I/O message communication.
*2 OUT data is transmitted to the target from the originator in I/O message communication.

For how devices are allocated in the EtherNet/IP communication shared memory, see "Memory Allocation for I/O Message Communication" on page 5-31.

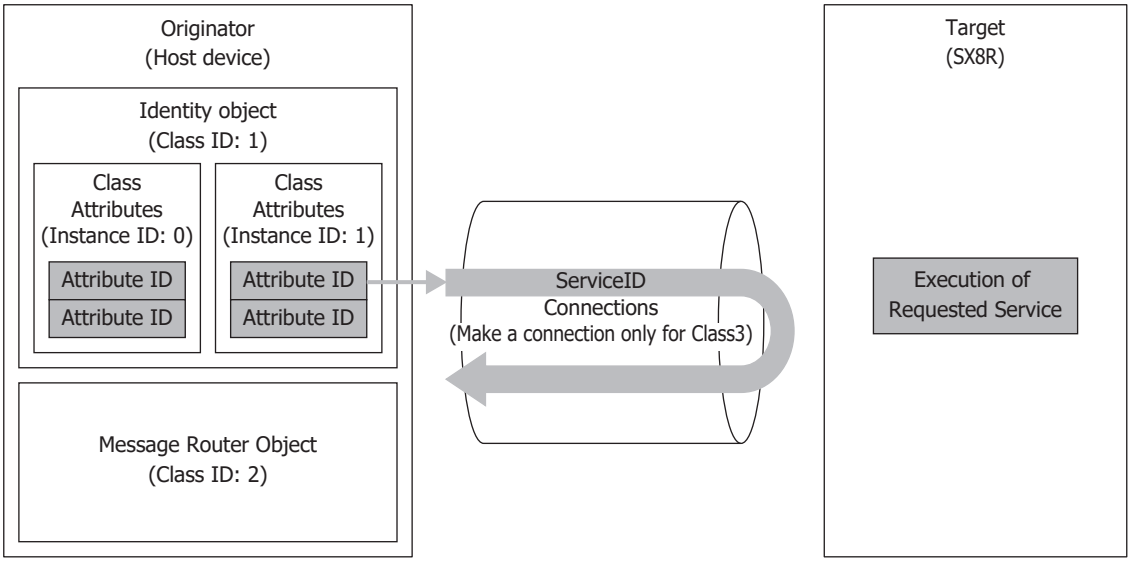
Class 3/UCMM Communication

Communication in which the target executes and responds to the service requested by the originator.

There are Class3 communication that opens the connection and UCMM communication that does not open.

The method to perform the service is to specify the CLassID, instancid and attributeids to request the assigned service to the target in the access method that corresponds to the serviceid.

- Get_Attribute_Single(0Eh): Get target data using one Attribute in Instance
- Get_Attribute_All(01h): Get target data using all Attribute in Instance
- Set_Attribute_Single(10h): Use one Attribute in Instance to populate the target



Service List

ClassID	InstanceID	AttributeID
Identity Object (01h)	Class Attributes (0)	Get_Attribute_Single (0Eh)
		Get_Attribute_All (01h)
	Instance attributes (1)	Get_Attribute_Single (0Eh)
		Get_Attribute_All (01h)
		Reset (05h)
Message Router Object (02h)	Class Attribute (0)	Get_Attribute_Single (0Eh)
	Instance attribute (1)	Get_Attribute_Single (0Eh)
Assembly Object (04h)	Class Attribute (0)	Get_Attribute_Single (0Eh)
	Instance attributes (100, 200)	Get_Attribute_Single (0Eh)
		Set_Attribute_Single(10h)
Connection Manager Object (06h)	Instance attributes (1)	Forward_Open(54h)
		Forward_Close(4Eh)
TCP/IP Interface Object (F5h)	Class Attribute (0)	Get_Attribute_Single (0Eh)
	Instance attributes (1)	Get_Attribute_Single (0Eh)
		Set_Attribute_Single(10h)
Ethernet Link Object (F6h)	Class Attribute (0)	Get_Attribute_Single (0Eh)
	Instance attribute (1)	Get_Attribute_Single (0Eh)
LLDP Management Object (109h)	Class Attribute (0)	Get_Attribute_Single (0Eh)
	Instance attributes (1)	Get_Attribute_Single (0Eh)
		Set_Attribute_Single (10h)

Identity Object (Class ID: 01h)

An object that provides device identification, general information and reset service, etc. The reset service performs by soft reset.

■ **Class Attributes (Instance ID: 0)**

Available ServiceID

- Get_Attribute_Single(0Eh)
- Get_Attribute_All(01h)

ID	Attributes	Name	Data Type	Description	Value
1	R	Revision	UNIT	Object revisions	1
2	R	Max Instance	UNIT	Maximum instance number	1
3	R	Number of Instances	UNIT	Number of generated object instances	1
6	R	Maximum ID Number Class Attributes	UNIT	Maximum attribute ID number for class attributes	7
7	R	Maximum ID Number Instance Attributes	UNIT	Maximum attribute ID number of the instance attribute	7

■ **Instance attributes (Instance ID: 1)**

Available ServiceID

- Get_Attribute_Single(0Eh)
- Get_Attribute_All(01h)
- Reset(05h) *Not required for Attribute ID

ID	Attributes	Name	Data Type	Description		Value
1	R	Vendor ID	UNIT	Vendor Identification Number		159
2	R	Device Type	UNIT	Common device types		12
3	R	Product Code	UNIT	Product Identification Code		1100
4	R	Revision	STRUCT of:	Identity object revision		—
		Major Revision	UNIT	Major revisions		—
		Minor Revision	UNIT	Minor revisions		—
5	R	Status	UNIT	Current status of the device bit4 to 7		Current Status
		Serial Number		0010:	Connection Timeout	
		Product Name		0011:	Connection disconnection	
		Vendor ID		0110:	One or more connections are in the RUN status	
		Device Type		0111:	All IDLE status during connection	
6	R	Product Code	UNIT	Serial Number		—
7	R	Revision	SHORT-STRING	Product Name		SX8R-ECBx

Message Router Object (Class ID: 02h)

An object to manage incoming messages.

■ **Class Attributes (Instance ID: 0)**

Available ServiceID

- Get_Attribute_Single(0Eh)

ID	Attributes	Name	Data Type	Description	Value
1	R	Revision	UNIT	Object revisions	1
2	R	Max Instance	UNIT	Maximum instance number	1
3	R	Number of Instances	UNIT	Number of generated object instances	1
6	R	Maximum ID Number Class Attributes	UNIT	Maximum attribute ID number for class attributes	7
7	R	Maximum ID Number Instance Attributes	UNIT	Maximum attribute ID number of the instance attribute	2

■ **Instance attribute (Instance ID: 1)**

Available ServiceID

- Get_Attribute_Single(0Eh)

ID	Attributes	Name	Data Type	Description	Value
1	R	Object_list	STRUCT of:	List of objects	—
		Number	UINT	The number of classes supported in the class array	7
		Classes	The UINT array	List of class codes	01h 02h 04h 06h F5h F6h 109h
2	R	Number Available	UNIT	Maximum number of connections	3

Assembly Object (Class ID: 04h)

Cyclic communication data objects.

■ **Class Attributes (Instance ID: 0)**

Available ServiceID

- Get_Attribute_Single(0Eh)

ID	Attributes	Name	Data Type	Description	Value
1	R	Revision	UNIT	Object revisions	2

■ **Instance attributes (Instance ID: 100, 200)**

Available ServiceID

- Get_Attribute_Single(0Eh)
- Set_Attribute_Single(10h)

ID	Attributes	Name	Data Type	Description	Value
3	*1	Data	BYTE Array	Cyclic communication data assigned to InstanceID	Cyclic communication data
4	R	Size	UNIT	Cyclic communication data size allocated to InstanceID	Cyclic communication data size

*1 R/W (Instance ID: 200), R (Instance ID: 100)

Connection Manager Object (Class ID: 06h)

An object used for connection-type communication. Used to open a connection to the device.

■ **Class Attributes**

There is no class attribution

■ **Instance attribute (Instance ID: 1)**

There is no class attribution

Available ServiceID

- Forward_Open(54h)
- Forward_Close(4Eh)

TCP/IP Interface Object (Class ID: F5h)

An object that provides a mechanism to set up a TCP/IP network interface.

■ **Class Attributes (Instance ID: 0)**

Available ServiceID

- Get_Attribute_Single(0Eh)

ID	Attributes	Name	Data Type	Description	Value
1	R	Revision	UNIT	Object revisions	4
2	R	Max Instance	UNIT	Maximum instance number	1
3	R	Number of Instances	UNIT	Number of generated object instances	1
6	R	Maximum ID Number Class Attributes	UNIT	Maximum attribute ID number for class attributes	7
7	R	Maximum ID Number Instance Attributes	UNIT	Maximum attribute ID number of the instance attribute	13

■ **Instance attribute (Instance ID: 1)**

Available ServiceID

- Get_Attribute_Single(0Eh)
- Set_Attribute_Single(10h)

ID	Attributes	Name	Data Type	Description	Value
1	R	Status	DWORD	Interface Status 0: Communication information not set 1: Communication information has been set (nonvolatile memory) 2: Communication information has been set (hardware setting)	2
2	R	Configuration Capability	DWORD	Interface function flags bit2: With or without DHCP function (No: 0) bit4: Setting value can be changed or not (enabled: 0) bit5: Hardware settings such as IP address (enabled: 1) bit6:Reset after change or not (No: 0)	32(0020h)
3	R	Configuration Control	DWORD	Interface control flag 0x0000: use the previous IP address value	0
4	R	Physical Link Object	STRUCT of:	Path to physical layer link object 20F6=Ethernet Link object 2401=Instance 1	—
		Path size	UINT	Path size (WORD)	2
		Path	Padded EPATH	Segments to identify physical layer link objects	20F62401h
5	R	Interface Configuration	STRUCT of:	TCP/IP Network Interface Settings	—
		IP Address	UDINT	IP address of the device	Current IP address
		Network Mask	UDINT	Device Network Mask	Current Sub Net Mask
		Gateway Address	UDINT	Default Gateway Address	Current Gateway
		Name Server	UDINT	The primary name server	0 (not set)
		Name Server 2	UDINT	Secondary name servers	0 (not set)
		Domain Name	STRING	Domain name ASCII string: 48 characters max	0 (not set)
6	R	Host Name	STRING	Host Name	0 (not set)
13	R/W	Encapsulation Inactivity Timeout	UINT	encapsulation session timeout time (1 to 3600 seconds, default: 120 seconds)	Timeout value

Ethernet Link Object (Class ID: F6h)

An object that provides Ethernet status information.

■ **Class Attributes (Instance ID: 0)**

Available ServiceID

- Get_Attribute_Single(0Eh)

ID	Attributes	Name	Data Type	Description	Value
1	R	Revision	UNIT	Object revisions	4
2	R	Max Instance	UNIT	Maximum instance number	1
3	R	Number of Instances	UNIT	Number of generated object instances	1

■ **Instance attribute (Instance ID: 1)**

Available ServiceID

- Get_Attribute_Single(0Eh)
- Get_Attribute_All(01h)

ID	Attributes	Name	Data Type	Description	Value
1	R	Interface Speed	UDINT	Interface communication speed (Mbps)	100
2	R	Interface Flags	DWORD	Interface status flag Full-duplex: 15 Half-duplex:13 Acquisition failure: 5	15
3	R	Physical Address	ARRAY of 6 USINTs	MAC layer address	MAC address value
10	R	Interface Label	SHORT-STRING	IP address of the device	Current IP address
11	R	Interface Capability	STRUCT of:	Interface function	—
		Capability Bits	DWORD	bit0: Reset after change or not (No: 0) bit1: Auto-negotiate function (Yes: 1) bit2: Auto-MDIX function (Yes: 1) bit3: Set value can be changed or not (No: 0)	6
		Speed/Duplex Options	STRUCT of:		—
		Speed/Duplex Array Count	USINT	Number of Speed/Duplex Array arrays	0

LLDP Management Object (Class ID: 109h)

An object that manages LLDP protocol.

■ **Class Attributes (Instance ID: 0)**

Available ServiceID

- Get_Attribute_Single(0Eh)

ID	Attributes	Name	Data Type	Description	Value
1	R	Revision	UINT	Object revisions	1
2	R	Max Instance	UINT	Maximum instance number	1
3	R	Number of Instances	UINT	Number of generated object instances	1
6	R	Maximum ID Number Class Attributes	UINT	Maximum attribute ID number for class attributes	7
7	R	Maximum ID Number Instance Attributes	UINT	Maximum attribute ID number of the instance attribute	3

■ **Instance attribute (Instance ID: 1)**

Available ServiceID

- Get_Attribute_Single(0Eh)
- Set_Attribute_Single(10h)

ID	Attributes	Name	Data Type	Description	Value
1	R/W	LLDP Enable	Struct of:	LLDP communication Enable/Disable	—
		LLDP Enable Array Length	UINT	Number of elements in the LLDP Enable Array	2
		LLDP Enable Array	ARRAY of: BYTE	bit0: Global setting bit1-N: Port transmission settings 0 = LLDP deactivated, 1 = LLDP activated	3
2	R/W	msgTxInterval	UINT	Interval in seconds after which the LLDP frames were sent from the device	1 to 3600 (Default: 30)
3	R/W	msgTxHold	USINT	A factor of msgTxInterval to determine the value of TTL TLV that was sent by the neighboring device	1 to 100 (Default: 4)

Memory Allocation for I/O Message Communication

EtherNet/IP communication shared memory is a memory that can be accessed by EtherNet/IP device (scanner). The EtherNet/IP communication shared memory (Input Assembly, Output Assembly) allocated to devices varies depending on the I/O module type and connection configuration. The EtherNet/IP device (scanner) uses shared memory to read and write values from and to devices on I/O modules connected to the SX8R.

When an I/O module is configured in the **Module Configuration** tab of the SX8R Configurator and "EtherNet/IP Adaptor" is configured under **Communication Mode** in the **Basic Settings** tab, EtherNet/IP communication shared memory is automatically assigned. EtherNet/IP communication shared memory can be found on the **EtherNet/IP Adaptor** tab.

Occupied Memory

The I/O module occupies the EtherNet/IP communication shared memory as follows.

I/O Module	Points		Size of Shared Memory to be Occupied	
	Inputs	Outputs	Input Assembly	Output Assembly
Digital input module	8	—	2 bytes	—
	16	—	2 bytes	—
	32	—	4 bytes	—
Digital output module	—	8	—	2 bytes
	—	16	—	2 bytes
	—	32	—	4 bytes
Digital mixed I/O module	4	4	2 bytes	2 bytes
	16	8	2 bytes	2 bytes
Analog input module	2	—	8 bytes	—
	4	—	16 bytes	—
	8	—	32 bytes	—
Analog output module	—	2	4 bytes	4 bytes
	—	4	8 bytes	8 bytes
Analog mixed I/O module	2	1	10 bytes	2 bytes
	4	2	20 bytes	4 bytes

The EtherNet/IP communication shared memory allocated to the analog I/O module parameters differs depending on its contents.

- Analog input data is assigned to the Input Assembly.
- Analog output data is assigned to the Output Assembly.
- Analog input status and analog output status are assigned to Input Assembly. However, when the **Analog I/O Module Status** check box in the **Basic Settings** tab of the SX8R Configurator is cleared, analog status is not assigned to the Input Assembly. Input Assembly can be saved. For details, see Chapter 6 "(6) Analog I/O Module Status" on page 6-11.

Input Assembly (0 to 482)

The host device can read the values of expansion inputs of the I/O modules connected to the SX8R via the Input Assembly. The values of data registers and System Software Status (D8020) of the SX8R can be read.

EtherNet/IP Communication Shared Memory		Expansion Inputs*2	Data Registers*2
Device	Offset from the First Address Number*1		
Input Assembly (InstanceID: 100)	0	—	D8020
	2 to 482	I0 to I597	D0000 to D0299

*1 Offset is in bytes.
*2 Access expansion inputs and data registers within the device range of the I/O modules connected to the SX8R.

Memory Allocation

The Input Assembly is occupied in order of slot number from offset 1, by the size of the memory occupied by the I/O module, and expansion inputs and data registers are assigned to them. For the size of memory occupied by I/O modules, see "Occupied Memory" on page 5-31.

Shared Memory	SX8R			
Offset	Device Address	Description		R/W
0	D8020	System Software Status	Reads the connection and error status of SX8R and I/O modules.	R
2 to 482	I0 to I597	Expansion Inputs	Reads the values of expansion inputs.	R
	D0000 to D0299	Data Registers	Reads I/O module parameters into data registers.	R

Example

See "Memory Allocation Example" on page 5-33.

Output Assembly (0 to 122)

The host device can write values to expansion outputs of the I/O modules connected to the SX8R via the Output Assembly. Values can be written to data registers and Host Device Control Register (D8021) of the SX8R.

EtherNet/IP Communication Shared Memory		Expansion Outputs*2	Data Registers*2
Device	Offset from the First Address Number*1		
Input Assembly (InstanceID: 200)	0	—	D8021
	2 to 122	Q0 to Q597	D0000 to D0299

*1 Offset is in bytes.
*2 Access expansion outputs and data registers within the device range of the I/O modules connected to the SX8R.

Memory Allocation

The Output Assembly is occupied in order of slot number from offset 1, by the size of the memory occupied by the I/O module, and expansion outputs and data registers are assigned to them. For the size of memory occupied by I/O modules, see "Occupied Memory" on page 5-31.

Shared Memory	SX8R			
Offset	Device Address	Description		R/W
0	D8021	Host Device Control Register	Controls the outputs of the I/O modules.	W
2 to 122	Q0 to Q597	Expansion Outputs	Writes values to expansion outputs.	W
	D0000 to D0299	Data Registers	Stores values in data registers and writes parameters to I/O modules.	W

Example

See "Memory Allocation Example" on page 5-33.

Memory Allocation Example

As shown in the table below, the device assignment when seven I/O modules are connected to the SX8R is as follows.

Slot No.	I/O Module		Digital Points		Analog Points		SX8R		
	Type No.	Module Type	Inputs	Outputs	Inputs	Outputs	Expansion Inputs*1	Expansion Outputs*1	Data Registers
1	FC6A-N16B1	Digital input module	16	—	—	—	I0 to I17	—	—
2	FC6A-T16P1	Digital output module	—	16	—	—	—	Q0 to Q17	—
3	FC6A-M08BR1	Digital mixed I/O module	4	4	—	—	I20 to I23*2	Q20 to Q23*3	—
4	FC6A-J4A1	Analog input module	—	—	4	—	—	—	D0060 to D0067*4
5	FC6A-K4A1	Analog output module	—	—	—	4	—	—	D0080 to D0087*4
6	FC6A-L06A1	Analog mixed I/O module	—	—	4	2	—	—	D0100 to D0111*4
7	FC6A-M08BR1	Digital mixed I/O module	4	4	—	—	I30 to I33*2	Q30 to Q33*3	—

*1 Expansion inputs and expansion outputs are assigned in 1-byte increments in order of slot number from the beginning of each device.
*2 FC6A-M08BR1 occupies 8 bits of expansion inputs and uses 4 bits of its expansion inputs. I20 to I27 and I30 to I37 are occupied, and I20 to I23 and I30 to I33 are assigned to expansion inputs. I24 to I27 and I34 to I37 are reserved.
*3 FC6A-M08BR1 occupies 8 bits of expansion outputs and uses 4 bits of its expansion outputs. Q20 to Q27 and Q30 to Q37 are occupied, and Q20 to Q23 and Q30 to Q33 are assigned to expansion outputs. Q24 to Q27 and Q34 to Q37 are reserved.
*4 Data registers occupy 20 words from address ((slot number - 1) x 20) th, and ((total number of I/O points) x 2) words are used.

- For details on device allocation, see Chapter 2 "Size of Device to Occupy" on page 2-9.
- The devices assigned to each I/O module can be viewed in the **Module Configuration** tab of the SX8R Configurator by clicking on the I/O module.

The devices of SX8R are assigned to the EtherNet/IP communication shared memory as follows.

Slot No.	SX8R				Offset of Shared Memory	
	Expansion Inputs	Expansion Outputs	Data Registers	Special Data Registers	Input Assembly	Output Assembly
—	—	—	—	D8020	0	—
				D8021	—	0
1	I0 to I17	—	—	—	2	—
2	—	Q0 to Q17	—	—	—	2
3	I20 to I23	Q20 to Q23	—	—	4*1	4*2
4	—	—	D0060 to D0067	—	See "Data Register Memory Allocation" on page 5-34.	
5	—	—	D0080 to D0087	—		
6	—	—	D0100 to D0111	—		
7	I30 to I33	Q30 to Q33	—	—	50*1	18*2

*1 FC6A-M08BR1 occupies 2 bytes of Input Assembly. The Input Assembly other than those assigned to I20 to I23 and I30 to I33 are reserved. When the reserved input assembly is read, its value is 0.

*2 FC6A-M08BR1 occupies 2 bytes of Output Assembly. The Output Assembly other than those assigned to Q20 to Q23 and Q30 to Q33 are reserved. Do not write to data in the reserved area. Otherwise the FC6A-M08BR1 may not operate correctly.

Data Register Memory Allocation

The EtherNet/IP communication shared memory allocated to data registers differs depending on its contents.

- Analog input data is assigned to Input Assembly.
- Analog output data is assigned to Output Assembly.
- Analog input status and analog output status are assigned to Input Assembly.

Slot No.	I/O Module	SX8R		Offset of Shared Memory	
		Device Address	Contents	Input Assembly	Output Assembly
4	FC6A-J4A1	D0060	Analog Input Data (AI0)	6	—
		D0061	Analog Input Status (AI0)	8	—
		…	…	…	…
		D0066	Analog Input Data (AI3)	18	—
		D0067	Analog Input Status (AI3)	20	—
5	FC6A-K4A1	D0080	Analog Output Data (AQ0)	—	6
		D0081	Analog Output Status (AQ0)	22	—
		D0082	Analog Output Data (AQ1)	—	8
		D0083	Analog Output Status (AQ1)	24	—
		…	…	…	…
		D0086	Analog Output Data (AQ3)	—	12
		D0087	Analog Output Status (AQ3)	28	—
6	FC6A-L06A1	D0100	Analog Input Data (AI0)	30	—
		D0101	Analog Input Status (AI0)	32	—
		…	…	—	—
		D0106	Analog Input Data (AI3)	42	—
		D0107	Analog Input Status (AI3)	44	—
		D0108	Analog Output Data (AQ0)	—	14
		D0109	Analog Output Status (AQ0)	46	—
		D0110	Analog Output Data (AQ1)	—	16
		D0111	Analog Output Status (AQ1)	48	—

- EtherNet/IP communication shared memory can be viewed in the **EtherNet/IP Adaptor** tab of the SX8R Configurator.
- When the **Analog I/O Module Status** check box in the **Basic Settings** tab of the SX8R Configurator is cleared, analog status is not assigned to the Input Assembly. Input Assembly can be saved. For details, see Chapter 6 "(6) Analog I/O Module Status" on page 6-11.

CC-Link IE Field Basic (Slave Station)

The SX8R supports CC-Link IE Field Basic communication (slave station).

SX8R works as a slave station in CC-Link Field Basic communication and communication can be performed with CC-Link Field Basic devices such as programmable displays or PLCs.

Communication Specifications

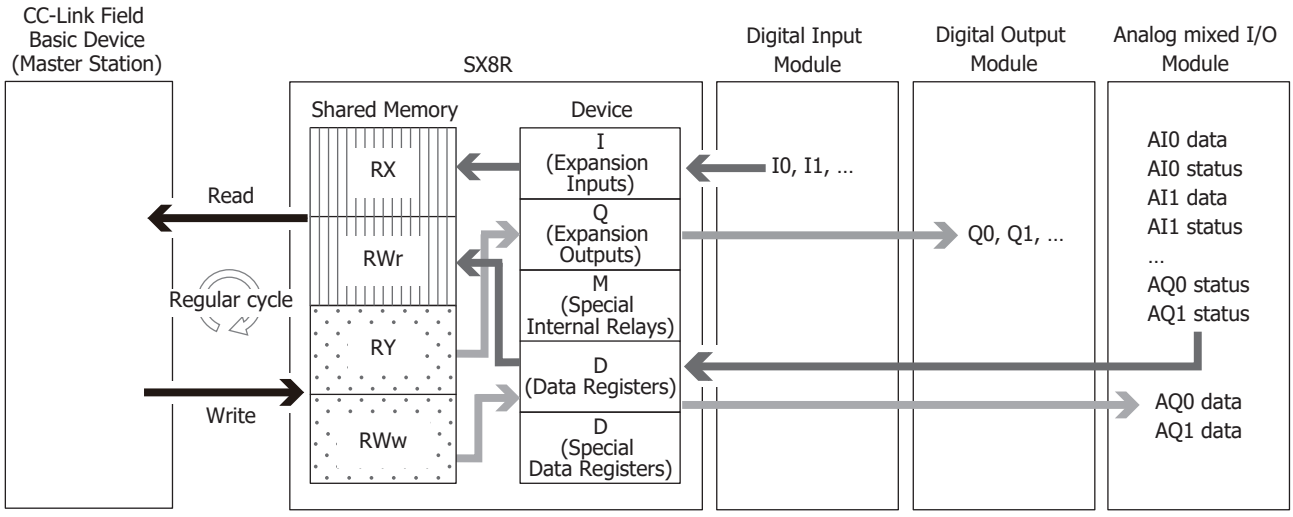
Item		Specifications			
Supported Protocols		CC-Link IE Field Basic (Slave station)			
Supported Ports		Ethernet port 1			
Action		Slave station			
Port Number		61450 (for cyclic transmission), 61451 (for device detection)			
Number of Connections		1 (number of occupied stations: maximum 4 stations)			
Send Wait Time		0 to 255ms (default 0ms)			
Maximum Size of Cyclic Data	**Occupied Stations**	**1 Station**	**2 Stations**	**3 Stations**	**4 Stations**
	RX	64 bits	128 bits	192 bits	256 bits
	RWr	32 words	64 words	96 words	128 words
	RY	64 bits	128 bits	192 bits	256 bits
	RWw	32 words	64 words	96 words	128 words

Depending on the I/O module connection configuration, the maximum size of cyclic data when 4 stations are occupied may be exceeded.
CC-Link IE Field Basic communication cannot be configured in such a connection configuration.

CC-Link IE Field Basic Communication Shared Memory

CC-Link IE Field Basic communication shared memory is a memory that can be accessed by CC-Link IE Field Basic master.

When **CC-Link IE Field Basic Slave** is selected in **Communication Mode** of **Connection** group on **Basic Settings** tab, the devices of the SX8R are read or written via CC-Link IE Field Basic Slave shared memory.



For the assignment of the shared memory, see "Memory Allocation for Cyclic Transmission" on page 5-38.

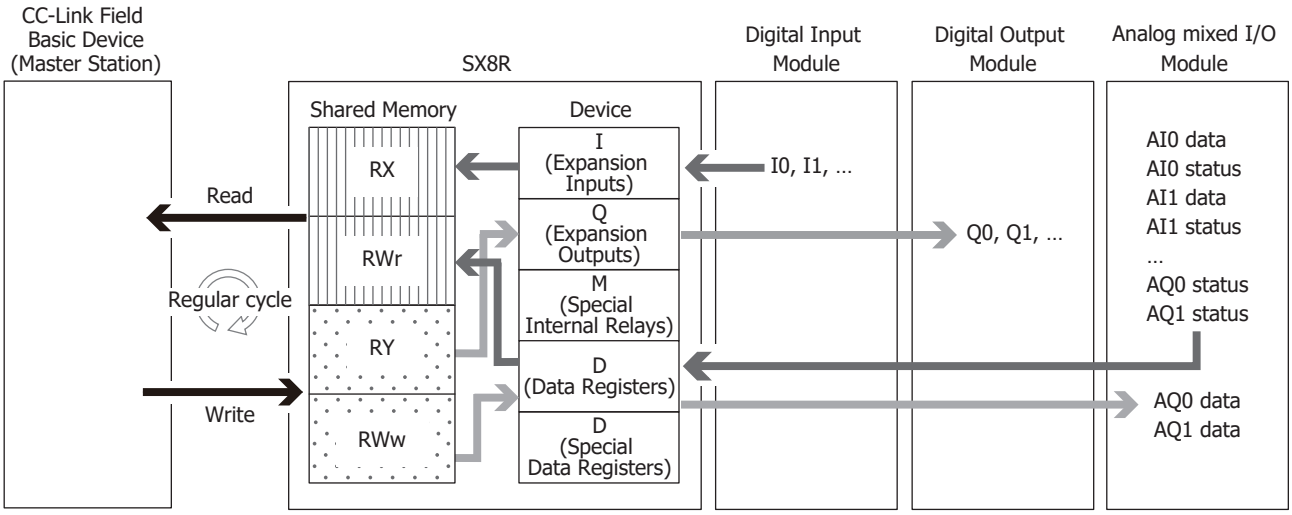
CC-Link IE Field Basic (Slave Station)

Cyclic Transmission

CC link IE field basic devices read and write data periodically. In order to read/write data, specify Rx/RWr/RY/RWw associated to the target data.

The SX8R writes device values to the CC-Link Field Basic communication shared memory before sending them to the master station. In addition, data received from the master station is written to the CC-Link Field Basic communication shared memory before being stored in the device. The CC-Link IE Field Basic Shared Memory is a memory inside the SX8R that stores data sent and received via cyclic communication.

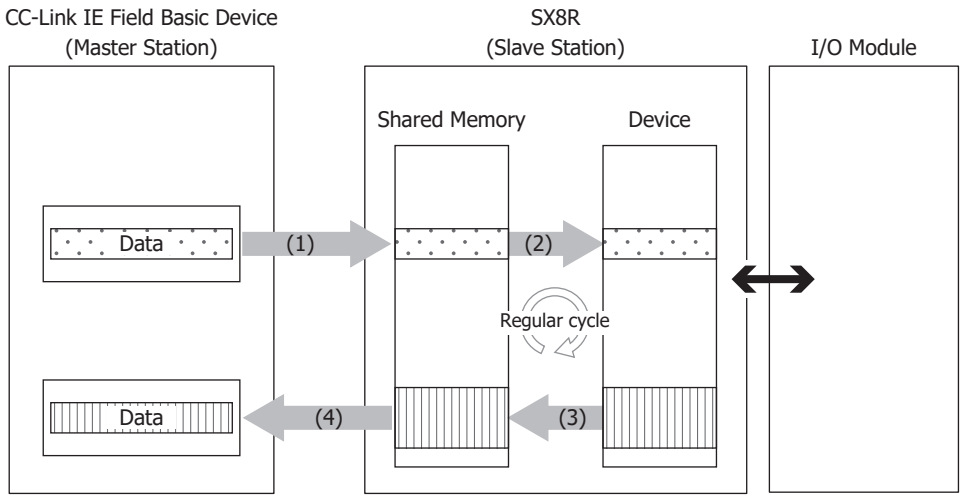
Conceptual Diagram of Cyclic Communication



Data and Device Binding Function

The SX8R allocates the set IN data[*1] and OUT data[*2] to the CC-Link IE Field Basic communication shared memory inside the SX8R.

The SX8R first writes the data received from the master via cyclic communication to the CC-Link IE Field Basic communication shared memory (1) and then stores it in devices (2). The values stored in devices are also first written to the CC-Link IE Field Basic communication shared memory (3) and then transmitted to the master (4). The processing to reflect data between the CC-Link IE Field Basic communication shared memory and devices is performed at a fixed cycle.



*1 IN data is received by the master station from the slave station in cyclic transmission.
*2 OUT data is transmitted to the slave station from the master station in cyclic transmission.

For how devices are allocated in the CC-Link IE Field Basic communication shared memory, see "Memory Allocation for Cyclic Transmission" on page 5-38.

Memory Allocation for Cyclic Transmission

CC-Link IE Field Basic communication shared memory is a memory that can be accessed by CC-Link IE Field Basic device (master station). The link devices (RX, RWr, RY, RWw) allocated to devices varies depending on the I/O module type and connection configuration. The CC-Link IE Field Basic device (master station) uses shared memory to read and write values from and to devices on I/O modules connected to the SX8R.

- The CC-Link IE Field Basic communication shared memory has link devices (RX/RY/RWr/RWw).

Link Device		Description
RX	Remote Input	Devices that input on/off information from the slave station to the master station in bit units.
RY	Remote Output	Devices that output on/off information from the master station to the slave station in bit units.
RWr	Remote Register	Devices that input numerical data from the slave station to the master station in one-word units.
RWw	Remote Register	Devices that output numerical data from the master station to the slave station in one-word units.

- When an I/O module is configured in the **Module Configuration** tab of the SX8R Configurator and "CC-Link IE Field Basic Slave" is configured under **Communication Mode** in the **Basic Settings** tab, CC-Link IE Field Basic communication shared memory is automatically assigned. CC-Link IE Field Basic communication shared memory can be found on the **CC-Link IE Field Basic Slave** tab.

Occupied Memory

The I/O module occupies the link devices as follows.

I/O Module	Points		Size of Shared Memory to be Occupied			
	Input	Output	RX	RY	RWr	RWw
Digital input module	8	—	8 bits	—	—	—
	16	—	16 bits	—	—	—
	32	—	32 bits	—	—	—
Digital output module	—	8	—	8 bits	—	—
	—	16	—	16 bits	—	—
	—	32	—	32 bits	—	—
Digital mixed I/O module	4	4	8 bits	8 bits	—	—
	16	8	16 bits	8 bits	—	—
Analog input module	2	—	—	—	4 words	—
	4	—	—	—	8 words	—
	8	—	—	—	16 words	—
Analog output module	—	2	—	—	2 words	2 words
	—	4	—	—	4 words	4 words
Analog mixed I/O module	2	1	—	—	5 words	1 words
	4	2	—	—	10 words	2 words

The link devices allocated to the analog I/O module parameters differs depending on its contents.

- Analog input data is assigned to RWr.
- Analog output data is assigned to RWw.
- Analog input status and analog output status are assigned to RWr. However, when the **Analog I/O Module Status** check box in the **Basic Settings** tab of the SX8R Configurator is cleared, analog status is not assigned to the RWr. RWr can be saved. For details, see Chapter 6 "(6) Analog I/O Module Status" on page 6-11.

Link Device

The master station can read and write the values of devices of the I/O modules connected to the SX8R via the link devices.

CC-Link IE Field Basic Communication Shared Memory		Expansion Inputs*3	Expansion Outputs*3	Data Registers*3
Link Device	Address Number			
RX	0h to FFh*1	I0 to I597	—	—
RY	0h to FFh*1	—	Q0 to Q597	—
RWr	0h to 7Fh*2	—	—	D0000 to D0299, D8020
RWw	0h to 7Fh*2	—	—	D0000 to D0299, D8021

*1 Address numbers are in bits.
*2 Address numbers are in words.
*3 Access data registers within the device range of the I/O modules connected to the SX8R.

Memory Allocation

Starting from address number 0, in order of slot number, each link device is occupied by the size of the memory occupied by the I/O module, and devices of SX8R are assigned to it. For the size of memory occupied by I/O modules, see "Occupied Memory" on page 5-38.

Shared Memory		SX8R			
Link Device	Address Number	Device Address	Description		R/W
RX	0h to FFh	I0 to I597	Expansion Inputs	Reads the values of expansion inputs.	R
RY	0h to FFh	Q0 to Q597	Expansion Outputs	Writes values to expansion outputs.	W
RWr	0h	D8020	System Software Status	Reads the connection and error status of SX8R and I/O modules.	R
	1h to 7Fh	D0000 to D0299	Data Registers	Reads I/O module parameters into data registers.	R
RWw	0h	D8021	Host Device Control Register	Controls the outputs of the I/O modules.	W
	1h to 7Fh	D0000 to D0299	Data Registers	Stores values in data registers and writes parameters to I/O modules.	W

Memory Allocation Example

As shown in the table below, the device assignment when seven I/O modules are connected to the SX8R is as follows.

Slot No.	I/O Module		Digital Points		Analog Points		SX8R		
	Type No.	Module Type	Inputs	Outputs	Inputs	Outputs	Expansion Inputs*1	Expansion Outputs*1	Data Registers
1	FC6A-N16B1	Digital input module	16	—	—	—	I0 to I17	—	—
2	FC6A-T16P1	Digital output module	—	16	—	—	—	Q0 to Q17	—
3	FC6A-M08BR1	Digital mixed I/O module	4	4	—	—	I20 to I23*2	Q20 to Q23*3	—
4	FC6A-J4A1	Analog input module	—	—	4	—	—	—	D0060 to D0067*4
5	FC6A-K4A1	Analog output module	—	—	—	4	—	—	D0080 to D0087*4
6	FC6A-L06A1	Analog mixed I/O module	—	—	4	2	—	—	D0100 to D0111*4
7	FC6A-M08BR1	Digital mixed I/O module	4	4	—	—	I30 to I33*2	Q30 to Q33*3	—

*1 Expansion inputs and expansion outputs are assigned in 1-byte increments in order of slot number from the beginning of each device.
*2 FC6A-M08BR1 occupies 8 bits of expansion inputs and uses 4 bits of its expansion inputs. I20 to I27 and I30 to I37 are occupied, and I20 to I23 and I30 to I33 are assigned to expansion inputs. I24 to I27 and I34 to I37 are reserved.
*3 FC6A-M08BR1 occupies 8 bits of expansion outputs and uses 4 bits of its expansion outputs. Q20 to Q27 and Q30 to Q37 are occupied, and Q20 to Q23 and Q30 to Q33 are assigned to expansion outputs. Q24 to Q27 and Q34 to Q37 are reserved.
*4 Data registers occupy 20 words from address ((slot number - 1) x 20) th, and ((total number of I/O points) x 2) words are used.

- For details on device allocation, see Chapter 2 "Size of Device to Occupy" on page 2-9.
- The devices assigned to each I/O module can be viewed in the **Module Configuration** tab of the SX8R Configurator by clicking on the I/O module.

The devices of SX8R are assigned to the CC-Link IE Field Basic communication shared memory as follows.

Slot No.	SX8R				Link Device Address Number			
	Expansion Inputs	Expansion Outputs	Data Registers	Special Data Registers	RX	RY	RWr	RWw
—	—	—	—	D8020	—	—	0h	—
				D8021	—	—	—	0h
1	I0 to I17	—	—	—	0h to Fh	—	—	—
2	—	Q0 to Q17	—	—	—	0h to Fh	—	—
3	I20 to I23	Q20 to Q23	—	—	10h to 13h*1	10h to 13h*2	—	—
4	—	—	D0060 to D0067	—	—	—	See "Data Register Memory Allocation" on page 5-42.	
5	—	—	D0080 to D0087	—	—	—		
6	—	—	D0100 to D0111	—	—	—		
7	I30 to I33	Q30 to Q33	—	—	18h to 1Bh*1	18h to 1Bh*2	—	—

*1 FC6A-M08BR1 occupies 8 bits of RX. Link device addresses number 14h to 17h and 1Ch to 1Fh of RX are reserved. When the reserved RX is read, its value is 0.

*2 FC6A-M08BR1 occupies 8 bits of RY. Link device addresses number 14h to 17h and 1Ch to 1Fh of RY are reserved. Do not write to data in the reserved area. Otherwise the FC6A-M08BR1 may not operate correctly.

This connection configuration allows occupying a slave station (one station) and transmitting/receiving within its maximum size of cyclic data. Unused shared memory is reserved. The reserved area for each link device is as follows.

Item	RX	RY	RWr	RWw
Maximum size of cyclic data when one station is occupied	64 bits	64 bits	32 words	32 words
Reserved address numbers of shared memory	20h to 3Fh	20h to 3Fh	17h to 1Fh	7h to 1Fh

For the number of occupied stations and the maximum size of cyclic data, see "Communication Specifications" on page 5-36.

Data Register Memory Allocation

The Link devices allocated to data registera differs depending on its contents.

- Analog input data is assigned to RWr.
- Analog output data is assigned to RWw.
- Analog input status and analog output status are assigned to RWr.

Slot No.	I/O Module	SX8R		Link Device Address Number	
		Device Address	Contents	RWr	RWw
4	FC6A-J4A1	D0060	Analog Input Data (AI0)	1h	—
		D0061	Analog Input Status (AI0)	2h	—
		…	…	…	…
		D0066	Analog Input Data (AI3)	7h	—
		D0067	Analog Input Status (AI3)	8h	—
5	FC6A-K4A1	D0080	Analog Output Data (AQ0)	—	1h
		D0081	Analog Output Status (AQ0)	9h	—
		D0082	Analog Output Data (AQ1)	—	2h
		D0083	Analog Output Status (AQ1)	Ah	—
		…	…	…	…
		D0086	Analog Output Data (AQ3)	—	4h
		D0087	Analog Output Status (AQ3)	Ch	—
6	FC6A-L06A1	D0100	Analog Input Data (AI0)	Dh	—
		D0101	Analog Input Status (AI0)	Eh	—
		…	…	—	—
		D0106	Analog Input Data (AI3)	13h	—
		D0107	Analog Input Status (AI3)	14h	—
		D0108	Analog Output Data (AQ0)	—	5h
		D0109	Analog Output Status (AQ0)	15h	—
		D0110	Analog Output Data (AQ1)	—	6h
		D0111	Analog Output Status (AQ1)	16h	—

- CC-Link IE Field Basic communication shared memory can be viewed in the **CC-Link IE Field Basic Slave** tab of the SX8R Configurator.
- When the **Analog I/O Module Status** check box in the **Basic Settings** tab of the SX8R Configurator is cleared, analog status is not assigned to the RWr. RWr can be saved. For details, see Chapter 6 "(6) Analog I/O Module Status" on page 6-11.

Maintenance Communication (Server)

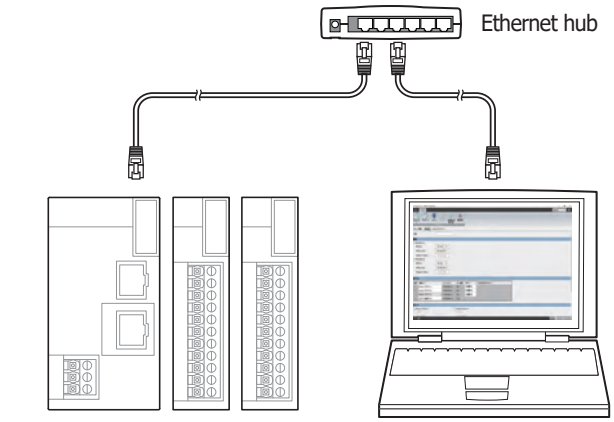
Maintenance communication server is the communication mode for communicating with the SX8R Configurator.

Maintenance communication is available on Ethernet ports 1 and 2.

The following functions can be executed using the SX8R Configurator.

- Download and upload user data
- Monitor status of SX8R and I/O modules
- Search SX8Rs
- Update for SX8R and I/O Modules system software
- Initialize of SX8R

System Configuration Image



Communication Specifications

Item	Specifications
Supported Protocol	Maintenance communication server
Supported Port	Ethernet port 1, Ethernet port 2
Port No.	2101 and 2102
Allow access by IP address	None
Function	• Download and upload user data • Monitor status of SX8R and I/O modules • Search SX8Rs • Update for SX8R and I/O Modules system software • Initialize of SX8R

Functions

■ **Download and upload user data**
You can download the user data created by SX8R Configurator to the SX8R and upload the user data from the SX8R. The user data in the SX8R can be protected with download and upload passwords.

- Downloading a User Data (Chapter 6 "Download User Data" on page 6-16)
- Uploading a User Data (Chapter 6 "Upload User Data" on page 6-18)

■ **Monitor status of SX8R and I/O modules**
The status of SX8R type and I/O modules can be monitored.

■ **Search SX8Rs**
SX8Rs within the same network can be searched.

■ **Update for SX8R and I/O modules system software**
You can update the system software on SX8R and I/O modules. Always using the SX8R and I/O modules with the latest system software is recommended. For details, see Chapter 6 "Download System Software" on page 6-31.

■ **Initialize of SX8R**
You can restore the current settings of the SX8R to the factory defaults by selecting **Factory Reset** in the **Online** tab of the SX8R Configurator. For details, see Chapter 6 "Initialize the SX8R" on page 6-26.

6: SX8R CONFIGURATOR

This chapter describes the SX8R Configurator.

Overview of the SX8R Configurator

The SX8R Configurator is software used to configure settings for SX8R series bus coupler module and to check its operation.

Operating Environment

The operating environment of the SX8R Configurator is as follows.

Item	Description
OS	Windows 11, Windows 10
CPU	1.0 GHz or faster
Memory	2 GB or more
Environment	Microsoft .NET 6.0 or higher

Installing the Software

1. Download the SX8R Configurator installer from the download site on the IDEC homepage.
2. Double-click the downloaded installer. The installer window is displayed. Install the software by following the on-screen instructions.

This concludes installing the SX8R Configurator.

Uninstalling the Software

1. Right the **Start** button and click **Apps and Features**.
   Apps & features is displayed.
2. Select "SX8R Configurator" and click the **Uninstall** button.
   The setup program is started.
3. Click the **Yes** button on the uninstall confirmation message.
   The selected application is deleted.
   This concludes uninstalling the SX8R Configurator.

Starting and Exiting the Software

Starting the SX8R Configurator

Click the **Start** button, **IDEC SX8R**, and then click **SX8R Configurator**.

This starts the SX8R Configurator.

You can also start the SX8R Configurator by double-clicking its icon on the desktop.

Exiting the SX8R Configurator

Click the X button on the top right corner of the **SX8R Configurator.**

This exits the SX8R Configurator.

Checking the SX8R Configurator Version Number

1. Click the button on the top right corner of the **SX8R Configurator.**
2. Click on "About SX8R Configurator".
   The version number of SX8R Configurator is displayed.

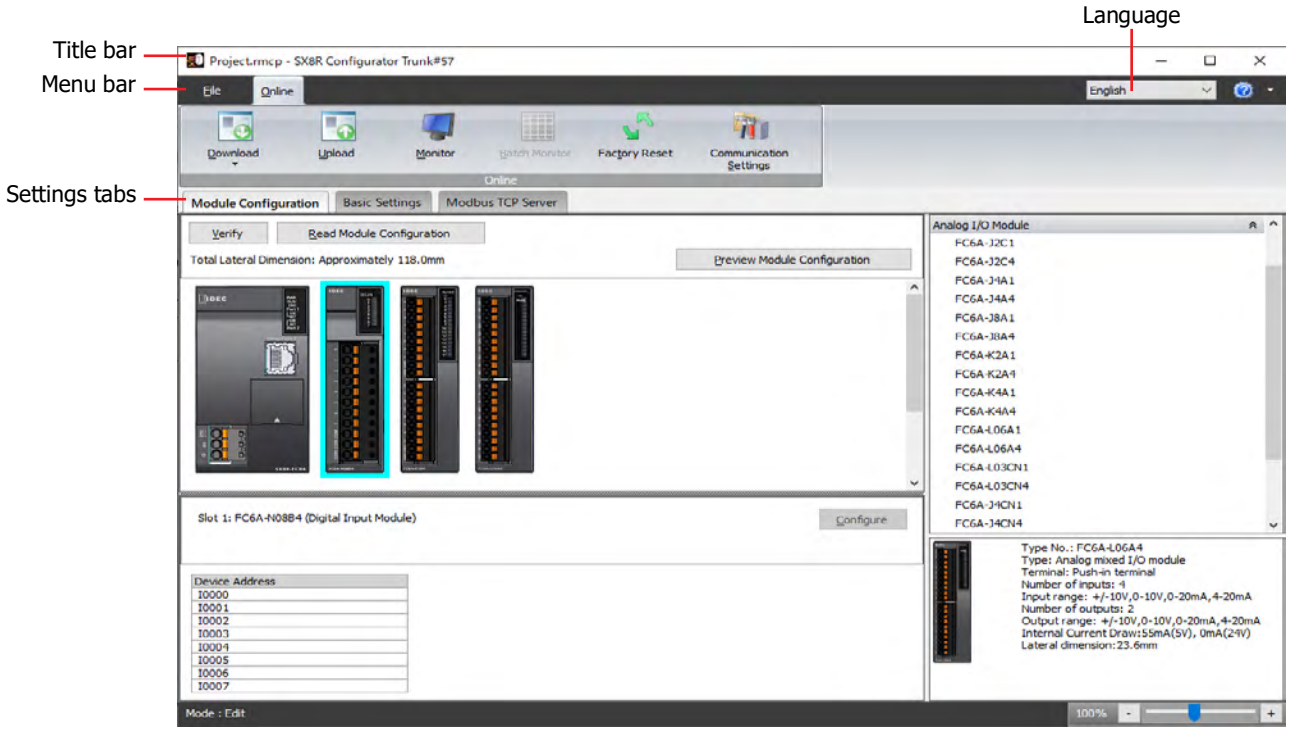
Opening the Manual

Click the button on the top right corner of the **SX8R Configurator.**
The SX8R series Bus Coupler Module User's Manual (PDF) is displayed.

Configuration and Functions

Configuration of the SX8R Configurator

This chapter describes the names and functions of the elements that make up the SX8R Configurator.



■ **Title bar**
Displays the name of the project being edited and the name of the software "SX8R Configurator".

■ **Language**
Select the display language of the software from the following.
"Japanese", "English", or "Chinese"

■ **Menu bar**
Displays commands to create a project and transfer the user data to the SX8R. For details, see "Menu Bar" on page 6-4.

■ **Settings tabs**
Configures the connection configuration and various settings of I/O modules connected to the SX8R, and the project of the SX8R. For details, see "Settings Tabs" on page 6-5.

Menu Bar

The commands that can be executed from the menu bar are as follows.

File

Command	Description
New	Creates a new project.
Open	Opens a created project.
Save	Saves the project being edited.
Save As	Saves the project being edited with a new name.
Export	Outputs the user data being edited in Word format.
Property	Configures the properties of the project.

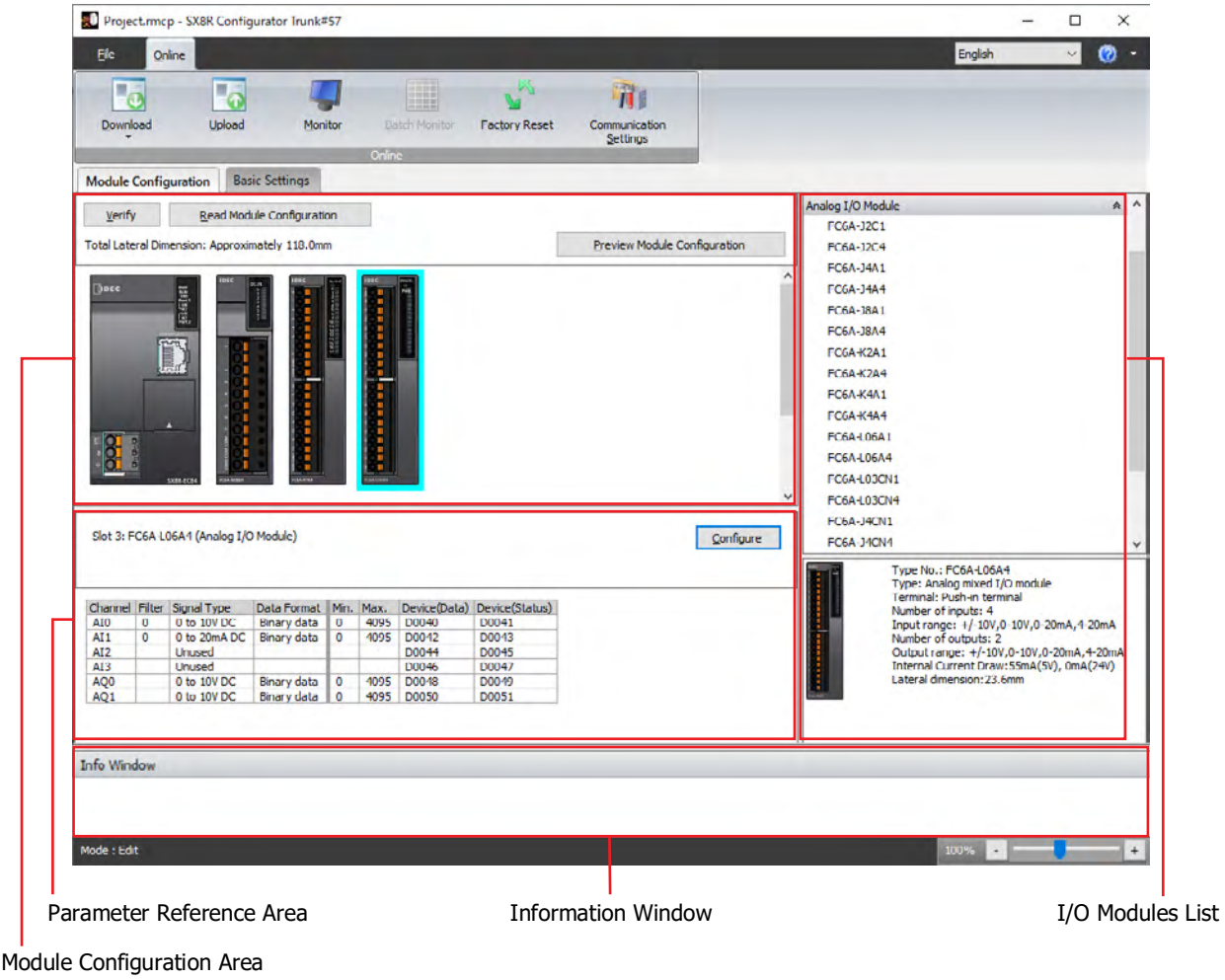
Online

Command	Description
Download	Downloads the user data to the SX8R.
System Software Download	Updates the system software of SX8R and I/O modules.
Upload	Uploads the user data from the SX8R.
Monitor	Starts/Stops monitoring of SX8R.
Batch Monitor	Monitors all devices of SX8R at once.
Factory Reset	Resets a SX8R to the factory settings.
Communication Settings	Configures the details of communication.

Settings Tabs

Module Configuration Tab

This tab is used to configure the I/O modules to be connected to the SX8R.



■ **Module Configuration Editor Structure**

The Module Configuration Editor is composed of the following three areas.

Module Configuration Area : Displays the configuration of connected I/O modules.

Read Module Configuration button: The **Read Module Configuration** dialog box is displayed.

Preview Module Configuration button: Previews the image of the SX8R and I/O modules configured in the module configuration area. Click this button to display the **Preview Module Configuration** dialog box.

I/O Modules List : Displays a list of I/O modules that can be connected to the SX8R.

Parameter Reference Area : Displays the parameters set for the object selected in the Module Configuration Area.

Configure button: Configured each parameter of the I/O module. Click this button to display the configuration dialog box for the I/O module selected in the module configuration area.

Information Window : When the system software version for the SX8R to which the user data is being downloaded is old, an error is displayed.

- For details on Read Module Configuration and the **Read Module Configuration** dialog box, see "Reading the Module Configuration" on page 6-34.
- Click the **Copy to clipboard** button in the **Preview Module Configuration** dialog box to copy the previewed image to the clipboard.

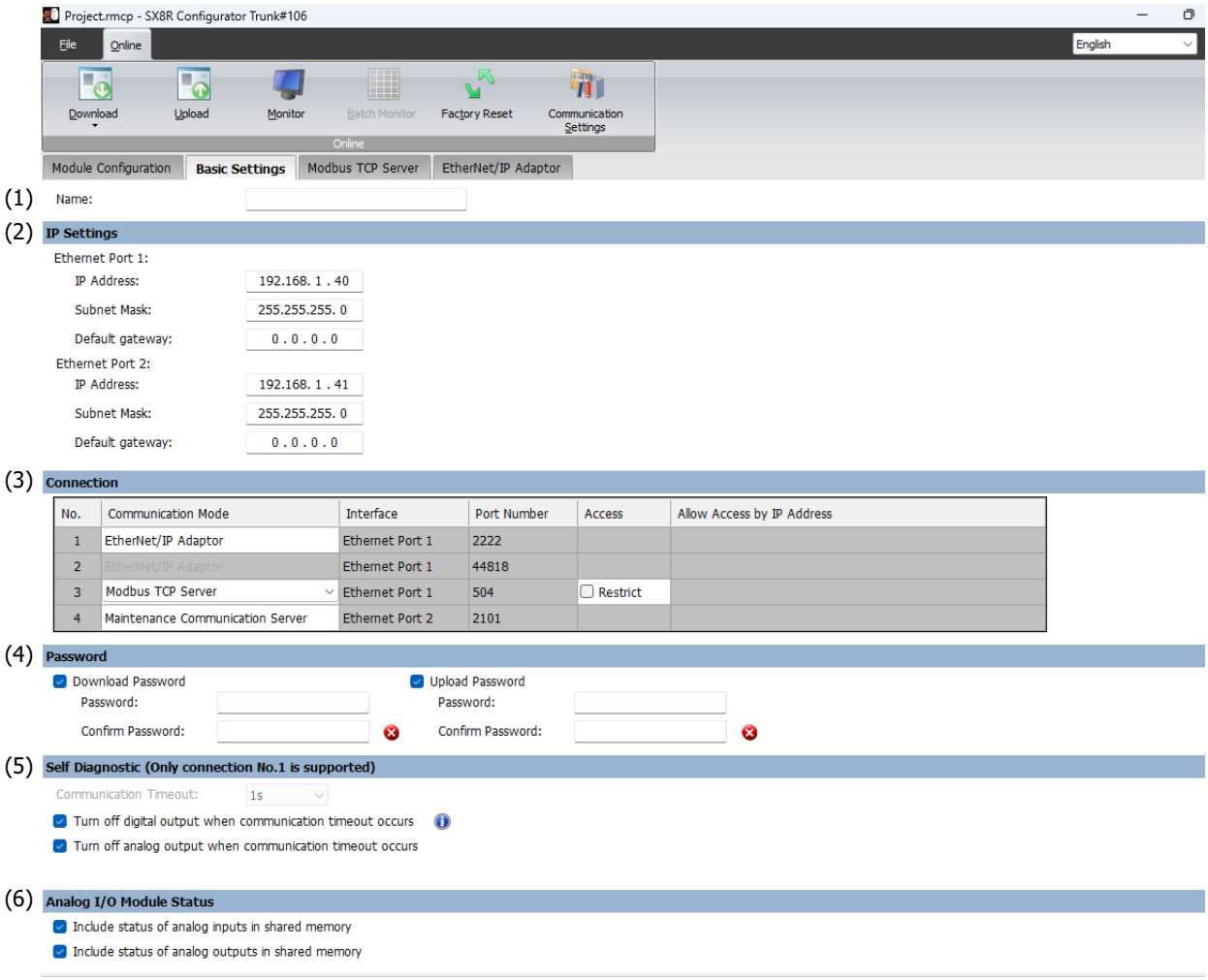
■ **Module Configuration Editor Functions**

The Module Configuration Editor functions are as follows. For the operating procedures of the functions, see "Module Configuration Editor" on page 6-28.

Function	Details
Insert I/O modules	I/O modules can be inserted into the module configuration area.
Delete I/O modules	Inserted I/O modules can be deleted. When an I/O module is deleted, all of the modules placed on the right side of the deleted module are shifted to the left.
Swap I/O modules	Inserted I/O modules can be moved to a different position.
Read module configuration	Information about the I/O modules connected to the SX8R is stored in special data registers. The configuration of I/O modules connected to the SX8R is automatically displayed by acquiring this information.

Basic Settings Tab

This tab is used to configure a project for the SX8R.



(1) Name

Enter the name of the SX8R. The maximum length of the SX8R name is 16 characters. Only alphanumeric characters and the symbols can be used.

(2) IP Settings

Set information for connecting the SX8R to a network.

Item	Description
IP Address	Specifies the IP address of the SX8R. (The default values are follows. Ethernet port 1: "192.168.1.40", Ethernet port 2: "192.168.1.41") The input format is "xxx.xxx.xxx.xxx". "xxx" stands for a numeric value from 0 to 255. Ensure that IP addresses are unique when connecting multiple devices to the same network.
Subnet Mask	The input format is "xxx.xxx.xxx.xxx". "xxx" stands for a numeric value from 0 to 255. Set the same value on all devices.
Default Gateway	The input format is "xxx.xxx.xxx.xxx". "xxx" stands for a numeric value from 0 to 255. Set this value to use a router. Leave this value blank if not required.

(3) Connection Settings

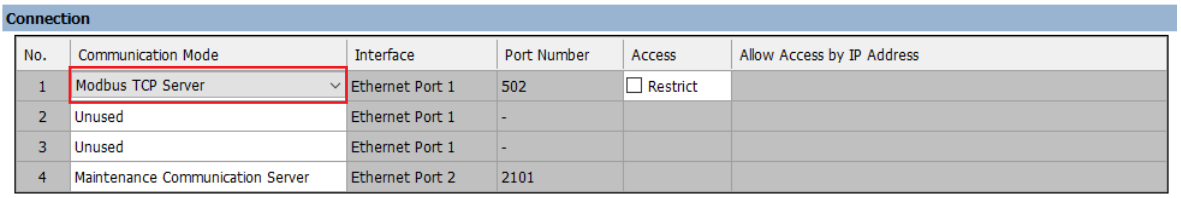
Set the connections to use for the SX8R. The communication mode that can be selected depends on the connection number.

Connection No.	Communication Mode
1	ModbusTCP Server, EtherNet/IP Adapter, CC-Link IE Field Basic Slave, Unused
2	ModbusTCP Server, Unused
3	ModbusTCP Server, Maintenance Communication Server, Unused
4	Maintenance Communication Server, Unused

- In order for the SX8R to communicate with the SX8R Configurator, set "Maintenance Communication Server" as the communication mode for connection number 3 or 4.
- When you set "Modbus TCP Server" as the communication mode for connection number 2 or 3, set the Communication Mode for connection number 1 to something other than "Unused".

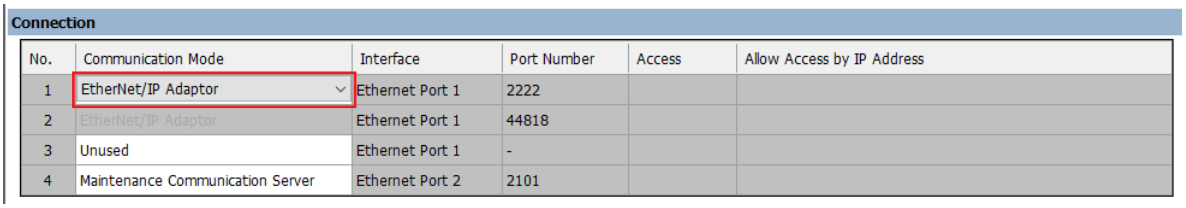
The following explains the communication modes that can be selected for connection numbers 2 to 4 when connection number 1 is set to "Modbus TCP Server", "EtherNet/IP Adapter" or "CC-Link IE Field Basic Slave"

"Modbus TCP Server" is selected



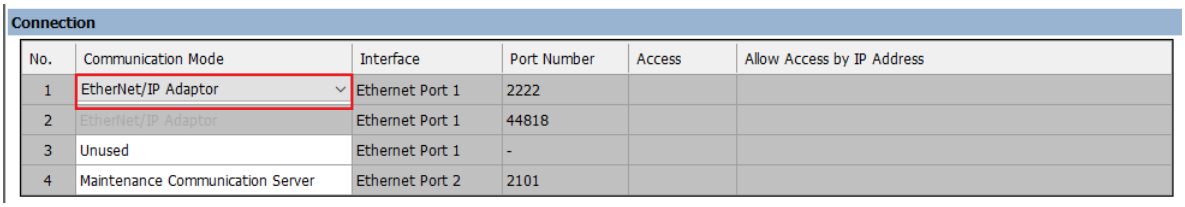
No.	Communication Mode	Interface	Port No.	Description
1	Modbus TCP Server	Ethernet Port 1	502	This is the communication mode that communicates with the host device controlling the system. To restrict access to the SX8R, select the **Restrict** check box, and then enter the IP address from which access is allowed in the **Allow Access by IP Address** field.
2	Modbus TCP Server	Ethernet Port 1	503	This is used to monitor the status of the SX8R on another host device. To restrict access to the SX8R, select the **Restrict** check box, and then enter the IP address from which access is allowed in the **Allow Access by IP Address** field.
	Unused		—	Do not use this port.
3	Modbus TCP Server	Ethernet Port 1	504	This is used to monitor the status of the SX8R on another host device. To restrict access to the SX8R, select the **Restrict** check box, and then enter the IP address from which access is allowed in the **Allow Access by IP Address** field.
	Maintenance Communication Server		2102	Use this port to communicate with the SX8R Configurator.
	Unused		—	Do not use this port.
4	Maintenance Communication Server	Ethernet Port 2	2101	Use this port to communicate with the SX8R Configurator.
	Unused		—	Do not use this port.

"EtherNet/IP Adapter" is selected



No.	Communication Mode	Interface	Port No.	Description
1	EtherNet/IP Adapter	Ethernet Port 1	2222	The role of communication varies based on the **Port No.**. 2222: This is a cyclic (Class1) communication that reads input values and parameters of I/O modules connected to SX8R and writes parameters to I/O modules. 44818: This is a response/request (Class3) communication in which the service requested from the host device (originator) is executed by the target (adapter) device.
2	—	Ethernet Port 1	44818	
3	ModbusTCP Server	Ethernet Port 1	504	This is used to monitor the status of the SX8R on another host device. To restrict access to the SX8R, select the **Restrict** check box, and then enter the IP address from which access is allowed in the **Allow Access by IP Address** field.
	Maintenance Communication Server		2102	Use this port to communicate with the SX8R Configurator.
	Unused		—	Do not use this port.
4	Maintenance Communication Server	Ethernet Port 2	2101	Use this port to communicate with the SX8R Configurator.
	Unused		—	Do not use this port.

"CC-Link IE Field Basic Slave" is selected



No.	Communication Mode	Send Wait Time [ms]	Interface	Port No.	Description
1	CC-Link IE Field Basic Slave	0 to 255	Ethernet Port 1	61450	Set the Send wait time (0 to 255 ms). The role of communication varies based on the **Port No.**. 61450: This is a cyclic (Class1) communication that reads input values and parameters of I/O modules connected to SX8R and writes parameters to I/O modules.
2	—	—	Ethernet Port 1	61451	61451: This is a communication that automatically detects peripherals connected via TCP/IP communication (NodeSearch).
3	ModbusTCP Server	—	Ethernet Port 1	504	This is used to monitor the status of the SX8R on another host device. To restrict access to the SX8R, select the **Restrict** check box, and then enter the IP address from which access is allowed in the **Allow Access by IP Address** field.
	Maintenance Communication Server			2102	Use this port to communicate with the SX8R Configurator.
	Unused			—	Do not use this port.
4	Maintenance Communication Server	—	Ethernet Port 2	2101	Use this port to communicate with the SX8R Configurator.
	Unused			—	Do not use this port.

(4) Password

Download Password: Select this check box to password protect downloading the user data to the SX8R.

- Password: Enter the password. The entered characters are masked with * (asterisks).
  The length of the password is 8 to 16 characters. Only single-byte alphanumeric characters and symbols can be used.
- Confirm Password: Enter the same password that you entered in **Password**.

Upload Password: Select this check box to password protect uploading the user data from the SX8R.

- Password: Enter the password. The entered characters are masked with * (asterisks).
  The length of the password is 8 to 16 characters. Only single-byte alphanumeric characters and symbols can be used.
- Confirm Password: Enter the same password that you entered in **Password**.

- Manage the passwords appropriately so that third parties do not know them.
- The function **Factory Reset** of the SX8R Configurator can be used to reset SX8R to the factory settings.

(5) Self Diagnostic (Only connection No.1 is supported)

Communication Timeout[*1]:

When the SX8R cannot receive a request from the host device (connection number 1) for more than the set time, a communication timeout occurs.

Sets the timeout "None" or a value between "100ms" and "10s". 100ms to 1s is set in 100ms increments, and 1s to 10s is set in 1s increments. The default value is 1s. This can only be set when "Modbus TCP Server" is selected for connection number 1.

Turn off digital output when communication timeout occurs:

Select this check box to turn off digital outputs of I/O modules when a communication timeout occurs.

When this check box is cleared, the state immediately before the communication timeout occurs is held.

Turn off analog output when communication timeout occurs:

Select this check box to turn off analog outputs of I/O modules when a communication timeout occurs.[*2]

When this check box is cleared, the value immediately before the communication timeout occurs is held.

*1 When "None" is selected, the following settings are disabled.
Turn off digital output when communication timeout occurs
Turn off analog output when communication timeout occurs

*2 The SX8R writes 0 to the data register that stores analog output data, and the I/O module outputs an analog value equivalent to 0.

(6) Analog I/O Module Status

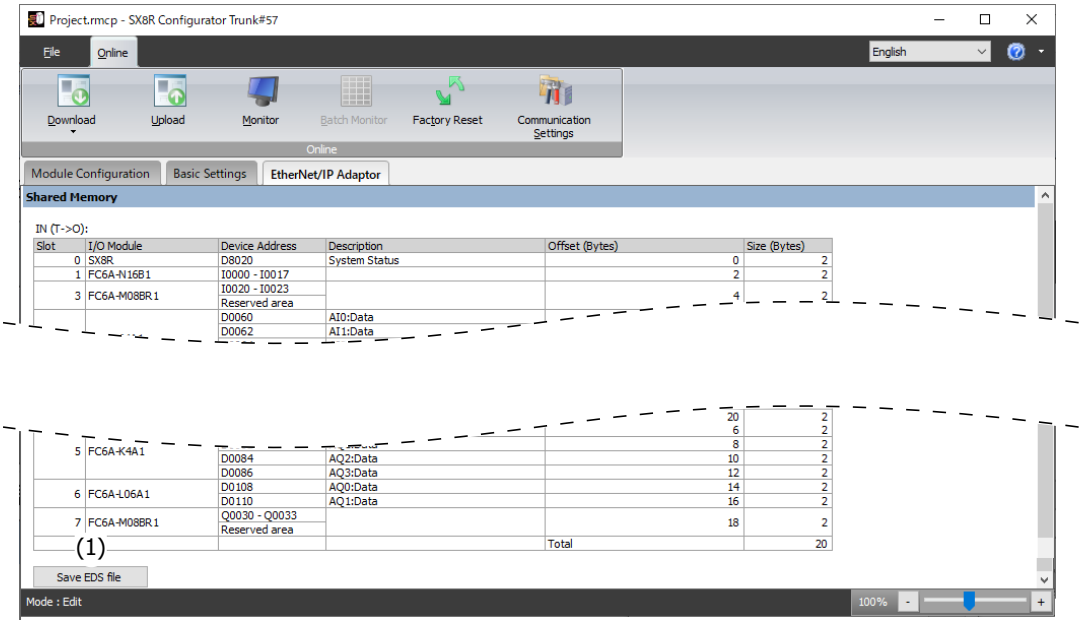
Include status of analog inputs in shared memory: Select this check box to assign the analog input status of the analog I/O module to the shared memory. The check box is selected by default.

Include status of analog outputs in shared memory: Select this check box to assign the analog output status of the analog I/O module to the shared memory. The check box is selected by default.

Shared Memory Tab

Shared memory is displayed according to the I/O module connection configuration set in the **Module Configuration** tab and the communication protocol selected for the **Communication Mode** in the **Basic Settings** tab.

The shared memory tab is displayed when "Modbus TCP Server", "EtherNet/IP Adapter" or "CC-Link IE Field Basic Slave" is selected as the **Communication Mode** in the **Basic Settings** tab.



(1) Save EDS file

Click this button to display the **Save EDS file** dialog box. Click the **Save** button to save the EDS file being edited.

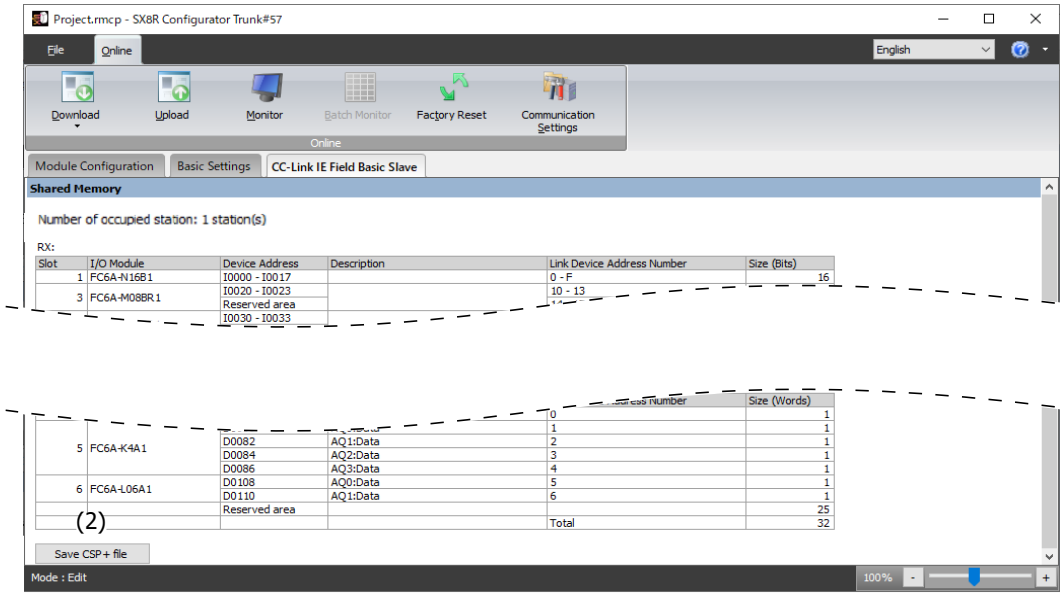
Save at maximum size independent of the I/O module configuration:

Select this option when multiple SX8R units are connected to the host device, or if you may change the I/O module configuration in the future.

Save the size according to the I/O module configuration:

In all other cases, select this option. When you select "Save the size according to the I/O module configuration", you can set the revision to the EDS file.

This button is only displayed when "EtherNet/IP Adapter" is selected as the **Communication Mode** in the **Basic Settings** tab.



(2)

(2) Save CSP+ file

Saves the CSP+ file of the project being edited.

This button is only displayed when "CC-Link IE Field Basic Slave" is selected as the **Communication Mode** in the **Basic Settings** tab.

Projects

A project is data that combines module configuration, basic settings, and shared memory map set up in the SX8R Configurator.

Creating New Project

Creates a new project.

1. From the **File menu**, click **New Project**.

A confirmation message is displayed if the project being edited is not saved.
- Click **Yes** to save the project, and then create a new project.
- Click **No** to discard the changes to the project and create a new project without saving the project.
- Click **Cancel** to return to the SX8R Configurator without saving the project.

Open Project

Opens a created project.

1. From the **File** menu, click **Open Project**.
   The **Open** dialog box is displayed.
2. Select the project file (*.rmcp) and click **Open**.

- A confirmation message is displayed if the project being edited is not saved.
  - Click **Yes** to save the project, and then display the **Open** dialog box.
  - Click **No** to discard the changes to the project and display the **Open** dialog box without saving the project.
  - Click **Cancel** to return to the SX8R Configurator without saving the project.
- If a project password is set, the **Enter Password** dialog box is displayed. Enter the password and click the **OK** button.
- A project created with a new version of the SX8R Configurator cannot be opened with an old version of the software.

Saving Project

Saves the project being edited.

1. From the **File** menu, click **Save Project**.

When new project is created and you have never save it, the **Save As** dialog box is displayed.

Saving Project as

Saves the project being edited with a new name.

1. From the **File** menu, click **Save Project As**.
   The **Save As** dialog box is displayed.
2. Enter the file name (*.rmcp) and click **Save**.

Export User Data

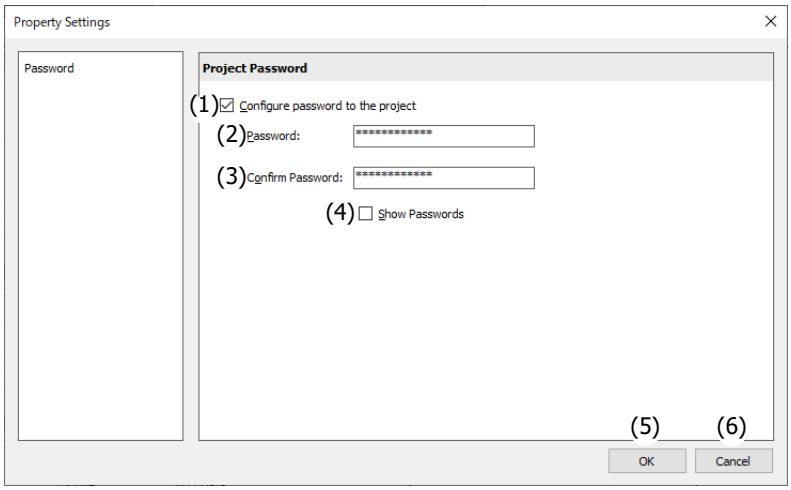
Outputs the user data being edited in Word format.

1. From the **File** menu, click **Export**.
   The **Save As** dialog box is displayed.
2. Enter the file name (*.docx) and click **Save**.

Changing Project Properties

Configures the project password.

1. From the **File** menu, click **Property**.
   The **Property Settings** dialog box is displayed.



(1) Configure password to the project

Select this check box to password protect access to the project file.

The **Enter Password** dialog box is displayed when you select a password-protected project in the **Open** from the File menu.

(2) Password

Enter the password. The entered characters are masked with * (asterisks).

The length of the password is 8 to 16 characters. Only single-byte alphanumeric characters and symbols can be used.

The password can be set only when the **Configure password to the project** check box is selected.

Manage the password appropriately so that third parties do not know it. If you forget the password to a project, you can no longer open that project file.

(3) Confirm Password

Enter the same password that you entered in **Password**.

The password can be set only when the **Configure password to the project** check box is selected.

(4) Show Passwords

Select this check box to show the password entered in (2).

(5) OK

Saves the settings and returns to the SX8R Configurator.

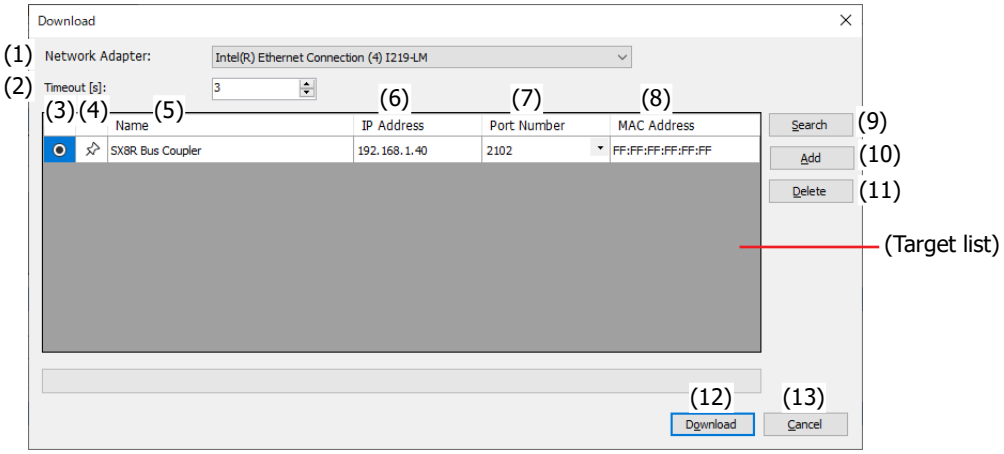
(6) Cancel

Closes the **Properties Settings** dialog box and returns to the SX8R Configurator.

Online

Download User Data

1. From the **Online** menu, under **Download**, click **Download** button.
   The **Download** dialog box is displayed.



(1) Network Adapter

Select the network adapter in the computer that is used. Only enabled network adapters are displayed. Disabled network adapters, such as those not connected with an Ethernet cable, are not displayed.

(2) Timeout [s]

Set the timeout used in maintenance communication (3 to 10 sec).

(3) ◉ button

Select the SX8R to which you want to download the user data.

(4) 📌 / 📌 button

If you want to fix the target SX8R to the target list, press this button to set it to this state 📌. The SX8R in this state 📌 is always displayed regardless of the search results for the SX8R.

(5) Name

Specify the name of the SX8R to which you want to download the user data.

(6) IP Address

Specify the IP address of the SX8R to which you want to download the user data.

(7) Port Number

Specify the port number of the SX8R to which you want to download the user data from "2101" or "2102".

(8) MAC Address

Displays the MAC address of the SX8R to which you want to download the user data.

(9) Search button

Searches for SX8R on the same network that can be connected to the computer over maintenance communication.

Information on SX8Rs that were found is added to the target list. A maximum of 250 devices can be added.

(10) Add button

Adds a SX8R to the target list.

A new row is added to the target list. Set the name, IP address, and port number. A maximum of 250 devices can be added.

(11) Delete button

Deletes the selected SX8R from the target list.

Click on the **Name**, **IP Address**, or **Port Number** cell to select the SX8R.

(12) Download button

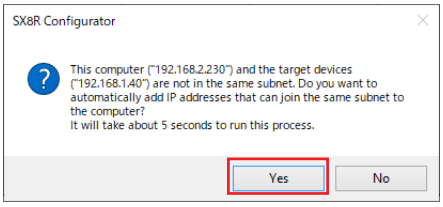
Executes the download of the user data.

(13) Cancel button

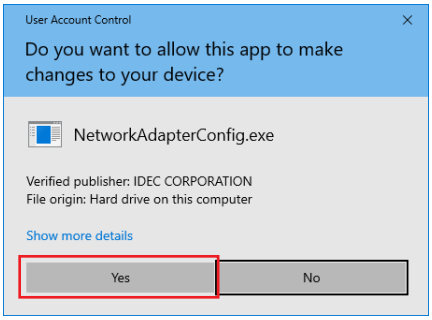
Returns to the SX8R Configurator without downloading the user data.

2. Change each setting as necessary and then click **Download** button.
   Downloads the user data.

- If a download password was set for the user data, the **Enter Password** dialog box is displayed. Enter the password and click the **OK** button. If the passwords match, download the user data. For the download password, see "(4) Password" on page 6-10.
- If the IP address of the SX8R connected by the Ethernet cable is not in the same subnet as the computer running SX8R Configurator, you must set an IP address in the same subnet for the computer. The SX8R Configurator has a function to add an IP address in the same subnet as the SX8R to the computer.
  Click **Yes** in the following confirmation message for adding an IP address. The confirmation message for changes to the device is displayed.



Click **Yes** in the following device change confirmation message. The IP address is added to your computer, and an informational message for the added IP address is displayed.

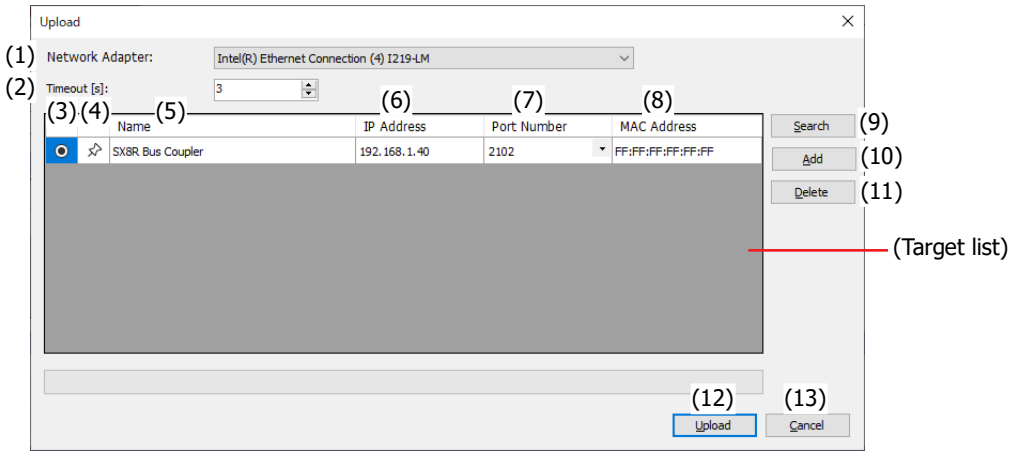


Click the **Yes** on the informational message to download the user data.

Upload User Data

Uploads a user data from the SX8R to a computer.

1. From the **Online** menu, click **Upload** button.
   The **Upload** dialog box is displayed.



(1) Network Adapter

Select the network adapter in the computer that is used. Only enabled network adapters are displayed. Disabled network adapters, such as those not connected with an Ethernet cable, are not displayed.

(2) Timeout [s]

Set the timeout used in maintenance communication (3 to 10 sec).

(3) ◉ button

Select the SX8R from which you want to upload user data.

(4) 📌 / 📌 button

If you want to fix the target SX8R to the target list, press this button to set it to this state 📌. The SX8R in this state 📌 is always displayed regardless of the search results for the SX8R.

(5) Name

Specify the name of the SX8R from which you want to upload user data.

(6) IP Address

Specify the IP address of the SX8R from which you want to upload user data.

(7) Port Number

Specify the port number of the SX8R from which you want to upload user data from "2101" or "2102".

(8) MAC Address

Displays the MAC address of the SX8R from which you want to upload user data.

(9) Search button

Searches for SX8R on the same network that can be connected to the computer over maintenance communication.

Information on SX8Rs that were found is added to the target list. A maximum of 250 devices can be added.

(10) Add button

Adds a SX8R to the target list.

A new row is added to the target list. Set the name, IP address, and port number. A maximum of 250 devices can be added.

(11) Delete button

Deletes the selected SX8R from the target list.

Click on the **Name**, **IP Address**, or **Port Number** cell to select the SX8R.

(12) Upload button

Executes the upload of the user data.

If an upload password was set for the SX8R project, the **Enter Password** dialog box is displayed. Enter the password and click the **OK** button. The upload will start only if the password matches. For details on the upload password, see "(4) Password" on page 6-10.

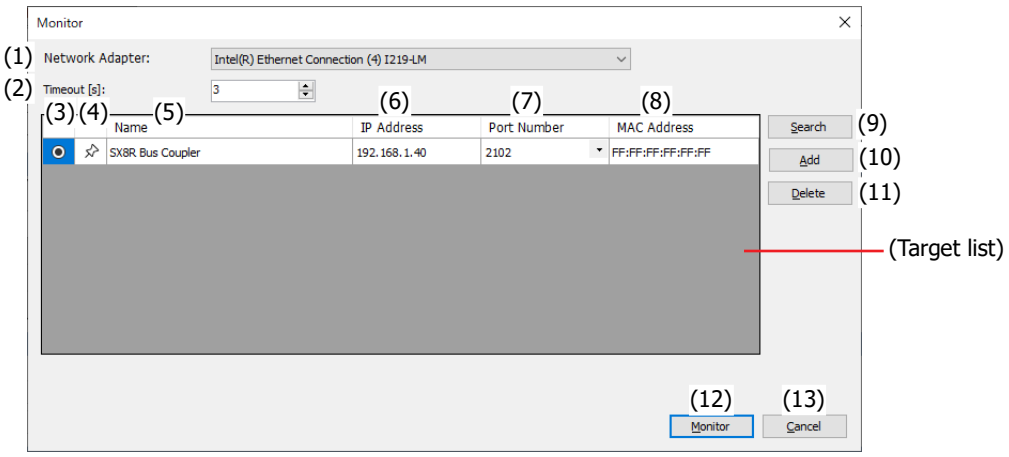
(13) Cancel button

Returns to the SX8R Configurator without uploading the user data.

2. Change each setting as necessary and then click **Upload** button.
Uploads the user data.

Monitor the SX8R

1. From the **Online** menu, click **Monitor** button.
   The **Monitor** dialog box is displayed.



(1) Network Adapter

Select the network adapter in the computer that is used. Only enabled network adapters are displayed. Disabled network adapters, such as those not connected with an Ethernet cable, are not displayed.

(2) Timeout [s]

Set the timeout used in maintenance communication (3 to 10 sec).

(3) button

Select the SX8R to monitor.

(4) / button

If you want to fix the target SX8R to the target list, press this button to set it to this state . The SX8R in this state is always displayed regardless of the search results for the SX8R.

(5) Name

Specify the name of the SX8R to monitor.

(6) IP Address

Specify the IP address of the SX8R to monitor.

(7) Port Number

Specify the port number of the SX8R to monitor from "2101" or "2102".

(8) MAC Address

Displays the MAC address of the SX8R to monitor.

(9) Search button

Searches for SX8R on the same network that can be connected to the computer over maintenance communication.

Information on SX8Rs that were found is added to the target list. A maximum of 250 devices can be added.

(10) Add button

Adds a SX8R to the target list.

A new row is added to the target list. Set the name, IP address, and port number. A maximum of 250 devices can be added.

(11) Delete button

Deletes the selected SX8R from the target list.

Click on the **Name**, **IP Address**, or **Port Number** cell to select the SX8R.

(12) Monitor button

Executes the monitor of the user data.

(13) Cancel button

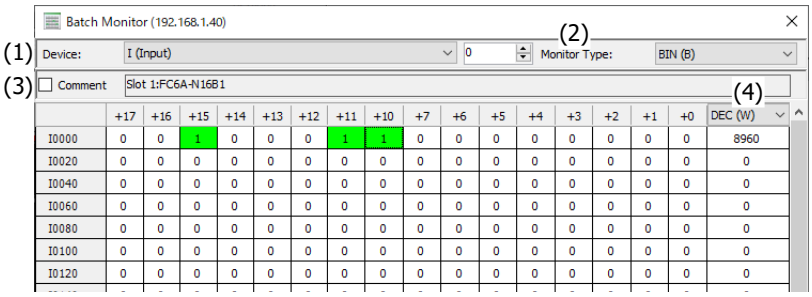
Closes the **Monitor** dialog box and returns to the SX8R Configurator.

2. Change each setting as necessary and then click **Monitor** button.
Monitors the SX8R.

Monitor all devices of SX8R at once

Consecutive device addresses can be monitored in a single dialog box. You can also change the value by entering the value directly into a cell in the **Batch Monitor** dialog box.

1. From the **Online** menu, click **Monitor** button.
   The **Monitor** dialog box is displayed.
2. Specify the SX8R to monitor and click **Monitor** button.
3. From the **Online** menu, click **Batch Monitor** button.
   Displays consecutive device addresses at once.



	+17	+16	+15	+14	+13	+12	+11	+10	+7	+6	+5	+4	+3	+2	+1	+0	DEC (W)
I0000	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	8960
I0020	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I0040	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I0060	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I0080	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I0100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I0120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

(1) Device

Select the device to batch monitor from the following.

- I (Input)
- Q (Output)
- M (Special Internal Relay)
- D (Data Register)
- D (Special Data Register)

Enter the address number of the selected device to change the device address to monitor.

(2) Monitor Type

Select the device monitor type from the following.

Monitor Type	Description	Range of Data
BIN (B)	1 bit (Binary)	0, 1
DEC (W)	Unsigned 16 bits	0 to 65535
DEC (I)	Signed 16 bits	-32768 to 32767
HEX (W)	16 bits in Hexadecimal	0000h to FFFFh

When setting constants in the SX8R Configurator, you can set them in decimal or hexadecimal. When setting in hexadecimal, add "$" ($0000 to $FFFFF) at the beginning.

(3) Comment

Select this check box to display the device value and any comments set for the device.

(4) Monitor Type for 16-bit Value

The right-most column of the **Batch Monitor** dialog box displays the 16-bit value of the device in each row. "DEC (W)" or "HEX (W)" can be selected as the monitor type for 16-bit values.

Right-click Menu

■ **Set**

Sets the device at the cursor position.

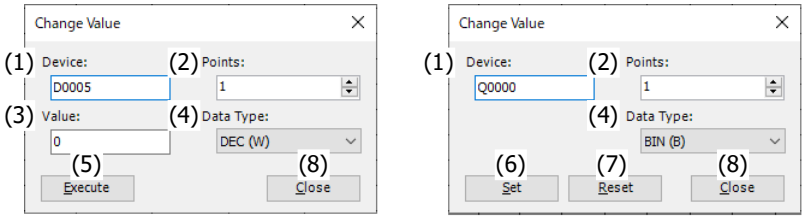
■ **Reset**

Resets the device at the cursor position.

- "Set" and "Reset" appear when "I (Input)", "Q (Output)" or "M (Special Internal Relay)" is selected in **Device** in the **Batch Monitor** dialog box.
- I (Input) and read-only M (Special Internal Relay) cannot be set and reset.

■ **Change Values**

The same value can be written to consecutive device addresses at once.



(1) Device

Specify the device address that is the starting point of a sequence of device addresses.

Enter the number of devices and the value to written.

- You cannot write values to I (Input), read-only M (Special Internal Relay) and read-only D (Special Data Register).
- You cannot write values to D (data register) where analog input data, analog input status and analog output status are stored.

(2) Points

Specify the number of devices whose values are to be changed.

(3) Value, (4) Data Type

Specify the value to be written to the device and its data type. Data types can be selected from the following.

Data Type	Range of Data
BIN (B)	0, 1
DEC (W)	0 to 65535
DEC (I)	-32768 to 32767
HEX (W)	0000h to FFFFh

(5) Execute

Changes the value.

(6) Set

Sets the value of the device.

(7) Reset

Resets the value of the device.

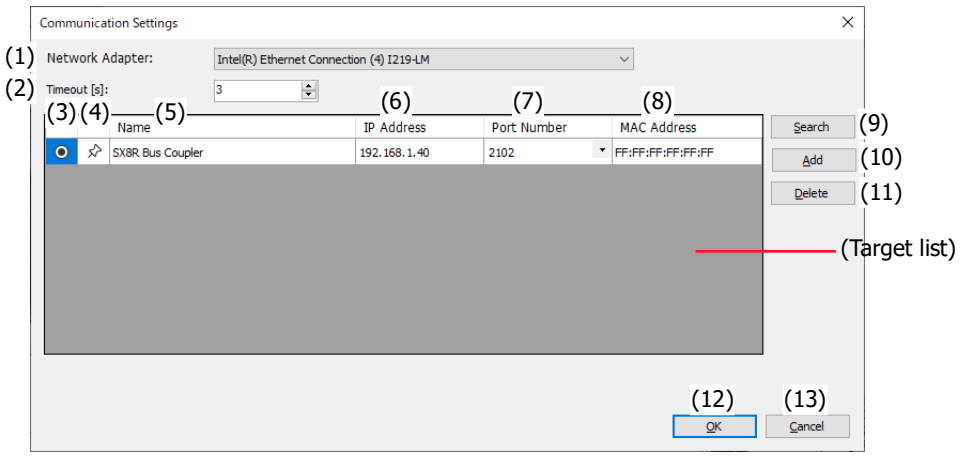
(8) Close

Close the **Change Value** dialog box and return to the **Batch Monitor** dialog box.

Configure the Communication Settings

This dialog box is used to configure the network adapter in the computer that is used, the timeout used in maintenance communication and SX8R to be used for maintenance communication.

1. From the **Online** menu, click **Communication Settings** button.
   The **Communication Settings** dialog box is displayed.



(1) Network Adapter

Select the network adapter in the computer that is used. Only enabled network adapters are displayed. Disabled network adapters, such as those not connected with an Ethernet cable, are not displayed.

(2) Timeout [s]

Set the timeout used in maintenance communication (3 to 10 sec).

(3) ◉ button

Select the SX8R to communicate.

(4) 📌 / 📌 button

If you want to fix the target SX8R to the target list, press this button to set it to this state 📌. The SX8R in this state 📌 is always displayed regardless of the search results for the SX8R.

(5) Name

Specify the name of the SX8R to communicate.

(6) IP Address

Specify the IP address of the SX8R to communicate.

(7) Port Number

Specify the port number of the SX8R to communicate from "2101" or "2102".

(8) MAC Address

Displays the MAC address of the SX8R to communicate.

(9) Search button

Searches for SX8R on the same network that can be connected to the computer over maintenance communication.

Information on SX8Rs that were found is added to the target list. A maximum of 250 devices can be added.

(10) Add button

Adds a SX8R to the target list.

A new row is added to the target list. Set the name, IP address, and port number. A maximum of 250 devices can be added.

(11) Delete button

Deletes the selected SX8R from the target list.

Click on the **Name**, **IP Address**, or **Port Number** cell to select the SX8R.

(12) OK button

Saves the settings and return to the SX8R Configurator.

(13) Cancel button

Closes the **Communication Settings** dialog box and returns to the SX8R Configurator.

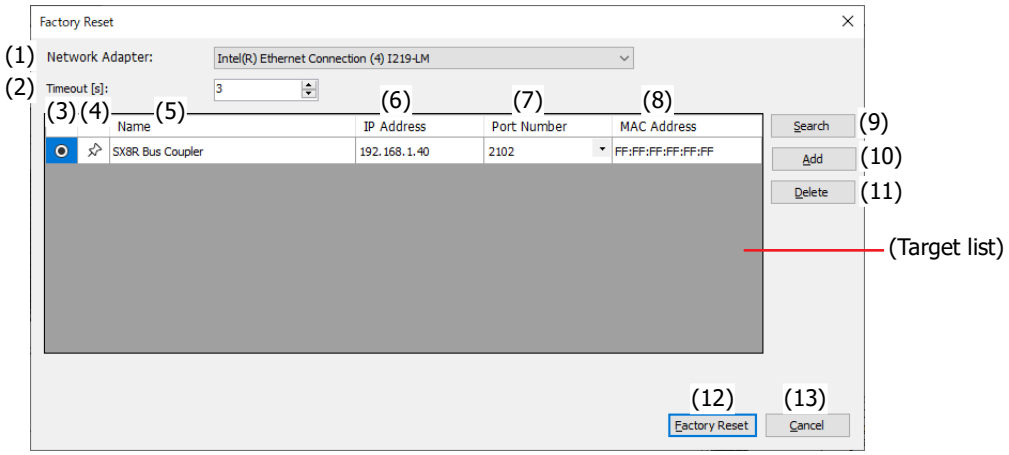
2. Change each setting as necessary and then click **OK** button.
This concludes configuring the communication settings of the computer.

The destination information set in the **Communication Settings** dialog box is added to the target list in the **Download**, **Upload**, and **Monitor** dialog boxes.

Initialize the SX8R

Initializes the SX8R to the factory settings.

1. From the **Online** menu, click **Factory Reset** button.
   The **Factory Reset** dialog box is displayed.



(1) Network Adapter

Select the network adapter in the computer that is used. Only enabled network adapters are displayed. Disabled network adapters, such as those not connected with an Ethernet cable, are not displayed.

(2) Timeout [s]

Set the timeout used in maintenance communication (3 to 10 sec).

(3) ◉ button

Select the SX8R to initialize.

(4) 📌 / 📌 button

If you want to fix the target SX8R to the target list, press this button to set it to this state 📌. The SX8R in this state 📌 is always displayed regardless of the search results for the SX8R.

(5) Name

Specify the name of the SX8R to initialize.

(6) IP Address

Specify the IP address of the SX8R to initialize.

(7) Port Number

Specify the port number of the SX8R to initialize from "2101" or "2102".

(8) MAC Address

Displays the MAC address of the SX8R to initialize.

(9) Search button

Searches for SX8R on the same network that can be connected to the computer over maintenance communication.

Information on SX8Rs that were found is added to the target list. A maximum of 250 devices can be added.

(10) Add button

Adds a SX8R to the target list.

A new row is added to the target list. Set the name, IP address, and port number. A maximum of 250 devices can be added.

(11) Delete button

Deletes the selected SX8R from the target list.

Click on the **Name**, **IP Address**, or **Port Number** cell to select the SX8R.

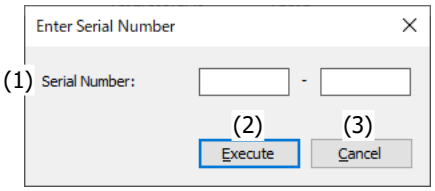
(12) Factory Reset

Executes the initialization of the SX8R.

(13) Cancel button

Closes the **Factory Reset** dialog box and returns to the SX8R Configurator.

2. Change each setting as necessary and then click **Factory Reset** button.
The **Enter Serial Number** dialog box is displayed.



(1) Serial Number

Enter the serial number printed on the left side of the SX8R module.

The maximum 5 characters can be entered in each text box. Only single-byte alphanumeric characters and symbols can be used. For the serial number, see Chapter 2 "About the Print Contents of the SX8R Module" on page 2-16.

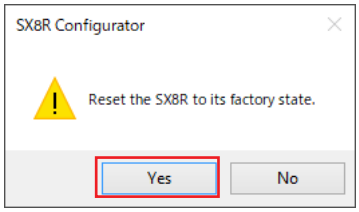
(2) Execute

Executes the initialization of the SX8R.

(3) Cancel

Closes the **Enter Serial Number** dialog box and returns to the **Factory Reset** dialog box.

3. Enter the serial number and click **Factory Reset** button.
When the serial number entered matches the serial number printed on the SX8R module, the confirmation message is displayed.



4. Click **Yes** button.
Executes the initialization of the SX8R.

Even if the user data in the SX8R is password-protected, the SX8R will be initialized to the factory default settings.

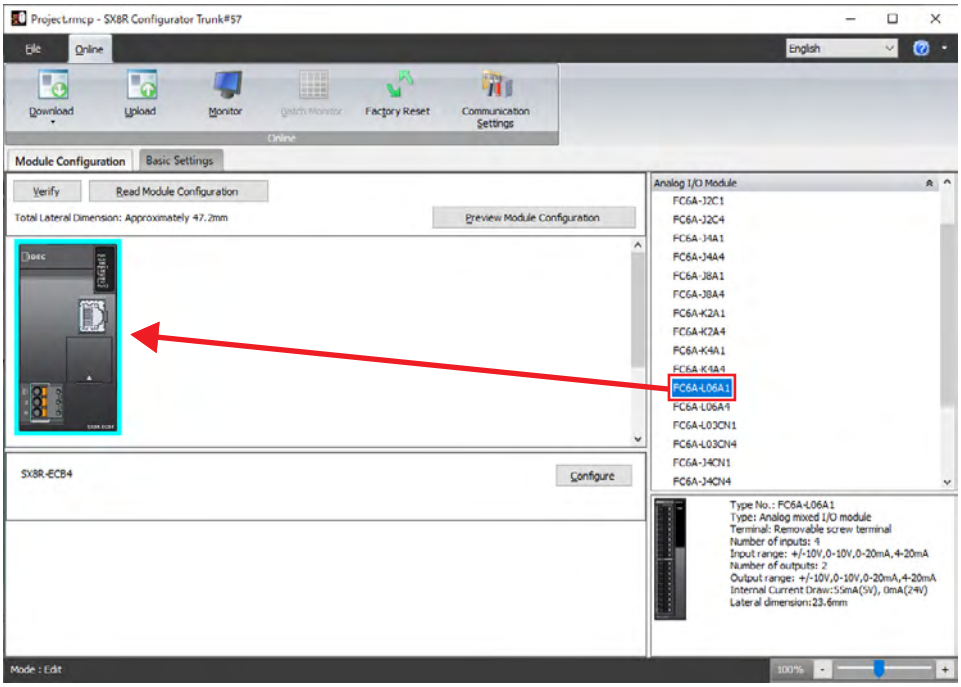
Module Configuration Editor

This section describes the operating procedures for each function of the Module Configuration Editor.

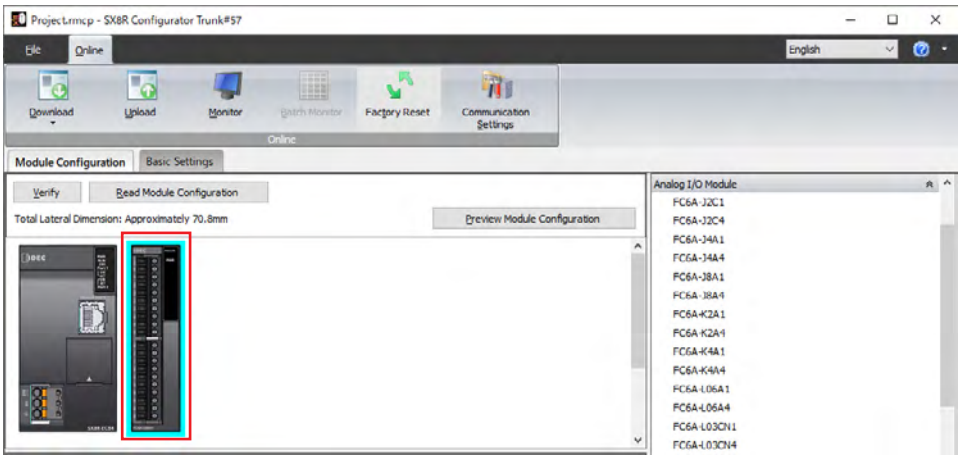
Inserting I/O Modules

This section describes how to insert I/O modules into the module configuration area.

1. Select the I/O module to insert in the I/O modules list and drag and drop it to the module configuration area.



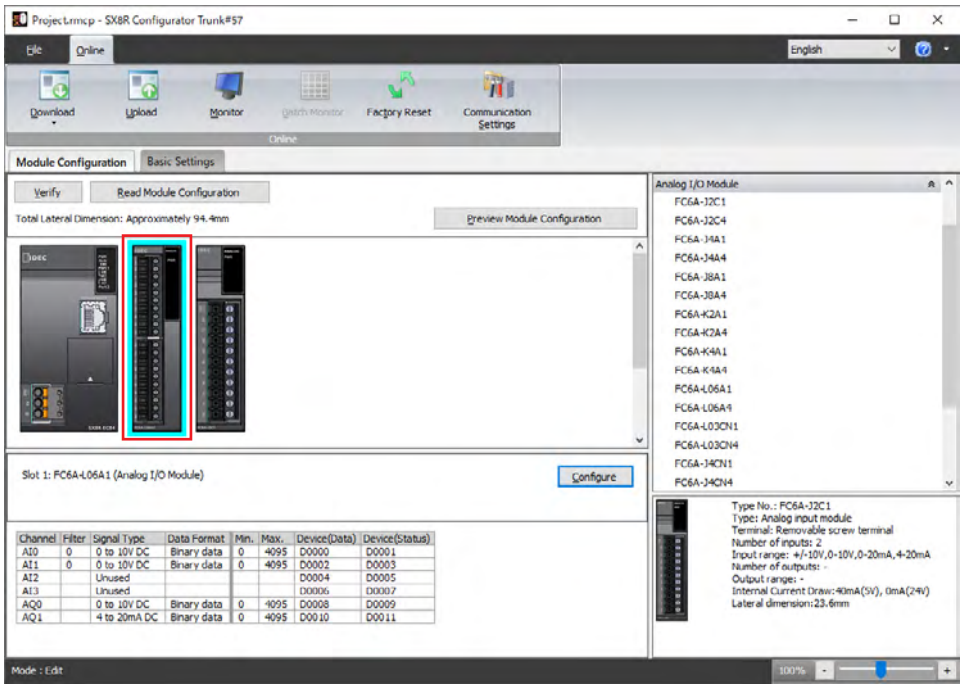
The I/O module is inserted into the module configuration area.



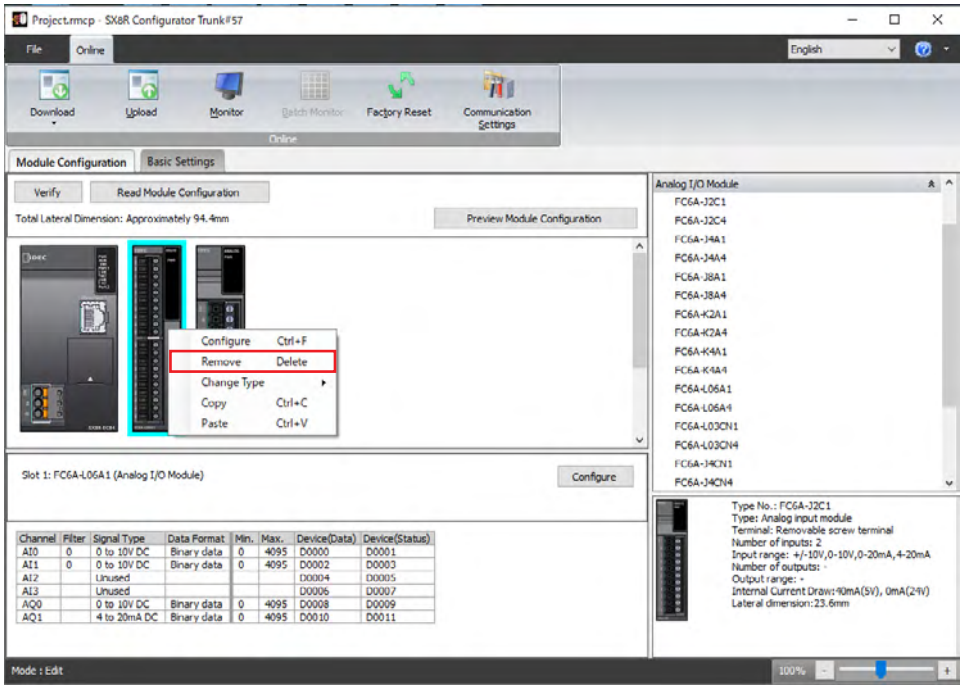
Deleting I/O Module

This section describes how to delete I/O modules that have been inserted into the module configuration area.

1. Click to select the I/O module to remove in the module configuration area.



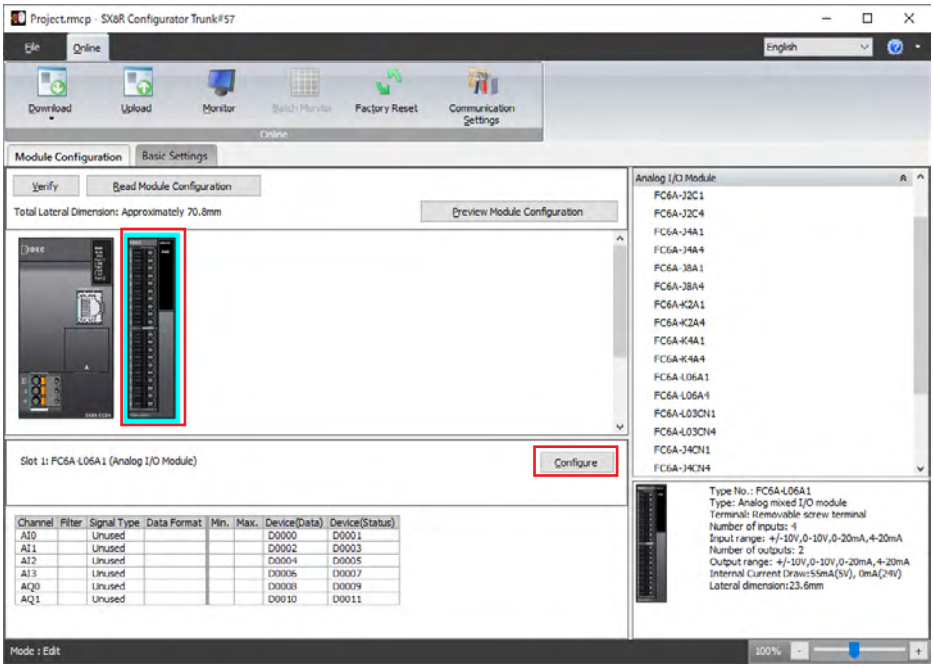
2. Right-click the I/O module to delete and click **Remove**.
The selected I/O module is removed.
All of the modules placed on the right side of the removed module are automatically shifted to the left.



Configuring I/O Module

This section describes how to configure I/O modules.

1. Click the I/O module inserted in the module configuration area and click the **Configure** button.
   The **Configuration** dialog box of the I/O module is displayed.

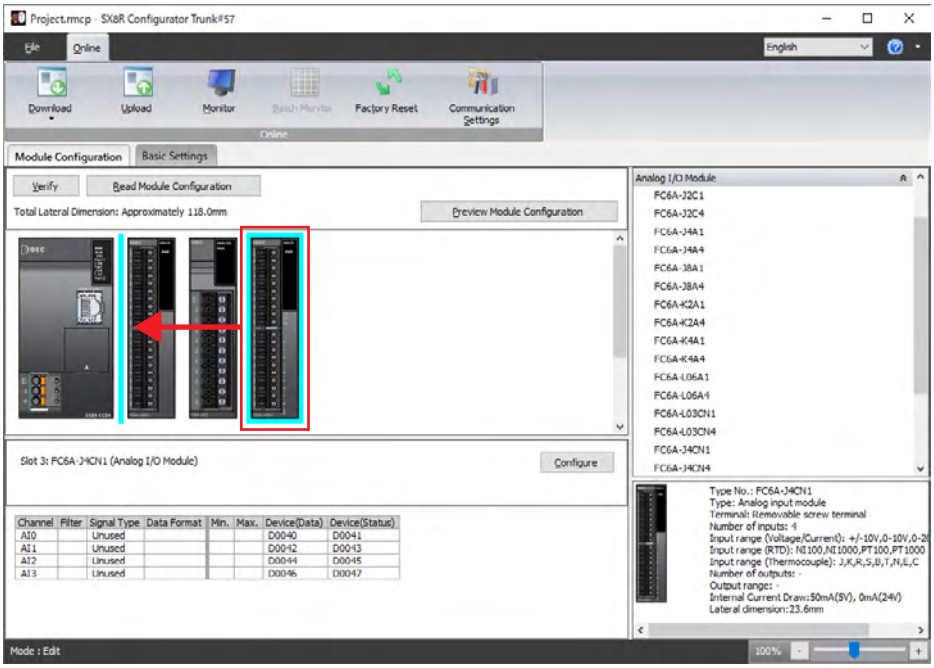


2. Configure each parameter of the I/O module.

Changing I/O Module

This section describes how to change the position of I/O modules that have been inserted into the module configuration area.

1. Select the I/O module to move and drag and drop it onto the destination I/O module.

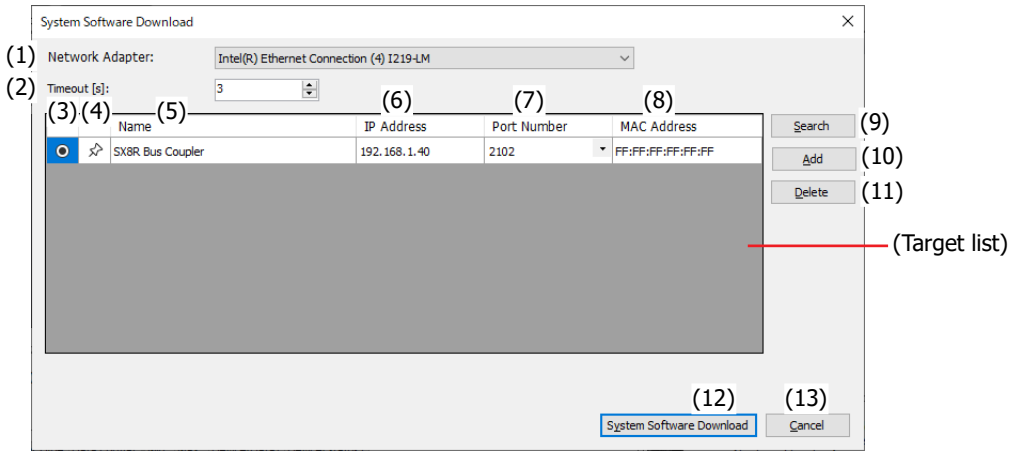


- When the I/O module is changed, the device addresses change according to the target slot. The device addresses in the project are not changed.
- When the position of an analog I/O module is changed, the configured parameters are also moved.

Download System Software

This section describes how to download the system software on the SX8R and I/O module.

1. From the **Online** menu, click **Download** button, then click **System Software Download**.
   The **System Software Download** dialog box is displayed.



(1) Network Adapter

Select the network adapter in the computer that is used. Only enabled network adapters are displayed. Disabled network adapters, such as those not connected with an Ethernet cable, are not displayed.

(2) Timeout [s]

Set the timeout used in maintenance communication (3 to 10 sec).

(3) ◉ button

Select the SX8R for which you want to download the system software.

(4) 📌 / 📌 button

If you want to fix the target SX8R to the target list, press this button to set it to this state 📌. The SX8R in this state 📌 is always displayed regardless of the search results for the SX8R.

(5) Name

Specify the name of the SX8R for which you want to download the system software.

(6) IP Address

Specify the IP address of the SX8R for which you want to download the system software.

(7) Port Number

Specify the port number of the SX8R for which you want to download the system software from "2101" or "2102".

(8) MAC Address

Displays the MAC address of the SX8R for which you want to download the system software.

(9) Search button

Searches for SX8R on the same network that can be connected to the computer over maintenance communication.

Information on SX8Rs that were found is added to the target list. A maximum of 250 devices can be added.

(10) Add button

Adds a SX8R to the target list.

A new row is added to the target list. Set the name, IP address, and port number. A maximum of 250 devices can be added.

(11) Delete button

Deletes the selected SX8R from the target list.

Click on the **Name**, **IP Address**, or **Port Number** cell to select the SX8R.

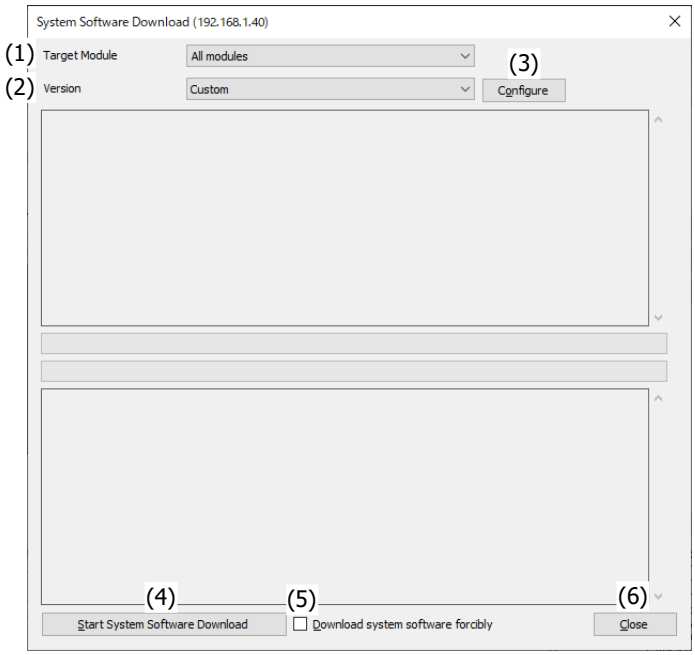
(12) System Software Download button

Downloads system software.

(13) Cancel button

Closes the **System Software Download** dialog box and returns to the SX8R Configurator.

2. Change each setting as necessary and then click **System Software Download** button.
The **System Software Download** dialog box is displayed.



(1) Target Module

Select the module from the following to download the system software.

- All modules
- SX8R
- Digital I/O module
- Analog I/O module

(2) Version

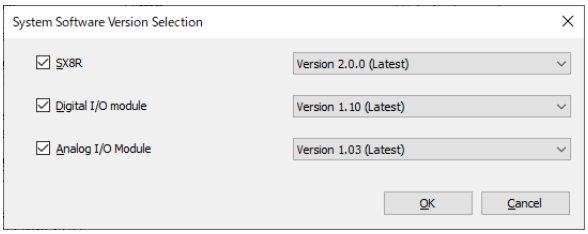
Select the system software version to download from the following.

- Latest version
- Custom

(3) Configure

The **System Software Version Selection** dialog box is displayed.

The **Configure** button is displayed only when "Custom" is selected for **Version** (2).
Click the **Configure** button to display the **System Software Version Selection** dialog box. The version of the system software to download can be selected for each module.



Select this check box to download the system software of the SX8R.
Select this check box to download the system software for all digital I/O modules or analog I/O modules connected to the SX8R.

(4) Start System Software Download

Downloads system software.

(5) Download System Software Forcibly

When the version of the system software you are trying to download is older than the version of the system software of the module itself, the system software cannot be downloaded. Select this check box to force downloading of the system software regardless of the system software version of the module itself.

(6) Close

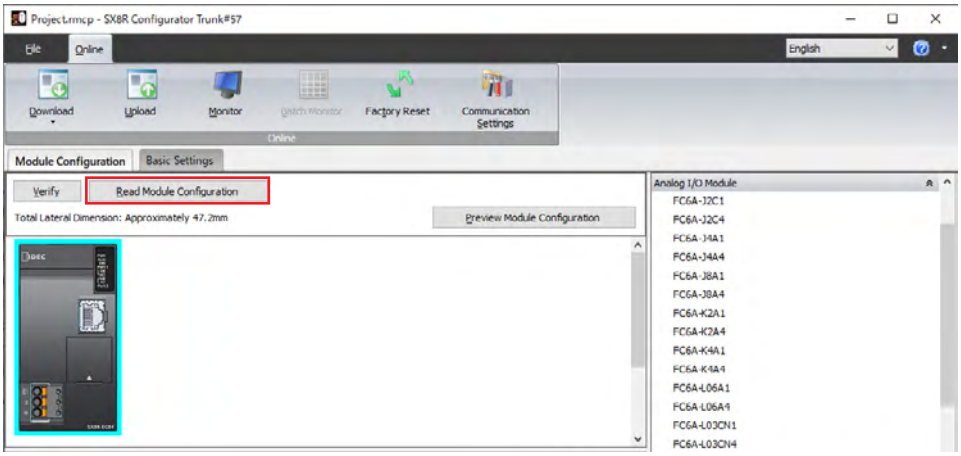
Closes the **System Software Download** dialog box and returns to the SX8R Configurator.

3. Specify **Target Module** and **Version** and click the **Start System Software Download** button.
   Starts downloading system software.

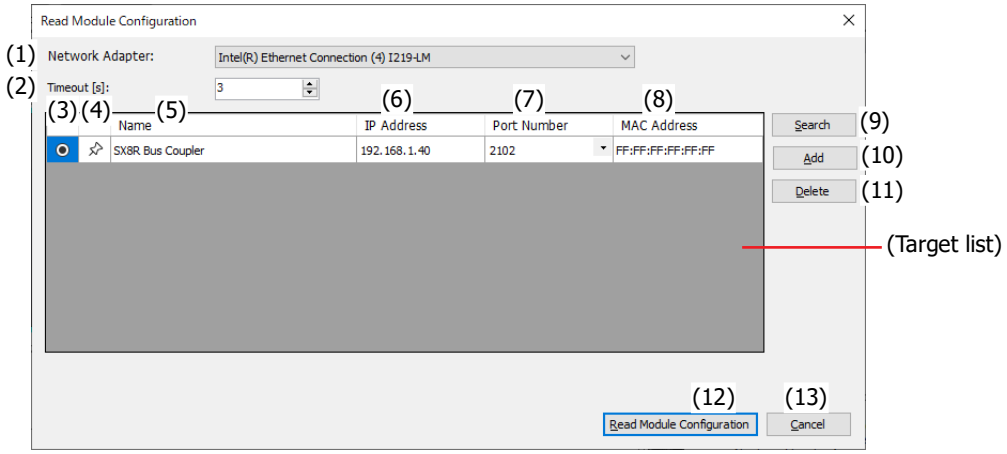
Reading the Module Configuration

This section describes how to obtain the information about I/O modules connected to the SX8R and automatically display their configuration.

1. Connect a PC to Ethernet port 1 or Ethernet port 2 on the SX8R.
2. Click **Read Module Configuration** in the module configuration area.



The **Read Module Configuration** dialog box is displayed.



(1) Network Adapter

Select the network adapter in the computer that is used. Only enabled network adapters are displayed. Disabled network adapters, such as those not connected with an Ethernet cable, are not displayed.

(2) Timeout [s]

Set the timeout used in maintenance communication (3 to 10 sec).

(3) ◉ button

Select the SX8R for which you want to read the module configuration.

(4) 📌 / 📌 button

If you want to fix the target SX8R to the target list, press this button to set it to this state 📌. The SX8R in this state 📌 is always displayed regardless of the search results for the SX8R.

(5) Name

Specify the name of the SX8R for which you want to read the module configuration.

(6) IP Address

Specify the IP address of the SX8R for which you want to read the module configuration.

(7) Port Number

Specify the port number of the SX8R for which you want to read the module configuration from "2101" or "2102".

(8) MAC Address

Displays the MAC address of the SX8R for which you want to read the module configuration.

(9) Search button

Searches for SX8R on the same network that can be connected to the computer over maintenance communication.

Information on SX8Rs that were found is added to the target list. A maximum of 250 devices can be added.

(10) Add button

Adds a SX8R to the target list.

A new row is added to the target list. Set the name, IP address, and port number. A maximum of 250 devices can be added.

(11) Delete button

Deletes the selected SX8R from the target list.

Click on the **Name**, **IP Address**, or **Port Number** cell to select the SX8R.

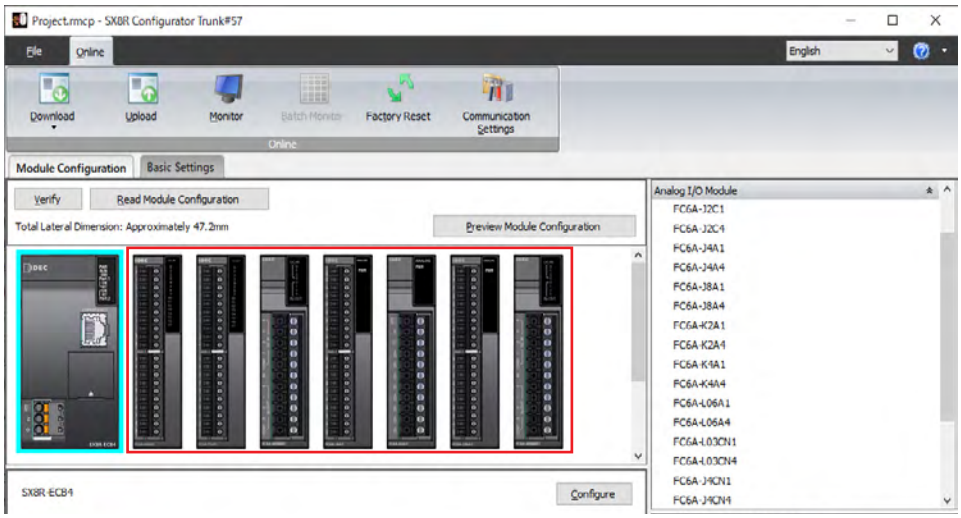
(12) Read Module Configuration button

Reads the module configuration of the SX8R.

(13) Cancel button

Closes the **Read Module Configuration** dialog box and returns to the SX8R Configurator.

3. Change each setting as necessary and then click **Read Module Configuration** button.
   The configuration of I/O modules connected to the SX8R is displayed in the module configuration area.



- Read module configuration only reads the connection configuration of I/O modules. It does not read the configured parameters. Therefore, the I/O module parameters are the default values. Configure the parameters as necessary.
- If digital I/O modules are connected, the actual model number such as FC6A-N08B1 cannot be distinguished by reading the module configuration. The model number will be a general term for number of I/O points such as 16 inputs or 16 outputs. Change the model number to the actual model number after reading the module configuration.
- On the **Online** tab, click **Monitor** button to start monitoring. The status and current values of I/O modules can be checked in the parameter reference area.
- If an I/O module has an error status, the corresponding module is shown in a red box in the module configuration area.

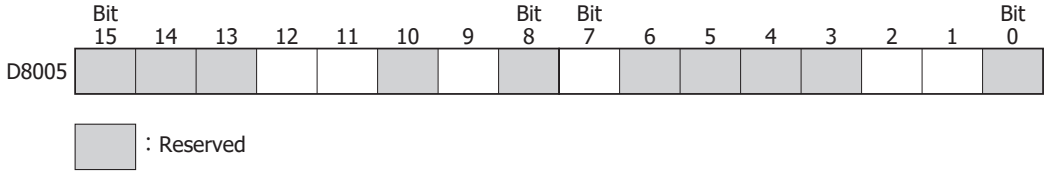
7: TROUBLESHOOTING

This chapter describes the procedures to determine the cause of problem in the SX8R or I/O module and actions to be taken when any problem occurs. The SX8R has self-diagnostic functions to prevent the spread of problems if any should occur. In case of any problem, follow the troubleshooting procedures to determine the cause and to correct the error.

Error

General Error

The general error status is written to special data register D8005. If "1" is stored in each bit of D8005, the corresponding error is occurring.



General Error Codes

Bit	Error Item	Description	Main Actions
1	Watchdog timer error	Processing time of SX8R exceeded the specified time.	Turn the power off and on. If this error occurs frequently, the SX8R may be broken and has to be replaced.
2	Communication error	SX8R cannot communicate with host device.	Connect the cable correctly, and then turn the power off and on. The error will be cleared when the SX8R begins communicating with the host device again.
7	User data error	User data has not been written to the SX8R, or user data is incorrect.	Download user data. The error will be cleared when normal user data is downloaded.
9	System error	SX8R cannot obtain basic operation information.	Turn the power off and on. If this error occurs frequently, the SX8R may be broken and has to be replaced.
11	Expansion bus initialization error	This error occurs when an I/O module fails to initialize.	Check that the configured module configuration matches the actual I/O module configuration and download the user data. If this error still occurs after downloading the user data, do the following. • Check that the I/O modules are securely connected to the expansion connectors. • Turn the power off and on. • Download I/O module's system software. If this error occurs frequently or the SX8R does not return, the I/O module must be replaced. If this error still occurs even after replacing the I/O module, the SX8R may be broken and has to be replaced.
12	Expansion bus error	This error occurs when communication could not be performed between the SX8R and the I/O modules.	Turn the power off and on, and check if expansion bus initialization error has occurred. When the error occurs, take measures to clear the expansion bus initialization error. When the error does not occur, the problem may be due to noise or an I/O module may be broken. Take measures against noise or replace the I/O module. The error will be cleared when the SX8R begins communicating with the I/O modules again.

Watchdog timer error, system error and expansion bus initialize error are retained. After dealing with each error, clear the errors in the SX8R Configurator.

Operation of SX8R when a General Error Occurs

When a general error occurs, the output state of the I/O module and the error LED of the SX8R is as follows.

Error Item	Output State of I/O Module	Error LED [ERR]	Checked at
Watchdog timer error	OFF	ON	Any time
Communication error	Maintained *1	ON	Any time
User data error	OFF	ON	Turning power on/ downloading user data
System error	OFF	ON	Turning power on/ downloading user data
Expansion bus initialization error	OFF	ON	Turning power on/ downloading user data
Expansion bus error	Maintained	ON	Any time

*1 The output is controlled according to the **Self Diagnostic** settings in the **Basic Settings** tab of the SX8R Configurator. For details, see Chapter 6 "(5) Self Diagnostic (Only connection No.1 is supported)" on page 6-11.

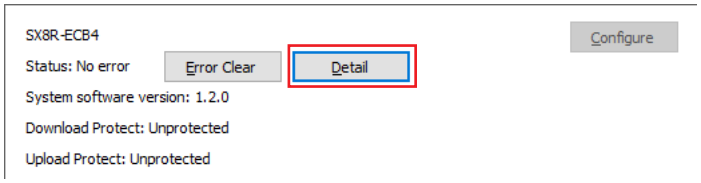
Clearing Error Codes from SX8R Configurator

Errors can be checked and cleared in the SX8R Configurator.

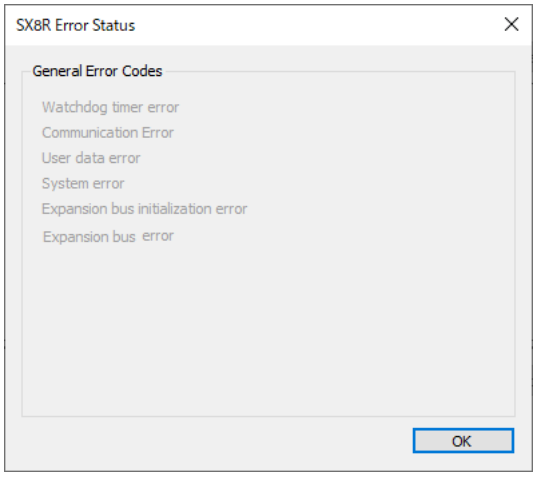
This section describes the procedures to check the error status and clear in the SX8R Configurator.

Checking Error Status

1. From the **Online** menu, click **Monitor** button.
   The **Monitor** dialog box is displayed.
2. Click on the SX8R in the module configuration area of the **Module Configuration** tab.
   The **Detail** button is displayed in the parameter reference area.
3. Click the **Detail** button.
   The **SX8R Error Status** dialog box is displayed.



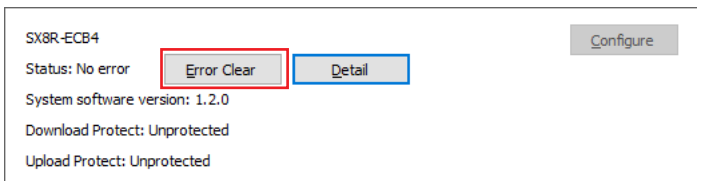
4. You can check the errors that are currently occurring.



5. After confirming, click the **OK** button.

Clearing Error Codes

1. Remove the cause of the error.
2. From the **Online** menu, click **Monitor** button.
3. Click on the SX8R in the module configuration area of the **Module Configuration** tab.
   The **Error Clear** button is displayed in the parameter reference area.
4. Click the **Error Clear** button.



ABOUT THE WARRANTY OF THE PRODUCTS

1. Warranty Period

The Products are warranted for 3 years from the date of purchase, or from the date of delivery completion.

* Consumable/maintenance parts such as batteries and relays if the operation exceeds 100,000 times are excluded from the 3-year warranty.

2. Extent of Warranty

IDEC CORPORATION is responsible for failures or defects of the Products during the above warranty period, either a replacement part will be provided or the defective parts of the Products will be repaired free of charge. If such failure or defects should occur, please offer them to the distributor, dealer or IDEC CORPORATION with the materials in which the date of purchase is specified.

* The expenses for installation and construction at the time of repair will not be borne.

3. Indemnification

IDEC CORPORATION will not be liable under this Warranty and be indemnified and held harmless from any and all demands, suits, expenses, claims, damages and liabilities in the following event that:

1) The Products are used or operated beyond the conditions or environment range as described in catalog, specifications or instruction; or
2) The failure or defects of the Products arise from the cause other than the Products; or
3) The Products are improved, modified or altered by the party other than IDEC; or
4) The failure or defects and damages of the Products arise from the usage of the Product in the way that is not intended; or
5) The failure or defects and damages of the Products arise from the cause beyond IDEC's control including, but not limited to, fire, earthquake, flood, lightning, other natural disasters, and acts of God; or
6) The failure or defects and damages of the Products arise from the relocation, transportation or drop after you purchase the Products; or
7) The failure or defects and damages of the Products arise from improper installation; or
8) Maintenance and inspection are not carried out in accordance with instruction.

* Customers assume their own risk in programming products, Company will not be held liable for damages as a result of improper programming.

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4. Extent of Service

The price of the Products will not include the fee for any service such as sending technicians and engineers, IDEC CORPORATION will charge you the fee for the following:

1) Instruction for installment and visiting for test operation, including, but not limited to creating application software and operation tests; and
2) Maintenance and inspection, arrangement and repair; and
3) Technical assistance and technical education; and
4) Product test and inspection based on you request.

IDEC CORPORATION

Head Office 6-64, Nishi-Miyahara-2-Chome, Yodogawa-ku, Osaka 532-0004, Japan

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