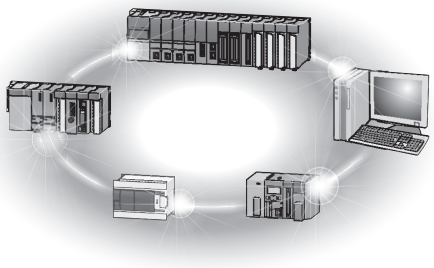
MITSUBISHI ELECTRIC

Programmable Controller

Industrial Managed Switch User's Manual

-NZ2MHG-T8F2



SAFETY PRECAUTIONS

(Read these precautions before using this product.)
Before using this product, please read this manual carefully and pay full attention to safety to handle the product correctly.
The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the user's manual for the CPU module used.
In this manual, the safety precautions are classified into two levels: "⚠ WARNING" and "⚠ CAUTION".

⚠ **WARNING**	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ **CAUTION**	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠ CAUTION" may lead to serious consequences.
Observe the precautions of both levels because they are important for personal and system safety.
Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

⚠ WARNING

- When an overcurrent caused by an error of an external device or a failure of the module flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.

[Design Precautions]

⚠ CAUTION

- Do not install the communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.
- The communication speeds (such as 1000Mbps) described in this manual are the theoretical maximum speeds of the wired LAN standards. They are not the actual communication speeds.
- Frame loss may occur depending on the connected external devices or installation environment.
- Sending jumbo frames to external devices that do not support jumbo frames may cause a significant reduction in communication efficiency. The communications may also be disconnected.
- Do not power off or reset the module while the settings are being written. Doing so will make the data in the flash ROM and SD memory card undefined. The values need to be written to the flash ROM and SD memory card again. Doing so also may cause malfunction or failure of the module.

[Installation Precautions]

⚠ WARNING

- Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may result in electric shock or cause the module to fail or malfunction.
- The module could be very hot while the power is on. Check that the module is not hot before mounting or removing the module. Failure to do so may result in a burn.

[Installation Precautions]

⚠ CAUTION

- Use the module in an environment that meets the specifications in this manual. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product. (☞ Page 12 General Specifications, Page 25 Installation Environment)
- Securely fix the module with a DIN rail or module mounting brackets.
- Securely connect the cable connectors. Failure to do so may result in malfunction due to poor contact.
- When using an SD memory card, fully insert it into the SD memory card slot. Check that it is inserted completely. Poor contact may cause malfunction.
- Do not directly touch any conductive parts and electronic components of the module, SD memory card, or connector. Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠ WARNING

- Shut off the external power supply (all phases) used in the system before installation and wiring. Failure to do so may result in electric shock or cause the module to fail or malfunction.

[Wiring Precautions]

⚠ CAUTION

- Individually ground the FG terminal of the programmable controller with a ground resistance of 100 ohms or less. Failure to do so may result in electric shock or malfunction.
- Check the rated voltage and terminal layout before wiring to the module, and connect the cables correctly. Connecting a power supply with a different voltage rating or incorrect wiring may cause fire or failure.
- Do not install the communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.
- Place the cables in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact.
- Tighten the screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, fire, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, fire, or malfunction.
- When disconnecting the cable from the module, do not pull the cable by the cable part. For the cable with connector, hold the connector part of the cable. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.
- When wiring, shield the module using a cover or similar means to prevent foreign matter such as dust or wire chips from entering the module. Such foreign matter can cause a fire, failure, or malfunction. Remove the shield for heat dissipation before operating the system.
- Modules must be installed in control panels. Wiring and replacement of a power supply module must be performed by qualified maintenance personnel with knowledge of protection against electric shock. For wiring, refer to this manual. (☞ Page 32 Wiring)
- Attach the included cover(s) to the unused optical fiber port(s). Touching the port with bare hands may result in injury.

[Startup and Maintenance Precautions]

⚠ WARNING

- Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
- Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal block mounting screws or screws for module mounting brackets. Failure to do so may result in electric shock.

[Startup and Maintenance Precautions]

⚠ CAUTION

- Do not disassemble or modify the modules. Doing so may cause failure, malfunction, injury, or a fire.
- Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may cause the module to fail or malfunction.
- After the first use of the product, do not mount/remove the terminal block for module power supply and FG to/from the module more than 50 times (IEC 61131-2/JIS B 3502 compliant). Exceeding the limit may cause malfunction.
- After the first use of the product, do not insert/remove the SD memory card to/from the CPU module more than 500 times. Exceeding the limit may cause malfunction.
- Do not touch the metal terminals on the back side of the SD memory card. Doing so may cause malfunction or failure of the module.
- Startup and maintenance of a control panel must be performed by qualified maintenance personnel with knowledge of protection against electric shock. Lock the control panel so that only qualified maintenance personnel can operate it.
- Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Failure to do so may cause the module to fail or malfunction.

[Disposal Precautions]

⚠ CAUTION

- When disposing of this product, treat it as industrial waste.

[Transportation Precautions]

⚠ CAUTION

- The halogens (such as fluorine, chlorine, bromine, and iodine), which are contained in a fumigant used for disinfection and pest control of wood packaging materials, may cause failure of the product. Prevent the entry of fumigant residues into the product or consider other methods (such as heat treatment) instead of fumigation. The disinfection and pest control measures must be applied to unprocessed raw wood.

CONDITIONS OF USE FOR THE PRODUCT

(1) MELSEC programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI ELECTRIC SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI ELECTRIC USER'S, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above restrictions, Mitsubishi Electric may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi Electric and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi Electric representative in your region.

(3) Mitsubishi Electric shall have no responsibility or liability for any problems involving programmable controller trouble and system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.

INTRODUCTION

Thank you for purchasing the industrial managed switch.
This manual describes the specifications, procedures before operation, system configuration, installation, wiring, functions, parameter settings, and troubleshooting of the industrial managed switch.
Before using this product, please read this manual carefully and develop familiarity with the functions and performance of the industrial managed switch to handle the product correctly.
Please make sure that the end users read this manual.

Relevant product

NZ2MHG-T8F2

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RELEVANT MANUALS

The following manuals are relevant to this product.

Manual name [manual number]	Description
Industrial Managed Switch User's Manual [SH-081612ENG] (this manual)	Specifications, procedures before operation, system configuration, installation, wiring, functions, parameter settings, and troubleshooting of the industrial managed switch

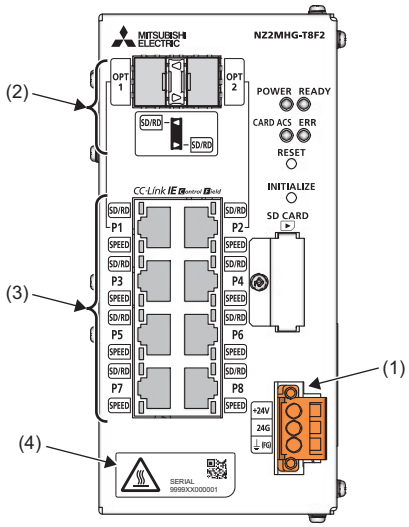
TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
CC frame	An abbreviation for Continuity Check. A frame that is specified in EthernetOAM and is used to check the connectivity.
CC-Link IE	A generic term for CC-Link IE Controller Network and CC-Link IE Field Network
CLI	An abbreviation for Command Line Interface. CLI sets the industrial managed switch and checks the status using the character instruction (command).
Cyclic transmission	A function by which data are periodically exchanged among stations on the same network using link devices on CC-Link IE
ERP	An abbreviation for Ethernet Ring Protection. ERP connects the industrial managed switches in a ring topology to build a redundant network configuration.
Ethernet device	A generic term for the devices supporting IP communication (such as personal computers)
ID for transferring priority frames	An ID for transferring priority frames having VLAN ID = 0 that is used by the IEEE 802.1Q Priority Tagged Frame function
LA	An abbreviation for Link Aggregation. LA bundles multiple physical links and treats them as a single virtual link.
RPL owner	RPL is an abbreviation for Ring Protection Link. A module to control the transmission path of frames among the industrial managed switches that configure the ERP.
SFP	An abbreviation for Small Form-Factor Pluggable. A standard for connecting an optical fiber cable to communication devices
SNMP	An abbreviation for Simple Network Management Protocol. This protocol is used to monitor and control the device connected to TCP/IP network.
Storm	Network down when the frame transfer and multiple processing are endlessly repeated and the communication band is narrowed.
TRAP	Information automatically notified in SNMP when an event occurs in connected devices
VLAN	An abbreviation for Virtual Local Area Network. A virtual LAN which the industrial managed switch configures independently from the physical LAN.
VLAN ID	An ID number added to each port for setting the VLAN function

1 PART NAMES

This chapter describes the part names of the industrial managed switch.



Indication or No.	Name		Description
POWER	POWER LED		Indicates the power supply status. On: Normal operation Off: No input from the power supply, power failure, or hardware failure
READY	READY LED		Indicates the operating status of the industrial managed switch and the error level. On: Normal operation Flashing: Initial processing Off: Major error
CARD ACS	CARD ACS LED		Indicates the status of the SD memory card. On: Available Flashing: Being accessed Off: Not available or not inserted
ERR	ERR LED		Indicates the error status. On: Minor error Flashing: Major error Off: Normal operation
RESET	RESET switch		A push switch to restart the industrial managed switch. (Push and hold the switch for approximately one second.) It takes up to five seconds for the industrial managed switch to start the restart processing after the RESET switch is pushed. When the restart processing starts, the READY LED flashes. When the processing completes, the LED turns on. The POWER LED remains on during the restart processing.
INITIALIZE	INITIALIZE switch		A push switch to initialize the settings of the industrial managed switch (Push and hold the switch for approximately 10 seconds.)
SD CARD	SD memory card slot		A slot where an SD memory card is inserted
(1)	Terminal block for module power supply and FG		A terminal block to connect the module power supply (24VDC) and FG
(2)	Optical fiber port	OPT1, OPT2	Attach an SFP module, and connect an optical fiber cable. For wiring methods and precautions, refer to the following. (☞ Page 36 Wiring to optical fiber ports)
		SD/RD LED	Indicates the data communication status. On: Data not being sent or received (Link-up) Flashing: Data being sent or received Off: Data not being sent or received (Link-down)

Indication or No.	Name		Description
(3)	Ethernet port	P1 to P8	A port to connect an Ethernet cable. For wiring methods and precautions, refer to the following. (☞ Page 35 Wiring to Ethernet ports)
		SD/RD LED	Indicates the data communication status. On: Data not being sent or received (Link-up) Flashing: Data being sent or received Off: Data not being sent or received (Link-down)
		SPEED LED	Indicates the link status. On (orange): Link-up (1Gbps) On (green): Link-up (100Mbps) Off: Link-down or link-up (10Mbps)
(4)	Production information marking		Shows the production information (12 digits) of the module.

2 SPECIFICATIONS

This chapter describes the specifications of the industrial managed switch.

2.1 General Specifications

This section describes the general specifications.

Item	Specifications					
Operating ambient temperature	0 to 60℃					
Storage ambient temperature	-25 to 75℃					
Operating ambient humidity	5 to 95%RH, non-condensing					
Storage ambient humidity						
Vibration resistance	—	Frequency	Constant acceleration	Half amplitude	Number of sweeps	IEC 61131-2:2007/JIS B 3502:2011
	Under intermittent vibration	5 to 8.4Hz	—	3.5mm	10 times each in X, Y, and Z directions	
		8.4 to 150Hz	9.8m/s²	—		
	Under continuous vibration	5 to 8.4Hz	—	1.75mm	—	
		8.4 to 150Hz	4.9m/s²	—		
Shock resistance	Three shocks in each direction per axis, on 3 mutually perpendicular axes (total of 18 shocks)					
Operating atmosphere	No corrosive gases, flammable gases, less conductive dust					
Operating altitude*1	0 to 2000m*4					
Installation location	Inside a control panel					
Overvoltage category*2	Ⅱ or less					
Pollution degree*3	2 or less					
Equipment class	Class Ⅰ					

*1 Do not use or store the industrial managed switch under pressure higher than the atmospheric pressure of altitude 0m. Doing so may cause malfunction. When using the industrial managed switch under pressure, please consult your local Mitsubishi representative.

*2 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises. Category Ⅱ applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the rated voltage of 300V is 2500V.

*3 This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used. Pollution degree 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.

*4 When the industrial managed switch is used at altitude above 2000m, the withstand voltage performance and the upper limit of the operating ambient temperature decrease. Please consult your local Mitsubishi representative.

2.2 Performance Specifications

This section describes the performance specifications.

Item			Specifications
Communication speed (Communication method)		10BASE-T	10Mbps (Full-duplex)*1
		100BASE-TX	100Mbps (Full-duplex)*1
		1000BASE-T	1Gbps (Full-duplex)
		1000BASE-SX	
		1000BASE-LX	
Maximum segment length		10BASE-T	100m
		100BASE-TX	
		1000BASE-T	
		1000BASE-SX	550m
		1000BASE-LX	5km
Communication interface		Ethernet port: RJ45 connector	8 ports (Two of them cannot be used with the optical fiber ports at the same time.)
		Optical fiber port: SFP connector	2 ports
Frame size (Jumbo frame compliant)			64 to 9022 bytes (VLAN setting data included)
Number of MAC addresses to be learned			2048 maximum
MAC address aging timer			300s
VLAN function		VLAN ID range	0 to 4095
		Number of VLAN IDs to be set for the port VLAN	1 per port
		Number of VLAN IDs to be set for the tag VLAN	4096 maximum per port
High reliability/redundancy function	ERP	Redundancy method	Ethernet Ring Protection (ERP)
		Number of ports set as ERP	2 ports
		ERP transmission path switch time	10ms or less after fault occurrence*2
	LA	Redundancy method	Link Aggregation (LA)
		Number of ports set as LA	4 pairs (2 ports per pair)
		LA transmission path switch time	1 second or less after fault occurrence
Startup time			Approximately 1 minute
Number of cascade connections (CC-Link IE)			20 levels maximum*3
Number of cascade connections (Ethernet)			No limitation*4
Applicable DIN rail			TH35-7.5Fe, TH35-7.5Al, TH35-15Fe (compliant with IEC 60715/JIS C 2812)
Rated input voltage			24VDC (Allowable voltage range: 20.4 to 28.8VDC)
Rated input current			1.20A
Maximum inrush current			150A within 1ms (with 24VDC input)
External dimensions			147(H) × 70(W) × 122(D)mm
Weight			0.95kg

*1 Do not connect the industrial managed switch with a device which communicates in half-duplex mode. If it is connected with such a device, re-transmission is not executed when a collision occurs. The communication speed cannot be set to 10Mbps or 100Mbps. The speed will be determined automatically to match the 10/100Mbps external device. (☞ Page 85 set port)

*2 This applies in a system where the number of industrial managed switches used is 16 or less and the CC frame send cycle is set to 1ms.

*3 When the CC-Link IE Field Network synchronous communication function is used, the number of connections differs depending on the firmware version of the master station used. For details, refer to the following.
MELSEC iQ-R Ethernet/CC-Link IE User's Manual (Startup)

*4 When using a hub other than the industrial managed switches, contact the manufacturer of the hub used.

3 FUNCTION LIST

This chapter lists the functions of the industrial managed switch.

Item	Description	Reference
Ethernet/CC-Link IE mix function	Without the VLAN function being set, the following devices can be connected to a single industrial managed switch so that they can coexist: • Ethernet device and CC-Link IE Controller Network (when Ethernet cables are used) device • Ethernet device and CC-Link IE Field Network device	☞ Page 38 Ethernet/CC-Link IE Mix Function
Port VLAN	Set to separate a network to each port on the industrial managed switch. With the port VLAN mode, the following devices can be connected to a single industrial managed switch so that they can coexist: • Ethernet device, CC-Link IE Controller Network (when Ethernet cables are used) device, and CC-Link IE Field Network device • CC-Link IE Controller Network (when Ethernet cables are used) devices whose network numbers differ from one another • CC-Link IE Field Network devices whose network numbers differ one from another	☞ Page 42 Port VLAN
Tag VLAN	When multiple networks are connected to multiple industrial managed switches, wiring needed for each network can be shared. Using the tag VLAN mode allows to reduce the amount of wiring among industrial managed switches.	☞ Page 44 Tag VLAN
Management VLAN	Set a management VLAN ID on a port which is used to transfer ping frames and other frames containing CLI commands between a personal computer and the industrial managed switch.	☞ Page 46 Management VLAN
Supporting optical fiber ports	Mounting appropriate SFP modules on optical fiber ports allows to use optical fiber cables to build a long-distance network (5km maximum).	☞ Page 22 Connections through optical fiber ports
High reliability/redundancy function	The following methods allow to continue communications even when a failure occurs on part of the transmission path: • LA: Treats two communication cables which connect between industrial managed switches, as a single virtual cable. • ERP: Connects industrial managed switches in a ring topology.	☞ Page 47 High Reliability/ Redundancy Function
Loop detection function	This function detects a loop generated due to a communication cable connection error or other error, and blocks the causing port to prevent the system from failing.	☞ Page 54 Loop Detection Function
Port mirroring function	The same frames as ones which flow in the industrial managed switch are output to the mirroring port. Doing so allows to analyze the status of the network with a packet analyzer, without stopping the system or disconnecting/re-connecting the communication cable.	☞ Page 58 Port Mirroring Function
Supporting CC-Link IE Field Network synchronous communication	The industrial managed switch can be used in the CC-Link IE Field Network synchronous communication.	☞ Page 58 Supporting CC-Link IE Field Network Synchronous Communication
Checking the status of the industrial managed switch	The status of the industrial managed switch can be checked by reading the current information (parameter settings, frame flow statistics, and log files) and the TRAP notification.	☞ Page 67 Checking the Status of the Industrial Managed Switch

MEMO

4 PROCEDURES BEFORE OPERATION

Take either of the following procedures before operating the industrial managed switch:

- Setting parameters with CLI commands
- Setting parameters through an SD memory card (Copying complete parameter settings to another industrial managed switch)

Point

If parameters are not set, the industrial managed switch operates with the default settings.

4.1 When Setting Parameters with CLI Commands

Take the following procedure:

1. Installing an industrial managed switch

Install an industrial managed switch into the control panel by using a DIN rail or module mounting brackets. (☞ Page 26 Installing an Industrial Managed Switch using a DIN Rail, Page 30 Installing an Industrial Managed Switch Using Module Mounting Brackets)

2. Wiring

Connect the power cable and the communication cables. (☞ Page 32 Wiring)

3. Powering on the industrial managed switch

Power on the industrial managed switch.

The POWER LED turns on, and the READY LED flashes.

4. Checking the LED status

Check that the POWER LED and the READY LED are on.

It takes approximately one minute for the industrial managed switch to be ready for operations after it is powered on.

5. Changing the parameter settings

Log in to the industrial managed switch from the terminal emulator (CLI) via Telnet, and change the default parameter settings. (☞ Page 60 Setting Procedure)

6. Checking the parameter settings

With CLI commands, check that the parameters are set correctly. (☞ Page 67 Checking the Status of the Industrial Managed Switch)

7. Powering on connected external devices

Power on connected external devices.

4.2 When Setting Parameters Through an SD Memory Card

To copy complete parameter settings to another industrial managed switch, take the following procedure:

1. Preparing an SD memory card which stores the parameter settings

Store the parameters that have been set on an industrial managed switch to an SD memory card. (☞ Page 60 Setting Procedure)

2. Installing an industrial managed switch

Install an industrial managed switch into the control panel by using a DIN rail or module mounting brackets. (☞ Page 26 Installing an Industrial Managed Switch using a DIN Rail, Page 30 Installing an Industrial Managed Switch Using Module Mounting Brackets)

3. Wiring

Connect the power cable and the communication cables. (☞ Page 32 Wiring)

4. Inserting the SD memory card

Insert the SD memory card which stores the parameter file (param.txt). (☞ Page 18 Inserting and Removing an SD Memory Card)

5. Powering on the industrial managed switch

Power on the industrial managed switch.

The POWER LED turns on, and the READY LED flashes.

6. Checking the LED status

Check that the POWER LED and the READY LED are on.

It takes approximately one minute for the industrial managed switch to be ready for operations after it is powered on.

7. Checking the parameter settings

Log in to the industrial managed switch from the terminal emulator (CLI) via Telnet, and check that the parameters are correctly set. (☞ Page 67 Checking the Status of the Industrial Managed Switch)

8. Changing the IP address

Check that neither the parameter-copy-source industrial managed switch nor a device having the same IP address exists on the same network, and change the IP address. (☞ Page 82 set ip)

9. Powering on connected external devices

Power on connected external devices.

Point

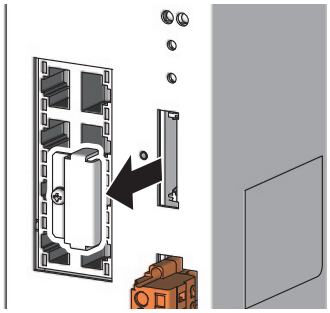
The procedure above stores the parameter settings from the SD memory card to the flash ROM of the industrial managed switch. Therefore, the SD memory card is no longer needed when the industrial managed switch is started next time.

4.3 Inserting and Removing an SD Memory Card

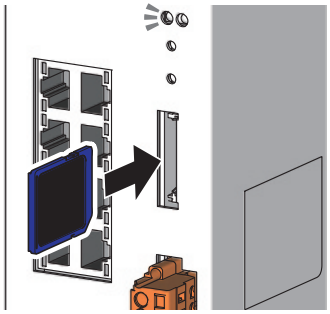
Follow the procedures described in this section to insert or remove an SD memory card while the industrial managed switch is powered on. If not, the data on the SD memory card may corrupt.

Insertion procedure

Check the orientation and insert an SD memory card, following the procedure below.

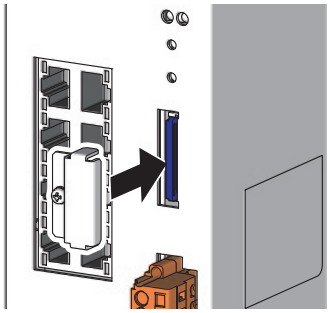


1. Loosen the screw (M2.5) on the dustproof SD memory card cover with a Phillips screwdriver and remove the cover.



2. Insert the SD memory card into the card slot until it clicks with the notched edge in the direction as illustrated. After inserting the card, check that it is inserted completely. Poor contact may cause malfunction.

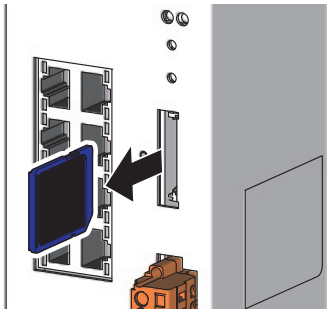
3. The CARD ACS LED starts flashing. When the card is ready to be used, the CARD ACS LED stops flashing and turns on.



4. Attach the dustproof SD memory card cover to the original position, and tighten the screw (M2.5) with a Phillips screwdriver. (Tightening torque: 0.36 to 0.48N·m)

Removal procedure

Remove the SD memory card when the CARD ACS LED is not flashing.



1. Loosen the screw (M2.5) on the dustproof SD memory card cover with a Phillips screwdriver and remove the cover.

2. Push in and release the SD memory card, and then pull the card out of the slot.

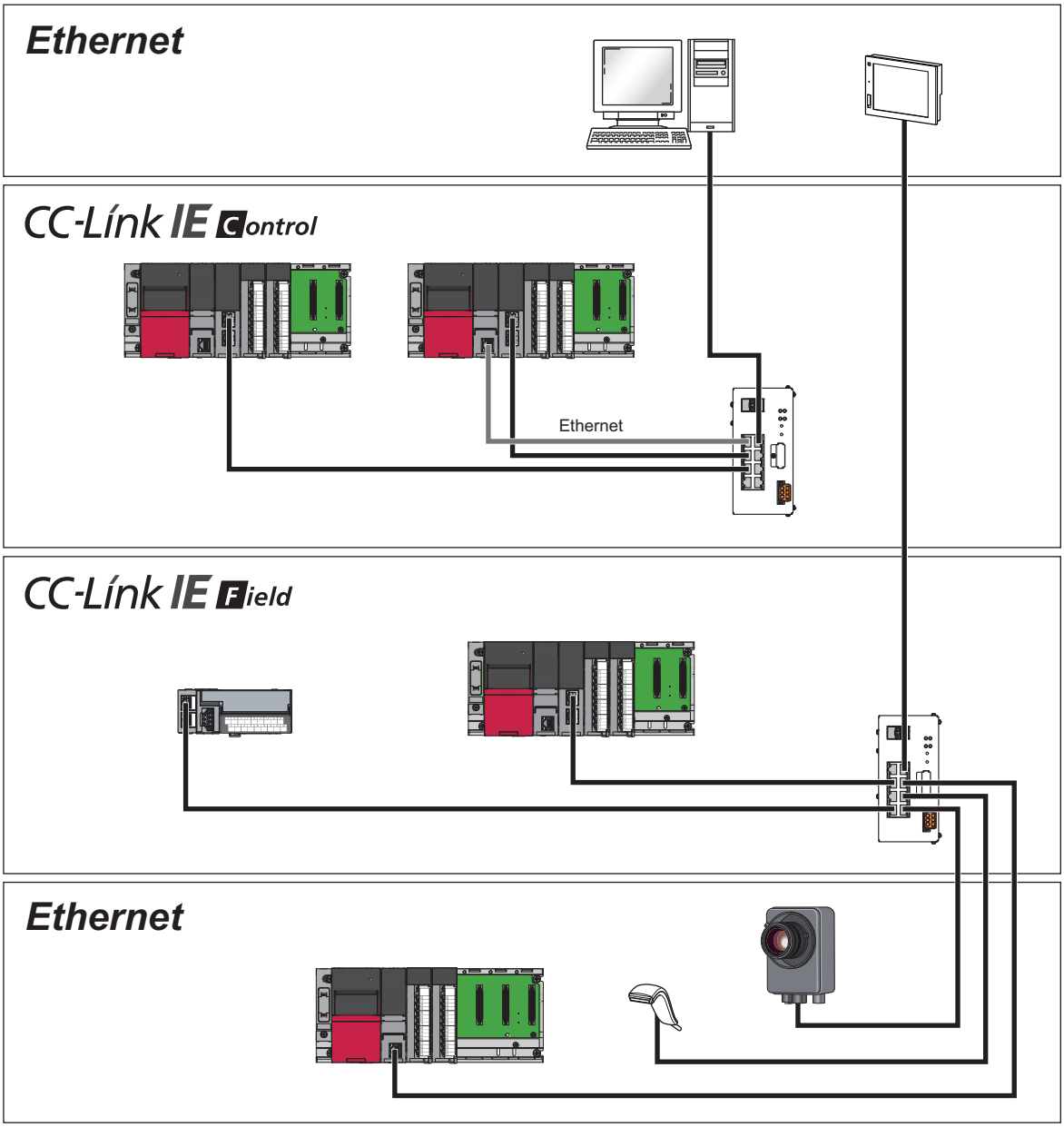
3. Attach the dustproof SD memory card cover to the original position, and tighten the screw (M2.5) with a Phillips screwdriver. (Tightening torque: 0.36 to 0.48N·m)

Precautions

- When inserting or removing the SD memory card, be careful not to drop the dustproof SD memory card cover.
- To re-insert the SD memory card immediately after removing it, check that the CARD ACS LED is off. If the SD memory card is re-inserted before the CARD ACS LED turns off, the card will not be recognized and the CARD ACS LED may not turn on after turning off. In this case, remove the SD memory card, and then re-insert the card again.
- Use the "format" command of the industrial managed switch to format the SD memory card. If the SD memory card is formatted by a command other than the "format" command, it may not be used by the industrial managed switch. (☞ Page 106 format)

5 SYSTEM CONFIGURATION

This chapter describes the system configuration using industrial managed switches.

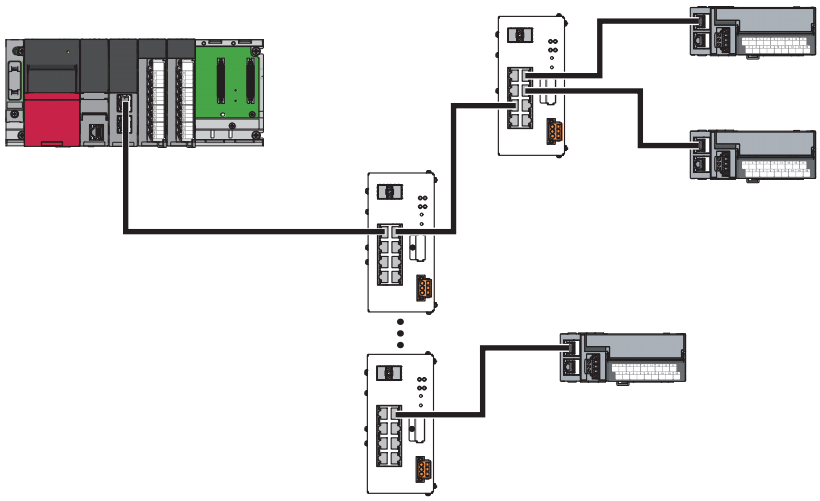


5.1 Configuration of Industrial Managed Switches

This section describes the configuration of industrial managed switches.

Star topology

Industrial managed switches are connected in multiple levels.



Precautions

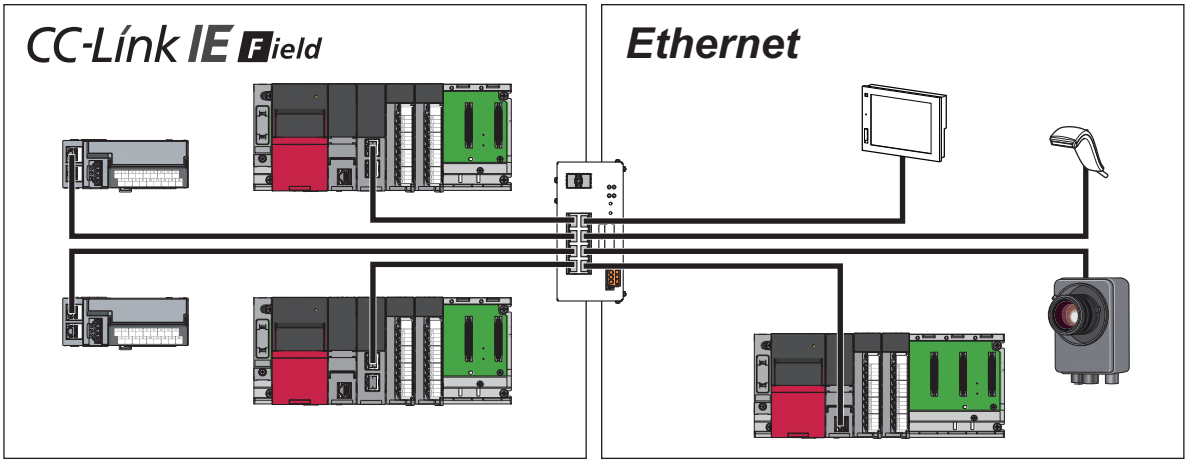
- The maximum number of cascade connections for CC-Link IE is 20.
- There is no restriction on the maximum number of cascade connections for Ethernet.*1

*1 When using a hub other than the industrial managed switches, contact the manufacturer for the maximum number of cascaded connections.

Mixed connections of Ethernet and CC-Link IE

The following networks can coexist in a configuration: (☞ Page 24 Supported Networks and Devices)

- Ethernet
- CC-Link IE Controller Network (when Ethernet cables are used)
- CC-Link IE Field Network



Connections through optical fiber ports

Installing appropriate SFP modules on optical fiber ports (OPT1 and OPT2) allows to build a long-distance network using optical fiber cables (5km maximum). (☞ Page 37 Wiring products)
Settings with CLI commands are not required.

Precautions

- OPT1 and P1 cannot be used at the same time. Select either one. This also applies to OPT2 and P2. The optical fiber ports and Ethernet ports are the same except for the type of communication cable.
- When a cable is connected to OPT1 while P1 is used, the communication is automatically switched to the one through the optical fiber cable. (The optical fiber ports have higher priority.) This also applies to OPT2 and P2.
- Do not connect a cable to P1 while OPT1 is used. In such a case, when the communication using the optical fiber cable fails, the transmission path may be switched to P1 unintentionally. This also applies to OPT2 and P2.
- CC-Link IE Controller Network modules that use optical fiber cables (such as RJ71GP21-SX) cannot be connected to the industrial managed switch.

Redundant connections (LA)

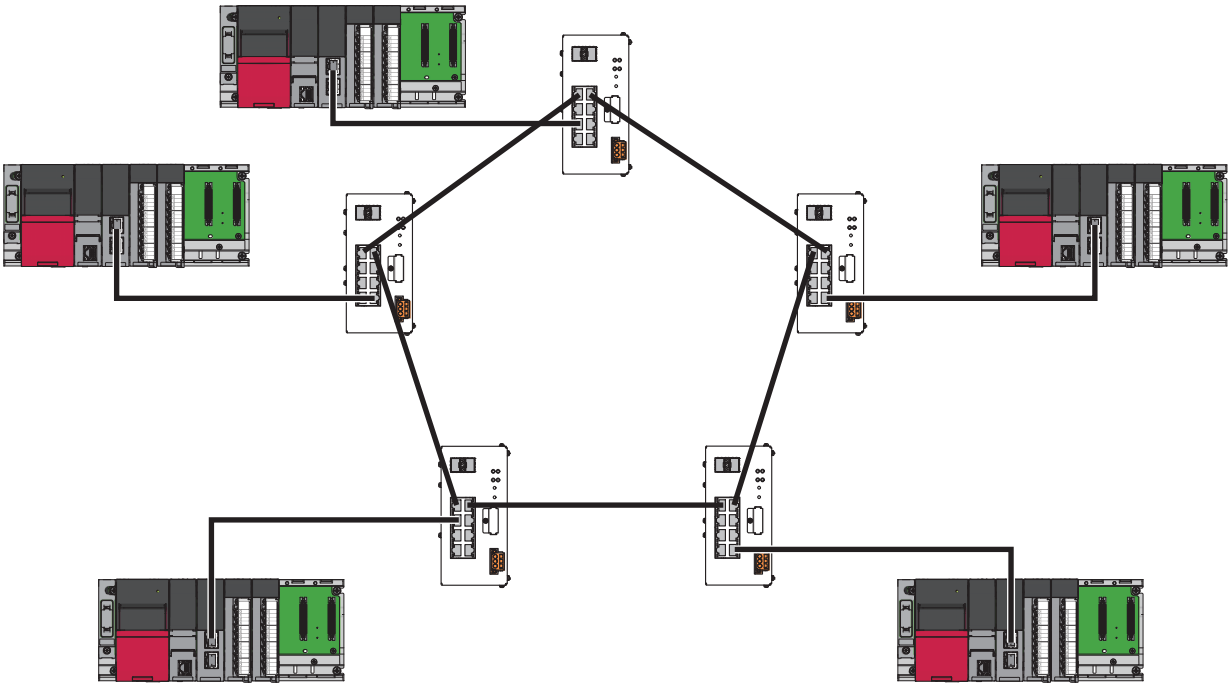
The Link Aggregation (LA) function allows to build a high reliability/redundancy network. Enable LA with a CLI command. (☞ Page 47 LA)

Precautions

- LA can work only on the following combinations of ports: P1 and P2 (or OPT1 and OPT2), P3 and P4, P5 and P6, or P7 and P8. The maximum number of combinations is four.
- On the combinations of OPT1/OPT2 and P1/P2, either LA or ERP can be effective. (A function which is set first becomes effective.)

Ring topology (ERP)

The Ethernet Ring Protection (ERP) function allows to build a high reliability/redundancy network. Enable ERP with a CLI command. (☞ Page 50 ERP)



Precautions

- ERP can work only on the combinations of OPT1 and OPT2 or P1 and P2. Both ports to be used must be optical fiber ports (OPT1 and OPT2) or Ethernet ports (P1 and P2).
- On the combinations of OPT1/OPT2 and P1/P2, either LA or ERP can be effective. (A function which is set first becomes effective.)

5.2 Supported Networks and Devices

The following table shows the combinations of networks that can be connected with the industrial managed switches at the same time.

◎: Setting is not required.

○: Setting of the Ethernet/CC-Link IE mix function is required. (☞ Page 38 Ethernet/CC-Link IE Mix Function)

△: Setting of the port VLAN or tag VLAN*2 is required. (☞ Page 42 Port VLAN, Page 44 Tag VLAN)

Supported device	Ethernet device	CC-Link IE Controller Network device (when Ethernet cables are used)	CC-Link IE Field Network device
Ethernet device	◎	○	○
CC-Link IE Controller Network device (when Ethernet cables are used)	○	◎*1	△
CC-Link IE Field Network device	○	△	◎*1

*1 Settings for using the port VLAN or tag VLAN mode are required for connecting CC-Link IE Controller Network (when Ethernet cables are used) devices having different network numbers or connecting CC-Link IE Field Network devices having different network numbers.

*2 The tag VLAN function in CC-Link IE can be used only on industrial managed switches with production information (first six digits) of 7104AV or later.

Communication cables and SFP modules

For communication cables and SFP modules supported by the industrial managed switches, refer to the following:

- Ethernet cables (☞ Page 36 Wiring products)
- SFP modules and optical fiber cables (☞ Page 37 Wiring products)

SD memory cards

The following table lists Mitsubishi-manufactured SD memory cards which can be inserted to the industrial managed switch.

Model	Description
NZ1MEM-2GBSD	2GB SD memory card
NZ1MEM-4GBSD	4GB SD memory card
NZ1MEM-8GBSD	8GB SD memory card
NZ1MEM-16GBSD	16GB SD memory card

For commercially available SD memory cards, refer to the following. Before using a commercially available SD memory card, check that the card does not affect the control of the target system.

TECHNICAL BULLETIN No.FA-A-0198

Precautions

- Inserting an SD memory card other than those above may cause a problem, such as corruption of data in the SD memory card and a shutdown of the system.
- Data in the SD memory card may corrupt if the following operation is performed while the SD memory card is being accessed: powering off the industrial managed switch, restarting the switch, or removing the SD memory card. The CARD ACS LED flashes while the SD memory card is being accessed. Wait for the LED status changes from flashing to on, and then power off the industrial managed switch, restart the switch, or remove the SD memory card.

6 INSTALLATION AND WIRING

Install an industrial managed switch into a control panel in either of the following ways:

- Using a DIN rail (☞ Page 26 Installing an Industrial Managed Switch using a DIN Rail)
- Using module mounting brackets (☞ Page 30 Installing an Industrial Managed Switch Using Module Mounting Brackets)

Precautions

The temperature of the module may become high during the setting and operation. Check that the temperature of the module is not high before installing/removing the module to avoid a burn.

The following caution mark for high temperature is shown on the production information marking of the module. (☞ Page 111 Production information marking)

6.1 Installation Environment

Install an industrial managed switch according to the installation environment shown in the general specifications. (☞ Page 12 General Specifications)

Do not install the industrial managed switch in the following place:

- Ambient temperature is outside the range of 0 to 60℃.
- Ambient humidity is outside the range of 5 to 95%RH.
- Condensation occurs because of rapid temperature change.
- Corrosive gas or combustible gas exists.
- Conductive powder such as dust and iron powder, oil mist, salinity, or organic solvent is filled.
- The industrial managed switch is exposed to direct sunlight.
- Strong electric field or strong magnetic field is generated.
- The industrial managed switch is subject to vibration and shock.

6.2 Installing an Industrial Managed Switch using a DIN Rail

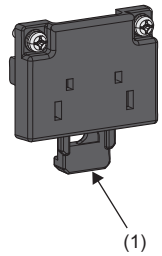
This section describes how to mount an industrial managed switch on a DIN rail. The following DIN rails are applicable (IEC 60715/JIS C 2812):

- TH35-7.5Fe
- TH35-7.5Al
- TH35-15Fe

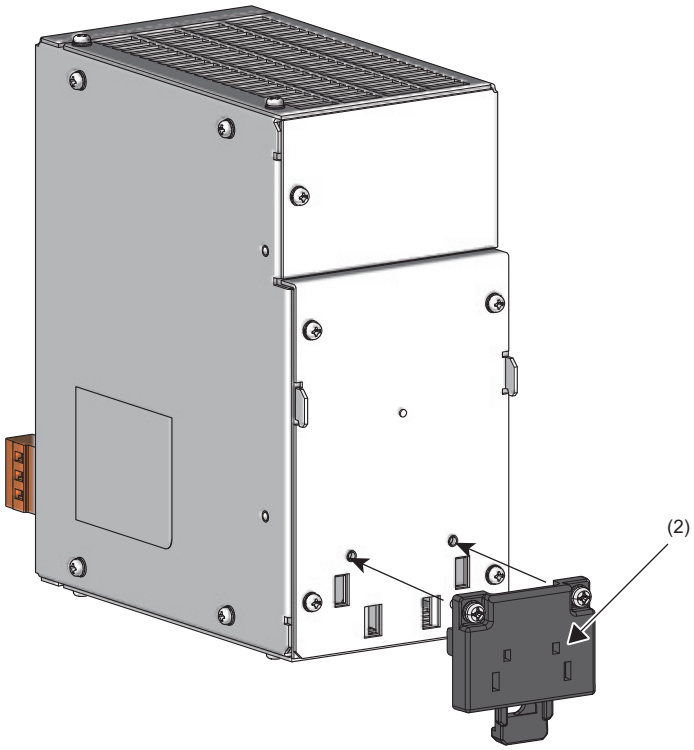
Installation/removal procedure

Installing a DIN rail adapter

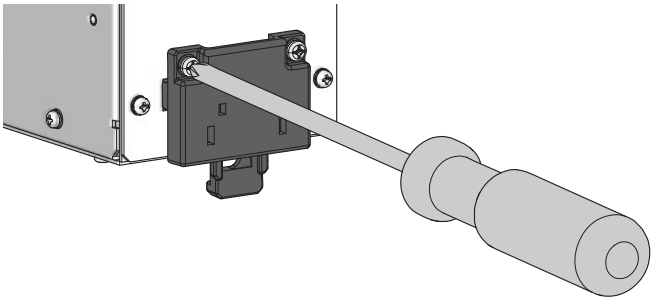
A DIN rail adapter provided with the product needs to be installed on the back of the industrial managed switch.



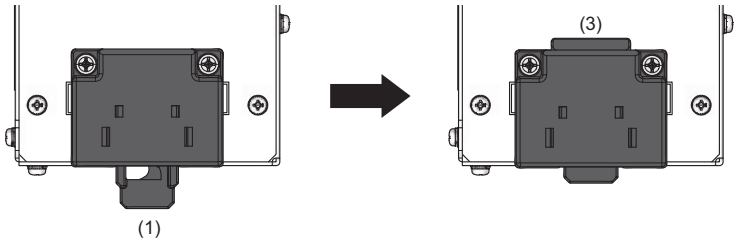
1. Project the hook (1) of the DIN rail adapter downward, as shown in the left figure.



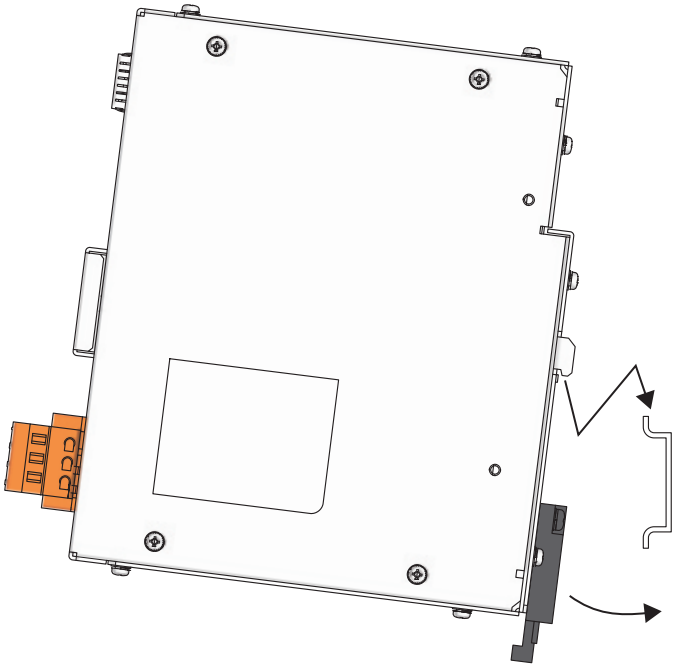
2. Push the tabs (2) on the DIN rail adapter into the two rectangular holes located horizontally on the back bottom of the industrial managed switch until they click. (Two spots)



3. Tighten the mounting screws (M3×10) of the DIN rail adapter with a screwdriver to fix the DIN rail adapter. (Two spots, tightening torque: 0.37 to 0.48N·m)



4. Push up the hook (1) so that the tab (3) projects upward.



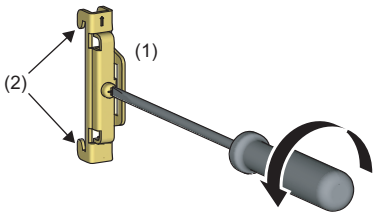
5. Hitch the upper part of the industrial managed switch to the DIN rail and push the lower part of the industrial managed switch until it clicks.

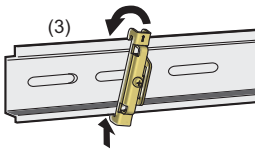
Precautions

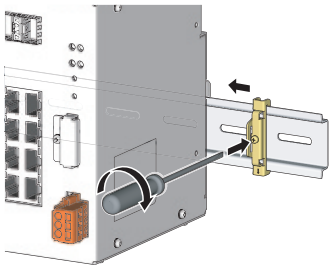
- The DIN rail adapter provided with the product cannot be used for the base unit of MELSEC iQ-R/Q series. The DIN rail adapter, R6DIN1, cannot be used as a DIN rail adapter for this product. Doing so may damage the product. The adapters are discriminated by the color of the screws. The screws of the DIN rail adapter provided with this product are sliver, and those of R6DIN1 are black.

Attaching DIN rail stoppers

After mounting the industrial managed switch with the DIN rail adapter on the DIN rail, attach the two stoppers provided with the product to the DIN rail, on both side of the industrial managed switch.



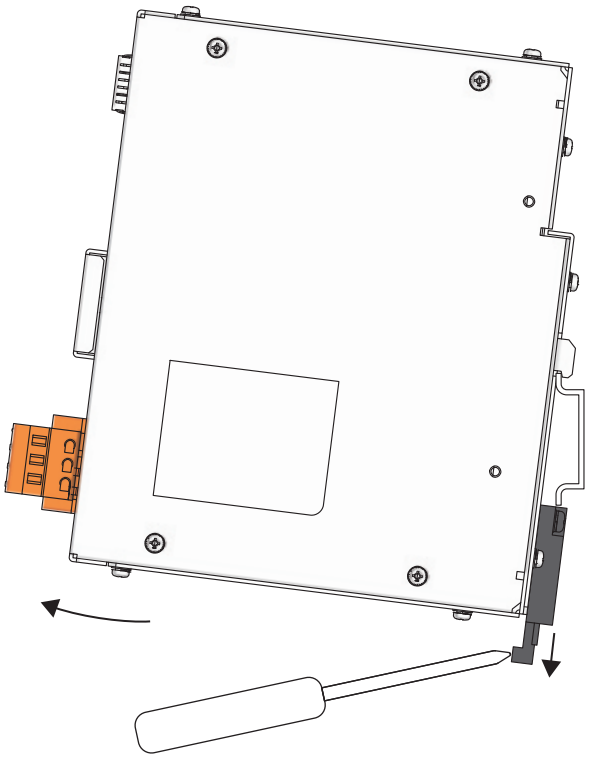




1. Loosen the screw at the upper part of a stopper (1).
2. For the stopper on the left side of the industrial managed switch, turn up the arrow mark printed on the stopper, and hitch the tab (2) at the lower part of the stopper to the DIN rail (3).
3. Hitch the tab at the upper part of the stopper to the upper part of the DIN rail.
4. Fix the stopper on the right side of the industrial managed switch upside down for the stopper on the left side.
5. Slide the stoppers to the ends of the industrial managed switch.
6. Tighten the screw of the stoppers with a screwdriver. The tightening torque is 1.00 to 1.35N·m.
7. Check that both stoppers are fixed on the DIN rail securely.

Removing the industrial managed switch

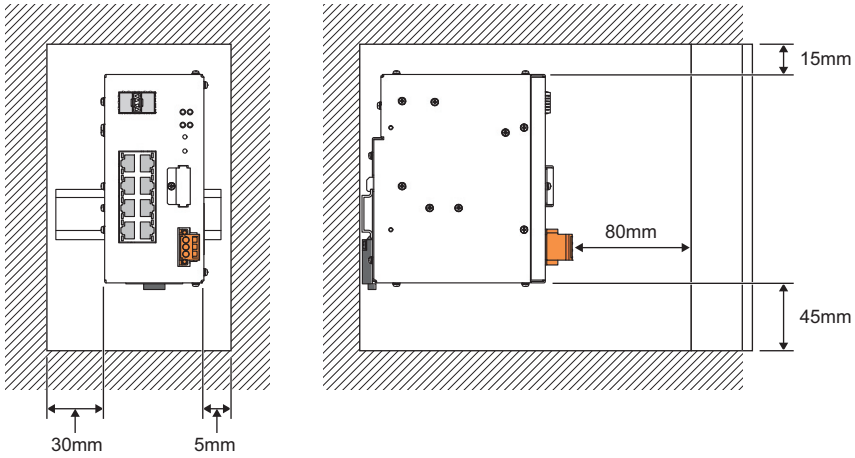
This section describes the procedure to remove the industrial managed switch from the DIN rail.



1. To remove the industrial managed switch, pull the lower part of the industrial managed switch, pushing down the DIN rail hook with a flathead screwdriver.

Installation position

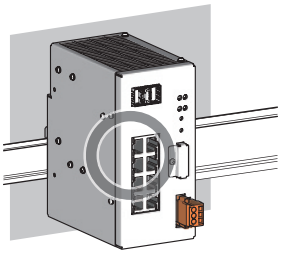
To improve the airflow and replace the industrial managed switch easily, provide clearance shown below or more between the industrial managed switch and the structures/parts.



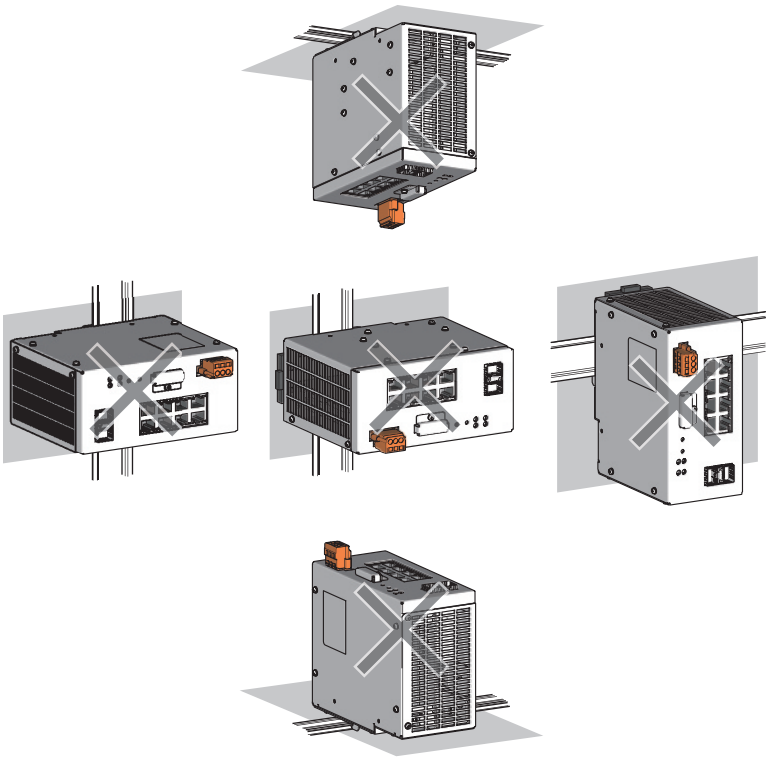
A shaded area shows the ceiling of a control panel, wiring duct, or parts.

Installation orientation

- To improve the airflow for heat dissipation, install an industrial managed switch in the following orientation.



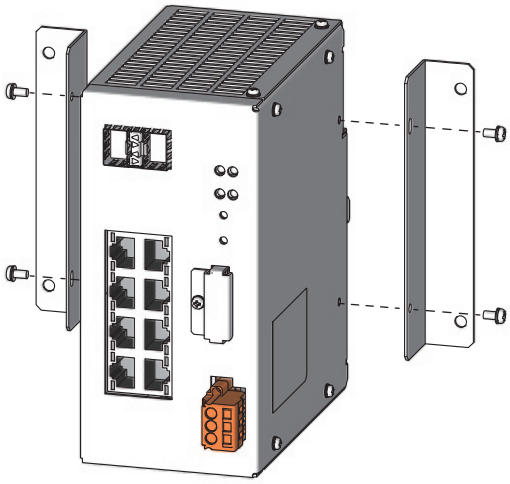
- Do not install an industrial managed switch in the following orientations. Doing so will hinder heat dissipation, causing a fire, failure, or malfunction.



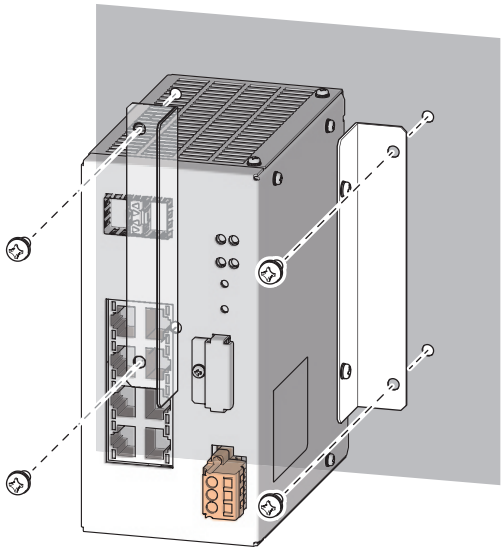
6.3 Installing an Industrial Managed Switch Using Module Mounting Brackets

Installation procedure

Module mounting brackets provided with the product needs to be installed to both sides of the industrial managed switch. (Mounting screws are also provided with the product.)



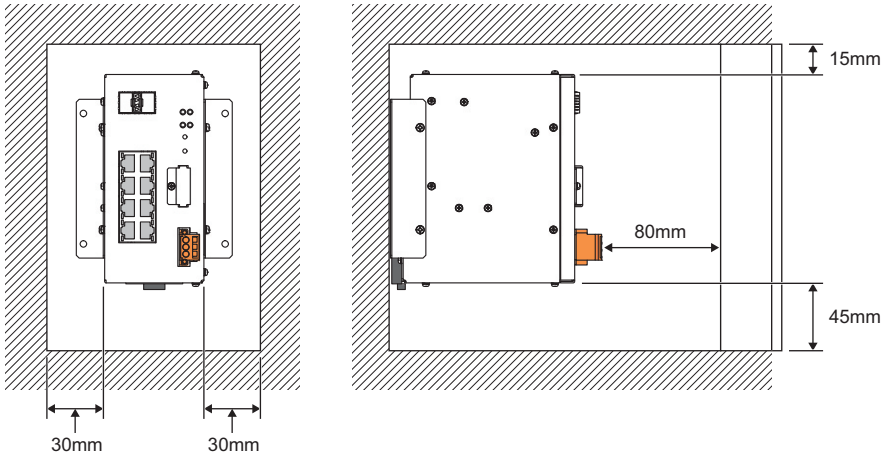
1. Tighten the small mounting screws (M3×6) with a screwdriver to fix the module mounting brackets to the industrial managed switch. (Four spots, tightening torque: 0.61 to 0.82N·m)



2. Tighten the large mounting screws (M4×12) with a screwdriver to fix the module mounting brackets to the wall. (Four spots, tightening torque: 1.40 to 1.89N·m)

Installation position

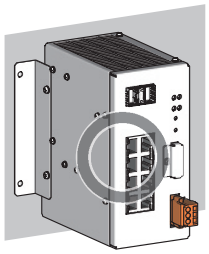
To improve the airflow and replace the industrial managed switch easily, provide clearance shown below or more between the industrial managed switch and the structures/parts.



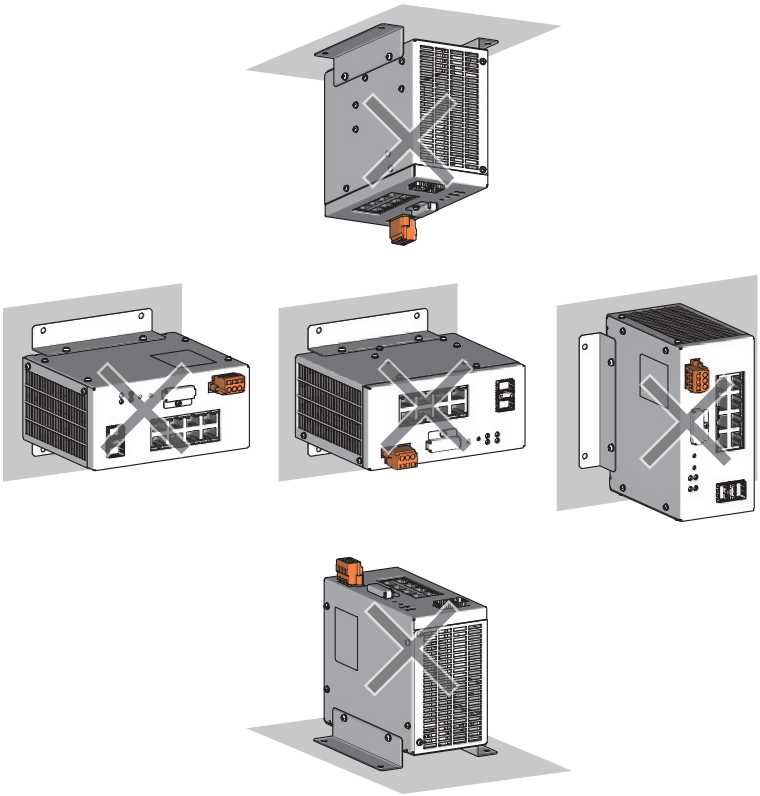
A shaded area shows the ceiling of a control panel, wiring duct, or parts.

Installation orientation

- To improve the airflow for heat dissipation, install an industrial managed switch in the following orientation.



- Do not install an industrial managed switch in the following orientations. Doing so will hinder heat dissipation, causing a fire, failure, or malfunction.



6.4 Wiring

Wiring to the terminal block for module power supply and FG

This section describes the wiring to the terminal block for module power supply and FG.

Tightening torque

Tighten the terminal block mounting screws within the specified torque range. Overtightening may damage the module case.

Screw	Tightening torque range
Terminal block mounting screw (M2.5)	0.2 to 0.3N·m

Applicable wire

The following table lists the wire to be connected to the terminal block for module power supply and FG.

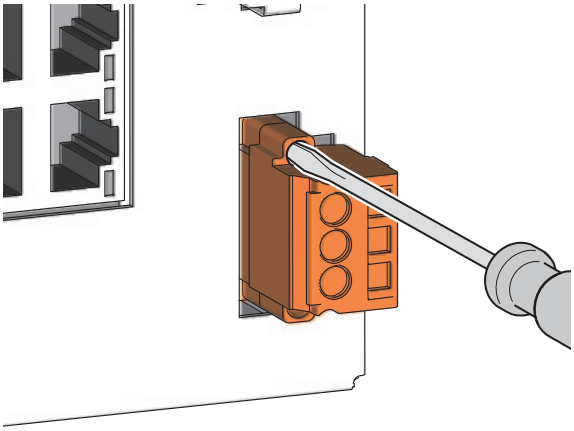
Diameter	Type	Material	Temperature rating
22 to 16 AWG	Stranded wire	Copper wire	75℃ or higher

Installing/removing a terminal block

To remove a terminal block, loosen the terminal block mounting screws with a flathead screwdriver.

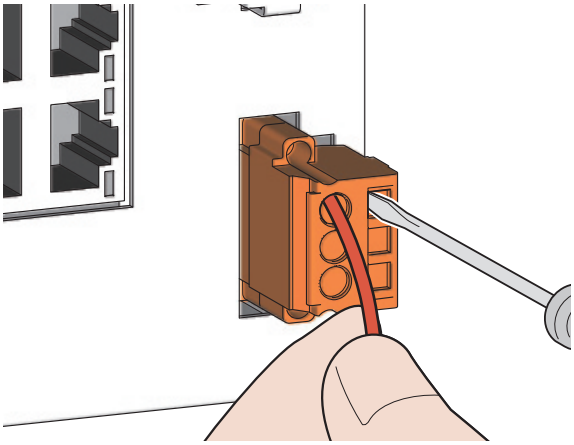
To install a terminal block, tighten the terminal block mounting screws with a flathead screwdriver.

Failure to secure the terminal block may cause drop, short circuit, and malfunction.



Connecting/disconnecting a cable

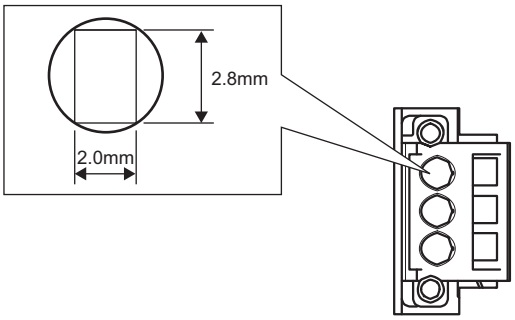
To connect a cable, open a round wire insertion opening by inserting a flathead screwdriver (the edge 3.5mm × 0.5mm) into a square opening on the terminal block for module power supply and FG, and tilting it to the right. (The round wire insertion opening cannot be opened if the flathead screwdriver is inserted shallowly. Check that the driver is inserted to the metal part by looking from the right window of the terminal block for the module power supply and FG.)
While the wire insertion opening is open, insert a wire having a bar solderless terminal into the opening.
After inserting the wire, pull it lightly to check that it is securely clamped.



To disconnect a cable, insert a flathead screwdriver to open the wire insertion opening in the same way as for connecting a cable.
Once after the wire insertion opening is opened, pull out a wire having a bar solderless terminal.

Precautions

- For wiring to the terminal block, use bar solderless terminals. If a stripped wire is inserted to the wire insertion opening, the wire cannot be securely clamped.
- For how long the wire should be stripped, follow the specifications of the bar solderless terminal used. To attach a bar solderless terminal to a wire, use a crimping tool.
- Before inserting a bar solderless terminal to the wire insertion opening, check the shape of the opening and the shape of the terminal. Insert the terminal paying attention to the orientation. If a bar solderless terminal larger than the wire insertion opening is inserted, the terminal block may be damaged.



■List of bar solderless terminals (reference products)

Name	Model	Applicable wire size	Bar solderless terminal tool	Manufacturer
Bar solderless terminal	NF 0.5-8, NF 0.5-10	0.3 to 0.5mm²	NH79A	NICHIFU TERMINAL INDUSTRIES CO., LTD.
	NF 0.75-8, NF 0.75-10	0.75mm²		
	NF 1.0-8, NF 1.0-10	0.9 to 1.0mm²		
	NF 1.5-8, NF 1.5-10	1.25 to 1.5mm²		
	AI 0.34-8TQ	0.3mm²	CRIMPFOX6	PHOENIX CONTACT GmbH & Co. KG
	AI 0.5-8WH, AI 0.5-10WH	0.5mm²		
	AI 0.75-8GY, AI 0.75-10GY	0.75mm²		
	AI 1-8RD, AI 1-10RD	1.0mm²		
	AI 1.5-8BK, AI 1.5-10BK	1.5mm²		
	FA-VTC125T9	0.3 to 1.65mm²	FA-NH65A	Mitsubishi Electric Engineering Co., Ltd.
	FA-VTCW125T9	0.3 to 1.6mm²		

Wiring to Ethernet ports

This section describes the wiring to Ethernet ports (P1 to P8).

Wiring method

Connect or disconnect an Ethernet cable, following the procedures below.

■Connecting a cable

1. Insert the Ethernet cable connector to the industrial managed switch until it clicks. Pay attention to the orientation of the connector.
2. Lightly pull the cable to check that it is securely connected.
3. Check that the SD/RD LED of the port to which the Ethernet cable is connected is on. Also, check the SPEED LED on/off status to see whether the communication speed is correct.*1 (☞ Page 10 PART NAMES)

*1 The time taken for the SD/RD LED to turn on after the cable is connected to the port may vary. The SD/RD LED usually turns on in a few seconds. Note, however, that the time may be extended further if the link-up processing is repeated depending on the status of the device on the line. If the SD/RD LED does not turn on, check that there is no problem with the Ethernet cable.

■Disconnecting a cable

1. Press the latch down and unplug the Ethernet cable.

Precautions

- Place the Ethernet cable in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cable or malfunction due to poor contact.
- Do not touch the core of the Ethernet cable-side or module-side connector, and protect it from dirt or dust. If any oil from your hand, or any dirt or dust sticks to the core, it can increase transmission loss, causing data link to fail.
- Check that the Ethernet cable is not disconnected/shorted or that there is no problem with the connector connection.
- Do not use Ethernet cables with broken latches. Doing so may cause disconnection of the cable or malfunction.
- Hold the connector part when connecting and disconnecting the Ethernet cable. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.
- For connectors to which no Ethernet cable is connected, attach provided connector covers to prevent foreign matter such as dust from entering the connectors.
- The maximum segment length of the Ethernet cable is 100m. However, the length may become shorter depending on the operating environment of the cable. For details, contact the manufacturer of the cables used.
- The bending radius of the Ethernet cable is limited. For details, check the specifications of the cable used.

Wiring products

Use the following devices to configure network using Ethernet ports.

■Ethernet cable

Application		Ethernet cable	Connector	Type
Ethernet	1Gbps	Category 5e or higher, straight cable (shielded, STP)	RJ45 connector	1000BASE-T
		Category 5e or higher, crossover cable (shielded, STP)		
	100Mbps	Category 5 or higher, straight cable (shielded, STP)		100BASE-TX
		Category 5 or higher, crossover cable (shielded, STP)		
	10Mbps	Category 3 or higher, straight cable (shielded, STP)		10BASE-T
		Category 3 or higher, straight cable (UTP)		
		Category 3 or higher, crossover cable (shielded, STP)		
		Category 3 or higher, crossover cable (UTP)		
CC-Link IE Controller Network (when Ethernet cables are used)		Category 5e or higher, straight cable (double shielded, STP)		The following conditioning cables: • IEEE 802.3 (1000BASE-T) • ANSI/TIA/EIA-568-B (Category 5e)
CC-Link IE Field Network				
Connecting industrial managed switches		Category 5e or higher, straight cable (shielded, STP)		1000BASE-T
		Category 5e or higher, crossover cable (shielded, STP)		

Wiring to optical fiber ports

This section describes the wiring to optical fiber ports (OPT1 and OPT2).

Wiring method

Connect or disconnect an optical fiber cable, following the procedures below.

An SFP module needs to be inserted to the port to use an optical fiber cable. (☞ Page 22 Connections through optical fiber ports)

■Connecting a cable

1. Insert an SFP module to the optical fiber port. Pay attention to the orientation of the SFP module.
2. Insert the optical fiber cable connector to the SFP module until it clicks. Pay attention to the orientation of the connector.
3. Lightly pull the cable to check that it is securely connected.
4. Check that the SD/RD LED of the port to which the optical fiber cable is connected is on.*1 (☞ Page 10 PART NAMES)

*1 The time taken for the SD/RD LED to turn on after the cable is connected to the port may vary. The SD/RD LED usually turns on in a few seconds. Note, however, that the time may be extended further if the link-up processing is repeated depending on the status of the device on the line. If the SD/RD LED does not turn on, check that there is no problem with the cable.

■Disconnecting a cable

1. Press the connector hook down and unplug the optical fiber cable.
2. Remove the SFP module from the optical fiber port.

Precautions

- Place the optical fiber cable in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the SFP module or cable or malfunction due to poor contact.
- Do not touch the optical fiber core of the optical fiber cable-side or SFP module-side connector, and protect it from dirt or dust. If any oil from your hand, or any dirt or dust sticks to the core, it can increase transmission loss, causing data link to fail.
- Check that the optical fiber cable is not disconnected or that there is no problem with the connector connection.
- Hold the connector part when connecting or disconnecting the optical fiber cable. Pulling the cable connected to the SFP module may result in damage to the SFP module or cable, or malfunction due to poor contact.
- For an unused optical fiber port, attach the provided connector cover to prevent foreign matter such as dust from entering the port. Touching the port with bare hands may result in injury.
- The maximum segment length of the optical fiber cable for 1000BASE-SX is 550m, and for 1000BASE-LX is 5km. However, the length may become shorter depending on the operating environment of the cable and the SFP module. For details, contact the manufacturers of the cable and the SFP module used.
- The bending radius of the optical fiber cable is limited. For details, check the specifications of the cable used.

Wiring products

Use the following devices to configure network using optical fiber ports.

■SFP module

For commercially available SFP modules, refer to the following. Before using a commercially available SFP module, check that the module does not affect the control of the target system.

TECHNICAL BULLETIN No.FA-A-0198

■Optical fiber cable (1000BASE-SX)

Optical fiber cable	Connector	Type
Optical fiber cable (multimode optical fiber (GI))	Duplex LC connector	The following conditioning cables: • IEEE 802.3 (1000BASE-SX) • IEC 60793-2-10 Types A1a.1

Optical fiber cables with connectors for 1000BASE-SX are available from Mitsubishi Electric System & Service Co., Ltd. (Catalogs of the optical fiber cables are also available.)

In addition, on-site connector polishing, terminal assembly, and fusion splicing is available. Please consult your local Mitsubishi representative.

Type	Model (Manufacturer)
Multimode optical fiber (GI)	QG series (Mitsubishi Electric System & Service Co., Ltd.)

■Optical fiber cable (1000BASE-LX)

Optical fiber cable	Connector	Type
Optical fiber cable (single-mode optical fiber)	Duplex LC connector	The following conditioning cables: • IEEE 802.3 (1000BASE-LX) • IEC 60793-2-50

The following table lists optical fiber cables for 1000BASE-LX (reference product).

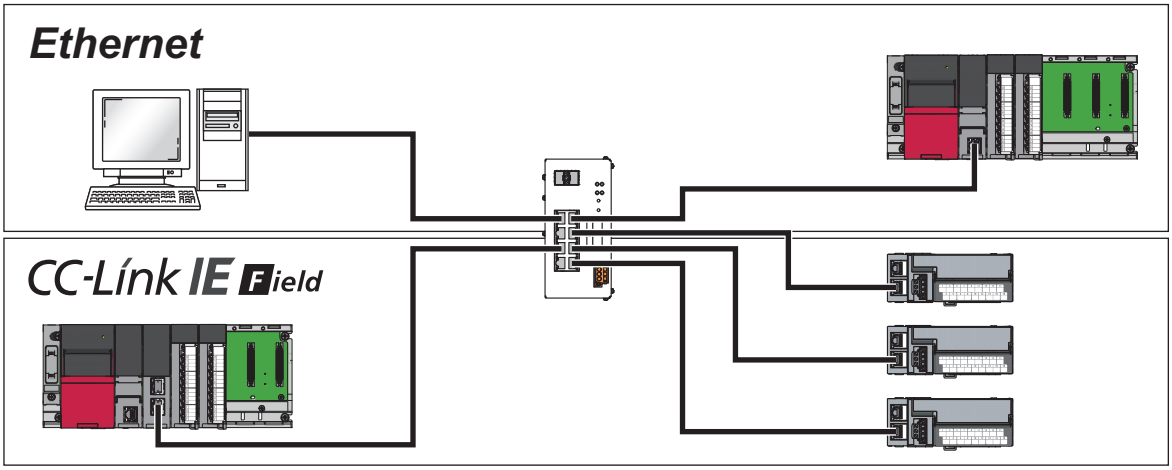
Type	Model (Manufacturer)
Single-mode optical fiber	STC-SM04 (SWCC SHOWA CABLE SYSTEMS CO., LTD.)

7 FUNCTIONS

7.1 Ethernet/CC-Link IE Mix Function

Without a VLAN function being set, the following devices can be connected to a single industrial managed switch so that they can coexist:

- Ethernet device and CC-Link IE Controller Network (when Ethernet cables are used) device
- Ethernet device and CC-Link IE Field Network device



Setting

Set the Ethernet/CC-Link IE mix function by using the following commands:

- "set fixdelay" command: Enable the CC-Link IE frame priority control (default) when the CC-Link IE synchronous communication function is used or a motion device or a similar device is connected. If such function or device is not used, it is recommended to disable the CC-Link IE frame priority control. (☞ Page 88 set fixdelay)
- "set port" command: Enable the CC-Link IE frame filtering on the port to which an Ethernet device is to be connected. (☞ Page 85 set port)

CC-Link IE frame priority control

CC-Link IE frames are preferentially processed than Ethernet frames. As a result, a cyclic transmission cycle of CC-Link IE is kept constant.

Restriction

Disable the CC-Link IE frame priority control on the following port when the tag VLAN is used. (☞ Page 88 set fixdelay)

- Port in the tag VLAN mode
- Port to which CC-Link IE device is connected

Communications become unavailable when the CC-Link IE frame priority control is enabled.

Precautions

- If Ethernet frames are output to a port that is connected to a CC-Link IE module, Ethernet frames are discarded on the CC-Link IE module. Accordingly, the LED which indicates reception of abnormal data may turns on in modules on the CC-Link IE or the number of reception error detections (SW0075 or SW007D) may be counted in the modules on the CC-Link IE Field Network.
- Disable the CC-Link IE frame priority control on the output port in the tag VLAN mode. If enabled, communications become unavailable. Do not set the tag VLAN when the CC-Link IE synchronous communication function is used or when a high-accuracy device such as a motion control device is connected.
- If the CC-Link IE Field Network synchronous communication function is not used or a motion device that needs synchronous accuracy is not connected, it is recommended to disable the CC-Link IE frame priority control. (Default: Enabled) When the CC-Link IE frame priority control is enabled, Ethernet frames may be discarded. When this function is enabled in the status where both Ethernet communication device and CC-Link IE Field Network communication device exist, communications may become unstable on the Ethernet communication device.

CC-Link IE frame filtering

This filtering prevents CC-Link IE frames from passing to ports that are connected to Ethernet devices. As a result, this prevents the Ethernet devices from being under heavy load to receive CC-Link IE cyclic frames or other frames that are passed at a high speed of 1Gbps.

Point

With the port VLAN mode, the following devices can be connected to a single industrial managed switch so that they can coexist: (☞ Page 42 Port VLAN)

- Ethernet device, CC-Link IE Controller Network (when Ethernet cables are used) device, and CC-Link IE Field Network device
- CC-Link IE Controller Network (when Ethernet cables are used) devices whose network numbers differ one another
- CC-Link IE Field Network devices whose network numbers differ one another

7.2 VLAN Function

The port VLAN or tag VLAN can be set for each port on the industrial managed switch.

- Port VLAN: Only one VLAN ID is set for one communication port. (☞ Page 42 Port VLAN)
- Tag VLAN: Multiple VLAN IDs can be set for one communication port. (☞ Page 44 Tag VLAN)

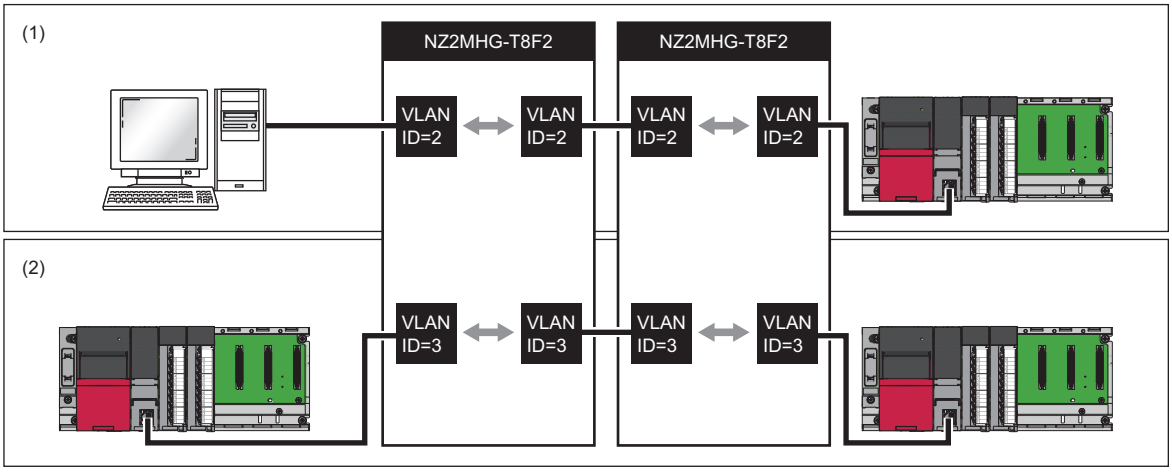
For how to change the port VLAN or tag VLAN setting, refer to the following.

☞ Page 86 set vlanmode

Network configuration

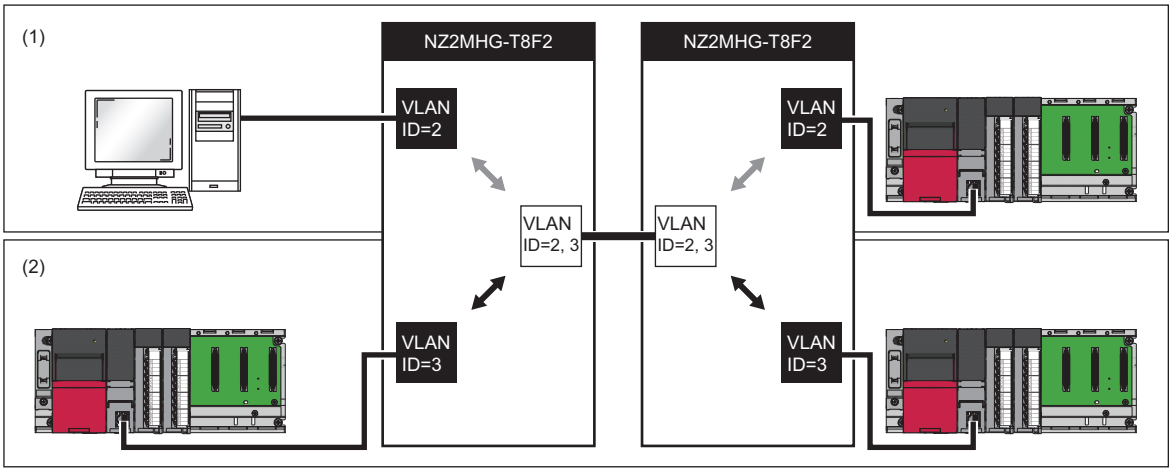
The following figures show the networks configured using the port VLAN and the tag VLAN.

■Port VLAN



(1) Network A
(2) Network B

■Tag VLAN



(1) Network A
(2) Network B

The following table lists the supported combinations of networks for the port VLAN and the tag VLAN.

◎: Port VLAN or tag VLAN can be used.

△: Only port VLAN can be used.

Network A	Network B	Production information	
		7103AV (first six digits) or earlier	7104AV (first six digits) or later
Ethernet	Ethernet	◎	◎
Ethernet	CC-Link IE device	△	◎
CC-Link IE device	CC-Link IE device	△	◎

Restriction

Disable the CC-Link IE frame priority control on the following ports when the tag VLAN is used in CC-Link IE. (☞ Page 88 set fixdelay)

- Port in the tag VLAN mode
- Port to which CC-Link IE device is connected

Communications become unavailable when the CC-Link IE frame priority control is enabled. Do not connect the device that uses CC-Link IE Field Network synchronous communication function to the port in the tag VLAN mode. (☞ Page 44 Tag VLAN)

Precautions

- When using CC-Link IE on the industrial managed switch with production information (first six digits) of 7103AV or earlier, do not set any ports to the tag VLAN mode. CC-Link IE frames are discarded on ports that are in the tag VLAN mode.
- The tag VLAN can be set even on the CC-Link IE communication port on the industrial managed switch with production information (first six digits) of 7104AV or later.
- Switching the VLAN mode resets the port to the default setting where the VLAN ID is set to 1. That is, when other ports are configured to input/output frames from/to ports with the VLAN ID = 1, frames are also transferred to a port where the VLAN mode was switched. To prevent this kind of unexpected transfer of frames, switch the VLAN mode with the communication cable disconnected.

Port VLAN

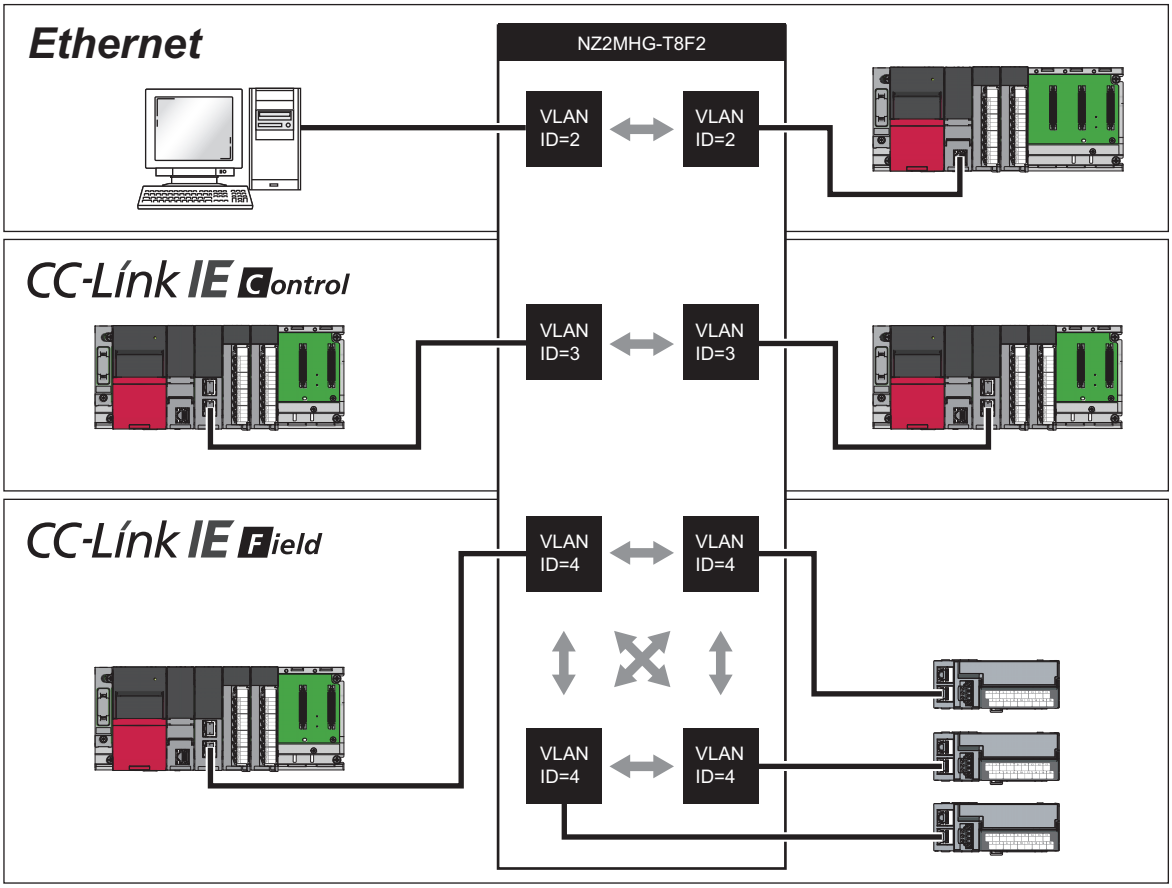
Set to separate a network to each port on the industrial managed switch.

With the port VLAN mode, the following devices can be connected to a single industrial managed switch so that they can coexist:

- Ethernet device, CC-Link IE Controller Network (when Ethernet cables are used) device, and CC-Link IE Field Network device
- CC-Link IE Controller Network (when Ethernet cables are used) devices whose network numbers differ one another
- CC-Link IE Field Network devices whose network numbers differ one another

Setting

Competing network communications can be isolated by assigning the same VLAN ID to ports to enable the ports to transfer the frames while assigning a different VLAN ID to other communication ports to prevent the ports from transferring the frames.



1. Switch the VLAN mode to the port VLAN.

- "set vlanmode" command (☞ Page 86 set vlanmode)

2. Set the VLAN ID for each port.

- "set portvid" command (☞ Page 87 set portvid)

Precautions

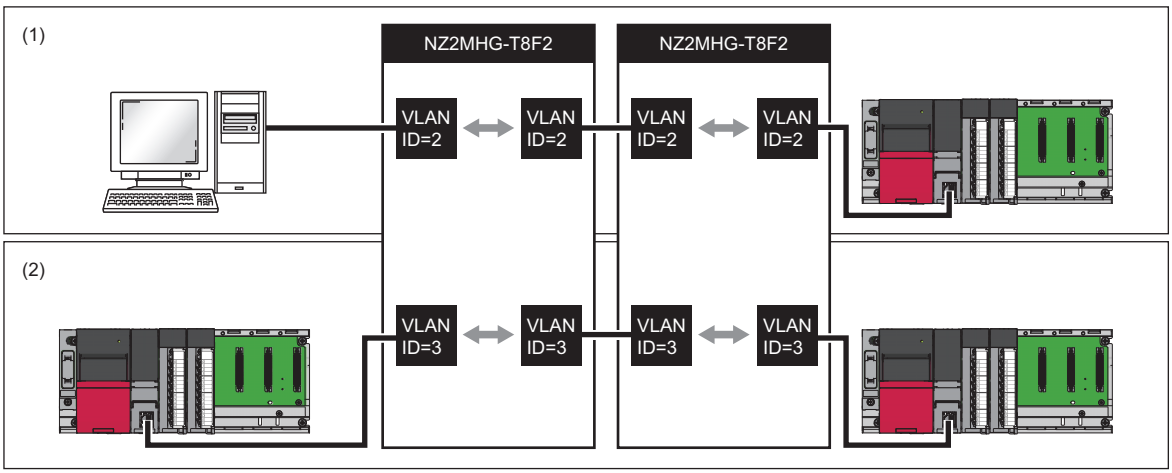
- Switching the VLAN mode resets the port to the default setting where the VLAN ID is set to 1. That is, when other ports are configured to input/output frames from/to ports with the VLAN ID = 1, frames are also transferred to a port where the VLAN mode was switched. To prevent this kind of unexpected transfer of frames, switch the VLAN mode with the communication cable disconnected.
- During a setting with CLI commands, if the VLAN ID of the used port is changed, it causes inconsistency with the management VLAN ID and thus CLI commands can no longer be issued for setting. In such a case, connect the personal computer to the port with the same VLAN ID as the management VLAN ID, which allows to continue the setting with CLO commands. Note, however, that login may not be allowed unless five minutes elapse. (☞ Page 46 Management VLAN)
- Non-VLAN-tagged communication frames and VLAN-tagged communication frames having VLAN ID = 0 (Priority Tagged Frame) can be received. However, VLAN-tagged communication frames having VLAN ID = other than 0 are discarded.
- The IEEE 802.1Q Priority Tagged Frame function is supported on products with production information (first six digits) of 7104AV or later.

Tag VLAN

When multiple networks are connected to multiple industrial managed switches, wiring needed for each network can be shared. Using the tag VLAN mode allows to reduce the amount of wiring among industrial managed switches.

Setting

When VLAN IDs are set in the port VLAN mode as shown below, each network requires a wire between the industrial managed switches.



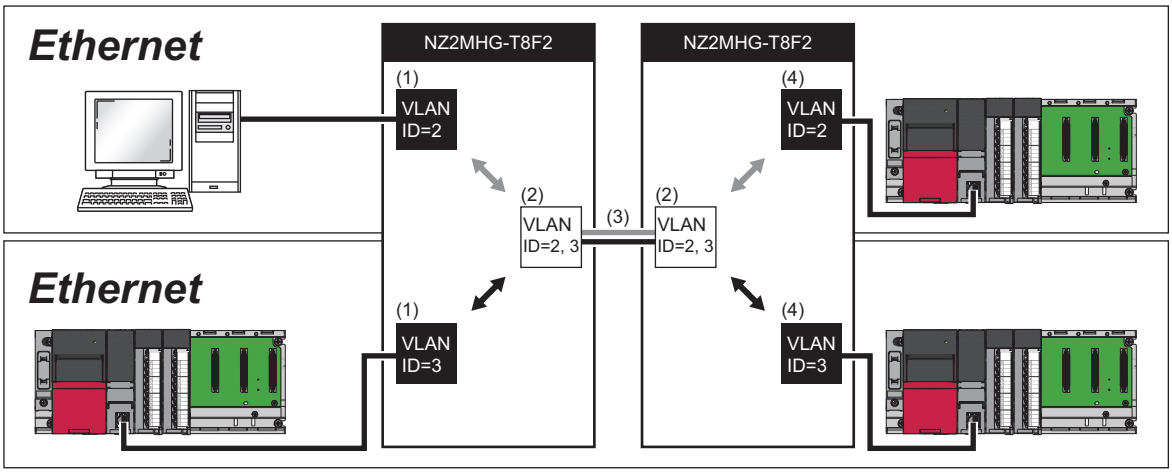
Setting the VLAN mode to the tag VLAN mode allows one port to be assigned with several VLAN IDs, and the frames of several networks can be sent/received with one wire, as described below:

(1) VLAN IDs are set in the port VLAN mode. Frames input from a connected external device are assigned with the same VLAN ID of that port and then transferred. The destination port receives and outputs frames whose VLAN ID matches the VLAN ID of the port and discards frames whose VLAN ID does not match.

(2) Switch ports that connect between the industrial managed switches to the tag VLAN mode, and assign two VLAN IDs to each port. By doing so, the ports receive and output two types of frames with different VLAN IDs. The output frames are passed through (3) and input to a port on the other industrial managed switch that is assigned with the same two VLAN IDs.

(3) Two types of frames with different VLAN IDs are sent/received with one cable.

(4) Two destination ports receive frames if the VLAN ID assigned to the frame matches, and output them to a connected external device after deleting the assigned VLAN ID.



1. Switch the VLAN mode of the ports that connects between the industrial managed switches to the tag VLAN mode.

- "set vlanmode" command (☞ Page 86 set vlanmode)

2. Assign or unassign VLAN IDs for each port.

- "add vlan" command (☞ Page 86 add vlan)
- "del vlan" command (☞ Page 87 del vlan)

Restriction

Disable the CC-Link IE frame priority control on the following ports when the tag VLAN is used in CC-Link IE. (☞ Page 88 set fixdelay)

- Port in the tag VLAN mode
- Port to which CC-Link IE device is connected

Communications become unavailable when the CC-Link IE frame priority control is enabled. Do not connect the device that uses CC-Link IE Field Network synchronous communication function to the port in the tag VLAN mode.

Precautions

- Do not connect ports that are assigned with different VLAN IDs. Frames will be discarded.
- Ports in the tag VLAN mode can connect and transfer frames only to ports on the industrial managed switch that are in the tag VLAN mode. MELSEC products must be connected to ports that are in the port VLAN mode.
- When using CC-Link IE on the industrial managed switch with production information (first six digits) of 7103AV or earlier, do not set any ports to the tag VLAN mode. CC-Link IE frames are discarded on ports that are in the tag VLAN mode.
- The tag VLAN can be set even on the CC-Link IE communication port on the industrial managed switch with production information (first six digits) of 7104AV or later.
- Switching the VLAN mode resets the port to the default setting where the VLAN ID is set to 1. That is, when other ports are configured to input/output frames from/to ports with the VLAN ID = 1, frames are also transferred to a port where the VLAN mode was switched. To prevent this kind of unexpected transfer of frames, switch the VLAN mode with the communication cable disconnected.
- VLAN-tagged communication frames having VLAN ID = other than 0 can be received. Communication frames having VLAN ID = 0 and non-VLAN-tagged communication frames are discarded.
- Do not set the VLAN ID to 0 for communication ports in the tag VLAN mode because the VLAN ID = 0 is for transferring priority frames. Communications may fail if the VLAN ID is set to 0.
- The CC-Link IE tag VLAN function is supported on products with production information (first six digits) of 7104AV or later.

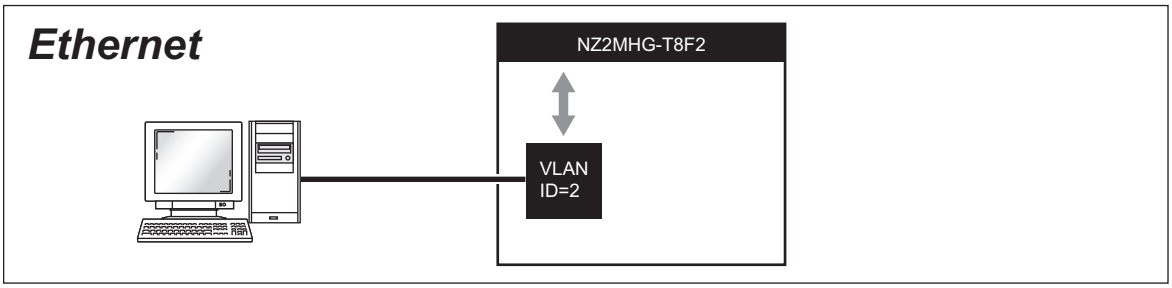
Management VLAN

Set a management VLAN ID on a port which is used to transfer ping frames and other frames containing CLI commands between a personal computer and the industrial managed switch.

Setting

Use the following command to change the management VLAN ID:

- "set mngvlan" command (☞ Page 88 set mngvlan)



Precautions

- Changing the management VLAN ID disconnects the connection of the CLI from the personal computer. In such a case, connect the personal computer to the port with the same VLAN ID as the new management VLAN ID, which can restore the connection of the CLI. Note, however, that login may not be allowed unless five minutes elapse.
- When changing the management VLAN ID without unexpected disconnection with the personal computer, set a VLAN ID on a new port, and then change the management VLAN ID to the new VLAN ID.
- When using CLI commands while CC-Link IE is working, enable the CC-Link IE frame filtering on the port that is connected to the personal computer. Otherwise, the connection between the personal computer and industrial managed switch may become unstable due to the load of CC-Link IE frames. (☞ Page 85 set port)
- If communication load is high, such as when a personal computer is connected to the industrial managed switch via several industrial managed switches, the execution of CLI commands may become unstable. In such a case, take a workaround such as reducing the communication load other than the communication between the personal computer and industrial managed switch, or providing a VLAN configuration and wiring dedicated to the personal computer and industrial managed switch.
- Do not set the VLAN ID to 0 because it is for transferring priority frames. Communications can be performed with management devices that do not send VLAN-tagged communication frames having VLAN ID = 0.

Point

In the default VLAN setting, all ports are set to the port VLAN mode and their VLAN IDs are set to 1. Additionally, the management VLAN ID is set to 1. That is, all ports can be used to access to the industrial managed switch.

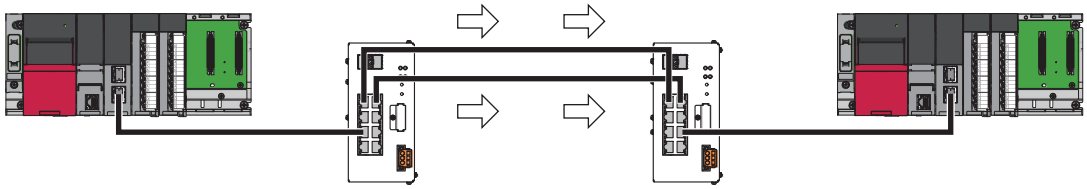
7.3 High Reliability/Redundancy Function

The following methods allow to continue communications even if a failure occurs on part of the transmission path:

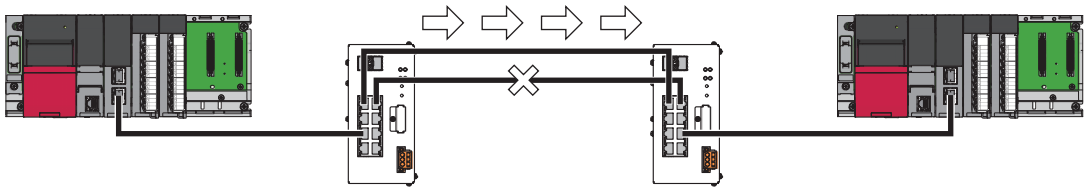
- LA: Treats two communication cables which connect between industrial managed switches, as a single virtual cable. (☞ Page 47 LA)
- ERP: Connects industrial managed switches in a ring topology. (☞ Page 50 ERP)

LA

Group two communication cables that connect between the industrial managed switches into an LA group to handle them as one virtual communication cable. (Compliance with the IEEE 802.3ad)



If one of two communication cables in an LA group is disconnected, the transmission path is automatically switched to the other communication cable to continue the communication.



Connection

An LA group can be any combination of the following: P1 and P2 (or OPT1 and OPT2), P3 and P4, P5 and P6, or P7 and P8. Connect the communication cables for LA settings to the ports having the same number on both of the industrial managed switches.

Setting

Use the following to set LA. Enable LA on both of the connected industrial managed switches.

- "set lag" command (☞ Page 89 set lag)

Precautions

- Four ports used in an LA group must be set to the same VLAN mode, the same VLAN ID, and the same communication speed. (☞ Page 86 set vlanmode, Page 86 add vlan, Page 87 set portvid, Page 85 set port)
- Do not set the VLAN ID to 0 because it is for transferring priority frames. LA does not operate properly if the tag VLAN is set and the VLAN ID is set to 0 on pair ports to be used for LA.
- LA and ERP cannot be set on the same port. The one set later will not be made effective. However, LA and ERP can be set on one industrial managed switch with different ports. (☞ Page 50 ERP)
- Do not set the loop detection function on a VLAN ID when the VLAN ID is assigned to a port where LA is enabled. The operation may not be performed normally. However, LA and the loop detection function can be set on one industrial managed switch with different ports that are assigned with different VLAN IDs. (☞ Page 54 Loop Detection Function)
- When Ethernet cables are used, the ERR LED will not be on even if two communication cables where LA is set are disconnected. Check the link status by seeing the SD/RD LEDs, SPEED LEDs, or event codes (TRAPs). (☞ Page 68 Event Code (TRAP)) When optical fiber cables are used, the ERR LED turns on even if a single cable having LA configured is disconnected.
- When using LA for CC-Link IE connection, an error may be detected because communication is disabled for a certain period of time (about one second) after a disconnection of one communication cable until the transmission path is switched to restore the communication.
- Regarding two communication cables having an LA group configured, only the SD/RD LED may turn on for one of the communication cables.

Setting and clearing during the operation

To prevent frames from looping, use the following procedure:

■When setting LA during operations:

1. Check that at least one port in the LA group is not connected with a communication cable.
2. Use the "set lag" command to enable LA. (☞ Page 89 Syntax)
3. Connect a communication cable to the port in the LA group.

■When clearing LA during operations:

1. Disconnect the communication cable from one port in the LA group to disable.
2. Use the "set lag" command to disable LA. (☞ Page 89 Syntax)

Forced LA switching

Forced LA switching can forcibly switch the communication to use one of the two communication cables in an LA group. This function is useful when replacing communication cables.

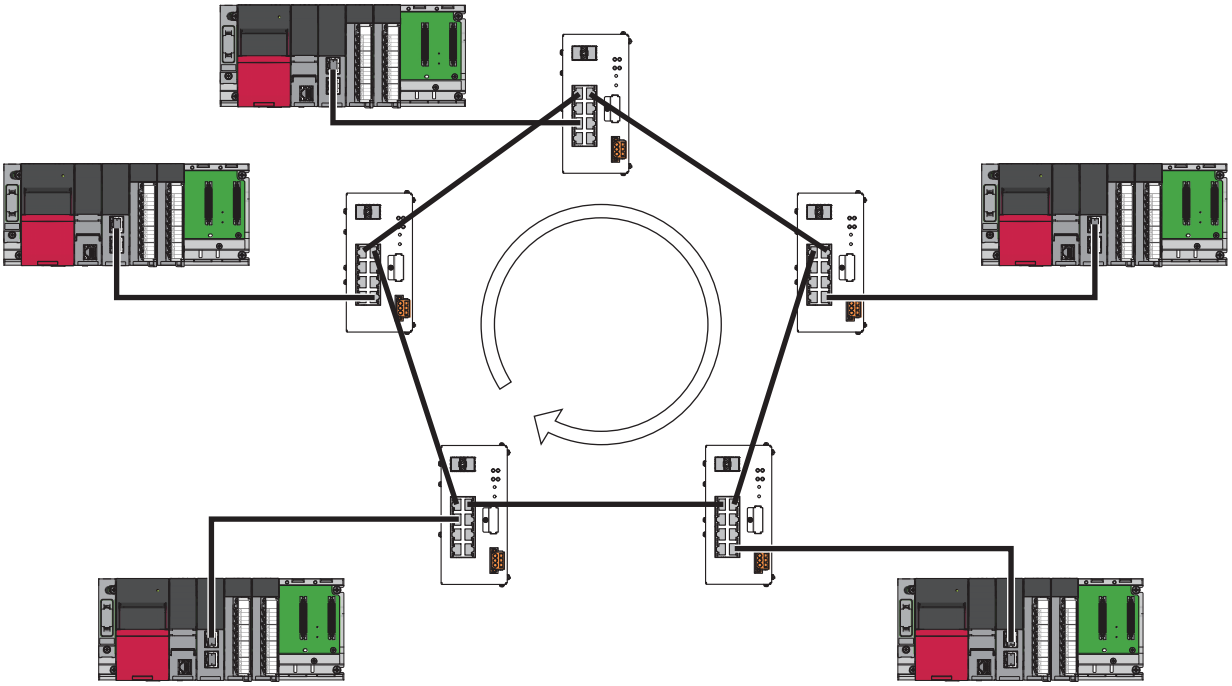
- "force laswitch" command (☞ Page 106 force laswitch)

Precautions

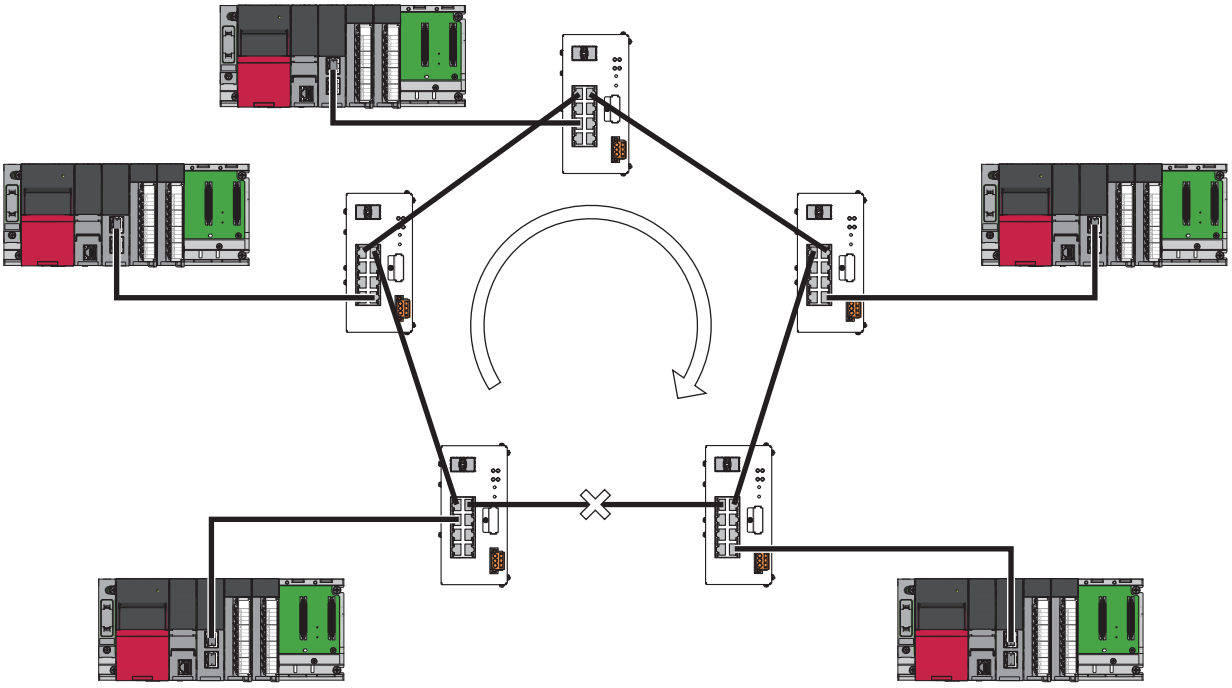
When the forced LA switching is set, a failure causes a link-down, instead of causing the transmission path to be switched.

ERP

ERP connects the industrial managed switches in a ring topology to build a redundant network configuration. (Compliance with the ITU-T G.8032 ver.1.0)



With ERP, when a communication cable disconnection or other failure occurs, the communication is automatically switched to a working transmission path so that the communication can continue.



Connection

An ERP ring must be composed of the industrial managed switches only. The combination of used ports must be either of OPT1 and OPT2 or P1 and P2.

The CC-Link IE Field Network diagnostics and CC-Link IE Controller Network diagnostics show an ERP ring topology as a star topology.

Setting

Use the following to set ERP. Enable ERP on all industrial managed switches that are connected in a ring.

- "set erp" command (☞ Page 90 set erp)

■RPL owner

Use the "rplowner" subcommand to assign one of the industrial managed switches connected in a ring to the RPL owner that monitors the status of ERP and switches the transmission path when a failure occurs.

Note that the "show param" command just shows values set with the parameters. That is, when the RPL owner is enabled on multiple industrial managed switches, the command shows that the RPL owner is enabled for all of the industrial managed switches. (☞ Page 91 show param)

Point

- If the RPL owner is not set, the RPL owner is determined by comparing the MAC addresses. In such a case, as the ERP protection occurs constantly, no ERP port link-down/link-up TRAP is shown or notified and no TRAP message is logged. (☞ Page 68 Event Code (TRAP))
- When the RPL owner is enabled on multiple industrial managed switches, one of them becomes the RPL owner. In such a case, temporarily multiple industrial managed switches work as the RPL owner, which can cause the communication to be disconnected several times due to switching the transmission path.

■CC frame send cycle

Use the "cc_cycle" subcommand to set the same CC frame send cycle for all industrial managed switches connected in a ring. Setting different values will turn on the ERR LEDs of the industrial managed switches of that block.

■Setting procedure

1. Check that a communication cable is not yet connected at least at one part of the ring.
2. Enable ERP sequentially on the industrial managed switches that will be connected in the ring. Set only one industrial managed switch to the RPL owner.
3. Connect a communication cable that is not yet connected in the ring.
4. Use the "show erpstate" command to check that the "ERP Status" is "Idle" five or more minutes after the cables are connected. (☞ Page 101 show erpstate) Although a ring topology failure or other failure occurs because CC frames cannot be received while setting ERP, the normal operation will start after five minutes.

■Clearing procedure

1. Disconnect a communication cable at least at one part of the ring.
2. Disable ERP sequentially on the industrial managed switches that were connected in the ring.

Precautions

- Failing to follow the setting procedure and clearing procedure causes looping, which can result in a storm that makes the network down. If ERP is enabled sequentially on industrial managed switches that are connected in the ring, the communication may be disabled due to transmission path switching each time ERP is enabled on an industrial managed switch because the MAC addresses learned by the industrial managed switches are not cleared.
- LA and ERP cannot be set on the same port. The one set later will not be made effective. However, LA and ERP can be set on one industrial managed switch with different ports.
- Do not set the loop detection function on a VLAN ID when the VLAN ID is assigned to a port where ERP is enabled. The operation may not be performed normally. However, ERP and the loop detection function can be set on one industrial managed switch with different ports that are assigned with different VLAN IDs. (☞ Page 54 Loop Detection Function)
- Do not set the VLAN ID to 0 because it is for transferring priority frames. ERP does not operate properly if the tag VLAN is set and the VLAN ID is set to 0 on port 1 and port 2 to be used for ERP.
- When ERP and CC-Link IE Field Network synchronous communication are used at the same time, CC-Link IE Field Network synchronous communication may not work successfully. (☞ Page 58 Supporting CC-Link IE Field Network Synchronous Communication) The transmission path switching time of ERP may not satisfy the performance specifications. (☞ Page 13 Performance Specifications)
- When using ERP for CC-Link IE connection, an error may be detected because communication is disabled for a certain period of time after failure occurrence until the transmission path is switched to restore the communication.
- More time may be needed to switch the transmission path after failure occurrence if ERP is composed of 17 or more industrial managed switches, if ERP comprises switches made by other manufacturers, or if ERP has not been properly configured.

Adding and removing the industrial managed switch while ERP is working

■Addition procedure

1. Check that the transmission path is not switched (the "show erpstate" command shows "Idle" for "ERP Status"). If the transmission path is switched ("ERP Status" is "Protection"), recover the part where a communication cable disconnection or other failure has been occurred. (☞ Page 101 show erpstate)
2. Disconnect communication cables from the industrial managed switches on both sides of the position to which an industrial managed switch to be added, and then connect a communication cable to only one side of the added industrial managed switch.
3. Enable ERP on the added industrial managed switch.
4. Connect a communication cable that is not yet connected.

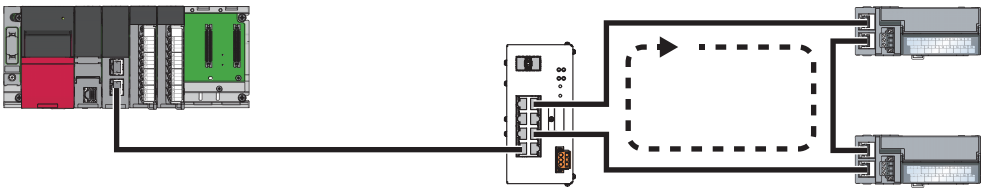
■Removal procedure

1. Check that the transmission path is not switched (the "show erpstate" command shows "Idle" for "ERP Status"). If the transmission path is switched ("ERP Status" is "Protection"), recover the part where a communication cable disconnection or other failure has been occurred. (☞ Page 101 show erpstate)
2. Disconnect communication cables from the industrial managed switch to be removed.
3. Connect a communication cable between the industrial managed switches that were connected on both sides of the removed industrial managed switch.
4. To remove the industrial managed switch which is assigned as the RPL owner, assign a new RPL owner.

7.4 Loop Detection Function

This function detects loops that occur on the network due to communication cable connection error or other error, and enables the following:

- Minimize impacts on the network by automatically blocking a port on the loop path to avoid a storm.
- It is easy to identify where a loop occurs because the ERR LED of the industrial managed switch turns on and the event code (TRAP) is shown and notified when a loop is detected. (☞ Page 68 Event Code (TRAP))



Setting

Use the following to set the loop detection function. Up to eight VLAN IDs can be set.

- "set loop" command (☞ Page 89 set loop)

The following two types of loop detection function are provided. They differ in frames that the industrial managed switch monitors to detect loops. Set either of them in accordance with the network to use.

- Loop detection with loop detection frames: Monitors frames that are generated and sent by the industrial managed switch to detect a loop in Ethernet. (☞ Page 55 Loop detection with loop detection frames)
- Loop detection with CC-Link IE frames: Monitors frames that are passing in CC-Link IE to detect a loop in CC-Link IE. (☞ Page 56 Loop detection with CC-Link IE frames)

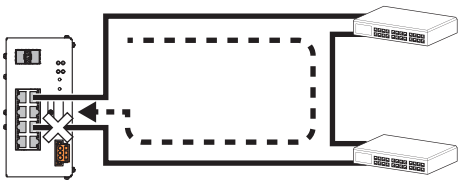
Precautions

- Do not set the loop detection with loop detection frames and the loop detection with CC-Link IE frames on ports that are assigned with the same VLAN ID. The operation may not be performed normally. To detect loops in both Ethernet and CC-Link IE, have a different VLAN ID for each network, and set the loop detection function for each VLAN ID.
- When a loop occurs on a path between the industrial managed switch and the destination of SNMP TRAP notification, TRAP notification may not be received because the port on the path is automatically blocked. (☞ Page 67 Using SNMP to check the status)
- Do not set the loop detection function and the high reliability/redundancy function (LA or ERP) on ports that are assigned with the same VLAN ID. The operation may not be performed normally. However, the loop detection function and the high reliability/redundancy function (LA and ERP) can be set on one industrial managed switch with different ports that are assigned with different VLAN IDs. (☞ Page 47 LA, Page 50 ERP)
- Do not set the VLAN ID to 0 because it is for transferring priority frames. The loop detection function may not be performed properly when the VLAN ID is set to 0.

Loop detection with loop detection frames

1. The industrial managed switch periodically sends loop detection frames and monitors the frames, and if a loop is detected, a newly connected port is automatically blocked to clear the loop temporarily.
2. The following is performed:

- The ERR LED of the industrial managed switch turns on. (☞ Page 10 PART NAMES)
- The "show unit" command displays a TRAP indicating that a loop is detected for the port. (☞ Page 95 show unit)
- When SNMP is used, a TRAP is sent indicating that a loop is detected. (☞ Page 68 Event Code (TRAP))



Clearing the detected loop

1. Use "show unit" command to identify which port is a cause. (☞ Page 95 show unit)
2. Disconnect the communication cable of the causing port to clear the loop. The blocked port is automatically released.

3. Check that the ERR LED turns off and the event code (TRAP) to ensure that the detected loop is cleared. (☞ Page 68 Event Code (TRAP))

Precautions

- In a network where the industrial managed switches and other hubs coexist, the loop detection function may not work successfully because other hubs discard loop detection frames when a storm occurs.
- When several loops occur, ports on the loop paths are automatically blocked by the industrial managed switch and the transmission path may be changed.

Loop detection with CC-Link IE frames

1. The industrial managed switch monitors CC-Link IE frames, and if a loop is detected, two ports on the loop path are automatically blocked.
2. The following is performed:

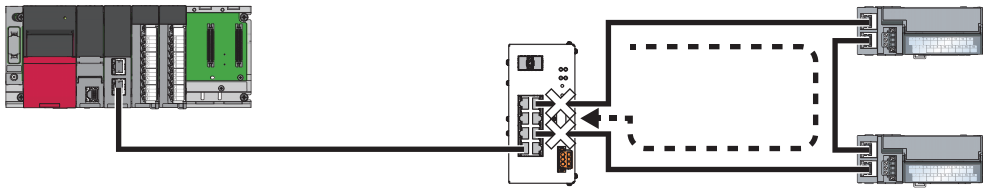
- The ERR LED of the industrial managed switch turns on. (☞ Page 10 PART NAMES)
- The "show unit" command displays a TRAP indicating that a loop is detected for the port. (☞ Page 95 show unit)
- When SNMP is used, a TRAP is sent indicating that a loop is detected. (☞ Page 68 Event Code (TRAP))

Precautions

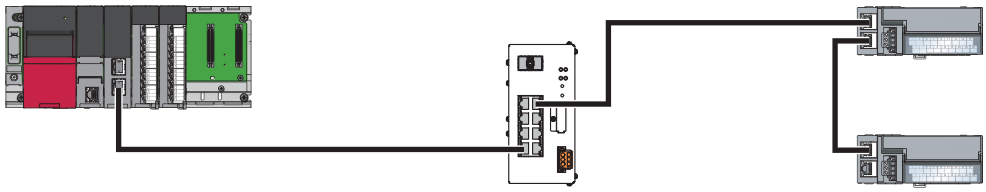
When a programmable controller detects a loop before the industrial managed switch can detect it, the programmable controller blocks the port, which may cause an error to be detected in CC-Link IE.

Clearing a detected loop on one industrial managed switch

When the following loop is detected, two ports are automatically blocked.



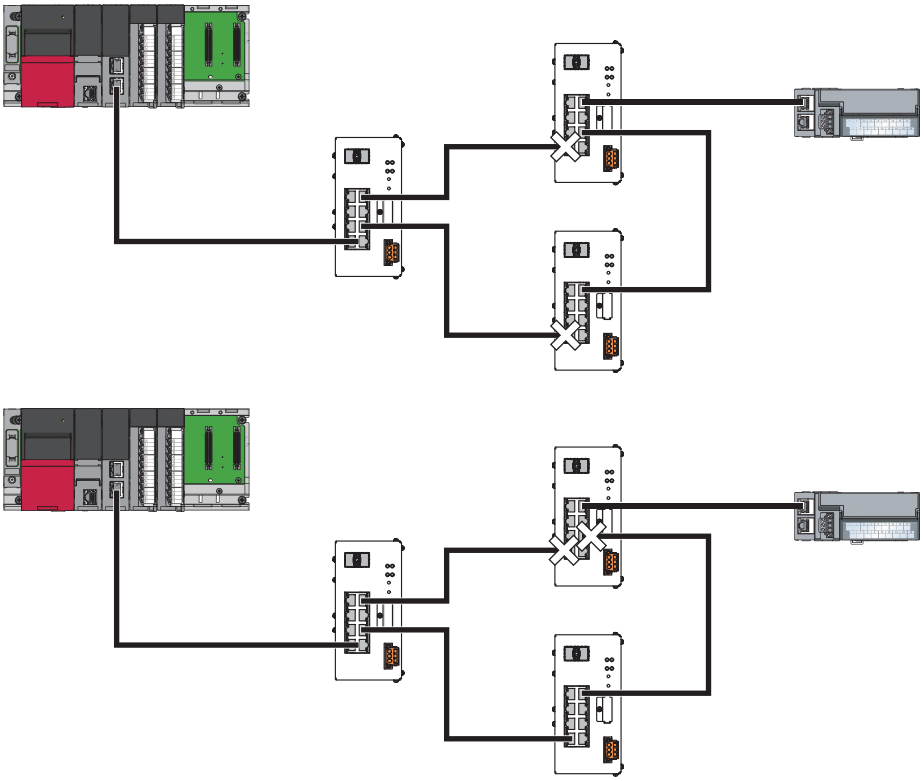
1. Use the "show unit" command to identify two blocked ports. (☞ Page 95 show unit)
2. Disconnect the communication cable of one of the two blocked ports to clear the loop.



3. Use the "set loop" command to disable the loop detection function on the VLAN ID with which the two blocked ports are assigned to release the ports from blocking. (☞ Page 89 set loop)
4. Check that the ERR LED turns off and the event code (TRAP) to ensure that the detected loop is cleared. (☞ Page 68 Event Code (TRAP))
5. Enable the disabled loop detection function again. (☞ Page 89 set loop)

Clearing a detected loop on multiple industrial managed switches

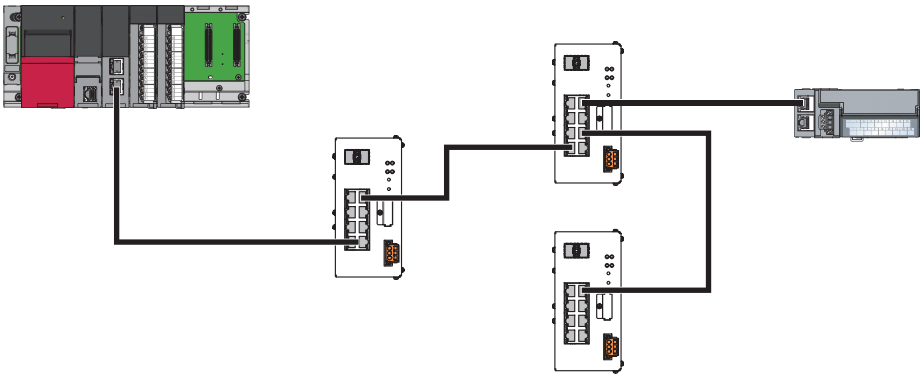
When the following loop is detected, there are such cases where one port each is blocked on two industrial managed switches, and where two ports are blocked on one industrial managed switch. (The resultant operation depends on the idle status of CC-Link IE frames and when the loop detection function is enabled.)



1. Check the following to identify the causing industrial managed switch and blocked ports:

- For the industrial managed switch: Check whether the ERR LED turns on, or the SNMP TRAP notification is made. (☞ Page 67 Using SNMP to check the status)
- For blocked ports: Check whether the "show unit" command displays a TRAP indicating that a loop is detected. (☞ Page 68 Event Code (TRAP))

2. Disconnect the communication cable of one of the two blocked ports to clear the loop. The port where the communication cable is disconnected is automatically released from blocking.



3. Check that the ERR LED turns off and the event code (TRAP) to ensure that the detected loop is cleared on the port that was released in step 2. (☞ Page 68 Event Code (TRAP))

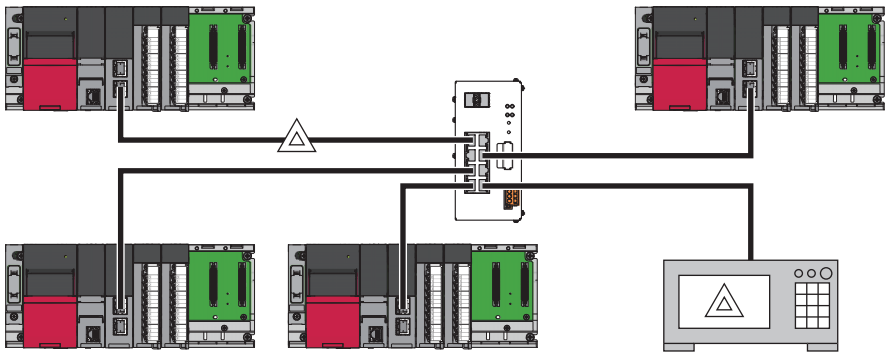
4. Use the "set loop" command to disable the loop detection function on the VLAN ID with which another blocked port is assigned to release the port from blocking. (☞ Page 89 set loop)

5. Check that the ERR LED turns off and the event code (TRAP) to ensure that the detected loop is cleared on the port that was released in step 4. (☞ Page 68 Event Code (TRAP))

6. Enable the loop detection function that was disabled in step 4. (☞ Page 89 set loop)

7.5 Port Mirroring Function

This function enables the same frames to be passed to a specified port and the mirroring port (P8). Network failure or other status can be analyzed by connecting a packet analyzer to the mirroring port, without stopping the system or connecting/disconnecting communication cables.



Setting

One input port and one output port to monitor can be specified.

- "set mirrorport" command (☞ Page 85 set mirrorport)

Precautions

- Error frames and frames that exceed 1Gbps band cannot be monitored.
- P8 cannot be specified as the input port or output port to monitor because it is used as the mirroring port.

7.6 Supporting CC-Link IE Field Network Synchronous Communication

The industrial managed switch can be used in the CC-Link IE Field Network synchronous communication.

Setting

Enable the CC-Link IE frame priority control.

- "set fixdelay" command (☞ Page 88 set fixdelay)

Precautions

- Ensure that ports to be used are in the port VLAN mode.
- This function supports the communication speed of 1Gbps only.
- Before powering on modules that use CC-Link IE Field Network synchronous communication, power on the industrial managed switch and check that the POWER LED and READY LED are on. (It takes about one minute.) Powering them on at once may cause an error to be detected on modules in the CC-Link IE field.

8 PARAMETER SETTINGS

Set parameters with CLI commands. (☞ Page 73 Overview of CLI Commands)

8.1 Setting Items

The following table lists available parameters.

Item	Description	CLI command to be used
Initial setting	Changes the password.	Page 81 set password
	Changes the IP Address.	Page 82 set ip
Ethernet/CC-Link IE mix function	Sets the CC-Link IE frame priority control.	Page 88 set fixdelay
	Sets the CC-Link IE frame filtering and others.	Page 85 set port
VLAN function	Switches the VLAN mode (to the port VLAN mode or the tag VLAN mode).	Page 86 set vlanmode
	Sets port VLAN.	Page 87 set portvid
	Sets tag VLAN.	Page 86 add vlan
	Sets the management VLAN ID.	Page 88 set mngvlan
High reliability/redundancy function	Sets the LA group.	Page 89 set lag
	Sets ERP.	Page 90 set erp
Loop detection function	Sets the loop detection function.	Page 89 set loop
Port mirroring function	Specifies the input port and output port to monitor.	Page 85 set mirrorport
Checking the status of the industrial managed switch	Sets SNMP TRAP notification.	Page 84 set alarm
	Specifies the destination IP address of SNMP TRAP notification.	Page 83 set trap

Precautions

- Some parameters listed above cannot be set simultaneously. The one set later will not be made effective. (☞ Page 76 List of CLI commands)

8.2 Setting Procedure

This section describes how to set parameters by using CLI commands.

1. Connect a personal computer to the industrial managed switch with an Ethernet cable.

2. Log in to the industrial managed switch from the terminal emulator (CLI) via Telnet. At login, set the new line character for Telnet as follows according to the setting of the terminal emulator.

- Receive: LF
- Send: CR+LF

3. Enter the user name and password to log in. (The default user name is "root", and the default password is "root".)

4. (Only when the industrial managed switch starts for the first time) Set the password and IP address. (The default IP address is 192.168.0.1.)

- "set password" command (☞ Page 81 set password)
- "set ip" command (☞ Page 82 set ip)

5. Use CLI commands to change parameter settings on the industrial managed switch. (☞ Page 76 List of CLI commands)

6. Save the parameter settings in the flash ROM. (Otherwise, the parameter settings will be erased when the industrial managed switch is powered off or reset.)

- "save" command (☞ Page 103 save)

7. Switch the industrial managed switch to the setting mode, and store the parameter file (param.txt) containing the parameter settings in an SD memory card (Recommended). (☞ Page 75 Operation mode, Page 18 Inserting and Removing an SD Memory Card)

- "backup" command (☞ Page 103 backup)

8. Check the parameter settings.

- "show param" command (☞ Page 91 show param)
- "show portparam" command (☞ Page 93 show portparam)
- "show vlan" command (☞ Page 94 show vlan)

9. Log out from Telnet.

- "logout" command (☞ Page 79 logout)

9 MAINTENANCE AND INSPECTION

This chapter describes items that must be maintained or inspected daily or periodically to properly use an industrial managed switch in optimal condition at all times.

9.1 Daily Inspection

The following table lists items that must be inspected daily.

Item	Inspection item	Inspection method	Criterion	Action
1	Installation status	Check the DIN rail adapter or the module mounting brackets for looseness.	The DIN rail adapter or the module mounting brackets must be fixed securely.	Retighten the screws.
2	Connection status	Check the terminal block mounting screws for looseness.	The terminal block mounting screws must not be loose.	Retighten the terminal block mounting screws.
		Check the cable connector for looseness.	The cable connector must not be loose.	Connect the connector securely.
3	POWER LED status	Check that the LED is on.	The LED must be on.	When the criterion is not satisfied, refer to the following and take the corrective action. ☞ Page 63 Troubleshooting with LED Indicators
4	READY LED status	Check that the LED is on.	The LED must be on.	
5	ERR LED status	Check that the LED is off.	The LED must be off.	

9.2 Periodic Inspection

The following table lists items that must be inspected one or two times every six months to one year.
When the equipment has been relocated or modified, or wiring layout has been changed, inspect the items.

Item	Inspection item	Inspection method	Criterion	Action
1	Ambient temperature*1	Measure the temperature by using a thermometer.	0 to 60℃	Create the environment that satisfies the criterion.
2	Ambient humidity	Measure the humidity by using a hygrometer.	5 to 95%RH	
3	Atmosphere	Measure corrosive gases.	No corrosive gases	
4	Power supply voltage	Measure a voltage between the terminals of 24VDC.	20.4 to 28.8V	Change the supply power.
5	Looseness and rattling	Touch the module to check for the looseness and rattling.	The module must be mounted securely.	Retighten the screws.
6	Attachment of dirt and foreign matter	Check visually.	Dirt and foreign matter must not be attached.	Remove them. Clean the industrial managed switch.
7	Connection status	Check the terminal block mounting screws for looseness.	The terminal block mounting screws must not be loose.	Retighten the terminal block mounting screws.
		Check the cable connector for looseness.	The cable connector must not be loose.	Connect the connector securely.

*1 A temperature in the control panel where the module is installed

MEMO

10 TROUBLESHOOTING

This section describes errors that may occur while using the industrial managed switch, error causes, and actions to be taken.

10.1 Troubleshooting Procedure

When the system has any trouble, perform troubleshooting in the following order:

1. Check LED indicators on the industrial managed switch. (☞ Page 63 Troubleshooting with LED Indicators)
2. Perform troubleshooting by symptom. (☞ Page 64 Troubleshooting by Symptom)
3. Check the status of the industrial managed switch. (☞ Page 67 Checking the Status of the Industrial Managed Switch)
4. Take actions in accordance with the event code (TRAP) and error message. (☞ Page 68 Event Code (TRAP), Page 71 Error Message)

10.2 Troubleshooting with LED Indicators

This section lists how to troubleshoot the system with the LEDs.
The status of the industrial managed switch can be identified depending on the on/off state of each LED as listed in the table below.

POWER LED	READY LED	ERR LED	Error description and cause	Action
On	On (During the startup: flashing)	Off	Normal	—
Off	—	—	The power supply cable is not connected.	Check that the power supply cable is connected correctly.
			There is no input from the module power supply (24VDC) or the input is not a specified one.	Check the output value of the module power supply (24VDC).
			The power supply cable is disconnected.	Check the output value of the module power supply (24VDC).
			Hardware failure	Replace the industrial managed switch.
On	Flashing (Two minutes or longer)	—	Hardware failure	Replace the industrial managed switch.
			Software failure	Press and hold the INITIALIZE switch (for about 10 seconds) to initialize.
On	On	On	Minor software failure	Press and hold the RESET switch (for about one second) to restart the industrial managed switch. (Restarting with the RESET switch causes an operation log to be left whereas restarting by turning the power off and on does not cause an operation log to be left.)
			The settings are not correct or an error is detected.	Check and correct the parameter settings. Use the "show unit" command or check the SNMP TRAP notification for error details. (☞ Page 67 Checking the Status of the Industrial Managed Switch)
			SD memory card failure	Replace the SD memory card.
			A loop is detected.	Eliminate the causes of the loop, although the loop detection function blocks the causing port automatically and the loop is cleared temporarily. (☞ Page 54 Loop Detection Function)
On	Off	Flashing	Hardware failure	Press and hold the RESET switch (for about one second) to restart the industrial managed switch. (Restarting with the RESET switch causes an operation log to be left whereas restarting by turning the power off and on does not cause an operation log to be left.) If the error is not eliminated after taking the above action, replace the industrial managed switch.

10.3 Troubleshooting by Symptom

This section describes troubleshooting methods for various symptoms.

Symptom	Error description and cause	Action
The communication is not enabled (when using an Ethernet cable).	The Ethernet cable is not connected.	• Check the SD/RD LED to see if communications are in progress. (☞ Page 10 PART NAMES) • Check the SPEED LED to see if linkage is being made. • Check the connections of the Ethernet cable.
	The Ethernet cable is disconnected.	Check whether the Ethernet cable is disconnected.
	The parameter settings do not match.	Use the CLI command to check whether the specified parameter settings match the settings on the connected external device. (☞ Page 93 show portparam)
	Hardware failure (Minor and serious)	Check the LED status. (☞ Page 63 Troubleshooting with LED Indicators) If the error is not eliminated after taking the above action, replace the industrial managed switch.
	Duplicate IP addresses	Check whether each device uses a unique IP address on the network.
	The Ethernet/CC-Link IE mix function is enabled but the CC-Link IE frame filtering is disabled.	Check that the CC-Link IE frame filtering is enabled. Ethernet communication may be disrupted by CC-Link IE communication.
	The VLAN ID is set to 0.	• Check whether the VLAN ID is set to other than 0. Do not set the VLAN ID to 0 because it is for transferring priority frames. • Using the show vlan all command, check the VLAN ID setting of each port.
The communication is not enabled (when using an optical fiber cable).	The SFP module or an optical fiber cable is not connected.	• Check the SD/RD LED to see if communications are in progress. (☞ Page 10 PART NAMES) • Check the connection of the SFP module and optical fiber cable.
	The optical fiber cable is disconnected.	Check whether the optical fiber cable is disconnected.
	The SFP module is not a specified one.	Check the model name of the SFP module.
	SFP module failure	Check the SFP module, and replace it.
	The settings do not match.	Use the CLI command to check whether the specified settings match the settings on the connected external device. (☞ Page 93 show portparam)
	Hardware failure (Minor and serious)	If the error is not eliminated after taking the above action, replace the industrial managed switch.
	The VLAN ID is set to 0.	• Check whether the VLAN ID is set to other than 0. Do not set the VLAN ID to 0 because it is for transferring priority frames. • Using the show vlan all command, check the VLAN ID setting of each port.
A communication error occurs.	The communication cable is disconnected.	• Check the SD/RD LED to see if communications are in progress. (☞ Page 10 PART NAMES) • Check the SPEED LED to see if linkage is being made. • Check the connections of the communication cable.
	The settings do not match.	Use the CLI command to check whether the specified settings match the settings on the connected external device. (☞ Page 93 show portparam) Use the port mirroring function to check frames. (☞ Page 58 Port Mirroring Function)
	Hardware failure (Minor and serious)	If the error is not eliminated after taking the above action, replace the industrial managed switch.

Symptom	Error description and cause	Action
Cannot log in to the industrial managed switch from the terminal emulator (CLI) via Telnet.	Communication failure	• Check the SD/RD LED to see if communications are in progress. (☞ Page 10 PART NAMES) • Check the SPEED LED to see if linkage is being made. • Check the connections of the Ethernet cable.
	Setting failure on the personal computer	Check the following settings on the personal computer: • Is the IP address set correctly? • Is any firewall or proxy server enabled? • Is the antivirus software blocking the communication?
	The management VLAN ID and the port do not match.	Check that the personal computer is connected to the port with which the management VLAN ID is assigned.
	The Ethernet/CC-Link IE mix function is enabled but the CC-Link IE frame filtering is disabled.	Check that the CC-Link IE frame filtering is enabled. Ethernet communication may be disrupted by CC-Link IE communication.
	Another user is logged into Telnet.	• Disconnect the Telnet connection of the other user. • If keep alive of the software to connect to Telnet is enabled, disable it.
	Duplicate IP addresses	Check the following. If duplication has occurred, change the IP address. (☞ Page 91 show param, Page 82 set ip) • Whether or not there exist more than one industrial managed switch having the IP address unchanged from the default. • Whether or not the industrial managed switch and the personal computer use the same IP address.
Unstable connection from Telnet on the personal computer	Duplicate IP addresses	Check the following. If duplication has occurred, change the IP address. (☞ Page 91 show param, Page 82 set ip) • Whether or not there exist more than one industrial managed switch having the IP address unchanged from the default. • Whether or not the industrial managed switch and the personal computer use the same IP address.
	The Ethernet/CC-Link IE mix function is enabled but the CC-Link IE frame filtering is disabled.	Check that the CC-Link IE frame filtering is enabled. Ethernet communication may be disrupted by CC-Link IE communication.
The CLI command cannot set parameters.	The specified value is invalid.	If the CLI displays an error, follow the description. Possible causes include an invalid value that is out of the acceptable range of the parameter and an invalid combination of parameters.
	Communication failure	• Check the SD/RD LED to see if communications are in progress. (☞ Page 10 PART NAMES) • Check the SPEED LED to see if linkage is being made. • Check the connections of the Ethernet cable.
No SNMP TRAP is shown.	Setting failure	Use the CLI command to check whether the settings are correct. (☞ Page 93 show portparam) Possible causes include incorrect IP address settings and incorrect TRAP mask settings.
	Communication failure	• Check the SD/RD LED to see if communications are in progress. (☞ Page 10 PART NAMES) • Check the SPEED LED to see if linkage is being made. • Check the connections of the Ethernet cable.
Slow Ethernet communication speed	A large amount of data is transferred.	Use the port mirroring function to check frames. (☞ Page 58 Port Mirroring Function) Possible causes include invalid frames and too many frames transferred.
	Communication failure	• Check the SD/RD LED to see if communications are in progress. (☞ Page 10 PART NAMES) • Check the SPEED LED to see if linkage is being made. • Check the connections of the Ethernet cable.
	The Ethernet/CC-Link IE mix function is enabled but the CC-Link IE frame filtering is disabled.	Check that the CC-Link IE frame filtering is enabled. Ethernet communication may be disrupted by CC-Link IE communication.
LA does not work successfully.	The settings do not match.	Check that LA is enabled on both connected industrial managed switches and that the same VLAN mode, same VLAN ID, and same communication speed are set on the both switches. (☞ Page 47 LA)
	The connected ports are not correct.	Check that two ports in the LA group are connected correctly. Check that ports that have the same port number are connected.
	The VLAN ID is set to 0.	• Check whether the VLAN ID is set to other than 0. Do not set the VLAN ID to 0 because it is for transferring priority frames. • Using the show vlan all command, check the VLAN ID of the port of which LA setting is enabled.

Symptom	Error description and cause	Action
ERP does not work successfully.	The settings do not match.	Check that ERP is enabled on all industrial managed switches in the ring and check that the RPL owner, VLAN ID, and CC frame send cycle are set correctly. (☞ Page 50 ERP)
	The connected ports are not correct.	Check that OPT1 and OPT2 or P1 and P2 are connected.
	It takes a long time for ERP to start.	It takes about five minutes for ERP to start normal operation after the settings of the industrial managed switches are completed or the configured switches are turned on. To check the ERP operating status, use the "erpstate" command. (☞ Page 101 show erpstate)
	It takes 10ms or more to switch the transmission path after failure occurrence.	• Check whether the settings of ERP are appropriate. • Check whether ERP is composed of 17 or more industrial managed switches. (☞ Page 13 Performance Specifications) • Check whether ERP comprises switches made by other companies.
	The settings are changed during the operation.	To change ERP settings while the industrial managed switches are working, disable ERP, and then change the settings.
	The VLAN ID is set to 0.	• Check whether the VLAN ID is set to other than 0. Do not set the VLAN ID to 0 because it is for transferring priority frames. • Using the show vlan all command, check the VLAN ID of the ports on which ERP is operated (OPT1 and OPT2 or P1 and P2).
The CARD ACS LED does not light up properly.	Removal of an SD memory card while the READY LED is flashing	Restart the industrial managed switch by turning the power off and on or using the RESET switch. (☞ Page 10 PART NAMES)
	Insertion of an SD memory card before the CARD ACS LED goes out	Remove the SD memory card, and then re-insert the card again.
	Hardware failure	If the error is not eliminated after taking the above action, replace the SD memory card.
• The LED which indicates reception of abnormal data lights up on the CC-Link IE module. • The number of reception error detections is counted on the CC-Link IE Field Network module.	With CC-Link IE frame priority control enabled, Ethernet frames are output to a port connected with a CC-Link IE module.	• Set the VLAN to distinguish the ports for Ethernet and the ports for CC-Link IE. • Do not specify a CC-Link IE module as the destination of Ethernet frames.

10.4 Checking the Status of the Industrial Managed Switch

Use CLI commands and SNMP to check the following details.

○: Available, ×: Not available

Description	CLI command		SNMP
Parameter settings	○	• Page 91 show param • Page 93 show portparam • Page 94 show vlan	×
TRAP and log file	○	• Page 95 show unit • Page 98 show log	○
Frame flow statistics	○	• Page 100 show statistics	○

Using CLI commands to check the status

Use the CLI commands to read the parameter settings, TRAPs, log files, and frame flow statistics.

Connect a personal computer to the industrial managed switch with an Ethernet cable, and use CLI commands to show desired information on the personal computer. (☞ Page 60 Setting Procedure)

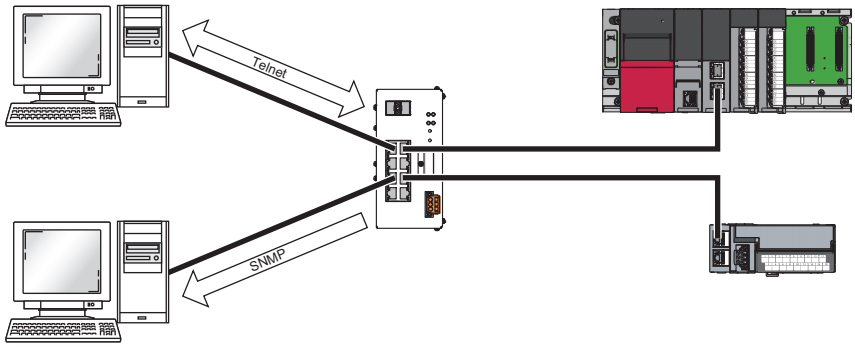
The information that is read from log files (operation.log and alarm.log) by using the CLI command "show log" can be stored in an SD memory card by using another CLI command. (☞ Page 103 backup)

Using SNMP to check the status

SNMP enables TRAP notification and read from frame flow statistics.

Use the following commands to enable SNMP TRAP notification:

- "set alarm" command (☞ Page 84 set alarm): Enables TRAP notification.
- "set trap" command (☞ Page 83 set trap): Specifies the destination IP address of TRAP notification.



To use SNMP, SNMP monitoring software must be installed on the personal computer. (For details, refer to the manual for the software used.)

The industrial managed switch uses SNMP (v2c), which can read the following two types of MIB (Management Information Base: a set of managed items).

- Object groups (excluding the egp group)*2 of the standard MIB*1, and standard TRAPs
- Extended TRAPs (☞ Page 68 Event Code (TRAP))

*1 The standard MIB is the Internet standard MIB which is defined by RFC1213 and is commonly called MIB-II.

*2 The object groups include the system group, the interface group, the at group, the ip group, the icmp group, the tcp group, the udp group, the transmission group, and the snmp group. (For details, refer to RFC1213.)

Precautions

- TRAP frames may be discarded if the communication load is high, such as when TRAPs are sent to a personal computer via several industrial managed switches. In such a case, take a workaround such as reducing the communication load other than TRAP notification, or providing a VLAN configuration and wiring dedicated to TRAP notification.

10.5 Event Code (TRAP)

The section lists possible events on the industrial managed switch. Use the following to check the event codes (TRAPs):

- TRAP occurrence status shown by the "show unit" command (☞ Page 95 show unit)
- TRAP log shown by the "show log" command (☞ Page 98 show log)
- SNMP TRAP notification (☞ Page 67 Using SNMP to check the status)

TRAP name shown by the "show unit" command	TRAP log message shown by the "show log" command	SNMP TRAP notification	Event description	Action
—	Cold Start.	snmpTraps.1.0 (ColdStart)	The module starts from power off state.	—
—	ifIndex 30: CPU Link up.	snmpTraps.4.0 (CPU Link up)	CPU link-up	—
—	SNMP Auth Error.	snmpTraps.5.0 (authenticationFailure)	The user authentication failed.	Check the community name specified in the SNMP manager.
TrapL2swSoftwareFailure	Inactive Side F/W Failure.	snmpTraps.6.1	A software failure occurs (or a restart occurs due to a software failure).	• Restart the industrial managed switch with the RESET switch, and check whether the failure is recovered.) (☞ Page 10 PART NAMES) Note that TRAP log messages may not be recorded. • Even if the above actions recovered the condition, replacing the industrial managed switch is recommended because a software failure may occur in the future.
TrapL2swHardwareFailure	• ECC 1 Bit Error. • ECC 2 Bit Error. • Inner Parity Error. • Inner FCS Error. • Clock Loss Detection. • Master Clock PLL Lock Error. • Transceiver PLL Lock Error. • RAM Check Error. • System Restart. (Clock Loss Detection.) • System Restart. (FPGA Config Error./ CRC Error.)	snmpTraps.6.3	Hardware failure	• Restart the industrial managed switch with the RESET switch, and check whether the failure is recovered.) (☞ Page 10 PART NAMES) Note that TRAP log messages may not be recorded. • If the above actions recovered the condition, replacing the industrial managed switch is recommended because a hardware failure may occur in the future.
TrapPortLinkDown	Change Port Link Status.	snmpTraps.6.7 • Consecutive number • Time of occurrence • Port number	Port link-down	• Check the status of the connected destination. • Check the connection of the communication cable and whether the cable is disconnected. • If taking the above action does not recover the condition, replace the industrial managed switch.
TrapPortLinkUp	Change Port Link Status.	snmpTraps.6.8 • Consecutive number • Time of occurrence • Port number	Port link-up	—
TrapSystemReset	System Reset.	snmpTraps.6.9 • Consecutive number • Time of occurrence • Cause (1: RESET switch, 2: INITIALIZE switch, 3: CLI command)	The module restarts.	—
TrapParamInvalid	FPGA Parameter Set Error.	snmpTraps.6.11 • Consecutive number • Time of occurrence • Cause (1: Not an acceptable value)	A parameter error occurs.	Check the parameter settings. (☞ Page 91 show param, Page 93 show portparam, Page 94 show vlan)

TRAP name shown by the "show unit" command	TRAP log message shown by the "show log" command	SNMP TRAP notification	Event description	Action
TrapFPGAConfigError	FPGA Config Error.	snmpTraps.6.13 • Consecutive number • Time of occurrence	FPGA configuration failure	—
TrapFromSave	From Save.	snmpTraps.6.15 • Consecutive number • Time of occurrence • Saved file (1: Parameter, 2: Log)	A file is saved to the flash ROM.	—
TrapMemoryBackUp	SD Card Backup. • Result: 1 (Success) • Result: 2 (Failure)	snmpTraps.6.16 • Consecutive number • Time of occurrence • Saved file (1: Parameter, 2: Log)	A file is saved to an SD memory card.	—
TrapOnOffSet	Change Trap On/Off Setting.	snmpTraps.6.17 • Consecutive number • Time of occurrence • TRAP notification ID • TRAP notification setting (1: Disabled, 2: Enabled)	A change is made to TRAP notification settings.	—
TrapSDCardError	• SD Card Config File Read Error. • SD Card Write Error. • SD Card Format Error.	snmpTraps.6.18 • Consecutive number • Time of occurrence • Type (1: Read error, 2: Write error, 3: Format error)	An SD memory card error occurs.	Possible causes include the following. Take appropriate actions. • The SD memory card and connector are not connected properly. Insert it again. • The capacity of the SD memory card is full. Check the volume of data by using a personal computer. • The SD memory card is formatted incorrectly. Format the SD memory card again. • The format of data stored in the SD memory card is not a specified format. Check the format again. • The SD memory card cannot be used. Replace it. (☞ Page 24 Supported Networks and Devices) • The SD memory card may be faulty. Replace it.
TrapLoopDetectionFailure	LoopDetection.	snmpTraps.6.21 • Consecutive number • Time of occurrence • Port number	A loop is detected.	Eliminate the causes of the loop, although the loop detection function blocks the causing port automatically and the loop is cleared temporarily. (☞ Page 54 Loop Detection Function)
TrapLoopDetectionRecovery	LoopDetection.	snmpTraps.6.22 • Consecutive number • Time of occurrence • Port number	A detected loop is cleared.	—
TrapPolicingControlFailure	Change Port Policing Status.	snmpTraps.6.23 • Consecutive number • Time of occurrence • Port number	A band control failure occurs.	Reduce the input band of Ethernet.
TrapPolicingControlRecovery	Change Port Policing Status.	snmpTraps.6.24 • Consecutive number • Time of occurrence • Port number	A band control failure is recovered.	—
TrapEjectSFP	SFP Removal Detection.	snmpTraps.6.25 • Consecutive number • Time of occurrence • Port number	The SFP module is removed.	—
TrapDetectSFP	SFP Insert Detection.	snmpTraps.6.26 • Consecutive number • Time of occurrence • Port number	The SFP module is mounted.	—
TrapSFPFailure	• SFP LOS Detection. • SFP TX-Fault Detection.	snmpTraps.6.27 • Consecutive number • Time of occurrence • Port number	An SFP module error occurs.	• The SFP module and connector may not be connected properly. Check again. • The SFP module may be broken. Replace it.

TRAP name shown by the "show unit" command	TRAP log message shown by the "show log" command	SNMP TRAP notification	Event description	Action
TrapSFPRecovery	• SFP LOS Restoration. • SFP TX-Fault Restoration.	snmpTraps.6.28 • Consecutive number • Time of occurrence • Port number	An SFP module error is recovered.	—
TrapERPPortLinkDown	ERP Link Failure.	snmpTraps.6.29 • Consecutive number • Time of occurrence • Port number	ERP port link-down (only when ERP is enabled)	• The ERP ring may have an invalid connection, disconnected communication cable, failed industrial managed switch, or other error. Check again. • Use the CLI command to check the settings on the industrial managed switches in the ERP ring. (☞ Page 91 show param)
TrapERPPortLinkUp	Resolution ERP Link Failure.	snmpTraps.6.30 • Consecutive number • Time of occurrence • Port number	ERP port link-up (only when ERP is enabled)	—
TrapERPPortProtection	• Change ERP Protection To Idle. • ERP Protection Occurrence.	snmpTraps.6.31 • Consecutive number • Time of occurrence	The ERP protection occurs.	• The ERP ring may have an invalid connection, disconnected communication cable, failed industrial managed switch, or other error. Check again. • Use the CLI command to check the settings on the industrial managed switches in the ERP ring. (☞ Page 91 show param)
TrapERPCCFrameFailure	ERP CC Frame Send Interval Unmatch.	snmpTraps.6.33 • Consecutive number • Time of occurrence	A CC frame send cycle mismatch occurs (only when ERP is enabled).	On all industrial managed switches for ring topology, set the same CC frame send cycle value of ERP. (☞ Page 90 set erp)
TrapERPCCFrameRecovery	Resolution ERP CC Frame Send Interval Unmatch.	snmpTraps.6.34 • Consecutive number • Time of occurrence	A CC frame send cycle mismatch is recovered (only when ERP is enabled).	—
TrapPortSwitching	• Port Switching Metal to SFP. • Port Switching SFP to Metal.	snmpTraps.6.35 • Consecutive number • Time of occurrence • Port number • Operation port (1: Ethernet port, 2: Optical fiber port)	Port switching occurs (between OPT1 and P1, or between OPT2 and P2 only).	—

10.6 Error Message

An error message generated when a CLI command is executed is composed as follows:

Error [operation mode][command ID][error position][error code]

Item	Description
Operation mode (1-digit)	Displays the operation mode when the command was executed. • 0: Control mode • 1: Setting mode
Command ID (2-digit)	Displays the hexadecimal ID of the command that caused an error.
Error position (2-digit)	Displays the position, which is counted from the head including the command part, of the subcommand that caused an error.
Error code (3-digit)	Displays the error code in hexadecimal. (☞ Page 71 List of error codes)

Point

If the command name or the operation mode is invalid, "Error 0FFFF001" is shown.

Ex.

When a port is attempted to be assigned with a VLAN ID of a tag VLAN but the port is in the port VLAN mode:

```
Control>> add vlan 10 5
 Error 0160400F: This port is portVLAN.
```

Command ID list

Command ID	Command	Command ID	Command
01	Page 78 help	1C	Page 89 set loop
02	Page 79 logout	1E	Page 89 set lag
03	Page 79 config	1F	Page 90 set erp
04	Page 80 exit	21	Page 91 show param
05	Page 80 history	22	Page 93 show portparam
08	Page 81 set password	23	Page 94 show vlan
0A	Page 81 date	24	Page 95 show unit
0B	Page 82 set ip	25	Page 97 show version
0C	Page 83 set trap	26	Page 98 show log
0D	Page 83 del trap	27	Page 99 show maclearn
0E	Page 84 set alarm	28	Page 100 show statistics
0F	Page 85 set port	29	Page 101 show erpstate
14	Page 85 set mirrorport	2A	Page 103 save
15	Page 86 set vlanmode	2B	Page 103 backup
16	Page 86 add vlan	2D	Page 104 clear
17	Page 87 del vlan	2E	Page 104 reboot
18	Page 87 set portvid	2F	Page 105 ping
19	Page 88 set mngvlan	30	Page 106 force laswitch
1A	Page 88 set fixdelay	36	Page 106 format

List of error codes

The following table lists error codes and their messages, error description and causes, and actions.

Error code	Error message	Error description and cause	Action
001H	No such command name.	The command name is invalid.	Check the command name again.
		The operation mode is invalid.	Check the operation mode again.
005H	Overlap entry.	The entry is duplicated.	Check the setting details again.
006H	Over size.	The capacity of the SD memory card is insufficient.	Delete unneeded files in the SD memory card, or format the SD memory card.

Error code	Error message	Error description and cause	Action
007H	Wrong file format.	A parameter file or log file is corrupted.	Use the "clear" command or the INITIALIZE switch to initialize the industrial managed switch. (☞ Page 104 clear)
008H	No such file.	No program file exists on the industrial managed switch.	Execute the put command for the program file over FTP.
009H	Locked by FTP.	The file is being accessed over FTP.	Ensure that the FTP process is completed.
00BH	Conflicted with another parameter.	The combination of specified subcommands is invalid.	Check the combination of specified subcommands, and enter them correctly.
		The specified IP address, mask value, or gateway address is incorrect.	Check the IP address, mask value, and gateway address to specify.
00CH	Gateway address is out of network.	The specified gateway address and the specified device IP address are not in the same network.	Specify the settings so that the gateway address and the device IP address are in the same network.
00DH	Command abort.	The commands are competing.	Wait for a while, and then execute the command again.
		The SD memory card is set to read-only.	Set the write protect switch of the SD memory card to off.
		The destination of ping is invalid.	Check the specified IP address.
00EH	Overlap port setting.	The ERP port settings are duplicated.	Check whether ERP setting conditions are satisfied.
00FH	This port is portVLAN.	The "add vlan" command or "del vlan" command was executed on a port in the port VLAN mode.	Use the "set vlanmode" command to switch to the tag VLAN mode, and then try again.(☞ Page 86 set vlanmode)
010H	This port is tagVLAN.	The "set portvid" command was executed on a port in the tag VLAN mode.	Use the "set vlanmode" command to switch to the port VLAN mode, and then try again. (☞ Page 86 set vlanmode)
011H	It cannot coexist "LAG" and "ERP".	It was attempted to enable LA and ERP on the same port.	Check the port settings.
012H	No setting.	The "force laswitch" command was executed while LA was disabled.	Use the "set lag" command to enable LA. (☞ Page 89 set lag)
		The "show erpstate" command was executed while ERP was disabled.	Use the "set erp" command to enable ERP. (☞ Page 90 set erp)
013H	Conflicted with ERP parameter.	A command was executed to disable a VLAN ID used for ERP while ERP was enabled.	Use the "set erp" command to disable ERP. (☞ Page 90 set erp)
014H	ERP Port1 is No VLAN setting.	P1 or OPT1 is not assigned with the specified VLAN ID.	Assign P1 or OPT1 to the VLAN ID to be used for ERP.
015H	ERP Port2 is No VLAN setting.	P2 or OPT2 is not assigned with the specified VLAN ID.	Assign P2 or OPT2 to the VLAN ID to be used for ERP.
016H	Memory Card is inactive.	A command that involves access to an SD memory card was executed while no SD memory card was inserted.	Insert an SD memory card.
017H	Conflicted with MNG VLAN parameter.	The specified management VLAN ID cannot enable communication.	Use the "set mngvlan" command to change the management VLAN ID. (☞ Page 88 set mngvlan)
018H	No VLAN.	There are no ports that are assigned with the specified VLAN ID.	Check the VLAN ID settings.
019H	Conflicted with LAG parameter.	A command was executed to attempt to make a change that is not allowed while LA is enabled.	Use "set lag" command to disable LA. (☞ Page 89 set lag)
01AH	VLAN parameters mismatch.	An attempt was made to enable LA on ports that are in different VLAN modes.	Ensure that the ports are in the same VLAN mode.
01BH	They don't match; try again.	The first and second inputs of the password are mismatched.	Check the password, and enter it again.
01CH	Permission denied.	The command is not allowed to be executed or is invalid.	Check the CLI command.
01DH	System reserve ip address.	A reserved IP address is set.	Check the IP address settings. Observe the following cautions when setting the IP address. • Neither a class D address nor class E address can be used as the IP address or gateway address. • A loopback address cannot be used as the IP address or gateway address.
01EH	TAG VLAN must be set to one or more.	The port in the tag VLAN mode is unassigned from all VLAN IDs.	A port in the tag VLAN mode must be assigned with one or more VLAN IDs.

APPENDICES

Appendix 1 Overview of CLI Commands

Use CLI commands to set parameters on the industrial managed switch and check the status of the industrial managed switch.

Prompt

A prompt is displayed on the CLI to indicate readiness to accept commands.

Window

When the operation mode is control mode and the type of the account is administrator:

```
Control>>
```

Syntax

A command is composed of a one- or two-word command name and zero or more subcommands.
Enter "ena" to enable the function and enter "dis" to disable the function by using a subcommand. (Instead of "ena" or "dis", "enable" or "disable" can be entered.)
Unless otherwise specified, command names and subcommands are not case sensitive.
On the industrial managed switch, a space (blank character) is used as a delimiter. Therefore, a space (blank character) preceding or succeeding a command is not considered as a space. For example, the combination of a space (blank character) and a new line character is treated as just a new line character.

Supported character codes

The following ASCII code characters are supported: 8H (back space), AH (LF), DH (CR), and 20H (space) to 7EH (~).
When an unsupported character code is entered, it is ignored.
The combination of CR and LF does not work as a new line character. (CR and LF are processed separately, which results in two new line characters.)

Display when a command cannot be executed

If the entered command cannot be executed because complete subcommands are not specified (such as an invalid argument name or value is specified), the command syntax is displayed instead of an error message. The command syntax to be displayed is the same as the one displayed in the command-line help of the command.

Window

```
Config>> show portparam
   SHOW PORTPARAM port_no
       #port_no : 1-8
```

Display when processing takes time

When the command processing takes time, "#" is displayed every three seconds (except for the "format" command).

Window

When a log file is specified by the "backup" command

```
Config>> backup log
# OK.
```

Operation target files

The target files for operations with CLI commands are as follows:

■Program file

- l2sw_sw.pkg

■Parameter file

- param.txt

■Log files

- Operation log (operation.log)
- TRAP log (alarm.log)

Login

Start Telnet with the CLI, and log in to it. The login user is authenticated by the user name and the password. (Only a single user can log in at a time.)
A user can log in to Telnet and FTP at the same time. To log in to FTP, the user name is optional and the password is not required.

Point

- The default user name is "root", and the default password is "root". Only the password can be changed with a CLI command. (☞ Page 81 set password)
- If there is no input from the keyboard for 300 seconds or longer, the logout is executed automatically.
- After a connection is established with Telnet, the connection will be disconnected if there is no input from the keyboard for 60 seconds (fixed value) before the login successes or if the login fails three times.

Window

```
Login: root
Password:
INDUSTRIAL MANAGED SWITCH NZ2MHG-T8F2
Copyright(C) 2015 MITSUBISHI ELECTRIC CO. All Rights Reserved.

Control>>
```

Logging in during the start-up of the industrial managed switch

While the industrial managed switch is being started (during the initial processing), it is not allowed to log in to Telnet with the CLI.

Name and model display

When the user successfully logs in, the following are displayed:

- Name: INDUSTRIAL MANAGED SWITCH
- Model: NZ2MHG-T8F2

Operation mode

The industrial managed switch operates in any of the two modes below. Some commands are available in either of the two modes. (☞ Page 76 List of CLI commands)

- Control mode
- Setting mode

Execute the "config" command to switch from control mode to setting mode. (☞ Page 79 config)

Execute the "exit" command to switch from setting mode to control mode. (☞ Page 80 exit)

In setting mode, executing the "exit" command after saving files in the flash ROM forcibly restarts the industrial managed switch. (☞ Page 103 save)

Control mode

The parameters changed in control mode are immediately applied to the operations of the industrial managed switch.

Just after login, the operation mode is set to control mode.

Setting mode

The following three commands can be executed only in setting mode:

- "backup" command (☞ Page 103 backup)
- "clear" command (☞ Page 104 clear)
- "format" command (☞ Page 106 format)

A

List of CLI commands

The following table lists CLI commands used by the industrial managed switch.

○: Available, ×: Not available

Category	ID[*1]	Command name	Description	Operation mode		Parameter file[*2]	Function that cannot be used together	Reference
				Control mode	Setting mode			
CLI control command	01H	help	Displays the names of commands available in the current operation mode, together with their subcommands.	○	○	×	—	Page 78 help
	02H	logout	Logs out from Telnet.	○	×	×	—	Page 79 logout
	03H	config	Switches the operation mode from control mode to setting mode.	○	×	×	—	Page 79 config
	04H	exit	Switches the operation mode from setting mode to control mode.	○	○	×	—	Page 80 exit
	05H	history	Displays the history of the commands completed successfully, up to the number of lines specified with a subcommand. (Display order: Oldest command → Latest command)	○	○	×	—	Page 80 history
Initial setting command	08H	set password	Changes the current password.	○	×	○	—	Page 81 set password
	0AH	date	Sets a time, or displays the current time.	○	×	×	—	Page 81 date
	0BH	set ip	Changes the IP address of the industrial managed switch.	○	×	○	—	Page 82 set ip
SNMP setting command	0CH	set trap	Specifies the destination IP address of SNMP TRAP notification.	○	×	○	—	Page 83 set trap
	0DH	del trap	Deletes the destination IP address of SNMP TRAP notification.	○	×	×	—	Page 83 del trap
	0EH	set alarm	Specifies the ID (category of TRAPs to be sent) of SNMP TRAP notification. Also, the command sets whether to enable SNMP TRAP notification or not.	○	×	○	—	Page 84 set alarm
Port control setting command	0FH	set port	Sets the communication speed, MDI, clock, and CC-Link IE frame filtering of the specified port.	○	×	○	—	Page 85 set port
	14H	set mirrorport	Specifies the input port and output port to be monitored by the port mirroring function.	○	×	○	—	Page 85 set mirrorport
VLAN function setting command	15H	set vlanmode	Switches the VLAN mode (port VLAN or tag VLAN) of the specified port.	○	×	○	LA, ERP	Page 86 set vlanmode
	16H	add vlan	Assigns the specified port to the VLAN ID in the tag VLAN mode.	○	×	○	Port VLAN, LA	Page 86 add vlan
	17H	del vlan	Unassigns the specified port from VLAN IDs in the tag VLAN mode.	○	×	×	Port VLAN	Page 87 del vlan
	18H	set portvid	Sets the VLAN ID in the port VLAN mode.	○	×	○	Tag VLAN, LA, ERP	Page 87 set portvid
	19H	set mngvlan	Specifies the management VLAN ID.	○	×	○	—	Page 88 set mngvlan
CC-Link IE frame priority control setting command	1AH	set fixdelay	Sets whether to enable the CC-Link IE frame priority control or not.	○	×	○	—	Page 88 set fixdelay

Category	ID[*1]	Command name	Description	Operation mode		Parameter file[*2]	Function that cannot be used together	Reference
				Control mode	Setting mode			
Loop detection function setting command	1CH	set loop	Sets whether to enable the loop detection function or not and specifies the monitor target VLAN ID.	○	×	○	LA, ERP	Page 89 set loop
High reliability/ redundancy function setting command	1EH	set lag	Sets whether to enable LA or not.	○	×	○	ERP	Page 89 set lag
	1FH	set erp	Specifies whether to enable ERP.	○	×	○	LA	Page 90 set erp
Parameter display command	21H	show param	Displays the parameter settings for the current operation mode.	○	○	×	—	Page 91 show param
	22H	show portparam	Displays the parameter settings of the specified port.	○	○	×	—	Page 93 show portparam
	23H	show vlan	Displays ports that belong to the specified VLAN ID. The management VLAN ID is also displayed.	○	○	×	—	Page 94 show vlan
Module information display command	24H	show unit	Displays information such as the version of the industrial managed switch, link status of each port, LA status, and TRAP status.	○	○	×	—	Page 95 show unit
	25H	show version	Displays the version of the software in the flash ROM.	○	○	×	—	Page 97 show version
	26H	show log	Displays operation log or TRAP log messages for the number of lines specified with a subcommand. The oldest log message is displayed at the top of the lines.	○	○	×	—	Page 98 show log
	27H	show maclearn	Displays the MAC address learning table.	○	×	×	—	Page 99 show maclearn
	28H	show statistics	Displays the frame flow statistics of the specified port.	○	×	×	—	Page 100 show statistics
	29H	show erpstate	Displays the ERP status.	○	○	×	—	Page 101 show erpstate
File operation command	2AH	save	Saves the current parameter file and log files to the flash ROM.	○	○	×	—	Page 103 save
	2BH	backup	Stores the current parameter file and log files to the SD memory card.	×	○	×	—	Page 103 backup
	2DH	clear	Initializes the parameter file and log files.	×	○	×	—	Page 104 clear
Module operation command	2EH	reboot	Restarts the industrial managed switch.	○	○	×	—	Page 104 reboot
	2FH	ping	Executes a ping test.	○	○	×	—	Page 105 ping
	30H	force laswitch	When LA is enabled, forcibly switches the port so that data communications are performed using only one communication cable of the specified port.	○	×	×	—	Page 106 force laswitch
	36H	format	Formats an SD memory card.	×	○	×	—	Page 106 format

*1 This is a command ID that appears in error messages. (☞ Page 71 Error Message)

*2 This column indicates whether the command is available with the parameter file (param.txt). The setting of the command is stored with the "backup" command.

Appendix 2 Details of CLI Commands

This section describes the details on CLI commands used by the industrial managed switch.

help

Displays the names of commands available in the current operation mode, together with their subcommands.

- Operation mode: Control mode, setting mode

Point

Among the displayed command names, the commands not described in this manual are not supported.

Syntax

help

Window

- Control mode

```
Control>> help

----  Basic words  ----
   HELP                      :This command.
   LOGOUT                    :Session close
   CONFIG                    :Go to config mode
   EXIT                      :Return to previous mode
   HISTORY  [line]           :Display command history
----  Management setup  ----
   SET PASSWORD              :Change password up to 15 characters
   DATE [yyyy/mm/dd hh:mm:ss]
   SET IP ipadr/mask [gateway]  :System IP address
         (eg.) set ip 192.168.0.1/24 192.168.0.250
----  SNMP setup  ----
   SET TRAP  1-2 ipadr [community_name]  :TRAP destination addresses
   DEL TRAP  1-2
   SET ALARM trap_id trap_flag                      :System Alarm Setting
       #trap_id   : 1-11 "*"|"all" =1-11
       #trap_flag : "ENAble"|"DISable"
---  Display status  ----
  SHOW UNIT                  :Display System information ,status & version.
  SHOW VERSION               :Display Firmware version.
  SHOW LOG key [line]
      #key     : "ope"|"alarm"
      #line    : "LINE=XXXX"  XXXX=1-5000 (no set [line]=20)
  SHOW MACLEARN              :Display MAC Address Learning Table.
  SHOW STATISTICS port_no    :Display Port statistics.
      #port_no          : 1-8
  SHOW ERPSTATE              :Display ERP status.
---  File operation  ----
  SAVE [type]                :Write parameter & log to flash ROM.
      #type             : "param"|"log"
---  Maintenance operation  ----
  REBOOT ["0"|"1"]           :Reboot L2SW & Select boot up program.
  PING ipadr                 :Pinging from System to Management network.
      #ipadr            : IP Address (Decimal)   Ex.) 10.137.137.148
  FORCE LASWITCH lag side
     :Move to one side the LA Group forcibly.
      #lag              : 1-4
      #side             : "lower"|"higher"|"clear"
```

- Setting mode

```
Config>> help

----  Basic words  ----
   HELP                      :This command.
   EXIT                      :Return to previous mode
   HISTORY  [line]           :Display command history
----  Display parameter  ----
   SHOW PARAM
   SHOW PORTPARAM port_no
       #port_no : 1-8
   SHOW VLAN [vid]             :Display VLAN parameter.
       #vid              : 0-4095,"*"|"all"
----  Display status  ----
   SHOW UNIT                   :Display System information ,status & version.
   [illegible]                 :Dis[illegible]version.
   SHOW LOG key [illegible]
       #key     : "ope"|"alarm"
       #line    : "LINE=XXXX"  XXXX=1-5000 (no set [line]=20)
   SHOW ERPSTATE               :Display ERP status.
----  File operation  ----
   SAVE [type]                 :Write parameter & log to flash ROM.
       #type             : "param"|"log"
   BACKUP [type]               :Write parameter & log to Memory Card.
       #type             : "param"|"log"
   UPDATE [side]               :Update this system.
       #side             : "0"|"1"|"all"
   CLEAR ["all"]               :Set default value
                                "clear"     :all parameters.
                                "clear all" :set factory defaults.
----  Maintenance operation  ----
   REBOOT ["0"|"1"]            :Reboot L2SW & Select boot up program.
   PING ipadr                  :Pinging from System to Management network.
       #ipadr            : IP Address (Decimal)   Ex.) 10.137.137.148
   FORMAT                      :Format Memory Card.
```

logout

Logs out from Telnet.

- Operation mode: Control mode

Syntax

logout

Window

```
Control>> logout
```

config

Switches the operation mode from control mode to setting mode.

- Operation mode: Control mode

Syntax

config

Window

```
Control>> config
 OK.

Config>>
```

A

exit

Switches the operation mode from setting mode to control mode.

- Operation mode: Control mode, setting mode

Point

- Executing the command in control mode logs out the user from Telnet. (This is the same processing as that of the "logout" command.)
- Executing the command in setting mode after the "save" command restarts the industrial managed switch.

Syntax

exit

Window

```
Config>> exit
 OK.

Control>>
```

history

Displays the history of the commands completed successfully, up to the number of lines specified with a subcommand.
(Display order: Oldest command → Latest command)

- Operation mode: Control mode, setting mode

Syntax

history [line]

Subcommand	Description	Setting range
line	Specifies the number of lines to be displayed.	1 to 512

Point

If [line] is not specified, up to 20 lines are displayed.

Window

```
Control>> history 3

>date 2015/12/31 10:50:50
>config
>exit
```

set password

Changes the current password.

- Operation mode: Control mode

Point

- The default password is "root" (administrator).
- A password can be composed of 0 to 15 ASCII characters and is case sensitive. Note that comma (,) and space cannot be included in a password.

Syntax

set password

Window

```
Control>> set password
enter new password:
reenter password:
 OK.
```

date

Sets a time, or displays the current time.

- Operation mode: Control mode

Syntax

date [date]

Subcommand	Description	Setting range
date	Sets a time in the form of yyyy/mm/dd HH:MM:SS.	2000/3/1 00:00:00 to 2035/12/31 23:59:59 (Default: 1970/1/1 00:00:00)

Point

- If [date] is not specified, the current time is displayed.
- The time is counted up to "2038/1/19 03:14:07", and then reset to "1901/12/13 20:45:52".
- The time is initialized at power-off, and therefore, it needs to be set again at power-on.

Window

- To set the time:

```
Control>> date 2015/12/31 10:10:25
 OK.
```

- To display the current time:

```
Control>> date
   2015/12/31 10:12:27
```

set ip

Changes the IP address of the industrial managed switch.

- Operation mode: Control mode

Point

When the default IP address has already been changed, the newly set IP address is overwritten.

Syntax

set ip ipadr/mask [gateway]

Subcommand	Description	Setting range
ipadr	Changes the IP address of the industrial managed switch.	0.0.0.0 to 223.255.255.255 (Default: 192.168.0.1)
mask	Sets the subnet mask.	• Class A: 8 to 15 • Class B: 16 to 23 • Class C: 24 to 30 (Default: 24)
gateway	Sets the gateway address.	0.0.0.0 to 223.255.255.255

Point

- If [gateway] is not specified, the gateway address is disabled.
- Neither a class D address nor class E address can be set as the IP address or gateway address.
- A broadcast address cannot be set as the IP address or gateway address.
- A loopback address (127.x.x.x) cannot be set as the IP address or gateway address.
- An address outside the own network cannot be set as the gateway address.
- The own IP address cannot be set as the gateway address.
- When this command is executed, the IP address of the industrial managed switch is changed, and thus the connection between the personal computer and CLI is forcibly disconnected.

Window

```
Control>> set ip 192.168.0.1/24
 OK.
```

set trap

Specifies the destination IP address of SNMP TRAP notification.

- Operation mode: Control mode

Syntax

set trap no ipadr [community_name]

Subcommand	Description	Setting range
no	Sets the destination number.	1, 2
ipadr	Specifies the destination IP address of TRAP notification.	0.0.0.0 to 223.255.255.255
community_name	Sets the community name.	A name can be composed of up to 20 ASCII characters and is case sensitive. Note that comma (,) and space cannot be included. (Default: public)

Point

- If [community_name] is not specified, "public" is set.
- Neither a class D address nor class E address can be set as the destination of TRAP notification.
- A loopback address (127.x.x.x) cannot be set as the destination of TRAP notification.

Window

```
Control>> set trap 1 192.168.0.1 manual123
 OK.
```

del trap

Deletes the destination IP address of SNMP TRAP notification.

- Operation mode: Control mode

Syntax

del trap no

Subcommand	Description	Setting range
no	Specifies the setting number of the TRAP notification destination to be deleted.	1, 2

Window

```
Control>> del trap 1
 OK.
```

A

set alarm

Specifies the ID (category of TRAPs to be sent) of SNMP TRAP notification.
Also, the command sets whether to enable SNMP TRAP notification or not.

- Operation mode: Control mode

Syntax

set alarm trap_id trap_flag

Subcommand	Description	Setting range
trap_id	Specifies the TRAP notification ID. (☞ Page 84 TRAP notification ID)	• 1 to 11 • Asterisk (*) or all: All
trap_flag	Sets whether to enable TRAP notification or not.	• ena: Enabled (TRAPs are sent.) • dis: Disabled (TRAPs are not sent.) (Default: ☞ Page 84 TRAP notification ID)

■TRAP notification ID

Category	TRAP notification ID	TRAP to be displayed	Event description	Default
Module start	1	snmpTraps.1.0	The module started up from the power-off state.	ena
Module operation group	2	snmpTraps.6.9	The module restarted.	dis
		snmpTraps.6.11	A parameter error has occurred.	
		snmpTraps.6.15	A file was saved to the flash ROM.	
		snmpTraps.6.16	A file was stored to the SD memory card.	
		snmpTraps.6.17	The TRAP notification setting was changed.	
		snmpTraps.6.35	Port switching has occurred.	
Link-up/link-down	3	snmpTraps.3.0	Link-down	dis
		snmpTraps.4.0	Link-up	
Authentication error	4	snmpTraps.5.0	The user authentication has failed.	dis
Port link	5	snmpTraps.6.7	Port link-down	ena
		snmpTraps.6.8	Port link-up	
System error group	6	snmpTraps.6.1	Software failure	ena
		snmpTraps.6.3	Hardware failure	
		snmpTraps.6.13	FPGA configuration failure	
Loop detection	7	snmpTraps.6.21	A loop has been detected.	ena
		snmpTraps.6.22	A detected loop has been cleared.	
Band control	8	snmpTraps.6.23	A bandwidth control error has occurred.	ena
		snmpTraps.6.24	A bandwidth control error was cleared.	
SFP module group	9	snmpTraps.6.25	An SFP module was removed.	ena
		snmpTraps.6.26	An SFP module was installed.	
		snmpTraps.6.27	An SFP module error has occurred.	
		snmpTraps.6.28	An SFP module error was cleared.	
ERP group	10	snmpTraps.6.29	ERP port link-down	ena
		snmpTraps.6.30	ERP port link-up	
		snmpTraps.6.31	The ERP protection switching has occurred.	
		snmpTraps.6.33	A CC frame send cycle mismatch has occurred.	
		snmpTraps.6.34	A CC frame send cycle mismatch was cleared.	
SD memory card group	11	snmpTraps.6.18	An SD memory card error has occurred.	ena

Window

```
Control>> set alarm 1 ena
 OK.
```

set port

Sets the communication speed, MDI, clock, and CC-Link IE frame filtering of the specified port.

- Operation mode: Control mode

Point

When this command is executed, communications on the specified port are momentarily interrupted with or without any setting change.

Syntax

set port port_no speed mdi clk filter

Subcommand	Description	Setting range
port_no	Specifies the port number.	• 1 to 8 • Asterisk (*) or all: All
speed	Sets the communication speed.	• 1000mfull • auto: Automatic setting (Default: auto)
mdi	Sets MDI.	• auto: Automatic setting • mdi: Straight cable • mdi-x: Crossover cable (Default: auto)
clk	Sets the clock.	• auto: Automatic setting • master: Clock master • slave: Clock slave (Default: auto)
filter	Specifies whether to enable the CC-Link IE frame filtering or not.	• ena: Enabled • dis: Disabled (Default: dis)

Point

- Setting "auto" enables auto-negotiation. Usually set "auto". Setting an option other than "auto" disables auto-negotiation, so that the communication setting is fixed to a specific value.
- The clock setting is for the clock master setting and clock slave setting for communications at 1Gbps, not for the master/slave settings in CC-Link IE Field Network.
- When the communication speed or MDI is set to "auto", set other options to "auto" as well.
- For ports on which the CC-Link IE frame filtering is enabled, CC-Link IE frames are not transferred.

Window

```
Control>> set port 2 1000mfull mdi slave ena
 OK.
```

set mirrorport

Specifies the input port and output port to be monitored by the port mirroring function.

- Operation mode: Control mode

Syntax

set mirrorport tx_port rx_port

Subcommand	Description	Setting range
tx_port	Specifies the output port. Specifying "0" disables the port mirroring function.	1 to 7
rx_port	Specifies the input port. Specifying "0" disables the port mirroring function.	1 to 7

Window

```
Control>> set mirrorport 5 5
 OK.
```

set vlanmode

Switches the VLAN mode (port VLAN or tag VLAN) of the specified port.

Point

Switching the VLAN mode resets the port to the default setting where the VLAN ID is set to 1.

- Operation mode: Control mode

Syntax

set vlanmode port_no mode

Subcommand	Description	Setting range
port_no	Specifies the port number.	1 to 8
mode	Sets the VLAN mode.	• tag: Tag VLAN • port: Port VLAN (Default: port)

Window

```
Control>> set vlanmode 2 tag
 OK.
```

add vlan

Assigns the specified port to VLAN IDs in the tag VLAN mode.

- Operation mode: Control mode

Syntax

add vlan vid port_no

Subcommand	Description	Setting range
vid	Specifies the VLAN ID.	0 to 4095 (Default: 1)*1
port_no	Specifies the port number.	• 1 to 8 • Asterisk (*) or all: All

*1 Do not set the VLAN ID to 0 because it is for transferring priority frames.
When the VLAN ID for the tag VLAN port is set to 0, VLAN-tagged communication frames having VLAN ID = 0 are discarded, and communications become unavailable.

Point

When an asterisk (*) or all is set to "port_no", only ports in the tag VLAN mode are targeted.

Window

```
Control>> add vlan 2 1
 OK.
```

del vlan

Unassigns the specified port from VLAN IDs in the tag VLAN mode.

- Operation mode: Control mode

Syntax

del vlan vid port_no

Subcommand	Description	Setting range
vid	Specifies the VLAN ID.	0 to 4095
port_no	Specifies the port number.	• 1 to 8 • Asterisk (*) or all: All

Point

When an asterisk (*) or all is set to "port_no", only ports in the tag VLAN mode are targeted.

Window

```
Control>> del vlan 2 1
 OK.
```

set portvid

Sets the VLAN ID in the port VLAN mode.

- Operation mode: Control mode

Syntax

set portvid port_no vid pcp

Subcommand	Description	Setting range
port_no	Specifies the port number.	1 to 8
vid	Sets the VLAN ID.	0 to 4095 (Default: 1)*2
pcp	Sets the priority.	0 to 7 (Default: 0)*1

*1 The larger the number, the higher the priority. Set 0 when the VLAN configuration includes the industrial managed switches only.

*2 Do not set the VLAN ID to 0 because it is for transferring priority frames.
Communications can be performed with communication devices that do not send VLAN-tagged communication frames having VLAN ID = other than 0.

Precautions

Some other types of hubs with the VLAN function perform QoS and other control by using the priority. When a different type of hub is included, refer to the manual for the hub used and be careful about the setting.

Window

```
Control>> set portvid 3 1 0
 OK.
```

set mngvlan

Specifies the management VLAN ID.

- Operation mode: Control mode

Point

A VLAN ID cannot be set to each port by using this command. The ID must be set previously by using the "set portvid" command or the "add vlan" command. (☞ Page 87 set portvid, Page 86 add vlan)

Syntax

set mngvlan vid pcp

Subcommand	Description	Setting range
vid	Specifies the VLAN ID.	0 to 4095 (Default: 1)*2
pcp	Sets the priority.	0 to 7 (Default: 0)*1

*1 The larger the number, the higher the priority. Set 0 when the VLAN configuration includes the industrial managed switches only.

*2 Do not set the VLAN ID to 0 because it is for transferring priority frames.
Communications can be performed with management devices that do not send VLAN-tagged communication frames having VLAN ID = 0.

Precautions

Some other types of hubs with the VLAN function perform QoS and other control by using the priority. When a different type of hub is included, refer to the manual for the hub used and be careful about the setting.

Window

```
Control>> set mngvlan 1 0
 OK.
```

set fixdelay

Sets whether to enable the CC-Link IE frame priority control or not.

- Operation mode: Control mode

Syntax

set fixdelay port_no flag

Subcommand	Description	Setting range
port_no	Specifies the port number.	• 1 to 8 • Asterisk (*) or all: All
flag	Sets whether to enable the CC-Link IE frame priority control or not.	• ena: Enabled • dis: Disabled (Default: ena)

Window

```
Control>> set fixdelay 1 ena
 OK.
```

set loop

Sets whether to enable the loop detection function or not and specifies the monitor target VLAN ID.

- Operation mode: Control mode

Syntax

set loop entry_no loop_flag td_flag vid

Subcommand	Description	Setting range
entry_no	Sets the entry number.	1 to 8
loop_flag	Sets whether to enable loop detection with loop detection frames or not.	• ena: Enabled • dis: Disabled (Default: dis)
td_flag	Sets whether to enable loop detection with CC-Link IE frames or not.	• ena: Enabled • dis: Disabled (Default: dis)
vid	Sets the monitor target VLAN ID.	0 to 4095 (Default: 0)*1

*1 Do not set the VLAN ID to 0 because it is for transferring priority frames. The loop detection function may not be performed properly when the VLAN ID is set to 0.

Window

```
Control>> set loop 1 ena dis 1
 OK.
```

set lag

Sets whether to enable LA or not. To enable LA, the target ports must have the same VLAN settings.

- Operation mode: Control mode

Syntax

set lag lag flag

Subcommand	Description	Setting range
lag	Specifies the combination of ports in an LA group.	1 to 4
flag	Sets whether to enable LA or not.	• ena: Enabled • dis: Disabled (Default: dis)

Point

The combinations of ports in an LA group are as follows:

- LA group "1": P1 and P2, or OPT1 and OPT2
- LA group "2": P3 and P4
- LA group "3": P5 and P6
- LA group "4": P7 and P8

Window

```
Control>> set lag 1 ena
 OK.
```

set erp

Sets whether to enable ERP or not.

- Operation mode: Control mode

Syntax

set erp flag rplowner erp_vid cc_cycle

Subcommand	Description	Setting range
flag	Sets whether to enable ERP or not.	• ena: Enabled • dis: Disabled (Default: dis)
rplowner	Specifies whether to enable monitoring of the ring status or not. Set this to only one of the industrial managed switches in the ring.	• ena: Enabled • dis: Disabled (Default: dis)
erp_vid	Specifies the VLAN ID used for ERP. Match the VLAN ID between OPT1 and OPT2 or between P1 and P2.	0 to 4095*1 (Default: 1)
cc_cycle	Sets the CC frame send cycle.	• 1(ms) • 3.33(ms) • 10(ms) (Default: 1)

*1 Do not set the VLAN ID to 0 because it is for transferring priority frames. When P1 and P2 used for ERP are set to the tag VLAN and the VLAN ID is set to 0, frames for ERP are discarded.

Point

- Setting "flag" to "dis" disables other subcommands as well.
- To change the setting of "rplowner", "erp_vid", or "cc_cycle", first set "flag" to "dis" and then change the setting.
- ERP can work only on the combinations of OPT1 and OPT2 or P1 and P2.
- Use the "add vlan" command or the "set portvid" command to set the VLAN ID of each port. (☞ Page 86 add vlan, Page 87 set portvid)

Window

```
Control>> set erp ena ena 1 1
 OK.
```

show param

Displays the parameter settings for the current operation mode.

- Operation mode: Control mode, setting mode

Syntax

show param

Window

```
Control>> show param

<IP configuration>
   IP address/mask              : 192.168.0.1/24
   Gateway address              : 0.0.0.0

<Snmp configuration>
  <Trap-IP address>
   No  Trap-IP address        Community name
   1   192.168.0.1            manual123
   2   -                      -

<Alarm configuration>
   Trap-ID  Trap Name                              Trap
   1        coldStart                              Enable
   2        TrapSystemReset                        Disable
            TrapParamInvalid
            TrapFromSave
            TrapMemoryBackUp
            TrapOnOffSet
            TrapSoftwareModify
            TrapFPGAModify
            TrapPortSwitching
   3        linkUP/linkDown                        Disable
```

```
<ERP configuration>
   ERP Function              : Disable
   RPL Owner                 : Disable

   ERP VID                   : -
   CC frame cycle            : -

<Mirror Port configuration>
   Tx Port                 : Disable
   Rx Port                 : Disable
```

Displayed items

Category	Item			Description	Range
IP address	<IP configuration>		IP address	IP address	0.0.0.0 to 223.255.255.255
			mask	Subnet mask	8 to 30
			Gateway address	Gateway address	0.0.0.0 to 223255.255.255
TRAP notification	<Snmp configuration>	<Trap-IP address>	No	Setting number of the TRAP notification destination	1, 2
			Trap-IP address	IP address of the TRAP notification destination	• 0.0.0.0 to 223.255.255.255 • --
			Community name	SNMP community name	20 alphanumeric characters maximum
	<Alarm configuration>		Trap-ID	TRAP notification ID	1 to 11
			Trap Name	TRAP notification classified into the displayed TRAP notification ID	ASCII character strings
			Trap	TRAP notification status	• Enable • Disable

A

Category	Item		Description	Range
Loop detection function	<Loop Detection configuration>	No.	Loop detection target port number	1 to 8
		Loop Frame	Loop detection status with loop detection frames	• Enable • Disable
		Test Data	Loop detection status with CC-Link IE frames	• Enable • Disable
		VID	Loop detection target VLAN ID	• 0 to 4095 • -
LA	<LAG configuration>	LAG	LA group	1 to 4
		Flag	LA status	• Enable • Disable
		Active Side	Setting of forced LA switching	• Both • Port1 • Port2 • Port3 • Port4 • Port5 • Port6 • Port7 • Port8 • -
ERP	<ERP configuration>	ERP Function	ERP status	• Enable • Disable
		RPL Owner	Status of the industrial managed switch targeted for ring topology status monitoring	• Enable • Disable
		ERP VID	VLAN ID used for ERP	0 to 4095
		CC frame cycle	CC frame send cycle	• 1 • 3.33 • 10 • -
Port mirroring function	<Mirror Port configuration>	Tx Port	Output port	• 1 to 7 • Disable
		Rx Port	Input port	• 1 to 7 • Disable

show portparam

Displays the parameter settings of the specified port.

- Operation mode: Control mode, setting mode

Syntax

show portparam port_no

Subcommand	Description	Setting range
port_no	Specifies the port number.	1 to 8

Window

```
Control>> show portparam 1

<PORT configuration>
   Configured Speed/Duplex        : Autonegotiate
   Configured MDI                 : AutoMDI-X
   Configured Clock Mode          : Auto
   CC-LINK Filter                 : Disable

<VLAN Configuration>
   VLAN Mode                      : PORT
   Port VID                       : 1
   Class                          : 0

<Policing configuration>
                                    Peak rate[Mbps]    Peak burst[Kbyte]
   All Frames                     : 400                1568
   Broadcast & Multicast          : 400                1568
   Unknown MAC Address            : 400                1568

<Fix Delay configuration>
   Fix Delay Function   : Enable
```

Displayed items

Category	Item		Description	Range
Communication	<PORT configuration>	Configured Speed/Duplex	Setting of the communication speed	• 1000MFULL • Autonegotiate
		Configured MDI	MDI setting	• AutoMDI-X • MDI-X • MDI
		Configured Clock Mode	Clock setting	• Auto • Master • Slave
Ethernet/CC-Link IE mix function		CC-Link Filter	CC-Link IE frame filtering status	• Enable • Disable
VLAN	<VLAN Configuration>	VLAN Mode	VLAN mode	• PORT • TAG
		Port VID	VLAN ID (when the VLAN mode is port VLAN). When the VLAN mode is tag VLAN, VLAN ID is not displayed. Use the "show vlan" command to check the tag VLAN settings. (☞ Page 94 show vlan)	• 0 to 4095 • -
		Class	Class value used in the port VLAN mode	• 0 to 7 • -
Band limit	<Policing configuration>	Peak rate	Peak rate	400Mbps
		Peak burst	Peak burst size	1568kbyte
Fix delay	<Fix Delay configuration>	Fix Delay Function	CC-Link IE frame priority control status	• Enable • Disable

A

show vlan

Displays ports that belong to the specified VLAN ID.
The management VLAN ID is also displayed.

- Operation mode: Control mode, setting mode

Point

Use the "show portparam" command to check the VLAN mode and port VLAN setting details. (☞ Page 93 show portparam)

Syntax

show vlan [vid]

Subcommand	Description	Setting range
vid	Specifies the display-target VLAN ID.	• 0 to 4095 • Asterisk (*) or all: All

Point

- If [vid] is not specified, the management VLAN ID is displayed.
- If an asterisk (*) or "all" is set, the VLAN IDs where any ports belong to are displayed.

Window

- When the subcommand is not specified:

```
Control>> show vlan

<Manage VLAN>
   Manage VLAN ID             : 1
   Manage VLAN Priority       : 0
```

- When "1" is specified for vid:

```
Control>> show vlan 1

<Belong Port>
  [Vlan1]    : 1, 3, 4, 5, 6, 7, 8
```

- When an asterisk (*) or all is specified for vid:

```
Control>> show vlan all

<Belong Port>
  [Vlan1]    : 1, 3, 4, 5, 6, 7, 8
  [Vlan10]   : 2
```

Displayed items

Category	Item		Description	Range
Management VLAN	<Manage VLAN>	Manage VLAN ID	Management VLAN ID	0 to 4095
		Manage VLAN Priority	Priority of the management VLAN ID	0 to 7
Belong port	<Belong Port>		Ports that belong to the VLAN ID specified with vid. If multiple VLAN IDs have been assigned to a single port with the tag VLAN, the port numbers are displayed for all of VLAN IDs.	• 1 to 8 • -

show unit

Displays information such as the version of the industrial managed switch, link status of each port, LA status, and TRAP status.

- Operation mode: Control mode, setting mode

Syntax

show unit

Window

```
Control>> show unit

 Date                 : 2015/12/31 10:34:11
 System UP time       : 0 days and 00:37:30
 MAC address          : [redacted]

<Hardware Status>
 Status               : NORMAL
 H/W Version          : 001.0F9
 FPGA Version         : 001.059
 FPGA Download Status : Idle
 S/W Version          : 001.023
 S/W Download Status  : Idle
 SD Card Status       : Not Inserted

<SFP Status>
 Port1 SFP            : Not Inserted
 Port2 SFP            : Not Inserted

<Port Status>
 No. Link Actual Speed/Duplex   Loop    Line    Policing
 1   Up   1000Mbps/Full duplex  Normal  Normal  Normal
 2   Down -/-                   Normal  Normal  Normal
 3   Down -/-                   Normal  Normal  Normal
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
 TrapSFPFailure               #1: Normal
                              #2: Normal
 TrapERPPortProtection          : Normal
 TrapERPCCFrameFailure          : Normal
 TrapSDCardError                : Normal
```

Displayed items

Category	Item		Description	Range
Basic	Date		Time information in the form of yyyy/mm/dd HH:MM:SS	2000/03/01 00:00:00 to 2035/12/31 23:59:59
	System UP time		Time elapsed after system start-up	• Number of days: 0 to 497 • Time: 00:00:00 to 23:59:59
	MAC address		MAC address	00:00:00:00:00:00 to FF:FF:FF:FF:FF:FF
Hardware status	<Hardware Status>	Status	Status of the hardware	• NORMAL • ALARM • FAIL
		H/W Version	Version of the running hardware	001.001 to 999.999
		FPGA Version	Version of the running FPGA	001.001 to 999.999
		FPGA Download Status	Writing status of the FPGA	• Idle • Writing • Reset Wait
		S/W Version	Version of the running software	001.001 to 999.999
		S/W Download Status	Writing status of the software	• Idle • Writing • Reset Wait
		SD Card Status	Status of the SD memory card	• Normal • Not Inserted • Fail • Write Protect

A

Category	Item		Description	Range
SFP module status	<SFP Status>	Port1 SFP	Status of the SFP module on OPT1	• Normal • Fail • Not Inserted
		Port2 SFP	Status of the SFP module on OPT2	• Normal • Fail • Not Inserted
Port status	<Port Status>	No.	Port number	1 to 8
		Link	Link status of the port	• Up • Down
		Actual Speed	Communication speed	• 10Mbps • 100Mbps • 1000Mbps • -
		Duplex	Duplex setting	• Half duplex • Full duplex • -
		Loop	Loop detection status	• Normal • Alarm
		Line	Line error detection status	• Normal • Alarm
		Policing	Band limit error detection status	• Normal • Alarm
LA status	<LAG State>	LAG	LA group	1 to 4
		State	LA status	• Normal • Both port Down • PortX Down (X: Port number)
TRAP status	<Alarm State>	TrapXxxxXxxxXxxx	Code (TRAP) of an event occurred (☞ Page 68 Event Code (TRAP))	• Normal • Alarm

show version

Displays the version of the software in the flash ROM.

- Operation mode: Control mode, setting mode

Syntax

show version

Window

```
Control>> show version

 <Software Information>
  Active side:  Side-0
  Side Name          Version                  Size      Date
   0   l2sw_apl.bin  L2SW-APL1-C01-SW[illegible]  2789376   [illegible]
   1   l2sw_apl.bin  L2SW-APL1-C01-SW[illegible]  2789376   [illegible]
   -   -             -                        -         -
   -   -             -                        -         -
   -   -             -                        -         -

 <FPGA Information>
  Active side:  Side-0
  Side Name          Version                  Size      Date
   0   l2sw_fpg.bin  L2SW-FPGA-C01-SW[illegible]  11613000  [illegible]
   1   l2sw_fpg.bin  L2SW-FPGA-C01-SW[illegible]  11613000  [illegible]
```

Displayed items

Item		Description	Range
• <Software Information> • <FPGA Information>	Active side	Current active side	• Side-0 • Side-1
	Side	Storage side of the file	• 0 • 1 • -
	Name	File name	• l2sw_apl.bin • param0.bin • operation.log • alarm.log • l2sw_fpg.bin
	Version	Version	24 characters maximum
	Size	File size	0 to 1000000
	Date	Time information in the form of yyyy/mm/dd HH:MM:SS (If no file exists, "-" is displayed.)	• 2000/03/01 00:00:00 to 2035/12/31 23:59:59 • -

show log

Displays operation log or TRAP log messages for the number of lines specified with a subcommand. (Display order: Oldest log → Latest log)

- Operation mode: Control mode, setting mode

Syntax

show log key [line]

Subcommand	Description	Setting range
key	Specifies a display-target log type.	• ope: Operation log • alarm: TRAP log
line	Specifies the number of lines to be displayed.	line = 1 to 5000

Point

If [line] is not specified, up to 20 lines are displayed.

Window

- Operation log

```
Control>> show log ope line=8

1970/01/01 00:02:45 [INFO] Login. ( Account = "root" )
1970/01/01 00:07:02 [INFO] Cmd "set password" ( Result = RESULT_OK )
2015/10/23 10:58:20 [INFO] Cmd "date 2015.10.23-10:58:20" ( Result = RESULT_OK )
2015/12/31 10:10:25 [INFO] Cmd "date 2015.12.31-10:10:25" ( Result = RESULT_OK )
2015/12/31 10:20:18 [INFO] Logout.
2015/12/31 10:20:40 [INFO] Login. ( Account = "root" )
2015/12/31 10:52:51 [INFO] Cmd "show log ope line=1" ( Result = RESULT_OK )
2015/12/31 10:53:13 [INFO] Cmd "show log ope line=20" ( Result = RESULT_OK )
```

- TRAP log

```
Control>> show log alarm line=8

2015/12/31 11:06:15 [INFO   ][Seq:  -] Change Port Link Status. (Port:7  Link St
atus:1->0)
2015/12/31 11:06:17 [INFO   ][Seq:  -] Change Port Link Status. (Port:3  Link St
atus:0->1)
2015/12/31 11:06:20 [INFO   ][Seq:  -] Change Port Link Status. (Port:1  Link St
atus:1->0)
2015/12/31 11:06:22 [INFO   ][Seq:  -] Change Port Link Status. (Port:4  Link St
atus:0->1)
2015/12/31 11:06:24 [INFO   ][Seq:  -] Change Port Link Status. (Port:2  Link St
atus:1->0)
2015/12/31 11:07:31 [INFO   ][Seq:  -] ERP Protection Occurrence.
2015/12/31 11:07:31 [WARNING][Seq:  -] ERP Link Failure. (Port:1)
2015/12/31 11:07:31 [WARNING][Seq:  -] ERP Link Failure. (Port:2)
```

show maclearn

Displays the MAC address learning table.

- Operation mode: Control mode

Syntax

show maclearn

Window

```
Control>> show maclearn

Port No. VLANid  MAC Address
   4     1       [illegible]
   3     1       [illegible]
   1     1       [illegible]

 Total Entry  :    3
```

Point

The display order is random.

Displayed items

Item	Description	Range
Port No.	Port number	1 to 8
VLANid	VLAN ID	0 to 4095
MAC Address	Learned MAC address	00:00:00:00:00:00 to FF:FF:FF:FF:FF:FF
Total Entry	Number of items learned	0 to 2048

A

show statistics

Displays the frame flow statistics of the specified port.

- Operation mode: Control mode

Syntax

show statistics port_no

Subcommand	Description	Setting range
port_no	Specifies the number of a display-target port.	1 to 8

Window

```
Control>> show statistics 1

  Date              :  2015/12/31 11:00:28

  Tx Frame                      : 529
  Rx Frame                      : 912
  FCS Error Frame               : 0
  Length Error Frame            : 0
  Class1 Drop Frame             : 0
  Class2 Drop Frame             : 0
  Class3 Drop Frame             : 0
  Class4 Drop Frame             : 0
```

Displayed items

Item	Description	Range
Date	Time information in the form of yyyy/mm/dd HH:MM:SS	2000/03/01 00:00:00 to 2035/12/31 23:59:59
Tx Frame	Number of send frames	0 to 4294967295
Rx Frame	Number of receive frames	0 to 4294967295
FCS Error Frame	Number of FCS error frames	0 to 4294967295
Length Error Frame	Number of length error frames	0 to 4294967295
Class1 Drop Frame	Number of discarded ERP-related frames (when ERP is enabled)	0 to 4294967295
Class2 Drop Frame	Number of discarded CC-Link IE frames and loop detection frames (only when ERP is enabled)	0 to 4294967295
Class3 Drop Frame	Number of discarded UDP frames and frames sent from the industrial managed switch (such as TRAP)	0 to 4294967295
Class4 Drop Frame	Number of other frames discarded	0 to 4294967295

show erpstate

Displays the ERP status.

- Operation mode: Control mode, setting mode

Syntax

show erpstate

Window

```
Control>> show erpstate

  ERP Status                    : Protection
  ERP Port1 SF status           : Fail
  ERP Port2 SF status           : Fail

  [receive]
                                  ERP Port1               ERP Port2
  CC Frame count                : 0                       0
  CC Frame cycle                : 1[ms]                   1[ms]

  R-APS NODE ID                 : 000000000000            000000000000
        Request/State           : NR                      NR
        Sub-code                : -                       -
        RPL Blocked             : UnBlocked               UnBlocked
        Do Not Flush            : Request                 Request
        Blocked Port Reference  : PORT1                   -
        Frame Count             : 0                       0


  [send]
                                  ERP Port1               ERP Port2
  CC Frame count                : 20581                   20581

  R-APS NODE ID                 : 104B46D77588            104B46D77588
        Request/State           : SF                      SF
        Sub-code                : -                       -
        RPL Blocked             : UnBlocked               UnBlocked
        Do Not Flush            : Request                 Request
        Blocked Port Reference  : -                       -
        Frame Count             : 10                      10
```

Displayed items

Item	Description	Range
ERP Status	ERP status	• Protection • Idle
ERP PortX SF status (X: Port number)	SF status	• Normal • Fail

Item		Description	Range
[receive]	CC Frame count	Number of CC frames received	0 to 4294967295
	CC Frame cycle	CC frame receive cycle	• 1(ms) • 3.33(ms) • 10(ms) • 100(ms) • 1(s) • 10(s) • 1(min) • 10(min)
	R-APS NODE ID	Node ID information of R-APS frames	6-digit hexadecimal number
	Request/State	Status of Request/State of R-APS frames	• NR: Normal (No failure detected) • SF: Link-down or no CC frame received
	Sub-code	Status of Sub code of R-APS frames	-
	RPL Blocked	Status of RPL Blocked of R-APS frames	• Blocked • UnBlocked
	Do Not Flush	Status of Do Not Flush of R-APS frames	• No request • Request
	Blocked Port Reference	Status of Blocked Port Reference of R-APS frames	• PORT1 • PORT2 • -
	Frame Count	Number of R-APS frames received	0 to 4294967295
[send]	CC Frame count	Number of CC frames sent	0 to 4294967295
	R-APS NODE ID	Node ID information of R-APS frames	6-digit hexadecimal number
	Request/State	Status of Request/State of R-APS frames	• FS • NR • SF • MS • Event • -
	Sub-code	Status of Sub code of R-APS frames	• FDB • -
	RPL Blocked	Status of RPL Blocked of R-APS frames	• Blocked • UnBlocked
	Do Not Flush	Status of Do Not Flush of R-APS frames	• No request • Request
	Blocked Port Reference	Status of Blocked Port Reference of R-APS frames	• PORT1 • PORT2 • -
	Frame Count	Number of R-APS frames sent	0 to 4294967295

save

Saves the current parameter file and log files to the flash ROM.

- Operation mode: Control mode, setting mode

Syntax

save [type]

Subcommand	Description	Setting range
type	Specifies a file to be saved to the flash ROM.	• param: Parameter file • log: Log files

Point

If [type] is not specified, both the parameter file and log files are saved to the flash ROM.

Window

```
Control>> save
 OK.
```

backup

Stores the current parameter file and log files to the SD memory card.

- Operation mode: Setting mode only (☞ Page 75 Operation mode)

Syntax

backup [type]

Subcommand	Description	Setting range
type	Specifies a file to be stored to the SD memory card.	• param: Parameter file • log: Log files

Point

If [type] is not specified, both the parameter file and log files are stored to the SD memory card.
Files are stored to the SD memory card as follows:

- sd\param.txt: Parameter file
- log\operation.log: Operation log
- log\alarm.log: TRAP log

The files other than those listed above are system files used by the industrial managed switch, therefore, do not operate them.

Window

```
Config>> backup log
# OK.
```

clear

Initializes the parameter file and log files.

- Operation mode: Setting mode only (☞ Page 75 Operation mode)

Syntax

clear [type]

Subcommand	Description	Setting range
type	Initializes the parameter file and log files.	all

Point

- If [type] is not specified, only the parameter file is initialized. To set the initialized parameters, execute the "save" command, and then the "exit" command. The industrial managed switch restarts automatically. (☞ Page 103 save, Page 80 exit)
- If "all" is set, both the parameter file and log files are initialized, and then the industrial managed switch restarts automatically.
- This command does not format the SD memory card. To format the SD memory card, execute the "format" command. (☞ Page 106 format)

Window

```
Config>> clear
 OK.
```

reboot

Restarts the industrial managed switch.

- Operation mode: Control mode, setting mode

Syntax

reboot [side]

Subcommand	Description	Setting range
side	Specifies a side of the system of the industrial managed switch.	• 0 • 1

Point

- If [side] is not specified, the current side is used.
- Restarting erases the parameter settings. Before restarting, save the parameter settings to the flash ROM or an SD memory card. (☞ Page 103 save, Page 103 backup)

Window

```
Control>> reboot
```

ping

Executes a ping test.

The command sends an ICMP echo frame every second, and completes after sending frames four times. After the completion, the following statistical information is displayed: the number of sent ICMP echo frames, number of received echo replies, and ratio of unreceived echo replies.

- Operation mode: Control mode, setting mode

Point

The management VLAN is assigned to ICMP echo frames.

Syntax

ping ipadr

Subcommand	Description	Setting range
ipadr	Specifies the destination IP address of a ping test.	0.0.0.0 to 223.255.255.255

Point

A broadcast address cannot be set as the destination IP address of a ping test.

Window

```
Control>> ping 192.168.0.1
PING 192.168.0.1 (192.168.0.1): 56 data bytes
64 bytes from 192.168.0.1: seq=0 ttl=64 time=0.460 ms
64 bytes from 192.168.0.1: seq=1 ttl=64 time=0.360 ms
64 bytes from 192.168.0.1: seq=2 ttl=64 time=0.309 ms
64 bytes from 192.168.0.1: seq=3 ttl=64 time=0.311 ms

--- 192.168.0.1 ping statistics ---
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max = 0.309/0.360/0.460 ms
```

force laswitch

When LA is enabled, forcibly switches the port so that data communications are performed using only one communication cable of the specified port. If data communication have already been performed using only one port, clear the setting, and then specify and switch the port.

- Operation mode: Control mode

Syntax

force laswitch lag side

Subcommand	Description	Setting range
lag	Specifies an LA group to execute the forced LA switching.	• 1: P1 and P2 or OPT1 and OPT2 • 2: P3 and P4 • 3: P5 and P6 • 4: P7 and P8
side	Specifies a port in the LA group to which data communications to be switched.	• lower: A port with an odd port number in the LA group • higher: A port with an even port number in the LA group • clear: Clear

Window

```
Control>> force laswitch 1 lower
 OK.
```

Point

- Execute the same command for both of the two industrial managed switches having an LA group configured. (Subcommand settings must be the same as well.)
- The command completes successfully even when forced LA switching has already been executed.

format

Formats an SD memory card.

- Operation mode: Setting mode only (☞ Page 75 Operation mode)

Syntax

format

Window

```
Config>> format
# OK.
```

Appendix 3 EMC and Low Voltage Directives

Compliance with the EMC Directive, which is one of the EU directives, has been mandatory for the products sold within EU member states since 1996 as well as compliance with the Low Voltage Directive since 1997.
For products compliant to the EMC and Low Voltage Directives, their manufacturers are required to declare compliance and affix the CE marking.
The sales representative in EU member states is:
Company: Mitsubishi Electric Europe BV
Address: Gothaer Strasse 8, 40880 Ratingen, Germany

Measures to comply with the EMC Directive

The EMC Directive sets requirements for emission (conducted and radiated electromagnetic interference emitted by a product) and immunity (the ability of a product not to be influenced by externally generated electromagnetic interference).
This section describes the precautions for machinery constructed with the module to comply with the EMC Directive.
These precautions are based on the requirements of the EMC Directive and the harmonized standards. However, they do not guarantee that the entire machinery constructed according to the descriptions complies with the EMC Directive.
The manufacturer of the machinery must determine the testing method for compliance and declare conformity to the EMC Directive.

EMC Directive related standards

■Emission requirements

Standard: EN 61131-2:2007

Test item	Test description	Value specified in standard
CISPR16-2-3 Radiated emission*2	The electromagnetic wave emitted by the product to the external space is measured.	• 30 to 230MHzQP: 40dBμV/m (measured at 10m distance)*1 • 230 to 1000MHzQP: 47dBμV/m (measured at 10m distance)
CISPR16-2-1, CISPR16-1-2 Conducted emission*2	The noise level which the product emits to the power line is measured.	• 0.15 to 0.5MHzQP: 79dB, Mean: 66dB*1 • 0.5 to 30MHzQP: 73dB, Mean: 60dB

*1 QP: Quasi-Peak value, Mean: Average value
*2 The module is an open-type device and must be placed in a conductive control panel or similar type of enclosure. The tests were conducted with the module installed in a control panel.

A

■Immunity requirements

Standard: EN 61131-2:2007

Test item	Test description	Value specified in standard
EN 61000-4-2 Electrostatic discharge immunity*1	An electrostatic discharge is applied to the enclosure of the equipment.	• 8kV: Air discharge • 4kV: Contact discharge
EN 61000-4-3 Radiated, radio-frequency, electromagnetic field immunity*1	An electric field is radiated to the product.	80% AM modulation @1kHz • 80 to 1000MHz: 10V/m • 1.4 to 2.0GHz: 3V/m • 2.0 to 2.7GHz: 1V/m
EN 61000-4-4 Fast transient burst immunity*1	Burst noise is applied to power lines and signal lines.	• AC/DC power, I/O power, and AC I/O (unshielded) lines: 2kV • DC I/O, analog, and communication lines: 1kV
EN 61000-4-5 Surge immunity*1	Lightning surge is applied to power lines and signal lines.	• AC power, AC I/O power, and AC I/O (unshielded) lines: 2kV CM, 1kV DM • DC power and DC I/O power lines: 0.5kV CM, 0.5kV DM • DC I/O, AC I/O (shielded), analog*2, and communication lines: 1kV CM
EN 61000-4-6 Conducted RF immunity*1	High-frequency noise is applied to power lines and signal lines.	0.15 to 80MHz, 80% AM modulation @1kHz, 10Vrms
EN 61000-4-8 Power-frequency magnetic field immunity*1	The product is immersed in the magnetic field of an induction coil.	50/60Hz, 30A/m
EN 61000-4-11 Voltage dips and interruptions immunity*1	Power voltage is momentarily interrupted.	• 0%, 0.5 periods, starting at zerocrossing • 0%, 250/300 periods (50/60Hz) • 40%, 10/12 periods (50/60Hz) • 70%, 25/30 periods (50/60Hz)

*1 The module is an open-type device and must be placed in a conductive control panel or similar type of enclosure. The tests were conducted with the module installed in a control panel.

*2 The accuracy of an analog-digital converter module may temporarily vary within ±10%.

Installation in a control panel

The module is an open-type device intended to be placed in a conductive control panel or similar type of enclosure. This ensures safety as well as effective shielding of electromagnetic noise emitted from the module.

■Control panel

- Use a conductive control panel.
- Mask off an area used for grounding in advance.
- To ensure electrical contact between inner plates and the control panel, mask off the bolt installation areas of each inner plate so that conductivity can be ensured in the largest area.
- Ground the control panel with a thick ground cable so that low impedance can be ensured even at high frequencies.
- Keep the diameter of the holes on the control panel to 10cm or less. If the diameter is larger than 10cm, electromagnetic wave may leak. In addition, because electromagnetic wave leaks through a clearance between the control panel and its door, reduce the clearance as much as possible. Use of EMI gaskets (sealing the clearance) can suppress undesired radiated emissions.

The tests were conducted by Mitsubishi Electric Corporation using a control panel having damping characteristics of 37dB (maximum) and 30dB (average) (measured at 3m distance, 30 to 300MHz).

■Power cable and ground cable

- Provide a ground point to the control panel near the power supply part. Ground the FG terminal to the ground point with the thickest and shortest ground cable possible (30cm or shorter).

■DIN rails

Aluminum DIN rails may have insulation films. If electric contacts cannot be secured between a DIN rail and the module, take measures to obtain conductivity.

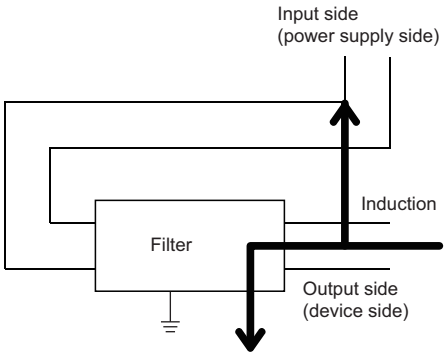
- Screw the module to the control panel directly, without using a DIN rail.
- Use iron DIN rails, such as TH35-7.5Fe and TH35-15Fe.

■Noise filter (power supply line filter)

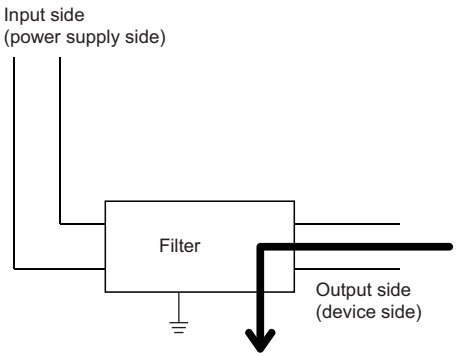
A noise filter is effective for reducing conducted noise in the 10MHz or less frequency band. (Use of a noise filter can suppress noise.)

The following are the installation precautions.

- Do not bundle the cables on the input side and output side of the noise filter. If bundled, the noise on the output side is induced into the filtered cable on the input side.



• Problematic example
Noise is induced when the input and output cables are bundled.



• Modification example
Install the input and output cables separately.

- Ground the ground terminal of the noise filter to the ground point of the control panel with the shortest cable possible (approximately 10cm).

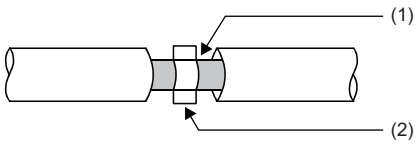
Cables extended out of the control panel

Use shielded cables for the cables which are connected to the module and extended out of the control panel.

If shielded cables are not used or not grounded correctly, the noise immunity will not meet the requirement.

■Ethernet cables

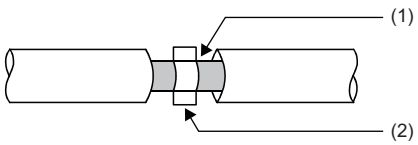
- Use a shielded twisted pair cable for connection to the 10BASE-T, 100BASE-TX, or 1000BASE-T connector. Strip a part of the jacket of the shielded twisted pair cable as shown below and ground the exposed shield to the largest area.



(1) Shield
(2) Clamp

■CC-Link IE Controller Network (when Ethernet cables are used) cables and CC-Link IE Field Network cables

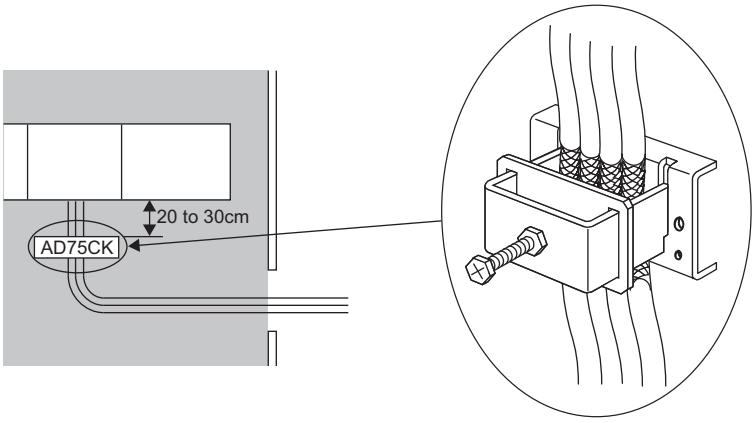
- Use an Ethernet cable recommended by CC-Link Partner Association.
- Ethernet cable is a shielded cable. Strip a part of the jacket as shown below and ground the exposed shield to the largest area.



(1) Shield
(2) Clamp

■Grounding cables with a cable clamp

Use shielded cables for external wiring and ground the shields of the shielded cables to the control panel with an AD75CK cable clamp (manufactured by Mitsubishi). Ground the shields within 20 to 30cm from the module.



For details on the AD75CK, refer to the following.

AD75CK-type Cable Clamping Instruction Manual

■Ferrite core

A ferrite core is effective for reducing radiated noise in the 30MHz to 100MHz frequency band.

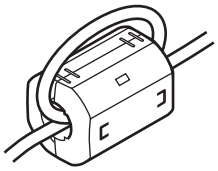
It is recommended to install a ferrite core if a shield cable extended out of the control panel does not provide sufficient shielding effects.

Install a ferrite core to the cable in the position just before the cable is extended out of the control panel. If the installation position is not appropriate, the ferrite core will not produce any effect.

Install a ferrite core to each power cable as shown below.

- (Ferrite core used for the tests conducted by Mitsubishi: ESD-SR-250 manufactured by NEC TOKIN Corporation, ZCAT3035-1330 manufactured by TDK Corporation)

Ex.



External power supply

- Use a reinforced or double insulated CE-marked external power supply, and ground the FG terminal. Ground the FG terminals. (External power supply used for the tests conducted by Mitsubishi: DLP-120-24-1 manufactured by TDK-Lambda Corporation, PS5R-SF24 and PS5R-F24 manufactured by IDEC Corporation)
- Keep the power cable connected to the power supply terminal of the module to 10m or less.
- Connect a noise filter to the external power supply. Use a noise filter with the damping characteristic equivalent to those of MA1206 (manufactured by TDK-Lambda Corporation). Note that a noise filter is not required if the module is used in Zone A defined in EN 61131-2.

Manufacturer	Contact
TDK-Lambda Corporation	www.tdk-lambda.com

Measures to comply with the Low Voltage Directive

The module operates at the rated voltage of 24VDC.

The modules which operate at less than 50VAC/75VDC rated input voltage are not targeted for the Low Voltage Directive compliance.

Appendix 4 Checking Production Information and Firmware Version

Checking methods

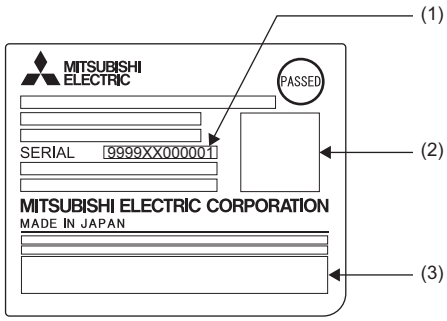
This section describes how to check the production information and firmware version of an industrial managed switch.

Checking production information

■Rating plate

The rating plate is located on the side of an industrial managed switch.

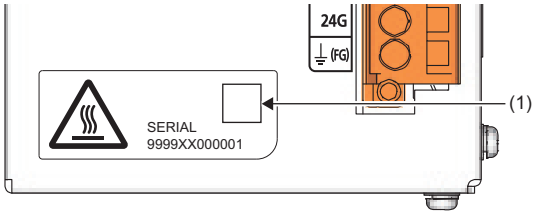
The production information (12 digits) of the industrial managed switch is shown on the SERIAL field.



(1) Production information (12 digits)
(2) QR code
(3) Relevant regulation standards

■Production information marking

The production information (12 digits) is printed on the marking on the front (at the bottom) of an industrial managed switch.



(1) QR code

Checking firmware version

The firmware version can be checked by using the "show unit" command. (☞ Page 95 show unit)

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Appendix 6 Band when tag VLAN is used

When the band between industrial managed switches that are connected in the tag VLAN mode exceeds 1Gbps, send/receive frames may be discarded. Configure the network so that the band between industrial managed switches does not exceed 1Gbps. In addition, when the following conditions for band calculation are satisfied, calculate the network band for each network number using the band calculation formula relevant to each network to see that the total band of the network does not exceed 1Gbps.

Combination of networks that requires band calculation

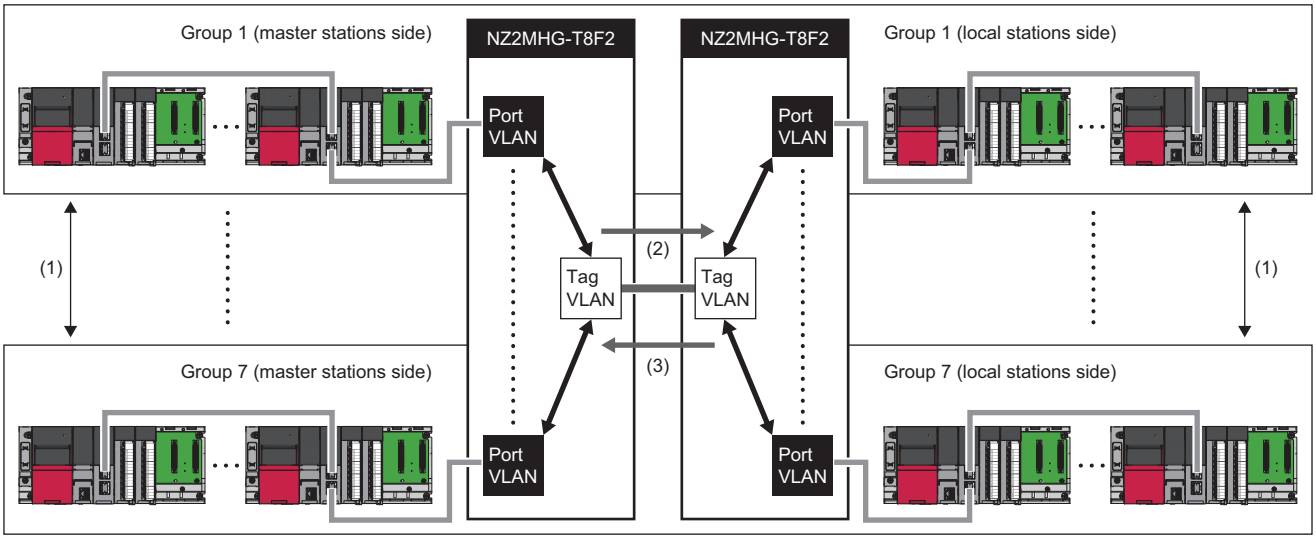
The following table lists the combinations of networks that require band calculation.

Combination of networks	Requirement of band calculation	Calculation procedure
CC-Link IE Field Network only	Band calculation is required when seven CC-Link IE Field Networks having different network numbers are connected to the industrial managed switch.	☞ Page 120 Configuration with CC-Link IE Field Network only
CC-Link IE Controller Network only	Band calculation is required when two or more CC-Link IE Controller Networks having different network numbers are connected to the industrial managed switch.	☞ Page 121 Configuration with CC-Link IE Controller Network only
CC-Link IE Field Network + CC-Link IE Controller Network	Band calculation is required in all cases.	☞ Page 123 Configuration with CC-Link IE Field Network and CC-Link IE Controller Network
Ethernet + CC-Link IE Field Network	Band calculation is required when four or more CC-Link IE Field Networks having different network numbers are connected to the industrial managed switch.	☞ Page 125 Configuration with Ethernet and CC-Link IE
Ethernet + CC-Link IE Controller Network	Band calculation is required in all cases.	
Ethernet + CC-Link IE Field Network + CC-Link IE Controller Network	Band calculation is required in all cases.	

Procedure of band calculation

Configuration with CC-Link IE Field Network only

The following figure shows the system configuration used for band calculation.



(1) Seven CC-Link IE Field Networks having different network numbers can be connected to up to seven communication ports.
(2) Total band on the master stations side → the local stations side in groups 1 to 7[*1] is calculated.
(3) Total band on the local stations side → the master stations side in groups 1 to 7[*1] is calculated.

*1 CC-Link IE Field Network devices having different network numbers are indicated as groups 1 to 7.

Procedure for band calculation is as follows.

1. Calculate the link scan time for each CC-Link IE Field Network having different network number that is connected to the industrial managed switch. For how to check the link scan time, refer to the following.

MELSEC iQ-R CC-Link IE Field Network User's Manual (Application)

2. Calculate the following parameters other than the link scan time for each group (groups 1 to 7).

Variable	Meaning
LS	Link scan time
Fbm	Total number of RX/RY points set in the network configuration setting in the basic setting + total assignment number of RX/RY points of the local stations connected to the master stations side in groups 1 to 7
Fwm	Total number of RWw/RWr points set in the network configuration setting in the basic setting + total assignment number of RWw/Rwr points of the local stations connected to the master stations side in groups 1 to 7
Nm	Total number of stations on the master stations side in groups 1 to 7
Fbs	Total assignment number of RX/RY points of the local stations connected to the local stations side in groups 1 to 7
Fws	Total assignment number of RWw/RWr points of the local stations connected to the local stations side in groups 1 to 7
Ns	Total number of stations on the local stations side in groups 1 to 7

For how to check the parameters, refer to the following.

MELSEC iQ-R CC-Link IE Field Network User's Manual (Application)

3. Using the following calculation formulas, calculate the total band on the master stations side → the local stations side and the total band of the local stations side → the master stations side of each group (groups 1 to 7).

Condition			Calculation formula
Communication mode	Normal mode	Band on the master stations side → the local stations side	Dnm[Mbps] = {(1000/LS) × (2 × Fbm + 2 × Fwm + 4608 × Nm)/1048546} × 1.4
		Band on the local stations side → the master stations side	Dns[Mbps] = {(1000/LS) × (2 × Fbs + 2 × Fws + 4608 × Ns)/1048546} × 1.4
	High-speed mode	Band on the master stations side → the local stations side	Dnm[Mbps] = {(1000/LS) × (Fbm + Fwm + 1792 × Nm)/1048546} × 1.4
		Band on the local stations side → the master stations side	Dns[Mbps] = {(1000/LS) × (Fbs + Fws + 1792 × Ns)/1048546} × 1.4

4. Check that the following conditions are satisfied for the total band on the master stations side → the local stations side and for the total band on the local stations side → the master stations side in groups 1 to 7.

- Total band on the master stations side → the local stations side in groups 1 to 7 < 1024Mbps
- Total band on the local stations side → the master stations side in groups 1 to 7 < 1024Mbps

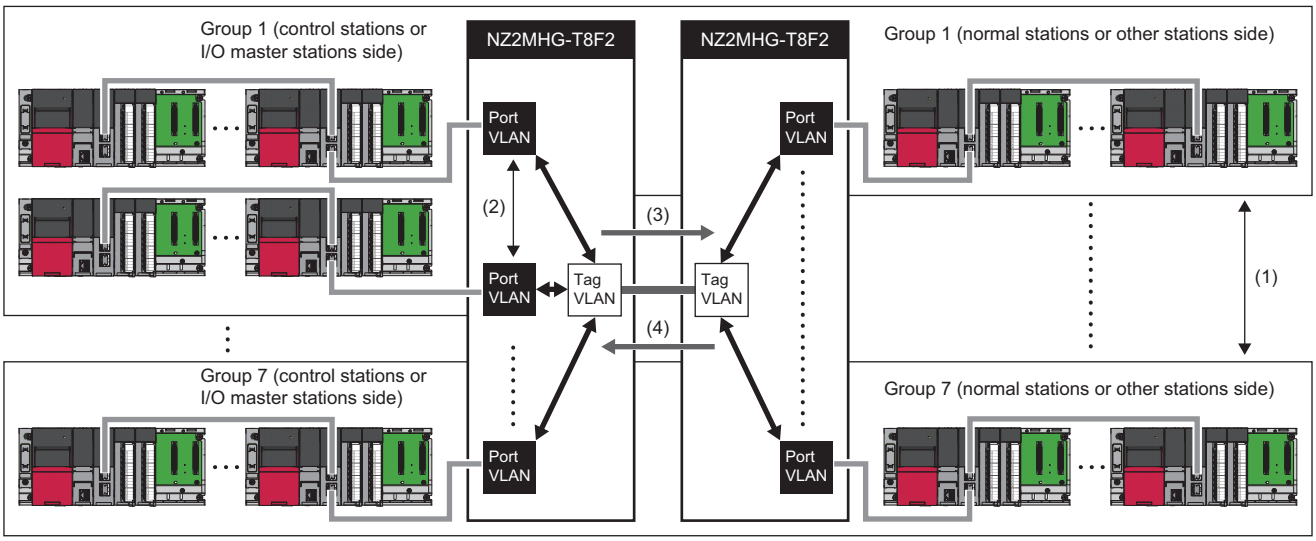
5. When the conditions described in step 4 are not satisfied, take one or more actions described below.

- Reduce the number of assignment points per network.
- Revise the connection configuration on the master stations side and the local stations side in groups 1 to 7 so as to make the number of connected stations on the master stations side and that on the local stations side equal as much as possible.
- Using port VLAN or other tag VLAN, isolate any of the networks to add one wiring system between industrial managed switches.

6. While the system is in operation, check the frame flow statistics of each port using "show statistics" command to see that the Class2 Drop Frame counter is not incremented. (☞ Page 100 show statistics)

Configuration with CC-Link IE Controller Network only

The following figure shows the system configuration used for band calculation.



(1) Seven CC-Link IE Controller Networks having different network numbers can be connected to up to seven communication ports.
(2) The same network can be connected to multiple communication ports.
(3) Total band on the control stations or I/O master stations side → the normal stations or other stations side in groups 1 to 7*1 is calculated.
(4) Total band on the normal stations or other stations side → the control stations or I/O master stations side in groups 1 to 7*1 is calculated.

*1 CC-Link IE Controller Network devices having different network numbers are described as groups 1 to 7.

Procedure for band calculation is as follows.

1. Calculate the link scan time for each CC-Link IE Controller Network having different network number that is connected to the industrial managed switch. For the link scan time, refer to the following.

MELSEC iQ-R CC-Link IE Controller Network User's Manual (Application)

2. Calculate the following parameters other than the link scan time for each group (groups 1 to 7).

Variable	Meaning
LS	Link scan time
Fbm	Total number of LB points of the station connected to the control stations or I/O master stations side in groups 1 to 7 that is specified in the LB/LW setting (1) and the LB/LW setting (2)
Fwm	Total number of LW points of the station connected to the control stations or I/O master stations side in groups 1 to 7 that is specified in the LB/LW setting (1) and the LB/LW setting (2)
Ncm	Total number of stations on the control stations or I/O master stations side in groups 1 to 7
Fbs	Total number of LB points of the station connected to the normal stations or other stations side in groups 1 to 7 that is specified in the LB/LW setting (1) and the LB/LW setting (2)
Fws	Total number of LW points of the station connected to the normal stations or other stations side in groups 1 to 7 that is specified in the LB/LW setting (1) and the LB/LW setting (2)
Ns	Total number of stations on the normal stations or other stations side in groups 1 to 7
Fy	Total number of LY points of the station connected to the other stations side that is specified in the network range assignment LX/LY setting (1) and LX/LY setting (2) in the required setting
Nis	Total number of stations on the normal stations or other stations side in groups 1 to 7

For how to check the parameters, refer to the following.

MELSEC iQ-R CC-Link IE Controller Network User's Manual (Application)

3. Using the following calculation formulas, calculate the total band on the control stations side → the normal stations side and the total band on the normal stations side → the control stations side in each group (groups 1 to 7).

Condition			Calculation formula
Communication mode	Normal mode/ extended mode	Band on the control stations or I/O master stations side → the normal stations or other stations side	Dnm[Mbps] = {(1000/LS) × (2 × Fbm + 2 × Fwm + 2 × Fy + 104128 × Ncm)/ 1048546)} × Ce*1
		Band on the normal stations or other stations side → the control stations or I/O master stations side	Dns[Mbps] = {(1000/LS) × (2 × Fbs + 2 × Fws + 2 × Fy + 768 × Nis + 103360 × Ncs)/ 1048546} × Ce*1

*1 The following table lists the values of Ce.

Communication mode	Total number of stations	Value
Normal mode	2 to 30	0.99
	31 to 60	0.67
	61 to 90	0.57
	91 to 120	0.52
Extended mode	2 to 30	1.05
	31 to 60	0.82
	61 to 90	0.75
	91 to 120	0.71

4. Check that the following conditions are satisfied for the total band on the control stations or I/O master stations side → the normal stations or other stations side and for the total band on the normal stations or other stations side → the control stations or I/O master stations side in groups 1 to 7.

- Total band on the control stations or I/O master stations side → the normal stations or other stations side in groups 1 to 7 < 1024Mbps
- Total band on the normal stations or other stations side → the control stations or I/O master stations side in groups 1 to 7 < 1024Mbps

5. When the conditions described in step 4 are not satisfied, take one or more actions described below.

- Reduce the number of assignment points per network.
- Revise the connection configuration on the control stations or I/O master stations side and the normal stations or other stations side in groups 1 to 7 so as to make the number of connected stations on the control stations or I/O master stations side and that on the normal stations or other stations side equal as much as possible.
- Using port VLAN or other tag VLAN, isolate any of the networks to add one wiring system between industrial managed switches.

6. While the system is in operation, check the frame flow statistics of each port using "show statistics" command to see that the Class2 Drop Frame counter is not incremented. (☞ Page 100 show statistics)

Configuration with CC-Link IE Field Network and CC-Link IE Controller Network

Procedure for band calculation is as follows.

1. Calculate the band of CC-Link IE Field Network and CC-Link IE Controller Network having different network numbers that are connected to the industrial managed switch. (☞ Page 120 Configuration with CC-Link IE Field Network only, Page 121 Configuration with CC-Link IE Controller Network only)

2. Check that the following conditions are satisfied for the total band on the master stations side → the local stations side and the control stations or I/O master stations side → the normal stations or other stations side and for the total band on the local stations side → the master stations side and the normal stations or other stations side → the control stations or I/O master stations side in groups 1 to 7.

- Total band on the master stations side → the local stations side and on the control stations or I/O master stations side → the normal stations or other stations side in groups 1 to 7 < 1024Mbps
- Total band on the local stations side → the master stations side and on the normal stations or other stations side → the control stations or I/O master stations side in groups 1 to 7 < 1024Mbps

3. When the conditions described in step 2 are not satisfied, take one or more actions described below.

- Reduce the number of assignment points per network.
- Revise the connection configuration on the master stations side or the control stations or I/O master stations side and on the local stations side or the normal stations or other stations side in groups 1 to 7 so as to make the number of connected stations on the master stations side or the control stations or I/O master stations side and that on the local stations side or the normal stations or other stations side equal as much as possible.
- Using port VLAN or other tag VLAN, isolate any of the networks to add one wiring system between industrial managed switches.

4. While the system is in operation, check the frame flow statistics of each port using "show statistics" command to see that the Class2 Drop Frame counter is not incremented. (☞ Page 100 show statistics)

Configuration with Ethernet and CC-Link IE

Procedure for band calculation is as follows.

1. Calculate the band of CC-Link IE Field Network and CC-Link IE Controller Network having different network numbers that are connected to the industrial managed switch. (☞ Page 120 Configuration with CC-Link IE Field Network only, Page 121 Configuration with CC-Link IE Controller Network only)
2. Check that the following conditions are satisfied for the total band on the master stations side → the local stations side and on the control stations side → the normal stations side and for the total band on the local stations side → the master stations side and on the normal stations side → the control stations side.

- Total band on the master stations side → the local stations side and on the control stations or I/O master stations side → the normal stations or other stations side in groups 1 to 7 < 614.4Mbps
- Total band on the local stations side → the master stations side and on the normal stations or other stations side → the control stations or I/O master stations side in groups 1 to 7 < 614.4Mbps
- Ethernet communication band in groups 1 to 7 < 400Mbps

3. When the conditions described in step 2 are not satisfied, take one or more actions described below.

- Reduce the number of assignment points per network.
- Revise the connection configuration on the master stations side or the control stations or I/O master stations side and on the local stations side or the normal stations or other stations side in groups 1 to 7 so as to make the number of connected stations on the master stations side or the control stations or I/O master stations side and that on the local stations side or the normal stations or other stations side equal as much as possible.
- Using port VLAN or other tag VLAN, isolate any of the networks to add one wiring system between industrial managed switches.

4. While the system is in operation, check the frame flow statistics of each port using "show statistics" command to see that the Class2 Drop Frame counter or the Class4 Drop Frame counter are not incremented. (☞ Page 100 show statistics)

Appendix 7 Added or Changed Functions

This chapter lists the functions of the industrial managed switch that have been added or changed.

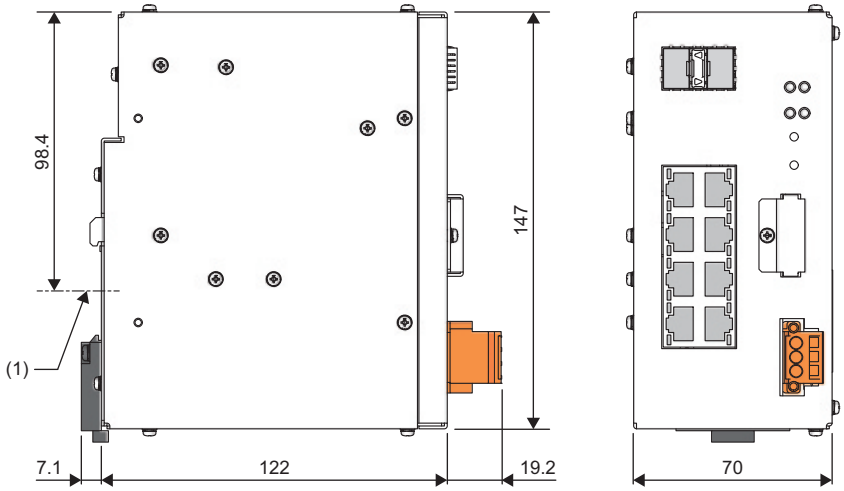
Added or changed functions	Production information
• Support of IEEE 802.1Q Priority Tagged Frame function • Support of CC-Link IE tag VLAN	7104AV (first six digits) or later

Appendix 8 External Dimensions

NZ2MHG-T8F2

■When installed using a DIN rail

(☞ Page 26 Installing an Industrial Managed Switch using a DIN Rail)

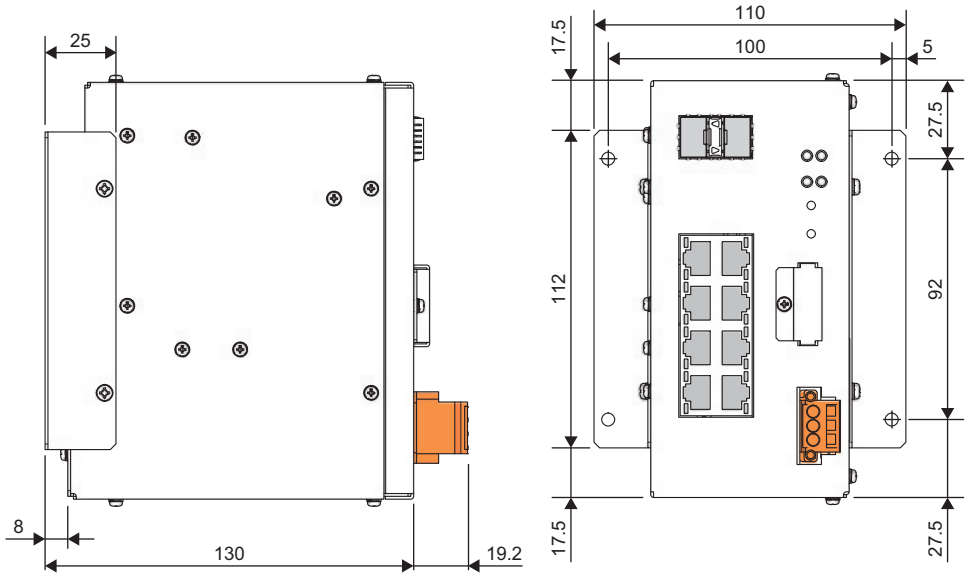


(1) DIN rail center

(Unit: mm)

■When installed using module mounting brackets

(☞ Page 30 Installing an Industrial Managed Switch Using Module Mounting Brackets)



(Unit: mm)

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REVISIONS

*The manual number is given on the bottom left of the back cover.

Revision date	*Manual number	Description
July 2016	SH(NA)-081612ENG-A	First edition
July 2018	SH(NA)-081612ENG-B	■Added or modified parts TERMS, Chapter 3, Section 4.1, 4.2, 5.2, 6.4, 8.2, 10.3, 10.4, 10.5, 10.6, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, Appendix 1, 2, 4, 6, 7
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Japanese manual number: SH-081611-D

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However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

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TRANSLATION OF THE ORIGINAL INSTRUCTIONS

SH(NA)-081612ENG-C(2601)MEE
MODEL: NZ2MHG-T8F2-U-E

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