MITSUBISHI ELECTRIC

Programmable Controller

CC-Link IE TSN Analog-Digital Converter Module User's Manual (CC-Link IE TSN Communication Mode)

-NZ2GN2S-60AD4
-NZ2GN2B-60AD4

SAFETY PRECAUTIONS

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals 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

- In the case of a communication failure in the network, data of the master station are held. Check Data link status (each station) (SW00B0 to SW00B7) and configure an interlock circuit in the program to ensure that the entire system will operate safely.
- Do not use any "use prohibited" signals as a remote input or output signal. These signals are reserved for system use. Do not write any data to the "use prohibited" areas in the remote register. If these operations are performed, an accident may occur due to an incorrect output or malfunction.

[Design Precautions]

⚠CAUTION

- Do not install the control lines or 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.

[Security Precautions]

⚠WARNING

- To maintain the security (confidentiality, integrity, and availability) of the programmable controller and the system against unauthorized access, denial-of-service (DoS) attacks, computer viruses, and other cyberattacks from external devices via the network, take appropriate measures such as firewalls, virtual private networks (VPNs), and antivirus solutions.

[Installation Precautions]

⚠WARNING

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

[Installation Precautions]

⚠CAUTION

- Use the module in an environment that meets the general specifications in this manual. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- Do not directly touch any conductive parts and electronic components of the module. Doing so can cause malfunction or failure of the module.
- Securely connect the cable connectors. Poor contact may cause malfunction.

[Wiring Precautions]

⚠WARNING

- Shut off the external power supply (all phases) used in the system before 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.
- Tighten any unused terminal screws within the specified torque range. Undertightening can cause a short circuit due to contact with a solderless terminal.
- Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when a terminal block screw comes loose, resulting in failure.
- 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 a fire or failure.
- Tighten the terminal block screws within the specified torque range. Undertightening can cause short circuit, fire, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, fire, or malfunction.
- Prevent foreign matter such as dust or wire chips from entering the module. Such foreign matter can cause a fire, failure, or malfunction.
- Place the cables in a duct or clamp them. If not, dangling cables may swing or inadvertently be pulled, resulting in malfunction or damage to modules or cables. In addition, the weight of the cables may put stress on modules in an environment of strong vibrations and shocks.
- Do not install the control lines or 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.

[Wiring Precautions]

⚠CAUTION

- 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. For the cable connected to the terminal block, loosen the terminal screw. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.
- When an overcurrent caused by an error of an external device or a failure of the programmable controller flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.
- Mitsubishi programmable controllers must be installed in control panels. Wiring and replacement of a module must be performed by qualified maintenance personnel with knowledge of protection against electric shock. For wiring methods, refer to "INSTALLATION AND WIRING" in this manual.

[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 screws or connector screws. Failure to do so may cause the module to fail or malfunction.

[Startup and Maintenance Precautions]

⚠CAUTION

- Do not disassemble or modify the module. Doing so may cause failure, malfunction, injury, or a fire.
- Do not drop or apply strong shock to the module. Doing so may damage the module.
- Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) more than 25cm away in all directions from the programmable controller. Failure to do so may cause malfunction.
- Shut off the external power supply (all phases) used in the system before mounting or removing a 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 or connector to/from the module more than 50 times (IEC 61131-2/JIS B 3502 compliant). Exceeding the limit may cause malfunction.
- Before handling the module or connection cables, 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.
- 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.

[Disposal Precautions]

⚠CAUTION

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

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 CC-Link IE TSN analog-digital converter module (hereafter abbreviated as A/D converter module).
This manual describes the procedures, system configuration, parameter settings, functions, and troubleshooting required to use the A/D converter module in CC-Link IE TSN communication mode.
Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the A/D converter module to handle the product correctly.
When applying the program examples introduced in this manual to an actual system, ensure the applicability and confirm that it will not cause system control problems.

CC-Link IE TSN communication mode

When using the A/D converter module as a remote station on CC-Link IE TSN, select CC-Link IE TSN communication mode.
To operate the A/D converter module in CC-Link IE TSN communication mode, set the function setting switch 1 to OFF. (☞ Page 28 Setting the function setting switches)

Relevant products

NZ2GN2S-60AD4, NZ2GN2B-60AD4

Point

Unless otherwise specified, this manual describes the program examples in which the remote I/O signals and remote registers are assigned for an A/D converter module as follows.

- Remote input signal: RX0 to RX2F
- Remote output signal: RY0 to RY2F
- Remote register: RWr0 to RWr1F
- Remote register: RWw0 to RWw1F

For the assignment of remote I/O signals and remote registers, refer to the following.
☞ Page 116 PROGRAMMING

CONTENTS

RELEVANT MANUALS

Manual name [manual number]	Description	Available form
CC-Link IE TSN Analog-Digital Converter Module User's Manual (CC-Link IE TSN Communication Mode) [SH-082131ENG] (this manual)	Part names, specifications, procedures before operation, system configuration, installation, wiring, parameter settings, functions, programming, troubleshooting, I/O signals, and remote buffer memory of the A/D converter module to be used in CC-Link IE TSN communication mode	Print book e-Manual PDF
CC-Link IE TSN Analog-Digital Converter Module User's Manual (CC-Link IE Field Network Communication Mode) [SH-082236ENG]	Part names, specifications, procedures before operation, system configuration, installation, wiring, parameter settings, functions, programming, troubleshooting, I/O signals, and remote buffer memory of the A/D converter module to be used in CC-Link IE Field Network communication mode	Print book e-Manual PDF
MELSEC iQ-R CC-Link IE TSN User's Manual (Startup) [SH-082127ENG]	Specifications, procedures before operation, system configuration, wiring, and communication examples of CC-Link IE TSN	Print book e-Manual PDF
MELSEC iQ-R CC-Link IE TSN User's Manual (Application) [SH-082129ENG]	Functions, parameter settings, troubleshooting, I/O signals, and buffer memory of CC-Link IE TSN	Print book e-Manual PDF
MELSEC iQ-R Inter-Module Synchronization Function Reference Manual [SH-081401ENG]	Inter-module synchronization function, which controls multiple modules synchronously	e-Manual PDF
GX Works3 Operating Manual [SH-081215ENG]	System configuration, parameter settings, and online operations of GX Works3	e-Manual PDF
SLMP Reference Manual [SH-080956ENG]	Describes protocols for accessing SLMP-compatible devices from external devices such as personal computers, HMIs, and SLMP-compatible modules (such as Ethernet-equipped modules and CC-Link IE TSN modules).	Print book e-Manual PDF

Point

e-Manual refers to the Mitsubishi Electric FA electronic book manuals that can be browsed using a dedicated tool.

e-Manual has the following features:

- Required information can be cross-searched in multiple manuals.
- Other manuals can be accessed from the links in the manual.
- The hardware specifications of each part can be found from the product figures.
- Pages that users often browse can be bookmarked.
- Sample programs can be copied to an engineering tool.

TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
CC-Link IE TSN Class*1	A group of devices and switching hubs compatible with CC-Link IE TSN, ranked according to the functions and performance by the CC-Link Partner Association. For details on CC-Link IE TSN Class, refer to the CC-Link IE TSN Installation Manual (BAP-C3007ENG-001) published by the CC-Link Partner Association.
Cyclic transmission	A function by which data are periodically exchanged among stations on the same network using link devices
Data link	Communications performed by cyclic transmission and transient transmission
Dedicated instruction	An instruction that simplifies programming for using functions of intelligent function modules
Engineering tool	A tool used for setting up programmable controllers, programming, debugging, and maintenance
Link device	A device (RX, RY, RWr, RWw, LB, or LW) in a module on CC-Link IE TSN
Link scan (link scan time)	Time required for all the stations on the network to transmit data. The link scan time depends on data volume and the number of transient transmission requests.
Local station	A station that performs cyclic transmission and transient transmission with the master station and other local stations.
Master station	A station that controls the entire network. This station can perform cyclic transmission and transient transmission with all stations. Only one master station can be used in a network.
Multicast filter	A filter function that selects whether or not the own station sends cyclic data of multicast to the subsequent stations after receiving them. Since the master station sets the multicast filter according to the system configuration, parameter settings for this filter function are not required.
Multicast mode	Cyclic data are sent to multiple stations in this communication mode.
Remote buffer memory	Buffer memory in a remote station
Remote station	A station that exchanges I/O signals (bit data) and I/O data (word data) with another station by cyclic transmission. This station can perform transient transmission.
Reserved station	A station reserved for future use. This station is not actually connected, but counted as a connected station.
Slave station	A station other than a master station: a local station, a remote station
Transient transmission	A function of communication with other stations, which is used when requested by a dedicated instruction or an engineering tool
TSN hub	A CC-Link IE TSN Class B switching hub authorized by the CC-Link Partner Association

*1 The term has been changed for standardization among manuals and software applications related to CC-Link IE TSN. However, the term used in some CC-Link IE TSN related software windows may remain unchanged and may be different from the term used in this manual.
In case of inconsistency, refer to the following.

Term used in software window	Term after change
Authentication Class	CC-Link IE TSN Class

GENERIC TERMS AND ABBREVIATIONS

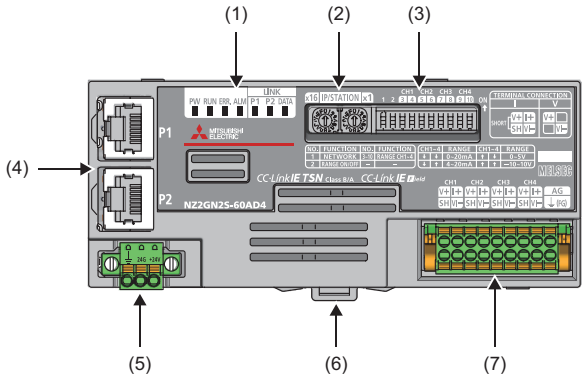
Unless otherwise specified, this manual uses the following generic terms and abbreviations.

Generic term and abbreviation	Description
A/D converter module	An abbreviation for the CC-Link IE TSN analog-digital converter module
Analog module	A generic term for an A/D converter module and a D/A converter module
CC-Link IE TSN remote module	A generic term for an A/D converter module, a D/A converter module, an I/O module
D/A converter module	An abbreviation for the CC-Link IE TSN digital-analog converter module
I/O module	An abbreviation for the CC-Link IE TSN remote I/O module
REMFR	An abbreviation for JP.REMFR or ZP.REMFR
REMFRD	An abbreviation for JP.REMFRD
REMFRDIP	An abbreviation for GP.REMFRDIP
REMFRIP	An abbreviation for GP.REMFRIP
REMTO	An abbreviation for JP.REMTO or ZP.REMTO
REMTOD	An abbreviation for JP.REMTOD
REMTODIP	An abbreviation for GP.REMTODIP
REMTOIP	An abbreviation for GP.REMTOIP
RWr	An abbreviation for the remote register of link device. RWr refers to word data input from a slave station to the master station (For some areas in a local station, data are input in the opposite direction.)
RWw	An abbreviation for the remote register of link device. RWw refers to word data output from the master station to a slave station (For some areas in a local station, data are output in the opposite direction.)
RX	An abbreviation for remote input of link device. Bit data input from a slave station to the master station (For some areas in a local station, data are input in the opposite direction.)
RY	An abbreviation for remote output of link device. Bit data output from the master station to a slave station (For some areas in a local station, data are output in the opposite direction.)
SLMPSND	A generic term for J.SLMPSND, JP.SLMPSND, G.SLMPSND, and GP.SLMPSND

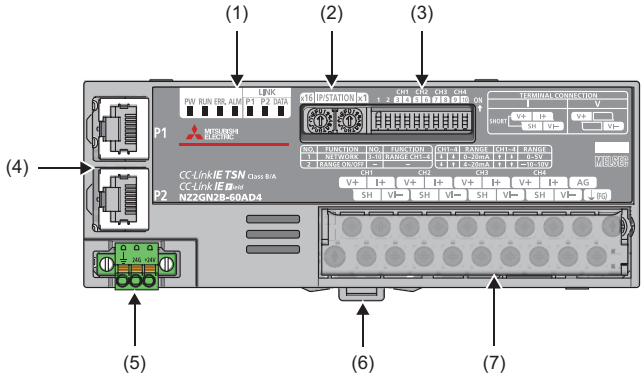
1 PART NAMES

This chapter describes part names of the A/D converter module.

- Spring clamp terminal block type



- Screw terminal block type



No.	Name	Application
(1)	PW LED	Indicates the power supply status of the A/D converter module. • On: Power-on • Off: Power-off
	RUN LED	Indicates the operating status of the A/D converter module. • On: In normal operation • Flashing: In unit test mode • Off: Major error occurred
	ERR. LED	Indicates the error status of the A/D converter module. • On: Moderate error or major error occurred • Flashing: Minor error occurred • Off: In normal operation
	ALM LED	Indicates the warning status of the A/D converter module. • On: Warning issued • Flashing: Input signal error occurred • Off: In normal operation
	P1 LINK LED	Indicates the link status for P1. • On: Link-up • Off: Link-down
	P2 LINK LED	Indicates the link status for P2. • On: Link-up • Off: Link-down
	DATA LINK LED	Indicates the data link status of the A/D converter module. • On: Cyclic transmission being performed • Flashing: Cyclic transmission stopped • Off: Data link not performed (disconnected)
(2)	IP address/station number setting switch	Sets the fourth octet of the IP address. ☞ Page 26 Setting the IP address/station number setting switches
(3)	Function setting switch	Sets the operation mode and the input range. ☞ Page 28 Setting the function setting switches

No.	Name	Application
(4)	P1	A port for the connection to CC-Link IE TSN (RJ45 connector) Connect an Ethernet cable. (☞ Page 36 Wiring of Ethernet Cable) There are no restrictions on the connection order of the cables for P1 and P2.
	P2	Same as P1
(5)	Terminal block for module power supply and FG	A terminal block for the connection to module power supply (24VDC) and FG.
(6)	DIN rail hook	A hook to mount an A/D converter module on a DIN rail
(7)	Analog input terminal block	A terminal block for the connection to external devices

A/D converter module status and LED status

The following table shows how the A/D converter module status and LED status correspond each other.

A/D converter module status		LED status				
		PW LED	RUN LED	DATA LINK LED	ERR. LED	ALM LED
Data link in operation		On	On	On	*2	*3
Disconnected		On	On	Off	*2	*3
Reserved station being set		On	On	Flashing	*2	*3
Link stop		On	On	Flashing	*2	*3
Network initial setting in progress*4		On	On	Flashing	*2	*3
Error	Major error	On	Off	*1	On	*3
	Moderate error	On	On	*1	On	*3
	Minor error	On	On	*1	Flashing	*3
Alarm	Warning issued	On	On	*1	*2	On
	Input signal error occurred	On	On	*1	*2	Flashing
Unit test	In progress	On	Flashing	Off	Off	Off
	Completed successfully	On	On	Off	Off	Off
	Completed with an error	On	On	Off	On	Off

*1 On: Cyclic transmission being performed
Flashing: Cyclic transmission stopped
Off: Data link not performed (disconnected)

*2 On: Moderate error or major error occurred
Flashing: Minor error occurred
Off: In normal operation

*3 On: Warning issued
Flashing: Input signal error occurred
Off: In normal operation

*4 If the master station becomes absent during network initial setting, DATA LINK LED may flash continuously.

2 SPECIFICATIONS

This chapter describes the specifications of the A/D converter module.

2.1 General Specifications

Item	Specifications					
Operating ambient temperature	0 to 55℃					
Storage ambient temperature	-25 to 75℃					
Operating ambient humidity	5 to 95%RH, non-condensing					
Storage ambient humidity						
Vibration resistance	Compliant with JIS B 3502 and IEC 61131-2	—	Frequency	Constant acceleration	Half amplitude	Number of sweeps
		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	Compliant with JIS B 3502 and IEC 61131-2 (147m/s², 3 times each in X, Y, and Z directions)					
Operating atmosphere	No corrosive gases					
Operating altitude	0 to 2000m					
Installation location	Inside a control panel					
Overvoltage category*1	Ⅱ or less					
Pollution degree*2	2 or less					
Equipment class	Class Ⅰ					

*1 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 the equipment with up to the rated voltage of 300V is 2500V.

*2 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.

Point

For compliance with the EMC Directive, refer to the following:

☞ Page 184 EMC and Low Voltage Directives

2.2 Ethernet Communication Specifications

The following table shows the Ethernet communication specifications for the A/D converter module.

Item			Description
Transmission specifications	Data transmission speed		• 1Gbps • 100Mbps*2
	Communication mode	1000BASE-T	Full-duplex
		100BASE-TX*2	
	Interface		RJ45 connector (AUTO MDI/MDI-X)
	Maximum frame size		1518 bytes
	Maximum segment length		100m*1
	Number of cascade connections	1000BASE-T	Check with the manufacturer of the switching hub to be used.
		100BASE-TX*2	
	IP version		IPv4

*1 For the maximum segment length (length between switching hubs), check with the manufacturer of the switching hub to be used.

*2 This can be used for the A/D converter module with the firmware version "05" or later.

2.3 Performance Specifications

NZ2GN2S-60AD4

Item		NZ2GN2S-60AD4			
Station type		Remote station			
Communication speed		• 1Gbps • 100Mbps[*6]			
CC-Link IE TSN Class		• CC-Link IE TSN Class B (factory default) • CC-Link IE TSN Class A[*8]			
CC-Link IE TSN Protocol version	CC-Link IE TSN Class B	CC-Link IE TSN Protocol version 1.0[*7] CC-Link IE TSN Protocol version 2.0[*8]			
	CC-Link IE TSN Class A	CC-Link IE TSN Protocol version 2.0[*8*9]			
Maximum response time for time-managed polling (for CC-Link IE TSN Class A)[*11]		512μs			
Network topology		Line topology, star topology, mixture of star topology and line topology, ring topology[*1*10]			
Number of analog input channels		4 channels/module			
Analog input	Voltage	-10 to 10VDC (input resistance 1MΩ)			
	Current	0 to 20mADC (input resistance 250Ω)			
Digital output		16-bit signed binary value (-16384 to 16383)			
I/O characteristics, maximum resolution[*2]		Input	Input range	Digital output value	Maximum resolution
		Voltage	-10 to 10V	-16000 to 16000	0.625mV
			0 to 10V	0 to 16000	0.625mV
			0 to 5V		0.3125mV
			1 to 5V		0.25mV
		Current	0 to 20mA	0 to 16000	1.25μA
			4 to 20mA		1μA
Conversion accuracy[*3]	Ambient temperature (25±5℃)	Within ±0.1%			
	Ambient temperature (0 to 55℃)	Within ±0.2%			
Conversion speed		200μs/channel			
Absolute maximum input		Voltage: ±15V, Current: ±30mA[*4]			
Isolation method		Between communication system terminal and all analog input terminals: Digital isolator isolation Between power supply system terminal and all analog input terminals: Transformer isolation Between input channels: Non-isolation			
Withstand voltage		Between all power supply and communication system terminals and all analog input terminals 510VAC for 1 minute			
Noise immunity		Noise voltage 500Vp-p, noise width 1μs, noise frequency 25 to 60Hz (noise simulator condition)			
External interface	Communication part	RJ45 connector			
	Module power supply part	Terminal block for module power supply and FG (2-piece spring clamp terminal block)			
	I/O part	18-point spring clamp terminal block			
Applicable wire size	For power supply	Stranded wire: 0.3 to 1.5mm² (22 to 16 AWG), terminal slot size: 2.4mm × 1.5mm			
	For I/O	Stranded wire: 0.3 to 1.5mm² (22 to 16 AWG)[*5]			
Applicable solderless terminal	Terminal block for module power supply and FG	☞ Page 34 Applicable solderless terminal			
	Analog input terminal block	☞ Page 38 Applicable solderless terminal			
Multicast filter		Available[*1]			
External power supply		24VDC (Allowable voltage range: 20.4 to 28.8VDC, ripple ratio within 5%) Current consumption: 150mA Inrush current: 40.7A, 0.72ms or lower			

Item	NZ2GN2S-60AD4
Weight	0.13kg

*1 The performance specifications vary depending on firmware versions of modules used. (☞ Page 191 Added and Changed Functions)
*2 For details on the I/O conversion characteristics, refer to the following:
☞ Page 179 I/O Conversion Characteristics of A/D Conversion
*3 Except for the conditions under noise influence.
*4 This current value is an instantaneous value at which no breakdown occurs in the internal resistance of the module. The maximum input current value for constant application is 24mA.
*5 When a solderless terminal with an insulation sleeve is used, the wire size must be 0.75㎟ or smaller.
*6 This can be used for the A/D converter module with the firmware version "05" or later.
*7 For firmware version "05" and earlier, the A/D converter module is protocol version 1.0.
*8 For firmware version "06" and later, the A/D converter module is protocol version 2.0.
*9 Only network time delivery is supported.
*10 The ring topology can only be connected when the CC-Link IE TSN Class is CC-Link IE TSN Class B. If a CC-Link IE TSN Class A A/D converter module is connected by ring topology, data links are not established.
*11 For details on the time-managed polling, refer to the following.
📖 User's manual for the master station used

NZ2GN2B-60AD4

Item		NZ2GN2B-60AD4			
Station type		Remote station			
Communication speed		• 1Gbps • 100Mbps[*5]			
CC-Link IE TSN Class		• CC-Link IE TSN Class B (factory default) • CC-Link IE TSN Class A[*7]			
CC-Link IE TSN Protocol version	CC-Link IE TSN Class B	CC-Link IE TSN Protocol version 1.0[*6] CC-Link IE TSN Protocol version 2.0[*7]			
	CC-Link IE TSN Class A	CC-Link IE TSN Protocol version 2.0[*7*8]			
Maximum response time for time-managed polling (for CC-Link IE TSN Class A)[*10]		512μs			
Network topology		Line topology, star topology, mixture of star topology and line topology, ring topology[*1*9]			
Number of analog input channels		4 channels/module			
Analog input	Voltage	-10 to 10VDC (input resistance 1MΩ)			
	Current	0 to 20mADC (input resistance 250Ω)			
Digital output		16-bit signed binary value (-16384 to 16383)			
I/O characteristics, maximum resolution[*2]		Input	Input range	Digital output value	Maximum resolution
		Voltage	-10 to 10V	-16000 to 16000	0.625mV
			0 to 10V	0 to 16000	0.625mV
			0 to 5V		0.3125mV
			1 to 5V		0.25mV
		Current	0 to 20mA	0 to 16000	1.25μA
			4 to 20mA		1μA
Conversion accuracy[*3]	Ambient temperature (25±5℃)	Within ±0.1%			
	Ambient temperature (0 to 55℃)	Within ±0.2%			
Conversion speed		200μs/channel			
Absolute maximum input		Voltage: ±15V, Current: ±30mA[*4]			
Isolation method		Between communication system terminal and all analog input terminals: Digital isolator isolation Between power supply system terminal and all analog input terminals: Transformer isolation Between input channels: Non-isolation			
Withstand voltage		Between all power supply and communication system terminals and all analog input terminals 510VAC for 1 minute			
Noise immunity		Noise voltage 500Vp-p, noise width 1μs, noise frequency 25 to 60Hz (noise simulator condition)			
External interface	Communication part	RJ45 connector			
	Module power supply part	Terminal block for module power supply and FG (2-piece spring clamp terminal block)			
	I/O part	18-point 2-piece terminal block (M3 screw)			
Applicable wire size	For power supply	Stranded wire: 0.3 to 1.5mm² (22 to 16 AWG), terminal slot size: 2.4mm × 1.5mm			
	For I/O	Stranded wire: 0.3 to 2.0mm² (22 to 14 AWG)			
Applicable solderless terminal	Terminal block for module power supply and FG	☞ Page 34 Applicable solderless terminal			
	Analog input terminal block	☞ Page 41 Applicable solderless terminal			
Multicast filter		Available[*1]			
External power supply		24VDC (Allowable voltage range: 20.4 to 28.8VDC, ripple ratio within 5%) Current consumption: 150mA Inrush current: 40.7A, 0.72ms or lower			
Weight		0.20kg			

*1 The performance specifications vary depending on firmware versions of modules used. (☞ Page 191 Added and Changed Functions)
*2 For details on the I/O conversion characteristics, refer to the following:
☞ Page 179 I/O Conversion Characteristics of A/D Conversion
*3 Except for the conditions under noise influence.
*4 This current value is an instantaneous value at which no breakdown occurs in the internal resistance of the module. The maximum input current value for constant application is 24mA.
*5 This can be used for the A/D converter module with the firmware version "05" or later.
*6 For firmware version "05" and earlier, the A/D converter module is protocol version 1.0.
*7 For firmware version "06" and later, the A/D converter module is protocol version 2.0.
*8 Only network time delivery is supported.
*9 The ring topology can only be connected when the CC-Link IE TSN Class is CC-Link IE TSN Class B. If a CC-Link IE TSN Class A A/D converter module is connected by ring topology, data links are not established.
*10 For details on the time-managed polling, refer to the following.
📖 User's manual for the master station used

2.4 Function List

This section lists the functions of the A/D converter module.

Item			Description	Reference
A/D conversion enable/disable function			Allows A/D conversion to be enabled or disabled for each channel. Disabling the A/D conversion for unused channels reduces the conversion cycles.	☞ Page 65 A/D Conversion Enable/ Disable Function
A/D conversion method	Sampling processing		Performs A/D conversion on analog input values sequentially, storing the digital operation values into the remote register.	☞ Page 66 Sampling processing
	Averaging processing	Time average	Performs A/D conversion for a set period of time and averages the total value excluding the maximum and the minimum values, storing the averaged value into the remote register. The number of processing times within the set period of time varies depending on the number of channels used (number of channels where A/D conversion is enabled).	☞ Page 66 Time average
		Count average	Performs A/D conversion a set number of times and averages the total value excluding the maximum and the minimum values, storing the averaged value into the remote register. Time taken to store the mean value by count average varies depending on the number of channels used (the number of channels where A/D conversion is enabled).	☞ Page 67 Count average
		Moving average	Takes in digital output values a set number of times at every sampling cycle and averages these values, storing the averaged value into the remote register. The target range for average processing moves at each sampling, thereby allowing the latest digital operation value to be obtained.	☞ Page 67 Moving average
Range switching function			Sets the input range for each channel.	☞ Page 69 Range Switching Function
Maximum value/minimum value hold function			For each channel, stores the maximum and minimum values of digital operation values into the remote buffer memory.	☞ Page 69 Maximum Value/ Minimum Value Hold Function
Input signal error detection function			Easily detects a disconnection of analog input signals.	☞ Page 70 Input Signal Error Detection Function
Warning output function (process alarm)			Outputs a warning when a digital operation value falls within the warning output range set in advance.	☞ Page 73 Warning Output Function (Process Alarm)
Scaling function			Performs scale conversion on a digital operation value within the range of the scaling upper limit value and the scaling lower limit value, both of which are set at desired values.	☞ Page 75 Scaling Function
Shift function			Adds the conversion value shift amount specified to a digital operation value and stores it into the remote register. This function facilitates fine adjustment at the system start-up.	☞ Page 77 Shift Function
CC-Link IE TSN Network synchronous communication function			This function performs A/D conversion with a synchronization cycle of the master station that supports the CC-Link IE TSN Network synchronous communication function. This enables an A/D converter module to operate at the same timing as other remote stations on the same network.	☞ Page 80 CC-Link IE TSN Network Synchronous Communication Function
CC-Link IE TSN Class setting function			Set the CC-Link IE TSN Class (CC-Link IE TSN Class B or CC-Link IE TSN Class A) of the A/D converter module and save it in the non-volatile memory.	☞ Page 84 CC-Link IE TSN Class Setting Function
Communication speed setting function			Sets the communication speed of A/D converter module (1Gbps or 100Mbps), and saves the setting in the non-volatile memory.	☞ Page 97 Communication Speed Setting Function
SLMP communication function			SLMP can be used to communicate with the A/D converter module.	☞ Page 109 SLMP Communication Function
Firmware update function			Updates firmware of an A/D converter module via CC-Link IE TSN.	☞ Page 111 Firmware Update Function

Item	Description	Reference
Module power supply voltage drop detection function	Detects voltage drop of the module power supply. This function makes troubleshooting easy when the voltage of the power supplied to the A/D converter module drops, or when poor connection in the wiring occurs. Note that the voltage to be monitored for a module power supply voltage drop is 20.4V.	☞ Page 115 Module Power Supply Voltage Drop Detection Function

3 PROCEDURES BEFORE OPERATION

This chapter describes the procedures before operation.

1. Setting the IP address/station number setting switches

Set the fourth octet of the IP address of the A/D converter module.

☞ Page 26 Setting the IP address/station number setting switches

2. Setting the function setting switches

Set the network setting function, input range switch enable/disable setting, and range switching function.

When the input range switch enable/disable setting is set to Enable, no parameter is necessary.

For the following cases, set the input range switch enable/disable setting to Disable, and set the parameters.

- Disabling the A/D conversion
- Setting the input range (1 to 5V, 0 to 10V) that cannot be set by using the function setting switches
- Using an A/D conversion method other than sampling processing
- Using the input signal error detection function
- Using the warning output function
- Using the scaling function
- Using the shift function

☞ Page 28 Setting the function setting switches

3. CC-Link IE TSN Class settings

Set the CC-Link IE TSN Class (CC-Link IE TSN Class B or CC-Link IE TSN Class A) of the A/D converter module.

☞ Page 84 CC-Link IE TSN Class Setting Function

4. Communication speed setting

Set the communication speed of A/D converter module (1Gbps or 100Mbps).

☞ Page 97 Communication Speed Setting Function

5. Installation

Install the A/D converter module on a DIN rail.

☞ Page 33 How to mount a module on a DIN rail

6. Wiring

Connect a power supply, an Ethernet cable, and external devices to the A/D converter module.

☞ Page 34 Wiring to Terminal Block for Module Power Supply and FG
☞ Page 36 Wiring of Ethernet Cable
☞ Page 38 Wiring to Analog Input Terminal Block

7. Network parameter setting

Set the network parameters.

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

8. Parameter setting

Set parameters in the following case.

- When the input range switch enable/disable setting is disabled

☞ Page 49 Parameter Setting

9. Programming

Create a program.

☞ Page 116 PROGRAMMING

Point

To replace the A/D converter module, follow the procedure described below.

- When the input range switch enable/disable setting is disabled, export the parameter setting. This step is not necessary when the slave station parameter automatic setting is enabled.
- Turn off the A/D converter module power supply and remove the A/D converter module.
- Prepare a new A/D converter module, and perform the procedure from step 1 to step 8. (When the input range switch enable/disable setting is disabled, import the parameter setting.) Step 8 is not necessary when the slave station parameter automatic setting is enabled.

Restriction

Restrictions apply where the input range switch enable/disable setting is enabled. Check the restrictions before setting. (☞ Page 28 Setting the function setting switches)

4 SYSTEM CONFIGURATION

This chapter describes how to configure the system using an A/D converter module.
For details on the CC-Link IE TSN configuration, refer to the following manual.
📖 User's manual for the master station used

4.1 Applicable Systems

Supported master station

For the use of an A/D converter module, select a product for the master station from the following list.

Model	Firmware version
RJ71GN11-T2	No restriction
RD78G64, RD78G32, RD78G16, RD78G8, RD78G4	
RD78GHV, RD78GHW	"05" or later

Information on "Supported master station" described above is the ones at the point when this manual was issued.
For latest information, please visit the website of CC-Link Partner Association.
www.cc-link.org

Compatible software version

For the compatible software version, always keep the engineering tool of the master station up to date.
Only GX Works3 is a compatible engineering tool.
When the latest software is necessary, please consult your local Mitsubishi representative.

Compatible software package

■GX Works3

Configuring or diagnosing the A/D converter module requires GX Works3.
Install GX Works3 with the following version in accordance with the A/D converter module used.

Model	Software version
NZ2GN2S-60AD4, NZ2GN2B-60AD4	Version 1.055H or later

■CC-Link IE TSN Configurator

Setting a communication speed for the A/D converter module and configuring the CC-Link IE TSN Class settings require CC-Link IE TSN Configurator.
Install CC-Link IE TSN Configurator with the following version in accordance with the A/D converter module used.

Model	Software version
NZ2GN2S-60AD4, NZ2GN2B-60AD4	Version 1.108L or later

Applicable profile

A profile is required to use the A/D converter module in the CC-Link IE TSN configuration setting.
The following table shows the applicable profile versions.

Model	Firmware version	Profile version
NZ2GN2S-60AD4, NZ2GN2B-60AD4	"01" or later	"00" or later
	"02" or later	"01" or later
	"03" or later	"02" or later
	"05" or later	"03" or later
	"06" or later	"04" or later

When the latest profile of the A/D converter module is necessary, please consult your local Mitsubishi representative.
The profile is a setting file that stores information required for the start-up, operation, and maintenance of devices supporting the CC-Link family.
A module is added to "Module List" of the "CC-Link IE TSN Configuration" window by profile registration to the engineering tool of the master station.
For the profile registration, refer to the following.
📖 GX Works3 Operating Manual

Ethernet cables

For the specifications of the Ethernet cable, refer to the following.
📖 User's manual for the master station used

Switching hub

For compatible switching hubs (the models and how to use them), check on the CC-Link Partner Association website (www.cc-link.org).

5 INSTALLATION AND WIRING

This chapter describes the installation and wiring of the A/D converter module.

5.1 Setting Switches

Setting the IP address/station number setting switches

Set the fourth octet of IP address using the IP address/station number setting switches on the front of A/D converter module. The setting of IP address/station number setting switches is enabled when the A/D converter module is powered on. Therefore, set this function when the module is powered off.

Point

When operating the IP address/station number setting switches, use a flathead screwdriver with a tip width of 2.5mm or less.

Setting method

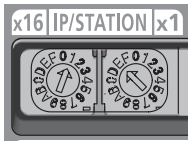
Set the fourth octet (decimal) of IP address using x1 and x16 (hexadecimal) of the IP address/station number setting switches.

Combinations of x1 and x16 are as follows.

x16 \ x1	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
3	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
4	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
5	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
6	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
7	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
8	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
9	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
A	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
B	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
C	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
D	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
E	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
F	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255

Ex.

To set to 30:



Setting range

The setting value must be in the range between 1 and 254.

When a value in the range of 1 to 254 is set, the IP address and subnet mask are as follows.

- The first three octets of the IP address: Octets one, two, and three from the IP address of the master station are used for operation.
- Subnet mask: The subnet mask of the master station is used for operation.

When a value outside the range of 1 to 254 is set, the following occurs.

- When 0 is set, the previously set IP address is used for operation.
- When 255 is set, an IP address/station number setting switches out of range error (IP address) (error code: 2400H) occurs, and the ERR. LED turns on.

Point

- Do not change the IP address/station number setting switches while the A/D converter module is powered on. If the IP address/station number setting switches are changed while the A/D converter module is powered on, an IP address/station number setting switches changed error (error code: 1030H) occurs and the ERR. LED flashes. After setting the IP address/station number setting switches back to the previous setting, turn on Error clear request flag (RYA) to clear the error state and turn off the ERR. LED.
- When the power is turned on with the IP address/station number setting switches set to a value in the range 1 to 254, the IP address is saved in the non-volatile memory at the time a data link with the master station is established. The address 192.168.3.250 is set to the non-volatile memory by factory default.
- Do not set an IP address with duplicated fourth octet in the access range of CC-Link IE TSN. If duplication occurs, the IP address may be duplicated depending on the settings of the first to third octets of the IP address, and data link cannot be established.

Restriction

The following IP addresses cannot used for A/D converter modules.

- IP addresses whose host addresses are all 0 or 255.
- IP addresses whose third and fourth octets are all 255.
- IP addresses outside the range 0.0.0.1 to 223.255.255.254

Setting the function setting switches

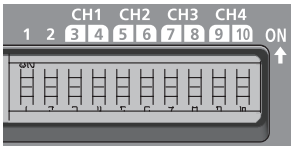
Use the function setting switches on the front of the A/D converter module to set the network setting function, input range switch enable/disable setting, and range switching function.
The setting of the function setting switch is enabled when the A/D converter module is powered on. Therefore, set each function when the module is powered off.

Point

When operating the function setting switch, use a flathead screwdriver with a tip width of 1.2mm or less.

Setting method

Set each function with the function setting switch 1 to function setting switch 10.
Enabling the function setting switch 2 before setting the function setting switch 3 to function setting switch10 makes the parameter setting unnecessary and shortens the start-up time.



Switch name		Function name	Setting details
Function setting switch 1	NETWORK	Network setting function	Set the operation mode. ☞ Page 63 Operation Mode Shift at Power-On
Function setting switch 2	RANGE ON/OFF	Input range switch enable/disable setting	Enable/disable the input range switch. • OFF: Disable • ON: Enable
Function setting switch 3*1 Function setting switch 4*1	RANGE CH1	Range switching function	Set the CH1 input range. ☞ Page 29 Settings of the function setting switch 3 to function setting switch 10
Function setting switch 5*1 Function setting switch 6*1	RANGE CH2		Set the CH2 input range. ☞ Page 29 Settings of the function setting switch 3 to function setting switch 10
Function setting switch 7*1 Function setting switch 8*1	RANGE CH3		Set the CH3 input range. ☞ Page 29 Settings of the function setting switch 3 to function setting switch 10
Function setting switch 9*1 Function setting switch 10*1	RANGE CH4		Set the CH4 input range. ☞ Page 29 Settings of the function setting switch 3 to function setting switch 10

*1 Set this switch when function setting switch 2 is enabled. The setting is ignored when function setting switch 2 is disabled.

■Settings of the function setting switch 3 to function setting switch 10

The following table lists the settings of the function setting switch 3 to function setting switch10.

Function setting switch 3 to function setting switch 10		Setting
3, 5, 7, 9	4, 6, 8, 10	
OFF	OFF	0 to 20mA
OFF	ON	4 to 20mA
ON	OFF	0 to 5V
ON	ON	-10 to 10V

Point

- Do not change any function setting switch while the A/D converter module is powered on. If the function setting switch is changed while the A/D converter module is powered on, any of the errors from Function setting switch 1 changed error (error code: 1041H) to Function setting switch 10 changed error (error code: 104AH) occurs and the ERR. LED flashes. After setting the function setting switch back to the previous setting, turn on Error clear request flag (RYA) to clear the error state and turn off the ERR. LED. When the setting of the function setting switch is changed, turn off and on the A/D converter module to apply the change.
- The status of the input range switch enable/disable setting can also be checked with Input range switch enable/disable setting status flag (RXC).

Restriction

The input range cannot be set to 1 to 5V or 0 to 10V. Use the parameter or program to set this range.

Operation

The following table lists the parameter settings when function setting switch 2 is enabled.

Setting item	Setting value
CH☐ A/D conversion enable/disable setting	Enable
CH☐ Range setting	Values set with function setting switches 3 to 10
CH☐ Averaging process setting	Sampling processing
CH☐ Time average/Count average/Moving average	0
CH☐ Input signal error detection setting	Disable
CH☐ Warning output setting	Disable
CH☐ Process alarm upper upper limit value	0
CH☐ Process alarm upper lower limit value	0
CH☐ Process alarm lower upper limit value	0
CH☐ Process alarm lower lower limit value	0
CH☐ Scaling enable/disable setting	Disable
CH☐ Scaling upper limit value	0
CH☐ Scaling lower limit value	0

Point

Parameters are not saved in the non-volatile memory when function setting switch 2 is enabled.

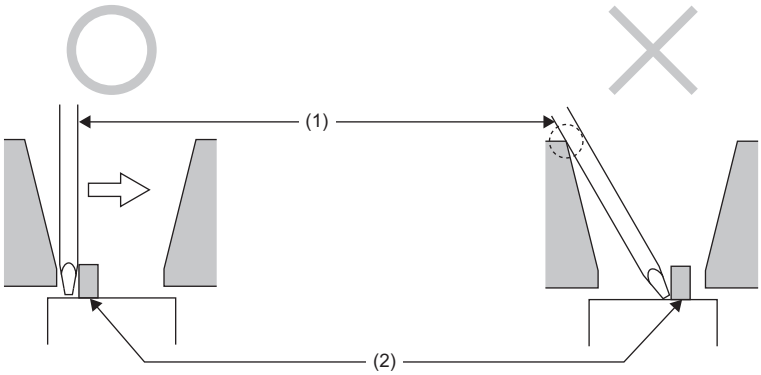
Restrictions

The following table lists the restrictions applied when function setting switch 2 is enabled.

Item	Description
Shift function	The shift function cannot be used. CH□ Shifting amount to conversion value settings (RWw2 to RWw5) are ignored.
Initial data setting request flag (RY9)	When Initial data setting request flag (RY9) is turned on, an operating condition setting change disable error (error code: 3610H) occurs and the operating condition is not changed.
Parameter writing	When parameter writing is performed from the engineering tool, an operating condition setting change disable error (error code: 3610H) occurs and the operating condition is not changed.
Parameter area initialization	When module parameter initialization is performed by using Parameter area initialization command (address: 1002H), an operating condition setting change disable error (error code: 3610H) occurs and the operating condition is not changed. The values in the parameter area of the remote buffer memory are also not changed.
Slave station parameter automatic setting	The slave station parameter automatic setting cannot be used. Parameters automatically set for the A/D converter module via the master station when the A/D converter module joins or returns to the network are ignored.

Precautions

Slide one function setting switch at a time horizontally. Do not hold the screwdriver at an angle or pivot it off the edge of the case while working a function setting switch, since damage or deformation may result.



(1) Flathead screwdriver
(2) Function setting switch

5.2 Installation Environment and Installation Position

Installation environment

Installation location

Do not install the A/D converter module in places where:

- Ambient temperature is outside the range of 0 to 55℃;
- Ambient humidity is outside the range of 5 to 95% RH;
- Condensation occurs due to rapid temperature change;
- Corrosive gas or combustible gas is present;
- There are a high level of conductive powder such as dust and iron powder, oil mist, salinity, or organic solvent;
- It is exposed to direct sunlight;
- A strong electric field or strong magnetic field is generated; and
- The module is subject to vibration and shock.

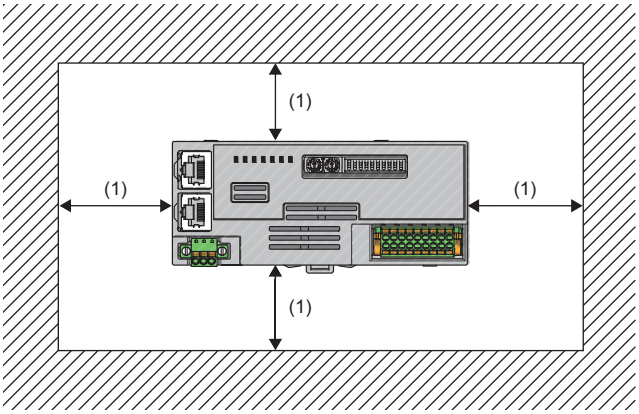
Installation surface

Install the A/D converter module on a flat surface. Unevenness on the installation surface causes application of an excessive force to the printed-circuit board, which may lead to a malfunction.

Installation position

When installing the A/D converter module in a control panel, provide a clearance of 60mm or more (1) between the A/D converter module and the sides of the control panel or other parts to ensure good ventilation and facilitate A/D converter module change.

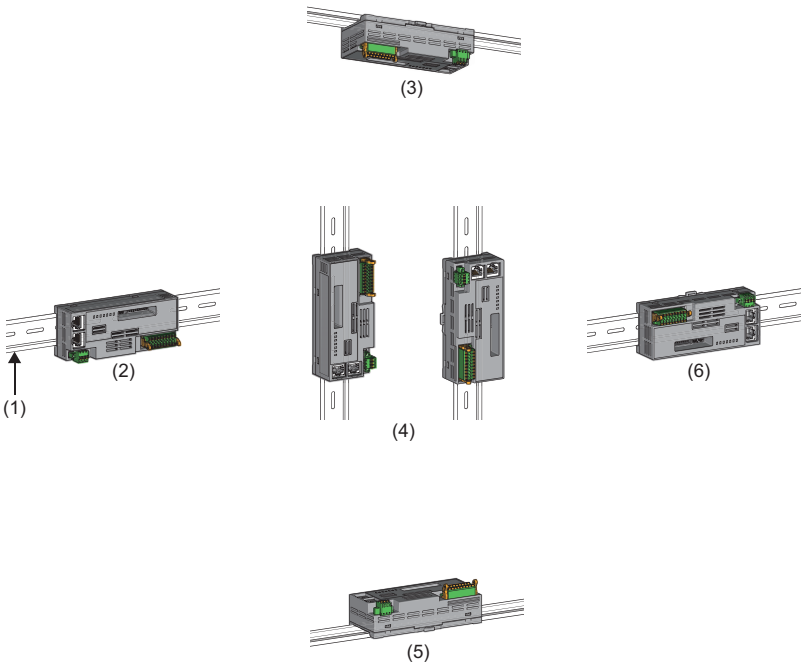
When installing two or more CC-Link IE TSN remote modules next to each other, they can be installed in contact with each other.



Installation direction

The A/D converter module can be installed in six directions.

Use a DIN rail (1) to install the A/D converter module.

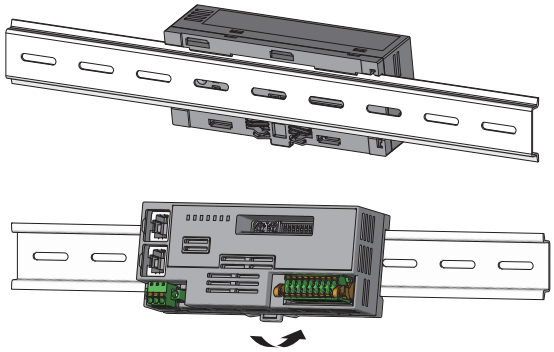


(1) DIN rail
(2) Horizontal installation
(3) Downward installation
(4) Vertical installation
(5) Upward installation
(6) Horizontal installation (upside down)

5.3 Installation

How to mount a module on a DIN rail

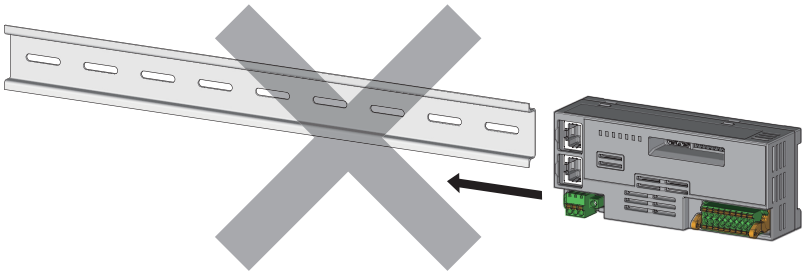
Installation procedure



1. Hang the upper tabs of the A/D converter module on the top of the DIN rail.
2. Push in the DIN rail hooks of the A/D converter module until they click.

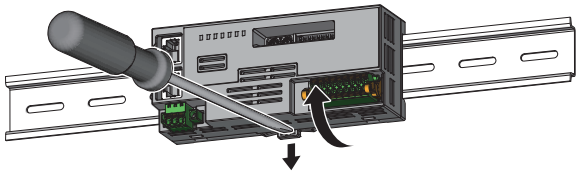
Point

Do not slide a module from the edge of the DIN rail when mounting it. Otherwise, the A/D converter module may be damaged.



Removal procedure

Remove the modules from the DIN rail by reversing the above procedure.



1. While pushing down the DIN rail hook with a flathead screwdriver, pull the bottom part of the A/D converter module to remove it from the DIN rail.

Applicable DIN rail models

Use the following DIN rails that are compliant with JIS C 2812 and IEC 60715.

- TH35-7.5Fe
- TH35-7.5Al

Space between DIN rail mounting screws

When installing a DIN rail, tighten the screws at a pitch of 200mm or less.

5.4 Wiring to Terminal Block for Module Power Supply and FG

Tightening torque

Tighten the terminal block mounting screws within the following tightening torque range.

Tightening the screws too much may damage the A/D converter module case.

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

Wire to be used

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

Wire diameter	Type	Material	Temperature rating
22 to 16 AWG	Stranded	Copper	75℃ or higher

Applicable solderless terminal

The following table lists the applicable solderless terminal.

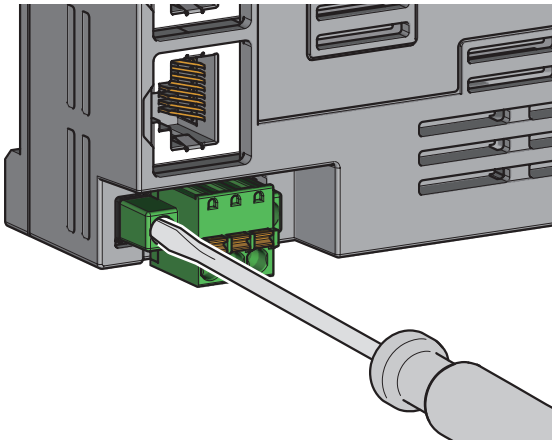
Product name	Terminal shape	Model	Applicable wire size	Bar solderless terminal tool	Contact
Bar solderless terminal	Ferrule (with insulation sleeve)	TE0.5-8, TE0.5-10	0.3 to 0.5mm²	NH-79A	NICHIFU Co., Ltd. www.nichifu.co.jp
		TE0.75-8, TE0.75-10	0.75mm²		
		AI0.34-10TQ	0.34mm²	CRIMPFOX6	PHOENIX CONTACT GmbH & Co. KG www.phoenixcontact.co.jp
		AI0.5-10WH	0.5mm²		
		AI0.75-10GY	0.75mm²		
	Ferrule (without insulation sleeve)	A0.5-10	0.5mm²		
		A0.75-10	0.75mm²		
		A1.0-10	1.0mm²		
		A1.5-10	1.5mm²		

Installing and removing the terminal block

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

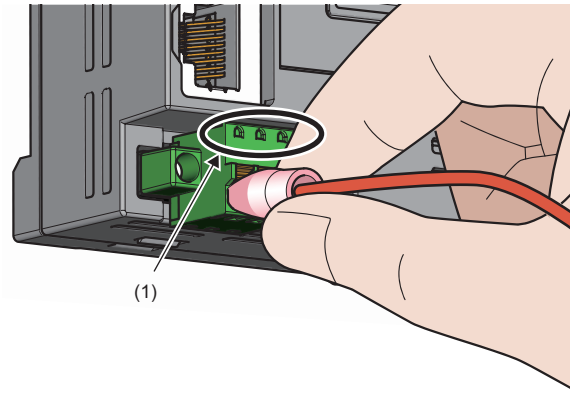
To install the terminal block, tighten the terminal block mounting screws with a flathead screwdriver.

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



Connecting and disconnecting the cable

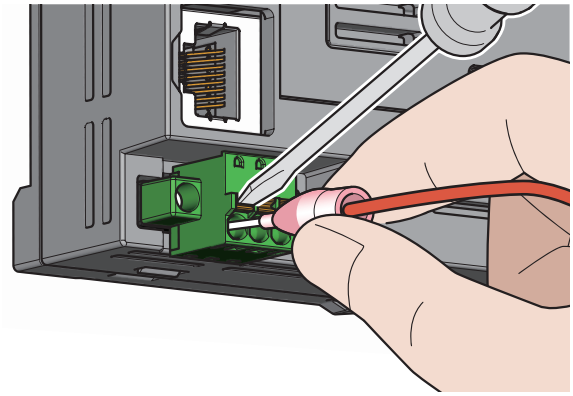
To connect the cable, fully insert a wire with a bar solderless terminal into a wire insertion opening.
After inserting the wire, pull it lightly to check that it is securely clamped.



Point

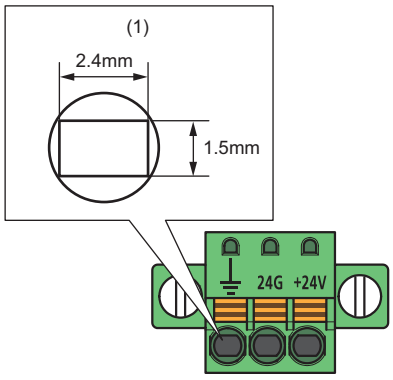
Continuity can be checked with test terminal (1).
Use the following test plug to check continuity.
• PHOENIX CONTACT GmbH & Co. KG test plug (ϕ1.0mm): MPS-MT 1-S4-B RD, MPS-MT 1-S

To disconnect the cable, push in the open/close button with a flathead screwdriver.
With the button pushed in, pull out the wire having a bar solderless terminal.



Precautions

- Use a bar solderless terminal for the wiring to the push-in type spring clamp terminal block. If a stripped wire is inserted into a 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 into a wire insertion opening (1), check the shape of the opening and the shape of the terminal, and insert the terminal paying attention to the orientation. If a bar solderless terminal larger than the wire insertion opening (1) is inserted, the terminal block may be damaged.



5.5 Wiring of Ethernet Cable

Wiring method

■Installation procedure

1. Power off the power supply of the A/D converter module and the power supply of the external device.
2. With attention to the orientation of the cable, push the Ethernet cable connector into the A/D converter module until it clicks.
3. Power on the power supply of the A/D converter module.
4. Power on the external device.
5. Check if P1 LINK LED/P2 LINK LED on the port into which the Ethernet cable is connected is on.[*1*2]

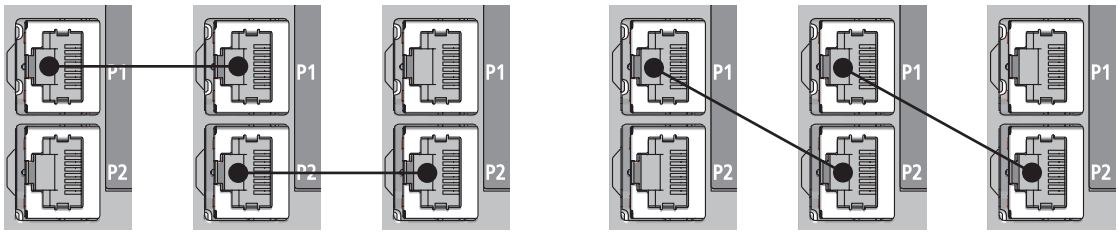
*1 The time taken for P1 LINK LED/P2 LINK LED to turn on after connection of the cable may vary. The LINK LED normally turns on in a few second. However, if link-up processing is repeated due to a condition of a device on the line, the longer time may be required. If P1 LINK LED/P2 LINK LED does not turn on, refer to the following and take corrective action.
☞ Page 136 When the P1 LINK LED or P2 LINK LED turns off

*2 When connecting the A/D converter module with the communication speed of 100Mbps to a device with the speed of 100Mbps, enable the auto-negotiation for that device.

Point

Both P1 and P2 connectors can be used.

- To use only one of them for star topology, either P1 or P2 can be connected.
- To use both of them for line topology and ring topology, P1-P1, P2-P2, and P1-P2 connections are possible.



■Disconnection procedure

1. Power off the power supply of the A/D converter module.
2. With the latch of the Ethernet cable pressed, unplug the cable.

Precautions

■Laying Ethernet cables

- Place the Ethernet 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.
- Do not touch the core of the connector of the cable or the module, and protect it from dirt and 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 cables to be used are not broken or short-circuited, and that connectors are connected securely.

■Broken cable latch

Do not use Ethernet cables with broken latches. Doing so may cause the cable to unplug or malfunction.

■Connecting and disconnecting an Ethernet cable

Hold the connector part when connecting and disconnecting the Ethernet cable. Pulling the cable connected to the module may result in damage to the module or cable or malfunction due to poor contact.

■Connector to which an Ethernet cable is not connected

Attach a connector cover to prevent dirt and dust from entering the A/D converter module and prevent A/D converter module failure and malfunction caused by static electricity.

■Maximum segment length for the Ethernet cable (Maximum cable length)

The maximum segment length is 100m. However, the distance may be shorter depending on the operating environment of the cable. For details, contact the manufacturer of the cables used.

■Bending radius of an Ethernet cable

There are restrictions on the bending radius of the Ethernet cable. Check the bending radius in the specifications of the Ethernet cables used.

5.6 Wiring to Analog Input Terminal Block

Wiring of spring clamp terminal block

Wire to be used

The following table describes the wire to be connected to the spring clamp terminal block.

Wire diameter	Type	Material	Temperature rating
22 to 16 AWG	Stranded	Copper	75℃ or higher

Applicable solderless terminal

The following table lists the applicable solderless terminal.

Product name	Terminal shape	Model	Applicable wire size*1	Bar solderless terminal tool	Contact
Bar solderless terminal	Ferrule (with insulation sleeve)	AI0.34-10TQ	0.34mm²	CRIMPFOX6	PHOENIX CONTACT GmbH & Co. KG www.phoenixcontact.co.jp
		AI0.5-10WH	0.5mm²		
		AI0.75-10GY	0.75mm²		
	Ferrule (without insulation sleeve)	A0.5-10	0.5mm²		
		A0.75-10	0.75mm²		
		A1.0-10	1.0mm²		
		A1.5-10	1.5mm²		

*1 When using a solderless terminal with an insulation sleeve, select the terminal whose applicable wire size is 0.75mm² or smaller.

Installing and removing the terminal block

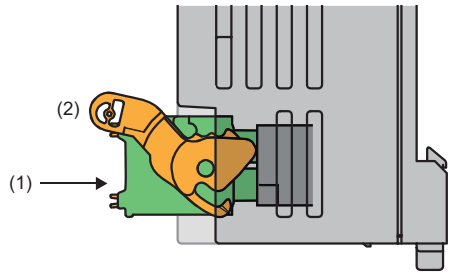
The following procedures show how to install and remove the terminal block.

■Lock and release lever positions

To make it easy to install and remove the terminal block, a three-stage positioning stopper is attached so that the lever does not freely turn around.

When installing or removing the terminal block, turn the lever to the lock or release lever position.

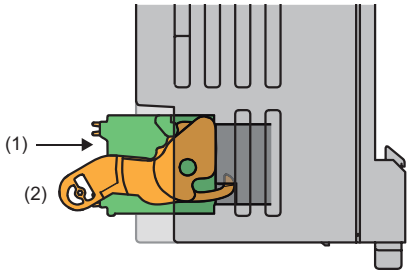
View of right side of A/D converter module: When pulling out the terminal block



1. Release lever position

This lever position shows the state in which the terminal block (1) has been completely pulled out from the A/D conversion module. Turn from the lock lever position to the release lever position (2) and lift the terminal block from the A/D converter module.

View of right side of the A/D converter module: When insertion of the terminal block is complete



2. Lock lever position

This position shows the state in which the terminal block (1) completely fits the A/D converter module. Check the lock lever position (2) and pull the terminal block lightly to check that the A/D converter module completely fits the terminal block.

■Removal procedure

Turn the lever to the release lever position and remove the terminal block from the A/D converter module.

■Installation procedure

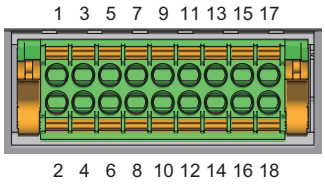
Move the lever to the lock lever position and push the terminal block. When the terminal block is fully pushed in, the hook of the lever hangs on the module and fits the terminal block.

Point

The terminal block can be inserted with the lever in positions other than the lock lever position.
After insertion, check that the lever is in the lock lever position.

Signal name

The following table lists the signal names of the terminal block.



Item	CH1		CH2		CH3		CH4		—
Terminal number	1	3	5	7	9	11	13	15	17
Signal name	V+	I+	V+	I+	V+	I+	V+	I+	AG
Signal name	SH	VI-	SH	VI-	SH	VI-	SH	VI-	FG
Terminal number	2	4	6	8	10	12	14	16	18

Connecting and disconnecting the cable

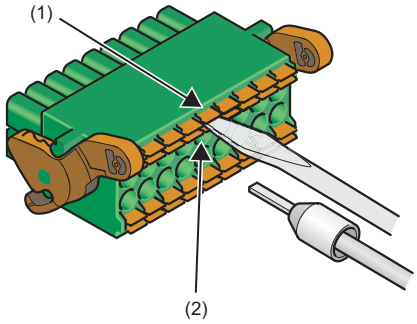
■Connecting the cable

Strip the cable as follows.

- The strip length of wire: 10mm

Insert a wire whose tip was processed into a wire insertion opening (2) and push it all the way in to the back.

If the wire cannot be inserted by this method, insert the wire all the way in to the back while pressing the release button (1) using a flathead screwdriver with a tip width of 2.0 to 2.5mm. Once the wire is inserted all the way in to the back, remove the flathead screwdriver.



Point

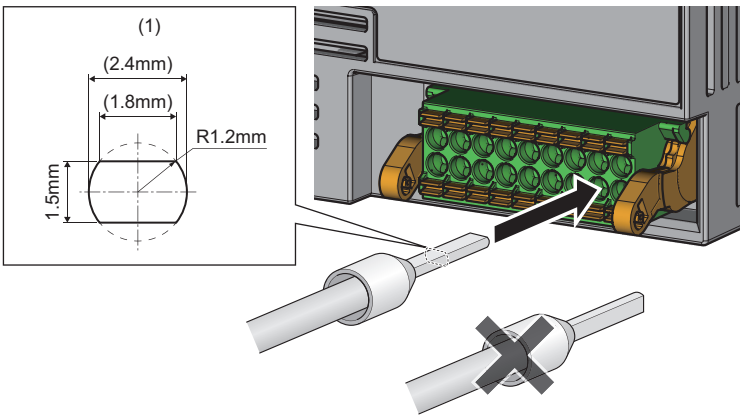
Pull the wire or bar solderless terminal lightly to check that it is securely clamped.

■Disconnecting the cable

Pull the wire while pressing the release button using a flathead screwdriver with a tip width of 2.0 to 2.5mm.

Precautions

- Use a bar solderless terminal for wiring to the terminal block. If a stripped wire is inserted to a wire insertion opening, the wire cannot be clamped securely.
- Use a crimping tool to connect a bar solderless terminal to a wire. (☞ Page 38 Applicable solderless terminal)
- When inserting a bar solderless terminal, check that the size of the terminal and its insertion direction are correct to prevent the terminal from getting stuck in or damage to the terminal block. When using a bar solderless terminal other than the applicable solderless terminals, check that for its size, the cross-sectional shape (1) of the terminal after processing is smaller than the size mentioned below, even including an error in processing. For the correct terminal insertion direction, refer to the figure below.



Point

For details on the finish shape of a bar solderless terminal including an error in processing, contact the manufacturers of the bar solderless terminal and the bar solderless terminal tool.

Wiring of screw terminal block

Tightening torque

Tighten the terminal screws within the following tightening torque range.

Tightening the screws too much may damage the A/D converter module case.

Screw type	Tightening torque range
Terminal screw (M3×5.2 screw)	0.43 to 0.57N·m
Terminal block mounting screw (M3.5 screw)	0.68 to 0.92N·m

Wire to be used

The following table describes the wire to be connected to the screw terminal block.

Wire diameter	Type	Material	Temperature rating
22 to 14 AWG	Stranded	Copper	75℃ or higher

Applicable solderless terminal

The following table lists the applicable solderless terminal.

Model	Applicable wire size	Contact
RAA1.25-3 (compliant with JIS C 2805)	0.3 to 1.25㎟	—
V2-MS3	1.25 to 2.0㎟	JST Mfg. Co., Ltd. www.jst-mfg.com
TGV2-3N	1.25 to 2.0㎟	NICHIFU Co., Ltd. www.nichifu.co.jp

Installing and removing the terminal block

■Removal procedure

1. Open the terminal cover, and loosen the terminal block mounting screws with a cross-head screwdriver.
2. When the terminal block mounting screws are loosened, the terminal block can be removed.

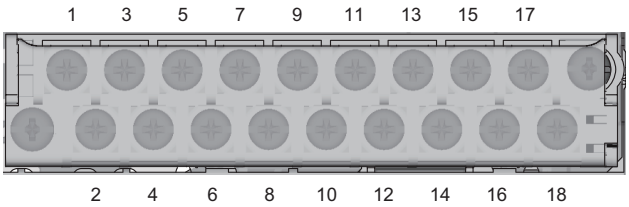
■Installation procedure

1. Open the terminal cover, and mount the terminal block.
2. Tighten the terminal block mounting screws with a cross-head screwdriver.

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

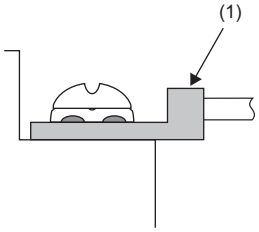
Signal name

The following table lists the signal names of the terminal block.



Item	CH1		CH2		CH3		CH4		—
Terminal number	1	3	5	7	9	11	13	15	17
Signal name	V+	I+	V+	I+	V+	I+	V+	I+	AG
Signal name	SH	VI-	SH	VI-	SH	VI-	SH	VI-	FG
Terminal number	2	4	6	8	10	12	14	16	18

Wiring method



1. Loosen the terminal screw. Connect the round solderless terminal (1) as it is.

Point

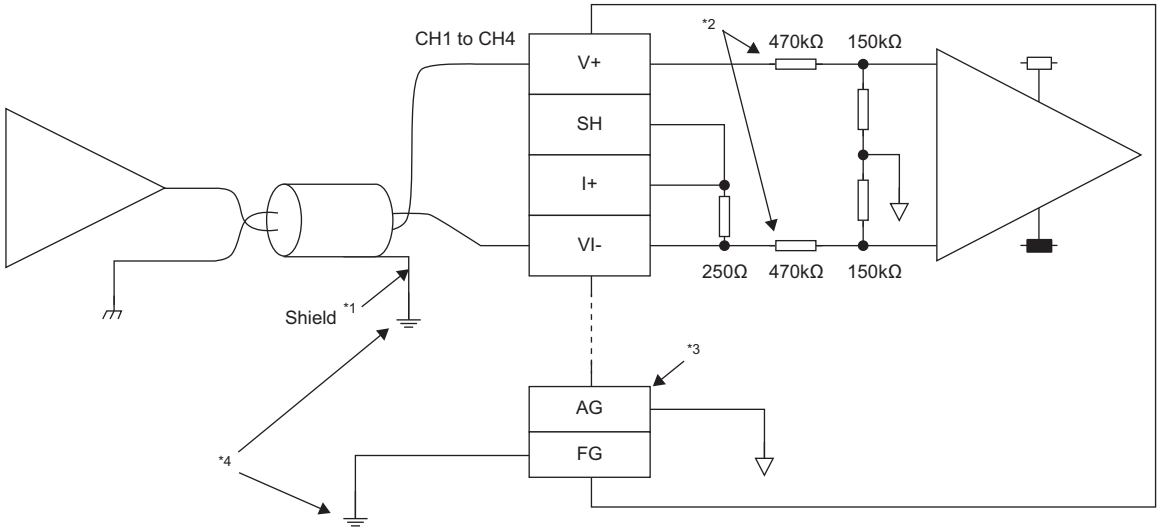
- Do not put oil on the terminal or screw. Doing so may damage the screw.
- The number of the applicable solderless terminals must be two or less. When inserting two applicable solderless terminals, insert them back-to-back. Otherwise, the screw cannot be tightened and it may damage the screw.
- Tighten the terminal screw with an applicable driver. Tightening with an inapplicable driver may damage the screw.
- When operating terminal screws in the lower row, prevent the screwdriver from contacting the upper row. If the screwdriver contacts the upper row, it may damage the terminal block.
- Install the terminal block so that it is level. If the terminal block skews when installed, it may damage the contacts of the terminal block.

5.7 External Wiring

Using a voltage input signal

Signal source

-10 to 10V

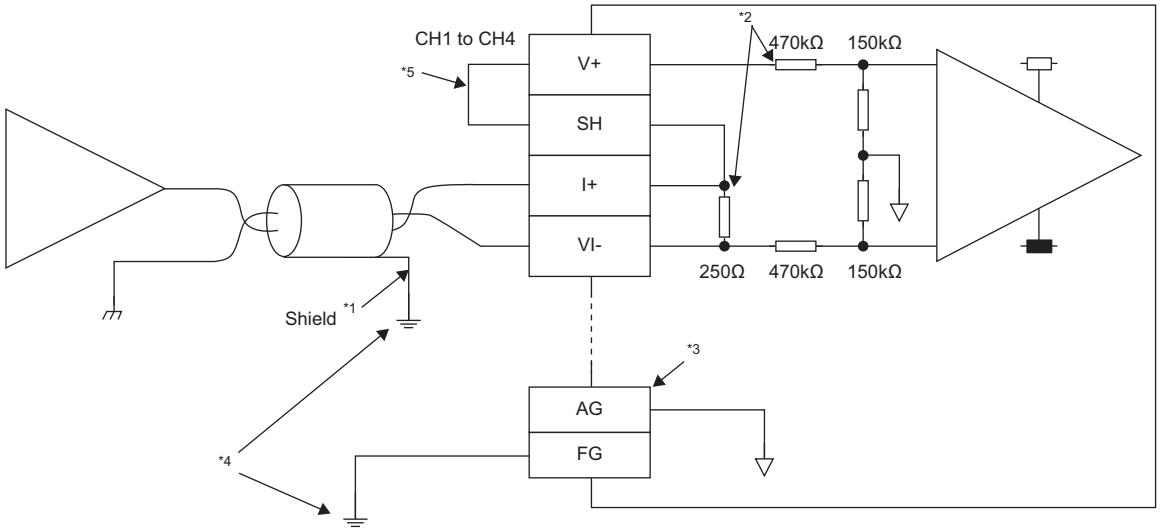


*1 Use a 2-core shielded twisted pair cable.
*2 Indicates the input resistance of the A/D converter module.
*3 In any of the following cases, connect the AG terminal to the GND of the external device.
· There is a potential difference between the AG terminal and GND.
· External devices connected to channels have common GND.
*4 Be sure to ground the shield wire and FG terminal of each channel.

Using a current input signal

Signal source

0 to 20mA



*1 Use a 2-core shielded twisted pair cable.
*2 Indicates the input resistance of the A/D converter module.
*3 In any of the following cases, connect the AG terminal to the GND of the external device.
· There is a potential difference between the AG terminal and GND.
· External devices connected to channels have common GND.
*4 Be sure to ground the shield wire and FG terminal of each channel.
*5 When using a current input signal, be sure to connect V+ and SH.

Precautions

To obtain the maximum performance from the functions of the A/D converter module and improve the system reliability, external wiring that is noise resistant is required. Precautions for external wiring are as follows.

- Use separate cables for the AC control circuit and the external input signals of the A/D converter module to avoid the influence of the AC side surges or induction.
- Do not install cables near or bundle cables with any main circuit lines, high voltage lines, or load cables for equipment other than the programmable controller. If not, noise, surges, or induction may affect the system.
- Ground shielded wires or shielded cables based on single-point ground. However, depending on the external noise conditions, it may be better to ground them externally.

6 VARIOUS SETTINGS

6.1 Network Configuration Setting

Set the parameters of the A/D converter module with the network parameters written to the CPU module of the master station. For the setting procedure for the master station, refer to the following.

User's manual for the master station used

Communication period interval setting

When using the A/D converter module in CC-Link IE TSN, set the communication period interval setting as follows.

■When the CC-Link IE TSN Class of the A/D converter module is CC-Link IE TSN Class B

Firmware version	Communication speed		Value that can be set
	Master station	A/D converter module	
"05" or later	1Gbps	1Gbps	• When the value is set in increments of 1µs: 125.00µs or more and 10000.00µs or less • When the value is not set in increments of 1µs: 31.25µs, 62.50µs, 125.00µs, 250.00µs, 500.00µs, 1000.00µs, 2000.00µs, 4000.00µs, or 8000.00µs
		100Mbps*1*3	• When the value is set in increments of 1µs: 125.00µs or more and 625.00µs or less • When the value is not set in increments of 1µs: 125.00µs, 250.00µs, or 500.00µs
	100Mbps	1Gbps*3	• When the value is set in increments of 1µs: 125.00µs or more and 10000.00µs or less • When the value is not set in increments of 1µs: 31.25µs, 62.50µs, 125.00µs, 250.00µs, 500.00µs, 1000.00µs, 2000.00µs, 4000.00µs, or 8000.00µs
		100Mbps*2	• When the value is set in increments of 1µs: 500.00µs or more, 10000.00µs or less, and divisible by 2µs • When the value is not set in increments of 1µs: 500.00µs, 1000.00µs, 2000.00µs, 4000.00µs, or 8000.00µs
04 03	1Gbps	1Gbps	• When the value is set in increments of 1µs: 125.00µs or more and 10000.00µs or less • When the value is not set in increments of 1µs: 31.25µs, 62.50µs, 125.00µs, 250.00µs, 500.00µs, 1000.00µs, 2000.00µs, 4000.00µs, or 8000.00µs
02	1Gbps	1Gbps	• When the value is set in increments of 1µs: 125.00µs or more and 8000.00µs or less • When the value is not set in increments of 1µs: 31.25µs, 62.50µs, 125.00µs, 250.00µs, 500.00µs, 1000.00µs, 2000.00µs, 4000.00µs, or 8000.00µs
01	1Gbps	1Gbps	125.00µs or more and 8000.00µs or less

*1 When using the A/D converter module with this combination of the conditions, set the "Communication Period Setting" of the A/D converter module to "Low-Speed".

*2 When using the A/D converter module with this combination of the conditions, set "Communication Period Setting" of the A/D converter module to "Basic Period" or "Normal-Speed".

*3 When communicating between the master station and the A/D converter module whose communication speed is different from each other, use the TSN hub.

■When the CC-Link IE TSN Class of the A/D converter module is CC-Link IE TSN Class A

Set the value at which the "Basic period (communication period interval setting)× Magnification" of the A/D converter module becomes 1ms or more and 1.28 seconds or less.

Item	Description
Basic period (Communication period interval setting)	Setting values of the communication period interval setting of master station parameters
Magnification	Magnification that is determined by the following master station parameters • Setting values of the communication period setting for network configuration setting • Setting values of the multiple period setting for master station parameters

When the communication speed of the master station is 1Gbps and the communication speed of the A/D converter module is 100Mbps, set the communication period setting of the A/D converter module to "Low-Speed".

Ex.

When the communication period setting of the A/D converter module is set to "Low-Speed" in the network configuration settings and "× 16" is set to "Low-Speed" in the multiple period setting of the master station parameters, the range of the basic period (the value of the communication period interval setting of the master station parameters) that satisfies the conditions is 62.5μs to 80ms.

Point

If an A/D converter module that satisfies the following conditions does not establish a data link even if a value within the above range is set in the communication period interval setting, check the CC-Link IE TSN Class A (Low-Speed) multiple (buffer memory address: 1294304) of the master station buffer memory.

• The CC-Link IE TSN Class setting is CC-Link IE TSN Class A

• The communication period setting is "Low-Speed"

In addition, if the value of the CC-Link IE TSN Class A (Low-Speed) multiple (buffer memory address: 1294304) is 6 or higher, set the value of basic period (communication period interval setting) × multiple × CC-Link IE TSN Class A (Low-Speed) multiple (buffer memory address: 1294304) to 1ms or higher and 6.4 seconds or lower in the communication period interval settings.

Network topology setting

When using the A/D converter module in CC-Link IE TSN, set the network topology setting as follows.

Firmware version of A/D converter module	Setting item
"03" or later	• Line topology, star topology, or mixture of star topology and line topology • Ring topology*1*2
"02" or earlier	Line topology, star topology, or mixture of star topology and line topology (fixed)

*1 Check that the firmware versions of all A/D converter modules on the network are "03" or later before setting the ring topology. When an A/D converter module with the firmware version of "02" or earlier is on the network, perform a firmware update.
If an A/D converter module with the firmware version of "02" or earlier is connected to the network, data link cannot be performed.

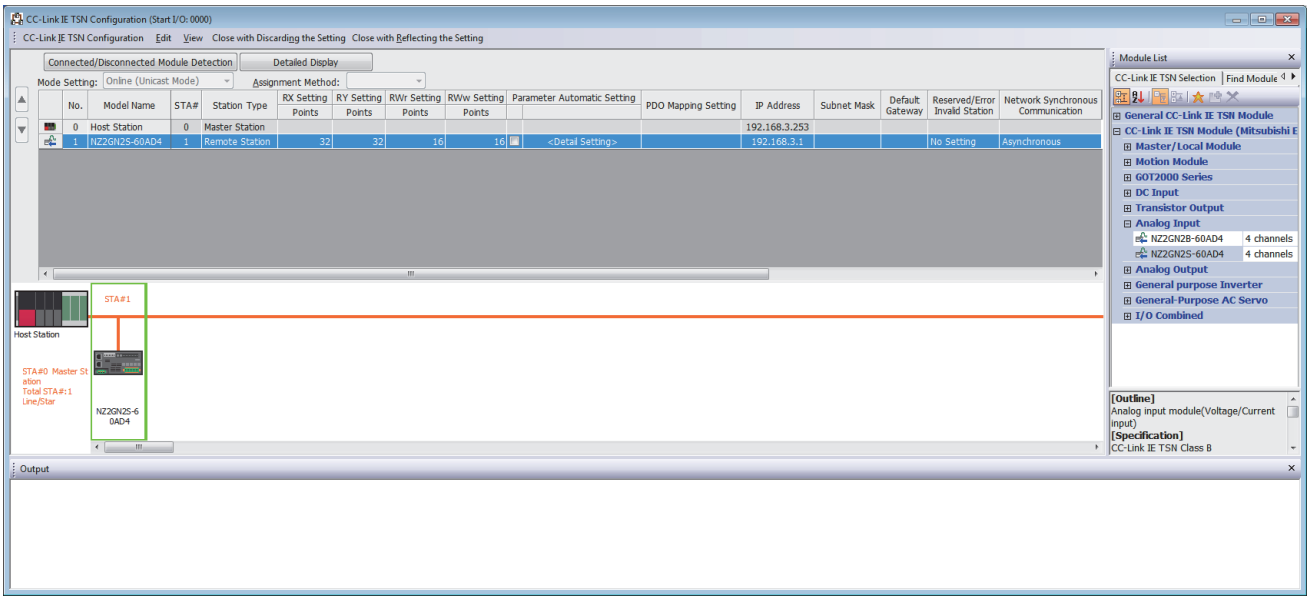
*2 The ring topology can only be connected when the CC-Link IE TSN Class is CC-Link IE TSN Class B. If a CC-Link IE TSN Class A A/D converter module is connected by ring topology, data links are not established.

Communication mode

Although the unicast mode and multicast mode are available for communication mode, A/D converter module operation varies depending on the firmware version if an Ethernet device (or a remote station of CC-Link IE TSN Class A) is connected to the A/D converter module in multicast mode.

Firmware version of A/D converter module	Description
"03" or later	Cyclic frames of multicast are not relayed via an Ethernet device (or a remote station of CC-Link IE TSN Class A) connected to an A/D converter module.
"02" or earlier	Cyclic frames of multicast are relayed via an Ethernet device (or a remote station of CC-Link IE TSN Class A) connected to an A/D converter module. Because of this, the Ethernet device (or the remote station of CC-Link IE TSN Class A) receives unnecessary cyclic frames, and thus the A/D converter module may not operate properly.

Window



Displayed items

Item		Setting details	Setting range
RX Setting, RY Setting	Points	Set the assignment of RX/RY points.	0 to 128 (Default value: 32)
	Start	The RX/RY start number is displayed.	—
	End	The RX/RY end number is displayed.	—
RWr Setting, RWw Setting	Points	Set the assignment of RWr/RWw points.	0 to 64 (Default value: 16)
	Start	The RWr/RWw start number is displayed.	—
	End	The RWr/RWw end number is displayed.	—
Network Synchronous Communication		Set whether to use the CC-Link IE TSN Network synchronous communication function.	• Asynchronous (Default value) • Synchronous

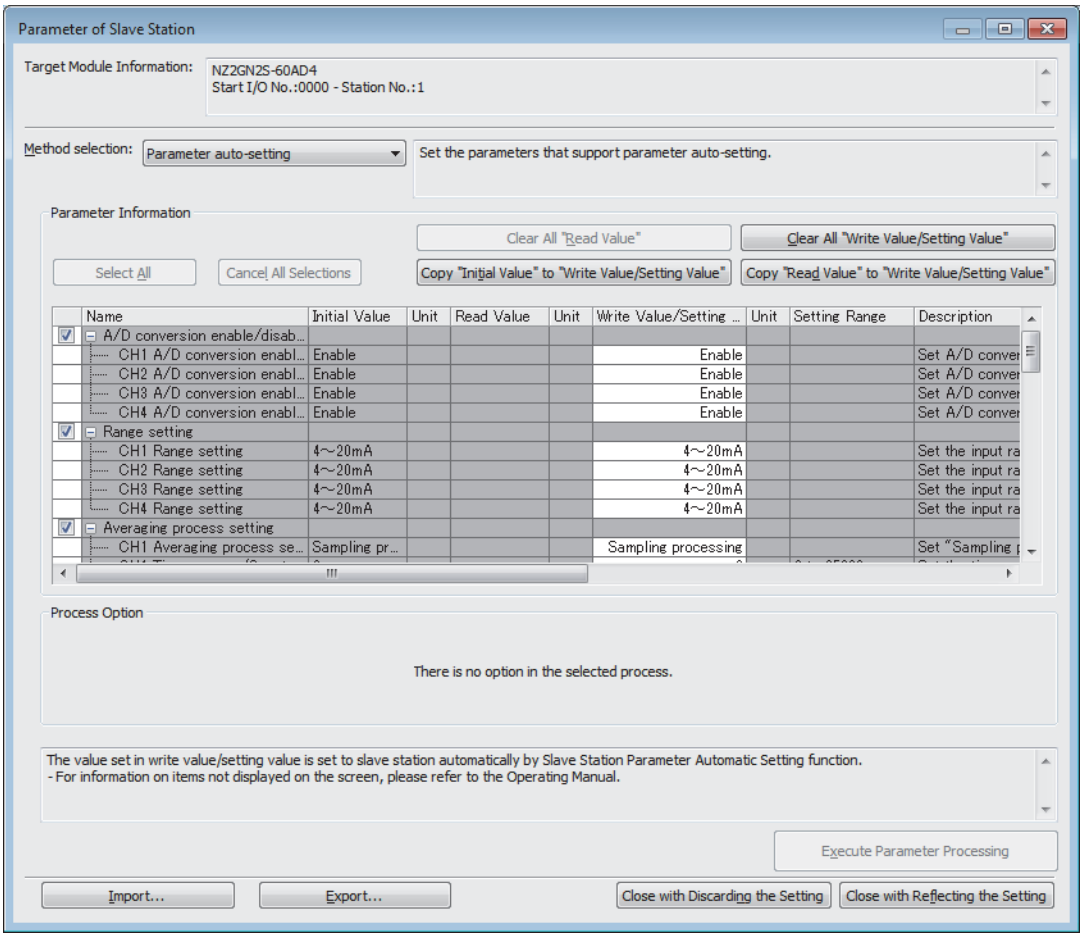
6.2 Parameter Setting

The following methods are available for setting parameters of the A/D converter module.

- Slave station parameter automatic setting (☞ Page 52 Slave station parameter automatic setting)
- Slave station parameter processing (☞ Page 58 Slave station parameter processing)

When parameters are set by the slave station parameter automatic setting, even if the A/D converter module is replaced due to its failure, the parameters for the A/D converter module are automatically set via the master station.
This reduces the time and effort to newly set the parameters.

Window



Displayed items

Item		Setting details	Setting range	Reference
A/D conversion enable/ disable setting	CH☐ A/D conversion enable/ disable setting	Specify whether to enable or disable the A/D conversion.	• Enable (Default value) • Disable	☞ Page 65 A/D Conversion Enable/Disable Function
Range setting	CH☐ Range setting	Set the input range.	• 4 to 20mA (Default value) • 0 to 20mA • 1 to 5V • 0 to 5V • -10 to 10V • 0 to 10V	☞ Page 69 Range Switching Function

Item		Setting details	Setting range	Reference
Averaging process setting	CH☐ Averaging process setting	Specify "Sampling processing" or "Averaging processing".	• Sampling processing (Default value) • Time average • Count average • Moving average	☞ Page 66 A/D Conversion Method
	CH☐ Time average/Count average/Moving average	Set the time for averaging (ms), count for averaging (times), and moving average count (times).	■Time average 2 to 5000 (Default value: 0) ■Count average 4 to 65000 (Default value: 0) ■Moving average 2 to 128 (Default value: 0)	
Input signal error detection function	CH☐ Input signal error detection setting	Set the error detection condition.	• Disable (Default value) • Simple disconnection detection	☞ Page 70 Input Signal Error Detection Function
Warning output function	CH☐ Warning output setting	Set whether to enable or disable warning output.	• Enable • Disable (Default value)	☞ Page 73 Warning Output Function (Process Alarm)
	CH☐ Process alarm upper upper limit value	Set the upper upper limit of the digital operation value. An error occurs if a value does not satisfy the condition of the lower lower limit value ≤ lower upper limit value ≤ upper lower limit value ≤ upper upper limit value. When Scaling enable/disable setting is set to "Enable", set a value with scaling conversion considered.	-32768 to 32767 (Default value: 0)	
	CH☐ Process alarm upper lower limit value	Set the upper lower limit of the digital operation value. An error occurs if a value does not satisfy the condition of the lower lower limit value ≤ lower upper limit value ≤ upper lower limit value ≤ upper upper limit value. When Scaling enable/disable setting is set to "Enable", set a value with scaling conversion considered.	-32768 to 32767 (Default value: 0)	
	CH☐ Process alarm lower upper limit value	Set the lower upper limit of the digital operation value. An error occurs if a value does not satisfy the condition of the lower lower limit value ≤ lower upper limit value ≤ upper lower limit value ≤ upper upper limit value. When Scaling enable/disable setting is set to "Enable", set a value with scaling conversion considered.	-32768 to 32767 (Default value: 0)	
	CH☐ Process alarm lower lower limit value	Set the lower lower limit of the digital operation value. An error occurs if a value does not satisfy the condition of the lower lower limit value ≤ lower upper limit value ≤ upper lower limit value ≤ upper upper limit value. When Scaling enable/disable setting is set to "Enable", set a value with scaling conversion considered.	-32768 to 32767 (Default value: 0)	

Item		Setting details	Setting range	Reference
Scaling function	CH☐ Scaling enable/disable setting	Set whether to enable or disable the scaling.	• Enable • Disable (Default value)	☞ Page 75 Scaling Function
	CH☐ Scaling upper limit value	Set the upper limit value of scale conversion. The upper limit value must be greater than the lower limit value.	-32000 to 32000 (Default value: 0)	
	CH☐ Scaling lower limit value	Set the lower limit value of scale conversion. The upper limit value must be greater than the lower limit value.	-32000 to 32000 (Default value: 0)	

Slave station parameter automatic setting

The slave station parameter automatic setting writes the A/D converter module parameters to the CPU module.
The A/D converter module parameters are saved in the CPU built-in memory or the SD memory card.
The parameters are automatically set in the A/D converter module via the master station when the A/D converter module joins or returns to the network. The parameters are written to the non-volatile memory of the A/D converter module.
The A/D converter module starts data link with the master station after parameters are automatically set.
The parameter automatic setting status can be checked in the buffer memory area. (☞ Page 177 Parameter automatic setting status monitor)

Point

To use parameters saved in an SD memory card for the CPU module, in "Setting of File/Data Use or Not in Memory Card" of "Memory Card Parameter" of the CPU module, set "Slave Station Parameter" to "Use".
MELSEC iQ-R CPU Module User's Manual (Application)

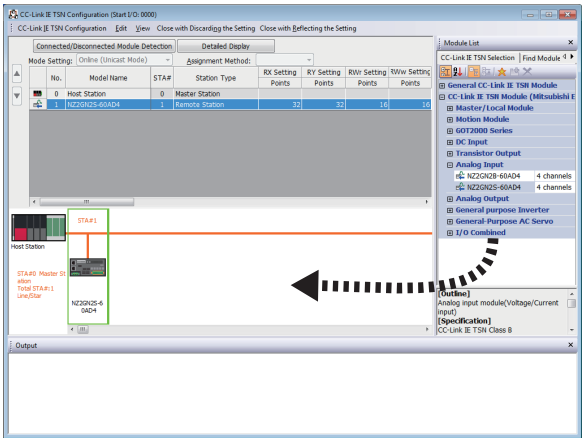
Parameter setting

Operating procedure

1. Display the "CC-Link IE TSN Configuration" window.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Model ⇨ [Basic Settings] ⇨ [Network Configuration Settings]

2. Select the A/D converter module from "Module List", and drag and drop it to the list of stations or the network map.



3. Select the "Parameter Automatic Setting" checkbox.

	No.	Model Name	RX Setting Points	RY Setting Points	RWr Setting Points	RWw Setting Points	Parameter Automatic Setting	
	0	Host Station						
	1	NZ2GN2S-60AD4	32	32	16	16	☑	<Detail Setting>

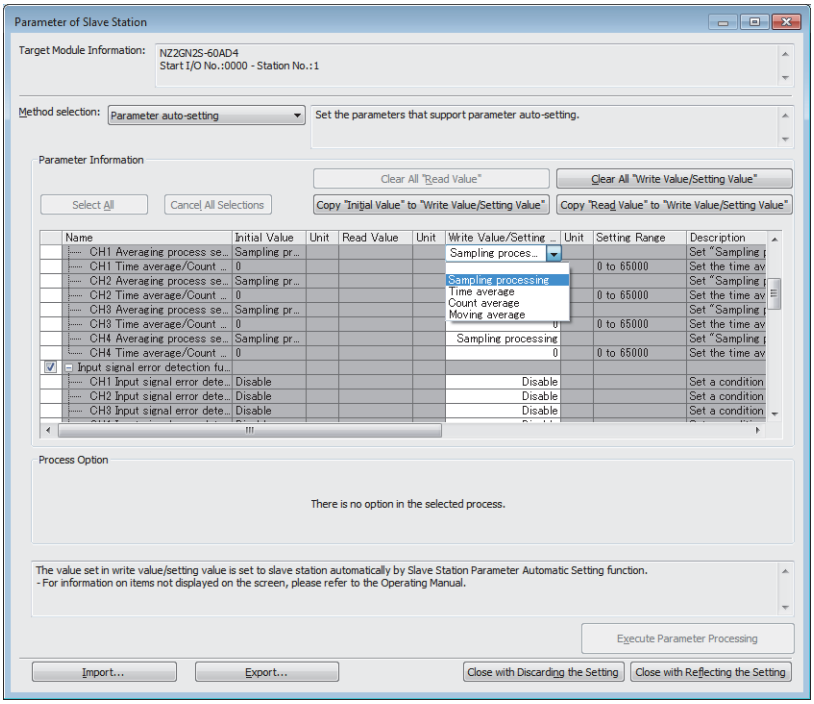
4. Double-click "Detail Setting" beside the "Parameter Automatic Setting" checkbox to display the "Parameter of Slave Station" window.

5. Check that "Method selection" is set to "Parameter auto-setting".

6. Double-click the item to be set, and enter the setting value.

To save the parameter setting values in a CSV file, click the [Export] button.

To read the parameter setting values from a CSV file, click the [Import] button.



7. Click the [Close with Reflecting the Setting] button to close the "Parameter of Slave Station" window.

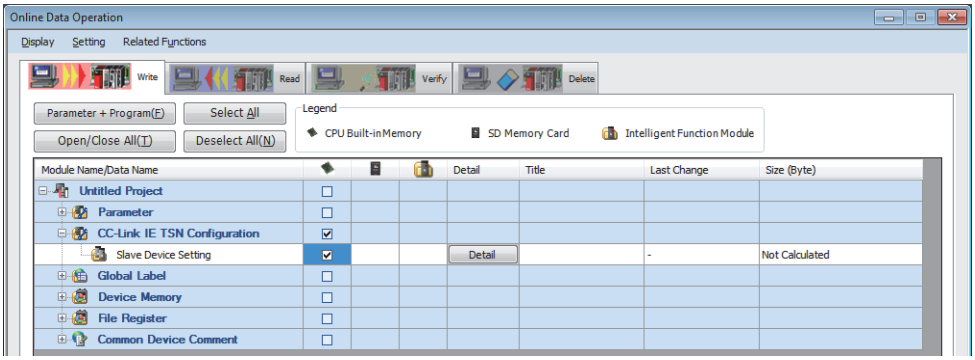
8. Select [Close with Reflecting the Setting] and close the "CC-Link IE TSN Configuration" window.

9. Click the [Apply] button.

10. Display the "Online Data Operation" window.

[Online] ⇨ [Write to PLC]

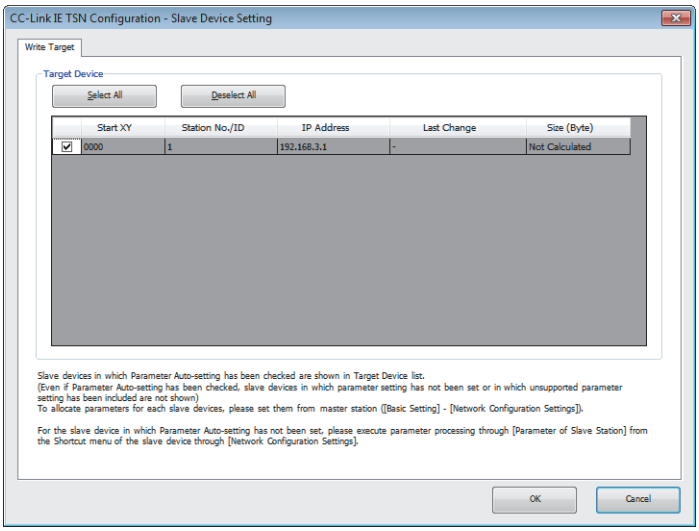
11. Select the checkbox for "Slave Device Setting" in "CC-Link IE TSN Configuration".



12. Click the [Detail] button for "Slave Device Setting" to display the "CC-Link IE TSN Configuration - Slave Device Setting" window.

13. Check that the checkbox for the write target A/D converter module is selected.

Select the checkbox if not selected.



Point

In the "CC-Link IE TSN Configuration - Slave Device Setting" window, only the slave stations whose "Parameter Automatic Setting" checkbox is selected are displayed.

14. Click the [OK] button to close the "CC-Link IE TSN Configuration - Slave Device Setting" window.

15. Write the set parameters to the CPU module of the master station and reset the CPU module of the master station, or turn off and on the power supply of the programmable controller.

16. Set the CPU module of the master station to RUN, and check that the DATA LINK LED of the A/D converter module is turned on.

Precautions

- Set all the items for the parameter. If any item is left blank, the "Parameter of Slave Station" window cannot be closed.
- Configure the advanced settings for each slave station whose "Parameter Automatic Setting" checkbox is selected.
- When the slave station parameter automatic setting is completed with an error, data link is not started. For stations whose slave station parameter automatic setting is completed with an error, Slave station parameter automatic setting function execution result (SW0160 to SW0167) of the master station turns on. To start a data link, check Slave station parameter automatic setting execution result details (SW0194) and the event history of the master/local module, and take the corrective actions corresponding to the stored error code.

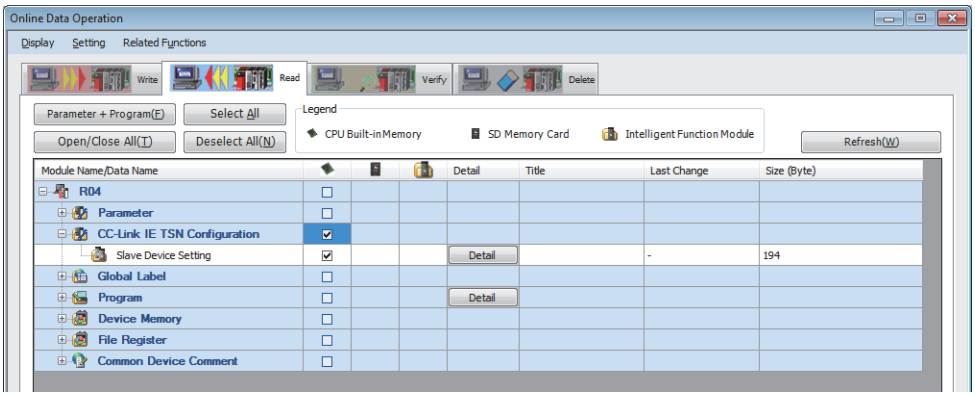
When changing the parameters

Operating procedure

1. Display the "Online Data Operation" window.

[Online] ⇨ [Read from PLC]

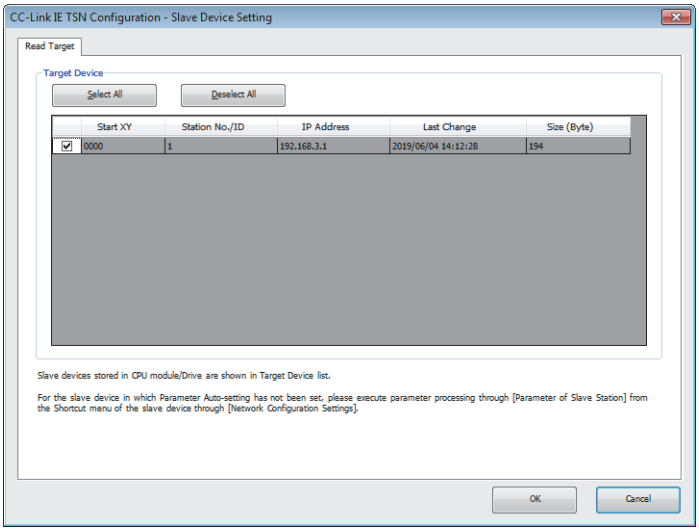
2. Select the read source "Slave Device Setting" checkbox.



3. Click the [Detail] button for "Slave Device Setting" to display the "CC-Link IE TSN Configuration - Slave Device Setting" window.

4. Check that the checkbox for the read target A/D converter module is selected.

Select the checkbox if not selected. All checkboxes are selected by default.



5. Click the [OK] button to close the "CC-Link IE TSN Configuration - Slave Device Setting" window.

6. Click the [Execute] button to read the parameters from the CPU module.

7. Display the "CC-Link IE TSN Configuration" window.

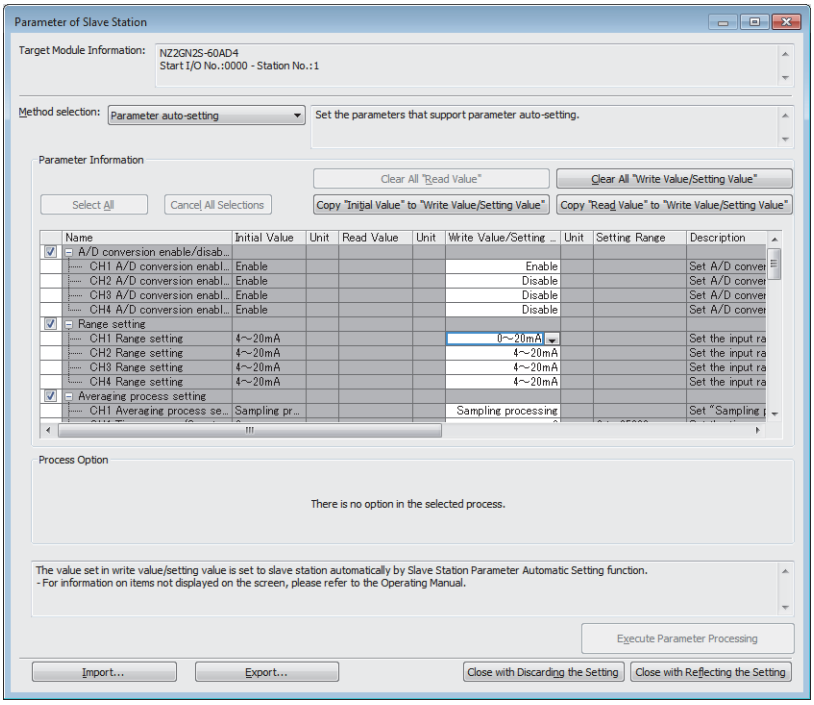
[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Model ⇨ [Basic Settings] ⇨ [Network Configuration Settings]

8. Double-click "Detail Setting" beside the "Parameter Automatic Setting" checkbox to display the "Parameter of Slave Station" window.

	No.	Model Name	STA#	Station Type	RX Setting Points	RY Setting Points	RWr Setting Points	RWw Setting Points	Parameter Automatic Setting	
	0	Host Station	0	Master Station						
	1	NZ2GN2S-60AD4	1	Remote Station	32	32	16	16	☑	<Detail Setting>

9. Check that "Method selection" is set to "Parameter auto-setting".

10. Select the items to be changed, and set new values.



11. Click the [Close with Reflecting the Setting] button to close the "Parameter of Slave Station" window.

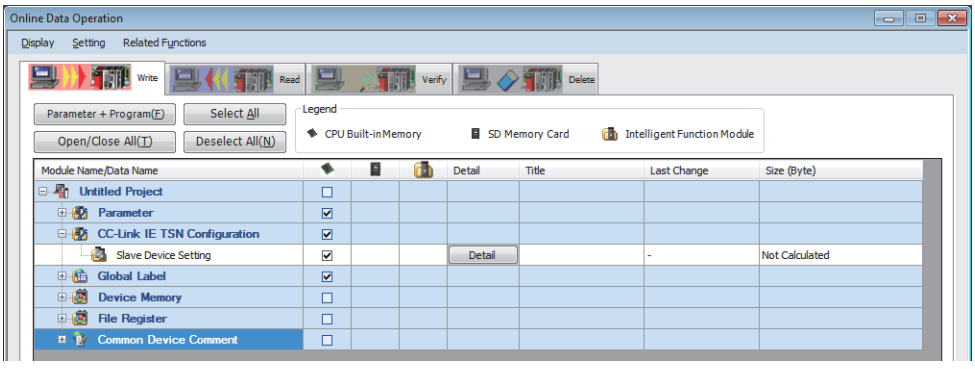
12. Select [Close with Reflecting the Setting] and close the "CC-Link IE TSN Configuration" window.

13. Click the [Apply] button.

14. Display the "Online Data Operation" window.

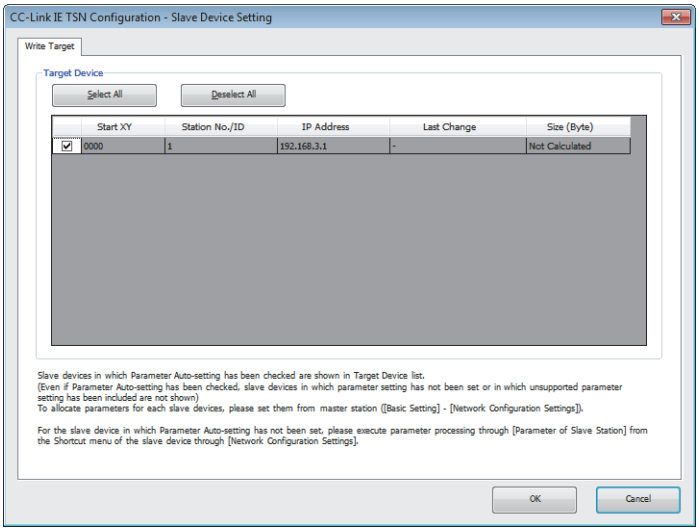
[Online] ⇨ [Write to PLC]

15. Select the checkbox for "Slave Device Setting" in "CC-Link IE TSN Configuration".



16. Click the [Detail] button for "Slave Device Setting" to display the "CC-Link IE TSN Configuration - Slave Device Setting" window.

17. Check that the checkbox for the write target A/D converter module is selected.
Select the checkbox if not selected.



18. Click the [OK] button to close the "CC-Link IE TSN Configuration - Slave Device Setting" window.

19. Write the set parameters to the CPU module of the master station and reset the CPU module of the master station, or turn off and on the power supply of the programmable controller.

20. Set the CPU module of the master station to RUN, and check that the DATA LINK LED of the A/D converter module is turned on.

Precautions

The parameters of a slave station not existing in the network map on the "CC-Link IE TSN Configuration" window or a slave station whose "Parameter Automatic Setting" is not selected cannot be read.
When an attempt is made to read parameters, an error message is displayed.

Slave station parameter processing

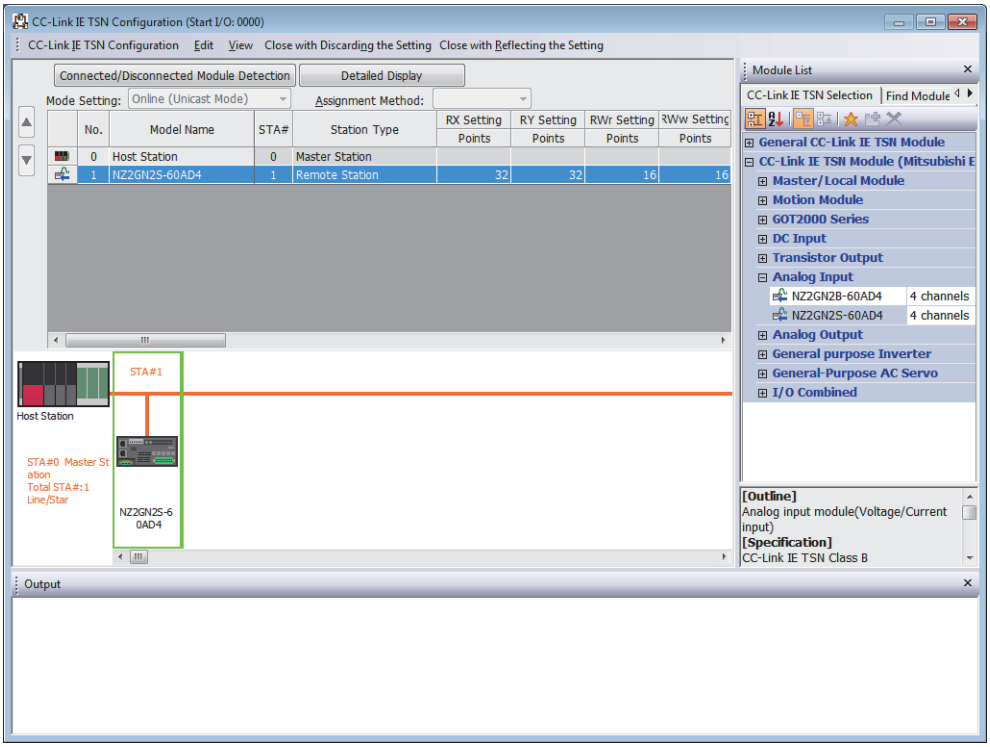
The slave station parameter processing writes the A/D converter module parameters to the A/D converter module.

Parameter setting

Operating procedure

1. Display the "CC-Link IE TSN Configuration" window.

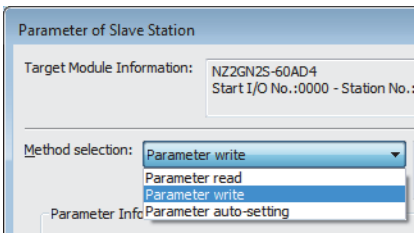
[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Model ⇨ [Basic Settings] ⇨ [Network Configuration Settings]



2. Open the "Parameter of Slave Station" window.

Select an A/D converter module from the station list, right-click, and select [Parameter of Slave Station].

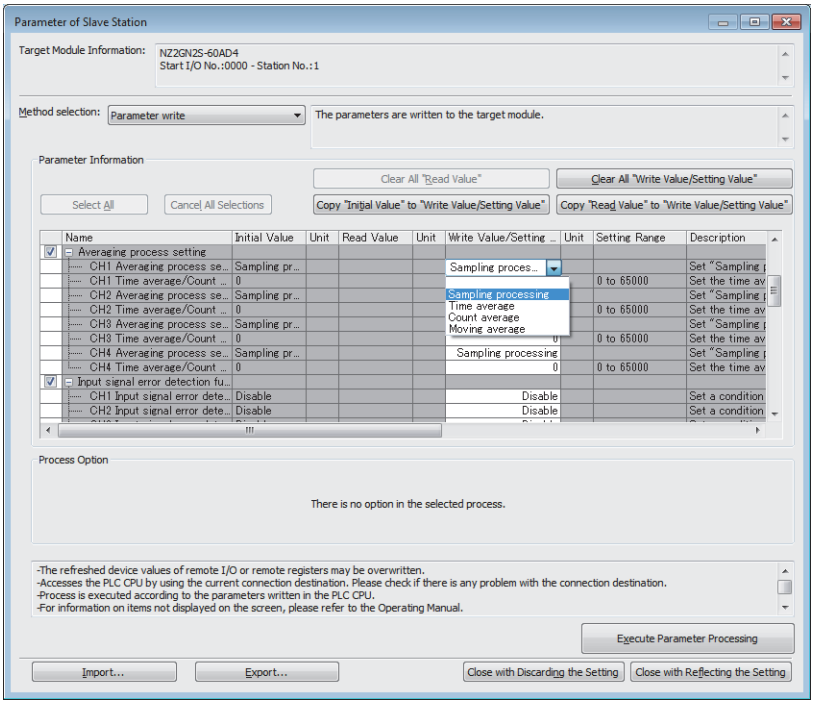
3. Set "Method selection" to "Parameter write".



4. Double-click the item to be set, and enter the setting value.

To save the parameter setting values in a CSV file, click the [Export] button.

To read the parameter setting values from a CSV file, click the [Import] button.



5. Click the [Execute Parameter Processing] button.

6. Follow the on-screen instructions and click the [Yes] button.

7. The parameters are written to the A/D converter module.

8. Select [Close with Reflecting the Setting] to close the "Parameter of Slave Station" window.

9. Select [Close with Reflecting the Setting] to end the CC-Link IE TSN configuration.

Precautions

Set all the items for the parameter. If any blank exists, the parameters cannot be written to the A/D converter module.

When changing the parameters

Operating procedure

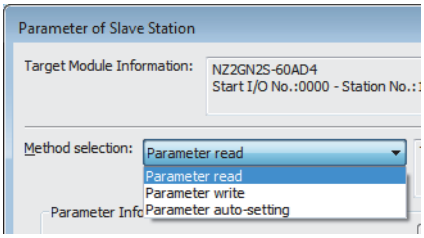
1. Display the "CC-Link IE TSN Configuration" window.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Model ⇨ [Basic Settings] ⇨ [Network Configuration Settings]

2. Open the "Parameter of Slave Station" window.

Select an A/D converter module from the station list, right-click, and select [Parameter of Slave Station].

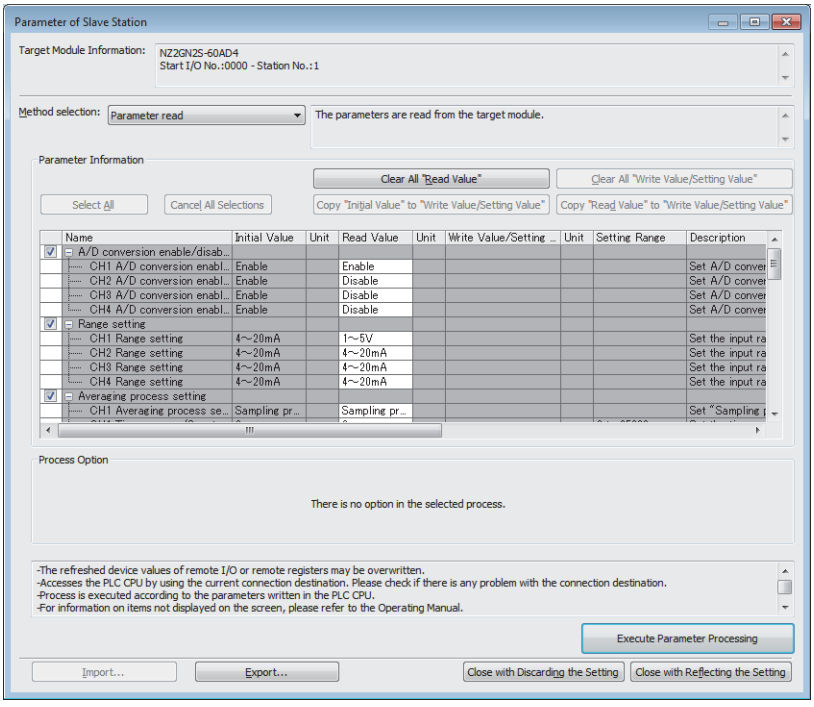
3. Set "Method selection" to "Parameter read".



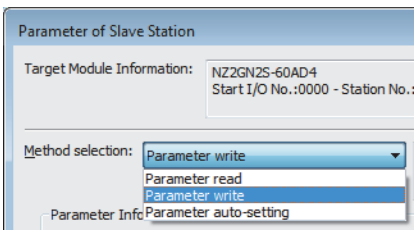
4. Click the [Execute Parameter Processing] button.

5. Click the [Yes] button.

6. The parameters are read from the A/D converter module.

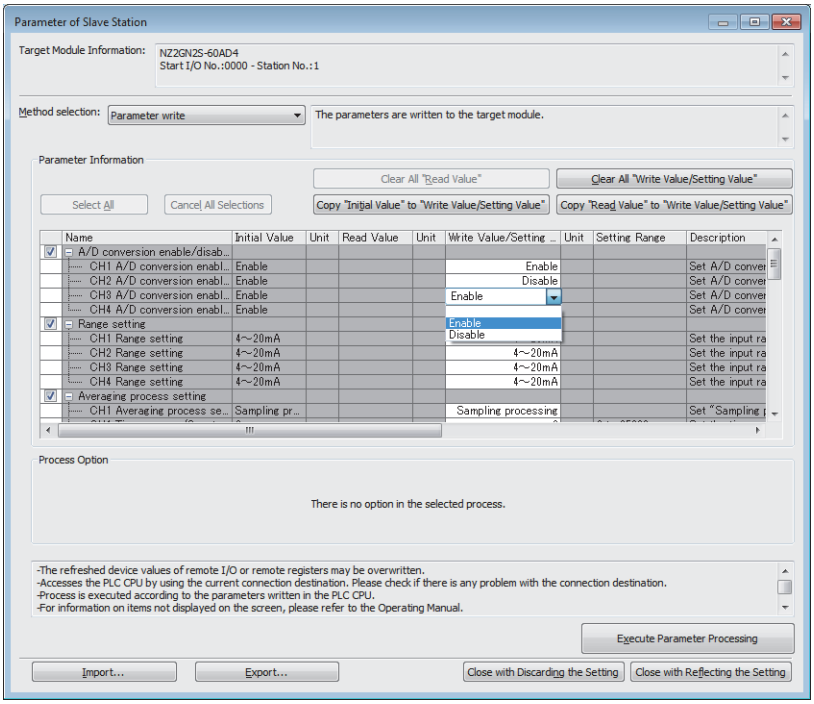


7. Set "Method selection" to "Parameter write".



8. Select the items to be changed, and set new values.

- Click [Copy "Read Value" to "Write Value/Setting Value"] button and paste the value.
- Select the items to be changed, and set new values.



9. Click the [Execute Parameter Processing] button.

10. Follow the on-screen instructions and click the [Yes] button.

11. The parameters are written to the A/D converter module.

Setting the module parameters of the slave station is complete.

6.3 Precautions

When using the master station in multicast mode

■When the firmware version is "03" or later

Cyclic frames of multicast are not relayed via an Ethernet device (or a remote station of CC-Link IE TSN Class A) connected to an A/D converter module.

■When the firmware version is "02" or earlier

Cyclic frames of multicast are relayed via an Ethernet device (or a remote station of CC-Link IE TSN Class A) connected to an A/D converter module. Because of this, the Ethernet device (or the remote station of CC-Link IE TSN Class A) receives unnecessary cyclic frames, and thus the A/D converter module may not operate properly.

When using the slave station parameter automatic setting

To use parameters set by the slave station parameter processing for the slave station parameter automatic setting, follow the procedure below.

1. Set the module parameters in the "Parameter of Slave Station" window.
2. Select the "Parameter Automatic Setting" checkbox in the "CC-Link IE TSN Configuration" window.
3. Set the save destination for the set parameters in the "Online Data Operation" window.
4. Write data to the programmable controller.

When the slave station parameter automatic setting is enabled

When the slave station parameter processing is executed with the slave station parameter automatic setting enabled, the A/D converter module operates with the parameters set by the slave station parameter processing.
However, when the A/D converter module is disconnected from the network and then returns to the network after the slave station parameter processing is executed, the slave station parameter automatic setting will be executed, and therefore the parameters for the A/D converter module will be overwritten by the parameters set by the slave station parameter automatic setting.

Non-volatile memory data error (parameter) occurrence

When a non-volatile memory data error (parameter) (error code: 2010H) occurs, the slave station parameter automatic setting is not executed. Normal completion (non-volatile memory not updated) (4H) is stored in Parameter automatic setting status monitor (address: 0612H).

When the slave station parameter automatic setting has an error

Slave station parameter automatic setting interruption (event code: 00C40H) is stored in the event history of the master/local module.
The following table lists slave station response codes that are stored in the slave station parameter automatic setting information of detailed information.

Slave station response code	Description and cause	Action
0010H	A module parameter set in the CPU module is invalid.	Set the module parameter again from the network configuration setting, and write it to the CPU module.
0020H	A module parameter set in the CPU module cannot be used for the A/D converter module.	Check the version of profile, and change it to the one that can be used for the A/D converter module. After that, set the module parameter again from the network configuration setting, and write it to the CPU module.

For details on the event history, refer to the following.
User's manual for the master station used

7 FUNCTIONS

This chapter describes the details of the functions available in the A/D converter module, and the setting procedures for those functions.

For details on remote I/O signals, remote register, and remote buffer memory, refer to the following:

☞ Page 155 Remote I/O Signal
☞ Page 164 Remote Register
☞ Page 168 Remote Buffer Memory

Setting method

Each function can be set by using the parameter setting. (☞ Page 49 Parameter Setting)

For items to be set for each function, check with the details of each function.

7.1 Operation Mode Shift at Power-On

When using the A/D converter module in CC-Link IE TSN communication mode, the operation mode shifts to either of the following modes at power-on.

- Normal mode
- Synchronous communication mode
- Unit test mode

When using the A/D converter module in CC-Link IE Field Network communication mode, refer to the following.

📖 CC-Link IE TSN Analog-Digital Converter Module User's Manual (CC-Link IE Field Network Communication Mode)

Normal mode

When either of the following conditions is satisfied, the operation mode shifts to normal mode.

- The function setting switch 1 is set to OFF, and "Network Synchronous Communication" is set to "Asynchronous".
- The function setting switch 1 is set to OFF, and the module is connected to the master station whose inter-module synchronous communication is not set with this module.

For details, refer to the following.

☞ Page 28 Setting the function setting switches
☞ Page 45 Network Configuration Setting

Synchronous communication mode

When all of the following conditions are satisfied, the operation mode shifts to synchronous communication mode.

- The function setting switch 1 is set to OFF.
- "Network Synchronous Communication" is set to "Synchronous".
- The module is connected to the master station whose inter-module synchronous communication is set with this module.

For details, refer to the following.

☞ Page 28 Setting the function setting switches
☞ Page 45 Network Configuration Setting

Unit test mode

When the IP address/station number setting switches and function setting switch 1 are set as follows, the mode shifts to unit test mode.

- IP address/station number setting switch (x1): Any position
- IP address/station number setting switch (x16): F
- Function setting switch 1: ON
- Function setting switch 2 to function setting switch 10: Any position

For details, refer to the following.

☞ Page 140 Unit Test

7.2 Each Function in the Sequence

An analog input value and digital operation value are processed by the functions in the order shown below. If multiple functions are enabled, the output of the first-processed function is used as the input of the next function.

1. Input signal error detection function (☞ Page 70 Input Signal Error Detection Function)

If an input signal error occurs, the subsequent processing is not executed.

2. Averaging processing (☞ Page 66 Averaging processing)

3. Scaling function (☞ Page 75 Scaling Function)

4. Shift function (☞ Page 77 Shift Function)

5. Warning output function (process alarm) (☞ Page 73 Warning Output Function (Process Alarm))

6. CH□ Digital operation value

Digital values after sampling processing or averaging processing have been performed are called digital output values.
The digital operation value calculated by the scaling function and shift function is stored.

7. Maximum value/minimum value hold function

8. CH□ Maximum value, CH□ Minimum value

The maximum and minimum values of the digital operation values are stored.

7.3 A/D Conversion Enable/Disable Function

This function allows A/D conversion to be enabled or disabled for each channel.
Disabling the A/D conversion for unused channels reduces the conversion cycles.

Setting method

Operating procedure

1. Use "CH□ A/D conversion enable/disable setting" in "A/D conversion enable/disable setting".

7.4 A/D Conversion Method

Set whether to perform sampling processing or averaging processing for each channel.

Sampling processing

For the A/D converter module, analog input values are stored in CH☐ Digital operation value (RWr2 to RWr5) in each sampling cycle.

The sampling cycle of the A/D converter module varies depending on the number of channels used (number of channels where A/D conversion is enabled).

- Sampling cycle [μs] = Number of channels used × Conversion speed (200μs/channel)

By disabling the conversion for the channels that are not used, the sampling cycle can be shortened.

Ex.

Sampling cycle when number of channels used is set to 3 channels (CH1 to CH3):

3×200 = 600μs

Averaging processing

Digital output values are averaged for each channel and stored in CH☐ Digital operation value (RWr2 to RWr5).

There are three types of averaging processing as follows:

- Time average
- Count average
- Moving average

■Time average

A/D conversion is executed for a specified time, and the total value excluding the maximum and minimum values is averaged and stored in CH☐ Digital operation value (RWr2 to RWr5).

The number of processing times varies depending on the sampling cycle.

Processing times (times) = Setting time ÷ Sampling cycle

Ex.

The number of processing times assuming the following settings is as follows.

- Number of channels used (whose A/D conversion is enabled): 4 channels (CH1 to CH4)
- Conversion speed: 200μs/channel
- Setting time: 15ms

15 ÷ (0.2 × 4) = 18.75 times

The average value of 18 measurements is output. (Rounded down to the nearest integer)

Point

The valid lower limit setting value for time averaging is the minimum processing times (4 times) × sampling cycle.

When using four channels (Conversion speed: 200μs/channel)

4 × (0.2 × 4) = 3.2ms

When the setting time is less than 3.2ms, CH☐ Time average setting out-of-range (error code: 320☐H) is determined and the digital operation value is set to 0.

■Count average

A/D conversion is executed for a specified number of times, and the total value excluding the maximum and minimum values is averaged and stored in CH☐ Digital operation value (RWr2 to RWr5).

The time taken for the mean value calculated through the count average processing to be stored in CH☐ Digital operation value (RWr2 to RWr5) changes depending on the sampling cycle.

Processing time (ms) = Set number of times × Sampling cycle

Ex.

The processing time assuming the following settings is as follows.

- Number of channels used (whose A/D conversion is enabled): 4 channels (CH1 to CH4)
- Conversion speed: 200μs/channel
- Set number of times: 20

20 × (0.2 × 4) = 16.0ms

→The average value is output per 16.0ms.

Point

Because the count average requires a sum of at least two counts except the maximum and minimum values, the set number of times should be set to four or more.

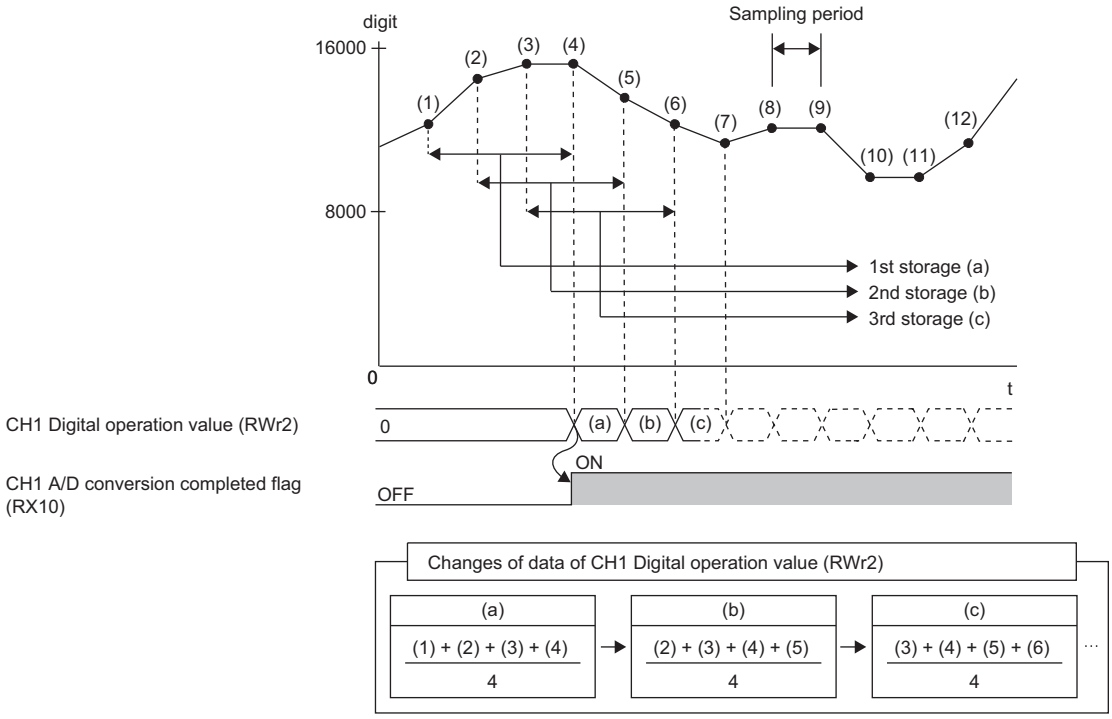
■Moving average

The acquired digital output values for the specified number of times are averaged for each sampling cycle and stored in CH☐ Digital operation value (RWr2 to RWr5).

The target range for average processing moves at each sampling, thereby allowing the digital operation value to be obtained for each conversion cycle.

Ex.

The moving average processing for a set number of times of four is shown below:



Setting method

Operating procedure

■Sampling processing

1. Set "CH☐ A/D conversion enable/disable setting" to "Enable".
2. Set "CH☐ Averaging process setting" to "Sampling processing".

■Averaging processing

1. Set "CH☐ A/D conversion enable/disable setting" to "Enable".
2. Specify the type of averaging processing for "CH☐ Averaging process setting".
3. Set the value of averaging processing in "CH☐ Time average/Count average/Moving average".

7.5 Range Switching Function

Set the input range for each channel.

An input range can be selected from the following.

- Voltage: 1 to 5V, 0 to 5V, -10 to 10V, 0 to 10V
- Current: 4 to 20mA, 0 to 20mA

Setting method

Operating procedure

1. Set "CH☐ A/D conversion enable/disable setting" to "Enable".
2. Set "CH☐ Range setting" to an input range.

7.6 Maximum Value/Minimum Value Hold Function

For each channel, this function stores the maximum value and the minimum value of digital operation values into the following remote buffer memory.

Channel	Remote buffer memory address	
	Maximum value	Minimum value
CH1	0600H	0601H
CH2	0602H	0603H
CH3	0604H	0605H
CH4	0606H	0607H

If averaging processing is specified, the values are updated per averaging process cycle. Otherwise they are updated per sampling cycle.

Resetting maximum and minimum values

The following two methods are available for resetting the maximum and minimum values.

■Turning on and off Maximum value/minimum value reset request (RY1D)

The maximum and minimum values are replaced with current values by turning on and off Maximum value/minimum value reset request (RY1D).

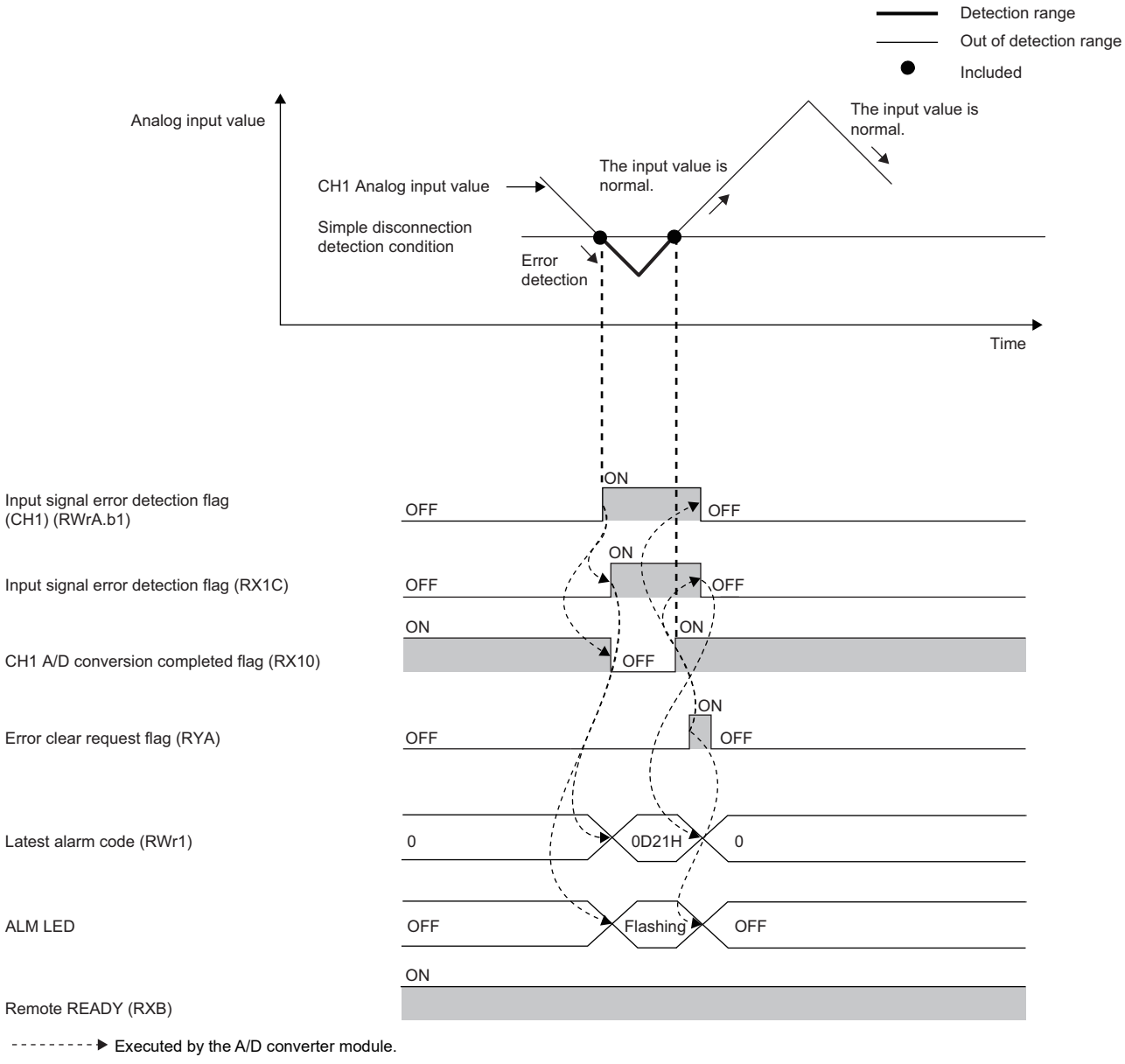
■Turning on and off Initial data setting request flag (RY9)

The maximum and minimum values are cleared to 0 by turning on and off Initial data setting request flag (RY9).

7.7 Input Signal Error Detection Function

This function simply detects a disconnection of an analog input signal.

The following figure schematically shows how the input signal error detection works in the A/D converter module.

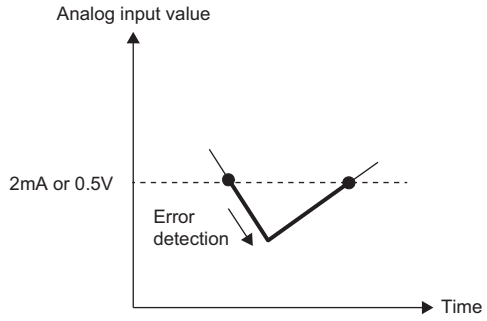


Detection condition

When the following condition is satisfied, a disconnection is simply detected.

Input range*1	Simple disconnection detection condition
4 to 20mA	Analog input value ≤ 2mA
1 to 5V	Analog input value ≤ 0.5V

*1 If the analog input range is other than the above range, CH☐ Simple disconnection detection setting error (error code: 342☐H) is stored in Latest error code (RWr0), Error flag (RXA) turns on, and the ERR. LED turns on.



Notification

If the analog input value is satisfied the simple disconnection detection condition, the A/D converter module results in the following state and an error is notified.

- Input signal error detection flag (RWrA): Bit corresponding to the channel turns on (☞ Page 166 Input signal error detection flag).
- Input signal error detection signal (RX1C): On
- ALM LED: Flashing

CH☐ Input signal error detection (simple disconnection) (alarm code: 0D2☐H) is stored in Latest alarm code (RWr1).

Operation

For the digital operation value of the error-detected channel, the value before the error detection is maintained and CH☐ A/D conversion completed flag (RX10 to RX13) corresponding to the channel turns off.

When the analog input value becomes greater again than the simple disconnection detection condition, A/D conversion restarts regardless of whether Input signal error detection flag (RWrA) and Input signal error detection signal (RX1C) are reset, and after the first update, CH☐ A/D conversion completed flag (RX10 to RX13) corresponding to the channel turns on again. (The ALM LED remains flashing.)

Point

The digital operation value is not updated while the input signal error is being detected.
Once the analog input value is out of the simple disconnection detection condition, updating the digital operation value restarts.

Detection cycle

This function is executed per sampling cycle.

Clearing the input signal error detection

After the analog input value becomes greater again than the simple disconnection detection condition, turn on and off Error clear request flag (RYA).

When the input signal error is cleared, the A/D converter module results in the following state:

- Input signal error detection flag (RWrA) is cleared.
- Input signal error detection signal (RX1C) turns off.
- The ALM LED turns off.
- The alarm code stored in Latest alarm code (RWr1) is cleared.

Setting method

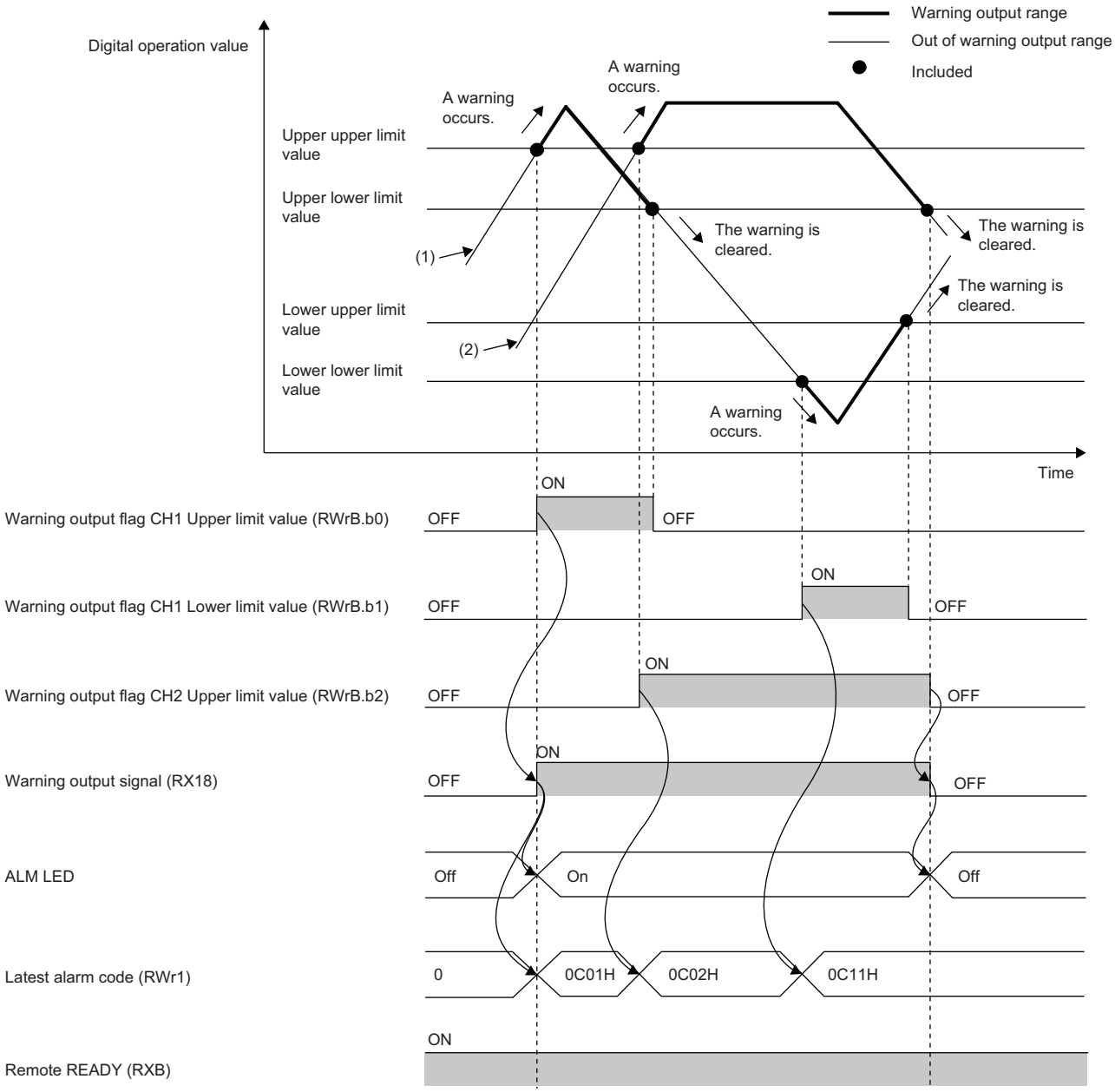
Operating procedure

1. Set "CH☐ A/D conversion enable/disable setting" to "Enable".
2. Set "CH☐ Input signal error detection setting" to "Simple disconnection detection".

7.8 Warning Output Function (Process Alarm)

A warning is output if the digital operation value enters the predefined warning output range.

The following figure schematically shows how the warning output behaves in the A/D converter module.



Notification

The module enters the following state and a warning is output when the digital operation value is equal to or more than the process alarm upper upper limit value, or equal to or less than the process alarm lower lower limit value (entering the warning output range).

- Warning output flag (RWrB): Bit corresponding to the warning content turns on (☞ Page 166 Warning output flag).
- Warning output signal (RX18): On
- ALM LED: On

CH☐ Process alarm (upper limit) occurrence (alarm code: 0C0☐H) or CH☐ Process alarm (lower limit) occurrence (alarm code: 0C1☐H) is stored in Latest alarm code (RWr1).

Operation

After the warning is output, when the digital operation value is smaller than the process alarm upper lower limit and greater than the process alarm lower upper limit value (entering the warning output setting range), the bit of Warning output flag (RWrB) corresponding to the channel turns off.

When all channels return within the warning output setting range, Warning output signal (RX18) turns off and the ALM LED turns off.

Detection cycle

Detection is executed for the set time when time average is specified, or for the set count when count average is specified. In addition, when sampling processing and moving average are specified, the function is executed per sampling cycle.

Clearing the alarm code

CH☐ Process alarm (upper limit) occurrence (alarm code: 0C0☐H) or CH☐ Process alarm (lower limit) occurrence (alarm code: 0C1☐H) set in Latest alarm code (RWr1) is not cleared even when the value becomes smaller than the process alarm upper lower limit and greater than the process alarm lower upper limit value (entering the warning output setting range) after the warning is output.

After all channels return within the warning output setting range, turn on and off Error clear request flag (RYA).

Point

The alarm code can also be cleared by turning on and off Initial data setting request flag (RY9).

Warning output target

The warning output target is CH☐ Digital operation value (RWr2 to RWr5).

When the scaling function and shift function are used, be sure to consider the operations of these functions when setting the process alarm upper upper limit value, process alarm upper lower limit value, process alarm lower upper limit value, and process alarm lower lower limit value.

Setting method

Operating procedure

1. Set "CH☐ A/D conversion enable/disable setting" to "Enable".
2. Set "CH☐ Warning output setting" to "Enable".
3. Specify the values for "CH☐ Process alarm upper upper limit value", "CH☐ Process alarm upper lower limit value", "CH☐ Process alarm lower upper limit value", and "CH☐ Process alarm lower lower limit value".

7.9 Scaling Function

Scaling function allows scale conversion on a digital output value within the range of the scaling upper limit value and the scaling lower limit value, both of which are set at desired values. This function saves many steps to create a scale conversion program.

A scale-converted value is stored in CH☐ Digital operation value (RWr2 to RWr5).

How to interpret the scaling setting

Ex.

If the input range is set to -10 to 10V:

For the scaling lower limit value, set a value corresponding to the lower limit of the input range (-16000), and for the scaling upper limit value, set a value corresponding to the upper limit of the input range (16000).

Point

Even if set for change that exceeds the maximum resolution, the maximum resolution is not increased.

Calculation of the digital operation value

Scale conversion is performed on the digital values using the following formula: (Values after the decimal point are rounded off during scale conversion.)

- If the input range is -10 to 10V

$$D_Y = \frac{D_X \times (S_H - S_L)}{32000} + \frac{(S_H + S_L)}{2}$$

- When the input range is 0 to 5V, 1 to 5V, 0 to 10V, 0 to 20mA, 4 to 20mA

$$D_Y = \frac{D_X \times (S_H - S_L)}{16000} + S_L$$

Item	Description
D_Y	Digital operation value
D_X	Digital output value
S_H	Scaling upper limit value
S_L	Scaling lower limit value

Setting method

Operating procedure

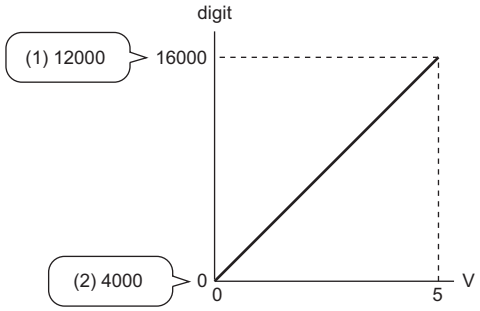
1. Set "CH☐ A/D conversion enable/disable setting" to "Enable".
2. Set "CH☐ Scaling enable/disable setting" to "Enable".
3. Set the values in "CH☐ Scaling upper limit value" and "CH☐ Scaling lower limit value".

Example of the scaling setting

Ex.

When the following setting is used for the channel 1 with the set input range of 0 to 5V:

- "CH1 Scaling enable/disable setting": "Enable"
- "CH1 Scaling upper limit value": 12000
- "CH1 Scaling lower limit value": 4000



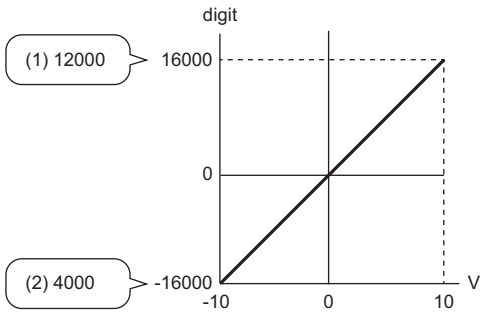
digit: Digital output value
V: Analog input voltage (V)
(1) Scaling upper limit value
(2) Scaling lower limit value

Analog input voltage	Digital output value	Digital operation value
0V	0	4000
1V	3200	5600
2V	6400	7200
3V	9600	8800
4V	12800	10400
5V	16000	12000

Ex.

When the following setting is used for the channel 1 with the set input range of -10 to 10V:

- "CH1 Scaling enable/disable setting": "Enable"
- "CH1 Scaling upper limit value": 12000
- "CH1 Scaling lower limit value": 4000



digit: Digital output value
V: Analog input voltage (V)
(1) Scaling upper limit value
(2) Scaling lower limit value

Analog input voltage	Digital output value	Digital operation value
-10V	-16000	4000
-5V	-8000	6000
0V	0	8000
5V	8000	10000
10V	16000	12000

7.10 Shift Function

This function adds (shifts) the set conversion value shift amount to a digital output value. Changes to the conversion value shift amount are applied to the digital operation value in real time, allowing fine adjustment to be easily performed when the system starts.

Operation

The set conversion value shift amount is added to the digital output value and stored in CH☐ Digital operation value (RWr2 to RWr5).

When the scaling function is used, the conversion value shift amount is added to the value obtained after the scale-conversion.

When sampling processing is executed, the conversion value shift amount is added in each sampling cycle. When averaging processing is executed, the conversion value shift amount is added in each averaging processing cycle.

If a value is set to the conversion value shift amount, this conversion value shift amount is added regardless of turning on and off Initial data setting request flag (RY9).

Setting method

Operating procedure

1. Set "CH☐ A/D conversion enable/disable setting" to "Enable".
2. Set a value to add in CH☐ Shifting amount to conversion value (RWw2 to RWw5).

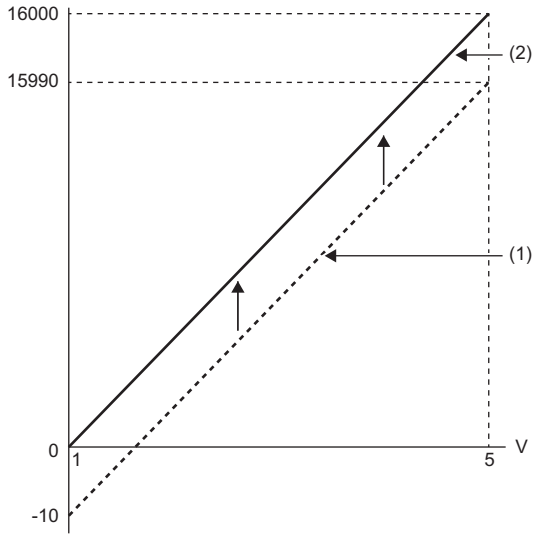
Point

If the digital operation value to which the conversion value shift amount is added is out of the range of -32768 to 32767, it is fixed to the lower limit value (-32768) or the upper limit value (32767).

Setting example

Ex.

For channel 1 to which the input range 0 to 5V is set, when a conversion value shift amount of 10 is added to an A/D converter module with the following I/O characteristics

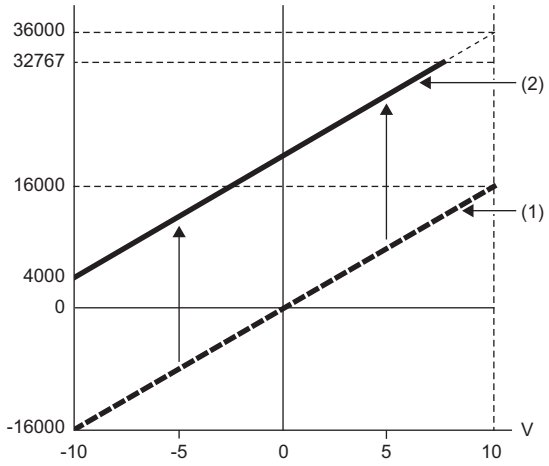


V: Analog input voltage (V)
(1) CH1 Digital output value
(2) CH1 Digital operation value (RWr2)

Analog input voltage	Digital output value	Digital operation value
0V	-10	0
5V	15990	16000

Ex.

When the conversion value shift amount of 20000 is added to channel 1, whose input range is -10 to 10V



V: Analog input voltage (V)
(1) CH1 Digital output value
(2) CH1 Digital operation value (RWr2)

Analog input voltage	Digital output value	Digital operation value
-10V	-16000	4000
-5V	-8000	12000
0V	0	20000
5V	8000	28000
10V	16000	32767*1

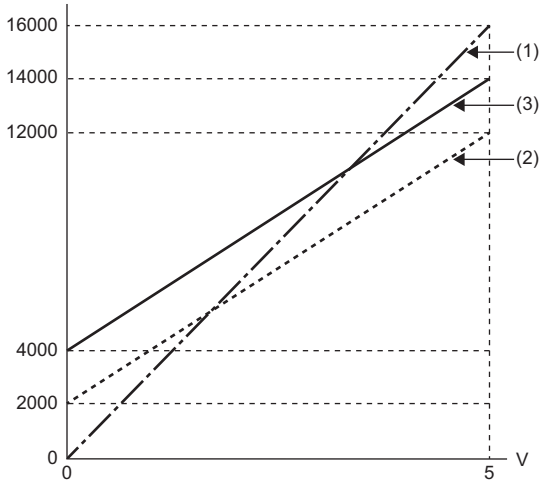
*1 Because the value exceeds the range of -32768 to 32767, it is fixed to 32767 (the upper limit value).

Example of combined use of scaling function and shift function

Ex.

When the following setting is used for the channel 1 with the set input range of 0 to 5V:

- "CH1 Scaling enable/disable setting": "Enable"
- "CH1 Scaling upper limit value": 12000
- "CH1 Scaling lower limit value": 2000
- CH1 Shifting amount to conversion value (RWw2): 2000



V: Analog input voltage (V)
(1) CH1 Digital output value
(2) Value after scaling processing
(3) CH1 Digital operation value (RWr2)

Analog input voltage	Digital output value	Value after scaling	Digital operation value
0V	0	2000	4000
1V	3200	4000	6000
2V	6400	6000	8000
3V	9600	8000	10000
4V	12800	10000	12000
5V	16000	12000	14000

Operating procedure

1. Set "CH1 A/D conversion enable/disable setting" to "Enable".
2. Set "CH1 Scaling enable/disable setting" to "Enable".
3. Set the values in "CH1 Scaling upper limit value" and "CH1 Scaling lower limit value".
4. Set a value in CH1 Shifting amount to conversion value (RWw2).

7.11 CC-Link IE TSN Network Synchronous Communication Function

This function performs A/D conversion with a synchronization cycle of the master station that supports the CC-Link IE TSN Network synchronous communication function.
This enables an A/D converter module to operate at the same timing as other remote stations on the same network.

Applicable version

When using the CC-Link IE TSN Network synchronous communication function, check the versions of A/D converter modules and master stations that support this function.

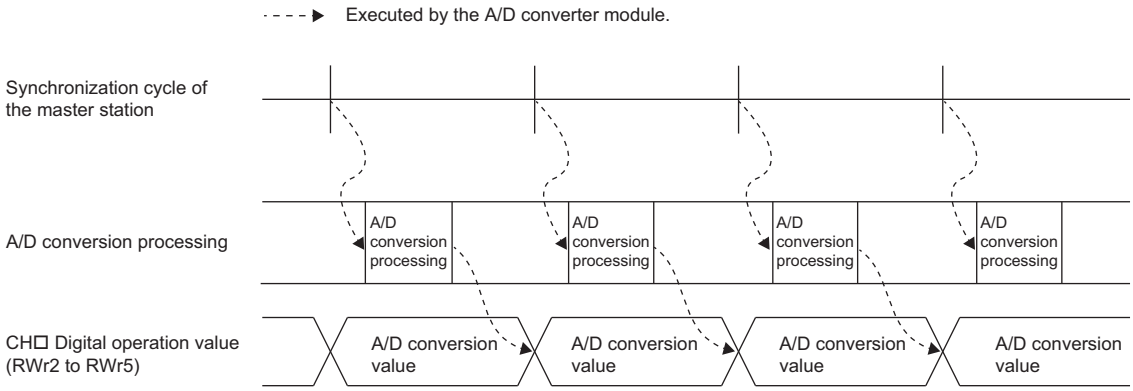
Item	Reference
A/D converter module	☞ Page 191 Added and Changed Functions
Master station	🕮 User's manual for the master station used

Precautions

If "Network Synchronous Communication" is set to "Synchronous" for an A/D converter module not supporting the CC-Link IE TSN Network synchronous communication function, an error occurs in the A/D converter module or the event code of 00C71 is registered with event history of the master station.

Operation

At every synchronization cycle of the master station, A/D conversion processing is performed on the A/D conversion enabled channels.



Setting method

Calculate synchronization cycles from the formula below.
Synchronization cycle = Basic period (Communication period interval setting) × Magnification

Item	Description
Basic period (Communication period interval setting)	Setting values of the communication period interval setting of master station parameters
Magnification	Magnification that is determined by the following master station parameters • Setting values of the communication period setting for network configuration setting • Setting values of the multiple period setting for master station parameters

Set the synchronization cycle to satisfy the following condition.
0.85ms ≤ Synchronization cycle ≤ 1000.00ms

Set the basic period setting for master station parameters to satisfy the following conditions.

■Condition 1

Set the basic period (communication period interval setting) so that it matches the inter-module synchronous fixed scan interval setting.

■Condition 2

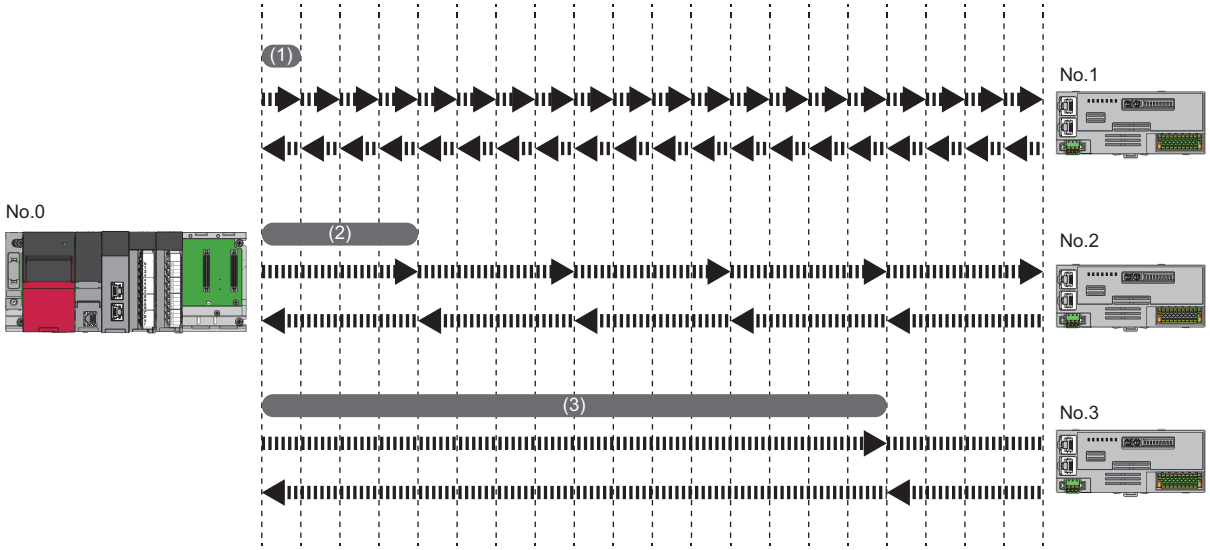
Configure the setting so that the transient transmission time satisfies the setting range shown below.

Communication speed		Value that can be set for the transient transmission time
Master station	A/D converter module	
1Gbps	1Gbps	0.1ms or more
	100Mbps*1	0.007ms or more
100Mbps	1Gbps*1	0.1ms or more
	100Mbps	

*1 When communicating between the master station and the A/D converter module whose communication speed is different from each other, use the TSN hub.

For the setting procedure, refer to the manual for the master station used.

The following figure shows an example of a synchronization cycle.



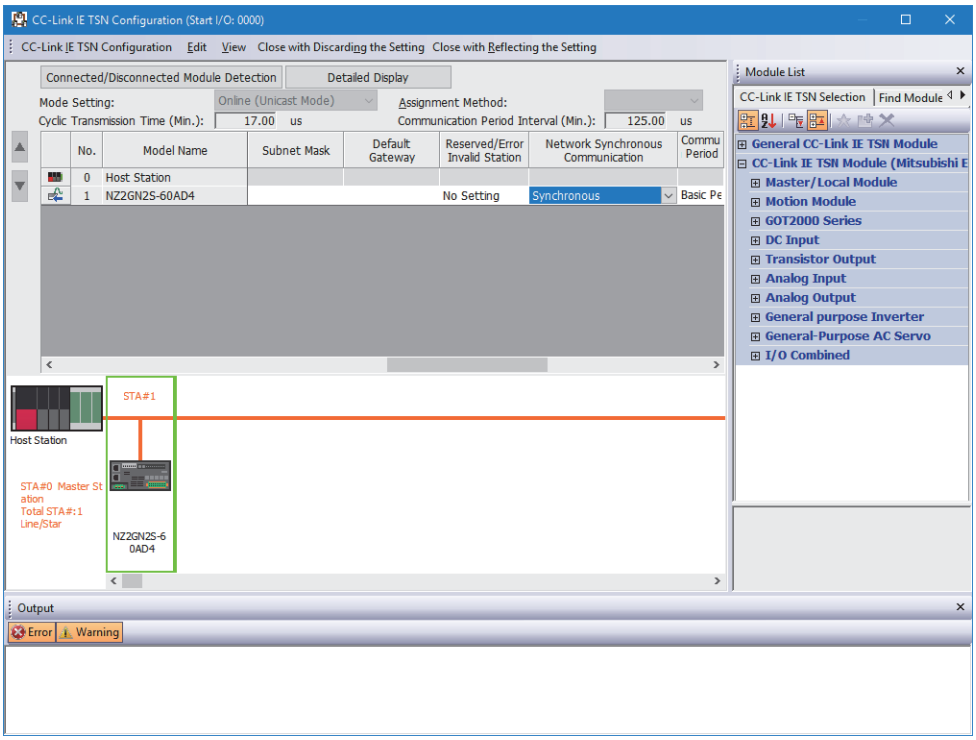
(1) Basic period
(2) Normal speed
(3) Low speed

Operating procedure

1. Display the "CC-Link IE TSN Configuration" window.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Model ⇨ [Basic Settings] ⇨ [Network Configuration Settings]

2. Set "Network Synchronous Communication" to "Synchronous".



Point

- To use the CC-Link IE TSN Network synchronous communication function for the A/D converter module, enable the CC-Link IE TSN Network synchronous communication function of the master station. For details, refer to the manual for the master station used.
- When the A/D converter module is turned on, the setting of whether to use the CC-Link IE TSN Network synchronous communication function (Synchronous/Asynchronous) cannot be changed.

Restrictions

This section describes restrictions to use the CC-Link IE TSN Network synchronous communication function.

■Restrictions to use this function with other functions

Function name	Restrictions
A/D conversion method	This method operates only when sampling processing is specified. Specifying time average, count average, or moving average would result in an error. In this case, the synchronous communication mode averaging processing specification error (370□H) is stored in the latest error code (RWr0), and Error flag (RXA) turns on. The digital operation value is set to 0 for the channels with the setting other than sampling processing.
Shift function	The shift function cannot be used. CH□ Shifting amount to conversion value settings (RWw2 to RWw5) are ignored.

■Restrictions on inter-module synchronous fixed scan interval setting

When 0.05ms Unit Setting" for "Fixed Scan Interval Setting of Inter-module Synchronization" is set to "Not Set", the CC-Link IE TSN network synchronous communication function cannot be used.

■CC-Link IE TSN Class restrictions

When the CC-Link IE TSN Class is set to CC-Link IE TSN Class A, the CC-Link IE TSN network synchronous communications function cannot be used.

When CC-Link IE TSN Class is CC-Link IE TSN Class A, event code 00C71 is recorded in the event history of the master station, and the A/D converter module does not establish a data link.

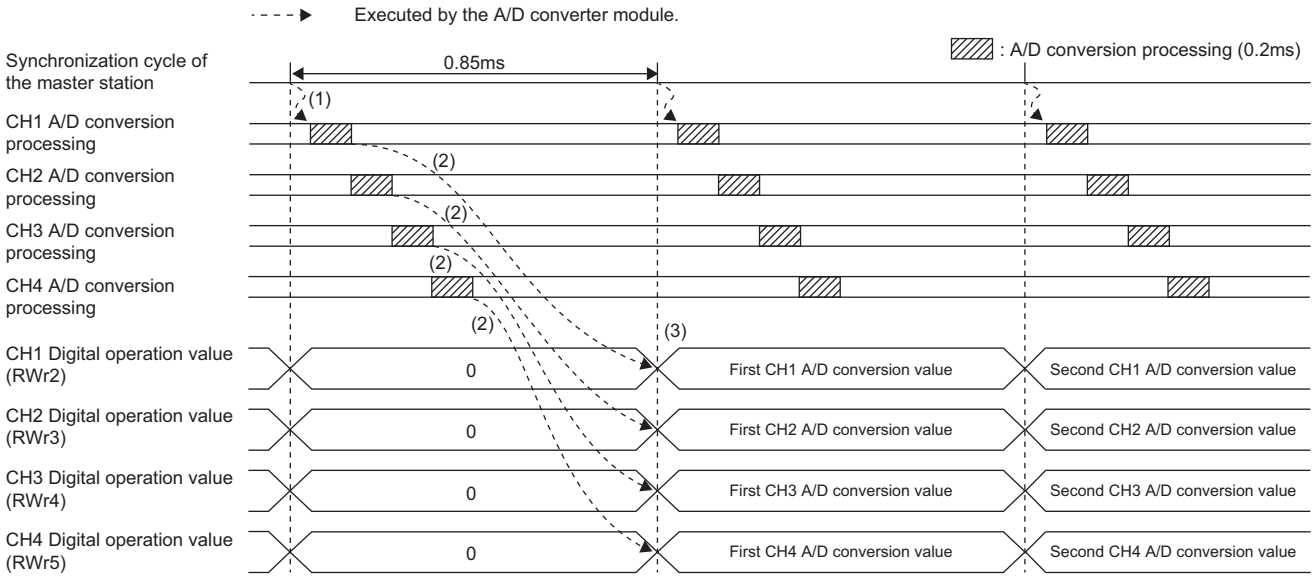
For details on the CC-Link IE TSN Class setting method, refer to the following.

☞ Page 84 CC-Link IE TSN Class Setting Function

Timing chart

The figure below shows the operation timing under the following settings:

- Synchronization cycle of the master station: 0.85ms
- Number of conversion enabled channels of the A/D converter module: 4 channels



(1) At the starting point of the synchronization cycle of the master station, A/D conversion starts.

(2) A/D conversion takes place in the order of from CH1 to CH4 at an interval of 200μs.

(3) At the starting point of the synchronization cycle of the master station, the values after A/D conversion are transferred to the master station.

7.12 CC-Link IE TSN Class Setting Function

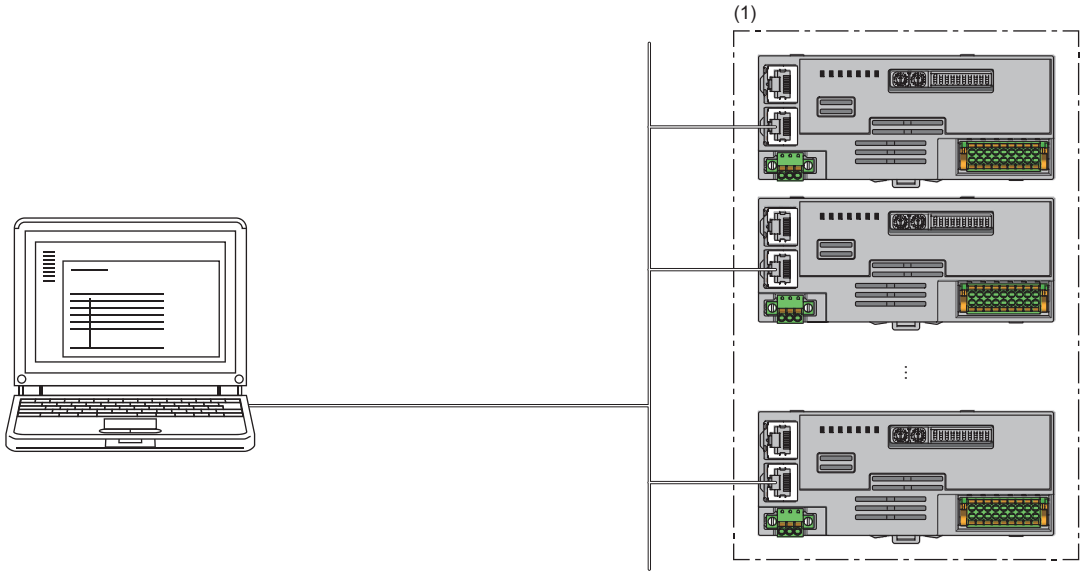
Set the CC-Link IE TSN Class (CC-Link IE TSN Class B or CC-Link IE TSN Class A) of the A/D converter module and save it in the non-volatile memory.

The settings of the CC-Link IE TSN Class are stored in the non-volatile memory inside the A/D converter module, and CC-Link IE TSN Class B is set by factory default. Change the CC-Link IE TSN Class as necessary.

System configuration

Connect the personal computer with CC-Link IE TSN Configurator installed to the A/D converter modules targeted for the CC-Link IE TSN Class setting using Ethernet cables.

For CC-Link IE TSN Configurator, download it from the CC-Link Partner Association website (www.cc-link.org).



(1) CC-Link IE TSN Class setting target A/D converter module

Point

- It is recommended that CC-Link IE TSN Class settings are configured using CC-Link IE TSN Configurator before starting up the system (before incorporating the A/D converter module into the system). When configuring the CC-Link IE TSN Class settings using CC-Link IE TSN Configurator for the A/D converter module operating with CC-Link IE TSN Class A, ensure that the entire system is disconnected beforehand.
- CC-Link IE TSN Configurator cannot detect an A/D converter module that has not linked up.

For the differences in system configurations that can be connected using CC-Link IE TSN Class, refer to the following.

User's manual for the master station used

Applicable version

- The A/D converter modules with firmware version "06" or later support this function.
- A/D converter modules with the firmware version that does not support this function operate with CC-Link IE TSN Class B.

☞ Page 191 Added and Changed Functions

- When operating an A/D converter module with CC-Link IE TSN Class A, use a master station compatible with CC-Link IE TSN protocol version 2.0. Also, master stations that support CC-Link IE TSN Protocol version 2.0 may also operate with CC-Link IE TSN Protocol version 1.0. For details, refer to the following.

📖 User's manual for the master station used

- The following table shows the CC-Link IE TSN Class protocol version combinations for a master station and an A/D converter module.

■When the master station does not support protocol version 2.0

○: Connectable, ×: Not Connectable

Master station	A/D converter module		Operation
CC-Link IE TSN Protocol version 1.0	CC-Link IE TSN Class B	CC-Link IE TSN Protocol version 1.0	○
		CC-Link IE TSN Protocol version 2.0	○
	CC-Link IE TSN Class A	CC-Link IE TSN Protocol version 2.0	×*1

*1 The A/D converter module does not establish a data link with the master station.
If the firmware version of the master station does not support CC-Link IE TSN Protocol version 2.0, please update to the corresponding firmware version.

■When the master station supports protocol version 2.0

○: Connectable, ×: Not Connectable

Master station	A/D converter module		Operation
CC-Link IE TSN Protocol version 1.0	CC-Link IE TSN Class B	CC-Link IE TSN Protocol version 1.0	○
		CC-Link IE TSN Protocol version 2.0	○
	CC-Link IE TSN Class A	CC-Link IE TSN Protocol version 2.0	○
CC-Link IE TSN Protocol version 2.0	CC-Link IE TSN Class B	CC-Link IE TSN Protocol version 1.0	○
		CC-Link IE TSN Protocol version 2.0	○
	CC-Link IE TSN Class A	CC-Link IE TSN Protocol version 2.0	○

Setting method

The setting procedure for the CC-Link IE TSN Class is shown below.

- Set at the module start-up
- Set while the module is operating

■Setting method at module start-up

The setting procedure for the CC-Link IE TSN Class at module start-up is shown below.

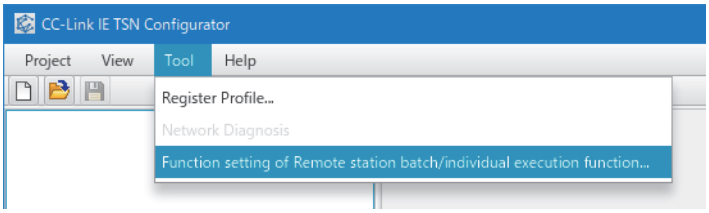
Point

Connect A/D converter modules to the external power supply if needed.

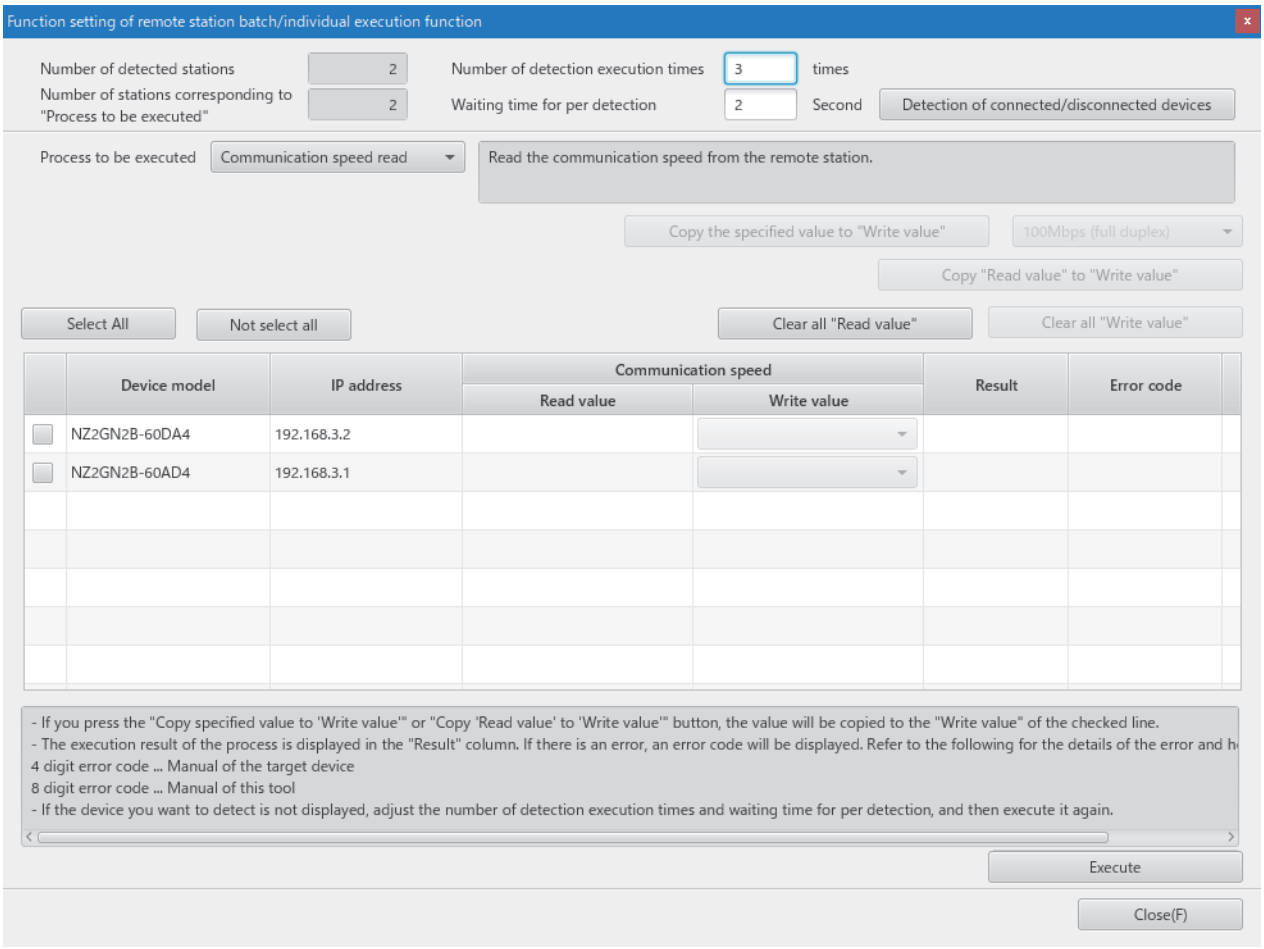
1. Connect the personal computer with CC-Link IE TSN Configurator installed to the A/D converter modules targeted for the CC-Link IE TSN Class setting using Ethernet cables.
2. Turn on the module power supply of the A/D converter modules.

3. Display the "Function setting of remote station batch/individual execution function" window.

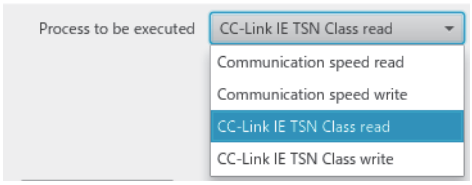
[Tool] ⇨ [Function setting of Remote station batch/individual execution function...]



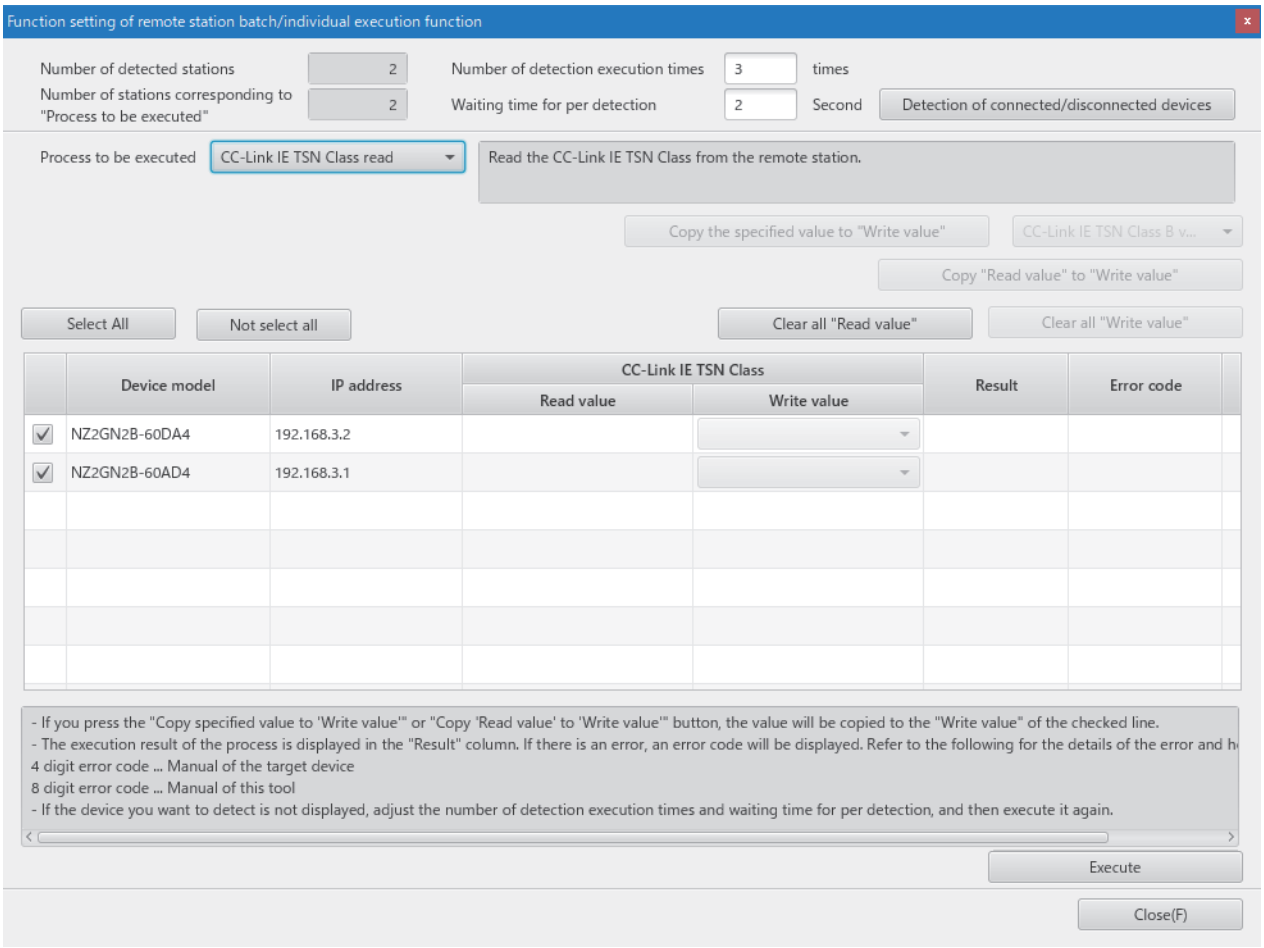
4. The A/D converter modules are detected.



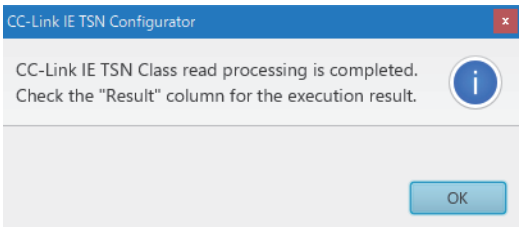
5. Set "Process to be executed" to "CC-Link IE TSN Class read".



6. Select the checkboxes for the A/D converter modules on which CC-Link IE TSN Class read is to be executed.

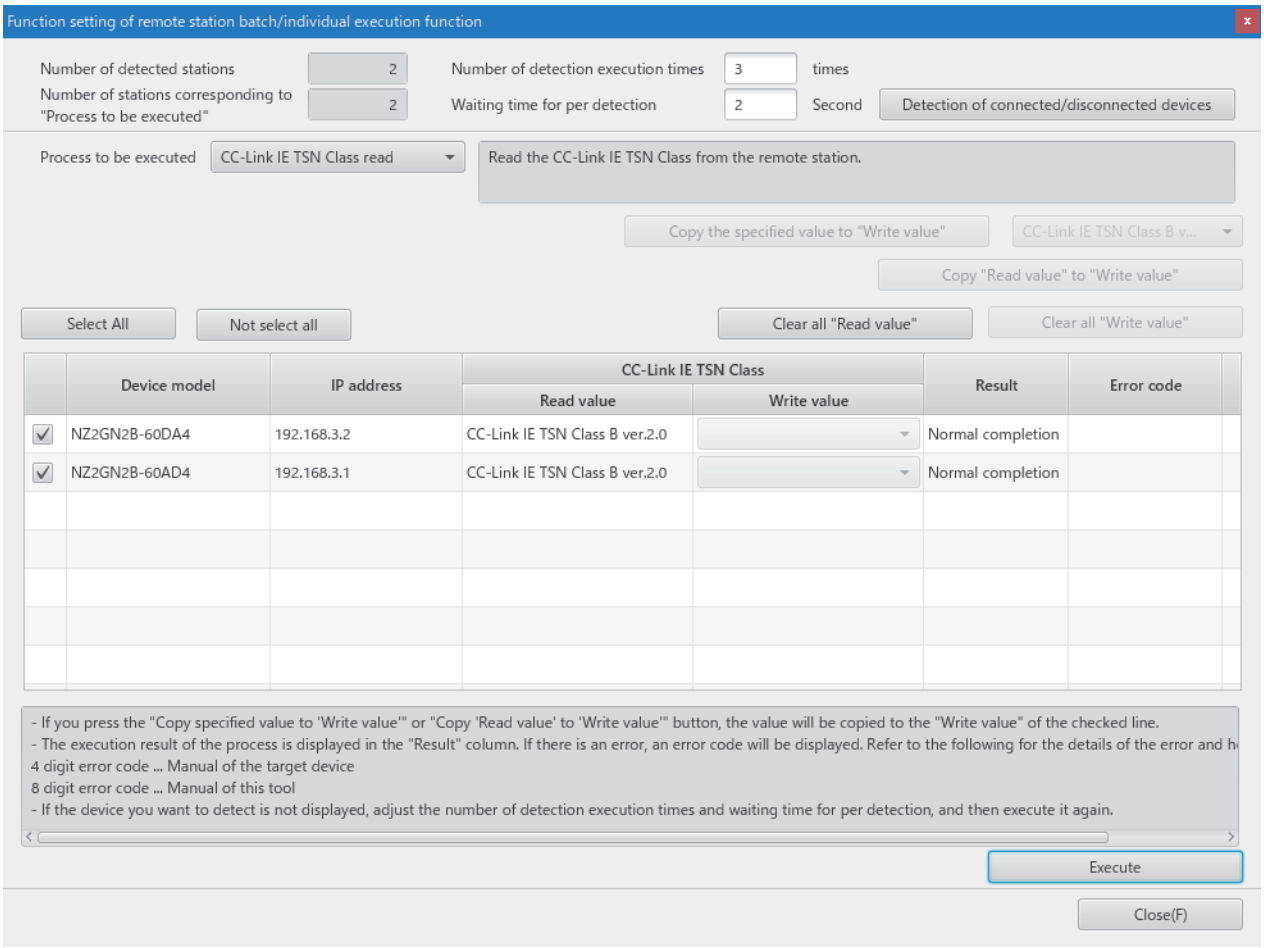


7. When the [Execute] button is clicked, the following window appears.



8. Click the [OK] button.

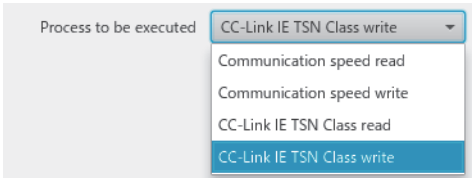
9. Check that "Result" is "Normal completion". The "Read value" is displayed in the CC-Link IE TSN Class.



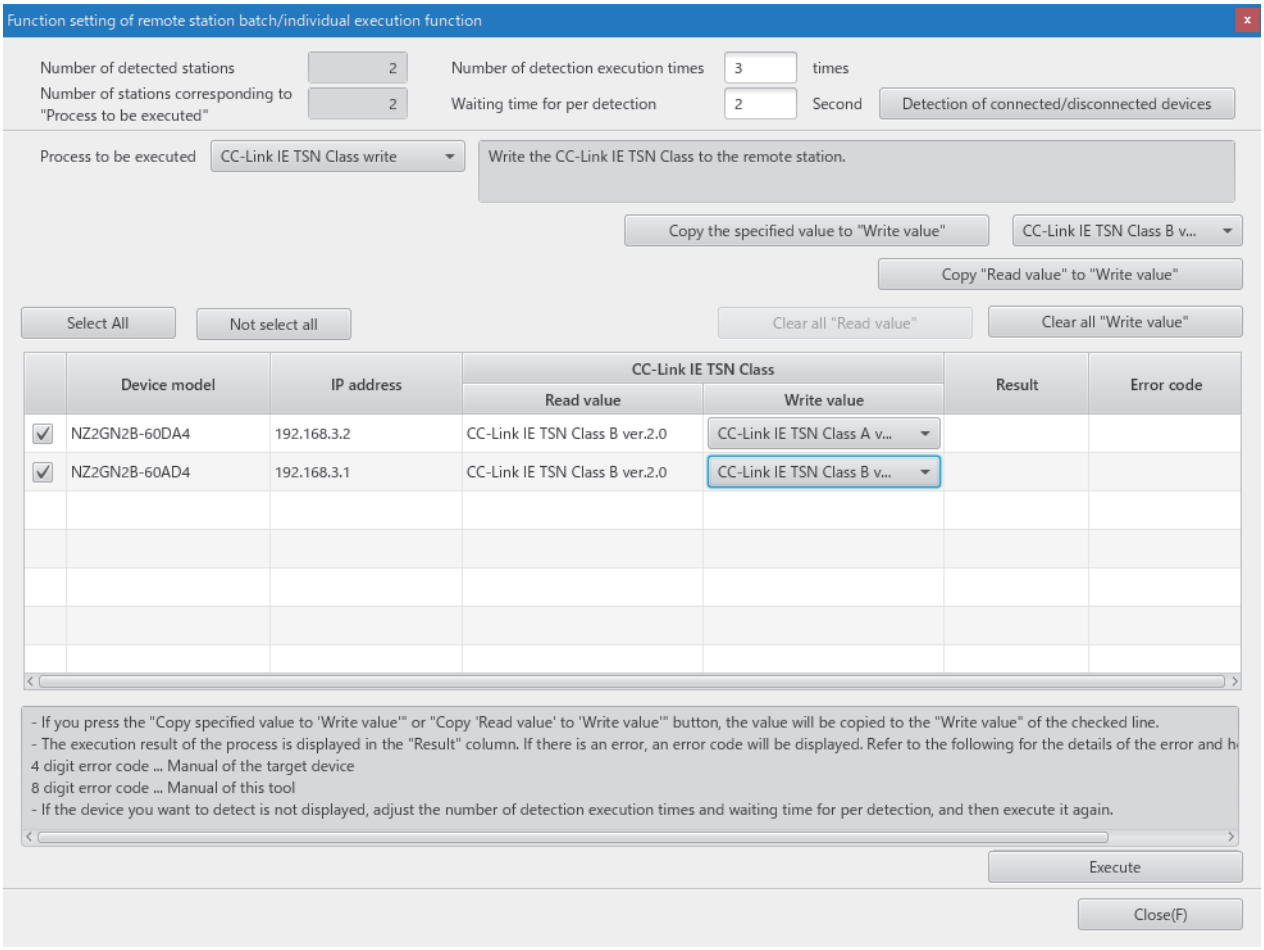
Point

In CC-Link IE TSN Class read, the CC-Link IE TSN Class in which the A/D converter module is currently operating is read.

10. Set "Processed to be executed" to "CC-Link IE TSN Class write".



11. Select the checkboxes for the A/D converter modules on which CC-Link IE TSN Class write is to be executed, and set "Write value" to CC-Link IE TSN Class.

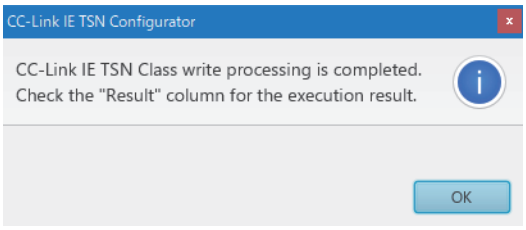


Point

The "Write value" that the A/D converter module can be set to using CC-Link IE TSN Class write are as follows.

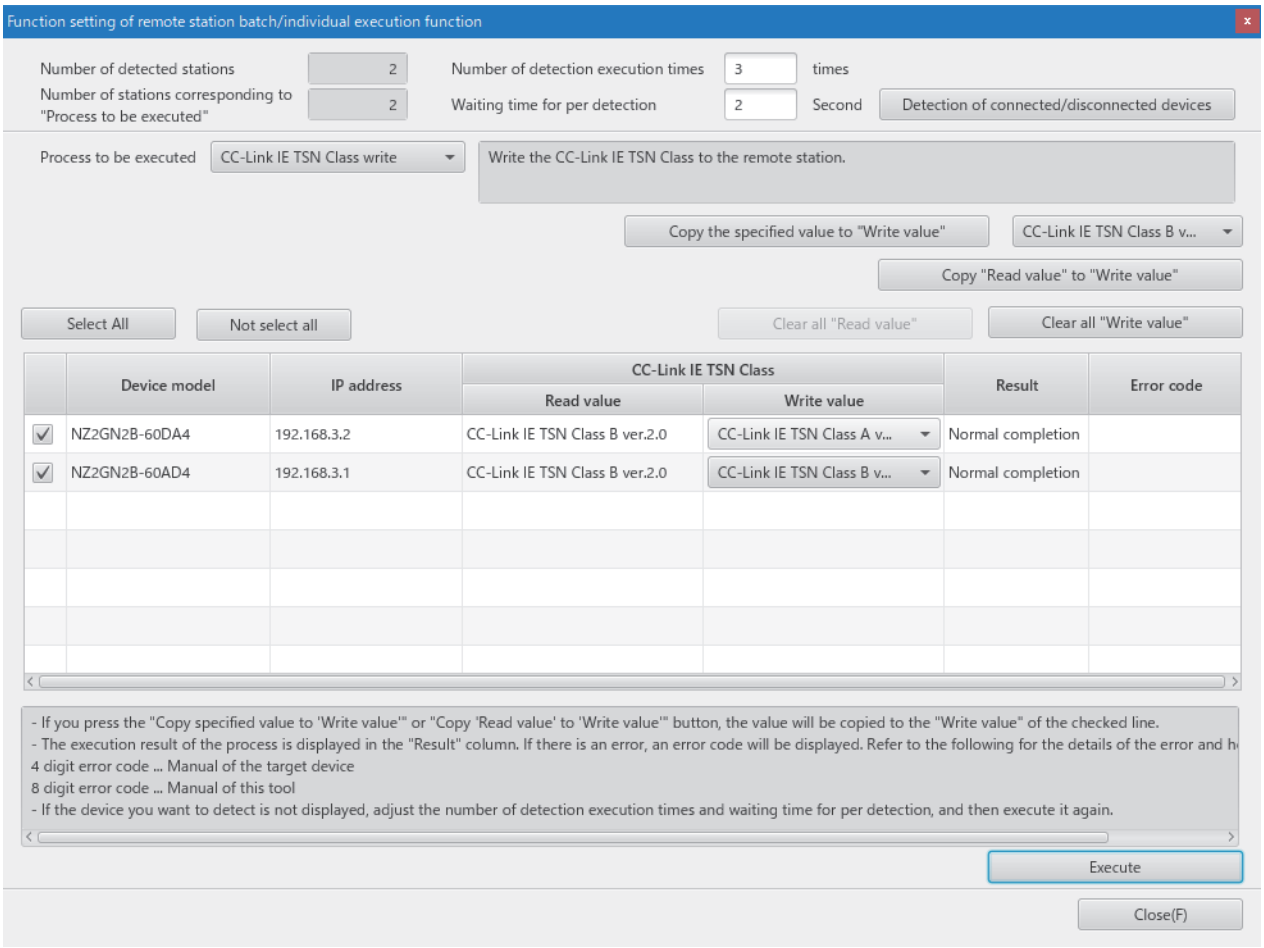
- CC-Link IE TSN Class B ver.1.0
- CC-Link IE TSN Class A ver.2.0 (NW time delivery supported)
- CC-Link IE TSN Class B ver.2.0

12. When the [Execute] button is clicked, the following window appears.



13. Click the [OK] button.

14. Check that "Result" is "Normal completion".



15. Turn off the A/D converter module power supply with CC-Link IE TSN Class set.

Point

- After executing "CC-Link IE TSN Class write", turn the module power supply on and off to operate with the set CC-Link IE TSN Class.
- If "CC-Link IE TSN Class B ver.1.0" was set in "CC-Link IE TSN Class write", in the operation when the module is restarted, it is assumed that "CC-Link IE TSN Class B ver.2.0" was set.

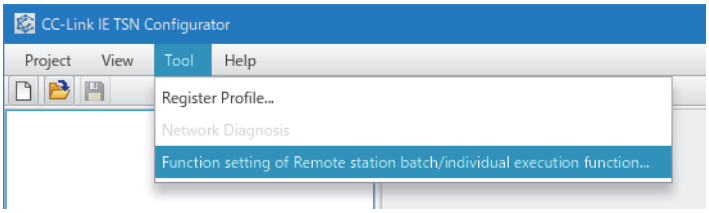
■Setting method when the module is operating

The setting procedure for the CC-Link IE TSN Class when the module is operating is shown below.

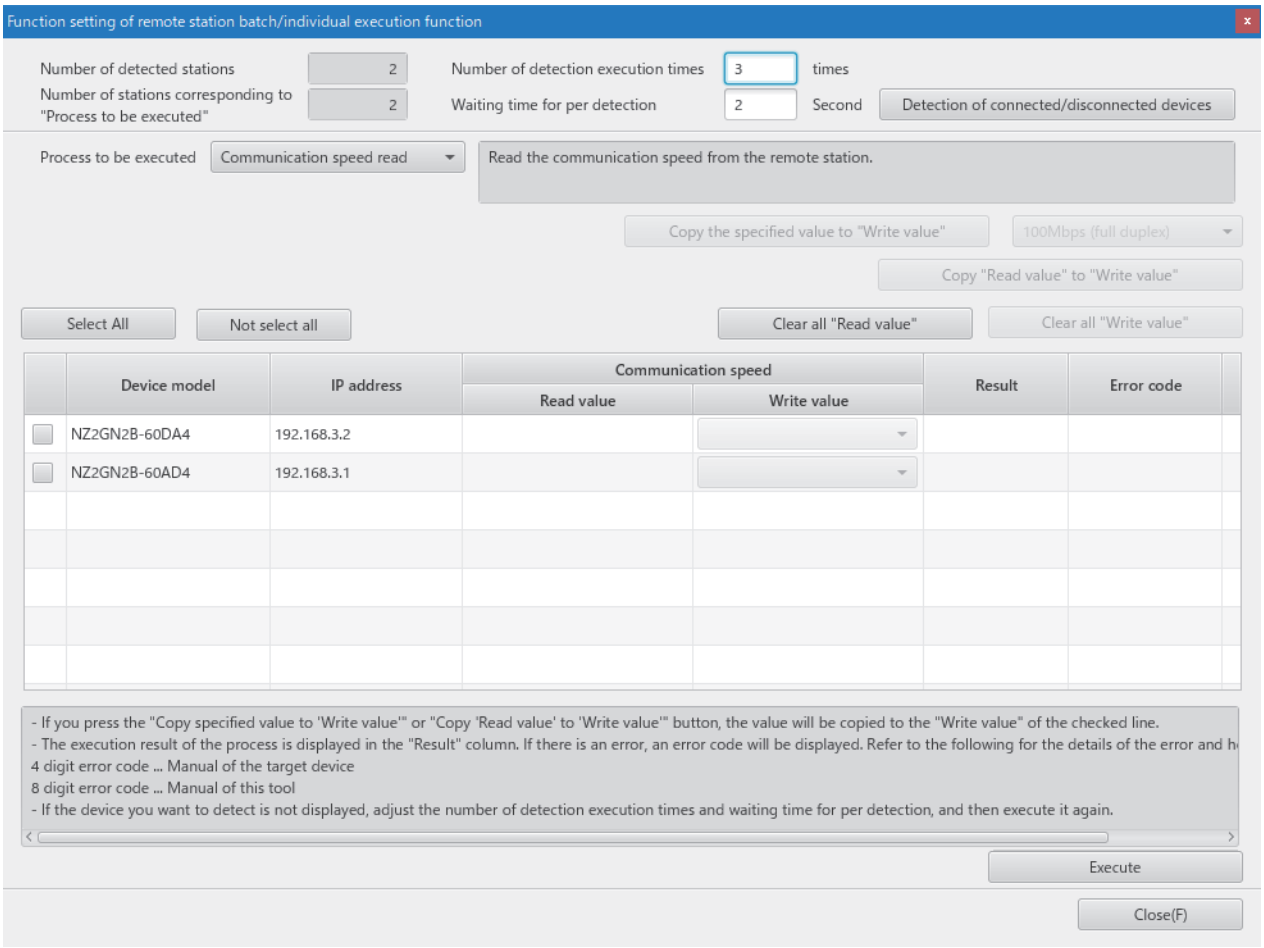
1. Connect the personal computer with CC-Link IE TSN Configurator installed to the A/D converter modules targeted for the CC-Link IE TSN Class setting using Ethernet cables.

2. Display the "Function setting of remote station batch/individual execution function" window.

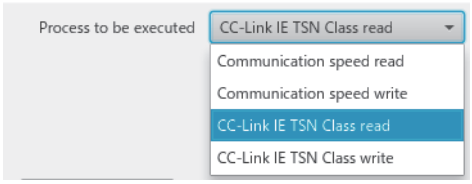
[Tool] ⇨ [Function setting of Remote station batch/individual execution function...]



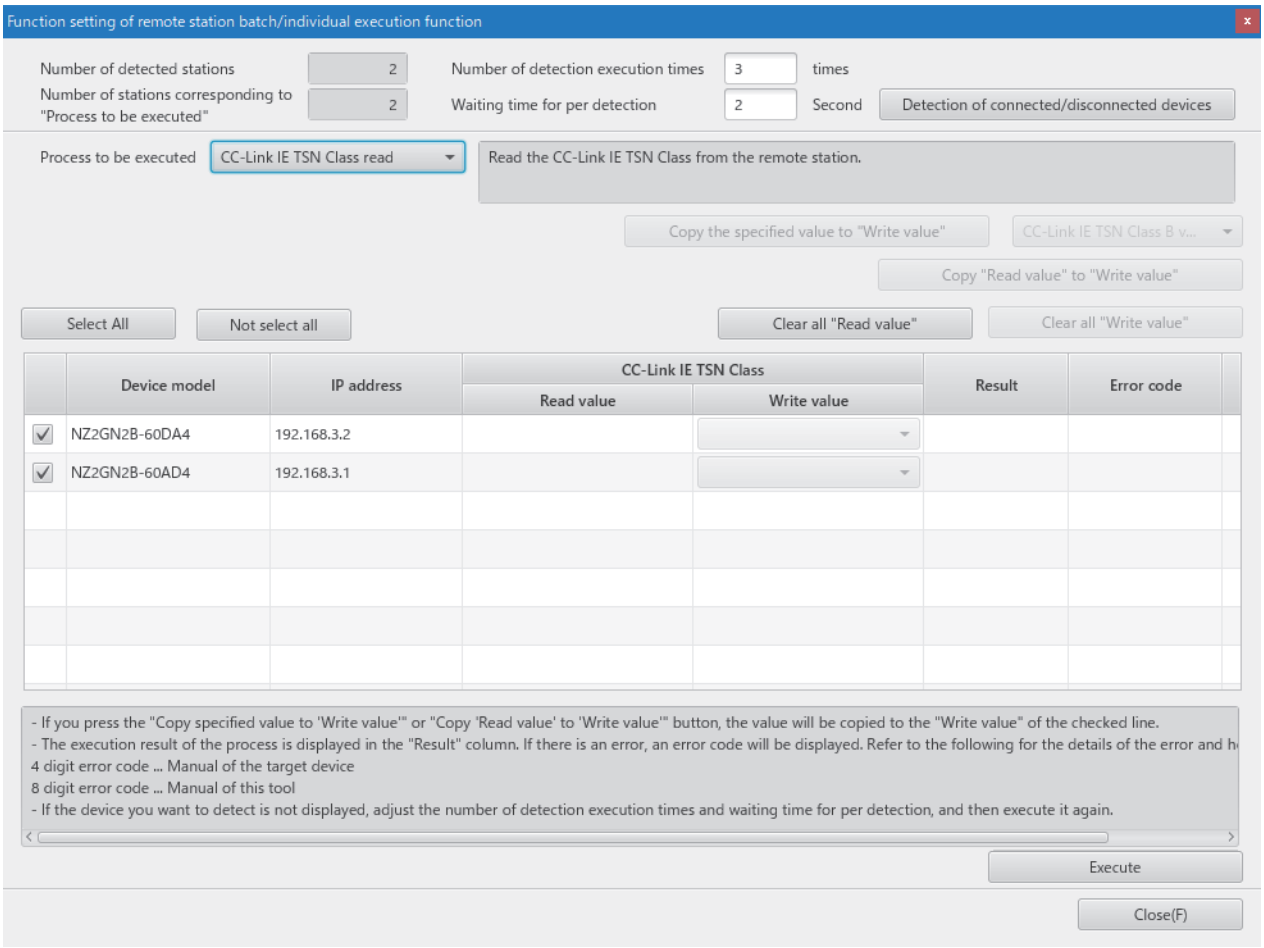
3. The A/D converter modules are detected.



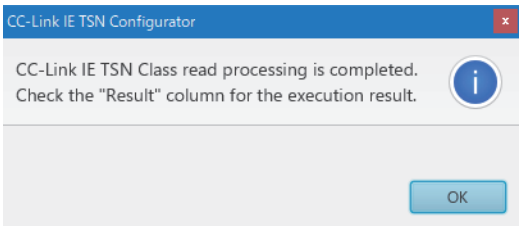
4. Set "Process to be executed" to "CC-Link IE TSN Class read".



5. Select the checkboxes for the A/D converter modules on which CC-Link IE TSN Class read is to be executed.

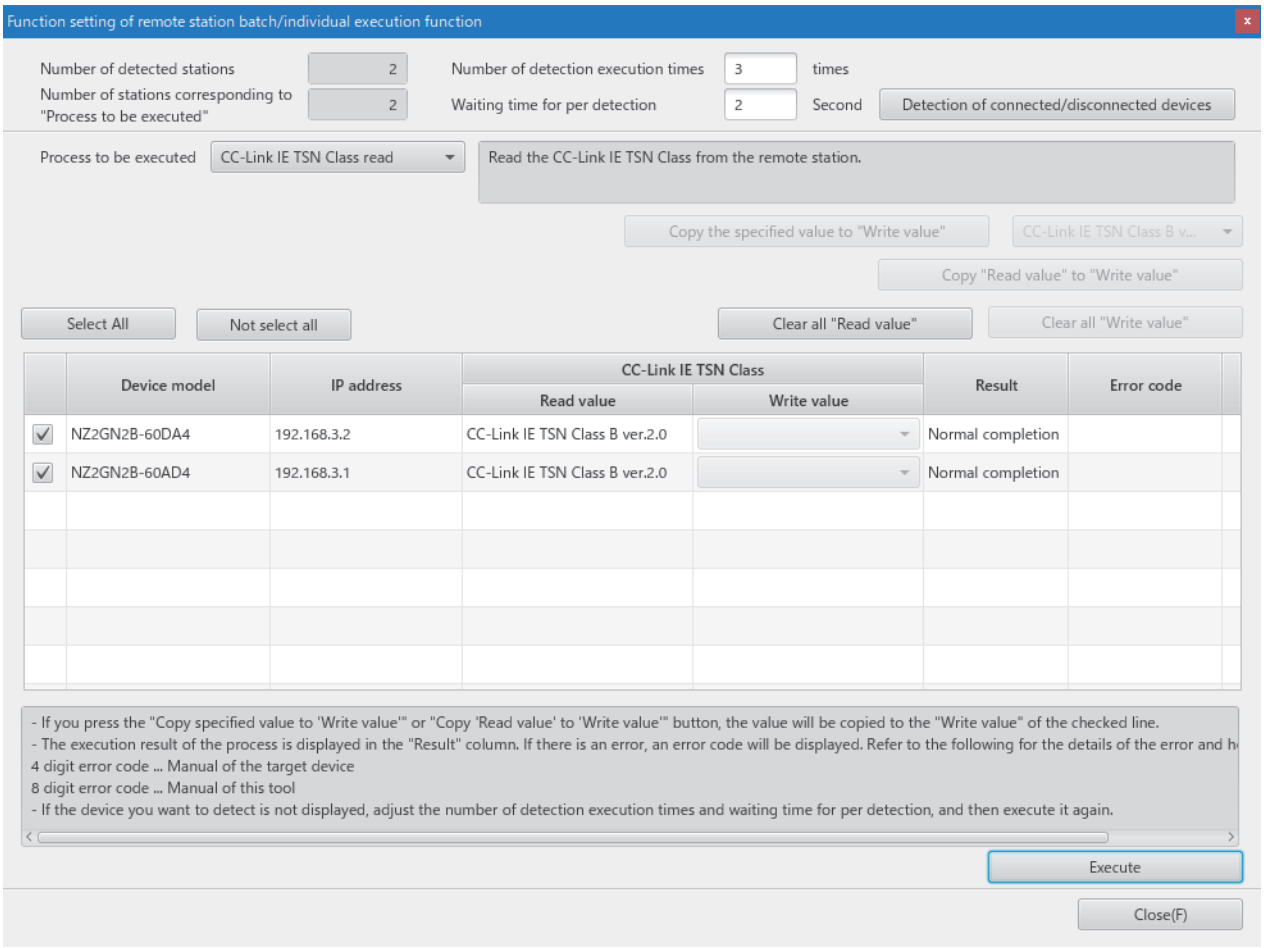


6. When the [Execute] button is clicked, the following window appears.



7. Click the [OK] button.

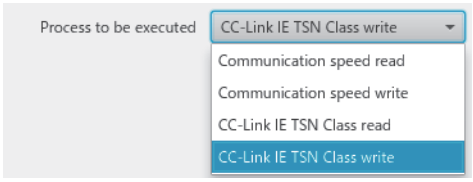
8. Check that "Result" is "Normal completion". The "Read value" is displayed in the CC-Link IE TSN Class.



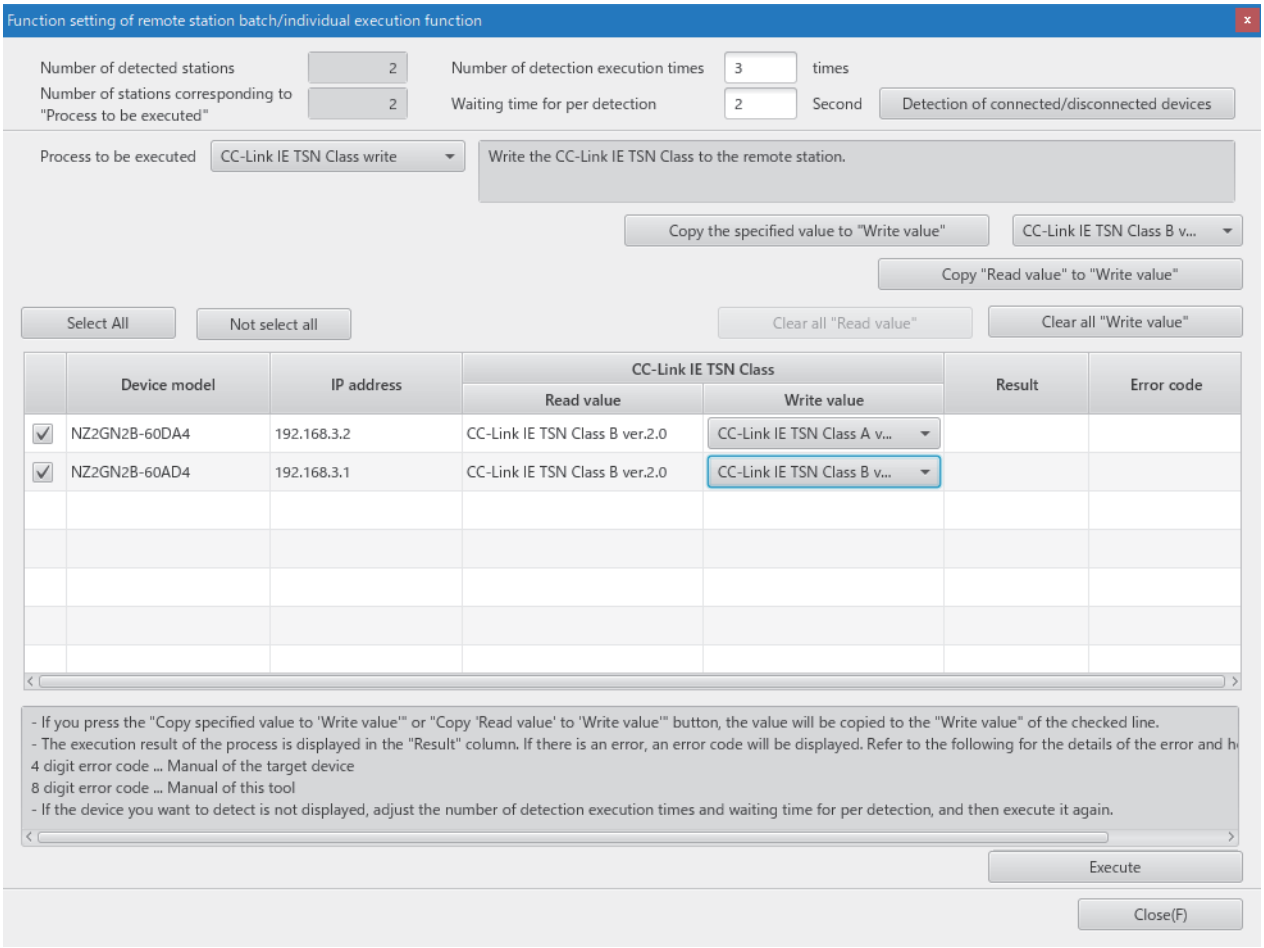
Point

In CC-Link IE TSN Class read, the CC-Link IE TSN Class in which the A/D converter module is currently operating is read.

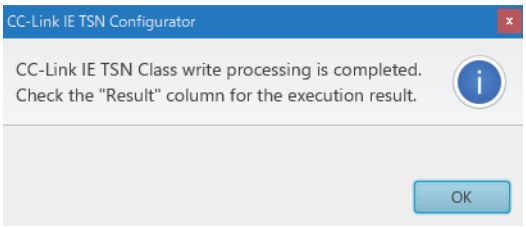
9. Set "Processed to be executed" to "CC-Link IE TSN Class write".



10. Select the checkboxes for the A/D converter modules on which CC-Link IE TSN Class write is to be executed, and set "Write value" to CC-Link IE TSN Class.

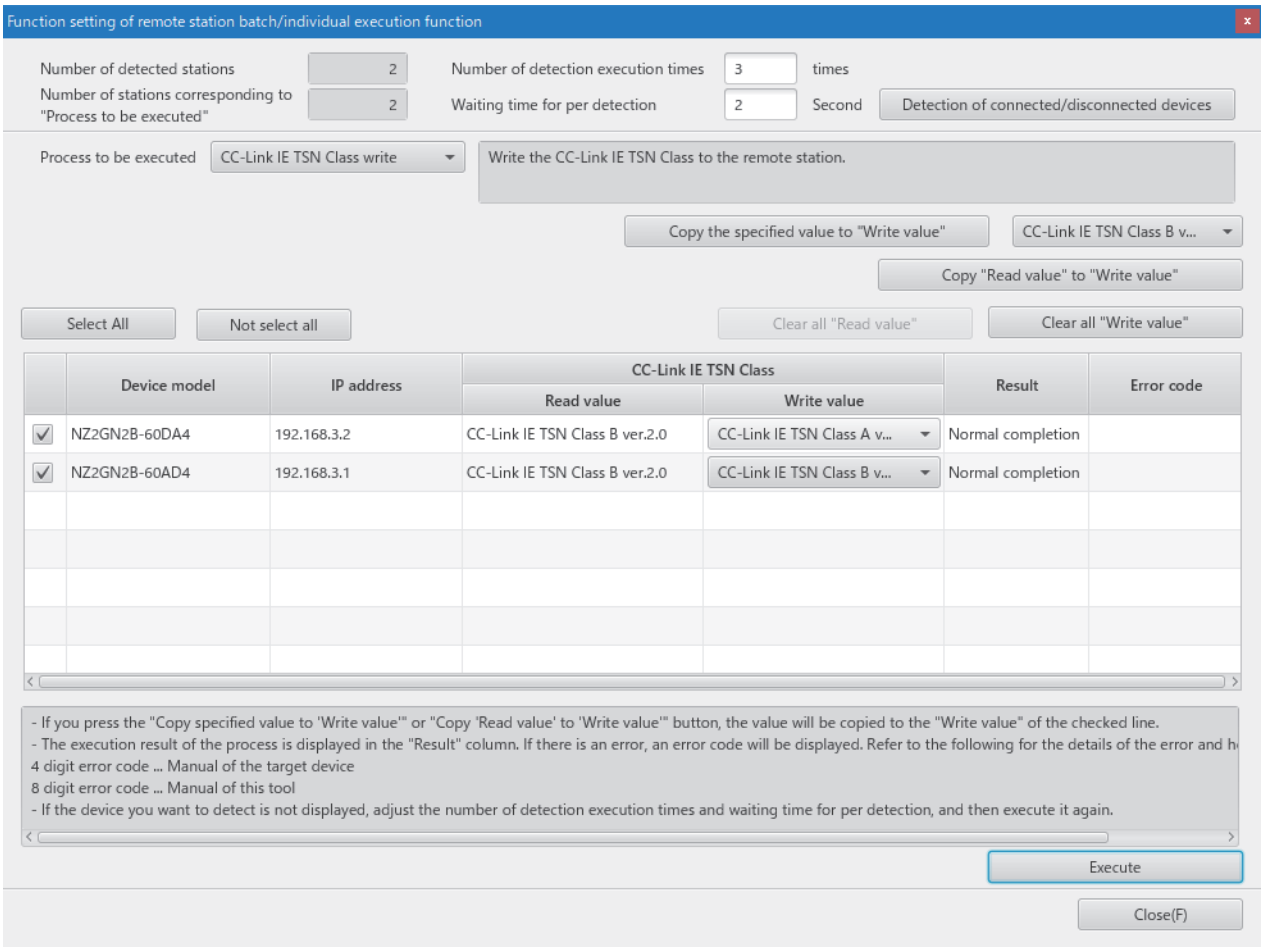


11. When the [Execute] button is clicked, the following window appears.



12. Click the [OK] button.

13. Check that "Result" is "Normal completion".



14. Power off and on the A/D converter module power supply with CC-Link IE TSN Class set.

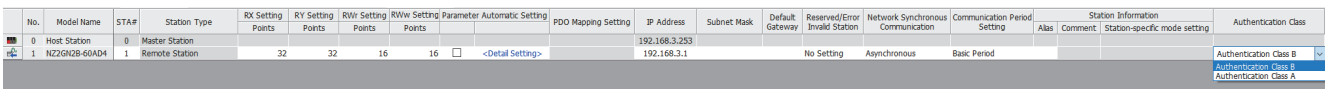
CC-Link IE TSN Class setting in the network configuration settings

Set the "CC-Link IE TSN Class" of the A/D converter module in the CC-Link IE TSN Configuration window of the network configuration settings.

1. Display the "CC-Link IE TSN Configuration" window.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Model ⇨ [Basic Settings] ⇨ [Network Configuration Settings]

2. Set "CC-Link IE TSN Class" to the same setting as the CC-Link IE TSN Class set for the A/D converter module.



In this manual, "Authentication Class" is described as "CC-Link IE TSN Class".

Point

- For A/D converter modules that do not support the CC-Link IE TSN Class setting function, set "CC-Link IE TSN Class" in the network configuration setting to "CC-Link IE TSN Class B".
- When the CC-Link IE TSN Class set in the A/D converter module and the "CC-Link IE TSN Class" in the network configuration settings are set to different values, event code 00C81 is recorded in the event history of the master station, and the A/D converter module does not establish a data link.
- When using a profile of a version that does not support the CC-Link IE TSN Class setting function, the "CC-Link IE TSN Class" of the A/D converter module cannot be set in the network configuration settings.

Monitoring setting status

■Method for monitoring using remote I/O signals

The setting status of the CC-Link IE TSN Class can be checked by using the CC-Link IE TSN Class setting status (RXE).

CC-Link IE TSN Class setting status (RXE)	CC-Link IE TSN Class setting status
ON	CC-Link IE TSN Class A
OFF	CC-Link IE TSN Class B

■Method for monitoring according to selected station communication status monitor

The setting status of the CC-Link IE TSN Class can be checked by using the "Selected Station Communication Status Monitor" of the CC-Link IE TSN/CC-Link IE Field diagnostics. For details, refer to the following.

📖 User's manual for the master station used

Precautions

- The CC-Link IE TSN Class varies the range of values that can be set for the communication period interval setting of master station parameters. For details, refer to the following.

☞ Page 45 Communication period interval setting

- When the CC-Link IE TSN Class is set to CC-Link IE TSN Class A, the CC-Link IE TSN network synchronous communications function cannot be used. When using the CC-Link IE TSN Network synchronous communications function, set the CC-Link IE TSN Class to CC-Link IE TSN Class B.
- When the CC-Link IE TSN Class is set to CC-Link IE TSN Class A, and the network synchronous communications setting is set to "Synchronous", event code 00C71 is recorded in the event history of the master station, and the A/D converter module does not establish a data link.
- When the CC-Link IE TSN Class is set to CC-Link IE TSN Class A, ring topology cannot be used. When using ring topology, set the CC-Link IE TSN Class to CC-Link IE TSN Class B.
- If the CC-Link IE TSN Class setting of the A/D converter module is completed with an error, the following error code is displayed in the tool window. When the other error codes are displayed, refer to the manual of CC-Link IE TSN Configurator to take actions.

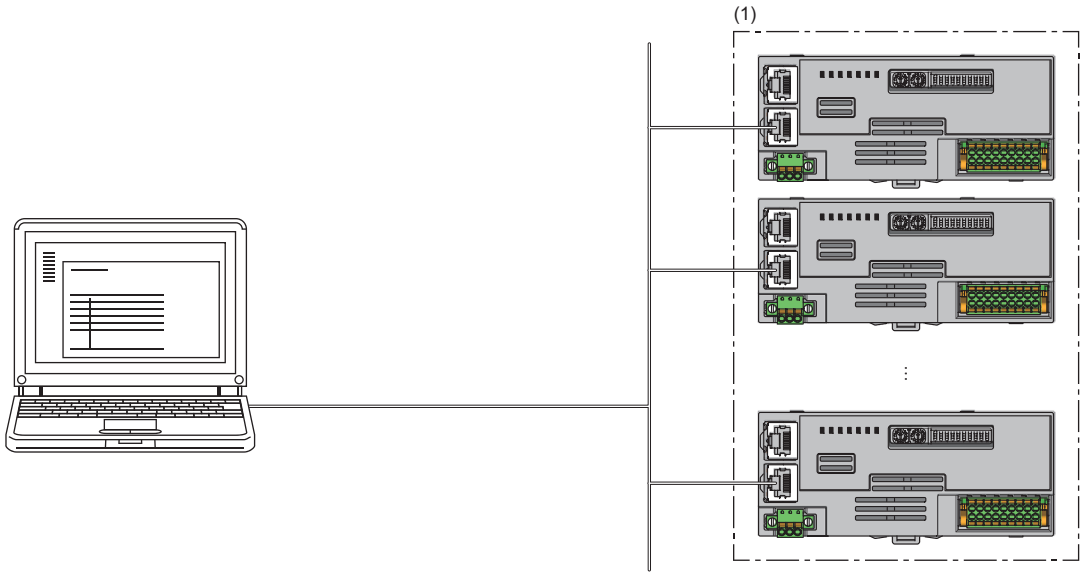
Error code	Description and cause	Action
0001H	Saving of the CC-Link IE TSN Class in the non-volatile memory failed.	The CC-Link IE TSN class is not saved in the non-volatile memory. Take measures to reduce noise, such as using a shielded cable for connection. If this error persists, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.
0002H	The upper limit for the number of times CC-Link IE TSN Class can be saved in the A/D conversion module has been reached, and thus saving the CC-Link IE TSN Class in the non-volatile memory failed.	CC-Link IE TSN Class settings made after this error occurs will not be saved in the non-volatile memory.

7.13 Communication Speed Setting Function

This function sets the communication speed of A/D converter module (1Gbps or 100Mbps), and saves the setting in the non-volatile memory.
The communication speed 1Gbps is set to the non-volatile memory by factory default.

System configuration

Connect the personal computer with CC-Link IE TSN Configurator installed to the A/D converter modules targeted for the communication speed setting. For the connection, use Ethernet cables.
For CC-Link IE TSN Configurator, download it from the CC-Link Partner Association website (www.cc-link.org).



(1) A/D converter modules targeted for the communication speed setting

Point

- It is recommended that communication speed settings are configured using CC-Link IE TSN Configurator before starting up the system (before incorporating the A/D converter module into the system). When configuring the communication speed settings using CC-Link IE TSN Configurator for the A/D converter module operating with CC-Link IE TSN Class A, ensure that the entire system is disconnected beforehand.
- CC-Link IE TSN Configurator cannot detect an A/D converter module that has not linked up.

Applicable version

The A/D converter modules with firmware version "05" or later support this function.
The A/D converter modules not supporting this function operate with the fixed communication speed of 1Gbps.
☞ Page 191 Added and Changed Functions

Setting method

The procedure of communication speed setting slightly varies depending on its timing.

- Set at the module start-up
- Set while the module is operating

■Set at the module start-up

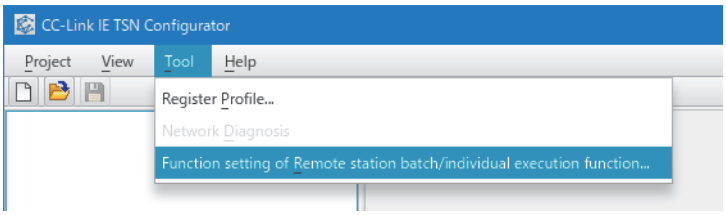
The following describes the procedure to set a communication speed at the module start-up.

Point

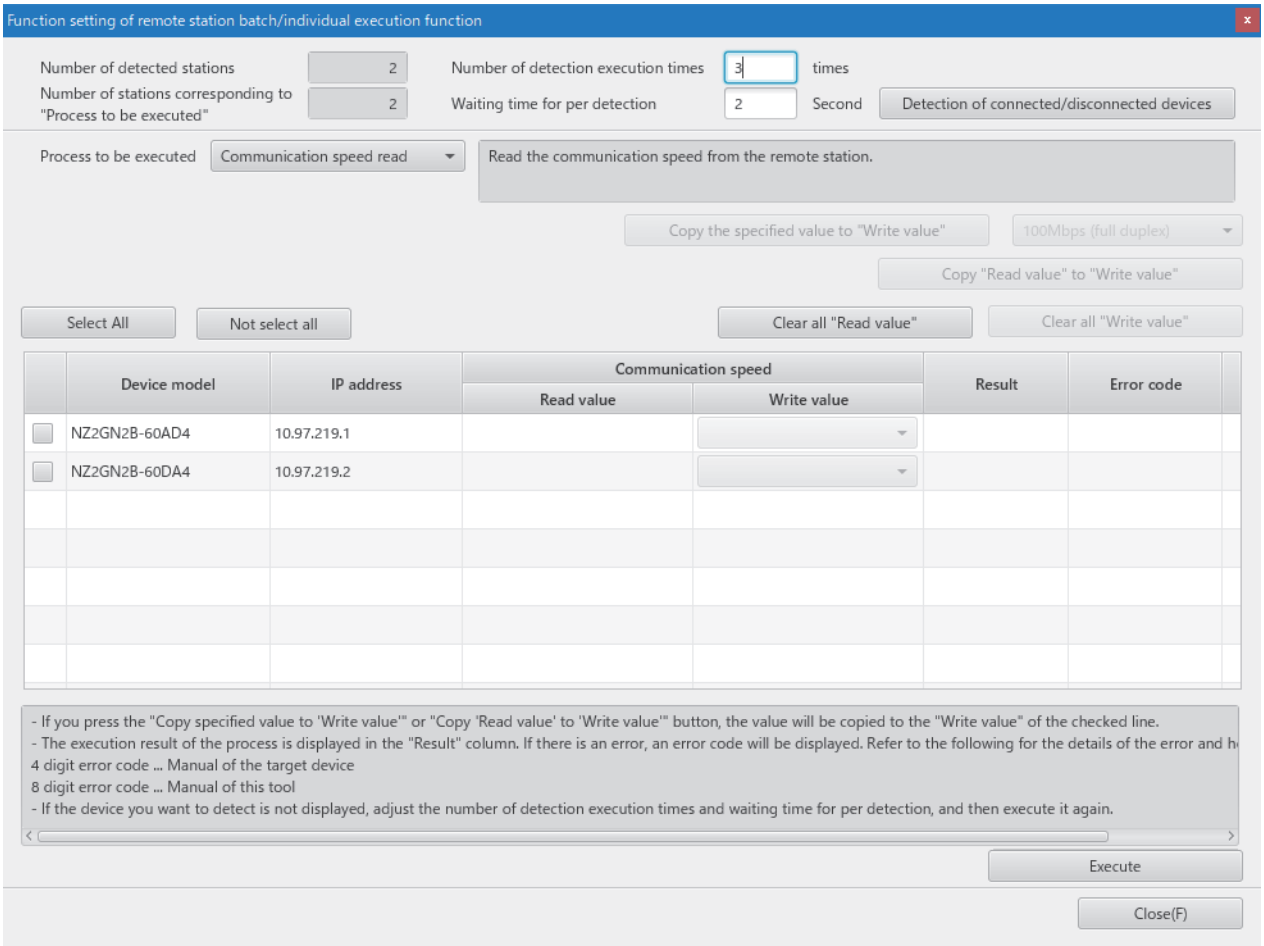
Connect A/D converter modules to the external power supply if needed.

1. Connect the personal computer with CC-Link IE TSN Configurator installed to the A/D converter modules targeted for the communication speed setting, by using Ethernet cables.
2. Turn on the module power supply of the A/D converter modules.
3. Display the "Function setting of remote station batch/individual execution function" window.

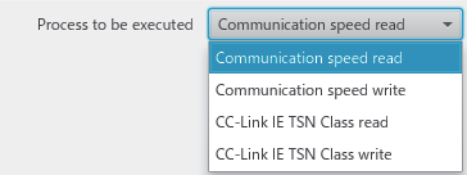
[Tool] ⇨ [Function setting of Remote station batch/individual execution function...]



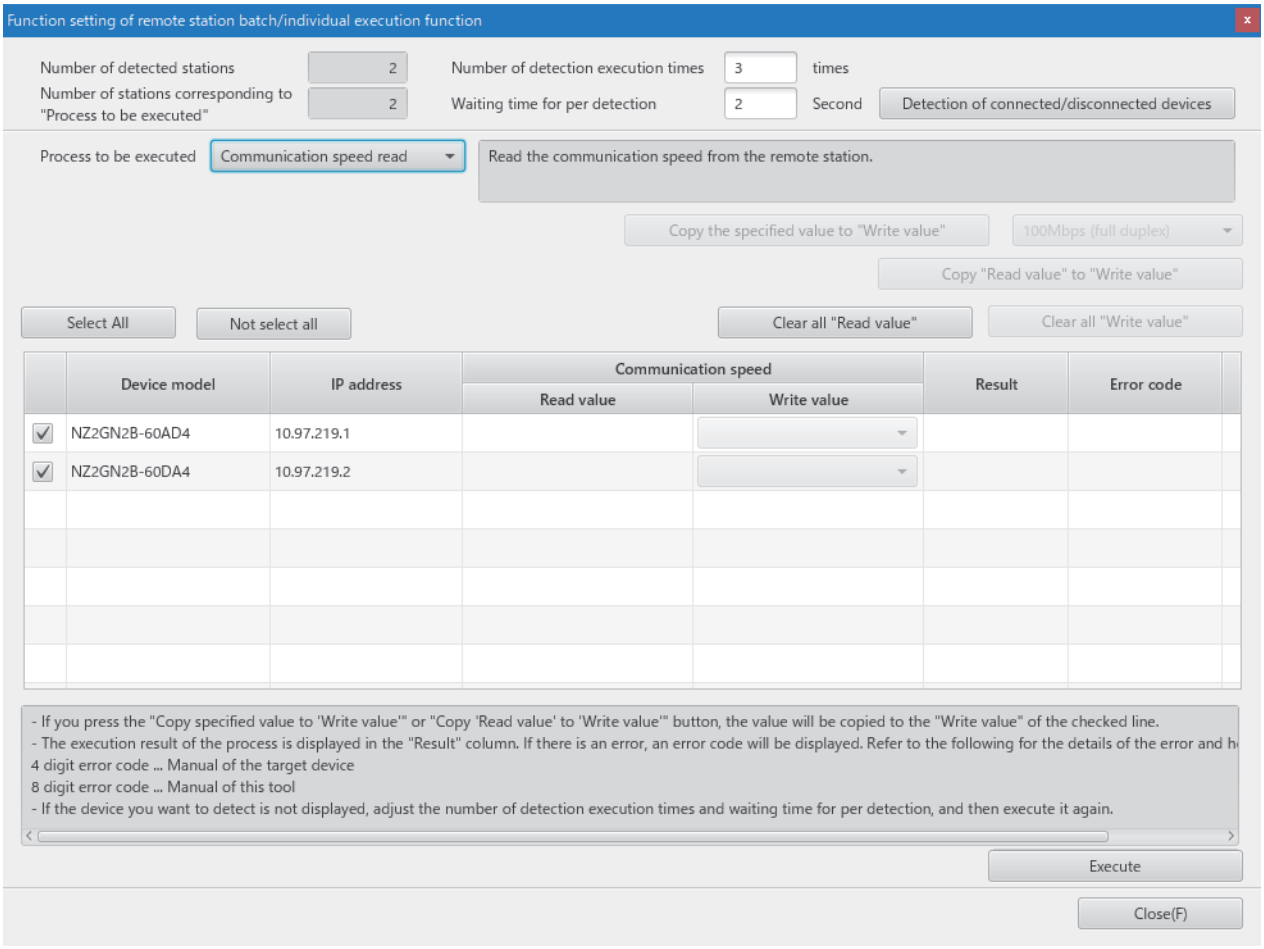
4. A/D converter modules supporting the communication speed setting are detected.



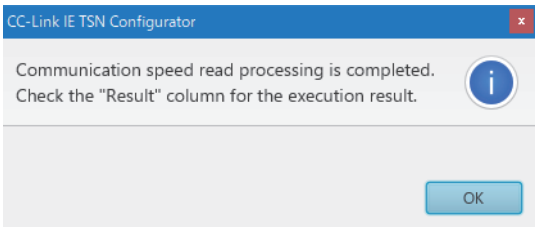
5. Set "Process to be executed" to "Communication speed read".



6. Select checkboxes of the A/D converter modules on which the communication speed read is to be executed.

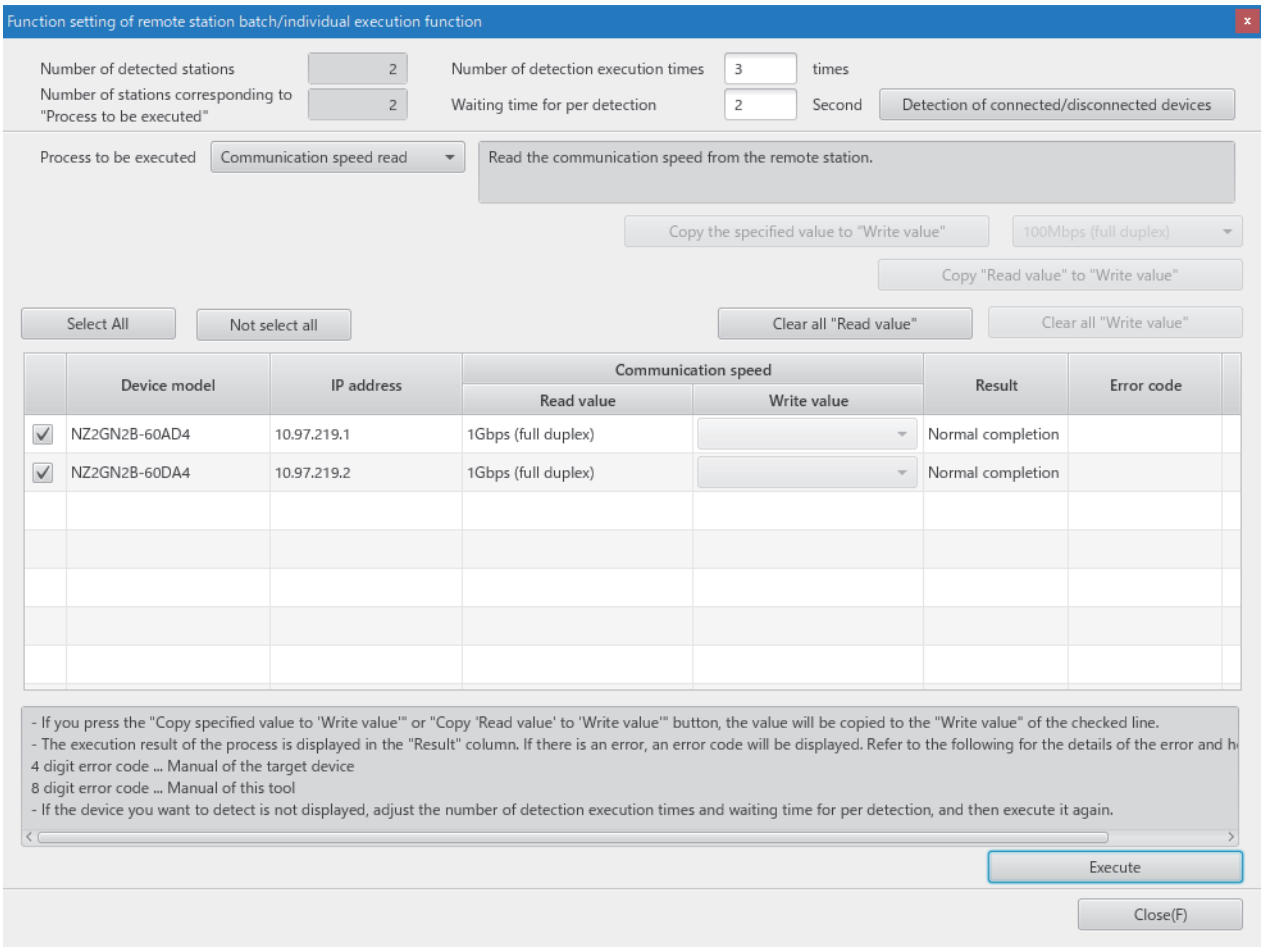


7. When the [Execute] button is clicked, the following window appears.



8. Click the [OK] button.

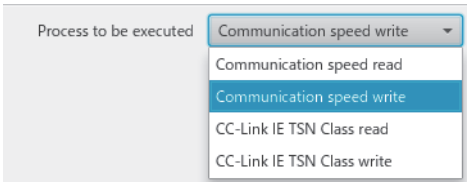
9. Check that "Result" is "Normal completion". The communication speed is displayed in "Read value".



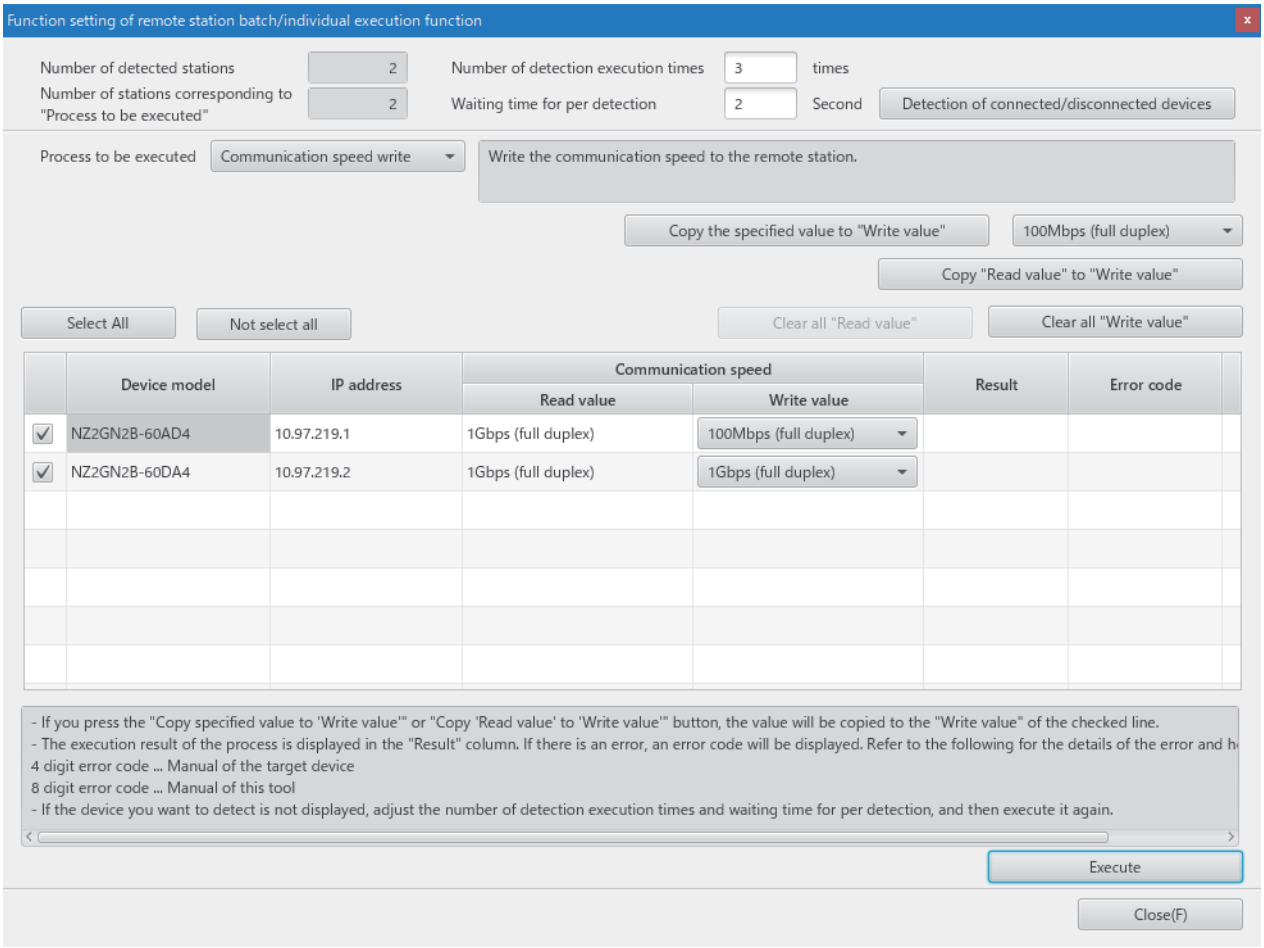
Point

A value to be read out by the communication speed read is an actual communication speed with which the A/D converter module is operating.

10. Set "Process to be executed" to "Communication speed write".



11. Select checkboxes of the A/D converter modules on which the communication speed write is to be executed, and set the communication speed to "Write value".

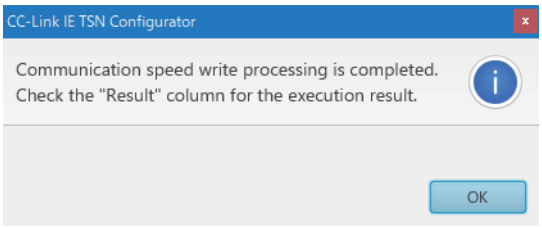


Point

The "Write value" that the A/D converter module can be set to using communication speed write are as follows.

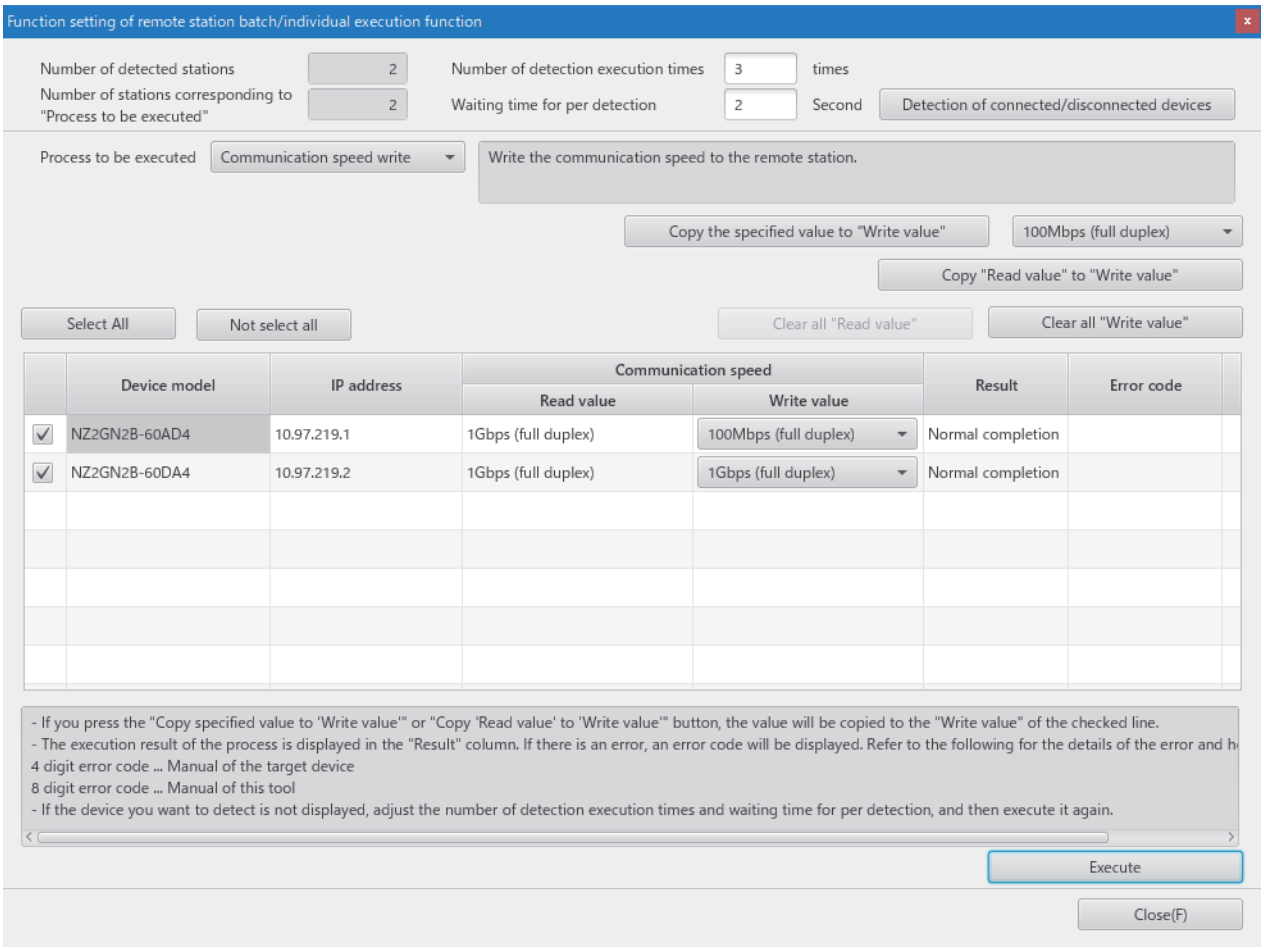
- 100Mbps (full-duplex)
- 1Gbps (full-duplex)

12. When the [Execute] button is clicked, the following window appears.



13. Click the [OK] button.

14. Check that "Result" is "Normal completion".



15. Turn off the module power supply of the A/D converter modules on which the communication speed setting has been executed.

Point

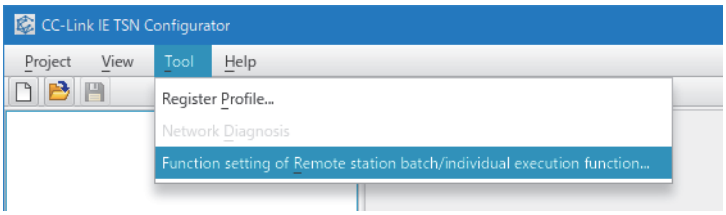
To operate the A/D converter modules with a newly set communication speed, turn off and on the module power supply after the execution of communication speed write.

■Set while the module is operating

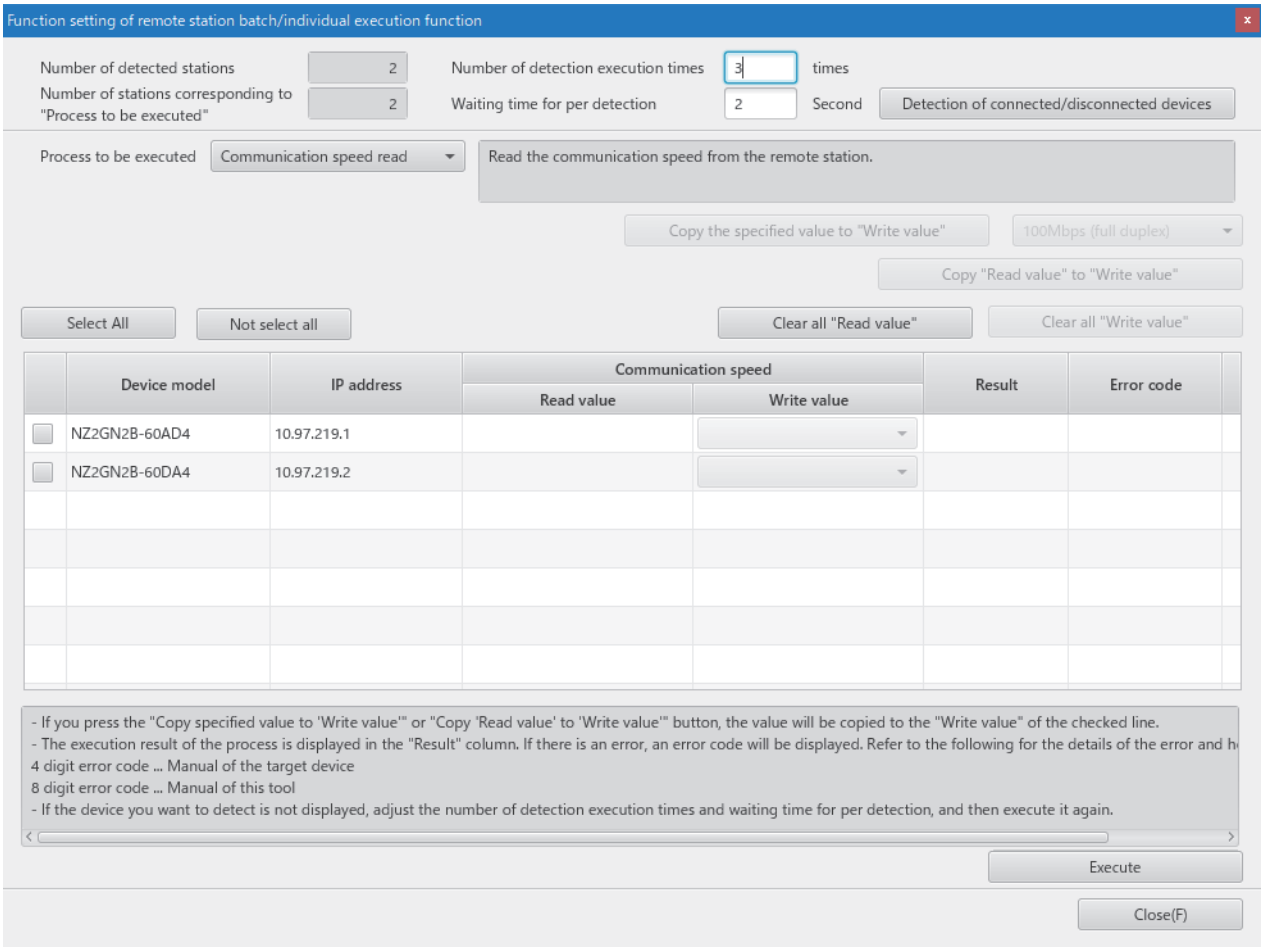
The following describes the procedure to set a communication speed while the module is operating.

1. Connect the personal computer with CC-Link IE TSN Configurator installed to the A/D converter modules targeted for the communication speed setting, by using Ethernet cables.
2. Display the "Function setting of remote station batch/individual execution function" window.

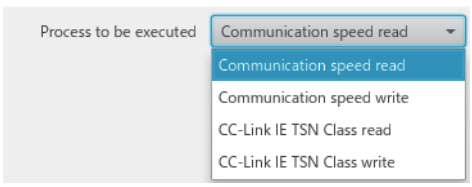
[Tool] ⇨ [Function setting of Remote station batch/individual execution function...]



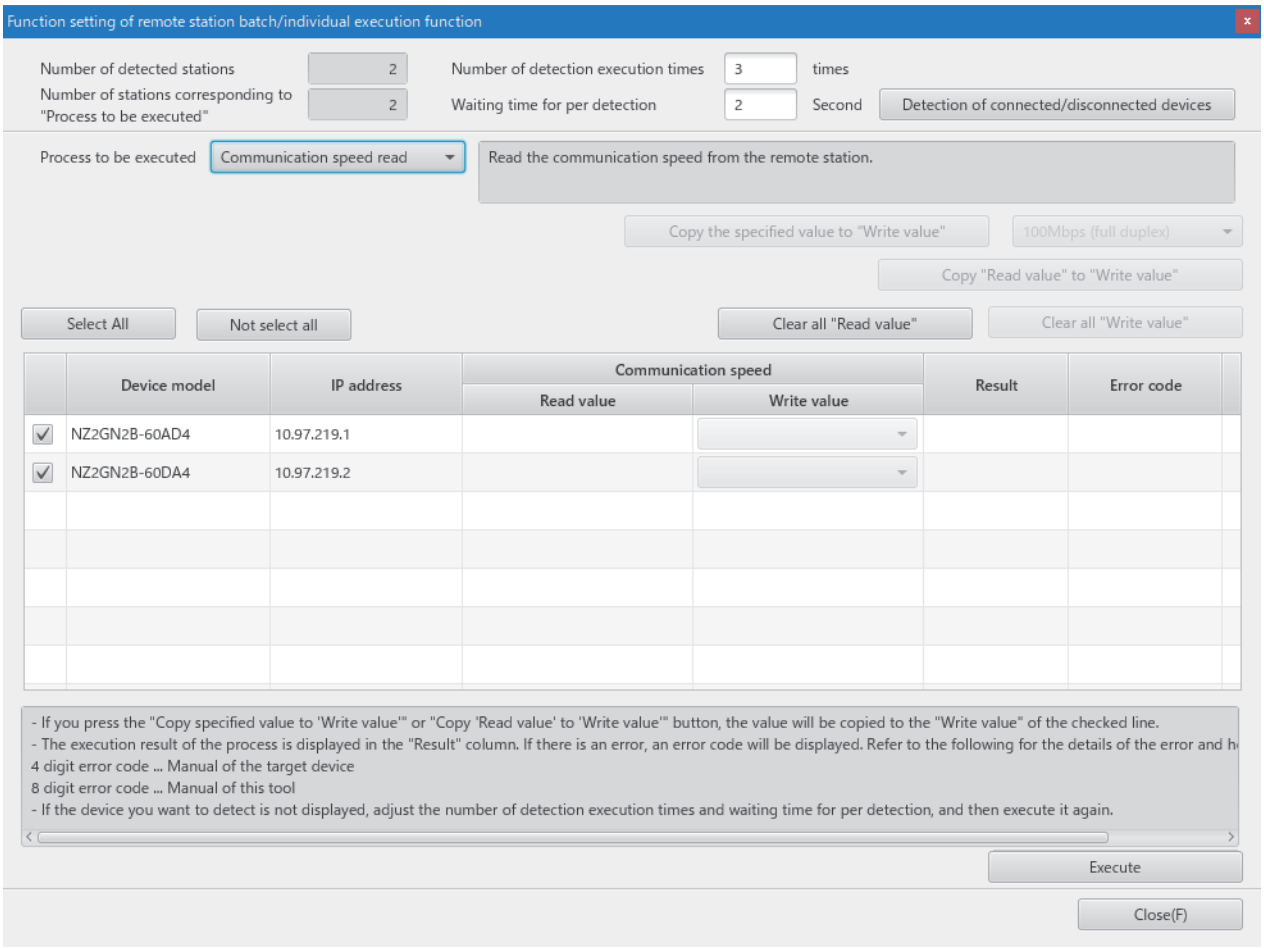
3. A/D converter modules supporting the communication speed setting are detected.



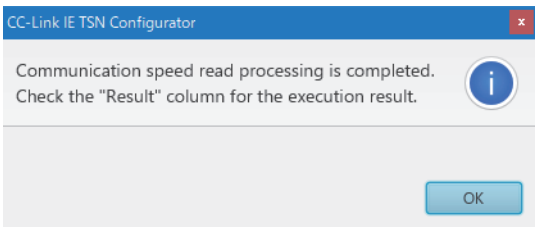
4. Set "Process to be executed" to "Communication speed read".



5. Select checkboxes of the A/D converter modules on which the communication speed read is to be executed.

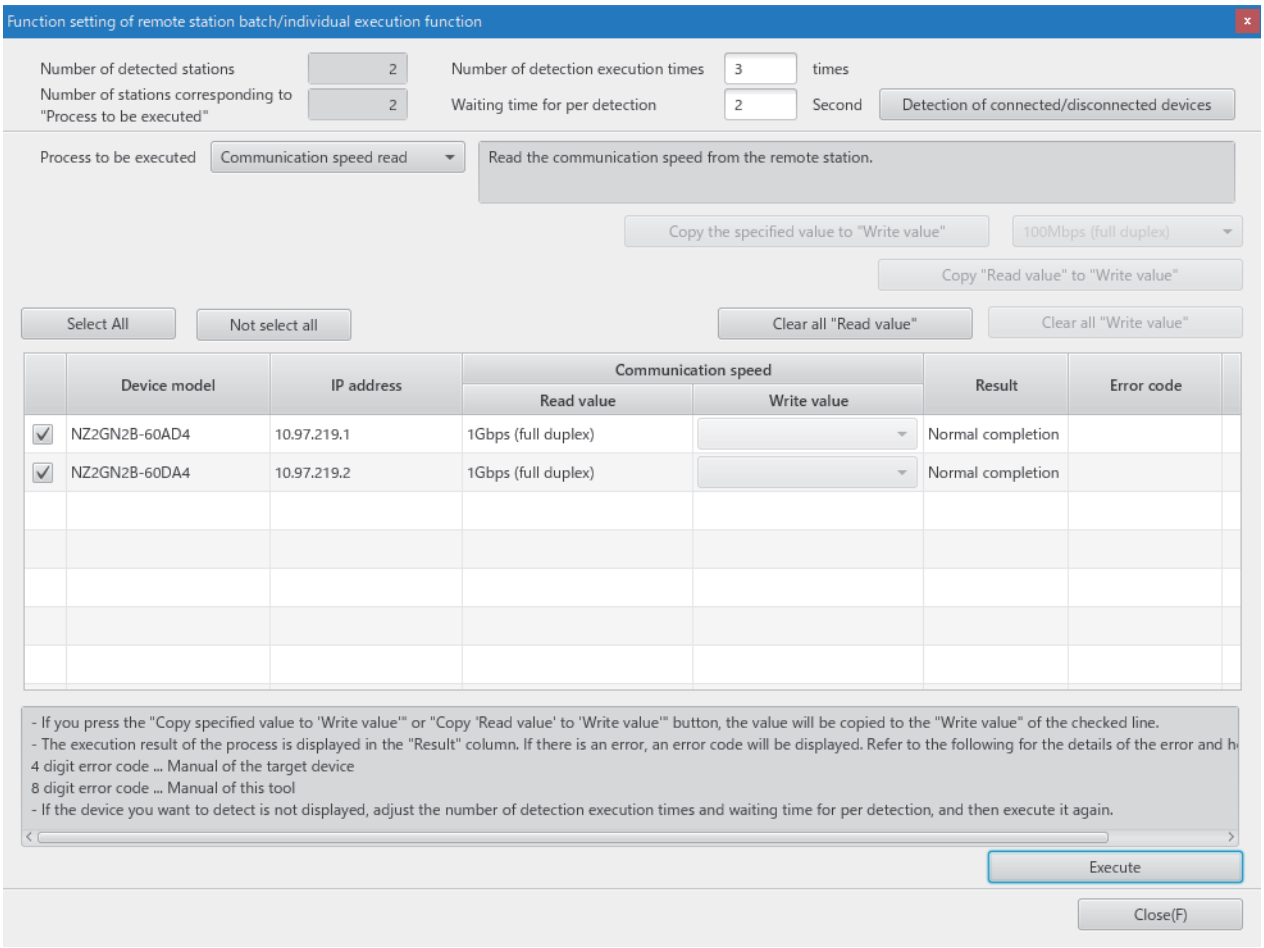


6. When the [Execute] button is clicked, the following window appears.



7. Click the [OK] button.

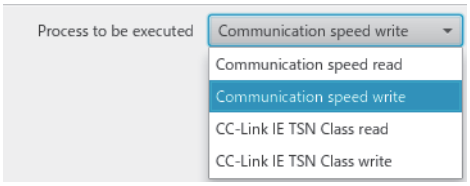
8. Check that "Result" is "Normal completion". The communication speed is displayed in "Read value".



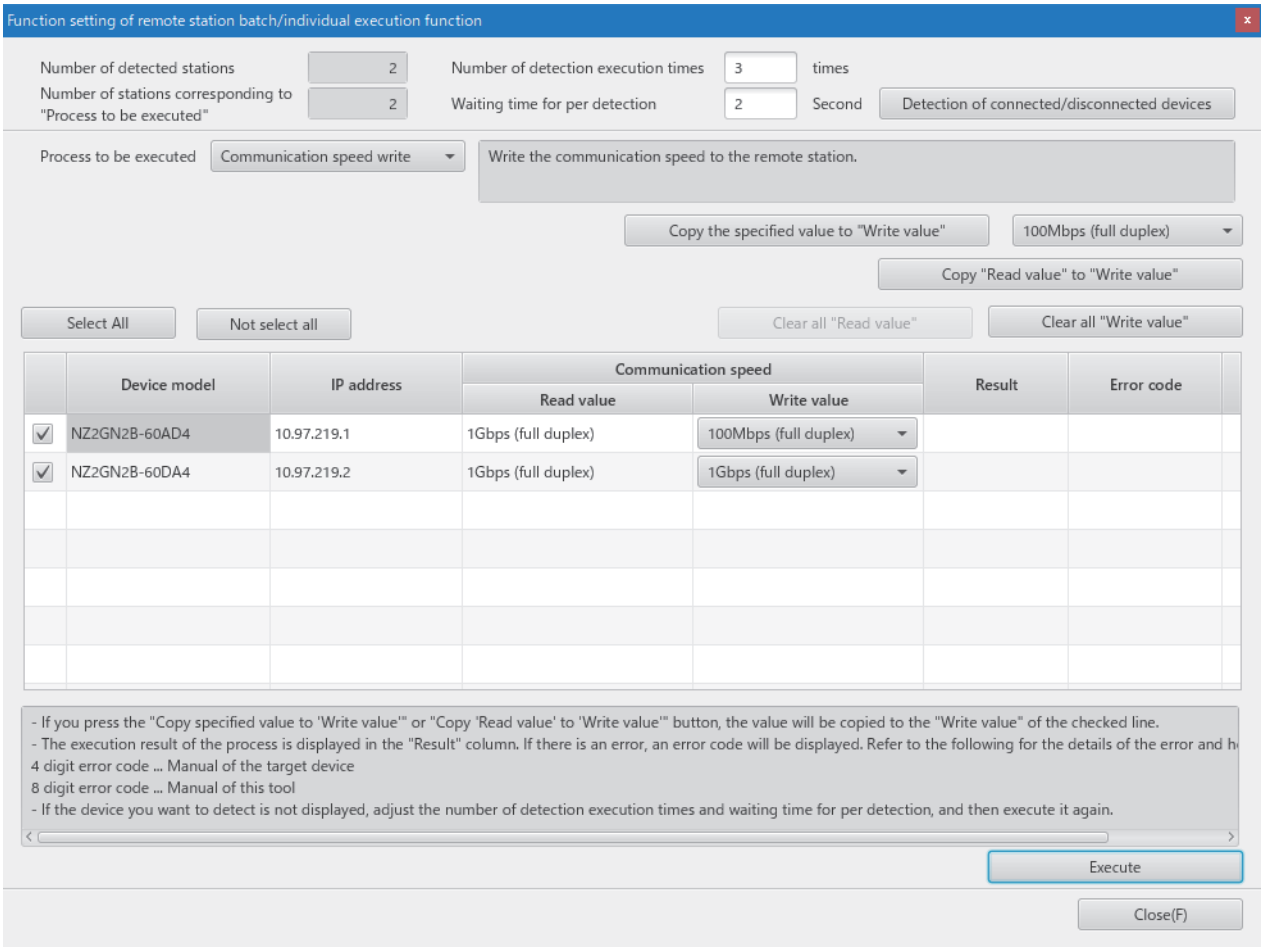
Point

A value to be read out by the communication speed read is an actual communication speed with which the A/D converter module is operating.

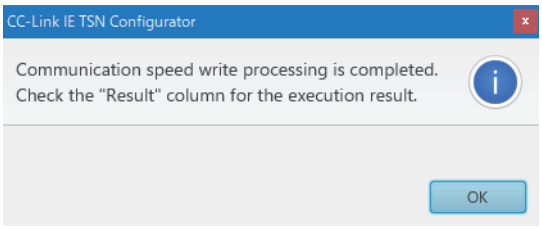
9. Set "Process to be executed" to "Communication speed write".



10. Select checkboxes of the A/D converter modules on which the communication speed write is to be executed, and set the communication speed to "Write value".

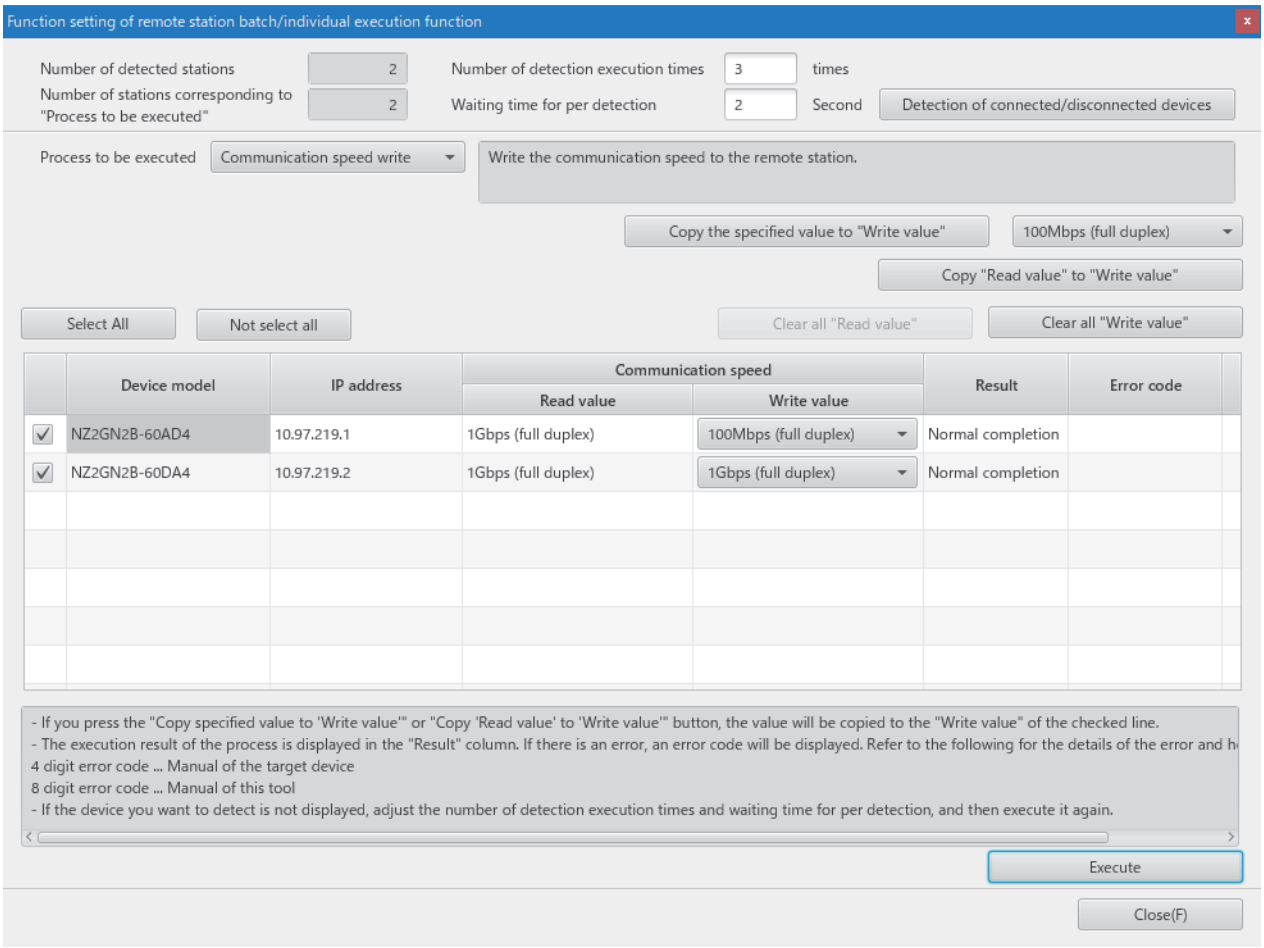


11. When the [Execute] button is clicked, the following window appears.



12. Click the [OK] button.

13. Check that "Result" is "Normal completion".



14. Turn off and on the module power supply of the A/D converter modules on which the communication speed setting has been executed.

Monitoring a set value

Which value is set as the communication speed can be checked by using Communication speed setting status (RXD).

Communication speed setting status (RXD)	Set value of communication speed
ON	100Mbps
OFF	1Gbps

Precautions

- The following table lists error codes that are displayed in "Error code" of CC-Link IE TSN Configurator if the communication speed write has been completed with an error. When the other error codes are displayed, refer to the manual of CC-Link IE TSN Configurator to take actions.

Error code	Description and cause	Action
0001H	The communication speed setting failed to be saved in the non-volatile memory.	• The communication speed setting is not saved in the non-volatile memory. • Take measures to reduce noise, such as using a shielded cable for connection. • If this error persists, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.
0002H	The number of saving the communication speed setting exceeds the limit at the analog module, and thus saving the setting in the non-volatile memory has failed.	The communication speed write executed in and after this error will not be saved in the non-volatile memory.

- The communication period interval setting range varies depending on the communication speed. For details, refer to the following.

☞ Page 45 Communication period interval setting

- When using a slave station that operates with the communication speed of 100Mbps, check which system configuration should be used by referring to the manual for the master station used.

7.14 SLMP Communication Function

SLMP can be used to communicate with the A/D converter module.

For details on SLMP, refer to the following.

📖SLMP Reference Manual

Applicable version

The A/D converter modules with firmware version "06" or later support this function.

☞ Page 191 Added functions

Applicable commands

SLMP commands*1				Application
Type	Operation	Command	Subcommand	
Remote Control	Remote Reset	1006H	0000H	Remotely reset the A/D converter module.
Memory	Read	0613H	0000H	Read the remote buffer memory.
	Write	1613H	0000H	Write to the remote buffer memory.
Clear Error		1617H	0000H	Initialize the A/D converter module error codes and turn off the ERR. LED.

*1 3E frame, 4E frame, and station number extension frame are supported.

Point

For a single A/D converter module, do not execute multiple dedicated SLMP commands at the same time. If multiple SLMP commands are executed at the same time, the A/D converter module may be unable to receive them and the SLMP commands may time out.

Communications settings

When communicating with the A/D converter module using SLMP, communicate as follows.

- TCP/UDP: UDP
- Port: 45239
- Code: binary code

Usage method

The SLMPSND command is used to send an SLMP command from the CPU module to the A/D converter module.

For details on the SLMPSND command, refer to the following.

📖MELSEC iQ-R Programming Manual (Module Dedicated Instructions)

If the A/D converter module detects an error in the SLMP command, it returns an abnormal response. However, the A/D converter module does not enter error status.

The error code is stored in the end code of the abnormal response data. Confirm the contents of the error and take action by referring to the following.

☞ Page 110 SLMP communications end code

SLMP communications end code

If the A/D converter module returns an abnormal response, the following code or error code is stored in the end code.

End code	Description and cause	Action
C059H	Incorrect command/sub-command specification.	Review the command/subcommand and resend it.
C05CH	Incorrect request specification.	Review the request and resend it.
C061H	The request data length does not match the number of data.	Review the content and length of the request data, and resend it.
CF44H	The request destination does not support splitting.	The A/D converter module does not support splitting. Send the request message without splitting it.

For details on error codes, refer to the following.

☞ Page 147 Error Code List

7.15 Firmware Update Function

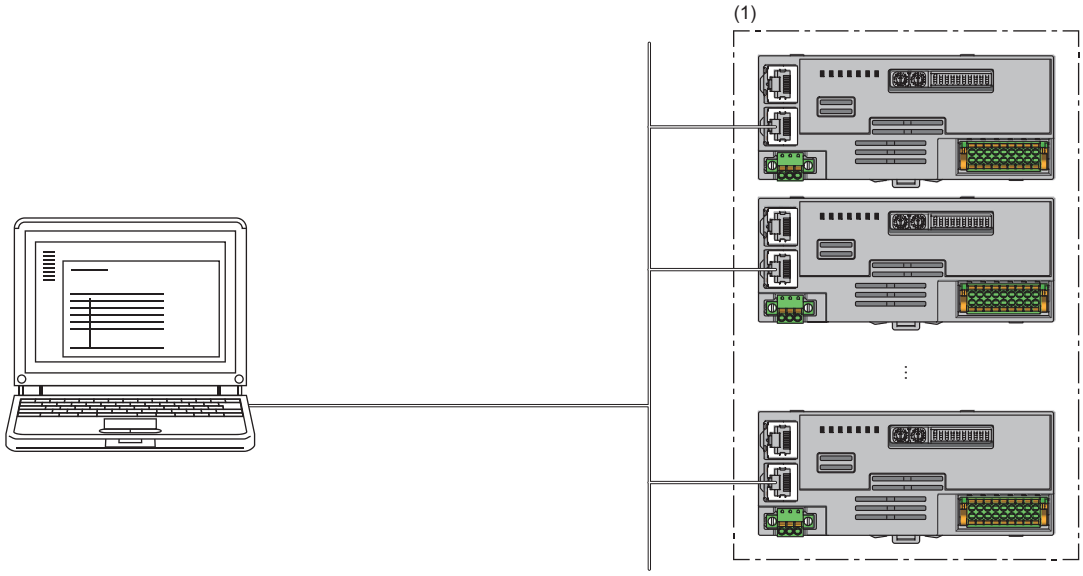
This function updates firmware of an A/D converter module via CC-Link IE TSN.

Update firmware by using the CC-Link IE TSN Firmware Update Tool.

When the CC-Link IE TSN Firmware Update Tool is necessary, please consult your local Mitsubishi representative.

System configuration

Connect the personal computer to A/D converter modules targeted for firmware update using Ethernet cables.



(1) A/D converter modules targeted for firmware update

Firmware update file

When the firmware update file is necessary, please consult your local Mitsubishi representative.

The file name of firmware update file is listed below.

Model name	File name
NZ2GN2B-60AD4, NZ2GN2S-60AD4	CCIET_AD.SYF

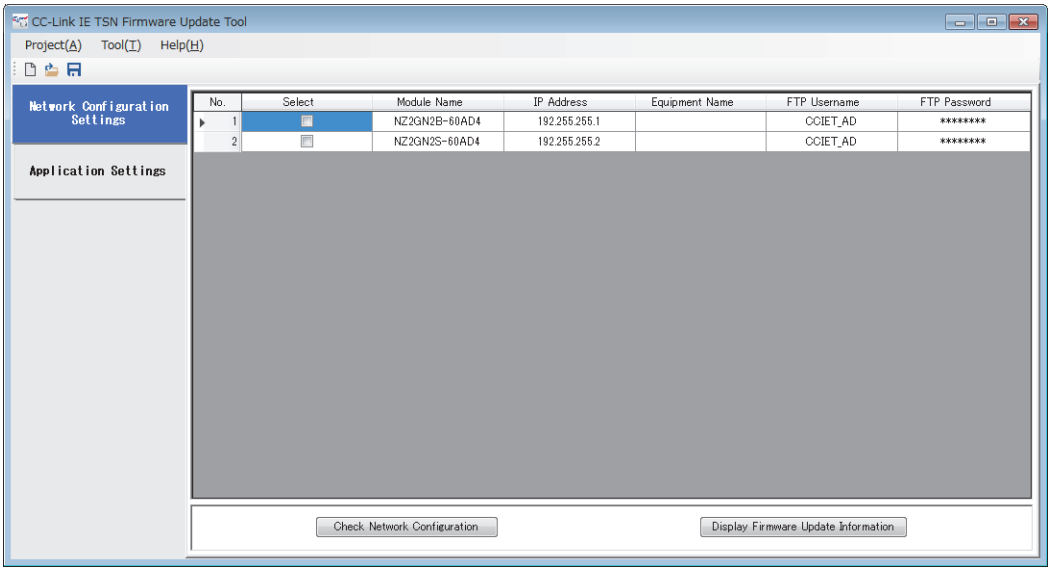
Setting method

Setting the CC-Link IE TSN Firmware Update Tool is required to update firmware for A/D converter modules.
For details, refer to the "Help" of the CC-Link IE TSN Firmware Update Tool.

■"Network Configuration Settings" window

Set the following items in the "Network Configuration Settings" window.

Item	Description
Module Name	Set the model name of an A/D converter module for which firmware is to be updated.
IP Address	Set the IP address of an A/D converter module for which firmware is to be updated.
Equipment Name	This setting is optional. Set this item when you register multiple pieces of equipment and need to distinguish them.
FTP User name	Set CCIET_AD.
FTP Password	Set CCIET_AD.



Point

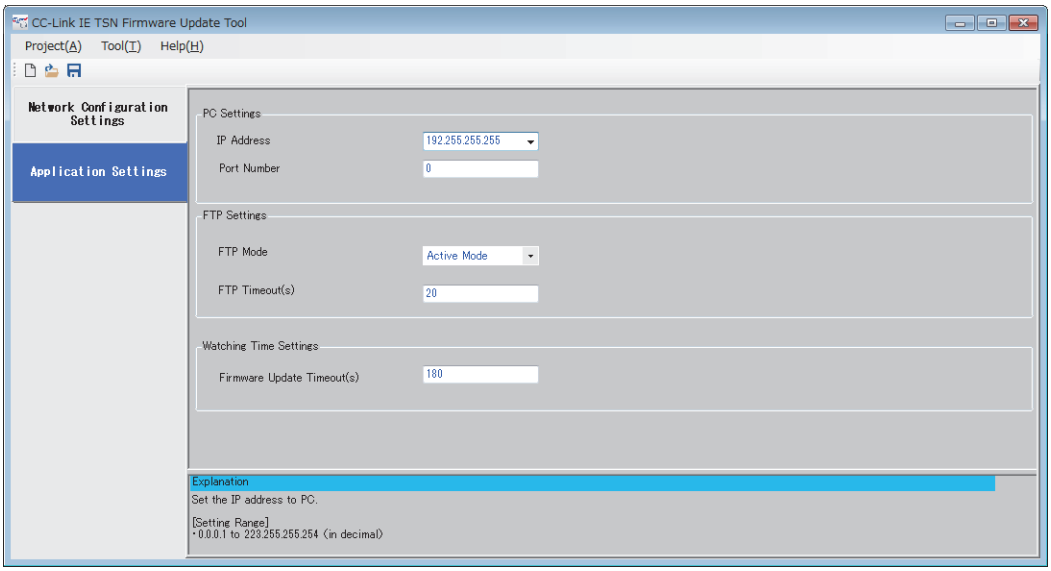
- When CCIET_AD is set for "Module Name", CCIET_AD is automatically set for "FTP User name" and "FTP Password" as well.
- Firmware can be simultaneously updated for A/D converter modules with different model names, when the used firmware update file is same, and the character strings set in "Module Name" of CC-Link IE TSN Firmware Update Tool are same (it does not matter if the model names of actual modules are different).

Setting example: Set NZ2GN2B-60AD4 for "Module Name" for all A/D converter modules targeted for firmware update.

■"Application Settings" window

Set the following items in the "Application Settings" window.

Classification	Item	Setting range	Description
PC Settings	IP Address	0.0.0.1 to 223.255.255.254	Set the IP address of the personal computer.
	Port Number	0, 49152 to 65535	Set 0.
FTP Settings	FTP Mode	"Active Mode" (fixed)	An A/D converter module supports only "Active Mode".
	FTP Timeout(s)	1 to 600(s)	Set the FTP timeout time.
Watching Time Settings	Firmware Update Timeout(s)	1 to 1200(s)	Set the firmware update timeout time.



Operation

■LED status

The state of firmware update can be checked with the LED of A/D converter module.

LED	Normal operation	Firmware update in progress	Firmware update completed (either completed successfully or completed with an error)
RUN LED	On	Flashing	Off

Error information list

The following table lists errors specific to A/D converter modules that may occur during firmware update.

Error information	Error name	Description and cause	Action
0001H	File error	The specified file is the one that cannot be used for the A/D converter module targeted for the update.	Review the firmware update file specified with the CC-Link IE TSN Firmware Update Tool.
0002H	Communication error	A communication error has occurred during firmware update.	• Check whether Ethernet cables are connected properly. • Take measures to reduce noise on the transmission path.
0003H	Module error	An error has occurred on the module during firmware update.	Turn off and on the module power supply, and restart the CC-Link IE TSN Firmware Update Tool. If this error persists, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.
0004H	Firmware update disabled	Firmware update was attempted during data link.	Update firmware while data link is not being performed (disconnected).

Precautions

If error information other than the above is displayed on the CC-Link IE TSN Firmware Update Tool, refer to the "Help" on the CC-Link IE TSN Firmware Update Tool.

Precautions

- After the completion of firmware update, power off and on the A/D converter module. Note that after firmware update, it takes longer time for the A/D converter module to restart (turning on of RUN LED) compared with ordinary times, since reconstruction processing is performed at restart after firmware update.
- Firmware cannot be updated for an A/D converter module where data link is being performed. When updating firmware for an A/D converter module, do not connect the A/D converter module to the master station. If firmware update is attempted for an A/D converter module where data link is being performed, a firmware update disabled (error code: 0004H) is displayed on the error information of the firmware update information window.
- If an error has occurred on firmware update, power off and on the A/D converter module or perform remote reset before attempting firmware update again.
- Do not update firmware for A/D converter modules simultaneously by using multiple CC-Link IE TSN Firmware Update Tools.

7.16 Module Power Supply Voltage Drop Detection Function

This function detects a voltage drop of the module power supply.
This function makes troubleshooting easy when the voltage of the power supplied to the A/D converter module drops, or when poor connection in the wiring occurs. Note that the voltage to be monitored for a module power supply voltage drop is 20.4V.

Operation

If a drop in the voltage of the module power supply is detected, the module enters the following state and an error is notified.

- Module power supply voltage drop error (error code: 1080H) is stored in Latest error code (RWr0).
- Error flag (RXA) turns on.

Point

- When an error is detected, since the power supply environment is out of specification range, the operation is not guaranteed.
- A power supply voltage drop is not detected in the event of a sudden power failure or when power-off operation is performed.
- The voltage to be monitored varies depending on the environment.

8 PROGRAMMING

This chapter describes the programming of the A/D converter module.

8.1 Precautions for Programming

This section describes the precautions for creating CC-Link IE TSN programs.

Program for cyclic transmission

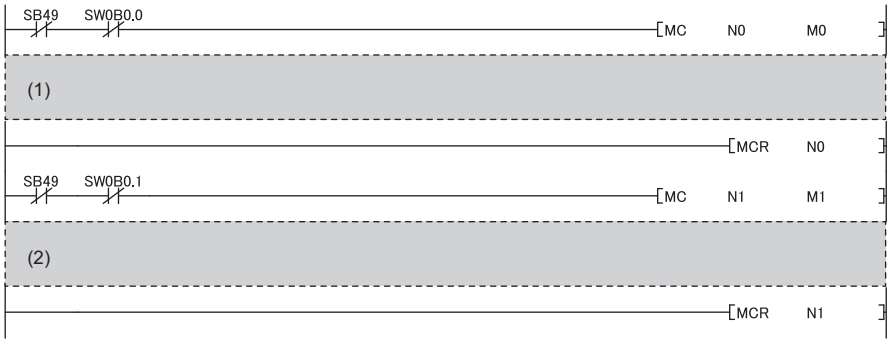
For a program for cyclic transmission, provide interlock between the following link special relay (SB) and the link special register (SW).

- Own station data link error status (master station) (SB0049)
- Data link status (each station) (SW00B0 to SW00B7)

User's manual for the master station used

Ex.

Interlock example



(1) Program for communications with station No.1
(2) Program for communications with station No.2

CC-Link IE TSN Network synchronous communication program

To check the operating status of the A/D converter module (synchronous or asynchronous), use the following link special register (SW) on the master station.

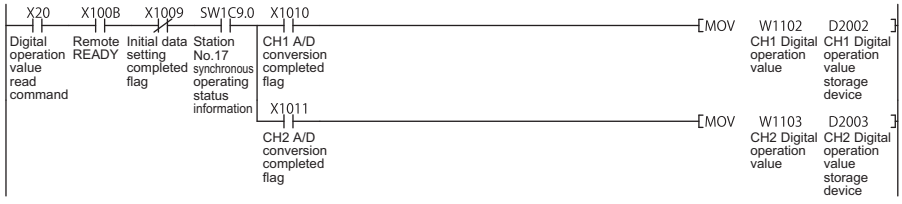
- Synchronous/asynchronous operation status information (each station) (SW01C8 to SW01CF) of the master station

For details, refer to the following.

User's manual for the master station used

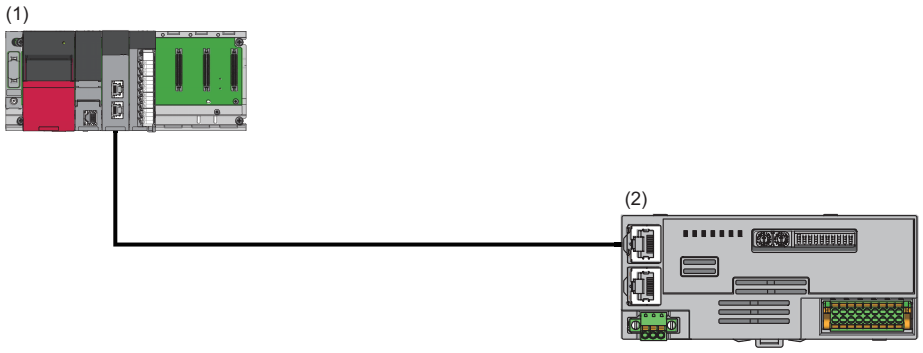
When reading digital operation values, use the condition of the above mentioned link special register (SW) (the corresponding bit of the register being on) as an interlock.

The following figure shows the program example for reading CH1 Digital operation value and CH2 Digital operation value of the A/D converter module with station number 17.



8.2 When the Function Setting Switch 2 Is Not Used

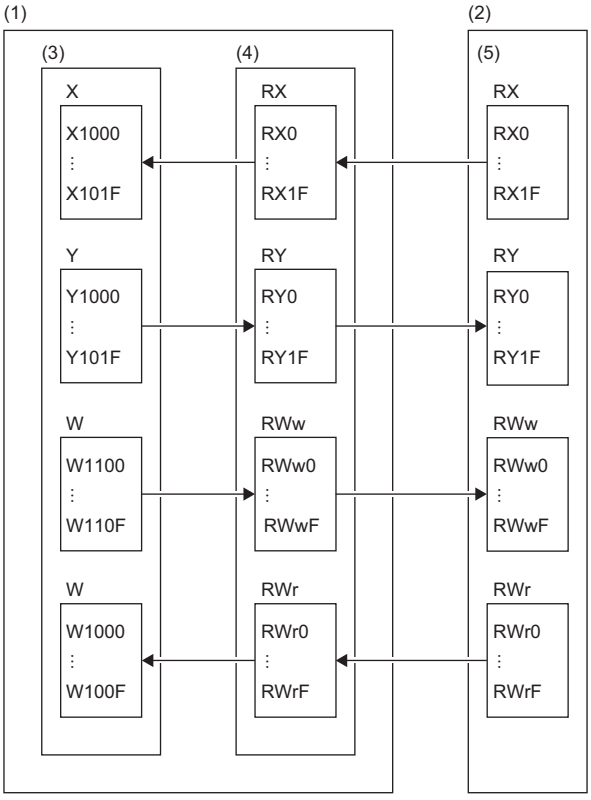
System configuration



(1) Master station
- Power supply module: R62P
- CPU module: R120CPU
- Master/local module: RJ71GN11-T2 (Start I/O number: 0000H to 001FH)
- Input module: RX40C7 (Start I/O number: 0020H to 002FH)

(2) Remote station (IP address/station number setting switches: 1)
- A/D converter module: NZ2GN2S-60AD4 (Analog input: CH1, CH2, CH3)

■Assignment of link devices



(1) Master station
(2) Remote station
(3) CPU module
(4) Master/local module
(5) A/D converter module

Programming conditions

Digital operation values obtained from A/D conversion on CH1, CH2, and CH3 of the A/D converter module are read out to the master station. A/D conversion takes place at the time of sampling processing for CH1, every 50 count averages for CH2, and every 10 moving averages for CH3.

Initial setting description

Setting item		Setting value
A/D conversion enable/disable setting	CH4 A/D conversion enable/disable setting	Disable
Averaging process setting	CH2 Averaging process setting	Count average
	CH2 Time average/Count average/Moving average	50
	CH3 Averaging process setting	Moving average
	CH3 Time average/Count average/Moving average	10
Input signal error detection function	CH1 Input signal error detection setting	Simple disconnection detection
	CH3 Input signal error detection setting	Simple disconnection detection
Warning output function	CH2 Warning output setting	Enable
	CH2 Process alarm upper upper limit value	16000
	CH2 Process alarm upper lower limit value	10000
	CH2 Process alarm lower upper limit value	3000
	CH2 Process alarm lower lower limit value	0
Scaling function	CH3 Scaling enable/disable setting	Enable
	CH3 Scaling upper limit value	32000
	CH3 Scaling lower limit value	0

For the parameters other than the above, use the initial value.

Devices to be used

Device	Description	
X20	Digital operation value read command	RX40C7 (X20 to X2F)
X22	Error reset command	
X24	Maximum value/minimum value read command	
X26	Maximum value/minimum value reset command	
X1009	Initial data setting completion flag	NZ2GN2S-60AD4 (RX0 to RX1F)
X100A	Error flag	
X100B	Remote READY	
X1010	CH1 A/D conversion completed flag	
X1011	CH2 A/D conversion completed flag	
X1012	CH3 A/D conversion completed flag	
X1018	Warning output signal	
X101C	Input signal error detection flag	
X101D	Maximum value/minimum value reset completed flag	
Y100A	Error clear request flag	NZ2GN2S-60AD4 (RY0 to RY1F)
Y101D	Maximum value/minimum value reset request	
W1000	Latest error code	Remote register RWr
W1001	Latest alarm code	
W1002	CH1 Digital operation value	
W1003	CH2 Digital operation value	
W1004	CH3 Digital operation value	
W100A	Input signal error detection flag	
W100B	Warning output flag	

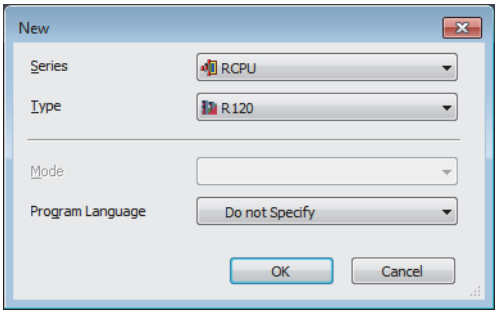
Device	Description	
D2002	CH1 Digital operation value	Device for storage
D2003	CH2 Digital operation value	
D2004	CH3 Digital operation value	
D2010	CH1 Maximum value	
D2011	CH1 Minimum value	
D2012	CH2 Maximum value	
D2013	CH2 Minimum value	
D2014	CH3 Maximum value	
D2015	CH3 Minimum value	
D2030	Latest error code	
D2031	Latest alarm code	
D2032	Input signal error detection flag	
D2033	Warning output flag	
M0	Communication ready flag	
M300	Maximum value/minimum value read flag	
M310	REMFR instruction completion flag	
M311	REMFR instruction abnormal completion flag	
F1	CH2 Warning output upper limit occurrence	
F2	CH2 Warning output lower limit occurrence	
F3	CH1 Disconnection occurrence	
F4	CH3 Disconnection occurrence	
F5	Maximum value/minimum value read failure	
SM400	Always ON	
SB49	Data link status of the own station (master station)	
SW0B0.0	Data link status of each station	
N0	Nesting	

Setting method

Operating procedure

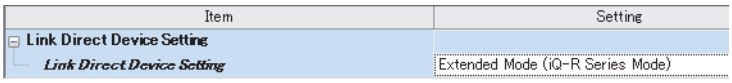
1. Create a project.

[Project] ⇨ [New]



2. For "CPU Parameter" in "Link Direct Device Setting", set "Extended Mode (iQ-R Series Mode)".

[CPU Parameter] ⇨ [Memory/Device Setting] ⇨ [Link Direct Device Setting] ⇨ [Link Direct Device Setting]

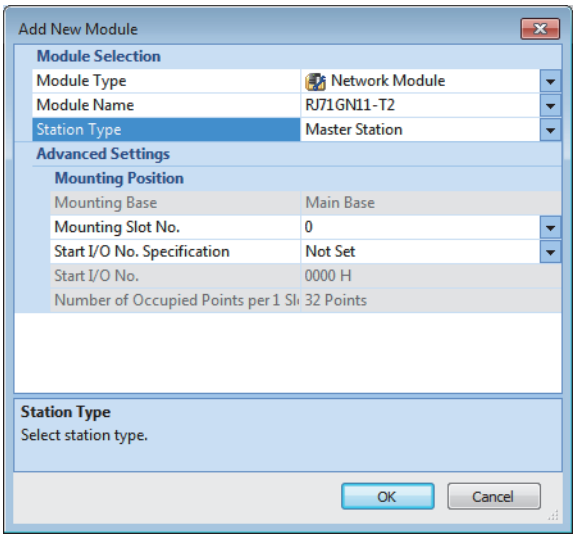


Restriction

When writing the module parameters of the RJ71GN11-T2 to the CPU module with the engineering tool, set "Extended Mode (iQ-R Series Mode)" for "Link Direct Device Setting".
When "Q Series Compatible Mode" is set for "Link Direct Device Setting", "Write to PLC" cannot be executed.

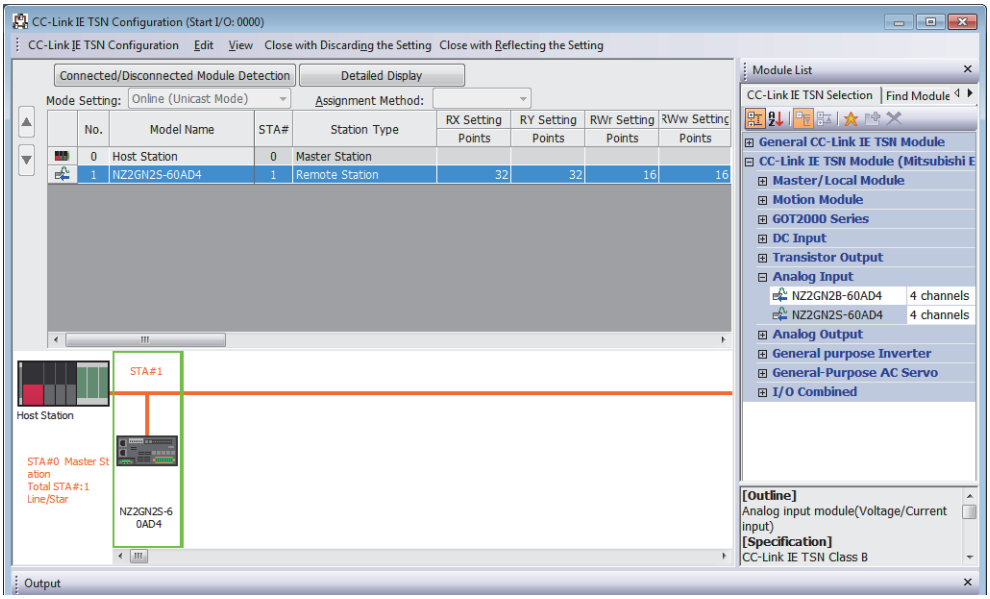
3. Set the master/local module in the following window.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Right-click ⇨ [Add New Module]



4. Display the "CC-Link IE TSN Configuration" window and set parameters as follows.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Model ⇨ [Basic Settings] ⇨ [Network Configuration Settings]



Point

If the A/D converter module firmware version is "06" or later, set "CC-Link IE TSN Class" on the "CC-Link IE TSN Configuration" window to match the CC-Link IE TSN Class of the A/D converter module.

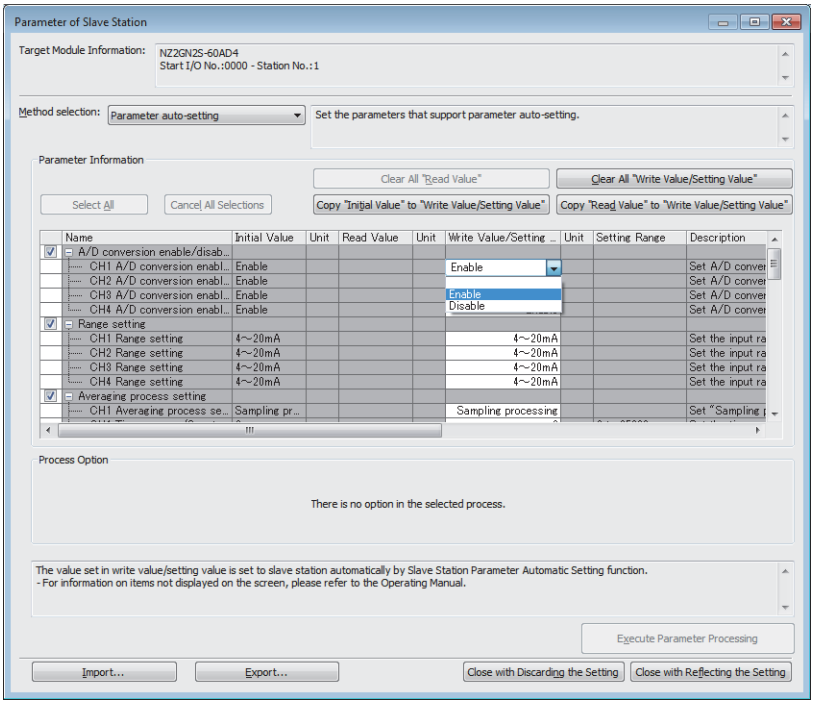
5. Select the "Parameter Automatic Setting" checkbox.

	No.	Model Name	STA#	Station Type	RX Setting Points	RY Setting Points	RWr Setting Points	RWw Setting Points	Parameter Automatic Setting	
	0	Host Station	0	Master Station						
	1	NZ2GN2S-60AD	1	Remote Station	32	32	16	16	☑	<Detail Setting>

6. Double-click "Detail Setting" beside the "Parameter Automatic Setting" checkbox to display the "Parameter of Slave Station" window.

7. Check that "Method selection" is set to "Parameter auto-setting".

8. In the "Parameter of Slave Station" window, set the items as described in Initial settings.



9. Click the [Close with Reflecting the Setting] button to close the "Parameter of Slave Station" window.

10. Select [Close with Reflecting the Setting] and close the "CC-Link IE TSN Configuration" window.

11. Display the refresh parameter setting window and set as follows.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Model ⇨ [Basic Settings] ⇨ [Refresh Settings]

No.	Link Side					CPU Side				
	Device Name	Points	Start	End		Target	Device Name	Points	Start	End
-	SB	512	00000	001FF		Specify Dev	SB	512	00000	001FF
-	SW	512	00000	001FF		Specify Dev	SW	512	00000	001FF
1	RX	32	00000	0001F		Specify Dev	X	32	01000	0101F
2	RY	32	00000	0001F		Specify Dev	Y	32	01000	0101F
3	RWr	16	00000	0000F		Specify Dev	W	16	01000	0100F
4	RWw	16	00000	0000F		Specify Dev	W	16	01100	0110F
5										

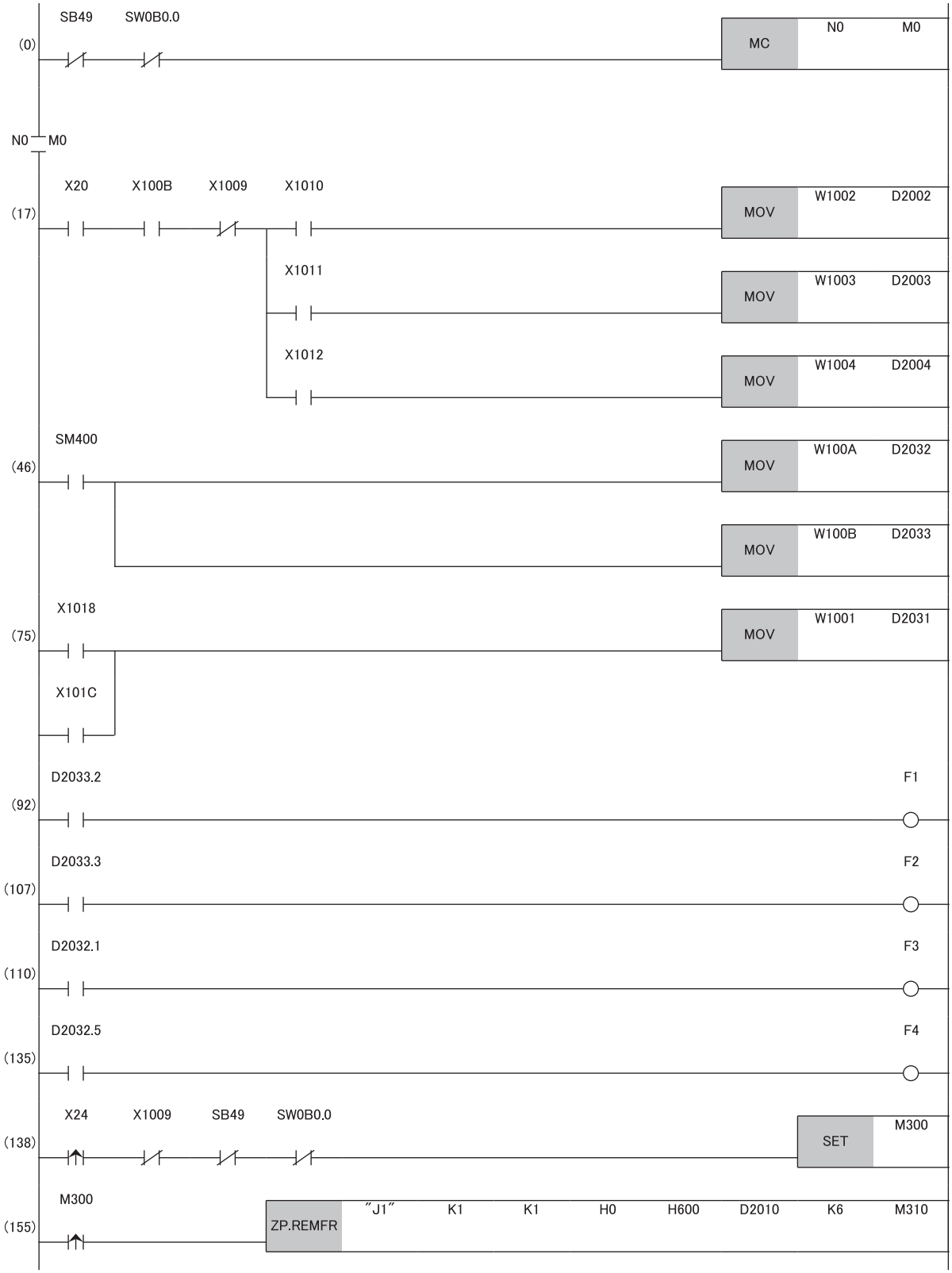
12. Click the [Apply] button.

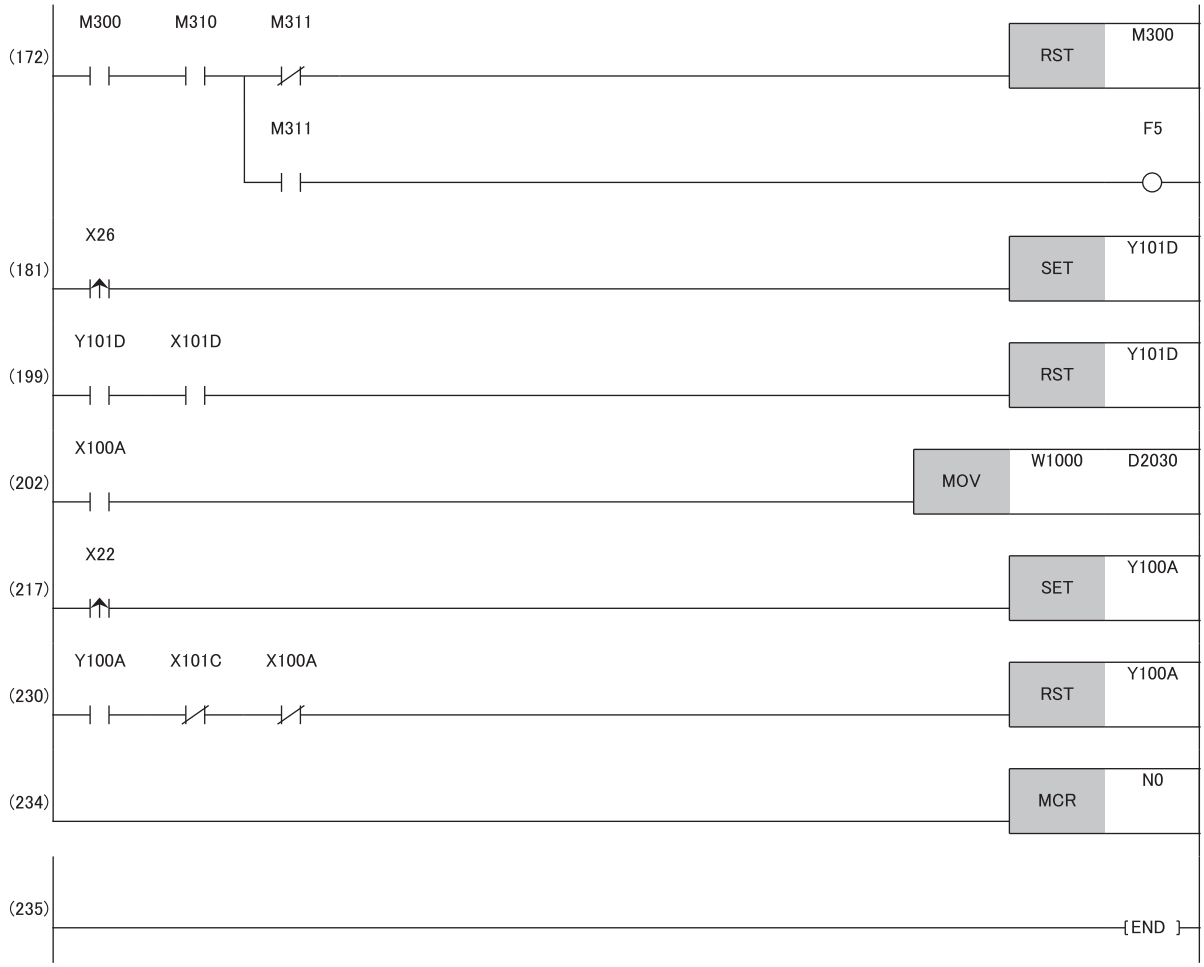
13. Write the set parameters to the CPU module of the master station and reset the CPU module of the master station, or turn off and on the power supply of the programmable controller.

[Online] ⇨ [Write to PLC]

14. Set the CPU module of the master station to RUN, and check that the DATA LINK LED of the A/D converter module is turned on.

Program example

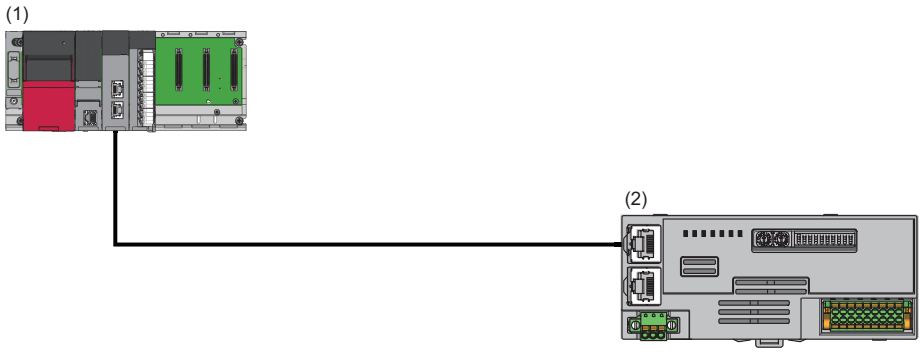




(17)Read the digital operation value.
(46)Detect Input signal error detection flag and Warning output flag.
(75)Read the latest alarm code.
(92), (107)Processing at warning occurrence
(110), (135)Processing at input signal error occurrence (disconnection detection)
(138), (155), (172)Read the maximum and minimum values.
(181), (199)Reset the maximum and minimum values.
(202)Read the latest error code.
(217), (230)Clear the latest error code.

8.3 When the Function Setting Switch 2 Is Used

System configuration



(1) Master station
- Power supply module: R62P
- CPU module: R120CPU
- Master/local module: RJ71GN11-T2 (Start I/O number: 0000H to 001FH)
- Input module: RX40C7 (Start I/O number: 0020H to 002FH)

(2) Remote station (IP address/station number setting switches: 1)
- A/D converter module: NZ2GN2S-60AD4 (Analog input: CH1, CH2, CH3, CH4)

Programming conditions

Digital operation values obtained from A/D conversion on CH1, CH2, CH3, and CH4 of the A/D converter module are read.

Initial setting description

Set the function setting switches as follows. Set the range to 4 to 20mA for all channels.

Switch name	Setting details
Function setting switch 1	OFF
Function setting switch 2	ON
Function setting switch 3	OFF
Function setting switch 4	ON
Function setting switch 5	OFF
Function setting switch 6	ON
Function setting switch 7	OFF
Function setting switch 8	ON
Function setting switch 9	OFF
Function setting switch 10	ON

Devices to be used

Device	Description	
X20	Digital operation value read command	RX40C7 (X20 to X2F)
X22	Error reset command	
X24	Maximum value/minimum value read command	
X26	Maximum value/minimum value reset command	

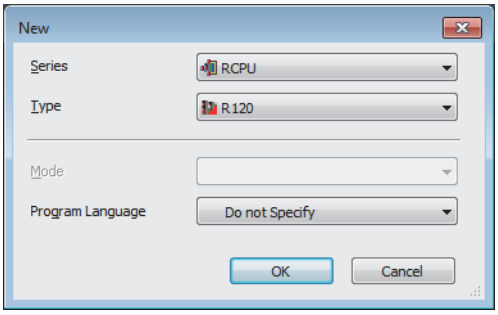
Device	Description	
X1009	Initial data setting completion flag	NZ2GN2S-60AD4 (RX0 to RX1F)
X100A	Error flag	
X100B	Remote READY	
X1010	CH1 A/D conversion completed flag	
X1011	CH2 A/D conversion completed flag	
X1012	CH3 A/D conversion completed flag	
X1013	CH4 A/D conversion completed flag	
X101D	Maximum value/minimum value reset completed flag	
Y100A	Error clear request flag	NZ2GN2S-60AD4 (RY0 to RY1F)
Y101D	Maximum value/minimum value reset request	
W1000	Latest error code	Remote register RWr
W1002	CH1 Digital operation value	
W1003	CH2 Digital operation value	
W1004	CH3 Digital operation value	
W1005	CH4 Digital operation value	
D2002	CH1 Digital operation value	Device for storage
D2003	CH2 Digital operation value	
D2004	CH3 Digital operation value	
D2005	CH4 Digital operation value	
D2010	CH1 Maximum value	
D2011	CH1 Minimum value	
D2012	CH2 Maximum value	
D2013	CH2 Minimum value	
D2014	CH3 Maximum value	
D2015	CH3 Minimum value	
D2016	CH4 Maximum value	
D2017	CH4 Minimum value	
D2030	Latest error code	
M0	Communication ready flag	
M300	Maximum value/minimum value read flag	
M310	REMTO instruction completed flag	
M311	REMTO instruction completed-with-error flag	
F5	Maximum value/minimum value read failure	
SB49	Data link status of the own station (master station)	
SW0B0.0	Data link status of each station	
N0	Nesting	

Setting method

Operating procedure

1. Create a project.

[Project] ⇨ [New]



2. For "CPU Parameter" in "Link Direct Device Setting", set "Extended Mode (iQ-R Series Mode)".

[CPU Parameter] ⇨ [Memory/Device Setting] ⇨ [Link Direct Device Setting] ⇨ [Link Direct Device Setting]

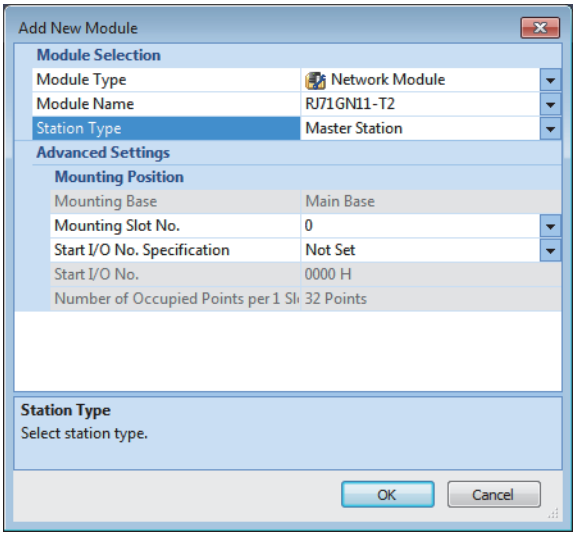
Item	Setting
Link Direct Device Setting	
Link Direct Device Setting	Extended Mode (iQ-R Series Mode)

Restriction

When writing the module parameters of the RJ71GN11-T2 to the CPU module with the engineering tool, set "Extended Mode (iQ-R Series Mode)" for "Link Direct Device Setting".
When "Q Series Compatible Mode" is set for "Link Direct Device Setting", "Write to PLC" cannot be executed.

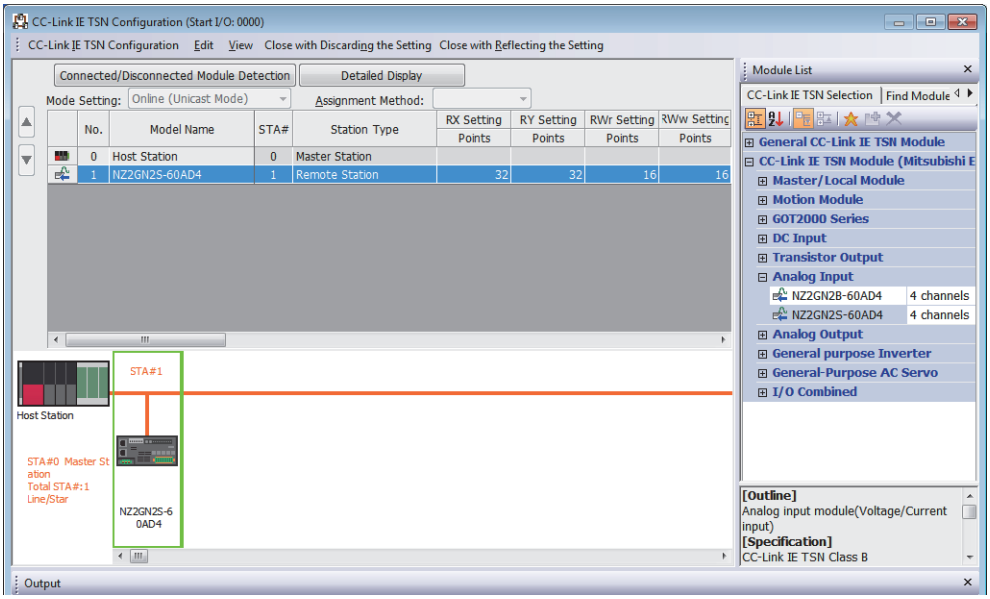
3. Set the master/local module in the following window.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Right-click ⇨ [Add New Module]



4. Display the "CC-Link IE TSN Configuration" window and set parameters as follows.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Model ⇨ [Basic Settings] ⇨ [Network Configuration Settings]



Point

If the A/D converter module firmware version is "06" or later, set "CC-Link IE TSN Class" on the "CC-Link IE TSN Configuration" window to match the CC-Link IE TSN Class of the A/D converter module.

5. Select [Close with Reflecting the Setting] and close the "CC-Link IE TSN Configuration" window.

6. Display the refresh parameter setting window and set as follows.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Model ⇨ [Basic Settings] ⇨ [Refresh Settings]

No.	Link Side					CPU Side				
	Device Name	Points	Start	End		Target	Device Name	Points	Start	End
-	SB	512	00000	001FF		Specify Dev	SB	512	00000	001FF
-	SW	512	00000	001FF		Specify Dev	SW	512	00000	001FF
1	RX	32	00000	0001F		Specify Dev	X	32	01000	0101F
2	RY	32	00000	0001F		Specify Dev	Y	32	01000	0101F
3	RWr	16	00000	0000F		Specify Dev	W	16	01000	0100F
4	RWw	16	00000	0000F		Specify Dev	W	16	01100	0110F
5										

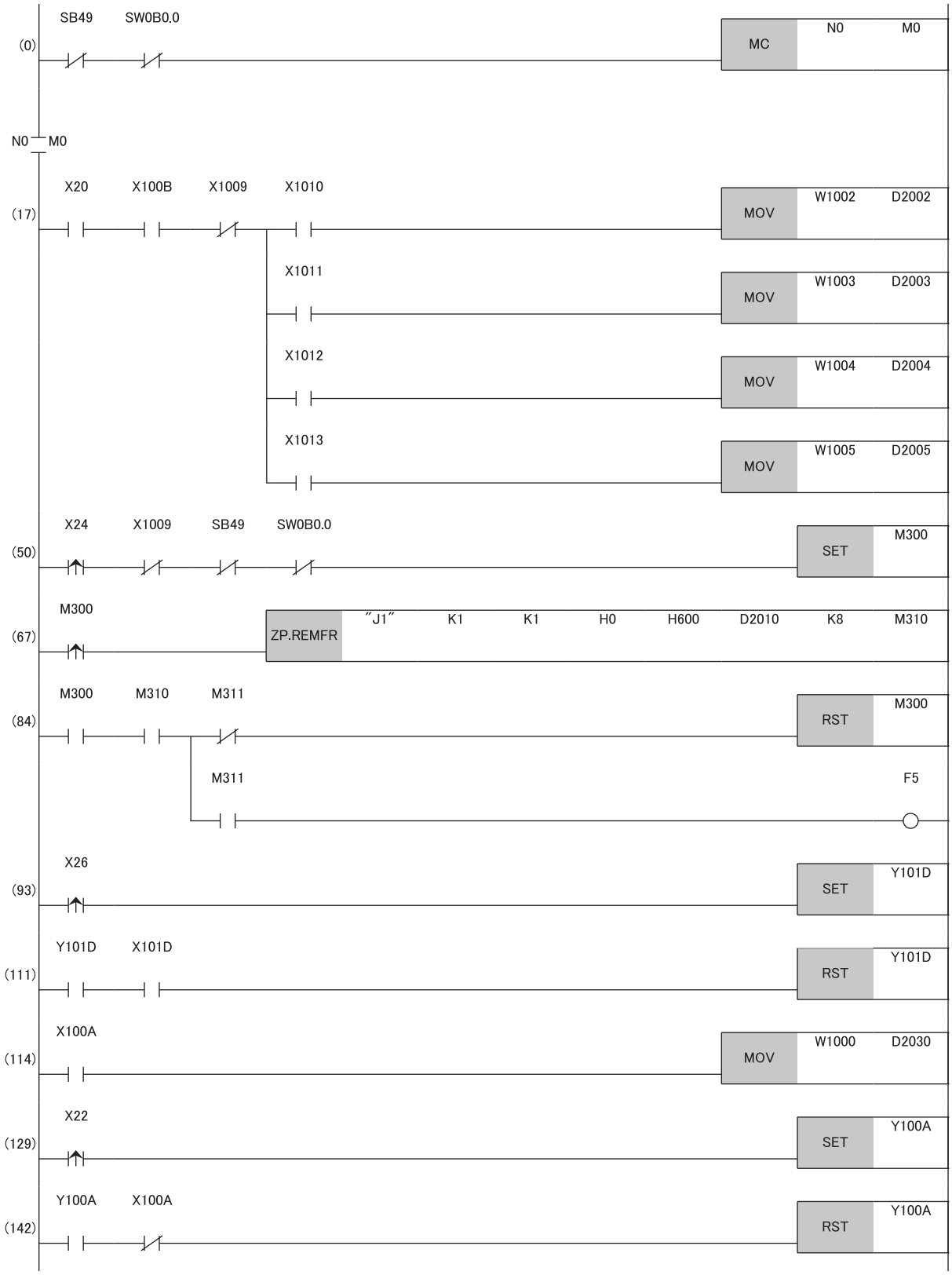
7. Click the [Apply] button.

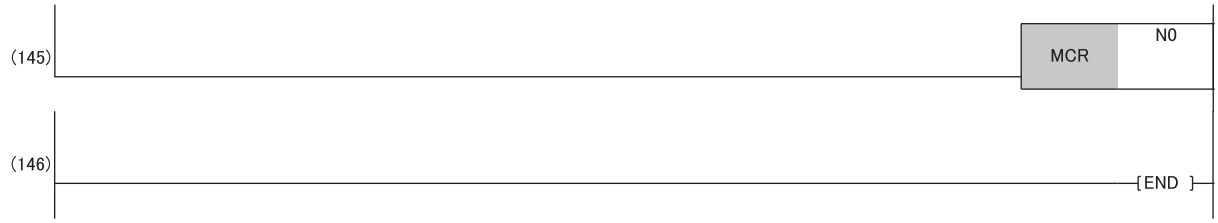
8. Write the set parameters to the CPU module of the master station and reset the CPU module of the master station, or turn off and on the power supply of the programmable controller.

[Online] ⇨ [Write to PLC]

9. Set the CPU module of the master station to RUN, and check that the DATA LINK LED of the A/D converter module is turned on.

Program example





(17)Read the digital operation value.
(50), (67), (84)Read the maximum and minimum values.
(93), (111)Reset the maximum and minimum values.
(114)Read the latest error code.
(129), (142)Clear the latest error code.

9 MAINTENANCE AND INSPECTION

The A/D converter module has no special item to be inspected. However, to maintain the best condition of the system, perform the inspection in accordance with the items described in the MELSEC iQ-R Module Configuration Manual.

MEMO

10 TROUBLESHOOTING

This chapter describes errors that may occur while the A/D converter module is used, and their troubleshooting.

10.1 CC-Link IE TSN/CC-Link IE Field Diagnostics

For CC-Link IE TSN, monitor the status and conduct an operation test.

For details on CC-Link IE TSN/CC-Link IE Field diagnostics, refer to the following.

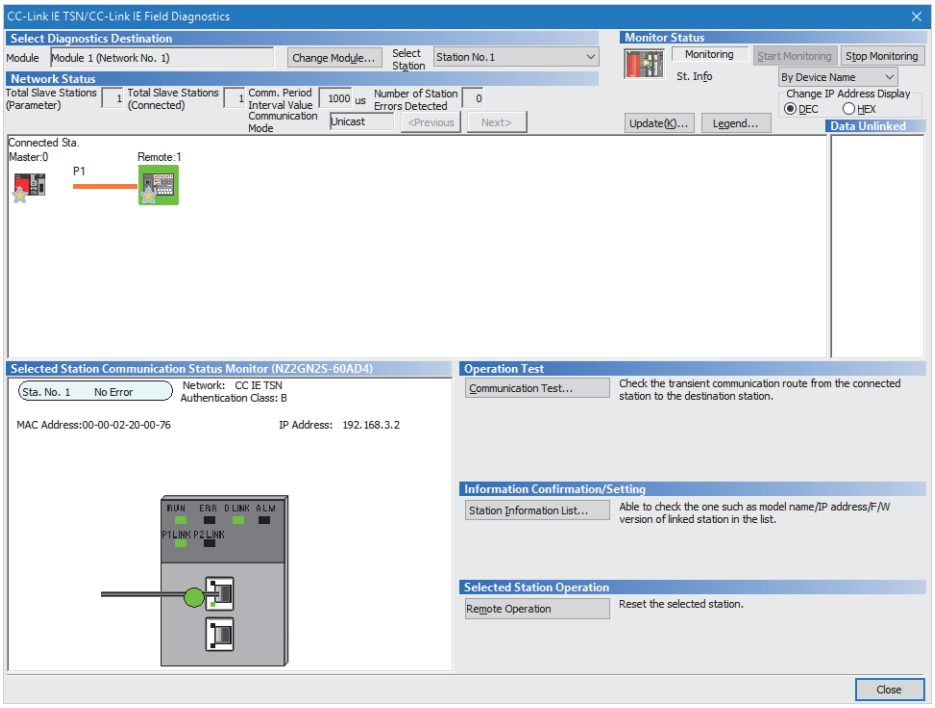
User's manual for the master station used

Remote reset

Perform the following operation to remotely reset a selected A/D converter module.

Operating procedure

1. Select a slave station to be reset and click the [Remote Operation] button.



In this manual, "Authentication Class" is described as "CC-Link IE TSN Class".

2. Follow the on-screen instructions and click the [Yes] button.
3. Follow the on-screen instructions and click the [OK] button.

Precautions

■Remote reset

Remote reset of an A/D converter module may cause the following because it affects communications on another station.

- Another station is disconnected.
- A synchronous communication error 1 (error code: 2210H) occurs on another A/D converter module using the CC-Link IE TSN Network synchronous communication function.

■Setting of function setting switches

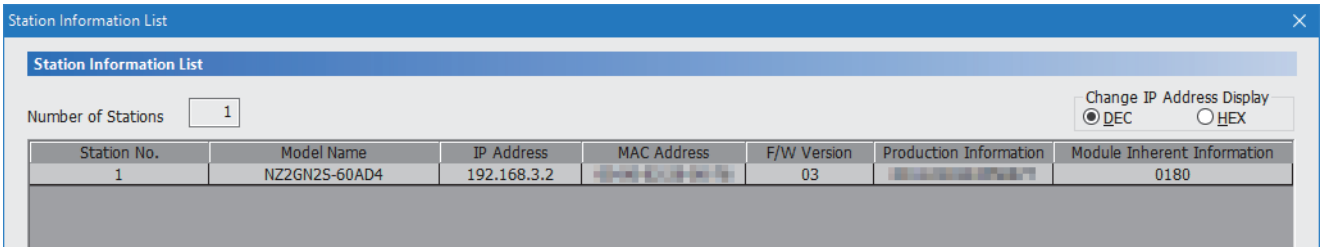
When remote reset is performed, if the setting of function setting switch 1 is different from the setting at power-on, a remote reset disable error (N/W mode setting) (error code: 1090H) occurs, and the A/D converter module is not reset.

■Communication speed setting function

- If the communication speed different from that of the currently-operating module has been set and remote reset is performed after that, a remote reset disable error (communication speed setting) (error code: 1091H) occurs, and the A/D converter module is not reset.
- When remote reset is performed under the error conditions (non-volatile memory data error (communication speed) (error code: 2012H) or non-volatile memory access error (communication speed) (error code: 1063H) caused by the execution of the communication speed write), a remote reset disable error (communication speed setting) (error code: 1091H) occurs, and the A/D converter module is not reset. The remote reset is enabled by executing the communication speed write.

Checking station information

Information on A/D converter modules where data link is established is displayed in the "Station Information List" window. Information on each A/D converter module, such as the production information, firmware version, and module inherent information, can be checked by clicking the [Station Information List] button in the "CC-Link IE TSN/CC-Link IE Field Diagnostics" window.



The module inherent information shows the startup status of function setting switches of each A/D converter module.

Ex.

When only the function setting switch 10 is on: The module inherent information is "0001".
When only the function setting switch 4 is on: The module inherent information is "0040".

Point

- When checking the station information of each A/D converter module in the "Station Information List" window, check the versions of A/D converter modules that support the "Station Information List" window display function. (☞ Page 191 Added and Changed Functions)
- For items displayed in the "Station Information List" window, refer to the following.

📖 User's manual for the master station used

10.2 Checking the LEDs

This section describes how to troubleshoot the system by the LEDs.

When the PW LED does not turn on

When the PW LED does not turn on, check the following items.

Check item	Action
Is any LED other than the PW LED turned on?	When any LED other than the PW LED turns on, the possible cause is a hardware failure. Please consult your local Mitsubishi representative.
Is the module power supply (24VDC) wired?	Wire the module power supply (24VDC).
Is the module power supply (24VDC) on?	Turn on the module power supply (24VDC).
Does the voltage of the module power supply (24VDC) conform to the specified range?	Adjust the voltage value to conform to the range of performance specifications.

When the RUN LED does not turn on

When the RUN LED does not turn on, check the following item.

Check item	Action
Has a hardware error occurred?	Turn off and on the module power supply. If the RUN LED does not turn on even after the module power supply is turned off and on, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.

When the RUN LED flashes

When the RUN LED flashes, check the following item.

Check item	Action
Is the A/D converter module in the unit test?	When the A/D converter module is in the unit test, the RUN LED turns on after the unit test is completed. Take corrective action according to the result of the unit test. When a unit test is not conducted, set the IP address/station number setting switches to an appropriate value, and set function setting switch 1 to OFF. ☞ Page 140 Unit Test

When the ERR. LED turns on or flashes

When the ERR. LED turns on or flashes, check the following item.

Check item	Action
Has any error occurred?	Identify the error factor of the A/D converter module with the engineering tool to take the corrective action. ☞ Page 143 How to Check Error Codes and Alarm Codes

When the ALM LED turns on

When the ALM LED turns on, check the following item.

Check item	Action
Is a warning issued in the A/D converter module?	Check Warning output flag (RWrB).

When the ALM LED flashes

When the ALM LED flashes, check the following item.

Check item	Action
Has any input signal error occurred in the A/D converter module?	Check Input signal error detection flag (RWrA).

When the P1 LINK LED or P2 LINK LED turns off

When the P1 LINK LED or P2 LINK LED turns off, check the following items.

Check item	Action
Is the Ethernet cable used compliant with the relevant standard?	Replace the cable with an Ethernet cable compliant with the relevant standard. 📖 User's manual for the master station used
Is the segment length 100m or less?	Change the segment length to 100m or less.
Does the cabling condition (bending radius) meet the specifications?	Refer to the manual for the Ethernet cable used, and correct the bend radius.
Is any Ethernet cable disconnected?	Replace the Ethernet cable.
Do the switching hub and other stations used in the system operate normally?	• Check that the switching hub and other stations are powered on. • Check that the switching hub compliant with the specifications of the master module in use is used. (📖 User's manual for the master station used) • Disconnect Ethernet cables, and then reconnect them. • Power off and on the switching hub.
Is the communication speed of the A/D converter module same as that of a device connected to the module?	• Set a communication speed to the A/D converter module using the communication speed setting, and connect the module to a device with the same communication speed. ☞ Page 97 Communication Speed Setting Function • When the firmware version of the A/D converter module is "04" or earlier, perform a firmware update or connect the module to a device that can communicate with 1Gbps.
Is the auto-negotiation is enabled for a device connected to the A/D converter module with the communication speed of 100Mbps?	Enable the auto-negotiation for that device. Or connect the A/D converter module to a device where the auto-negotiation is enabled.

Point

If link-up processing is repeated due to a condition of a device on the line, it may take longer for the P1 LINK LED/P2 LINK LED to turn on. This phenomenon may be eliminated by changing the connector of the relevant module to which the Ethernet cable is connected (example: P1 → P2).

For the wiring of Ethernet cable, refer to the following.

☞ Page 36 Wiring of Ethernet Cable

When the DATA LINK LED turns off

When the DATA LINK LED turns off, check the following items.

Check item	Action
Is the Ethernet cable used compliant with the relevant standard?	Replace the cable with an Ethernet cable compliant with the relevant standard. 📖 User's manual for the master station used
Is the segment length 100m or less?	Change the segment length to 100m or less.
Does the cabling condition (bending radius) meet the specifications?	Refer to the manual for the Ethernet cable used, and correct the bend radius.
Is any Ethernet cable disconnected?	Replace the Ethernet cable.
Do the switching hub and other stations operate normally?	• Check that the switching hub and other stations are powered on. • Check that the switching hub compliant with the specifications of the master module in use is used. (www.cc-link.org) • Disconnect Ethernet cables, and then reconnect them. • Power off and on the switching hub.
Does the master station connected to the network operate normally?	• If an error occurs in the master station, clear the error in the master station. • Check that the master station in use is a supported master station. (☞ Page 24 Supported master station)
Is another module that is powered off or in the middle of remote reset connected between the master station and the A/D converter module?	• Power on the A/D converter module(s) that is off because an A/D converter module becomes disconnected when it is off. • The A/D converter module becomes disconnected during remote reset. Avoid unnecessary remote reset.

Check item	Action
Does the module between the master station and the A/D converter module link up at the desired communication speed?	Change the communication speed of the module or the switching hub to satisfy the communication speed.
Is the IP address of the A/D converter module duplicated by any of other devices within the access range of CC-Link IE TSN?	Change the IP address so that no IP address duplication occurs in the access range of CC-Link IE TSN.
Is a device that is operating as a network other than CC-Link IE TSN connected between the master station and the A/D converter module?	Disconnect a device that is not operating as CC-Link IE TSN from the system. For a device that can be set to operate on CC-Link IE TSN, make sure that it is operating as CC-Link IE TSN.
Is function setting switch 1 turned off?	Turn off function setting switch 1 if it is turned on, and turn off and on the module power supply.

When the DATA LINK LED flashes

When the DATA LINK LED flashes, check the following items.

Check item	Action
Do the IP addresses match?	Match the IP address of the A/D converter module with the IP address that is set in the network configuration settings of the master station.
Does the station type match?	Match the station type of the A/D converter module with the station type that is set in the network configuration settings of the master station.
Is the A/D converter module a reserved station?	Change the setting of reserved/error invalid station to other than the reserved station in the network configuration settings of the master station.
Is the IP address of the A/D converter module duplicated with that of other station?	At least two IP addresses are overlapped. Change the setting so that all IP addresses differ.
In the network configuration settings of the master station, is the third or fourth octet of the IP address duplicated by that of another station?	Set the IP addresses so that there is no duplication in the third and fourth octets of the IP addresses for all the stations.
In the network configuration settings of the master station, does each network address (the subnet mask part of IP address) match that of the master station?	Set each IP address and subnet mask so that the network addresses of all the stations are the same.
Is another station in which a communication error has occurred connected between the master station and the A/D converter module?	An A/D converter module cannot establish data link if there is no path available with which the A/D converter module can communicate with the master station without relaying data via a station with a communication error. If a communication error has occurred in two or more stations, clear the error one by one, starting from the station closest to the master station on the communication path.
Has another station been remotely reset or powered off?	Disconnection temporarily occurs due to remote reset or power-off of another station. Wait until communication restarts.
Does a station on the network link up at the desired communication speed?	Change the communication speed of the module or the switching hub to satisfy the communication speed.
Does the time synchronization source module operate normally?	• If an error occurs in the time synchronization source module, clear the error. • When the time synchronization source module is reset or powered off, disconnection temporarily occurs due to switching of time synchronization sources. Wait until communication restarts.
Is a time synchronization source module with a higher priority newly connected to the network?	Disconnection temporarily occurs due to switching of time synchronization sources. Wait until communication restarts.
Does the master station connected to the network operate normally?	If an error occurs in the master station, clear the error in the master station.
Does the model name of the slave station set in the network configuration settings match the model name of the actual device?	Change the network configuration settings so that the model name of the slave station set in the network configuration settings matches the model name of the actual device. Or, in the network configuration settings, set the A/D converter module as a "general-purpose remote station".
Is the event code of 00C81 registered for the A/D converter module with event history of the master station?	• Change the CC-Link IE TSN Class in the network configuration settings so that the CC-Link IE TSN Class set in the network configuration settings matches the CC-Link IE TSN Class of the A/D converter module. Alternatively, change the CC-Link IE TSN Class of the A/D converter module. • For A/D converter modules that do not support the CC-Link IE TSN Class setting function, set "CC-Link IE TSN Class" in the network configuration setting to "CC-Link IE TSN Class B", or update the firmware to the latest version.
Is the event code of 00C71 registered for the A/D converter module with event history of the master station?	• "Network Synchronous Communication" of the network configuration setting may be set to "Synchronous" for an A/D converter module not supporting the CC-Link IE TSN Network synchronous communication function. In this case, set "Network Synchronous Communication" in the network configuration setting to "Asynchronous" or perform a firmware update so that the firmware of the module becomes the latest. • The CC-Link IE TSN network synchronous communications function may be set to "Synchronous" for A/D converter modules that have the CC-Link IE TSN Class setting set to CC-Link IE TSN Class A. In this case, set the CC-Link IE TSN Network synchronous communications function to "Asynchronous" or set the CC-Link IE TSN Class of the A/D converter module to "CC-Link IE TSN Class B". • If the event code of 00C71 is still registered even after the above actions are taken, check the manual for the master station in use and eliminate the cause.
Are the IP address and subnet mask that can be used for the A/D converter module set in the network configuration settings?	Set the IP address and subnet mask that can be used for the A/D converter module. (☞ Page 26 Setting the IP address/station number setting switches)
In the network configuration settings, are the number of points set for RX and RY within the range that can be used for the A/D converter module?	Set 128 or less for the number of points for RX and RY.
In the network configuration settings, are the number of points set for RWr and RWw within the range that can be used for the A/D converter module?	Set 64 or less for the number of points for RWr and RWw.

Check item	Action
Is the slave station parameter automatic setting completed with an error when the slave station parameter automatic setting is enabled?	Check Slave station parameter automatic setting execution result details (SW0194) and the event history of the master/local module, and take the corrective actions corresponding to the stored error code.
When the CC-Link IE TSN network synchronous communications function is used, is the set synchronization cycle supported by the A/D converter unit?	When using the CC-Link IE TSN network synchronous communications function, set values in the range that the A/D converter module supports for the synchronous cycle. (☞ Page 80 CC-Link IE TSN Network Synchronous Communication Function)
Has any error occurred in the A/D converter module?	If an error has occurred in the A/D converter module, a network parameter may be set to a value that the A/D converter module cannot handle. If following errors have occurred, eliminate them in order from the top one. (☞ Page 147 Error Code List) • D023H: Communication period setting error (CC-Link IE TSN Class B/1Gbps) • D024H: Communication period setting error (CC-Link IE TSN Class B/100Mbps) • D028H: Communication period setting error (CC-Link IE TSN Class A) • D026H: Synchronization cycle setting error • D025H: RWw/RWr setting error • D020H: Network synchronous communication setting error • D027H: Network synchronous communication setting change disable error • D001H: Communication setting error 2 • D000H: Communication setting error 1
Has ring topology been configured?	When the firmware version of the A/D converter module is "02" or earlier, perform a firmware update or connect with line topology, star topology, or a mixture of star topology and line topology. When the CC-Link IE TSN Class of the A/D converter module is CC-Link IE TSN Class A, set it to CC-Link IE TSN Class B or connect with line topology, star topology, or a mixture of star topology and line topology.
Is the CC-Link IE TSN Class of the A/D converter module set to CC-Link IE TSN Class A?	If the CC-Link IE TSN Class setting of the A/D converter module is set to CC-Link IE TSN Class A, take the following actions. • Check the version of the master station, and if the version does not support CC-Link IE TSN Protocol version 2.0, please update the master station to the corresponding version. If the communication period setting of the A/D converter module is "Low-Speed", check the CC-Link IE TSN Class A (Low-Speed) multiple (buffer memory address: 1294304) of the master module, unit buffer memory. In addition, if the value of the CC-Link IE TSN Class A (Low-Speed) multiple (buffer memory address: 1294304) is 6 or higher, set the value of basic period × multiple × CC-Link IE TSN Class A (Low-Speed) multiple (buffer memory address: 1294304) to 1ms or higher and 6.4 seconds or lower in the communication period interval settings. For details, refer to the following. ☞ Page 46 When the CC-Link IE TSN Class of the A/D converter module is CC-Link IE TSN Class A
Is the network in a high load state?	Reduce the network load. • If a broadcast storm is occurring, eliminate the cause. • If an Ethernet device is connected, reduce the frequency of packets sent by the Ethernet device.

10.3 Unit Test

The purpose of a unit test is to check if there is any abnormality in the A/D converter module hardware.

1. Power off the power supply of the A/D converter module.
2. Connect P1 and P2 of the A/D converter module with an Ethernet cable.
3. Set the IP address/station number setting switches and function setting switches as follows.

- IP address/station number setting switch (x1): Any position
- IP address/station number setting switch (x16): F
- Function setting switch 1: ON
- Function setting switch 2 to function setting switch 10: Any position

4. Power on the power supply of the A/D converter module.
5. Unit test begins.

The RUN LED flashes during the unit test.

6. The RUN LED turns on when the unit test is completed.

- When completed normally, the ERR. LED does not turn on, remaining off.
- When completed with an error, the ERR. LED turns on. If the test is completed with an error, replace the Ethernet cable and run the test again. If the test is completed with an error again, it may be due to a hardware failure in the A/D converter module. Please consult your local Mitsubishi representative.

10.4 Troubleshooting by Symptom

Troubleshooting by symptom is suitable for the case where modules fail to operate normally even though no error has occurred in the A/D converter module. If an error occurs in the A/D converter module, identify the cause of the error using the engineering tool.

When digital operation value cannot be read

When a digital operation value cannot be read, check the following items.

Check item	Action
Is there any problem with the wiring, such as looseness or disconnection of analog signal lines?	Check the faulty area by checking signal line visually or conductively.
Is the input range setting correct?	• Check Input range switch enable/disable setting status flag (RXC) for the input range switch enable/disable setting. • If Input range switch enable/disable setting status flag (RXC) is enabled, check the settings of the function setting switches 3 to 10. Change any incorrect settings, and turn off and on the module power supply. • If Input range switch enable/disable setting status flag (RXC) is disabled, check the range setting (address: 0103H) using the engineering tool or dedicated instruction. If the input range setting is incorrect, correct it via the program or parameter setting.
Is A/D conversion enable/disable setting set to A/D conversion disabled for the channels where the analog value is to be input?	Check A/D conversion enable/disable setting (address: 0102H) by using the engineering tool or the dedicated instruction. Then, set A/D conversion enabled by program or parameter setting.
Is Initial data setting request flag (RY9) executed?	Use the engineering tool to turn on and off Initial data setting request flag (RY9), and check that the digital operation value is stored in CH□ Digital operation value (RWr2 to RWr5). When the problem has been solved, check the program again.
Are V+ and SH terminals connected when using a current input signal?	When using a current input signal, be sure to connect V+ and SH terminals. (☞ Page 43 Using a current input signal)
Does the voltage of the module power supplied externally reach to the voltage of the performance specifications?	Check that module power supply voltage is within the range of performance specifications. (☞ Page 16 Performance Specifications)
Is a value set correctly for the averaging processing?	When the time average processing is specified, set a value satisfying the following condition: a set value is equal to or greater than "4 × sampling cycle" (ms). If a set value does not satisfy the condition, 0 is stored in Digital operation value.
Is there any potential difference between the AG terminal and the external device GND?	Connect the AG terminal and the external device GND.
Is the inter-module synchronous interrupt program created when the CC-Link IE TSN Network synchronous communication function is used?	Create the inter-module synchronous interrupt program when the CC-Link IE TSN Network synchronous communication function is used. For the inter-module synchronous interrupt program, refer to the following: MELSEC iQ-R Inter-Module Synchronization Function Reference Manual
Is a supported master station used when the CC-Link IE TSN Network synchronous communication function is used?	When using the CC-Link IE TSN Network synchronous communication function, use a supported master station. ☞ Page 80 Applicable version

Point

If the digital operation value cannot be read even after the above actions are taken, the failure of the A/D converter module is a possible cause.
Please consult your local Mitsubishi representative.

When an A/D conversion completed flag does not turn on in the normal mode

When an A/D conversion completed flag does not turn on in normal mode, check the following item.

Check item	Action
Has any input signal error occurred?	Check Input signal error detection flag (RWrA).

When the digital operation value is out of the accuracy range

When the digital operation value is out of the accuracy range, check the following item.

Check item	Action
Is any measure against noise taken?	Take measures to reduce noise, such as using a shielded cable for connection.

When parameter read/write and CC-Link IE TSN diagnostics cannot be performed

When parameter read/write and CC-Link IE TSN diagnostics cannot be performed, check the following items.

Check item	Action
Is the DATA LINK LED of the A/D converter module on?	Check the DATA LINK LED of the A/D converter module and if it is not on, perform troubleshooting by referring to the following. ☞ Page 136 When the DATA LINK LED turns off ☞ Page 138 When the DATA LINK LED flashes Check other LEDs by referring to the following. ☞ Page 135 Checking the LEDs
Is the version of the engineering tool supported?	Check the version of the engineering tool, and if it is older than the supported versions, upgrade it.
Are network parameter settings same as the settings of the CPU module?	Perform "Verify with PLC" and check that network parameter settings match the settings of the CPU module. If they differ, match the settings by performing "Read from PLC" and "Write to PLC", and write the parameters to modules on slave stations.

Point

If parameter read/write and CC-Link IE TSN diagnostics cannot be performed even after the above actions are taken, the failure of the A/D converter module is a possible cause.
Please consult your local Mitsubishi representative.

When the A/D converter module repeats disconnection and return

Confirm the check items for when the DATA LINK LED flashes.
☞ Page 138 When the DATA LINK LED flashes

10.5 How to Check Error Codes and Alarm Codes

Error and alarm codes can be checked with the following methods.

- Checking by using CC-Link IE TSN/CC-Link IE Field diagnostics
- Checking by Latest error code (RWr0)
- Checking by Latest alarm code (RWr1)

Checking by using CC-Link IE TSN/CC-Link IE Field diagnostics

The error history held in the A/D converter module can be read. Errors that occurred before powering-off can be checked as well.

Point

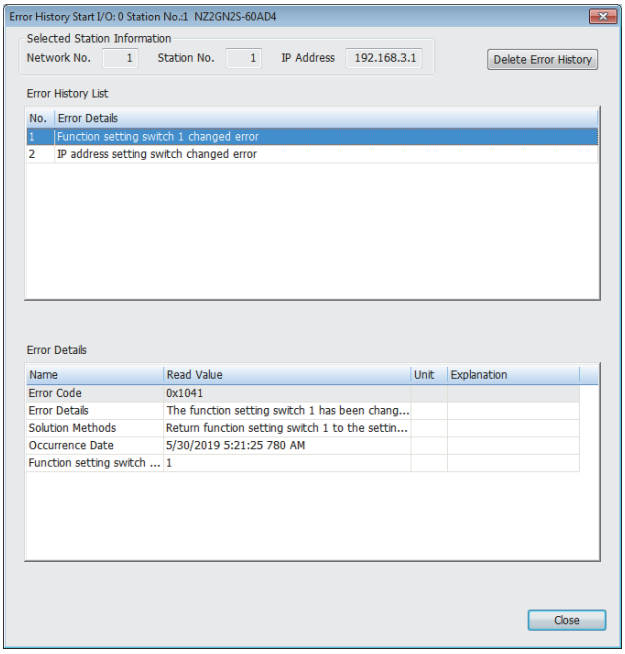
- The error history records a maximum of 16 errors in reverse chronological order of occurrence. If 17 or more errors occur, errors are deleted from the oldest.
- If the same error occurs continuously, only the error that occurred first is stored to the error history.
- The error history is stored in the flash memory in the A/D converter module, and it remains even when the power is cut off. However, when the upper limit for the number of writes to the flash memory is reached, the error history cannot be stored in the flash memory.
- "Occurrence Date" information in the error history is recorded after clock information is distributed from the master station. When an error occurs before clock information is distributed from the master station, occurrence date information is not recorded.

Operating procedure

1. Connect the engineering tool to the CPU module.
2. Start CC-Link IE TSN/CC-Link IE Field diagnostics from the menu.

[Diagnostics] ⇨ [CC-Link IE TSN/CC-Link IE Field Diagnostics]

3. Right-click the slave station whose error history is to be checked, and select "Error History".
4. Follow the on-screen instructions and click the [Yes] button.
5. The error history appears.



Point

To initialize the error history, click the [Delete Error History] button.

Checking by Latest error code (RWr0)

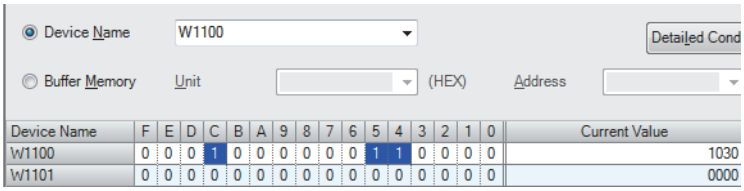
Check the latest error code with the remote register of the master/local module.

Operating procedure

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor]

Ex.

When the refresh target device for Latest error code (RWr0) is W1100



■How to clear an error

How to clear an error depends on the error type.

Error type	How to clear an error
Major error	An error cannot be cleared.
Moderate error	Eliminate the error cause, and power off and on the A/D converter module. Or turn on and off Error clear request flag (RYA).
Minor error	Eliminate the error cause, and power off and on the A/D converter module. Or turn on and off Error clear request flag (RYA).

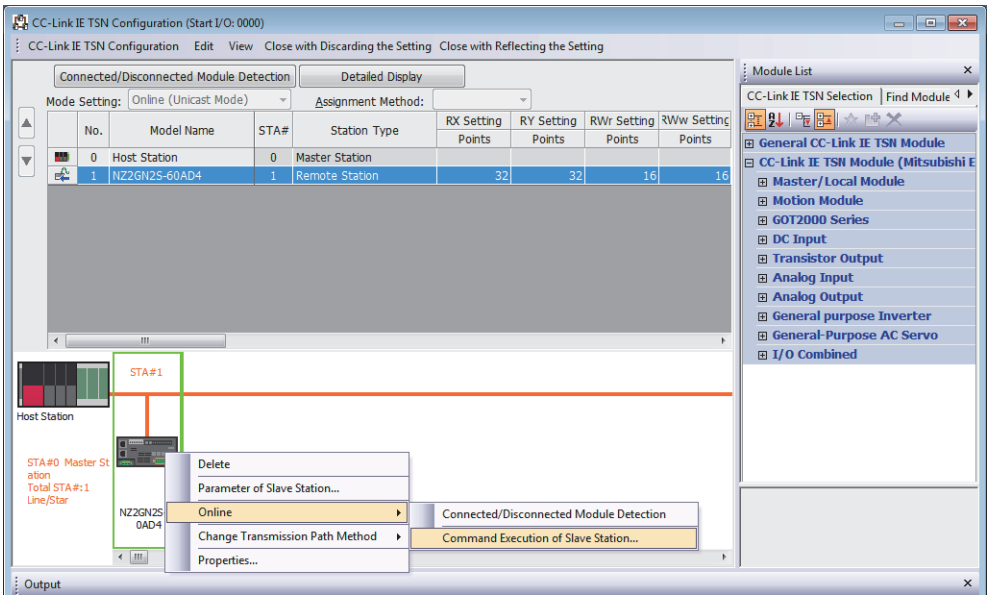
■How to clear an error using the command execution of slave station.

Follow the procedure below to clear an error using the command execution of slave station.

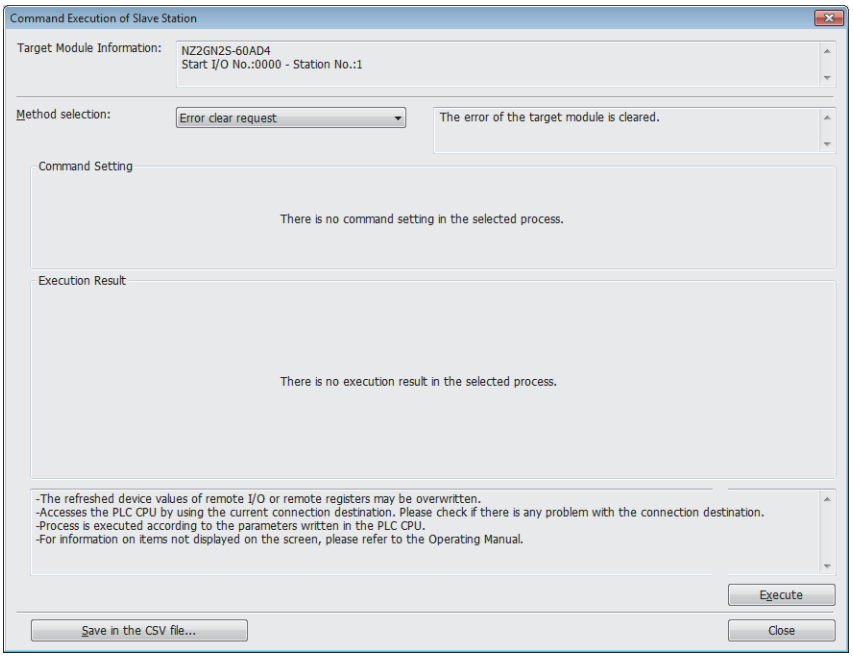
Operating procedure

1. Select an A/D converter module from the station list on the "CC-Link IE TSN Configuration" window.
2. Open the "Command Execution of Slave Station" window.

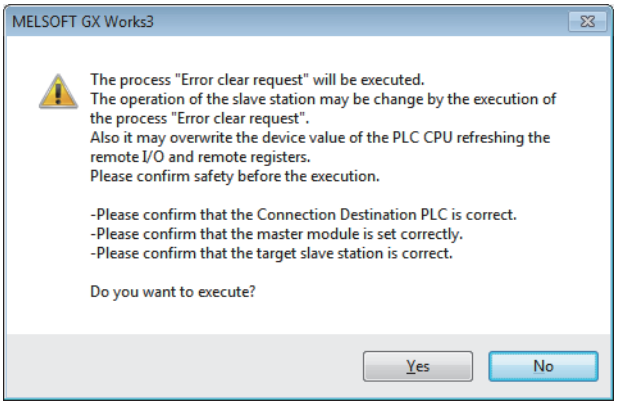
Right-click on the target A/D converter module ⇨ [Online] ⇨ [Command Execution of Slave Station]



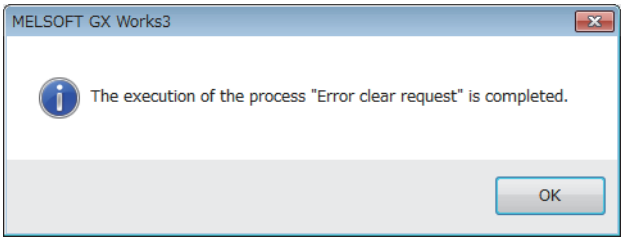
3. Set "Method selection" to "Error clear request", and click the [Execute] button.



4. When the following window appears, click the [Yes] button.



5. When the following window appears, click the [OK] button.



6. An error on the A/D converter module is cleared.

Checking by Latest alarm code (RWr1)

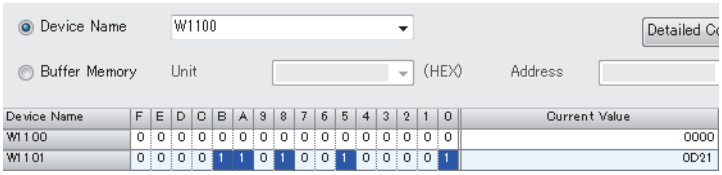
Check the latest alarm code with the remote register of the master/local module.

Operating procedure

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor]

Ex.

When the refresh target device for Latest alarm code (RWr1) is W1101



10.6 Error Code List

The error codes are classified into the following three types.

Classification	Description
Major error	This error is a sign that recovery is impossible, with the RUN LED turning off.
Moderate error	This error is a sign that the module cannot continue to operate, with the ERR. LED turning on.
Minor error	This error is a sign that the module can continue to operate, with the ERR. LED flashing.

If any of these errors occurs, check that the DATA LINK LED is on, and take the corrective actions corresponding to the error code with the list below.

☐ indicates the channel number where the error occurred.

(Address: 01××H) indicates the address where the error occurred.

Error code (hexadecimal)	Classification	Error name	Description and cause	Action
1020H[*1]	Minor error	Remote buffer memory access error	A buffer memory area other than the remote buffer memory areas has been accessed using the REMFR/REMTO instruction.	Correct the setting data of the REMFR/REMTO instruction to access the remote buffer memory.
1030H[*1]	Minor error	IP address/station number setting switches changed error	IP address/station number setting switches have been changed with the module powered on.	Return the IP address/station number setting switches to the setting they had when the module was powered on.
1041H[*1]	Minor error	Function setting switch 1 change error	Function setting switch 1 has been changed with the module powered on.	Return function setting switch 1 to the setting it had when the module was powered on.
1042H[*1]	Minor error	Function setting switch 2 change error	Function setting switch 2 has been changed with the module powered on.	Return function setting switch 2 to the setting it had when the module was powered on.
1043H[*1]	Minor error	Function setting switch 3 change error	Function setting switch 3 has been changed with the module powered on.	Return function setting switch 3 to the setting it had when the module was powered on.
1044H[*1]	Minor error	Function setting switch 4 change error	Function setting switch 4 has been changed with the module powered on.	Return function setting switch 4 to the setting it had when the module was powered on.
1045H[*1]	Minor error	Function setting switch 5 change error	Function setting switch 5 has been changed with the module powered on.	Return function setting switch 5 to the setting it had when the module was powered on.
1046H[*1]	Minor error	Function setting switch 6 change error	Function setting switch 6 has been changed with the module powered on.	Return function setting switch 6 to the setting it had when the module was powered on.
1047H[*1]	Minor error	Function setting switch 7 change error	Function setting switch 7 has been changed with the module powered on.	Return function setting switch 7 to the setting it had when the module was powered on.
1048H[*1]	Minor error	Function setting switch 8 change error	Function setting switch 8 has been changed with the module powered on.	Return function setting switch 8 to the setting it had when the module was powered on.
1049H[*1]	Minor error	Function setting switch 9 change error	Function setting switch 9 has been changed with the module powered on.	Return function setting switch 9 to the setting it had when the module was powered on.
104AH[*1]	Minor error	Function setting switch 10 change error	Function setting switch 10 has been changed with the module powered on.	Return function setting switch 10 to the setting it had when the module was powered on.
1050H[*1]	Minor error	Error history save limit error	The upper limit for the number of times an error is saved in the error history is reached.	No more errors can be saved in the error history. Check the error by the latest error code.
1051H[*1]	Minor error	IP address save limit error	The upper limit for the number of times the IP address is saved is reached.	IP address changes made after this error occurs will not be saved in the non-volatile memory.
1052H[*1]	Minor error	Module parameter save limit error	The upper limit for the number of times a module parameter is saved is reached.	Module parameter changes made after this error occurs will not be saved in the non-volatile memory.

Error code (hexadecimal)	Classification	Error name	Description and cause	Action
1053H[*1]	Minor error	Communication speed save limit error	The upper limit for the number of times a communication speed setting is saved is reached.	Communication speed changes made in and after this error will not be saved in the non-volatile memory.
1054H[*1]	Minor error	CC-Link IE TSN Class save limit error	The upper limit for the number of times CC-Link IE TSN Class can be saved has been reached.	Changes to the CC-Link IE TSN Class made after this error occurs will not be saved in the non-volatile memory.
1060H[*1]	Minor error	Non-volatile memory access error (error history)	The error cannot be saved because an error in access to the non-volatile memory was detected.	• Errors that occur after this error occurs may not be saved in the non-volatile memory. • Take measures to reduce noise, such as using a shielded cable for connection. • If this error persists, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.
1061H[*1]	Minor error	Non-volatile memory access error (IP address)	The IP address cannot be saved because an error in access to the non-volatile memory was detected.	• The IP address is not saved in the non-volatile memory. • Take measures to reduce noise, such as using a shielded cable for connection. • If this error persists, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.
1062H[*1]	Minor error	Non-volatile memory access error (module parameter)	The module parameters cannot be saved because an error in access to the non-volatile memory was detected.	• The module parameters are not saved in the non-volatile memory. • Take measures to reduce noise, such as using a shielded cable for connection. • If this error persists, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.
1063H[*1]	Minor error	Non-volatile memory access error (communication speed)	The communication speed setting cannot be saved because an error in access to the non-volatile memory was detected.	• The communication speed setting is not saved in the non-volatile memory. • Take measures to reduce noise, such as using a shielded cable for connection. • If this error persists, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.
1064H[*1]	Minor error	Non-volatile memory access error (CC-Link IE TSN Class)	The CC-Link IE TSN Class cannot be saved because an error was detected when attempting to access the non-volatile memory.	• The CC-Link IE TSN Class was not saved in the non-volatile memory. • Take measures to reduce noise, such as using a shielded cable for connection. • If this error persists, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.
1080H[*1]	Minor error	Module power supply voltage drop error	The module power supply voltage is dropped.	• Check the state of the module power supply. • Check that the power supply voltage satisfies the specifications for the analog module.
1090H[*1]	Minor error	Remote reset disable error (N/W mode setting)	Remote reset could not be performed because the setting of function setting switch 1 is different from the setting it had when the module was powered on.	Return function setting switch 1 to the setting it had when the module was powered on, and then perform remote reset again.

Error code (hexadecimal)	Classification	Error name	Description and cause	Action
1091H[*1]	Minor error	Remote reset disable error (communication speed setting)	Remote reset cannot be performed due to the following reasons related to the communication speed setting function. • The communication speed different from that of the currently-operating module has been set. • The communication speed saved in the non-volatile memory cannot be accessed.	• Turn off and on the module power supply. • Set the communication speed again.
2010H[*2]	Moderate error	Non-volatile memory data error (parameter)	The parameter data stored in the non-volatile memory are abnormal.	• To set the parameters of the non-volatile memory back to their default, change Parameter area initialization command (address: 1002H) as follows: Not commanded (0) → Commanded (1) → Not commanded (0), and turn off and on the module power supply. After that, set the parameters again. • Take measures to reduce noise, such as using a shielded cable for connection. • If this error persists, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.
2011H[*1]	Moderate error	Non-volatile memory data error (IP address)	The IP address and subnet mask stored in the non-volatile memory are abnormal.	• The module will be automatically recovered immediately after the error occurs. However, the stored IP address and subnet mask are lost, and operation is performed assuming that the following are stored. IP address: 192.168.3.250 Subnet mask: 255.255.255.0 • Take measures to reduce noise, such as using a shielded cable for connection. • If this error persists, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.
2012H[*1]	Moderate error	Non-volatile memory data error (communication speed)	The communication speed setting stored in the non-volatile memory is abnormal.	• The module will automatically recover immediately after the error occurs. When the module is started up by turning off and on the module power supply, the stored communication speed setting is discarded, and the module operates with the communication speed of 1Gbps. When the module is started up by remote reset, it operates with the communication speed that was applied at the remote reset. • Take measures to reduce noise, such as using a shielded cable for connection. • If this error persists, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.

Error code (hexadecimal)	Classification	Error name	Description and cause	Action
2013H[*1]	Moderate error	Non-volatile memory data error (CC-Link IE TSN Class)	The CC-Link IE TSN Class saved in the non-volatile memory is abnormal.	• The module will be automatically recovered immediately after the error occurs. However, the saved CC-Link IE TSN Class is lost, and the system operates under the assumption that CC-Link IE TSN Class B is saved. • Take measures to reduce noise, such as using a shielded cable for connection. • If this error persists, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.
2210H[*2]	Moderate error	Synchronous communication error 1	When CC-Link IE TSN Network synchronous communication function is used, time synchronization is abnormal.	• Check that the system configuration meets the specifications by referring to the manual for the master station. • Check that no communication error has occurred on the other stations. • Check that no remote reset has been performed to the other stations. • Take measures against noise on the transmission path. • If this error persists, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.
2220H[*2]	Moderate error	Synchronous communication error 2	When CC-Link IE TSN Network synchronous communication function is used, synchronous communication with the master station has failed for a certain period of time.	• Change the synchronization cycle of the master station to a longer cycle. • Reduce the number of slave stations that operate with the CC-Link IE TSN Network synchronous communication function. • Take measures against noise on the transmission path. • If this error persists, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.
2400H[*2]	Moderate error	IP address/station number setting switches out of range error (IP address)	IP address/station number setting switches are set to 255.	Turn on the power supply with the IP address/station number setting switches set to a value in the range 0 to 254.
310□H[*1]	Moderate error	CH□ Range setting out-of-range	The value set in CH□ Range setting (address: 0103H) is out of the setting range.	Set the value of CH□ Range setting (address: 0103H) within the allowable range.
320□H[*1]	Moderate error	CH□ Time average setting out-of-range	• The time average setting in CH□ Time average/Count average/ Moving average (address: 0107H to 010AH) is out of the range of 2 to 5000ms. • The time average setting in CH□ Time average/Count average/ Moving average (address: 0107H to 010AH) is less than "4 × sampling cycle" (ms).	• Set the CH□ time averaging setting to 2 to 5000ms. • Set the CH□ time averaging setting to a value greater than or equal to "4 × sampling cycle" (ms).
321□H[*1]	Moderate error	CH□ Count average setting out-of-range	The count average setting in CH□ Time average/Count average/Moving average (address: 0107H to 010AH) is out of the range of 4 to 65000.	Set the CH□ count average setting to 4 to 65000.
322□H[*1]	Moderate error	CH□ Moving average setting out-of-range	The moving average count setting in CH□ Time average/Count average/ Moving average (address: 0107H to 010AH) is out of the range of 2 to 128.	Set the CH□ moving average count setting to 2 to 128.

Error code (hexadecimal)	Classification	Error name	Description and cause	Action
330□H[*1]	Moderate error	CH□ Process alarm setting error (Process alarm lower lower limit value > Process alarm lower upper limit value)	Magnitude correlation between CH□ Process alarm lower lower limit (address: 01××H) and CH□ Process alarm lower upper limit (address: 01××H) is invalid.	Set CH□ Process alarm lower lower limit value (address: 01××H) and CH□ Process alarm lower upper limit value (address: 01××H) correctly.
331□H[*1]	Moderate error	CH□ Process alarm setting error (Process alarm lower upper limit value > Process alarm upper lower limit value)	Magnitude correlation between CH□ Process alarm lower upper limit (address: 01××H) and CH□ Process alarm upper lower limit value (address: 01××H) is invalid.	Set CH□ Process alarm lower upper limit value (address: 01××H) and CH□ Process alarm upper lower limit value (address: 01××H) correctly.
332□H[*1]	Moderate error	CH□ Process alarm setting error (Process alarm upper lower limit value > Process alarm upper upper limit value)	Magnitude correlation between CH□ Process alarm upper lower limit (address: 01××H) and CH□ Process alarm upper upper limit (address: 01××H) is invalid.	Set CH□ Process alarm upper lower limit value (address: 01××H) and CH□ Process alarm upper upper limit value (address: 01××H) correctly.
340□H[*1]	Moderate error	CH□ Input signal error detection setting out-of-range	CH□ Input signal error detection setting (address: 010FH) is set to a value out of the setting range.	Set CH□ Input signal error detection setting (address: 010FH) to Disable (0H) or Simple disconnection detection (4H).
342□H[*1]	Moderate error	CH□ Simple disconnection detection setting error	CH□ Input signal error detection setting (address: 010FH) is set to Simple disconnection detection (4H), and CH□ Range setting (address: 0103H) is set to an input range other than 4 to 20mA or 1 to 5V.	• To enable simple disconnection detection, set CH□ Range setting (address: 0103H) to a value in the range of 4 to 20mA or 1 to 5V. • To disable simple disconnection detection, set CH□ Input signal error detection setting (address: 010FH) to Disable (0H).
350□H[*1]	Moderate error	CH□ Scaling setting out-of-range	CH□ Scaling lower limit value (address: 01××H) and CH□ Scaling upper limit value (address: 01××H) are set to values out of the range of -32000 to 32000.	Set CH□ Scaling lower limit value (address: 01××H) and CH□ Scaling upper limit value (address: 01××H) to values in the range of -32000 to 32000.
351□H[*1]	Moderate error	CH□ Scaling setting upper/lower limit inversion	CH□ Scaling lower limit value (address: 01××H) and CH□ Scaling upper limit value (address: 01××H) are set such that the Scaling lower limit value ≥ Scaling upper limit value.	Set CH□ Scaling lower limit value (address: 01××H) and CH□ Scaling upper limit value (address: 01××H) such that the Scaling lower limit value < Scaling upper limit value.
3610H[*3]	Moderate error	Operating condition setting change disable error	While the input range switch enable/disable setting is enabled, Initial data setting request flag (RY9) is turned on, parameters are written from the engineering tool, or module parameter initialization is executed by Parameter area initialization command (address: 1002H).	Set the input range switch enable/disable setting to disable when turning on Initial data setting request flag (RY9), writing parameters from the engineering tool, or executing Parameter area initialization command (address: 1002H).
370□H	Moderate error	CH□ Synchronous communication mode averaging processing specification error	When CC-Link IE TSN Network synchronous communication function is used, CH□ Averaging process setting (address: 0105H) is set to the setting other than sampling processing.	When using CC-Link IE TSN Network synchronous communication function, set CH□ Averaging process setting (address: 0105H) to sampling processing.
3C00H	Major error	Hardware error	Module hardware error	• Turn off and on the module power supply. • If this error persists, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.

*1 The error can be cleared by turning on and off Error clear request flag (RYA), or turning on and off Initial data setting request flag (RY9).

*2 The error cannot be cleared by turning on and off Error clear request flag (RYA), or turning on and off Initial data setting request flag (RY9). After clearing the error, turn off and on the power supply or perform a remote reset.

*3 The error can be cleared by turning on and off Error clear request flag (RYA).

Point

When multiple errors occur, only the latest error code is stored in Latest error code (RWr0).

Communication system error codes

Error code (hexadecimal)	Classification	Error name	Description and cause	Action
D000H[*1*2]	Minor error	Communication setting error 1	Invalid network settings are received.	• Turn off and on the module power supply. • If this error persists, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.
D001H[*1*2]	Minor error	Communication setting error 2	Network settings that cannot be handled by the analog module are received.	• Check that the model name of the slave station set in the network configuration settings matches the model name of the actual device. • If this error persists even when the model names match, update firmware to the latest version for the analog module. • If this error persists even when firmware is the latest version, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.
D010H[*1]	Minor error	IP address duplication detection	IP address duplication was detected.	Change the IP address so that no IP address duplication occurs in the access range of CC-Link IE TSN. After change, power off and on the module power supply.
D011H[*1*2]	Moderate error	IP address setting error	Values the analog module cannot use were set for the IP address and subnet mask settings.	• Without using the set IP address and subnet mask, the module is operated based on the previous IP address and subnet mask. • The set IP address and subnet mask will not be saved in the non-volatile memory. • Check the IP address and subnet mask again, and change the settings to values the analog module can use. After change, power off and on the module power supply.
D020H[*1*2*3]	Minor error	Network synchronous communication setting error	The network synchronous communication setting of the analog module is set to synchronous.	• Set the network synchronous communication setting of the analog module to asynchronous. • Perform a firmware update so that the firmware of the analog module becomes the latest.
D021H[*1*2]	Minor error	Number of RX/RY points error	RX/RY with a number of points that cannot be handled by the analog module are set.	Set 128 or less for the number of points for RX and RY in the network configuration setting.
D022H[*1*2]	Minor error	RWr/RWw number of points error	RWr/RWw with a number of points that cannot be handled by the analog module are set.	Set 64 or less for the number of points for RWr and RWw in the network configuration setting.
D023H[*1*2]	Minor error	Communication period setting error (CC-Link IE TSN Class B/ 1Gbps)	A communication period that cannot be handled by the analog module was set while the analog module was operating with CC-Link IE TSN Class B and a communication speed of 1Gbps.	Correct the communication period setting so that the analog module can operate with the set communication period.
D024H[*1*2]	Minor error	Communication period setting error (CC-Link IE TSN Class B/ 100Mbps)	A communication period that cannot be handled by the analog module was set while the analog module was operating with CC-Link IE TSN Class B and a communication speed of 100Mbps.	Correct the communication period setting so that the analog module can operate with the set communication period.
D025H[*1*2]	Minor error	RWw/RWr setting error	In synchronous communication mode, the system area (RWwF/RWrF) is not assigned for the RWw/RWr settings in the network configuration setting.	In the RWw/RWr settings of the network configuration setting, assign the system area (RWwF/RWrF).

Error code (hexadecimal)	Classification	Error name	Description and cause	Action
D026H[*1*2]	Minor error	Synchronization cycle setting error	The synchronization cycle set in the master station is not supported by the module.	Adjust the synchronization cycle of the master station and then turn off and on the module power supply, or perform remote reset.
D027H[*1*2]	Minor error	Network synchronous communication setting change disable error	After the module power supply is turned on, the network synchronous communication setting in the network configuration settings has been changed.	In the network configuration setting, return the network synchronous communication setting to the setting of when the module power supply was on.
D028H[*1*2]	Minor error	Communication period setting error (CC-Link IE TSN Class A)	A communication period that cannot be handled by the analog module was set while the analog module was operating with CC-Link IE TSN Class A.	Correct the communication period setting so that the analog module can operate with the set communication period.

*1 This error occurs only once when an abnormality is detected. Before clearing the error, eliminate the cause and check that a data link is established.

*2 For these types of errors, more than one error may not occur at the same time. If errors occur, eliminate the cause of one error after another until a data link is established.

*3 This error occurs when the firmware version is "02" or earlier.

10.7 List of Alarm Codes

Here is the list of alarm codes:

☐ indicates the number of the channel where an alarm has occurred.

Alarm code (hexadecimal)	Classification	Alarm name	Description and cause	Action
0C0☐H	Minor error	CH☐ Process alarm (upper limit) occurrence	A process alarm (upper limit) has occurred in CH☐.	When the digital operation value returns within the setting range, the corresponding bit of Warning output flag (RWrB) and Warning output signal (RX18) turn off automatically. To clear Latest alarm code (RWr1), turn on and off Error clear request flag (RYA) after the digital operation value returns within the setting range.
0C1☐H	Minor error	CH☐ Process alarm (lower limit) occurrence	A process alarm (lower limit) has occurred in CH☐.	When the digital operation value returns within the setting range, the corresponding bit of Warning output flag (RWrB) and Warning output signal (RX18) turn off automatically. To clear Latest alarm code (RWr1), turn on and off Error clear request flag (RYA) after the digital operation value returns within the setting range.
0D2☐H	Minor error	CH☐ Input signal error detection (simple disconnection)	An input signal error (simple disconnection) has occurred in CH☐. This alarm code is stored when an input signal error is detected according to the setting of the input signal error detection function.	Turning on and off Error clear request flag (RYA) after the analog input value returns within the setting range turns off the corresponding bit of Input signal error detection flag (RWrA) and Input signal error detection signal (RX1C).

Point

When multiple alarms occur, only the latest alarm code is stored in Latest alarm code (RWr1).

APPENDICES

Appendix 1 Remote I/O Signal

List of remote I/O signals

This section lists I/O signals for a master/local module.
The I/O signals assignment shown assumes that the remote I/O signals of the A/D converter module are assigned to RX0 to RX2F and RY0 to RY2F.
Remote input (RX) indicates the input signal from the A/D converter module to the master/local module.
Remote output (RY) indicates the output signal from the master/local module to the A/D converter module.

Point

Do not use any "Use prohibited" remote I/O signals. Doing so may result in an accident due to an incorrect output or malfunction.

Remote input signals

Device number	Name
RX0 to RX8	Use prohibited
RX9	Initial data setting completion flag
RXA	Error flag
RXB	Remote READY
RXC	Input range switch enable/disable setting status flag
RXD	Communication speed setting status*1
RXE	CC-Link IE TSN Class setting status*2
RXF	Use prohibited
RX10	CH1 A/D conversion completed flag
RX11	CH2 A/D conversion completed flag
RX12	CH3 A/D conversion completed flag
RX13	CH4 A/D conversion completed flag
RX14 to RX17	Use prohibited
RX18	Warning output signal
RX19 to RX1B	Use prohibited
RX1C	Input signal error detection signal
RX1D	Maximum value/minimum value reset completed flag
RX1E to RX2F	Use prohibited

*1 This can be used for the A/D converter module with the firmware version "05" or later.
*2 This can be used for the A/D converter module with the firmware version "06" or later.

Remote output signals

Device number	Name
RY0 to RY8	Use prohibited
RY9	Initial data setting request flag
RYA	Error clear request flag
RYB to RY1C	Use prohibited
RY1D	Maximum value/minimum value reset request
RY1E to RY2F	Use prohibited

A

Details of remote input signals

Initial data setting completion flag

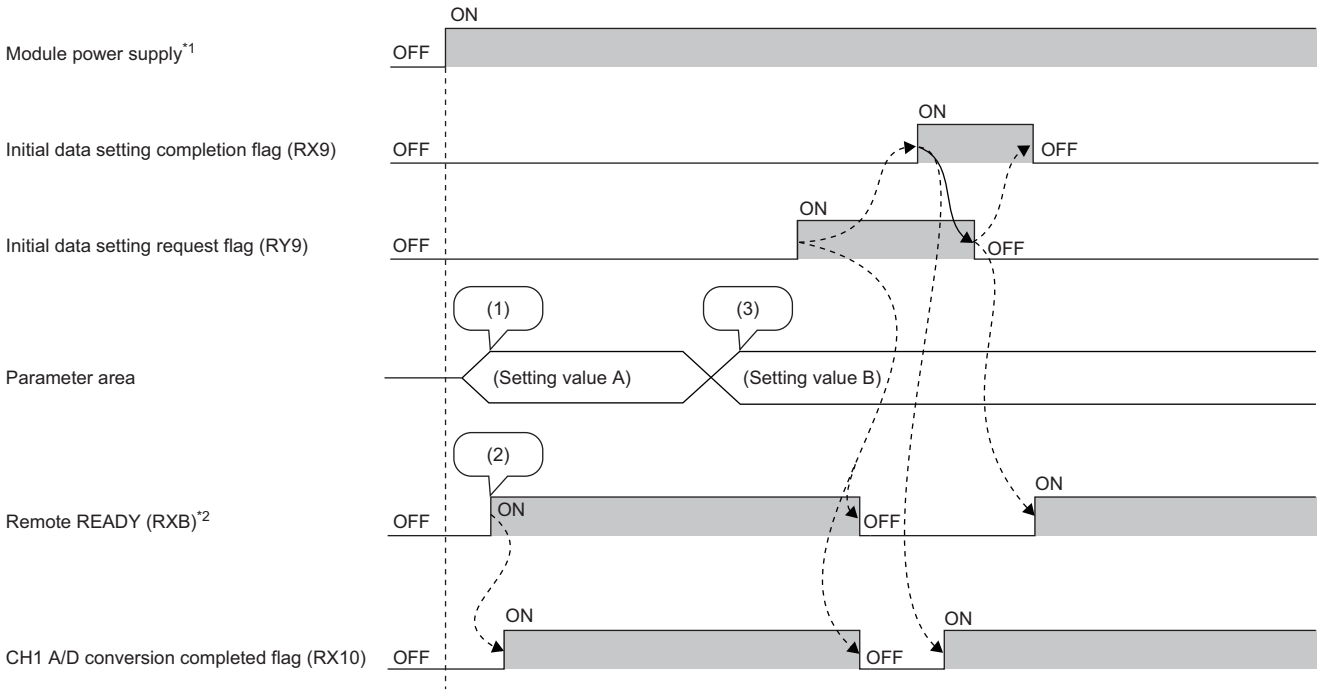
■Device number

Name	Device number
Initial data setting completion flag	RX9

■Description

This flag turns on when the following is performed and the operation conditions are changed.

1. Write the parameters to the remote buffer memory area using the REMTO instruction.
2. Turn on Initial data setting request flag (RY9).



Executed by the A/D converter module.

Executed by the program.

(1) The setting is read from the non-volatile memory.

(2) The operation starts with setting value A.

(3) The setting value is changed by the user.

*1 For data link to be made at the power-on of the module power supply

*2 When turning on and off Initial data setting request flag (RY9), check that Remote READY (RXB) turns on before starting the control.

Use Initial data setting completion flag as an interlock condition for turning on and off Initial data setting request flag (RY9) when changing the following settings.

- A/D conversion enable/disable setting (address: 0102H)
- Range setting (address: 0103H)
- Averaging process setting (address: 0105H)
- CH1 Time average/Count average/Moving average (address: 0107H) to CH4 Time average/Count average/Moving average (address: 010AH)
- Input signal error detection setting (address: 010FH)
- Warning output setting (address: 0111H)
- CH1 Process alarm lower lower limit value (address: 0112H) to CH4 Process alarm upper upper limit value (address: 0121H)
- Scaling enable/disable setting (address: 0133H)
- CH1 Scaling lower limit value (address: 0134H) to CH4 Scaling upper limit value (address: 013BH)

Error flag

■Device number

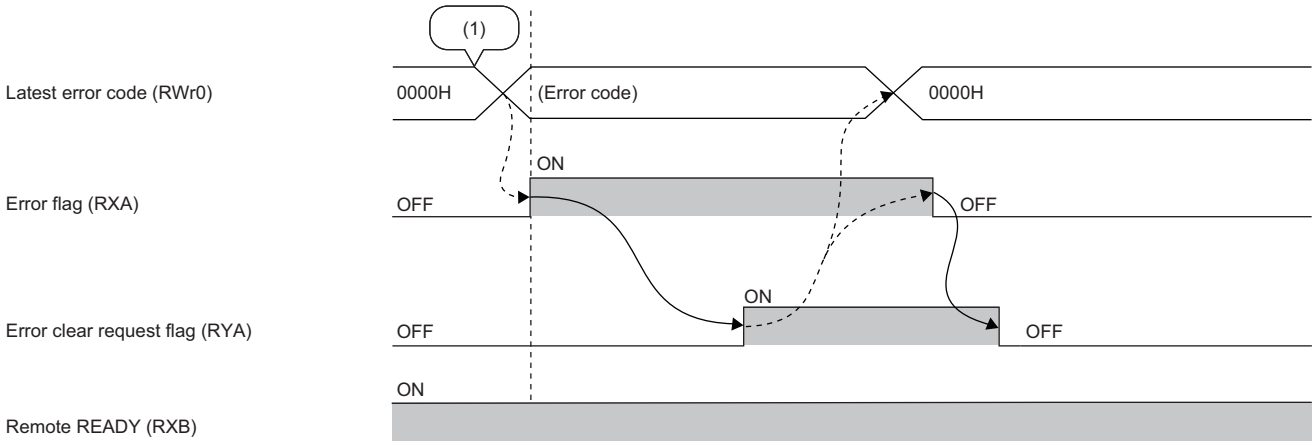
Name	Device number
Error flag	RXA

■Description

Error flag (RXA) turns on when an error occurs.

To clear Latest error code (RWr0), turn on and off Error clear request flag (RYA).

- When a minor error occurs

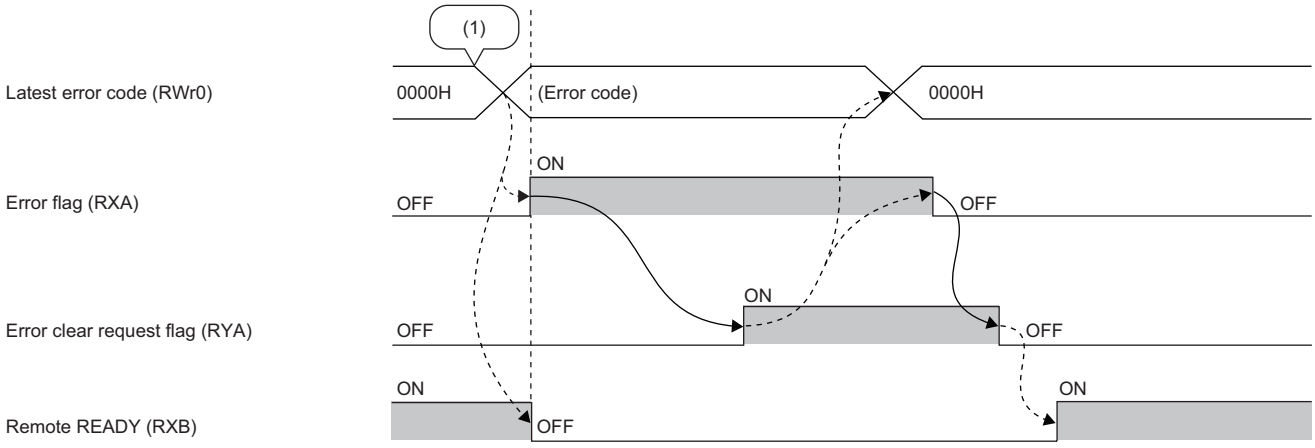


Executed by the A/D converter module.

Executed by the program.

(1) An error occurs.

- With a moderate error



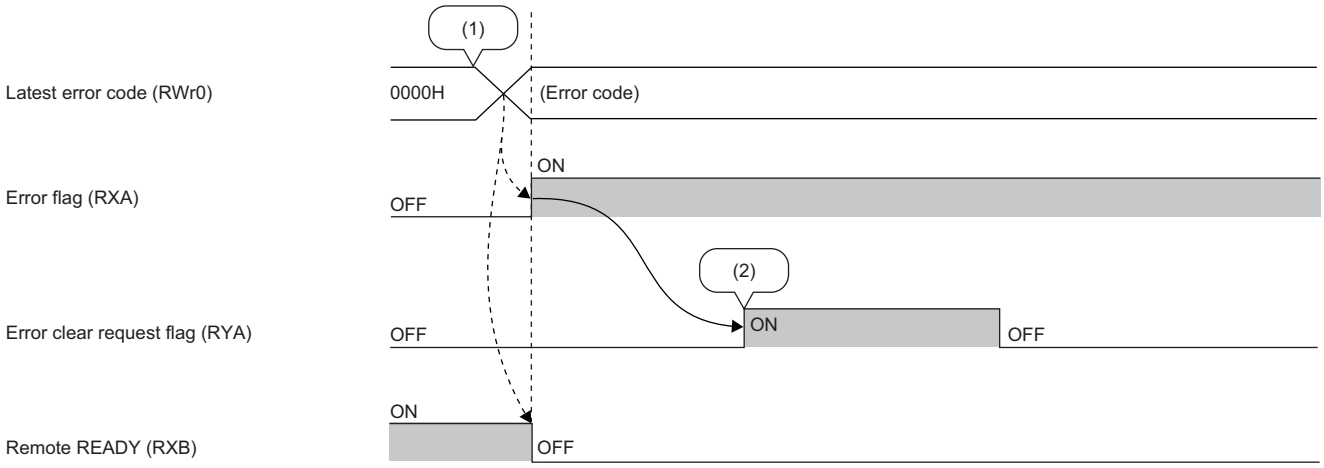
Executed by the A/D converter module.

Executed by the program.

(1) An error occurs.

A

• When a major error occurs



Executed by the A/D converter module.

Executed by the program.

(1) An error occurs.

(2) When a major error occurs, it is not cleared even by executing an error clear request.

Remote READY

■Device number

Name	Device number
Remote READY	RXB

■Description

Remote READY (RXB) turns on when the module is powered on.

This signal is used as an interlock condition when the master station reads/writes data from/to the remote register or remote buffer memory areas of the A/D converter module.

Remote READY (RXB) turns off when a moderate error or major error occurs.

Input range switch enable/disable setting status flag

■Device number

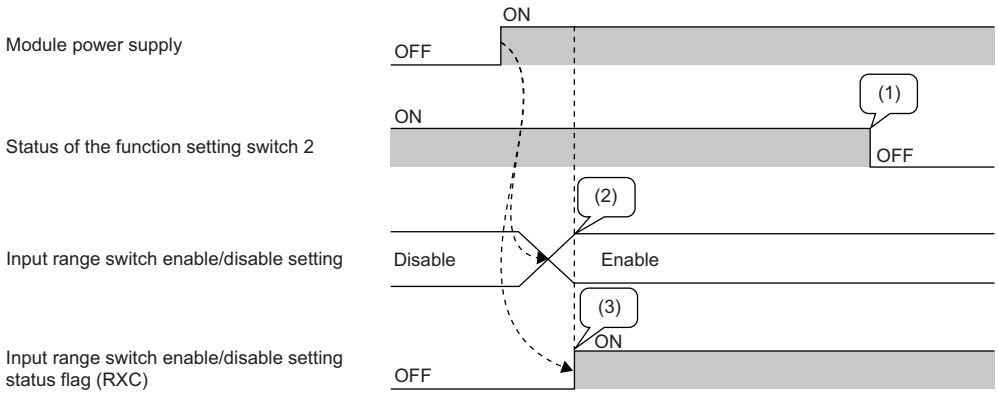
Name	Device number
Input range switch enable/disable setting status flag	RXC

■Description

This flag can be used to check the input range switch enable/disable setting status.

- Enable: ON
- Disable: OFF

The input range switch enable/disable setting status is set with the function setting switch. (☞ Page 28 Setting the function setting switches)



- - - - - - - - - ▶ Executed by the A/D converter module.

(1) The input range switch enable/disable setting status is not changed even if the function setting switch 2 is changed while the module is being powered on.

(2) The status of the function setting switch 2 when the module is powered on determines the input range switch enable/disable setting status.

(3) The flag indicates the input range switch enable/disable setting status, not the status of the function setting switch 2.

Communication speed setting status

■Device number

Name	Device number
Communication speed setting status	RXD

■Description

This signal indicates which value is set as the communication speed.

Communication speed setting status (RXD)	Set value of communication speed
ON	100Mbps
OFF	1Gbps

CC-Link IE TSN Class setting status

■Device number

Name	Device number
CC-Link IE TSN Class setting status	RXE

■Description

The CC-Link IE TSN Class setting status is stored.

CC-Link IE TSN Class setting status (RXE)	CC-Link IE TSN Class setting status
ON	CC-Link IE TSN Class A
OFF	CC-Link IE TSN Class B

A/D conversion completed flag

■Device number

Name	Device number			
	CH1	CH2	CH3	CH4
A/D conversion completed flag	RX10	RX11	RX12	RX13

■Description

- This flag turns on when A/D conversion of the channel whose A/D conversion enable/disable setting (address: 0102H) is set to A/D conversion enabled.
- This flag turns off (default) when Initial data setting request flag (RY9) is turned on and off, and it turns on when A/D conversion is complete.

Warning output signal

■Device number

Name	Device number
Warning output signal	RX18

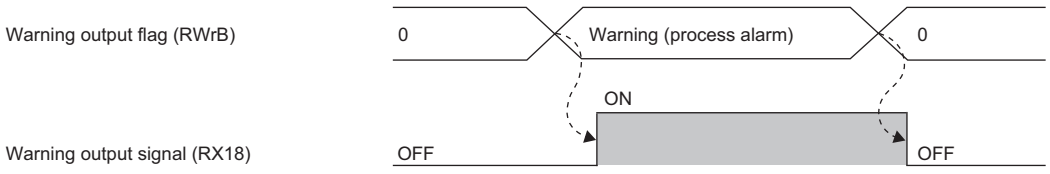
■Description

This signal turns on when a process alarm is detected.

■Process alarm

- For channels whose Warning output setting (address: 0111H) is enabled, and A/D conversion enable/disable setting (address: 0102H) is set to A/D conversion enabled, Warning output signal (RX18) turns on if the digital operation value exceeds the range set by CH1 Process alarm lower lower limit value (address: 0112H) to CH4 Process alarm upper upper limit value (address: 0121H). The corresponding bit of Warning output flag (RWrB) also turns on, and the ALM LED of the A/D converter module turns on.
- For all the channels whose A/D conversion enable/disable setting (address: 0102H) is set to A/D conversion enabled, Warning output signal (RX18) turns off and the A/D converter module results in the following state when the digital operation value returns within the setting range.

Item	Status
Corresponding bit of Warning output flag (RWrB)	OFF
ALM LED of the A/D converter module	Off



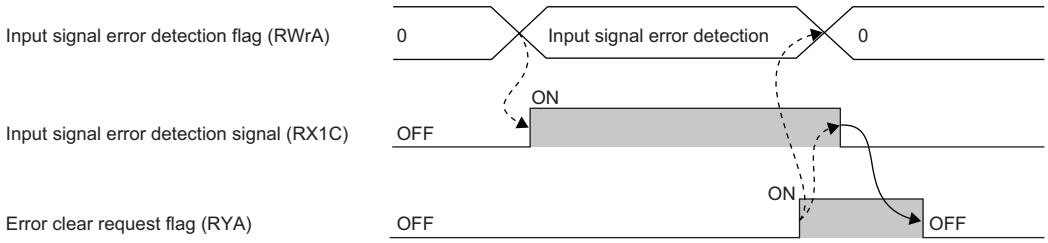
Input signal error detection signal

■Device number

Name	Device number
Input signal error detection signal	RX1C

■Description

When Input signal error detection setting (address: 010FH) is set to Simple disconnection detection (4H), this signal turns on when disconnection is detected for any channel whose A/D conversion enable/disable setting (address: 0102H) is set to A/D conversion enabled. After the analog input value returns to a value that is larger than the criteria of simple disconnection detection (2mA or lower, or 0.5V or lower), turning on and off Error clear request flag (RYA) results in Input signal error detection signal (RX1C) turning off.



Executed by the A/D converter module.
Executed by the program.

Check that Input signal error detection signal (RX1C) is off before turning off Error clear request flag (RYA). Turning off Error clear request flag (RYA) before Input signal error detection signal (RX1C) turns off does not allow Input signal error detection signal (RX1C) to be cleared.

■When Input signal error detection signal turns on

- CH☐ A/D conversion completed flag (RX10 to RX13) corresponding to the channel turns off.
- The digital operation value of the corresponding channel before error detection is maintained.
- The ALM LED flashes.

■When Input signal error detection signal turns off

- The ALM LED turns off.
- Latest alarm code (RWr1) is cleared.

Point

Once the analog input value returns to a value enough to pass the simple disconnection detection criterion (2mA or lower, or 0.5V or lower), A/D conversion restarts whether or not Input signal error detection signal (RX1C) is reset. When the first A/D conversion is complete after the restart, CH☐ A/D conversion completed flag (RX10 to RX13) corresponding to the channel turns on again.
Averaging processing starts over after the A/D conversion resumed.

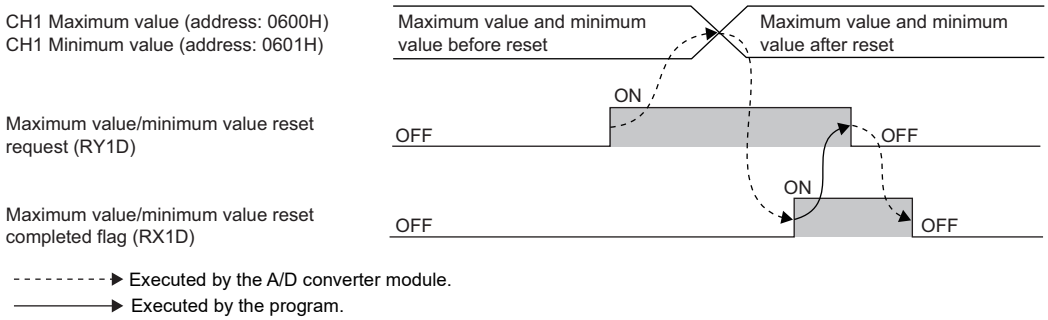
Maximum value/minimum value reset completed flag

■Device number

Name	Device number
Maximum value/minimum value reset completed flag	RX1D

■Description

This flag turns on when Maximum value/minimum value reset request (RY1D) is turned on and off, and the values stored in CH□ Maximum value (address: 0600H, 0602H, 0604H, 0606H) and CH□ Minimum value (address: 0601H 0603H, 0605H, 0607H) are cleared.



Details of remote output signals

Initial data setting request flag

■Device number

Name	Device number
Initial data setting request flag	RY9

■Description

Turn on this flag after writing parameters to the remote buffer memory with a program.

Upon completion of the change of operating conditions, Initial data setting completion flag (RX9) turns on.

For the timing of turning the flag on and off, refer to the following.

☞ Page 156 Initial data setting completion flag

Error clear request flag

■Device number

Name	Device number
Error clear request flag	RYA

■Description

Use this flag to clear Error flag (RXA), Input signal error detection signal (RX1C), Latest error code (RWr0), and Latest alarm code (RWr1).

The error history is not cleared even when this flag is turned on.

■When a minor error, moderate error, or input signal error is detected

Eliminating the cause of the error and turning on Error clear request flag (RYA) allow the error status to be cleared, resulting in Error flag (RXA) turning off.

Before Error flag (RXA) turns off, turning off Error clear request flag (RYA) does not allow Error flag (RXA) to turn off.

For the timing of turning the flag on and off, refer to the following.

☞ Page 157 Error flag

☞ Page 161 Input signal error detection signal

■When a major error occurs

Error flag (RXA) does not turn off even by turning on and off Error clear request flag (RYA).

For the timing of turning the flag on and off, refer to the following.

☞ Page 157 Error flag

Maximum value/minimum value reset request

■Device number

Name	Device number
Maximum value/minimum value reset request	RY1D

■Description

CH☐ Maximum value (address: 0600H, 0602H, 0604H, 0606H) and CH☐ Minimum value (address: 0601H 0603H, 0605H, 0607H) are cleared when this signal is turned on and off.

For the timing of when to turn on and off, refer to the following:

☞ Page 162 Maximum value/minimum value reset completed flag

Appendix 2 Remote Register

List of remote register areas

This section lists remote register areas for a master/local module.
The remote register area assignment shown assumes that the remote register areas of the A/D converter module are assigned to RWr0 to RWr1F and RWw0 to RWw1F.
Remote register (RWr) is the information input from the A/D converter module to the master/local module.
Remote register (RWw) is the information output from the master/local module to the A/D converter module.

Point

- Do not read or write data from/to any "Use prohibited" remote register areas. Otherwise, an accident may occur due to an incorrect output or malfunction.
- Remote register areas are reset to the initial state when the A/D converter module is powered off and on, because the contents of remote register areas are not saved in the non-volatile memory of the A/D converter module.

Remote register areas (RWr)

Device number	Name
RWr0	Latest error code
RWr1	Latest alarm code
RWr2	CH1 Digital operation value
RWr3	CH2 Digital operation value
RWr4	CH3 Digital operation value
RWr5	CH4 Digital operation value
RWr6 to RWr9	Use prohibited
RWrA	Input signal error detection flag
RWrB	Warning output flag
RWrC to RWr1F	Use prohibited

Remote register areas (RWw)

Device number	Name
RWw0 to RWw1	Use prohibited
RWw2	CH1 Shifting amount to conversion value
RWw3	CH2 Shifting amount to conversion value
RWw4	CH3 Shifting amount to conversion value
RWw5	CH4 Shifting amount to conversion value
RWw6 to RWw1F	Use prohibited

Details of remote register areas

Latest error code

■Device number

Name	Device number
Latest error code	RWr0

■Description

The error code is stored when an error occurs.

Turning on Error clear request flag (RYA) after eliminating the cause of the error clears the error code.

The errors that have occurred in the past can be checked from the engineering tool. (☞ Page 143 Checking by using CC-Link IE TSN/CC-Link IE Field diagnostics)

Latest alarm code

■Device number

Name	Device number
Latest alarm code	RWr1

■Description

The alarm code is stored when an alarm occurs.

Turning on Error clear request flag (RYA) after eliminating the cause of the alarm clears the alarm code.

The alarms that have occurred in the past can be checked from the engineering tool. (☞ Page 143 Checking by using CC-Link IE TSN/CC-Link IE Field diagnostics)

Digital operation value

■Device number

Name	Device number			
	CH1	CH2	CH3	CH4
CH☐ Digital operation value	RWr2	RWr3	RWr4	RWr5

■Description

The digital operation value calculated by the scaling function and shift function is stored as 16-bit signed binary data.

Input signal error detection flag

■Device number

Name	Device number
Input signal error detection flag	RWrA

■Description

The input signal status of each channel can be checked.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed to "0".								CH4	0	CH3	0	CH2	0	CH1	0

OFF: Normal, ON: Disconnection detection

■The state of Input signal error detection flag (RWrA)

- When Input signal error detection setting (address: 010FH) is set to Simple disconnection detection (4H), the corresponding channel is monitored for disconnection. When the analog input value satisfies the disconnection detection condition (2mA or less or 0.5V or less), Input signal error detection flag turns on.
- When the input signal error detection function is used, an error detected in any of the channels where A/D conversion enable/disable setting (address: 0102H) is set to A/D conversion enabled results in Input signal error detection signal (RX1C) turning on.

■Turning off Input signal error detection flag (RWrA)

- This flag turns off when the analog input value becomes greater again than the disconnection detection condition (2mA or less or 0.5V or less) and Error clear request flag (RYA) is turned on and off.
- Turning on and off Initial data setting request flag (RY9) results in this flag being cleared.

Warning output flag

■Device number

Name	Device number
Warning output flag	RWrB

■Description

Whether each channel is at the process alarm upper limit or the process alarm lower limit can be checked.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed to "0".								CH4		CH3		CH2		CH1	
								(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)

(1) Upper limit
(2) Lower limit
OFF: Normal, ON: Alarm ON

■Status of Warning output flag (RWrB)

- If the digital operation value exceeds the range set by CH1 Process alarm lower lower limit value (address: 0112H) to CH4 Process alarm upper upper limit value (address: 0121H), the bit of Warning output flag (RWrB) corresponding to the channel turns on.
- Of the A/D conversion enabled channels and the warning output enabled channels, a warning detected even in one channel results in Warning output signal (RX18) turning on.

■Turning off Warning output flag (RWrB)

- When the digital operation value returns within the setting range, Warning output flag (RWrB) is automatically cleared.
- Turning on and off Initial data setting request flag (RY9) results in this flag being cleared. Warning output signal (RX18) also turns off.

Shifting amount to conversion value

■Device number

Name	Device number			
	CH1	CH2	CH3	CH4
CH☐ Shifting amount to conversion value	RWw2	RWw3	RWw4	RWw5

■Description

Set the conversion value shift amount used for the shift function as 16-bit signed binary data. The shifted and added digital operation value is stored in CH☐ Digital operation value (RWr2 to RWr5).

For details on the shift function, refer to the following:

☞ Page 77 Shift Function

■Setting range

-32768 to 32767 (Default value: 0)

■Enabling the setting

Once a value is set, the conversion value shift amount is valid regardless of turning on and off Initial data setting request flag (RY9).

Appendix 3 Remote Buffer Memory

This section describes the remote buffer memory.
The remote buffer memory consists of addresses for the parameter area, monitor area, and module control data area.
Data can be read or written from/to remote buffer memory areas by using SLMP commands or dedicated instructions.
For SLMP commands, refer to the following.
☞ Page 109 SLMP Communication Function

Point

- Do not read or write data from/to any "Use prohibited" remote buffer memory areas. Otherwise, an accident may occur due to an incorrect output or malfunction.
- For a single A/D converter module, do not execute multiple dedicated instructions at the same time. If multiple dedicated instructions are executed at the same time, the A/D converter module may be unable to receive the dedicated instructions, and the dedicated instructions may time out.

List of remote buffer memory areas

This section lists the remote buffer memory areas of the A/D converter module.
The remote buffer memory areas of the A/D converter module are assigned as shown below.
○: Access permitted, ×: Access not permitted

Remote buffer memory address		Area name	Target	Access method		
Decimal	Hexadecimal			CC-Link IE TSN configuration of the engineering tool	Dedicated instruction*1	SLMP command
0 to 255	0000H to 00FFH	Parameter area	Use prohibited	—	—	—
256 to 511	0100H to 01FFH		Module-based parameter data	○*2	○	○
512 to 1279	0200H to 04FFH	Use prohibited		—	—	—
1280 to 1535	0500H to 05FFH	Monitor area	Use prohibited	—	—	—
1536 to 1791	0600H to 06FFH		Module-based monitor data	×	○	○
1792 to 4095	0700H to 0FFFH	Use prohibited		—	—	—
4096 to 4351	1000H to 10FFH	Module control data area	Station-based control data	×	○	○
4352 to 4607	1100H to 11FFH		Use prohibited	—	—	—
4608 to 5375	1200H to 14FFH	Use prohibited		—	—	—

*1 Data can be read or written from/to remote buffer memory areas by using the following dedicated instructions.
REMTO instruction, REMTOD instruction, REMTOIP instruction, REMTODIP instruction, REMFR instruction, REMFRD instruction, REMFRIP instruction, REMFRDIP instruction
(📖 MELSEC iQ-R CC-Link IE TSN User's Manual (Application))

*2 For details on the access method, refer to the following.
Parameter area (☞ Page 45 VARIOUS SETTINGS)

Parameter area

■Module-based parameter data

○: Applicable, ×: Not applicable

Address		Name	Default value	Read	Write
Decimal	Hexadecimal				
256, 257	0100H, 0101H	Use prohibited	—	×	×
258	0102H	A/D conversion enable/disable setting	0000H	○	○
259	0103H	Range setting	0000H	○	○
260	0104H	Use prohibited	—	×	×
261	0105H	Averaging process setting	0000H	○	○
262	0106H	Use prohibited	—	×	×
263	0107H	CH1 Time average/Count average/Moving average	0	○	○
264	0108H	CH2 Time average/Count average/Moving average	0	○	○
265	0109H	CH3 Time average/Count average/Moving average	0	○	○
266	010AH	CH4 Time average/Count average/Moving average	0	○	○
267 to 270	010BH to 010EH	Use prohibited	—	×	×
271	010FH	Input signal error detection setting	0000H	○	○
272	0110H	Use prohibited	—	×	×
273	0111H	Warning output setting	000FH	○	○
274	0112H	CH1 Process alarm lower lower limit value	0	○	○
275	0113H	CH1 Process alarm lower upper limit value	0	○	○
276	0114H	CH1 Process alarm upper lower limit value	0	○	○
277	0115H	CH1 Process alarm upper upper limit value	0	○	○
278	0116H	CH2 Process alarm lower lower limit value	0	○	○
279	0117H	CH2 Process alarm lower upper limit value	0	○	○
280	0118H	CH2 Process alarm upper lower limit value	0	○	○
281	0119H	CH2 Process alarm upper upper limit value	0	○	○
282	011AH	CH3 Process alarm lower lower limit value	0	○	○
283	011BH	CH3 Process alarm lower upper limit value	0	○	○
284	011CH	CH3 Process alarm upper lower limit value	0	○	○
285	011DH	CH3 Process alarm upper upper limit value	0	○	○
286	011EH	CH4 Process alarm lower lower limit value	0	○	○
287	011FH	CH4 Process alarm lower upper limit value	0	○	○
288	0120H	CH4 Process alarm upper lower limit value	0	○	○
289	0121H	CH4 Process alarm upper upper limit value	0	○	○
290 to 306	0122H to 0132H	Use prohibited	—	×	×
307	0133H	Scaling enable/disable setting	000FH	○	○
308	0134H	CH1 Scaling lower limit value	0	○	○
309	0135H	CH1 Scaling upper limit value	0	○	○
310	0136H	CH2 Scaling lower limit value	0	○	○
311	0137H	CH2 Scaling upper limit value	0	○	○
312	0138H	CH3 Scaling lower limit value	0	○	○
313	0139H	CH3 Scaling upper limit value	0	○	○
314	013AH	CH4 Scaling lower limit value	0	○	○
315	013BH	CH4 Scaling upper limit value	0	○	○
316 to 511	013CH to 01FFH	Use prohibited	—	×	×

Point

To enable the parameter data, turn on Initial data setting request flag (RY9). Parameter data is not enabled simply by having it written to the parameter area.

Monitor area

■Module-based monitor data

○: Applicable, ×: Not applicable

Address		Name	Default value	Read	Write
Decimal	Hexadecimal				
1536	0600H	CH1 Maximum value	0	○	×
1537	0601H	CH1 Minimum value	0	○	×
1538	0602H	CH2 Maximum value	0	○	×
1539	0603H	CH2 Minimum value	0	○	×
1540	0604H	CH3 Maximum value	0	○	×
1541	0605H	CH3 Minimum value	0	○	×
1542	0606H	CH4 Maximum value	0	○	×
1543	0607H	CH4 Minimum value	0	○	×
1544 to 1551	0608H to 060FH	Use prohibited	—	×	×
1552	0610H	Setting range monitor	0000H	○	×
1553	0611H	Use prohibited	—	×	×
1554	0612H	Parameter automatic setting status monitor	0000H	○	×
1555 to 1791	0613H to 06FFH	Use prohibited	—	×	×

Module control data area

■Station-based control data

○: Applicable, ×: Not applicable

Address		Name	Default value	Read	Write
Decimal	Hexadecimal				
4096, 4097	1000H, 1001H	Use prohibited	—	×	×
4098	1002H	Parameter area initialization command	0	○	○
4099	1003H	Parameter area initialization completed	0	○	×
4100 to 4351	1004H to 10FFH	Use prohibited	—	×	×

Details of remote buffer memory

This section describes the remote buffer memory areas of the A/D converter module.

A/D conversion enable/disable setting

■Address

Name	Address
A/D conversion enable/disable setting	0102H

■Description

Enable or disable A/D conversion for each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed to "0".												CH4	CH3	CH2	CH1

0: A/D conversion enabled (default value)
1: A/D conversion disabled

Point

If a value other than the above is set, the setting values of lower 4 bits are used for operation.

■Enabling the setting

Turn on and off Initial data setting request flag (RY9) to enable the setting.

Range setting

■Address

Name	Address
Range setting	0103H

■Description

Set the input range for each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
CH4				CH3				CH2				CH1			

If A/D conversion enable/disable setting (address: 0102H) is set to A/D conversion disabled, the range is not changed. To change the range, set A/D conversion enable/disable setting (address: 0102H) to A/D conversion enabled, and turn on and off Initial data setting request flag (RY9).

■Setting value

The following table lists the setting values.

Input range	Setting value
4 to 20mA	0H (Default value)
0 to 20mA	1H
1 to 5V	2H
0 to 5V	3H
-10 to 10V	4H
0 to 10V	5H

Point

If a value other than the above is set, CH☐ Range setting out-of-range (error code: 310☐H) is stored in Latest error code (RWr0), Error flag (RXA) turns on, and the ERR. LED turns on. For channels for which data other than the above values has been set, the operation is the same as that with A/D conversion disabled.

■Enabling the setting

Turn on and off Initial data setting request flag (RY9) to enable the setting.

Averaging process setting

■Address

Name	Address
Averaging process setting	0105H

■Description

Set sampling processing or averaging processing for each channel.

There are the following types of averaging processing: time average, count average, and moving average.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
CH4				CH3				CH2				CH1			

■Setting value

The following table lists the setting values.

Processing method	Setting value
Sampling processing	0H (Default value)
Time average	1H
Count average	2H
Moving average	3H

■Enabling the setting

Turn on and off Initial data setting request flag (RY9) to enable the setting.

Point

A channel to which a value out of the above range is written operates with the sampling processing.

Time average/Count average/Moving average

■Address

Name	Address			
	CH1	CH2	CH3	CH4
CH☐ Time average/Count average/Moving average	0107H	0108H	0109H	010AH

■Description

Set the time (for averaging), count (for averaging), and moving average count for each channel to which Averaging process setting is specified.

Processing method	Setting value
Time average*1	2 to 5000ms
Count average	4 to 65000 times
Moving average	2 to 128 times

*1 For time average, set a value of (4 × Sampling cycle)ms or more. If a value less than this criterion is set, CH☐ Time average setting out-of-range (error code: 320☐H) is stored in Latest error code (RWr0), Error flag (RXA) turns on, and the ERR. LED turns on. 0 is stored in CH☐ Digital operation value (RWr2 to RWr5).

If a value other than the above is set, CH☐ Time average setting out-of-range (error code: 320☐H), CH☐ Count average setting out-of-range (error code: 321☐H) or CH☐ Moving average setting out-of-range (error code: 322☐H) is stored in Latest error code (RWr0), Error flag (RXA) turns on, and the ERR. LED turns on. The A/D conversion processing is performed with the settings just before the error.

■Enabling the setting

Turn on and off Initial data setting request flag (RY9) to enable the setting.

Point

- By default, 0 is set and so change the value according to the processing method.
- A value set for channels with sampling processing specified is ignored.

Input signal error detection setting

■Address

Name	Address
Input signal error detection setting	010FH

■Description

Set the condition to detect input signal errors for each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
CH4				CH3				CH2				CH1			

■Setting value

The following table lists the setting values.

Detection method for input signal error	Setting value
Disable	0H (Default value)
Simple disconnection detection	4H

■Enabling the setting

Turn on and off Initial data setting request flag (RY9) to enable the setting.

Point

Simple disconnection detection (4H) is valid only when the input range is 1 to 5V or 4 to 20mA. If Simple disconnection detection (4H) is set for a channel with a different input range, CH☐ Simple disconnection detection setting error (error code: 342☐H) occurs.

Warning output setting

■Address

Name	Address
Warning output setting	0111H

■Description

Set whether to enable or disable process alarm warning output for each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed to "0".												CH4	CH3	CH2	CH1

0: Enable
1: Disable (Default value)

Point

If a value other than the above is set, the setting values of lower 4 bits are used for operation.

■Enabling the setting

Turn on and off Initial data setting request flag (RY9) to enable the setting.

Process alarm

■Address

Name	Address			
	CH1	CH2	CH3	CH4
CH☐ Process alarm lower lower limit value	0112H	0116H	011AH	011EH
CH☐ Process alarm lower upper limit value	0113H	0117H	011BH	011FH
CH☐ Process alarm upper lower limit value	0114H	0118H	011CH	0120H
CH☐ Process alarm upper upper limit value	0115H	0119H	011DH	0121H

■Description

The warning output function (process alarm) is configured in four steps: Process alarm upper upper limit value, Process alarm upper lower limit value, Process alarm lower upper limit value, and Process alarm lower lower limit value.

For details on warning output function (process alarm), refer to the following:

☞ Page 73 Warning Output Function (Process Alarm)

■Setting range

-32768 to 32767 (Default value: 0)

■Enabling the setting

Turn on and off Initial data setting request flag (RY9) to enable the setting.

Point

- An error occurs on channels whose setting is out of setting range or do not satisfy the condition of Process alarm upper upper limit ≥ Process alarm upper lower limit ≥ Process alarm lower upper limit ≥ Process alarm lower lower limit. CH☐ Process alarm setting error (Process alarm lower lower limit value > Process alarm lower upper limit value) (error code: 330☐H) to CH☐ Process alarm setting error (Process alarm upper lower limit > Process alarm upper upper limit) (error code: 332☐H) is stored in Latest error code (RWr0), Error flag (RXA) turns on, and the ERR. LED turns on and operates with the settings before the error occurrence.
- Change the setting from the default value 0.
- When the scaling function and/or shift function are used, operation results of these functions are applied to the digital operation value for determining warning. Set values considering operation results of each function.

Scaling enable/disable setting

■Address

Name	Address
Scaling enable/disable setting	0133H

■Description

Enable or disable scaling for each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed to "0".												CH4	CH3	CH2	CH1

0: Enable
1: Disable (Default value)

■Enabling the setting

Turn on and off Initial data setting request flag (RY9) to enable the setting.

Point

If a value other than the above is set, the setting values of lower 4 bits are used for operation.

Scaling

■Address

Name	Address			
	CH1	CH2	CH3	CH4
CH☐ Scaling lower limit value	0134H	0136H	0138H	013AH
CH☐ Scaling upper limit value	0135H	0137H	0139H	013BH

■Description

Set the lower limit value and upper limit value of the scale conversion range.

For details on the scaling function, refer to the following:

☞ Page 75 Scaling Function

■Setting range

-32000 to 32000 (Default value: 0)

■Enabling the setting

Turn on and off Initial data setting request flag (RY9) to enable the setting.

Point

- An error occurs on channels for which a value out of the above range is set. CH☐ Out of scaling setting range (error code: 350☐H) is stored in Latest error code (RWr0), Error flag (RXA) turns on, and the ERR. LED turns on and operates with the settings before the error occurrence.
- An error occurs on channels for which a value not satisfying the condition of Scaling upper limit value > Scaling lower limit value is set. CH☐ Scaling setting upper/lower limit inversion (error code: 351☐H) is stored in Latest error code (RWr0), Error flag (RXA) turns on, and the ERR. LED turns on and operates with the settings before the error occurrence.
- Change the setting from the default value 0.
- This setting is ignored when Scaling enable/disable setting (address: 0133H) is disabled.

Maximum value/minimum value

■Address

Name	Address			
	CH1	CH2	CH3	CH4
CH☐ Maximum value	0600H	0602H	0604H	0606H
CH☐ Minimum value	0601H	0603H	0605H	0607H

■Description

The maximum and minimum values for the converted digital operation value are stored as 16-bit signed binary data.

The following two methods are available for resetting the maximum and minimum values.

- The maximum and minimum values are replaced with current values by turning on and off Maximum value/minimum value reset request (RY1D).
- The maximum and minimum values are cleared to 0 by turning on and off Initial data setting request flag (RY9).

Point

- The maximum and minimum values are updated in averaging process cycle if average processing is set. Otherwise, the maximum and minimum values are updated in sampling cycle.
- When the scaling function and/or shift function are used, the operation results of these functions are applied to the maximum and minimum values to be stored.

Setting range monitor

■Address

Name	Address
Setting range monitor	0610H

■Description

The set input range value can be checked.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
CH4				CH3				CH2				CH1			

Point

When A/D conversion enable/disable setting (address: 0102H) is set to A/D conversion disabled, the range is not changed and the value of Setting range monitor (address: 0610H) is not updated.

■Monitored value

The following table lists the monitored values.

Input range	Monitored value
4 to 20mA	0H (Default value)
0 to 20mA	1H
1 to 5V	2H
0 to 5V	3H
-10 to 10V	4H
0 to 10V	5H

Parameter automatic setting status monitor

■Address

Name	Address
Parameter automatic setting status monitor	0612H

■Description

The parameter automatic setting status can be checked.

■Monitored value

The following table lists the monitored values.

Parameter automatic setting status	Monitored value	Details
Unexecuted	0H (Default value)	Parameter automatic setting execution is not in progress.
Executing	1H	Parameter automatic setting execution is in progress.
Completed successfully (non-volatile memory updated)	2H	The parameter automatic setting is executed and completed successfully. The non-volatile memory is updated with the parameter automatic setting parameters.
Completed with an error	3H	The parameter automatic setting is executed and completed with an error.
Completed successfully (non-volatile memory not updated)	4H	The parameter automatic setting is executed and completed successfully. In any of the following states in which the parameter automatic setting is not required or cannot be executed, if the parameter automatic setting is executed, the non-volatile memory is not updated. • The parameters stored in the non-volatile memory are the same as the parameter automatic setting parameters. • Input range switch enable/disable setting is enabled. • A non-volatile memory data error (parameter) (error code: 2010H) occurs.

Parameter area initialization command

■Address

Name	Address
Parameter area initialization command	1002H

■Description

This command resets parameters stored in the remote buffer memory and non-volatile memory to the default values.
The A/D converter module can be restored when a non-volatile memory data error (parameter) (error code: 2010H) occurs.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed to "0".															(1)

(1) 0: Not commanded (default value), 1: Commanded

Point

If a value other than the above is set, the setting value of lower 1 bit is used for operation.

■Behavior of parameter area initialization

Setting Parameter area initialization command (address: 1002H) to Commanded (1) sets the parameters in the non-volatile memory back to default values.

Point

After the execution of Parameter area initialization command (address: 1002H), turning off and on the module power supply enables the module to operate normally. Parameters used for operation of the A/D converter module after the module is powered off and on vary depending on whether parameter automatic setting is enabled or not.

- When the parameter automatic setting is executed, the module operates with the slave station parameters that are automatically set.
- When the parameter automatic setting is disabled, the module operates with initialized parameters as it operates with parameters saved in the non-volatile memory.

Parameter area initialization completed

■Address

Name	Address
Parameter area initialization completed	1003H

■Description

This area indicates the initialization completion status of parameters stored in the non-volatile memory.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed to "0".															(1)

(1) 0: Not performed (default value), 1: Completed

■Behavior of parameter area initialization

Parameter area initialization completed (address: 1003H) is set to Completed when parameters stored in the non-volatile memory are set to the default values.

Appendix 4 I/O Conversion Characteristics of A/D Conversion

I/O conversion characteristics of A/D conversion mean the slope connecting the offset value and gain value for converting an analog signal (voltage or current input) from outside of the A/D converter module to a digital value.

Offset value

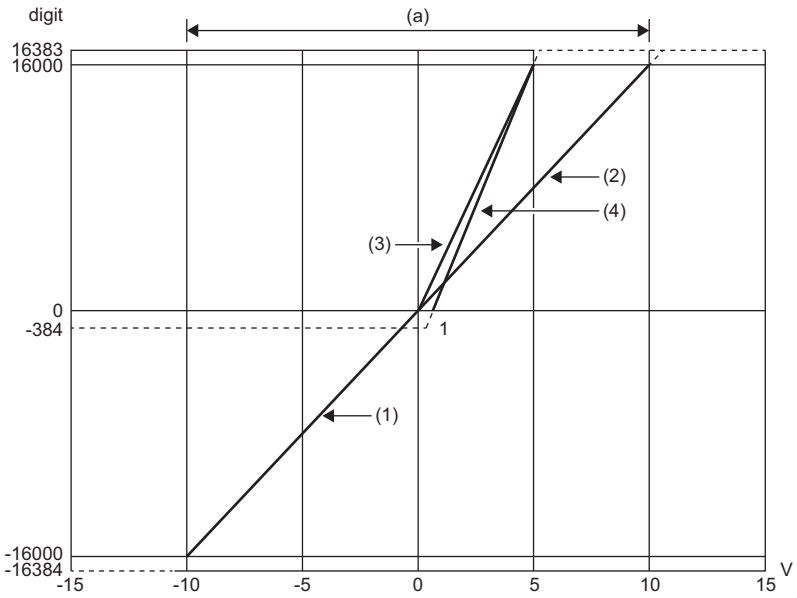
The analog input value (voltage or current) corresponding to the digital output value 0

Gain value

The analog input value (voltage or current) corresponding to the digital output value 16000

Voltage input characteristics

The following graph shows the voltage input characteristics.



digit: Digital output value
V: Analog input voltage (V)
(a) Analog input practical range

No.	Range setting	Offset value	Gain value	Digital output value*1	Maximum resolution
(1)	-10 to 10V	0V	10V	-16000 to 16000	0.625mV
(2)	0 to 10V	0V	10V	0 to 16000	0.625mV
(3)	0 to 5V	0V	5V	0 to 16000	0.3125mV
(4)	1 to 5V	1V	5V	0 to 16000	0.25mV

*1 When the analog input value exceeds the range of digital output values, the digital output value is fixed to the maximum or minimum value.

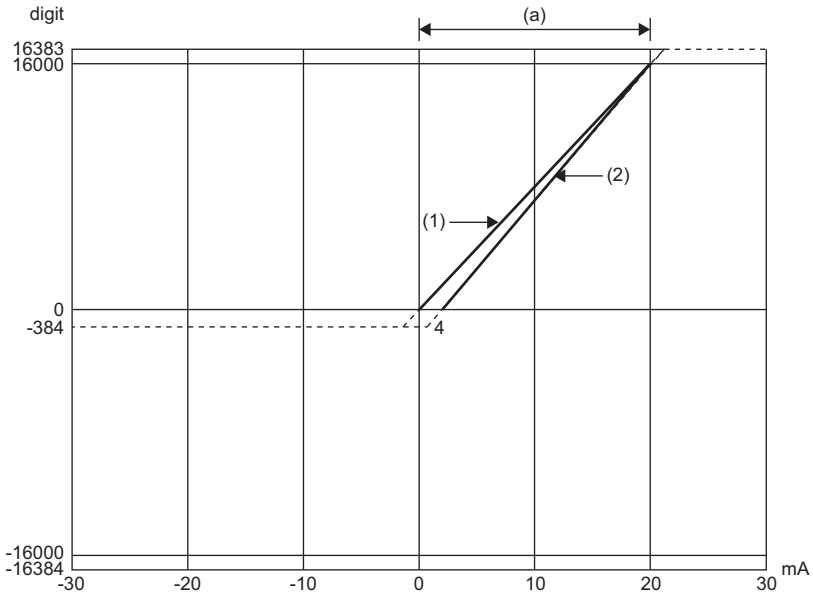
Range setting	Digital output value	
	Minimum	Maximum
-10 to 10V	-16384	16383
0 to 10V	-384	
0 to 5V		
1 to 5V		

Point

- Use a value within the practical analog input range for each input range. If a value is out of the range, the maximum resolution and accuracy may not fall within the range of performance specifications. (Do not use the value in the dotted line region in the graph of voltage input characteristics.)
- Do not set the voltage over ±15V. Doing so can cause breakdown of the elements.

Current input characteristics

The following graph shows the current input characteristics.



digit: Digital output value
mA: Analog input current (mA)
(a) Analog input practical range

No.	Range setting	Offset value	Gain value	Digital output value*1	Maximum resolution
(1)	0 to 20mA	0mA	20mA	0 to 16000	1.25μA
(2)	4 to 20mA	4mA	20mA		1μA

*1 When the analog input value exceeds the range of digital output values, the digital output value is fixed to the maximum or minimum value.

Range setting	Digital output value	
	Minimum	Maximum
0 to 20mA	-384	16383
4 to 20mA		

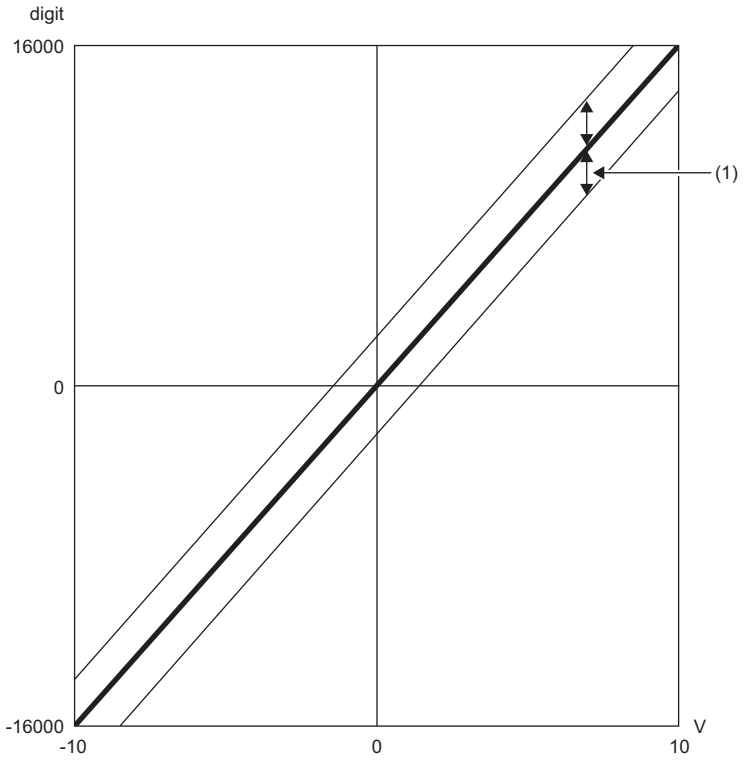
Point

- Use a value within the practical analog input range for each input range. If a value is out of the range, the maximum resolution and accuracy may not fall within the range of performance specifications. (Do not use the value in the dotted line region in the graph of current input characteristics.)
- Do not set the current over ±30mA. Doing so can cause breakdown of the elements.

A

Appendix 5 Accuracy of A/D Conversion

Accuracy of A/D conversion is the accuracy of the maximum value of digital output value.
An input characteristic change by changing the input range does not sacrifice the accuracy, which is maintained within the described range of the performance specifications.
The following figure shows the fluctuation range of accuracy with the range of -10 to 10V selected.
A digital value is output with an accuracy of ±0.1% (±16 digits) when the ambient temperature is 25±5℃ or with an accuracy of ±0.2% (±32 digits) when the ambient temperature is 0 to 55℃. (except for the conditions under noise influence).



digit: Digital output value
V: Analog input value (V)
(1) Fluctuation range

Appendix 6 CC-Link IE TSN Processing Time

The CC-Link IE TSN processing time is the time taken for the A/D converter module to retrieve an analog input value and store the data in the master station CPU module device.

The CC-Link IE TSN processing time is determined by the following processing time.

Data link processing time = SM + LS + Remote station processing time

- SM: Sequence scan time of the master station (📖 MELSEC iQ-R CPU Module User's Manual (Application))
- LS: Communication cycle interval (📖 MELSEC iQ-R CC-Link IE TSN User's Manual (Application))
- Remote station processing time: Conversion speed (200μs/channel) × number of conversion enabled channels

For details on processing time, refer to the following.

📖 MELSEC iQ-R CC-Link IE TSN User's Manual (Application)

A

Appendix 7 EMC and Low Voltage Directives

In each country, laws and regulations concerning electromagnetic compatibility (EMC) and electrical safety are enacted.
For the products sold in the European countries, compliance with the EU's EMC Directive has been a legal obligation as EMC regulation since 1996, as well as the EU's Low Voltage Directive as electrical safety regulation since 1997.
Manufacturers who recognize their products are compliant with the EMC and Low Voltage Directives are required to attach a "CE marking" on their products in European countries.
In some other countries and regions, manufacturers are required to make their products compliant with applicable laws or regulations and attach a certification mark on the products as well (such as UK Conformity Assessed (UKCA) marking in the UK, and Korea Certification (KC) marking in South Korea).
Each country works to make their regulatory requirements consistent across countries based on international standards. When the requirements are consistent, measures to comply with the EMC and electrical safety regulations become common across countries.
The UK and South Korea have enacted EMC regulations whose requirements are consistent with those of the EMC Directive. The UK has also enacted electrical safety regulations whose requirements are consistent with those of the Low Voltage Directive. In this section, the requirements of the EMC and Low Voltage Directives are described as examples of those of the EMC and electrical safety regulations.

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 modules 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	Test item	Test details	Standard value
EN61131-2: 2007	CISPR16-2-3 Radiated emission*2	Radio waves from the product are measured.	• 30M to 230MHz QP: 40dBμV/m (measured over 10m)*1 • 230M to 1000MHz QP: 47dBμV/m (measured over 10m)
	CISPR16-2-1, CISPR16-1-2 Conducted emission*2	Noise from the product to the power line is measured.	• 150k to 500kHz QP: 79dB, Mean: 66dB*1 • 500k to 30MHz QP: 73dB, Mean: 60dB

*1 QP (Quasi-Peak): quasi-peak value, Mean: mean value
*2 The module is an open type device (a device designed to be housed in other equipment) and must be installed inside a conductive control panel. The tests were conducted with the module installed in a control panel.

■Immunity requirements

Standard	Test item	Test details	Standard value
EN61131-2: 2017	EN61000-4-2 Electrostatic discharge immunity*1	Static electricity is applied to the cabinet of the equipment.	• 30M to 230MHz QP: 40dBμV/m (measured over 10m)*1 • 230M to 1000MHz QP: 47dBμV/m (measured over 10m)
	EN61000-4-3 Radiated, radio-frequency, electromagnetic field immunity*1	Electric fields are radiated to the product.	• 150k to 500kHz QP: 79dB, Mean: 66dB*1 • 500k to 30MHz QP: 73dB, Mean: 60dB
	EN61000-4-4 Electrical fast transient/burst immunity*1	Burst noise is applied to the power line and signal line.	• AC/DC main power supply, I/O power supply, AC I/O (unshielded): 2kV • DC I/O, analog, communication cable: 1kV
	EN61000-4-5 Surge immunity*1	A lightning surge is applied to the power line and signal line.	• AC power line, AC I/O power supply, AC I/O (unshielded): 2kV CM, 1kV DM • DC power line, DC I/O power supply: 0.5kV CM, DM • DC I/O, AC I/O (shielded), analog*2, communication: 1kV CM
	EN61000-4-6 Conducted RF immunity*1	High frequency noise is applied to the power line and signal line.	0.15M to 80MHz, 80% AM modulation @1kHz, 10Vrms
	EN61000-4-8 Power-frequency magnetic field immunity*1	The product is installed in an inductive magnetic field.	50Hz/60Hz, 30A/m
	EN61000-4-11 Voltage dips and interruption immunity*1	A momentary power failure is caused to the power supply voltage.	• Apply at 0%, 0.5 cycles and zero-cross point • 0%, 250/300 cycles (50/60Hz) • 40%, 10/12 cycles (50/60Hz) • 70%, 25/30 cycles (50/60Hz)

*1 The module is an open type device (a device designed to be housed in other equipment) and must be installed inside a conductive control panel. 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%.

A

Installation in a control panel

The module is an open type device and must be installed inside a control panel.

This ensures safety as well as effective shielding of module-generated electromagnetic noise.

■Control panel

- Use a conductive control panel.
- When securing the top or bottom plate using bolts, cover the grounding part on the control panel so that the part will not be painted.
- To ensure electrical contact between the inner plate and control panel, take measures such as covering the bolts so that conductivity can be ensured in the largest possible area.
- Ground the control panel with a thick ground cable so that low impedance can be ensured even at high frequencies.
- Holes in the control panel must be 10cm diameter or less. If the holes are larger than 10cm in diameter, radio waves may leak. In addition, because radio waves leak through a clearance between the control panel and its door, reduce the clearance as much as possible. The leakage of radio waves can be suppressed by the direct application of an EMI gasket on the paint surface.

Our tests have been carried out on a control panel having the damping characteristics of 37dB (max.) and 30dB (mean) (measured by 3m method, 30 to 300MHz).

■Wiring of power cables and ground cables

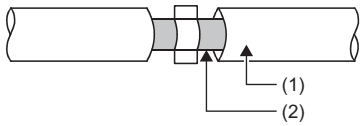
Near the power supply part, provide a grounding point to the control panel. Ground the FG terminal with the thickest and shortest possible ground cable (30cm or shorter).

Cables

Use shielded cables for the cables which are connected to the module and run out from the control panel. If a shielded cable is not used or not grounded correctly, the noise immunity will not meet the specified value.

■Network cable

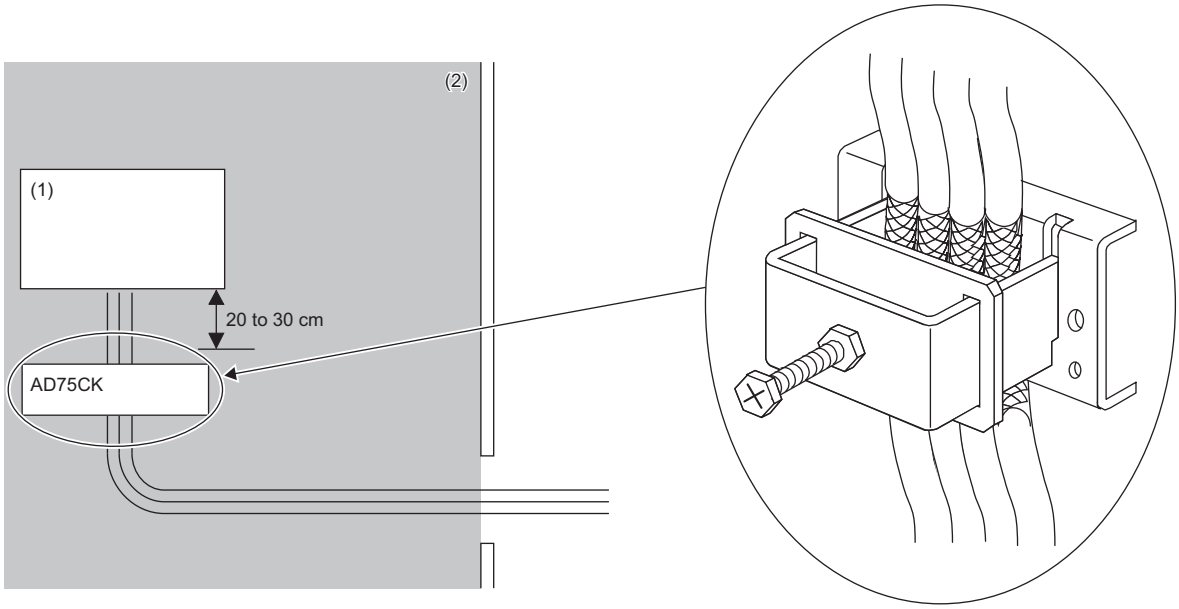
Network cables are shielded cables. Strip a part of the jacket as shown below and ground the exposed shield in the largest possible area.



(1) Network cable
(2) Shield

■Grounding the cable clamp

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



(1) Module
(2) In the control panel

For details on AD75CK, refer to the following.

📖 AD75CK-type Cable Clamping Instruction Manual

■Analog I/O signal line

Use a signal line of 30m or shorter when connecting it to the analog I/O terminals of the module.

External power supply

- Use a CE-marked product for an external power supply and always ground the FG terminal. (External power supply used in testing by Mitsubishi: DRJ100-24-1 and DRJ240-24-1 manufactured by TDK-Lambda Corporation)
- Connect a power cable with the length of 30m or less to the module power supply terminal.

Others

■Ferrite core

A ferrite core has the effect of reducing radiation noise in the 30MHz to 100MHz band.

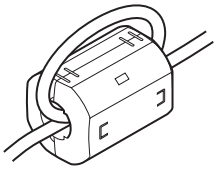
It is recommended to attach ferrite cores if shielded cables coming out of the control panel do not provide sufficient shielding effects.

Note that the ferrite cores must be attached at the position closest to the cable hole inside the control panel. If attached at an improper position, the ferrite core will not produce any effect.

For the FG terminal connected to the external power supply of the A/D converter module, attach a ferrite core 4cm away from the module. (Ferrite core used for the tests conducted by Mitsubishi: ESD-SR-250 manufactured by TOKIN Corporation, and ZCAT3035-1330 manufactured by TDK Corporation)

Ex.

Attachment



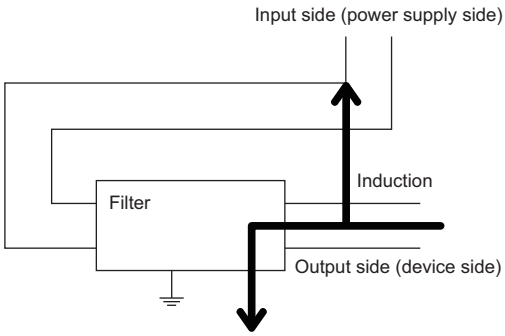
■Noise filter (power supply line filter)

A noise filter is a component which has an effect on conducted noise. Attaching the filter can suppress more noise. (The noise filter has the effect of reducing conducted noise of 10MHz or less.)

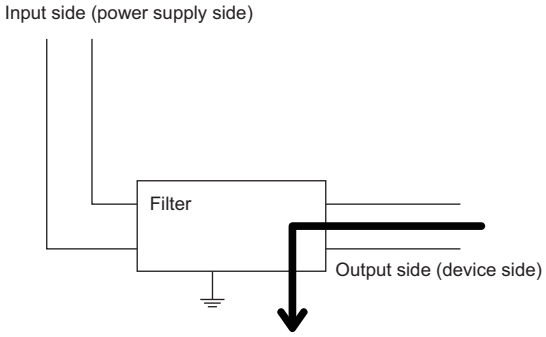
Connect a noise filter to the external power supply of an A/D converter module. Use a noise filter with the damping characteristics equivalent to those of RSEN-2006 (manufactured by TDK-Lambda Corporation). Note that a noise filter is not required if the module is used in Zone A defined in EN61131-2.

The precautions for attaching a noise filter are described below.

- Do not bundle the cables on the input side and output side of the noise filter. If bundled, the output side noise will be induced into the input side cables from which the noise was filtered.



• Example of failure
Bundle of input and output wires all together induces noise.



• Example of countermeasure
Route the input and output wires separated from each other.

- Ground the noise filter grounding terminal to the control panel with the shortest cable possible (approx. 10cm).
- Install a noise filter within 3m from the module. (Distance between the external power supply and module is 30m.)

A

Requirements to compliance with the Low Voltage Directive

The module operates at the rated voltage of 24VDC.

The Low Voltage Directive is not applied to the modules that operate at the rated voltage of less than 50VAC and 75VDC.

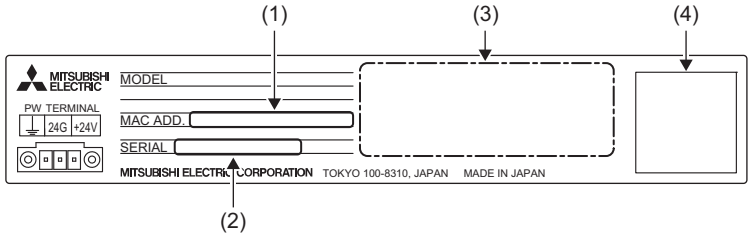
Appendix 8 How to Check Production Information and Firmware Version

Checking the production information

The production information of A/D converter module can be checked with the following.

- Rating plate
- CC-Link IE TSN/CC-Link IE Field diagnostics

Checking on the rating plate



(1) MAC address
(2) Production information
(3) Relevant standard symbol
(4) QR code

Checking by using CC-Link IE TSN/CC-Link IE Field diagnostics

■Checking by each A/D converter module

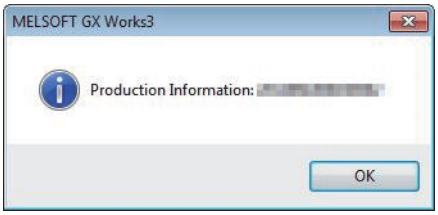
The production information of each A/D converter module can be checked by following the procedure below.

Operating procedure

1. Connect the engineering tool to the CPU module.
2. Start CC-Link IE TSN/CC-Link IE Field diagnostics from the menu.

[Diagnostics] ⇨ [CC-Link IE TSN/CC-Link IE Field Diagnostics]

3. Right-click the slave station and then select "Production Information" to display the production information.
4. The production information is displayed.



■Checking with the "Station Information List" window

For how to check the production information, refer to the following.

☞ Page 134 Checking station information

A

Checking the firmware version

Check the firmware version of an A/D converter module with the following.

- "Station Information List" window of CC-Link IE TSN/CC-Link IE Field Diagnostics
- CC-Link IE TSN Firmware Update Tool

Point

For a module on which a firmware update has not been performed yet, the firmware version can be checked with the production information. (The first two digits of production information show the firmware version.)
(☞ Page 189 Checking the production information)

Checking with the "Station Information List" window

For how to check the firmware version, refer to the following.
☞ Page 134 Checking station information

Checking with the CC-Link IE TSN Firmware Update Tool

For how to check the firmware version, refer to the "Help" of CC-Link IE TSN Firmware Update Tool.

Appendix 9 Added and Changed Functions

This section lists functions added to or changed in the A/D converter module.

Added functions

The following table shows the functions that were added to the A/D converter module and the versions supporting these functions.

Additional function	Firmware version	Profile version	Reference
CC-Link IE TSN Network synchronous communication function	"03" or later	"02" or later	☞ Page 80 CC-Link IE TSN Network Synchronous Communication Function
Ring topology	"03" or later	—*1	☞ Page 47 Network topology setting
"Station Information List" window display	"03" or later	—*1	☞ Page 134 Checking station information
Communication speed setting function	"05" or later	"03" or later	☞ Page 97 Communication Speed Setting Function
CC-Link IE TSN Class setting function	"06" or later	"04" or later	☞ Page 84 CC-Link IE TSN Class Setting Function
CC-Link IE TSN Protocol version 2.0 • CC-Link IE TSN Class B ver.2.0-compatible • CC-Link IE TSN Class A ver.2.0-compatible	"06" or later	"04" or later	☞ Page 85 Applicable version
SLMP communication function	"06" or later	—*1	☞ Page 109 SLMP Communication Function

*1 The function can be used regardless of the version.

Function changes

The following table shows the functions that were changed in the A/D converter module and the versions supporting these functions.

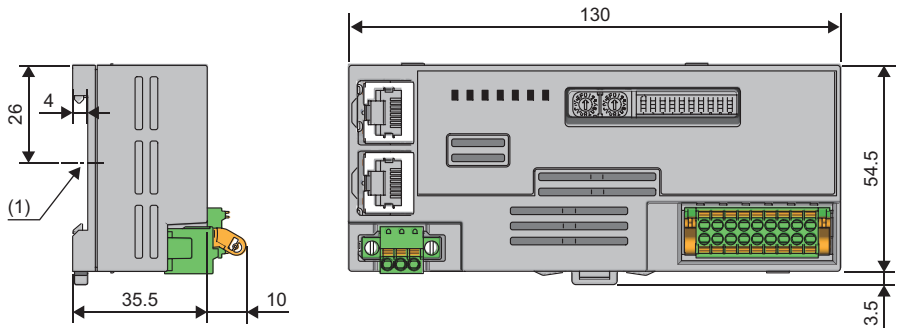
Details of change	Firmware version	Reference
Setting values of the communication period interval setting	"02" or later	☞ Page 45 Communication period interval setting
Setting values of the communication period interval setting	"03" or later	☞ Page 45 Communication period interval setting
Operation in multicast mode	"03" or later	☞ Page 47 Communication mode

A

Appendix 10 External Dimensions

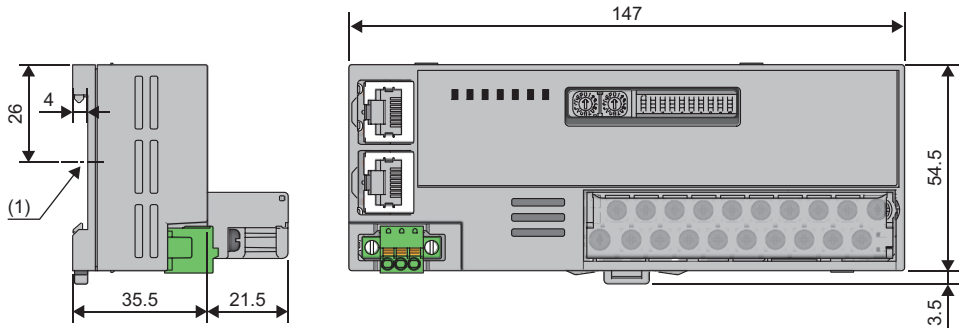
External dimensions of the A/D converter module is as follows.

- Spring clamp terminal block type



(1) Center of DIN rail
(Unit: mm)

- Screw terminal block type



(1) Center of DIN rail
(Unit: mm)

MEMO

INDEX

MEMO

REVISIONS

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

Revision date	*Manual number	Revision
May 2019	SH(NA)-082131ENG-A	First edition
November 2019	SH(NA)-082131ENG-B	■Added or modified parts INTRODUCTION, RELEVANT MANUALS, GENERIC TERMS AND ABBREVIATIONS, Chapter 1, Section 2.4, Chapter 3, Section 4.1, 5.1, Chapter 6, Section 7.1, 7.11, 7.12, 8.2, 8.3, 10.1, 10.2, 10.6, Appendix 3, 5, 8, 9, 10
May 2020	SH(NA)-082131ENG-C	■Added function CC-Link IE TSN Network synchronous communication function ■Added or modified parts INTRODUCTION, RELEVANT MANUALS, TERMS, GENERIC TERMS AND ABBREVIATIONS, Section 2.3, 2.4, Chapter 4, Section 5.2, 5.5, 6.1, 6.3, 7.1, 7.11, 7.12, 8.1, 10.1, 10.2, 10.4, 10.6, Appendix 8, 9
July 2020	SH(NA)-082131ENG-D	■Added or modified parts SAFETY PRECAUTIONS, CONDITIONS OF USE FOR THE PRODUCT
May 2021	SH(NA)-082131ENG-E	■Added or modified parts TERMS, Chapter 1, Section 2.3, 7.10, Chapter 9
October 2021	SH(NA)-082131ENG-F	■Added or modified parts SAFETY PRECAUTIONS, TERMS, Section 2.4, Chapter 3, Section 4.1, 5.5, 6.1, 7.11, 7.12, 10.1, 10.2, 10.6, Appendix 1, 7, 9
May 2022	SH(NA)-082131ENG-G	■Added functions CC-Link IE TSN Class setting function, SLMP communication function ■Added or modified parts RELEVANT MANUALS, TERMS, Chapter 1, Section 2.3, 2.4, Chapter 3, Section 4.1, 6.1, 7.11, 7.12, 7.13, 7.14, 10.2, 10.6, Appendix 1, 3, 9

Japanese manual number: SH-082130-G

WARRANTY

Please confirm the following product warranty details before using this product.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.

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]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place. Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.

1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

(1) Damages caused by any cause found not to be the responsibility of Mitsubishi.

(2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.

(3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.

(4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

TRADEMARKS

QR Code is either a registered trademark or a trademark of DENSO WAVE INCORPORATED in the United States, Japan, and/or other countries.

The company names, system names and product names mentioned in this manual are either registered trademarks or trademarks of their respective companies.

In some cases, trademark symbols such as '™' or '®' are not specified in this manual.

SH(NA)-082131ENG-G(2205)MEE
MODEL: CCIETSN-AD-U-E
MODEL CODE: 13JX1A

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS : 1-14 , YADA-MINAMI 5-CHOME , HIGASHI-KU, NAGOYA , JAPAN