MITSUBISHI ELECTRIC

Programmable Controller

CC-Link IE Field Network Multiple Input
(Voltage/Current/Temperature) Module
User's Manual

-NZ2GF2S-60MD4

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 of the CPU module used.

In this manual, the safety precautions are classified into two levels: " ⚠ WARNING" and " ⚠ CAUTION".

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

Under some circumstances, failure to observe the precautions given under " ⚠ CAUTION" may lead to serious consequences.

Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

⚠WARNING

- When a communication failure occurs in the network, data in the master module 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 I/O signal since they are used by the system. Do not write any data to the "use prohibited" areas in the remote register. Doing so may result in an accident 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.
- When the input type is a thermocouple, eliminate any disturbances which cause instability or non-uniformity in the temperature around the module (especially the analog input terminal block). Failure to do so will cause accuracy errors.

[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.
● Connect the connector of each cable securely. 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.
- Use applicable solderless terminals and tighten them within the specified torque range.
- 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 cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact.
- 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.
- 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 Electric 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.
- ● 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 connect/disconnect the terminal block more than 50 times (in accordance with IEC 61131-2).
- ● 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 Field Network multiple input module (hereafter abbreviated as multiple input module).

This manual describes the procedures, system configuration, parameter settings, functions, and troubleshooting of a multiple input module.

Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the multiple input 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.

Relevant module

NZ2GF2S-60MD4

> **Point**
>
> Unless otherwise specified, this manual describes the program examples in which the remote I/O signals and remote register areas are assigned for a multiple input module as follows.
> • Remote input signal: RX0 to RX1F
> • Remote output signal: RY0 to RY1F
> • Remote register: RWr0 to RWr17, RWw0 to RWw17
> For the assignment of remote I/O signals and remote register areas, refer to the following.
> 📖 User's manual for the master/local module used

MEMO

CONTENTS

CONTENTS

9

RELEVANT MANUALS

Manual name [manual number]	Description	Available form
MELSEC iQ-R Ethernet/CC-Link IE User's Manual (Startup) [SH-081256ENG]	Specifications, procedures before operation, system configuration, wiring, and communication examples of Ethernet, CC-Link IE Controller Network, and CC-Link IE Field Network	Print book
		e-Manual PDF
MELSEC iQ-R CC-Link IE Field Network User's Manual (Application) [SH-081259ENG]	Functions, parameter settings, programming, troubleshooting, I/O signals, and buffer memory of CC-Link IE Field Network	Print book
		e-Manual PDF
MELSEC-L CC-Link IE Field Network Master/Local Module User's Manual [SH-080972ENG]	Overview of the CC-Link IE Field Network, and specifications, procedures before operation, system configuration, installation, wiring, settings, functions, programming, and troubleshooting of the LJ71GF11-T2	Print book
		e-Manual PDF
MELSEC-Q CC-Link IE Field Network Master/Local Module User's Manual [SH-080917ENG]	Overview of the CC-Link IE Field Network, and specifications, procedures before operation, system configuration, installation, wiring, settings, functions, programming, and troubleshooting of the QJ71GF11-T2	Print book
		PDF
MELSEC iQ-R Simple Motion Module User's Manual (Network) [IB-0300307ENG]	Functions, programming, and troubleshooting regarding CC-Link IE Field Network of the RD77GF	Print book
		e-Manual PDF
MELSEC-Q QD77GF Simple Motion Module User's Manual (Network) [IB-0300203]	Functions, programming, and troubleshooting regarding CC-Link IE Field Network of the QD77GF16	Print book
		PDF

Point

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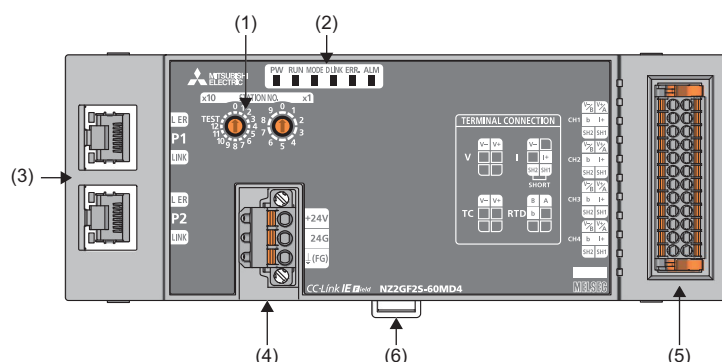
e-Manual has the following features:

- 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.

TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
CC-Link IE Field Network	A high-speed and large-capacity open field network that is based on Ethernet (1000BASE-T)
Cyclic transmission	A function by which data is periodically exchanged among stations on the network using link devices
Data link	A generic term for cyclic transmission and transient transmission
Dedicated instruction	An instruction that simplifies programming for using functions of intelligent function modules
Device station	A generic term for local station, remote I/O station, remote device station, and intelligent device station
Digital output value	A generic term for digital values and temperature measured values converted from analog signals which have been input from the outside
Disconnection	A process of stopping data link if a data link error occurs
Engineering tool	The another name for the software package for the MELSEC programmable controllers
Input range	A property that indicates the range of input value when the input type is set to the voltage, current, or micro voltage; indicates the type of resistance temperature detector when the input type is set to the resistance temperature detector; indicates the type of thermocouple when the input type is set to the thermocouple
Input type	A type of analog signals (voltage, current, and a sensor such as a thermocouple and a resistance temperature detector) to be input to the multiple input module from the outside
Intelligent device 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 as well. This station responds to a transient transmission (request) from other stations and also issues a transient transmission (request) to other stations.
Link device	A device (RX, RY, RWr, or RWw) in a module on CC-Link IE Field Network
Link special register (SW)	Word data that indicates the operating status and data link status of a module on CC-Link IE Field Network
Link special relay (SB)	Bit data that indicates the operating status and data link status of a module on CC-Link IE Field Network
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.
Master/local module	The abbreviation for the CC-Link IE Field Network master/local module
Multiple input	A capability to input analog signals by different input types (voltage, current, micro voltage, thermocouple, or resistance temperature detector) for one channel
Multiple input module	The abbreviation for the NZ2GF2S-60MD4 CC-Link IE Field Network multiple input module
REMFR	The abbreviation for ZP.REMFR
Remote buffer memory	Buffer memory in a remote device station and intelligent device station
Remote device station	A station that exchanges I/O signals (bit data) and I/O data (word data) with another station by cyclic transmission. This station responds to a transient transmission (request) from other stations.
Remote I/O station	A station that exchanges I/O signals (bit data) with the master station by cyclic transmission
Remote input (RX)	Bit data input from a device station to the master station (For some areas in a local station, data are input in the opposite direction.) 📖 User's manual for the master/local module used
Remote output (RY)	Bit data output from the master station to a device station (For some areas in a local station, data are output in the opposite direction.) 📖 User's manual for the master/local module used
Remote register (RWr)	Word data input from a device station to the master station (For some areas in a local station, data are input in the opposite direction.)
Remote register (RWw)	Word data output from the master station to a device station (For some areas in a local station, data are output in the opposite direction.)
REMTO	The abbreviation for ZP.REMTO
Reserved station	A station actually not connected to the network. This station is counted as a connected station as a station reserved for future use.
Simple motion module	The abbreviation for the QD77GF16 and RD77G simple motion modules
Transient transmission	A function of communication with other stations, which is used when requested by a dedicated instruction or an engineering tool

1 PART NAMES

No.	Name	Application
(1)	Station number setting switch	A rotary switch for the following setting and test. • Station number setting (☞ Page 30 Switch Setting) • Unit Test (☞ Page 103 Unit Test) When operating the station number setting switch, use a flathead screwdriver with 3.5mm or less width of the tip.
(2)	PW LED (green)	Indicates the power supply status of the multiple input module. • On: Power supply ON • Off: Power supply OFF
	RUN LED (green)	Indicates the operating status of the multiple input module. • On: Operating normally • Off: A major error has occurred.
	MODE LED (green)	Indicates the mode of the multiple input module. • On: Online mode • Flashing: Unit test mode • Off: The unit test is completed.
	D LINK LED (green)	Indicates the data link status of the multiple input module. • On: Data link in operation (cyclic transmission being performed) • Flashing: Data link in operation (cyclic transmission stopped) • Off: Data link not in operation (disconnected)
	ERR. LED (red)	Indicates the error status of the multiple input module. • On: A moderate or major error has occurred. • Flashing: A warning has occurred. • Off: Operating normally
	ALM LED (red)	Indicates the alarm status of the multiple input module. • Flashing: An input signal error or disconnection is detected. • Off: No alarm in the module
(3)	P1	PORT1 connector for CC-Link IE Field Network connection (RJ45 connector) Connects an Ethernet cable. (☞ Page 39 Wiring of Ethernet cable) There are no restrictions on the connection order of the cables for the P1 connector and P2 connector.
	L ER LED (red)	• On: Module received abnormal data, or module performing loopback • Off: Module received normal data, or module not performing loopback
	LINK LED (green)	• On: Link-up in progress • Off: Link-down in progress
	P2	PORT2 connector for CC-Link IE Field Network connection (RJ45 connector) Connects an Ethernet cable. (☞ Page 39 Wiring of Ethernet cable) There are no restrictions on the connection order of the cables for the P1 connector and P2 connector.
	L ER LED (red)	(Same as the LEDs of P1 connector)
	LINK LED (green)	
(4)	Terminal block for module power supply and FG	A terminal block to connect the module power supply (24VDC) and FG
(5)	Analog input terminal block	A 24-point spring clamp terminal block. Connects input signal lines of external devices.
(6)	DIN rail hook	A hook used to mount the multiple input module to a DIN rail

Multiple input module status and LED status

The following table lists the correspondence between the multiple input module status and the LED status.

Multiple input module status		Data link status	LED status					
			PW LED	RUN LED	MODE LED	D LINK LED	ERR. LED	ALM LED
Normal mode	Disconnected	Disconnection	On	On	On	Off	Off	Off
	Data link in operation	Data link in operation	On	On	On	On	Off	Off
	Reserved station specification being performed	Cyclic stop	On	On	On	Flashing	Off	Off
	Data link stop	Cyclic stop	On	On	On	Flashing	Off	Off
Unit test	In progress	—	On	On	Flashing	Off	Off	Off
	Completed successfully.	—	On	On	Off	Off	Off	Off
	Completed with an error.	—	On	On	Off	Off	On	Off
Communication system error		Cyclic stop	On	On	On	Flashing	Off	Off
Error	Major error	—	On	Off	*2	*1	On[3]	*1
	Moderate error	—	On	On	*2	*1	On	*1
Warning	Minor error	—	On	On	*2	*1	Flashing	*1
Alarm	A disconnection is detected.	—	On	On	On	*1	*1	Flashing
	An input signal error is detected.	—	On	On	On	*1	*1	Flashing

*1 Either of On, Flashing, or Off.

*2 Either of On or Off.

*3 When the module is failed, the LED may not turn on.

2 SPECIFICATIONS

This chapter describes the specifications of the multiple input 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	Sweep count
		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[*1]	0 to 2000m					
Installation location	Inside a control panel[*2]					
Overvoltage category[*3]	II or less					
Pollution degree[*4]	2 or less					
Equipment class	Class I					

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

*2 If the environment satisfies the operating ambient temperature, operating ambient humidity and other conditions, the module can be used even outside the control panel.

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

*4 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

To use the multiple input module complying with the EMC Directive, refer to "EMC and Low Voltage Directives" in this manual. (☞ Page 137 EMC and Low Voltage Directives)

2.2 Performance Specifications

Item			NZ2GF2S-60MD4
Station type			Remote device station
Number of analog input channels			4 channels/1 module (isolation between channels)
Analog input	Voltage		-10 to 10VDC (input resistance 1MΩ)
	Current		0 to 20mADC (input resistance 250Ω)
	Micro voltage		-100 to 100mVDC (input resistance 1MΩ)
	Thermocouple	Available type	12 types K, J, T, E, N, R, S, B, U, L, PLⅡ, W5Re/W26Re
		Cold junction compensation	Use the internal sensor.
	Resistance temperature detector	Available type	10 types Pt100, JPt100, Pt50, Pt500, Pt1000, Ni100, Ni120, Ni500, Cu50, Cu100
		Measurement method	3-wire type
Digital output	Voltage, current, micro voltage		-32000 to 32000
	Thermocouple		-2700 to 18200 (value rounded off to one decimal place × 10)
	Resistance temperature detector	Resolution 0.1℃ (16-bit signed binary)	-2000 to 8500 (value rounded off to one decimal place × 10)
		Resolution 0.025℃ (32-bit signed binary)	-200000 to 850000 (value rounded off to three decimal places × 1000)
Resolution	Voltage, current, micro voltage		☞ Page 127 I/O Conversion Characteristic
	Thermocouple		• B, R, S, N, PLⅡ, W5Re/W26Re: 0.3℃ • K, E, J, T, U, L: 0.1℃
	Resistance temperature detector		0.025℃/0.1℃
Accuracy (accuracy of the maximum selection range)	Voltage, current, micro voltage	Ambient temperature: 25±5℃	Within ±0.1% (±32 digit)
		Ambient temperature: 0 to 55℃	Within ±0.2% (±64 digit)
	Thermocouple		☞ Page 131 Measured temperature range accuracy at thermocouple input
	Cold junction compensation accuracy	Measured temperature: -100℃ or higher	±2℃
		Measured temperature: -150 to -100℃	±3℃
		Measured temperature: -200 to -150℃	±5℃
	Resistance temperature detector		☞ Page 134 Measured temperature range accuracy at input of a resistance temperature detector
Conversion speed			40ms/4CH
Induced current of resistance temperature detectors			• Pt100, JPt100, Pt50, Ni100, Ni120, Cu50, Cu100: 1mA • Pt500, Pt1000, Ni500: 0.1mA
Disconnection detection			Available (In the thermocouple, resistance temperature detector, and micro voltage ranges, each channel is independent.)
Absolute maximum input[1]			Voltage: ±15V, Current: 30mA
Isolation method			• Between communication system and analog input: Transformer • Between power supply system and analog input: Transformer • Between analog input channels: Transformer
Withstand voltage			• Between power supply/communication system batch and analog input: 500VAC for 1 minute • Between analog input channels: 500VAC for 1 minute

Item		NZ2GF2S-60MD4
Isolation resistance		• Between power supply/communication system batch and analog input: 500VDC 10MΩ or higher • Between analog input channels: 500VDC 10MΩ or higher
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	A 3-point spring clamp terminal block
	Analog input part	A 24-point spring clamp terminal block
Applicable DIN rail		TH35-7.5Fe, TH35-7.5Al (compliant with IEC 60715)
Applicable wire size	Module power supply part[*2]	• Core: 0.3 to 1.5mm² (22 to 16 AWG) • Terminal hole size: 2.8mm × 2.0mm • Tightening torque range: 0.2 to 0.3N·m
	Analog input part[*2]	• Core: 0.2 to 1.5mm² (24 to 16 AWG) • Terminal hole size: 2.4mm × 1.5mm
Applicable solderless terminal	Module power supply part	☞ Page 38 List of the reference products of bar solderless terminals
	Analog input part	☞ Page 43 List of the reference products of bar solderless terminals
Cyclic transmission	Number of RX/RY points	32 points
	Number of RWr/RWw points	24 points
Communication cable		An Ethernet cable that meets the 1000BASE-T standard: Category 5e or higher (double shielded, STP), straight cable
Availability of connecting extension module		Not available
Module power supply	Voltage	24VDC (ripple rate: 5% or less) (Allowable voltage range: 20.4 to 28.8VDC)
	Inrush current	16A 0.5ms or less
	Current consumption	325mA
Weight		0.23kg

*1   A momentary current value which does not cause damage to internal resistors of the module. The maximum input current value for constant application is 24mA.

*2   Use a bar solderless terminal for the wiring.

2.3　Function List

The following table lists the functions of the multiple input module.

V: Voltage, I: Current, mV: Micro voltage, TC: Thermocouple, RTD: Resistance temperature detector

○: Available, ×: Not available

Item			Description	Input type					Reference
				V	I	mV	TC	RTD	
Temperature conversion function			By connecting a thermocouple or resistance temperature detector, the temperature data is converted and stored in the remote register.	×	×	×	○	○	—
Voltage/current/micro voltage conversion function			A voltage of -10 to 10V, current of 0 to 20mA, and micro voltage of -100 to 100mV are converted and stored in the remote register.	○	○	○	×	×	—
Input type/range setting			The input type and input range that are to be used can be selected for each channel.	○	○	○	○	○	Page 59 Input Type/Range Setting
Conversion method	Sampling processing		Analog input values and temperature input values are converted at every conversion cycle and stored in the remote register as digital output values.	○	○	○	○	○	Page 61 Sampling processing
	Averaging processing	Time average	The conversion is performed for a set period of time and averaging processing is performed on the total value excluding the maximum and minimum values. The values obtained in averaging processing are stored in the remote register.						Page 61 Time average
		Count average	The conversion is performed a set number of times and averaging processing is performed on the total value excluding the maximum and minimum values. The values obtained in averaging processing are stored in the remote register.						Page 61 Count average
		Moving average	The average of a specified number of digital output values that are imported at every conversion cycle is calculated and stored in the remote register. Because the target range for averaging processing is moved in response to every conversion cycle, the latest digital output value can be obtained.						Page 62 Moving average
Disconnection detection function			This function outputs an alarm at disconnection detection of the external wiring (resistance temperature detector, thermocouple, conducting wire, or auxiliary conducting wire), provided that the input type is a micro voltage, thermocouple, or resistance temperature detector.	×	×	○	○	○	Page 64 Disconnection Detection Function
Input signal error detection function			This function outputs an alarm if an analog input value exceeds a preset range, provided that the input type is voltage or current.	○	○	×	×	×	Page 70 Input Signal Error Detection Function
Cold junction temperature compensation setting function			By selecting the setting with or without cold junction compensation using the built-in temperature sensor in the multiple input module, two types of cold junction compensation including a temperature sensor and external (ice bath) can be conducted.	×	×	×	○	×	Page 68 Cold Junction Temperature Compensation Setting Function
Error notification function			When an error, warning, or alarm occurs, the occurrence of the error, warning, or alarm is notified to the master station using remote input signals and remote register.	○	○	○	○	○	Page 77 Error Notification Function
CC-Link IE Field Network diagnostic function			This function allows the presence or absence of a network error to be checked by accessing the engineering tool connected to the CPU module.	○	○	○	○	○	Page 80 CC-Link IE Field Network Diagnostic Function

Item	Description	Input type					Reference
		V	**I**	**mV**	**TC**	**RTD**	
iQ Sensor Solution data backup/restoration function	This function allows data such as the setting data of the device station to be backed up in the SD memory card of the CPU module of the master station. Subsequently, the setting data and others that is backed up in the SD memory card of the CPU module of the master station is restored in the device station.	○	○	○	○	○	📖 iQ Sensor Solution Reference Manual

2.4 List of Remote I/O Signals

This section lists I/O signals for a master/local module.

The assignment of I/O signals shown is an example with the remote I/O signals of the multiple input module assigned to RX0 to RX1F and RY0 to RY1F.

Remote input (RX) indicates the input signal from the multiple input module to the master/local module.

Remote output (RY) indicates the output signal from the master/local module to the multiple input module.

For details on the remote I/O signals, refer to the following.

☞ Page 106 Details of Remote I/O Signals

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		Remote output	
Signal direction: Multiple input module → Master/local module		Signal direction: Master/local module → Multiple input module	
Device number	Description	Device number	Description
RX0	Use prohibited	RY0	Use prohibited
RX1		RY1	
RX2		RY2	
RX3		RY3	
RX4		RY4	
RX5		RY5	
RX6		RY6	
RX7	Warning flag	RY7	
RX8	Use prohibited	RY8	
RX9	Initial data setting completion flag	RY9	Initial data setting request flag
RXA	Error flag	RYA	Error clear request flag
RXB	Remote READY	RYB	Use prohibited
RXC	Use prohibited	RYC	
RXD		RYD	
RXE		RYE	
RXF		RYF	
RX10	CH1 Conversion completed flag	RY10	
RX11	CH2 Conversion completed flag	RY11	
RX12	CH3 Conversion completed flag	RY12	
RX13	CH4 Conversion completed flag	RY13	
RX14	Use prohibited	RY14	
RX15		RY15	
RX16		RY16	
RX17		RY17	
RX18		RY18	
RX19		RY19	
RX1A		RY1A	
RX1B	Disconnection detection signal	RY1B	
RX1C	Input signal error detection signal	RY1C	
RX1D	Use prohibited	RY1D	
RX1E		RY1E	
RX1F		RY1F	

2.5 Remote Register List

This section lists remote register areas for a master/local module.

The assignment of the remote register areas shown is an example with the remote register areas of the multiple input module assigned to RWr0 to RWr17 and RWw0 to RWw17.

Remote register (RWr) is the information input from the multiple input module to the master/local module.

Remote register (RWw) is the information output from the master/local module to the multiple input module.

For details on the remote register, refer to the following.

☞ Page 114 Details of Remote Register

> **Point**
>
> Do not read or write the data from/to any "Use prohibited" remote register areas. Doing so may result in an accident due to an incorrect output or malfunction.

Remote register (RWr)		Remote register (RWw)	
Signal direction: Multiple input module → Master/local module		Signal direction: Master/local module → Multiple input module	
Device number	Description	Device number	Description
RWr0	Latest error code	RWw0	Use prohibited
RWr1	Latest warning code	RWw1	
RWr2	CH1 Digital output value	RWw2	
RWr3	CH2 Digital output value	RWw3	
RWr4	CH3 Digital output value	RWw4	
RWr5	CH4 Digital output value	RWw5	
RWr6	Use prohibited	RWw6	
RWr7		RWw7	
RWr8		RWw8	
RWr9		RWw9	
RWrA	Input signal error detection flag	RWwA	
RWrB	Use prohibited	RWwB	
RWrC		RWwC	
RWrD	Disconnection detection flag	RWwD	
RWrE	Use prohibited	RWwE	
RWrF		RWwF	
RWr10	CH1 Digital output value (L)	RWw10	
RWr11	CH1 Digital output value (H)	RWw11	
RWr12	CH2 Digital output value (L)	RWw12	
RWr13	CH2 Digital output value (H)	RWw13	
RWr14	CH3 Digital output value (L)	RWw14	
RWr15	CH3 Digital output value (H)	RWw15	
RWr16	CH4 Digital output value (L)	RWw16	
RWr17	CH4 Digital output value (H)	RWw17	

Precautions

The remote register is not stored in the non-volatile memory. If the module power supply is turned off, the values are returned to the default values.

2.6   List of Remote Buffer Memory Areas

This section lists the remote buffer memory areas of the multiple input module.

Range of remote buffer memory addresses

The following table lists the ranges of remote buffer memory addresses occupied by multiple input modules.

For details on the remote buffer memory, refer to the following.

☞ Page 117 Details of Remote Buffer Memory Areas

○: Available, ×: Not available

Address		Area	Target	Access method	
Decimal	Hexadecimal			CC IE Field configuration of the engineering tool	REMFR instruction, REMTO instruction[*1]
0 to 255	0000H to 00FFH	Parameter area	Station-based parameter data	×	×
256 to 511	0100H to 01FFH		Module-based parameter data	○[*2]	○
512 to 1279	0200H to 04FFH	System area		×	×
1280 to 1535	0500H to 05FFH	Monitoring area	Station-based monitor data	×	○
1536 to 1791	0600H to 06FFH		Module-based monitor data		
1792 to 2559	0700H to 09FFH	System area		×	×
2560 to 4095	0A00H to 0FFFH	Error history area	Station-based error history data	○[*2]	○
4096 to 4351	1000H to 10FFH	Module control data area	Station-based control data	×	○
4352 to 4607	1100H to 11FFH		Module-based control data		
4608 to 5375	1200H to 14FFH	System area		×	×

*1   For the REMFR and REMTO instructions, refer to the following.
📖 User's manual for the master/local module used

*2   For the access method, refer to the following.
Parameter area (☞ Page 50 Parameter Setting)
Error history area (☞ Page 92 Checking for the Error Codes and the Alarm Codes)

Point

- Do not access the system area using the REMFR or REMTO instruction. Doing so may lead the module to malfunction.
- Do not use the dedicated instruction of the REMFR and REMTO instructions to the areas later than the above areas. If these instructions are used, the remote buffer memory access error (error code: 0160H) is stored in Latest warning code (RWr1), Warning flag (RX7) turns on, and the ERR. LED flashes.

Parameter area (address: 0000H to 01FFH)

For the parameter area, parameters can be set by means of the CC IE Field configuration of the engineering tool, or the REMTO instruction.

The parameters in the parameter area are backed up to the non-volatile memory.

Parameters backed up to the non-volatile memory are read in the parameter area when the module power supply is turned off and on or the module returns from remote reset.

For the parameters written from the parameter settings of the CC IE Field configuration of the engineering tool, the write to the non-volatile memory is also completed at the same time.

When the parameter is written using the REMTO instruction, it is written to the non-volatile memory when Initial data setting request flag (RY9) is turned on.

At this time, the parameter is written to the non-volatile memory even though it is incorrect.

When the power supply is turned off and on with an incorrect parameter written, the incorrect parameter is read from the non-volatile memory and an error code is stored to Latest error code (RWr0). Take corrective action according to the error code list. (☞ Page 95 List of Error Codes)

■Station-based parameter data

Address		Description
Decimal	Hexadecimal	
0 to 255	0000H to 00FFH	System area

■Module-based parameter data

R: Readable through a program, W: Writable through a program

Address		Description	Default value[*1]	Read/Write
Decimal	Hexadecimal			
256	0100H	CH1 Input type/range setting	0000H	R/W
257	0101H	CH2 Input type/range setting	0000H	R/W
258	0102H	CH3 Input type/range setting	0000H	R/W
259	0103H	CH4 Input type/range setting	0000H	R/W
260	0104H	Averaging process setting	0000H	R/W
261	0105H	CH1 Time Average/Count Average/Moving Average	0	R/W
262	0106H	CH2 Time Average/Count Average/Moving Average	0	R/W
263	0107H	CH3 Time Average/Count Average/Moving Average	0	R/W
264	0108H	CH4 Time Average/Count Average/Moving Average	0	R/W
265	0109H	Input signal error/disconnection detection automatic clear enable/disable setting	1	R/W
266	010AH	Input signal error detection setting	0000H	R/W
267	010BH	CH1 Input signal error detection setting value	50	R/W
268	010CH	CH2 Input signal error detection setting value	50	R/W
269	010DH	CH3 Input signal error detection setting value	50	R/W
270	010EH	CH4 Input signal error detection setting value	50	R/W
271	010FH	Conversion setting for disconnection detection	1111H	R/W
272	0110H	CH1 Conversion setting value for disconnection detection (L)	0	R/W
273	0111H	CH1 Conversion setting value for disconnection detection (H)	0	R/W
274	0112H	CH2 Conversion setting value for disconnection detection (L)	0	R/W
275	0113H	CH2 Conversion setting value for disconnection detection (H)	0	R/W
276	0114H	CH3 Conversion setting value for disconnection detection (L)	0	R/W
277	0115H	CH3 Conversion setting value for disconnection detection (H)	0	R/W
278	0116H	CH4 Conversion setting value for disconnection detection (L)	0	R/W
279	0117H	CH4 Conversion setting value for disconnection detection (H)	0	R/W
280	0118H	Cold junction temperature compensation setting	0	R/W
281 to 511	0119H to 01FFH	System area	—	—

*1 This value is the value of factory default or the value of initialization by Parameter area initialization command (address: 1002H).

Monitoring area (address: 0500H to 06FFH)

■Station-based monitor data

Address		Description
Decimal	Hexadecimal	
1280 to 1535	0500H to 05FFH	System area

■Module-based monitor data

R: Readable through a program

Address		Description	Default value[*1]	Read/Write
Decimal	Hexadecimal			
1536	0600H	CH1 Input type/range monitor	0000H	R
1537	0601H	CH2 Input type/range monitor	0000H	R
1538	0602H	CH3 Input type/range monitor	0000H	R
1539	0603H	CH4 Input type/range monitor	0000H	R
1540	0604H	Cold junction temperature compensation setting state	0	R
1541 to 1791	0605H to 06FFH	System area	—	—

*1   This value is the value of factory default or the value of initialization by Parameter area initialization command (address: 1002H).

Error history area (address: 0A00H to 0FFFH)

■Station-based error history data

R: Readable through a program

Address		Description		Default value[*1]	Read/Write
Decimal	**Hexadecimal**				
2560	0A00H	Error history 1	Error code	0000H	R
2561	0A01H		Order of generation	0000H	R
2562	0A02H		[Error time] First two digits of the year/Last two digits of the year	0000H	R
2563	0A03H		[Error time] Month/Day	0000H	R
2564	0A04H		[Error time] Hour/Minute	0000H	R
2565	0A05H		[Error time] Second/No Use	0000H	R
2566	0A06H		CH1 Digital output value	0000H	R
2567	0A07H		CH2 Digital output value	0000H	R
2568	0A08H		CH3 Digital output value	0000H	R
2569	0A09H		CH4 Digital output value	0000H	R
2570 to 2575	0A0AH to 0A0FH		System area	—	—
2576 to 2591	0A10H to 0A1FH	Error history 2	Same as Error history 1.		
2592 to 2607	0A20H to 0A2FH	Error history 3	Same as Error history 1.		
2608 to 2623	0A30H to 0A3FH	Error history 4	Same as Error history 1.		
2624 to 2639	0A40H to 0A4FH	Error history 5	Same as Error history 1.		
2640 to 2655	0A50H to 0A5FH	Error history 6	Same as Error history 1.		
2656 to 2671	0A60H to 0A6FH	Error history 7	Same as Error history 1.		
2672 to 2687	0A70H to 0A7FH	Error history 8	Same as Error history 1.		
2688 to 2703	0A80H to 0A8FH	Error history 9	Same as Error history 1.		
2704 to 2719	0A90H to 0A9FH	Error history 10	Same as Error history 1.		
2720 to 2735	0AA0H to 0AAFH	Error history 11	Same as Error history 1.		
2736 to 2751	0AB0H to 0ABFH	Error history 12	Same as Error history 1.		
2752 to 2767	0AC0H to 0ACFH	Error history 13	Same as Error history 1.		
2768 to 2783	0AD0H to 0ADFH	Error history 14	Same as Error history 1.		
2784 to 2799	0AE0H to 0AEFH	Error history 15	Same as Error history 1.		
2800 to 4095	0AF0H to 0FFFH	System area		—	—

*1   This value is the value of factory default or the value of initialization by Error history clear command (address: 1000H).

Module control data area (address: 1000H to 11FFH)

■Station-based control data

R: Readable through a program, W: Writable through a program

Address		Description	Default value[*1]	Read/Write
Decimal	Hexadecimal			
4096	1000H	Error history clear command	0	R/W
4097	1001H	Error history clear completed	0	R
4098	1002H	Parameter area initialization command	0	R/W
4099	1003H	Parameter area initialization completed	0	R
4100 to 4351	1004H to 10FFH	System area	—	—

*1   This value is the value for when the module power supply is turned off and on or at the remote reset.

■Module-based control data

Address		Description
Decimal	Hexadecimal	
4352 to 4607	1100H to 11FFH	System area

3 PROCEDURES BEFORE OPERATION

This chapter describes the procedures before operation.

1. Station number setting

Set the station number of the multiple input module with the station number setting switch.

☞ Page 30 Station number setting

2. Mounting

Mount the multiple input module on the DIN rail.

☞ Page 31 Installation Environment and Installation Position

☞ Page 33 Installation

3. Wiring

Wire the power supply, Ethernet cables, and external devices to the multiple input module.

☞ Page 36 Wiring with terminal block for module power supply and FG

☞ Page 39 Wiring of Ethernet cable

☞ Page 41 Wiring for analog input terminal block

☞ Page 48 Wiring examples with an external device

4. Parameter setting and programming

Set parameters and create a program.

☞ Page 50 Parameter Setting

☞ Page 54 Changing the Parameter[*1]

☞ Page 82 PROGRAMMING

*1 To replace the module, refer to the point below.

Point

To replace the module, follow the procedure described below:

- Turn off the module power supply and disconnect the multiple input module.
- Prepare a new multiple input module and perform the procedure above from "Station number setting" to "Parameter setting and programming".
- After checking the operation, restart the control.

MEMO

3

4 SYSTEM CONFIGURATION

This chapter describes the configuration of the system using a multiple input module.

For CC-Link IE Field Network configuration, refer to the following manual.

📖 User's manual for the master/local module used

4.1 Applicable System

Applicable master station

When using a multiple input module, use the following products as a master station.

Model name	First five digits of serial number
RJ71GF11-T2	(No restriction)
RJ71EN71	
RD77GF	
QJ71GF11-T2	"14102" or later
LJ71GF11-T2	
QD77GF16	"14111" or later

Information on "Applicable 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

Ethernet cable

For the specifications of the Ethernet cable, refer to the following manual.

📖 User's manual for the master/local module used

Applicable software package

Configuring and diagnosing the multiple input module requires GX Works2 or GX Works3. Install GX Works2 or GX Works3 with the following version in accordance with the master station used.

Engineering tool	Software version
GX Works2	Version 1.560J or later
GX Works3	Version 1.032J or later

Point

When the latest profile of the multiple input 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 IE Field configuration window by profile registration to GX Works2 or GX Works3. For registration of the profile, refer to the following.

📖 GX Works2 Version 1 Operating Manual (Common)

📖 GX Works3 Operating Manual

MEMO

5 INSTALLATION AND WIRING

This chapter describes the installation and wiring of the multiple input module.

5.1 Switch Setting

Station number setting

Set the station number with the rotary switch on the front of the module. The setting value of the station number becomes valid when the module is powered on. Thus, set the station number when the module is powered off.

 • The hundreds and tens places of the station number are set with x10.
 • The ones place of the station number is set with x1.

Ex.
To set the station to 115, set the switch as shown below.
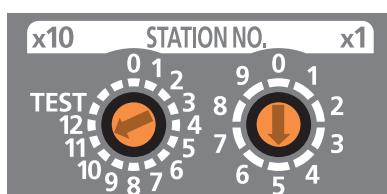
Setting range

Set the station number from 1 to 120. Setting the value other than 1 to 120 causes a communication system error and the D LINK LED flashes.

> **Point**
>
> • Changing the station number setting switch while the module is powered on causes a minor error and flashes the ERR. LED. Returning the station number setting switches to the previous setting eliminates the error after five seconds and turns off the ERR. LED.
> • Do not set a station number duplicated with other station numbers. If the station number is duplicated, a communication system error occurs and the D LINK LED does not turn on.

5.2 Installation Environment and Installation Position

Installation environment

Installation location

Do not install the multiple input module to the place 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 flammable gas is present;
- Conductive powder such as dust and iron powder, oil mist, salinity, or organic solvent is filled;
- The multi input module is exposed to direct sunlight;
- A strong electric field or strong magnetic field is generated; and
- The multiple input module is subject to vibration and shock.

Installation surface

Install the multiple input module on the flat surface. When the installation surface is uneven, excessive force is applied to the printed-circuit board and may cause a defect.

Installation position

When installing the multiple input module in a control panel, provide clearance of 60mm or longer (1) between the module and the sides of control panel or neighboring modules to ensure good ventilation and an easy module change.
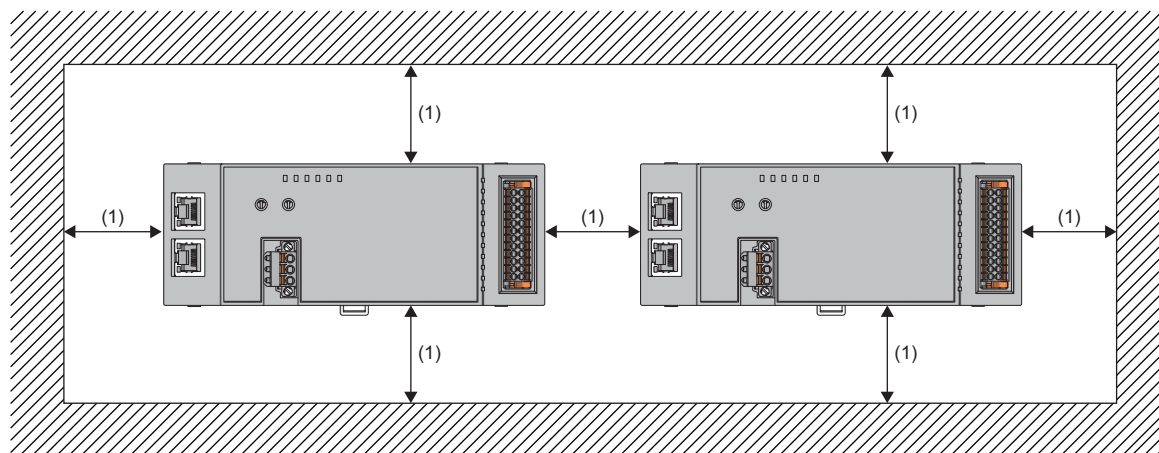
Installation direction

The multiple input module can be installed in six directions.

Use the DIN rail to install the module.
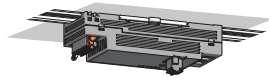
Downward installation

DIN rail

Horizontal installation
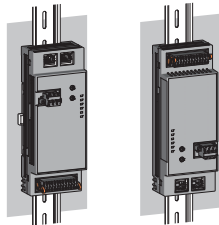
Vertical installation

Horizontal installation
(upside down)
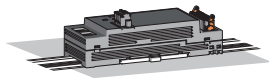
Upward installation

5.3 Installation

Mounting the modules on a DIN rail

Point

An example of the use of the DIN rail stopper is described in the following procedure. Fix the module according to the manual of the DIN rail stopper used.

Mounting procedure
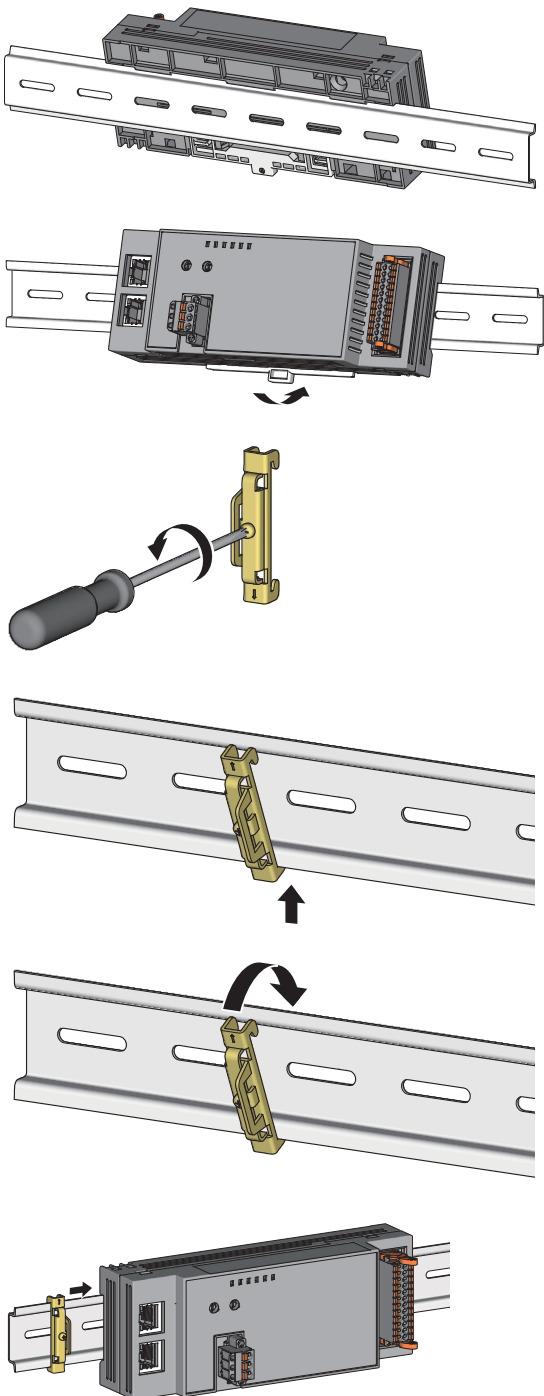
1. Hang the upper tabs of the module on a DIN rail.

2. Push the module into position until the DIN rail hook of the module clicks.

3. Loosen the screw on DIN rail stopper.

4. Hitch the bottom hook of the DIN rail stopper to the bottom of the DIN rail.
Hitch the hook according to the orientation of the arrow on the front of the stopper.

5. Hitch the upper hook of the DIN rail stopper to the top of the DIN rail.

6. Slide the DIN rail stopper up to the left side of the module.
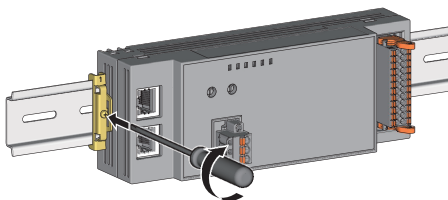
7. Hold the DIN rail stopper in the direction opposite to the arrow on the stopper and tighten the screw with a driver.
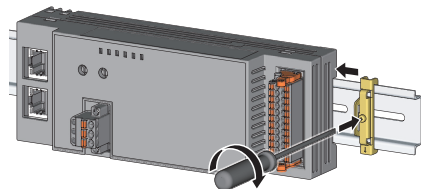
8. Install the DIN rail stopper on the right side of the module in the same procedure.
Pay attention to install the DIN rail stopper upside down for the right side.

Point

Do not slide modules from the edge of the DIN rail when mounting them. The modules may be damaged.
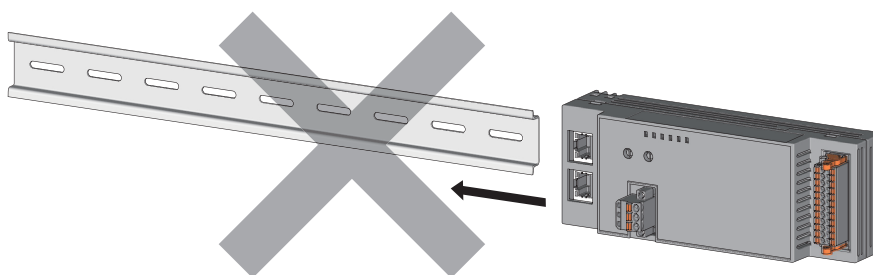
Removal procedure
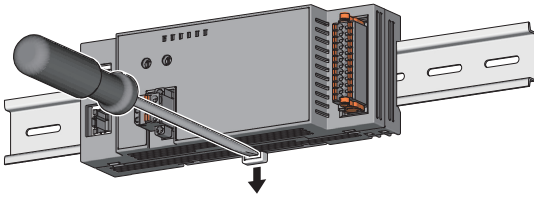
1. Remove the DIN rail stoppers.

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

2. Press down the DIN rail hook using a flathead screwdriver and pull the bottom of the module to remove the module from the DIN rail.

Applicable DIN rail model (compliant with IEC 60715)

- TH35-7.5Fe
- TH35-7.5Al

Interval between DIN rail mounting screws

Tighten the screws at intervals of 200mm or less.

DIN rail stopper

Use a stopper that is attachable to the DIN rail.

5.4 Wiring

Wiring with terminal block for module power supply and FG

Tightening torque

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

Tightening the screws too much may damage the 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.

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

Installing and removing the terminal block

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

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

Failure to secure the terminal block may cause drop, short circuit, malfunction.
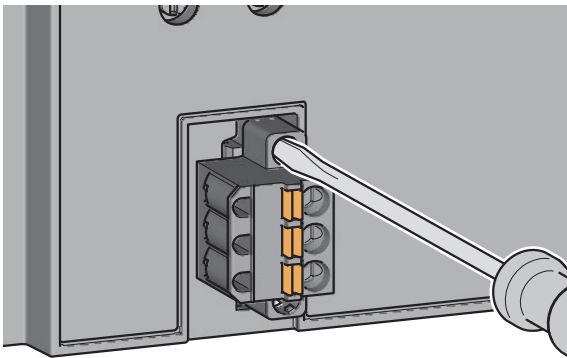
Reference product of the tool to be used for pulling the terminal block

Using the following tool makes it easier to pull the terminal block from the module.

Product name	Model name	Contact
Connector pulling jig	FRONT-MSTB-EW-MIT[1]	PHOENIX CONTACT GmbH & Co. KG

*1 For inquiries regarding the reference product or ordering this product, contact PHOENIX CONTACT GmbH & Co. KG directly.

Connecting and disconnecting the cable

To connect the cable, fully insert a wire having a bar solderless terminal into a wire insertion opening.

After inserting the wire, pull it lightly to check that it is securely clamped.
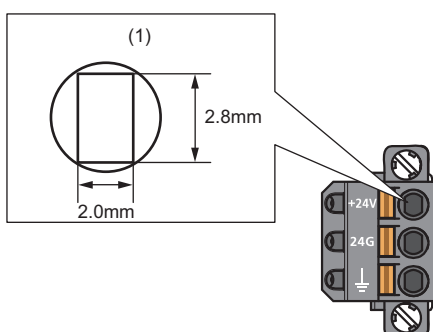

(1)
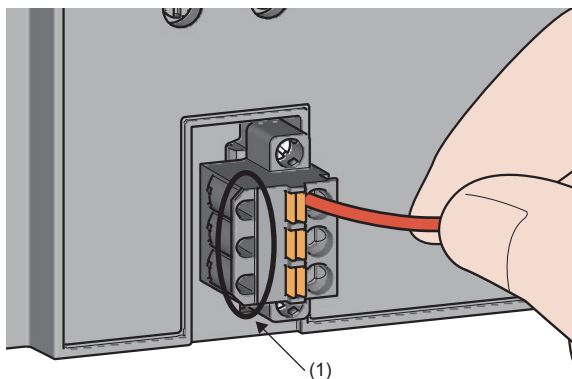
Point

A continuity check can be conducted using a test terminal (1).

To disconnect the cable, push in the open/close button using 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 (1), 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. 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.

(1)

2.8mm

2.0mm

List of the reference products of bar solderless terminals

The following table lists the reference products of bar solderless terminals.

Product name	Model name	Applicable wire size	Bar solderless terminal tool	Contact
Bar solderless terminal	TE 0.5-8, TE 0.5-10	0.3 to 0.5mm²	NH79	NICHIFU TERMINAL INDUSTRIES CO., LTD.
	TE 0.75-8, TE 0.75-10	0.75mm²		
	TE 1.0-8, TE 1.0-10	1.0mm²		
	TE 1.5-8, TE 1.5-10	1.5mm²		
	AI 0.34-8TQ	0.34mm²	CRIMPFOX6	PHOENIX CONTACT GmbH & Co. KG
	AI 0.5-8WH, AI 0.5-10WH	0.5mm²		
	AI 0.75-8GY, AI 0.75-10GY	0.75mm²		
	AI 1-8RD, AI 1-10RD	1.0mm²		
	AI 1.5-8BK, AI 1.5-10BK	1.5mm²		

Wiring of Ethernet cable

Connecting the Ethernet cable
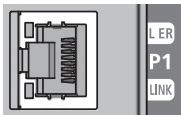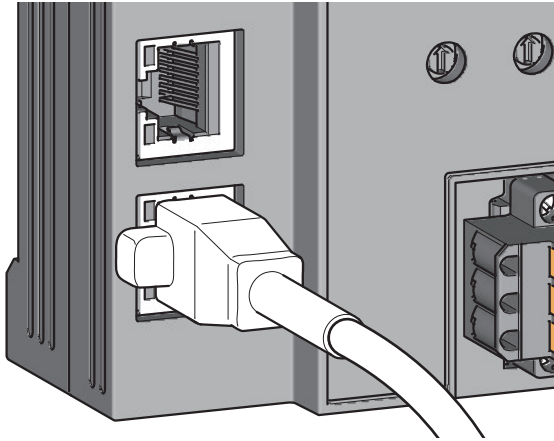
■Connecting

1. Power off the power supplies of the multiple input module and the external device.
2. Push the Ethernet cable connector into the multiple input module until it clicks. Pay attention to the connector's direction.

3. Power on the module.
4. Power on the external device.
5. Check if the LINK LED on the port into which the Ethernet cable is connected is on.[1]

*1 The time taken for the 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 the LINK LED does not turn on, refer to the following and take a corrective action.
☞ Page 101 When the LINK LED turns off

Point

Both PORT1 connector and PORT2 connector can be used.

- When only one connector is used in star topology, either PORT1 connector or PORT2 connector can be connected.
- When two connectors are used in line topology or ring topology, any combination including a connection between PORT1 connectors, between PORT2 connectors, and between PORT1 and PORT2 connectors is possible.
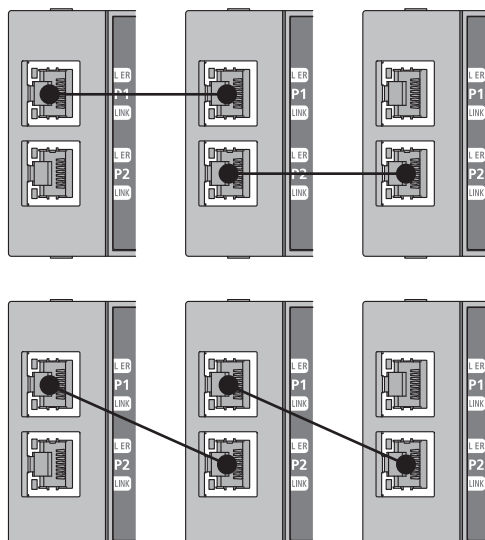
■Disconnecting
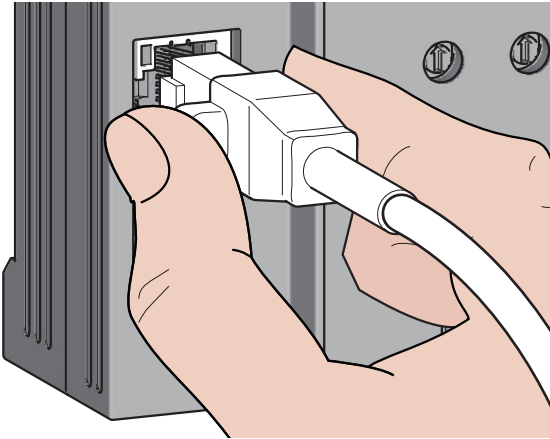
1. Power off the module.

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

Precautions

■Laying Ethernet cables
- Place the Ethernet cable in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or 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.
- Regarding the Ethernet cable to be used, check that the Ethernet cable has no disconnections or short circuits, or problems in the connection of the connector.

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

■Connecting and disconnecting the 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.

■Connectors without Ethernet cable
To prevent dust from entering the module, attach the provided connector cover.

■Maximum station-to-station distance of the Ethernet cable (Maximum Ethernet cable length)
The maximum station-to-station distance 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 the 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.

Wiring for analog input terminal block

Wire to be used

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

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

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.

Figure viewed from the module top surface: When pulling the terminal block
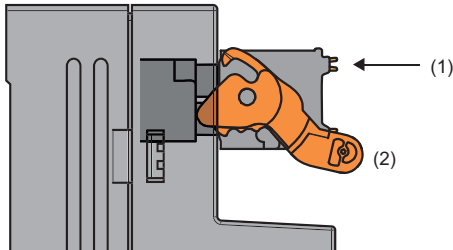
1. Release lever position

This lever position shows the state in which the terminal block (1) has been completely pulled out from the module. Turn from the locking lever position to the release lever position (2) and lift the terminal block from the module.

Figure viewed from the module top surface: When insertion of the terminal block has completed
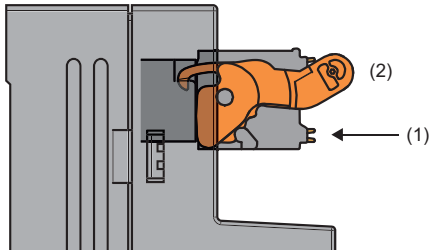
2. Lock lever position

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

■Removal procedure

Turn the lever to the release lever position and remove the terminal block from the module.

■Installation procedure

Move the lever to the locking lever position and push the terminal block. If 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 locations other than the lock lever position.

After insertion, confirm that the lever is in the lock lever position.

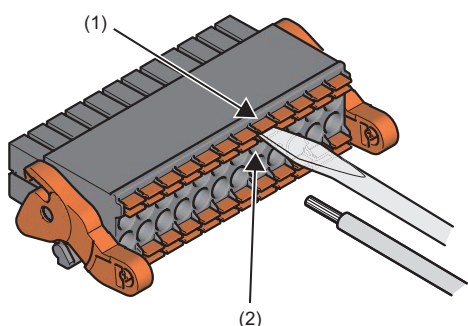## Connecting and disconnecting the cable

■Connecting the cable

Wire covering shall be as follows.

- Strip length: 10mm

Insert wire in which the tip thereof has been processed into a wire insertion opening (2) and push it to the back.

If the wire cannot be inserted by this method, insert the wire 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 to the back, remove the screwdriver.

Point

Pull the wire or bar solderless terminal lightly to confirm 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 the wiring to the push-in type spring clamp terminal block. If a stripped wire is inserted into a wire insertion opening (1), 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. 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.
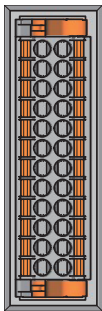
List of the reference products of bar solderless terminals

The following table lists the reference products of bar solderless terminals.

Product name	Model name	Applicable wire size	Bar solderless terminal tool	Contact
Bar solderless terminal	TE 0.5-10	0.3 to 0.5mm²	NH79	NICHIFU TERMINAL INDUSTRIES CO., LTD.
	TE 0.75-10	0.75mm²		
	A 0.5-10, AI 0.5-10WH	0.5mm²	CRIMPFOX6	PHOENIX CONTACT GmbH & Co. KG
	A 0.75-10, AI 0.75-10GY	0.75mm²		
	A 1-10	1.0mm²		
	A 1.5-10	1.5mm²		

Signal names of the terminal block

The following table shows signal names of the terminal block.

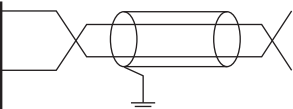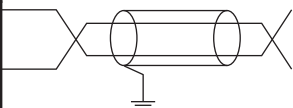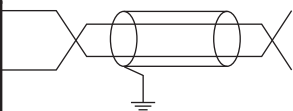| Terminal block	CH	Signal name	
	CH1	V-/B	V+/A
		b	I+
		SH2	SH1
	CH2	V-/B	V+/A
		b	I+
		SH2	SH1
	CH3	V-/B	V+/A
		b	I+
		SH2	SH1
	CH4	V-/B	V+/A
		b	I+
		SH2	SH1
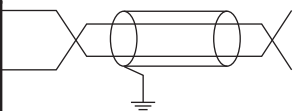
Wiring to the terminal block

The following figures show wiring to the terminal block.

The wiring to the terminal block can be also checked by the "TERMINAL CONNECTION" on the front surface of the multiple input module.
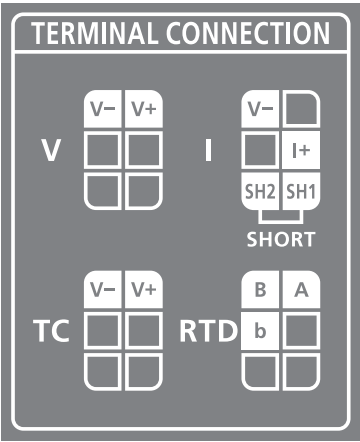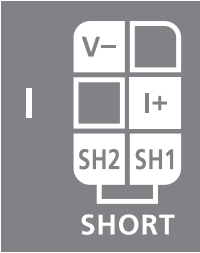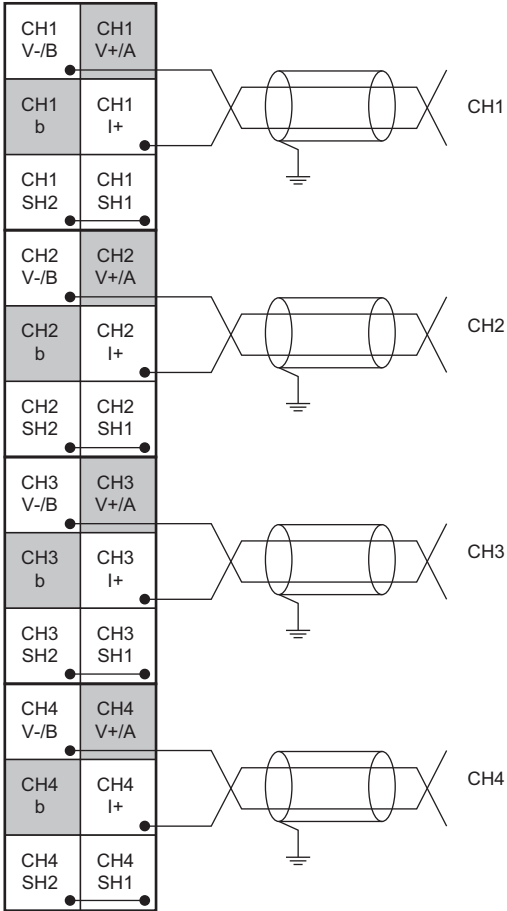
V: At current input and micro voltage input
I: At current input
TC: At thermocouple input
RTD: At resistance temperature detector input

■Voltage input and micro voltage input

Terminal connection diagram (TERMINAL CONNECTION)	Wiring

■Current input

Always connect SH1 and SH2.

Terminal connection diagram (TERMINAL CONNECTION)	Wiring

■Thermocouple input

Terminal connection diagram (TERMINAL CONNECTION)	Wiring

■Resistance temperature detector input

Terminal connection diagram (TERMINAL CONNECTION)	Wiring

CH1 V-/B	CH1 V+/A	CH1
CH1 b	CH1 I+	
CH1 SH2	CH1 SH1	
CH2 V-/B	CH2 V+/A	CH2
CH2 b	CH2 I+	
CH2 SH2	CH2 SH1	
CH3 V-/B	CH3 V+/A	CH3
CH3 b	CH3 I+	
CH3 SH2	CH3 SH1	
CH4 V-/B	CH4 V+/A	CH4
CH4 b	CH4 I+	
CH4 SH2	CH4 SH1	

Precautions

As one of the conditions to ensure the functions of the multiple input module and maintain a high reliability system, external wiring which is not easily affected by noise is required. Precautions for the external wiring are shown below.

- Use different cables for the external input signal of the AC control circuit and multiple input module so as not to be affected by the surges and induction on the AC side.
- Do not wire together or bundle with the main circuit lines, high voltage lines, or load cables from anything other than the programmable controller. Doing so makes it more likely to be affected by noise, surges, or induction.
- For a shield wire or a shielded cable, conduct single-point grounding. However, there may be a case in which grounding on the external side is recommended depending on the external noise situation.

Wiring examples with an external device

The following figures show the external wiring.

> **Point**
>
> If the circuit between the terminals of unused channels is kept open and the conversion is enabled, an undefined digital value may be output. To avoid this phenomenon, set CH□ Input type/range setting (address: 0100H to 0103H) of the unused channels to Conversion disable (0H). (☞ Page 117 Input type/range setting)

Wiring examples

■Voltage input

Signal source: -10 to 10V
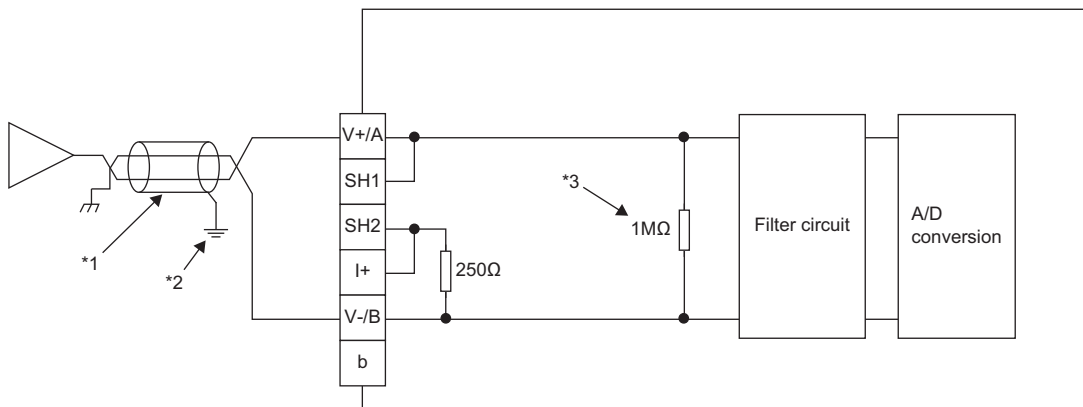
*1 For the wire, use the 2-core shielded twisted pair cable.
*2 Always ground the shield wire of the wire in each channel.
*3 Indicates the input resistance of the multiple input module.

■Current input

Signal source: 0 to 20mA
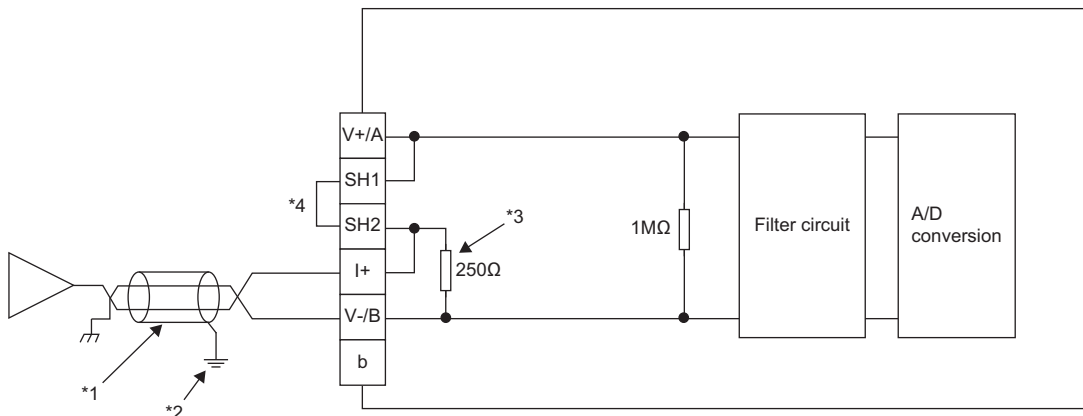
*1 For the wire, use the 2-core shielded twisted pair cable.
*2 Always ground the shield wire of the wire in each channel.
*3 Indicates the input resistance of the multiple input module.
*4 For the current input, always connect the SH1 terminal and SH2 terminal.

■Micro voltage input

Signal source: -100 to 100mV
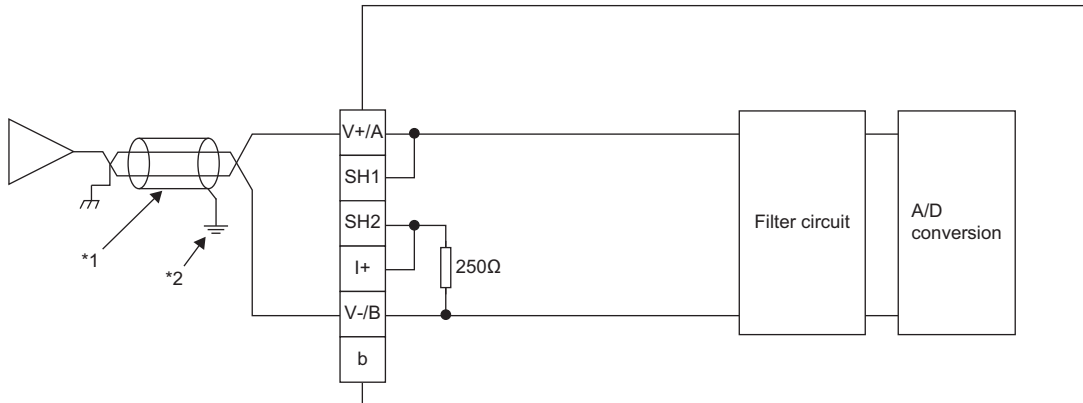
*1   For the wire, use the 2-core shielded twisted pair cable.
*2   Always ground the shield wire of the wire in each channel.

■Thermocouple input
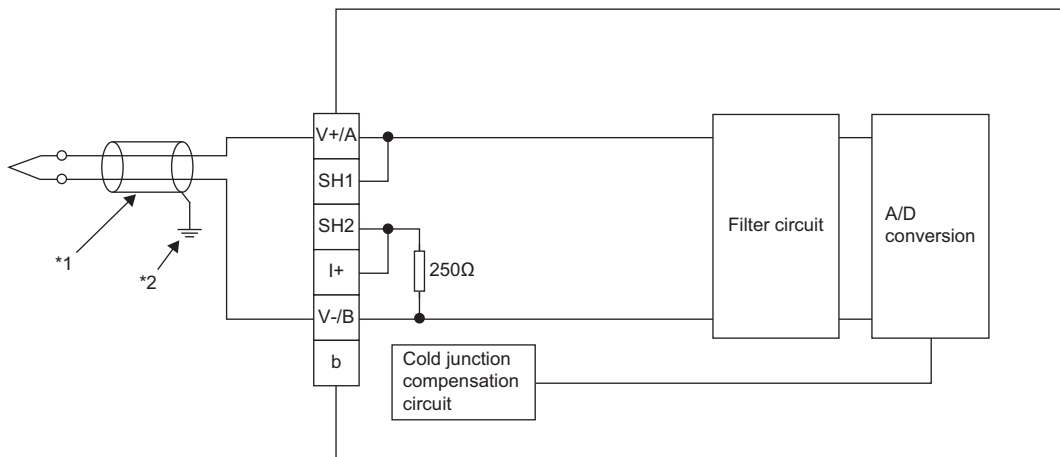
*1   Always use the shielded compensation lead wire.
*2   Always ground the shield wire of the compensation lead wire in each channel.

■Resistance temperature detector input
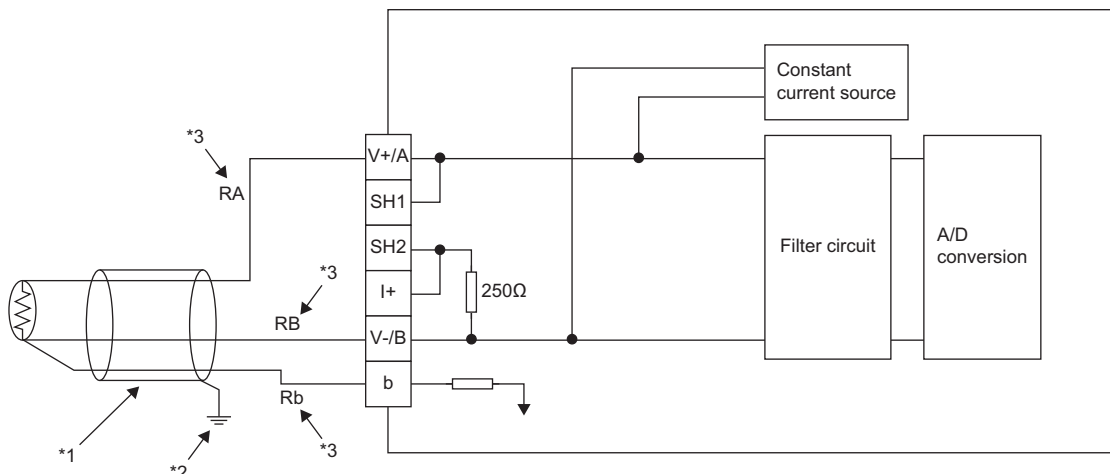
*1   Always use a shielded cable.
*2   Always ground the shield wire of the wire in each channel.
*3   Install a resistance temperature detector so as to shorten the wiring length (minimize the conductor resistance values of RA, RB, and Rb) and set each conductor resistance value of RA, RB, and Rb to 150Ω or less. Arrange the wiring length so that RA and RB have equal conductor resistance values.
     Otherwise, they will cause accuracy errors. (☞ Page 135 Accuracy of difference in conductor resistance values upon connection of RTD)

6 VARIOUS SETTINGS

This chapter describes the setting procedures of the multiple input module.

This chapter uses GX Works2 for explanations.

6.1 Parameter Setting

Set the parameter of this module with the network parameter written to the CPU module of the master station. For the setting procedure of the master station, refer to the following manual.

📖 User's manual for the master/local module used

> **Point** 🔑
>
> - Before parameter settings, "Set network configuration setting in CC IE Field configuration window" needs to be selected on the "MELSECNET/CC IE/Ethernet Module Configuration" window.
>
> | ☑ Set network configuration setting in CC IE Field configuration window |
> |---|
> | Module 1 |
>
> - When points less than the ones of the multiple input module are set for the remote I/O signal and remote register, no error occurs. The cyclic transmission is performed for the data of the points set from the start.
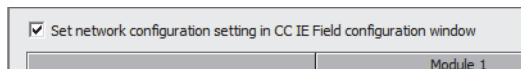
Precautions

■Precautions before parameter settings

For the precautions before parameter settings, refer to the following.

📖 GX Works3 Operating Manual

📖 GX Works2 Version 1 Operating Manual (Common)

■Precautions for parameter settings

- When using the multiple input module, always enable the block data assurance per station. When it is disabled, correct operation of the multiple input module cannot be guaranteed. For details on the block data assurance per station, refer to the user's manual for the master/local module used.
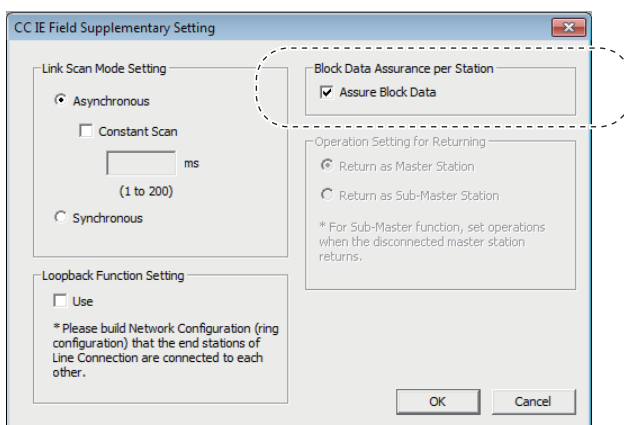
- Do not set the parameter using the CCPASET instruction in the master station. Correct operation of the multiple input module cannot be guaranteed because the module operates with the block data assurance per station disabled when the CCPASET instruction is executed. (The CCPASET instruction is intended to configure parameters for a master/local module. For details on the CCPASET instruction, refer to the user's manual for the master/local module used.)

Operating procedure

1. Open the CC IE Field configuration window.

For the master/local module QJ71GF11-T2

 Project window ⇨ [Parameter] ⇨ [Network Parameter] ⇨ [Ethernet / CC IE / MELSECNET] ⇨ [CC IE Field Configuration Setting] button

2. Select the multiple input module in "List of stations" (1) on the CC IE Field configuration window.
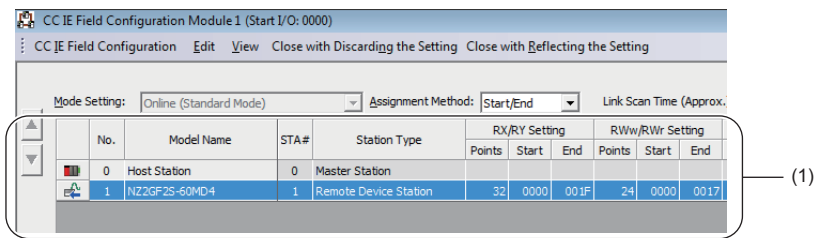
3. Open the "Parameter Processing of Device Station" window.

 [CC IE Field Configuration] ⇨ [Online] ⇨ [Parameter Processing of Device Station]

4. Set "Method selection" to "Parameter write".
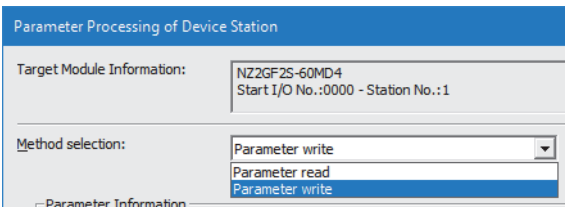
5. Double-click the item to change the setting, and input the setting value.

Setting item		Reference
Input type/range setting	CH1 Input type/range setting	☞ Page 59 Input Type/Range Setting
	CH2 Input type/range setting	
	CH3 Input type/range setting	
	CH4 Input type/range setting	
Averaging process setting	CH1 Averaging process setting	☞ Page 61 Conversion Method
	CH1 Time average/Count average/Moving average	
	CH2 Averaging process setting	
	CH2 Time average/Count average/Moving average	
	CH3 Averaging process setting	
	CH3 Time average/Count average/Moving average	
	CH4 Averaging process setting	
	CH4 Time average/Count average/Moving average	
Input signal error/disconnection detection auto clear enable/disable setting		—
Input signal error detection function	CH1 Input signal error detection setting	☞ Page 70 Input Signal Error Detection Function
	CH1 Input signal error detection setting value	
	CH2 Input signal error detection setting	
	CH2 Input signal error detection setting value	
	CH3 Input signal error detection setting	
	CH3 Input signal error detection setting value	
	CH4 Input signal error detection setting	
	CH4 Input signal error detection setting value	

Setting item		Reference
Disconnection detection function	CH1 Conversion setting for disconnection detection	☞ Page 64 Disconnection Detection Function
	CH1 Conversion setting value for disconnection detection	
	CH2 Conversion setting for disconnection detection	
	CH2 Conversion setting value for disconnection detection	
	CH3 Conversion setting for disconnection detection	
	CH3 Conversion setting value for disconnection detection	
	CH4 Conversion setting for disconnection detection	
	CH4 Conversion setting value for disconnection detection	
Cold contact compensation function	Cold contact compensation setting	☞ Page 68 Cold Junction Temperature Compensation Setting Function

6. Click the [Execute Parameter Processing] button and the following window is displayed.

> **MELSOFT Series GX Works2** ✕
>
> ⚠ The process "Parameter write" will be executed, targeting the selected parameters.
> The operation of the device station may be changed by the execution of the process "Parameter write".
> Also it may overwrite the device value of the PLC CPU refreshing the remote I/O and remote registers.
> Please confirm safety before the execution.
>
> -Please confirm that the Connection Destination PLC is correct.
> -Please confirm that the parameter of CC IE Field module is set correctly.
> -Please confirm that the target device station is correct.
>
> Do you want to execute?
>
> [Yes] [No]

7. Click the [Yes] button.

8. The parameter is written to the multiple input module.

Point

- Set all the items for the parameter. If any blank exists, the parameter cannot be written to the multiple input module.
- To read the parameter from the multiple input module, set "Method selection" to "Parameter read" and click the [Execute Parameter Processing] button.
- When the following message is displayed, take corrective action for the error code in < >.

> **MELSOFT Series GX Works2** ✕
>
> ℹ Error occurred in communication with device station.
>
> < ▮▮▮ >
>
> Please check if there is any problem with PLC CPU, master module and network of communication route.
>
> When there is no problem with communication route, device station error may be responsible.
> Please refer to the device station Operating Manual for error details.
> Error details can be checked in Command Execution of Device Station Function by model name.
>
> [OK]

For details on the error code, refer to the following.
☞ Page 95 List of Error Codes
📖 User's manual for the master/local module used

6.2 Changing the Parameter

This section describes the procedure for changing the parameter.

The precautions for changing the parameter are the same as those in the following section.

☞Page 50 Precautions

Changing the network configuration

When changing the network configuration diverting the created project, set the parameter in the following procedure.

1. Power off the module power supply.

2. Connect the modules again according to the desired network configuration.

3. Power on the module power supply.

4. Open the CC IE Field configuration window.

For the master/local module QJ71GF11-T2

🖱 Project window ➪ [Parameter] ➪ [Network Parameter] ➪ [Ethernet / CC IE / MELSECNET] ➪ [CC IE Field Configuration Setting] button

5. Drag and drop a module to set the device station. Input a numerical value to set the station number of the station. Change the value as necessary.
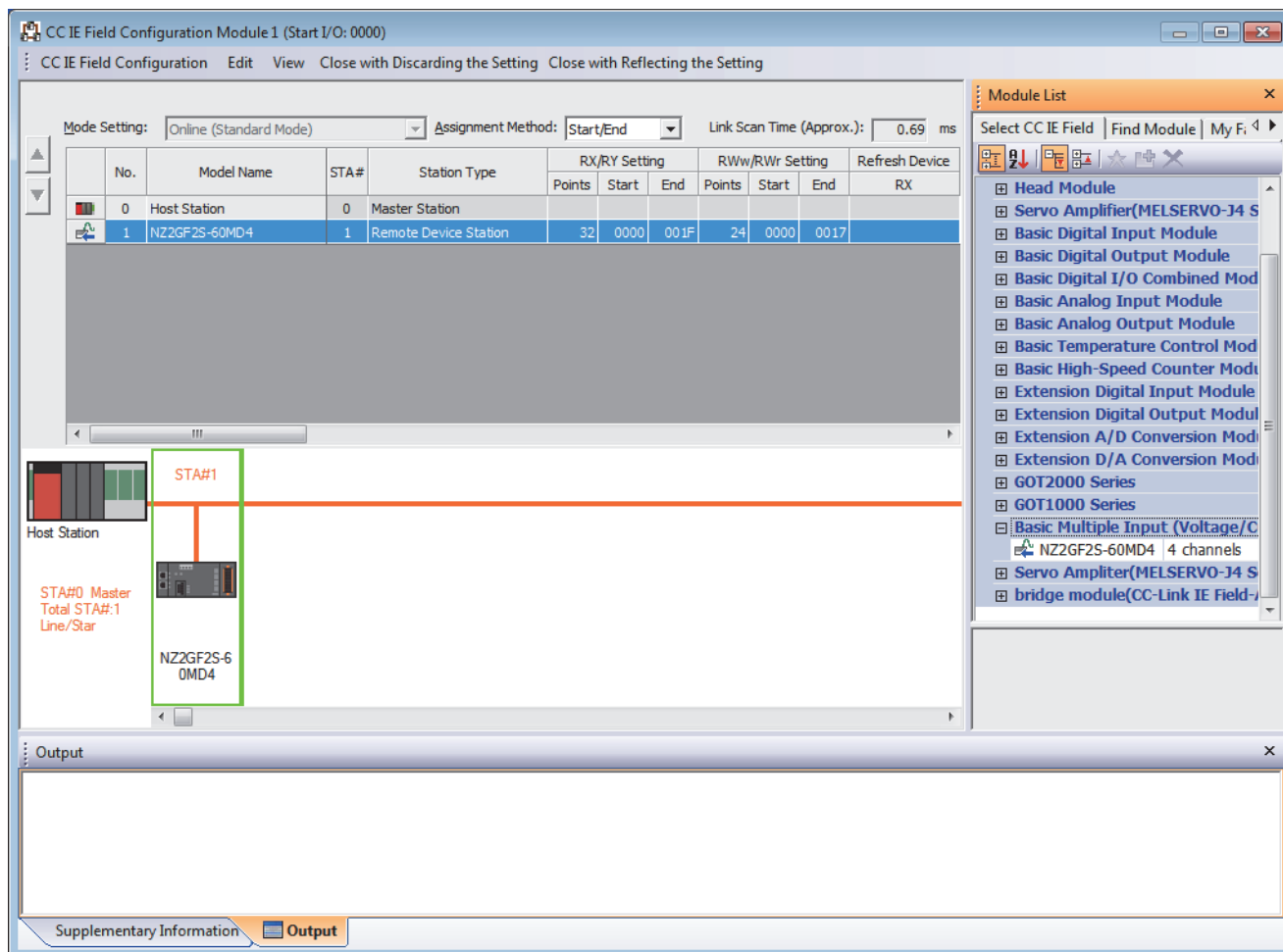
6. Set the module parameter referring to the following:

☞Page 51 Operating procedure

7. Close the CC IE Field configuration window.

🖱 [CC IE Field Configuration] ➪ [Close with Reflecting the Setting]

8. Click the [Refresh Parameters] button to display the refresh parameter setting window.

Online (Normal Mode)	▼
CC IE Field Configuration Setting	
Network Operation Settings	
Refresh Parameters	
Interrupt Settings	
Specify Station No. by Parameter	▼

9. Set the refresh parameter. Change the value as necessary.

Assignment Method
- ○ Points/Start
- ● Start/End

	Link Side					PLC Side			
	Dev. Name	Points	Start	End		Dev. Name	Points	Start	End
Transfer SB	SB	512	0000	01FF	↔	SB	512	0000	01FF
Transfer SW	SW	512	0000	01FF	↔	SW	512	0000	01FF
Transfer 1	RX ▼	32	0000	001F	↔	X ▼	32	1000	101F
Transfer 2	RY ▼	32	0000	001F	↔	Y ▼	32	1000	101F
Transfer 3	RWr ▼	24	0000	0017	↔	W ▼	24	000100	000117
Transfer 4	RWw ▼	24	0000	0017	↔	W ▼	24	000200	000217
Transfer 5	▼				↔	▼			
Transfer 6	▼				↔	▼			
Transfer 7	▼				↔	▼			
Transfer 8	▼				↔	▼			

10. Write the set parameter to the CPU module of the master station and reset the CPU module.

11. Change the status of the CPU module of the master station to RUN.

The network configuration setting is now completed.

6

Changing the parameter without changing the network configuration

To change only the created module parameter of the device station without changing the network configuration, set the parameter in the following procedure.

1. Open the CC IE Field configuration window.

For the master/local module QJ71GF11-T2

🖏 Project window ⇨ [Parameter] ⇨ [Network Parameter] ⇨ [Ethernet / CC IE / MELSECNET] ⇨ [CC IE Field Configuration Setting] button

2. Select the multiple input module in "List of stations" (1) on the CC IE Field configuration window.
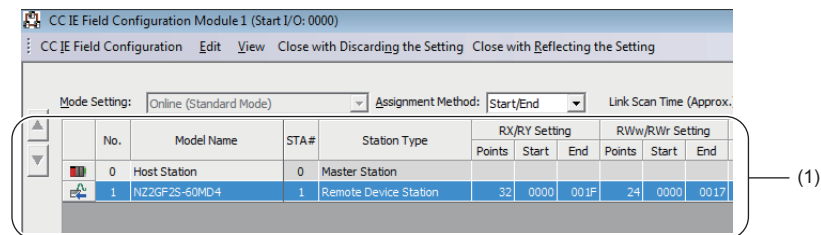
3. Open the "Parameter Processing of Device Station" window.

🖏 [CC IE Field Configuration] ⇨ [Online] ⇨ [Parameter Processing of Device Station]

4. Set "Method selection" to "Parameter read".
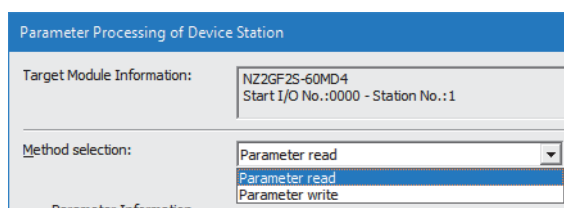
5. Click the [Execute Parameter Processing] button and the following window is displayed.
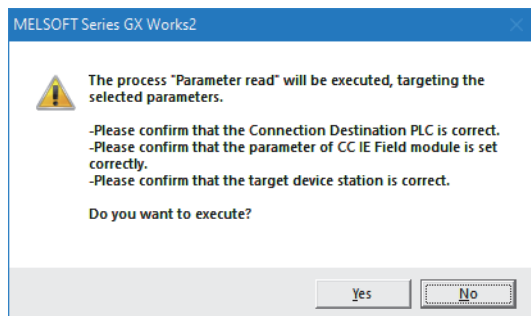
6. Click the [Yes] button.

7. The parameter is read from the multiple input module.

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

9. Set "Write Value". The procedures are as follows.

- Click the title cell of "Read Value" to select all the items and copy them.
- Click the title cell of "Write Value" to select all the items and paste the copy.
- Select the items to be changed, and set new values.

10. Click the [Execute Parameter Processing] button and the following window is displayed.

11. Click the [Yes] button.

12. The parameter is written to the multiple input module.

The module parameter setting of the device station is completed.

7 FUNCTIONS

This chapter describes the functions of the multiple input 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 106 Details of Remote I/O Signals
☞ Page 114 Details of Remote Register
☞ Page 117 Details of Remote Buffer Memory Areas

7.1 Processing Order of Each Function

Each function is processed in the following order.

```
Analog input (CH1 to CH4)
         │
         ▼
┌─────────────────────────────────────────────────────────────┐
│ Input signal error detection function or disconnection detection function │
└─────────────────────────────────────────────────────────────┘
         │
         ▼
┌─────────────────────────────────────────────────────────────┐
│ Averaging processing                                          │
└─────────────────────────────────────────────────────────────┘
         │
    ┌────┴──────────────────────────┐
    ▼                               ▼
┌──────────────────────┐   ┌──────────────────────────┐
│ CH□ Digital output value │   │ CH□ Digital output value (32 bits) │
│ (RWr2 to RWr5)        │   │ (RWr10 to RWr17)         │
└──────────────────────┘   └──────────────────────────┘
```
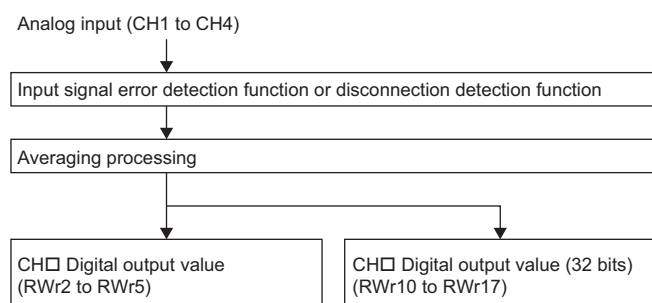
> **Point**
>
> - When using the disconnection detection function, conversion is stopped if a disconnection is detected. In this case, regarding the digital output values, the contents set in Conversion setting for disconnection detection (address: 010FH) are stored. The conversion restarts once the disconnection is recovered. (☞ Page 64 Disconnection Detection Function)
> - When using the input signal error detection function, conversion is stopped if an input signal error is detected. In this case, the digital output values are not updated. The values obtained before the input signal error is detected are held. When the analog input value returns to a normal value, conversion restarts. (☞ Page 70 Input Signal Error Detection Function)

Digital output value

The digital values obtained in sampling processing or averaging processing are stored.

7.2 Input Type/Range Setting

The input type and input range that are to be used can be selected for each channel.

Setting procedure

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

👆 CC IE Field configuration window ⇨ Select a multiple input module in "List of stations". ⇨ [CC IE Field Configuration] ⇨ [Online] ⇨ [Parameter Processing of Device Station]

2. Configure the settings of the input type and input range in "CH☐ Input type/range setting".

Name	Initial Value	Unit	Read Value	Unit	Write Value
☑ ⊟ Input type/range setting					
CH1 Input type/range setti...	0: Conversio...				
CH2 Input type/range setti...	0: Conversio...				
CH3 Input type/range setti...	0: Conversio...				
CH4 Input type/range setti...	0: Conversio...				

Setting item	Setting range
CH☐ Input type/range setting	• 0: Conversion disable • 10h: 4 to 20mA • 11h: 0 to 20mA • 20h: 1 to 5V • 21h: 0 to 5V • 22h: -10 to 10V • 23h: 0 to 10V • 30h: -100 to 100mV • 40h: Pt100 (-200 to 850℃) • 41h: Pt100 (-20 to 120℃) • 42h: Pt100 (0 to 200℃) • 43h: JPt100 (-180 to 600℃) • 44h: JPt100 (-20 to 120℃) • 45h: JPt100 (0 to 200℃) • 46h: Pt1000 (-200 to 850℃) • 47h: Pt50 (-200 to 650℃) • 48h: Pt500 (-200 to 850℃) • 49h: Ni100 (-60 to 250℃) • 4Ah: Ni120 (-60 to 250℃) • 4Bh: Ni500 (-60 to 250℃) • 4Ch: Cu50 (-180 to 200℃) • 4Dh: Cu100 (-180 to 200℃) • 50h: Thermocouple B (0 to 1820℃) • 51h: Thermocouple R (-50 to 1760℃) • 52h: Thermocouple S (-50 to 1760℃) • 53h: Thermocouple K (-270 to 1370℃) • 54h: Thermocouple E (-270 to 1000℃) • 55h: Thermocouple J (-210 to 1200℃) • 56h: Thermocouple T (-270 to 400℃) • 57h: Thermocouple N (-270 to 1300℃) • 58h: Thermocouple U (-200 to 600℃) • 59h: Thermocouple L (-200 to 900℃) • 5Ah: Thermocouple PLⅡ (0 to 1390℃) • 5Bh: Thermocouple W5Re/W26Re (0 to 2300℃)

Conversion enable and conversion disable

Whether to enable or disable conversion for each channel can be set in "CH☐ Input type/range setting". In this manual, conversion enable and conversion disable are defined as follows.

■Conversion disable

Indicates the state generated by selecting "0: Conversion disable" in "CH☐ Input type/range setting". In this case, the conversion is not performed in the target channel.

"0: Conversion disable" is set in the multiple input module by default. Thus, change the setting values of "CH☐ Input type/range setting" depending on the connected sensor type.

■Conversion enable

Indicates the state generated by selecting values (values other than "0: Conversion disable" in "CH☐ Input type/range setting") based on the connected sensor type in "CH☐ Input type/range setting". In this case, the conversion is performed in the target channel.

7.3 Conversion Method

Set sampling processing or averaging processing for each channel.

Sampling processing

Analog input values and temperature input values are converted at every conversion cycle and stored in the remote register as digital output values. Processing does not depend on the number of conversion enabled channels and the conversion cycle of sampling processing is fixed at 40ms.

Averaging processing

Averaging processing is performed on digital output values for each channel. The values obtained in averaging processing are stored in the remote register. The following three types of averaging processing are provided.
- Time average
- Count average
- Moving average

■Time average

The conversion is performed for a set period of time and averaging processing is performed on the total value excluding the maximum and the minimum values. The values obtained in averaging processing are stored in the remote register.

The number of processing times within a set period of time changes depending on the setting time.

Processing times = Setting time ÷ Conversion speed (40ms)

Ex.

When the setting time is 250ms

250 (ms) ÷ 40 (ms) = 6.25 ≒ 6 (times) Values after the decimal point are rounded down.

This means that the measurement is conducted six times, after which the mean value is output.

Point℗

Set a value of 160ms or more for the time average, calculated as follows: lowest processing frequency (4 times) × conversion speed (40ms).

■Count average

The conversion is performed a set number of times and averaging processing is performed on the total value excluding the maximum and the minimum values. The values obtained in averaging processing are stored in the remote register.

The time at which the mean value obtained by the count average is stored in the remote register changes depending on the set number of times.

Processing times = Set number of times × Conversion speed (40ms)

Ex.

When the number of the averaging processing is set to 5

5 (times) × 40 (ms) = 200 (ms)

The mean value is output every 200ms.

Point℗

Because the count average requires a sum of at least two counts excluding the maximum and minimum values, set four or larger number of counts.

■Moving average

The average of a specified number of digital output values that are imported at every conversion cycle is calculated and stored in the remote register.

Because the target range for averaging processing is moved in response to every conversion cycle, the latest digital output value can be always obtained.

The setting range of the count (for averaging) is from 2 to 1000.

The following figure illustrates the moving average processing when the set number of times is 5.
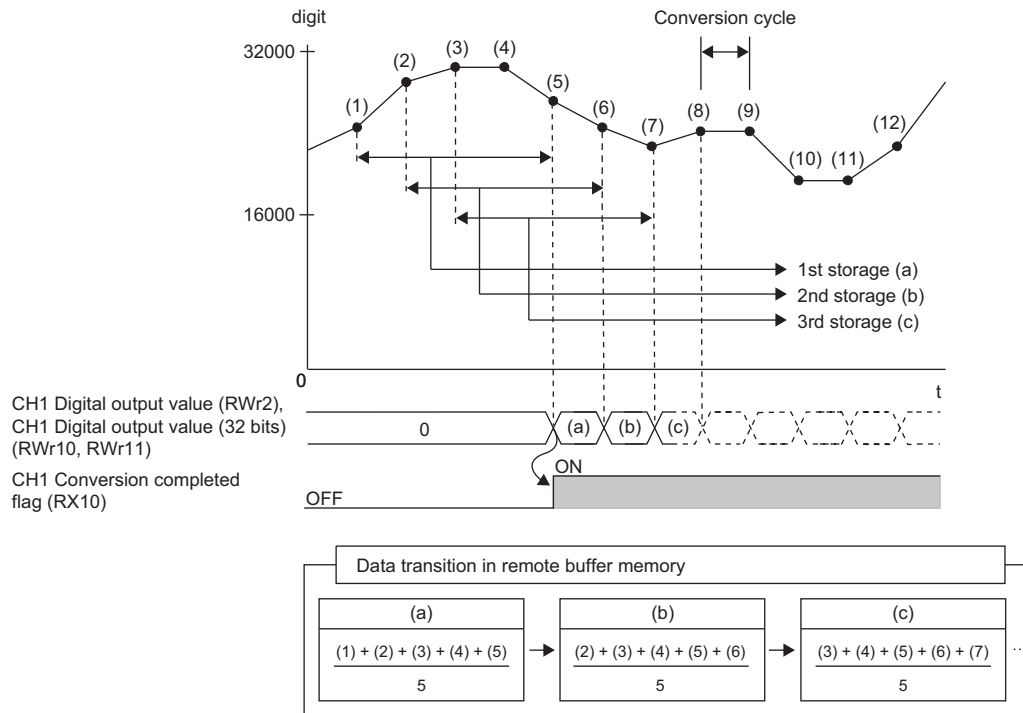
Conversion cycle

The conversion cycle is the cycle in which CH□ Digital output value (RWr2 to RWr5) and CH□ Digital output value (32 bits) (RWr10 to RWr17) are actually updated due to sampling processing and averaging processing. The conversion cycle of the multiple input module is as follows.

Conversion method	Conversion cycle
Sampling processing	Conversion speed (40ms)
Time average	(Time set in CH□ Time Average/Count Average/Moving Average (address: 0105H to 0108H) ÷ Conversion speed (40ms))[*1] × Conversion speed (40ms)
Count average	Number of times set in CH□ Time Average/Count Average/Moving Average (address: 0105H to 0108H) × Conversion speed (40ms)
Moving average	Conversion speed (40ms)

*1   Values after the decimal point are rounded down.

Setting procedure

■Sampling processing

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

🖰 CC IE Field configuration window ⇨ Select a multiple input module in "List of stations". ⇨ [CC IE Field Configuration] ⇨ [Online] ⇨ [Parameter Processing of Device Station]

2. Set "CH☐ Averaging process setting" to "0: Sampling processing".

	Name	Initial Value	Unit	Read Value	Unit	Write Value	Unit
✔	⊟ Averaging process setting						
	┄ CH1 Averaging process se...	0: Sampling ...				0: Samplin... ▼	
	┄ CH1 Time average/Count ...	0					
	┄ CH2 Averaging process se...	0: Sampling ...				0: Sampling processing	
	┄ CH2 Time average/Count ...	0				1: Time average	
	┄ CH3 Averaging process se...	0: Sampling ...				2: Count average	
	┄ CH3 Time average/Count ...	0				3: Moving average	

■Averaging processing

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

🖰 CC IE Field configuration window ⇨ Select a multiple input module in "List of stations". ⇨ [CC IE Field Configuration] ⇨ [Online] ⇨ [Parameter Processing of Device Station]

2. Set the averaging processing method in "CH☐ Averaging process setting".

	Name	Initial Value	Unit	Read Value	Unit	Write Value	Unit
✔	⊟ Averaging process setting						
	┄ CH1 Averaging process se...	0: Sampling ...				1: Time av... ▼	
	┄ CH1 Time average/Count ...	0					
	┄ CH2 Averaging process se...	0: Sampling ...				0: Sampling processing	
	┄ CH2 Time average/Count ...	0				1: Time average	
	┄ CH3 Averaging process se...	0: Sampling ...				2: Count average	
	┄ CH3 Time average/Count ...	0				3: Moving average	

Setting item	Setting range
CH☐ Averaging process setting	• 0: Sampling processing • 1: Time average • 2: Count average • 3: Moving average

3. Set an averaging processing value for "CH☐ Time average/Count average/Moving average".

	Name	Initial Value	Unit	Read Value	Unit	Write Value	Unit
✔	⊟ Averaging process setting						
	┄ CH1 Averaging process se...	0: Sampling ...				1: Time average	
	┄ CH1 Time average/Count ...	0				200	
	┄ CH2 Averaging process se...	0: Sampling ...					
	┄ CH2 Time average/Count ...	0					
	┄ CH3 Averaging process se...	0: Sampling ...					
	┄ CH3 Time average/Count ...	0					
	┄ CH4 Averaging process se...	0: Sampling ...					
	┄ CH4 Time average/Count ...	0					

Setting item		Setting range
CH☐ Time average/Count average/ Moving average	1: Time average	160 to 5000 (ms)
	2: Count average	4 to 62500 (times)
	3: Moving average	2 to 1000 (times)

7.4 Disconnection Detection Function

This function outputs an alarm at disconnection detection of the external wiring (resistance temperature detector, thermocouple, conducting wire, or auxiliary conducting wire), provided that the input type is a micro voltage, thermocouple, or resistance temperature detector.

Notification

- Disconnection (1) is stored in the bit corresponding to the channel number of Disconnection detection flag (RWrD).
- Disconnection detection signal (RX1B) turns on.
- The ALM LED flashes.
- Disconnection detection (alarm code: 0C0□H) is stored in Latest warning code (RWr1).
- One of "Value immediately before disconnection", "Up scale", "Down scale", or "Arbitrary value" specified in Conversion setting for disconnection detection (address: 010FH) is stored in CH□ Digital output value (RWr2 to RWr5) and CH□ Digital output value (32 bits) (RWr10 to RWr17).

Relation between disconnection detection and conversion enable/disable setting

Disconnection detection is executed only in the channel where the conversion is enabled.
The following table shows the relation between the disconnection detection and conversion enable/disable setting status.
(The conversion enable/disable setting can be performed in CH□ Input type/range setting (address: 0100H to 0103H.)

Connection status	Status of the conversion enable/disable setting	Disconnection detection flag
No disconnection	Conversion enable	OFF
	Conversion disable	
Disconnection	Conversion enable	ON
	Conversion disable	OFF
No connection	Conversion enable	ON
	Conversion disable	OFF

Point

In the channel in which no disconnection is detected, the conversion continues.

Conversion setting for disconnection detection

Conversion setting for disconnection detection (address: 010FH) can configure the values stored in CH□ Digital output value (RWr2 to RWr5) and CH□ Digital output value (32 bits) (RWr10 to RWr17) upon disconnection detection. Thus, disconnection detection is enabled only by checking CH□ Digital output value (RWr2 to RWr5) and CH□ Digital output value (32 bits) (RWr10 to RWr17) without monitoring Disconnection detection signal (RX1B). The default value of Conversion setting for disconnection detection (address: 010FH) is Down scale (1H). Change the setting value as needed.

Conversion setting for disconnection detection	Processing at disconnection detection
Up scale (0H)	The up scale value (upper limit value + 5% of the input range) of the input range currently set is stored in CH□ Digital output value (RWr2 to RWr5) and CH□ Digital output value (32 bits) (RWr10 to RWr17).
Down scale (1H)	The down scale value (lower limit value - 5% of the input range) of the input range currently set is stored in CH□ Digital output value (RWr2 to RWr5) and CH□ Digital output value (32 bits) (RWr10 to RWr17).
Arbitrary value (2H)	The value set in CH□ Conversion setting value for disconnection detection (address: 0110H to 0117H) is stored in CH□ Digital output value (RWr2 to RWr5) and CH□ Digital output value (32 bits) (RWr10 to RWr17).
Value immediately before disconnection (3H)	The value immediately before a disconnection occurs is held in CH□ Digital output value (RWr2 to RWr5) and CH□ Digital output value (32 bits) (RWr10 to RWr17).

■Up scale and down scale

The up-scale value (upper limit value + 5% of the input range) and down-scale value (lower limit value - 5% of the input range) of the input range currently set are stored in CH□ Digital output value (RWr2 to RWr5) and CH□ Digital output value (32 bits) (RWr10 to RWr17) when a disconnection occurs.

Moreover, if the value of "upper limit value + 5% of the input range" is 32767 or more when up scale is selected, 32767 is stored.

Whereas, if the value of "lower limit value - 5% of the input range" is -32768 or less when down scale is selected, -32768 is stored.

- Micro voltage

Input range	Digital output value		
	Output range	Up scale	Down scale
-100 to 100mV	-32000 to 32000	32767[*1]	-32768[*2]

*1 When the value of "upper limit value + 5% of the input range" is 32767 or more
*2 When the value of "lower limit value - 5% of the input range" is -32768 or less

- Thermocouple

Input range	Digital process value (℃)		
	Temperature measuring range	Up scale	Down scale
Type B thermocouple (0 to 1820℃)	0 to 1820	1911.0	-91.0
Type R thermocouple (-50 to 1760℃)	-50 to 1760	1850.5	-140.5
Type S thermocouple (-50 to 1760℃)	-50 to 1760	1850.5	-140.5
Type K thermocouple (-270 to 1370℃)	-270 to 1370	1452.0	-352.0
Type E thermocouple (-270 to 1000℃)	-270 to 1000	1063.5	-333.5
Type J thermocouple (-210 to 1200℃)	-210 to 1200	1270.5	-280.5
Type T thermocouple (-270 to 400℃)	-270 to 400	433.5	-303.5
Type N thermocouple (-270 to 1300℃)	-270 to 1300	1378.5	-348.5
Type U thermocouple (-200 to 600℃)	-200 to 600	640.0	-240.0
Type L thermocouple (-200 to 900℃)	-200 to 900	955.0	-255.0
Type PLⅡ thermocouple (0 to 1390℃)	0 to 1390	1459.5	-69.5
Type W5Re/W26Re thermocouple (0 to 2300℃)	0 to 2300	2415.0	-115.0

- Resistance temperature detector

Input range	Temperature measured value (℃)		
	Temperature measuring range	Up scale	Down scale
Pt100 (0 to 200℃)	0 to 200	210.0	-10.0
Pt100 (-20 to 120℃)	-20 to 120	127.0	-27.0
Pt100 (-200 to 850℃)	-200 to 850	902.5	-252.5
JPt100 (0 to 200℃)	0 to 200	210.0	-10.0
JPt100 (-20 to 120℃)	-20 to 120	127.0	-27.0
JPt100 (-180 to 600℃)	-180 to 600	639.0	-219.0
Pt1000 (-200 to 850℃)	-200 to 850	902.5	-252.5
Pt50 (-200 to 650℃)	-200 to 650	692.5	-242.5
Pt500 (-200 to 850℃)	-200 to 850	902.5	-252.5
Ni100 (-60 to 250℃)	-60 to 250	265.5	-75.5
Ni120 (-60 to 250℃)	-60 to 250	265.5	-75.5
Ni500 (-60 to 250℃)	-60 to 250	265.5	-75.5
Cu100 (-180 to 200℃)	-180 to 200	219.0	-199.0
Cu50 (-180 to 200℃)	-180 to 200	219.0	-199.0

■**Arbitrary value**

The value set in CH□ Conversion setting value for disconnection detection (address: 0110H to 0117H) is stored in CH□ Digital output value (RWr2 to RWr5) and CH□ Digital output value (32 bits) (RWr10 to RWr17) when a disconnection is detected.

The default value of CH□ Conversion setting value for disconnection detection (address: 0110H to 0117H) is 0. Although the disconnection detection function is available with 0, the value can be changed to an arbitrary value.

Point🖉

When the value set in CH□ Conversion setting value for disconnection detection (address: 0110H to 0117H) is 32767 or more, 32767 is stored in CH□ Digital output value (RWr2 to RWr5).

Moreover, the value set in CH□ Conversion setting value for disconnection detection (address: 0110H to 0117H) is -32768 or less, -32768 is stored in CH□ Digital output value (RWr2 to RWr5).

Detection cycle

This function is executed for every sampling processing.

When the disconnection is recovered

A normal digital output value is stored in the remote register in the next conversion after recovery from the disconnection. Once averaging processing has been performed, the normal digital output value is stored in the remote register after the disconnection is recovered and the averaging process cycle elapses.

Until the normal digital output value is stored in the remote register, the digital output value remains a specified value in the conversion setting for disconnection detection (such as the down-scale value).

Moreover, the operation after the causes of the disconnection are eliminated and the connection with the external device is recovered depends on the setting of Input signal error/disconnection detection automatic clear enable/disable setting (address: 0109H).

■**When the setting is Enable (0H)**

When the disconnection is recovered and all Disconnection detection flags (RWrD) are turned off, the status changes as follows.

- Disconnection detection signal (RX1B) turns off.
- The ALM LED turns off.
- Latest warning code (RWr1) is cleared.

■When the setting is Disable (1H)

When Error clear request flag (RYA) is turned on and off after the recovery of the disconnection, the status changes as follows.

- Disconnection detection flag (RWrD) turns off.
- Disconnection detection signal (RX1B) turns off.
- The ALM LED turns off.
- Latest warning code (RWr1) is cleared.

Setting procedure

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

✎ CC IE Field configuration window ⇨ Select a multiple input module in "List of stations". ⇨ [CC IE Field Configuration] ⇨ [Online] ⇨ [Parameter Processing of Device Station]

2. Set "Input signal error/disconnection detection auto clear enable/disable setting" to either "0: Enable" or "1: Disable".

Setting item	Setting range
Input signal error/disconnection detection auto clear enable/disable setting	• 0: Enable • 1: Disable

3. Set values to be stored in the remote register upon disconnection detection in "CH□ Conversion setting for disconnection detection".

Setting item	Setting range
CH□ Conversion setting for disconnection detection	• 0: Up Scale • 1: Down Scale • 2: Given Value • 3: Value immediately before disconnection

4. When setting "2: Given Value" in "CH□ Conversion setting for disconnection detection", set an arbitrary value.

Setting item	Setting range
CH□ Conversion setting value for disconnection detection	-2147483648 to 2147483647

Point

When the input type is set to the thermocouple or resistance temperature detector, configure the settings as follows.
- Thermocouple: Set the value in increments of 0.1℃.
- Resistance temperature detector: Set the value in increments of 0.001℃.

7.5 Cold Junction Temperature Compensation Setting Function

By selecting the setting with or without cold junction compensation using the built-in temperature sensor in the multiple input module, two types of cold junction compensation including a temperature sensor and external (ice bath) can be conducted.

Operation

The operations when cold junction compensation is performed using the built-in temperature sensor in the multiple input module and when cold junction compensation is performed outside the module are described below.

■When cold junction compensation is performed using the built-in temperature sensor in the multiple input module

By setting Cold junction temperature compensation setting (address: 0118H) to With cold junction compensation (0H), cold junction compensation using the built-in temperature sensor in the multiple input module is automatically performed.
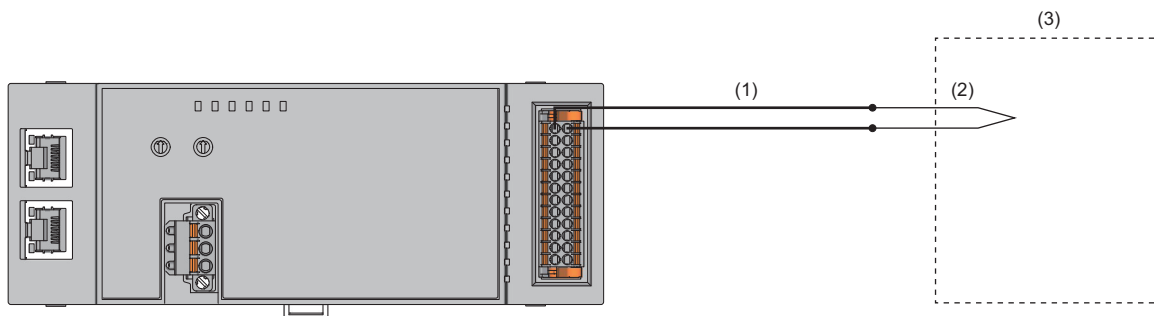
(1)Compensation lead wire
(2)Thermocouple
(3)Temperature-measured object

■When cold junction compensation is performed outside of the module

Set Cold junction temperature compensation setting (address: 0118H) to Without cold junction compensation (other than 0H) and install a high-accuracy ice bath outside the module. Because the thermoelectromotive force occurring at the tip of the thermocouple can be led to the thermocouple input module without making any changes, the accuracy of cold junction compensation can be improved. This option is selected when highly accurate temperature measurement is required as the accuracy of cold junction compensation using the built-in temperature sensor in the multiple input module cannot be tolerated as an error.
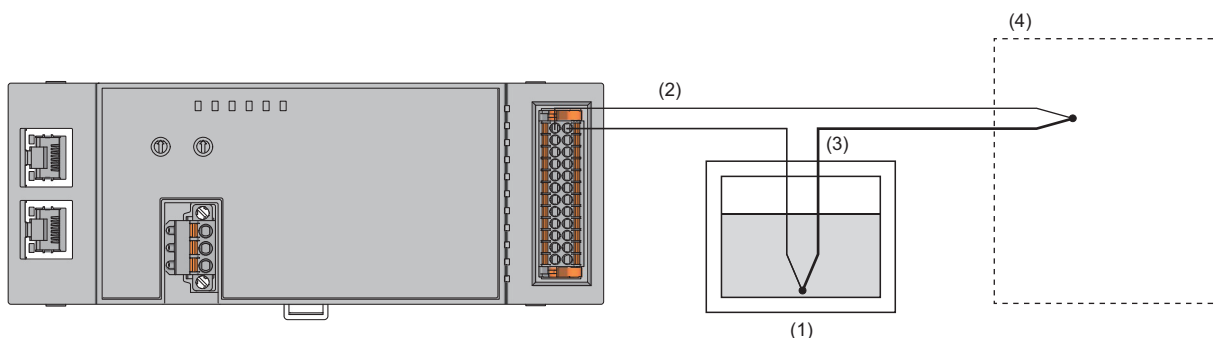
(1)Ice bath
(2)Thermocouple +
(3)Thermocouple -
(4)Temperature-measured object

Setting procedure

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

✍ CC IE Field configuration window ⇒ Select a multiple input module in "List of stations". ⇒ [CC IE Field Configuration] ⇒ [Online] ⇒ [Parameter Processing of Device Station]

2. Set "Cold contact compensation setting" to either "0: With cold junction temperature compensation" or "1: Without cold junction temperature compensation".

Setting item	Setting range
Cold contact compensation setting	• 0: With cold junction temperature compensation • 1: Without cold junction temperature compensation

7.6 Input Signal Error Detection Function

This function outputs an alarm if an analog input value exceeds a preset range, provided that the input type is voltage or current.

InH: Input signal error detection upper limit value
InL: Input signal error detection lower limit value
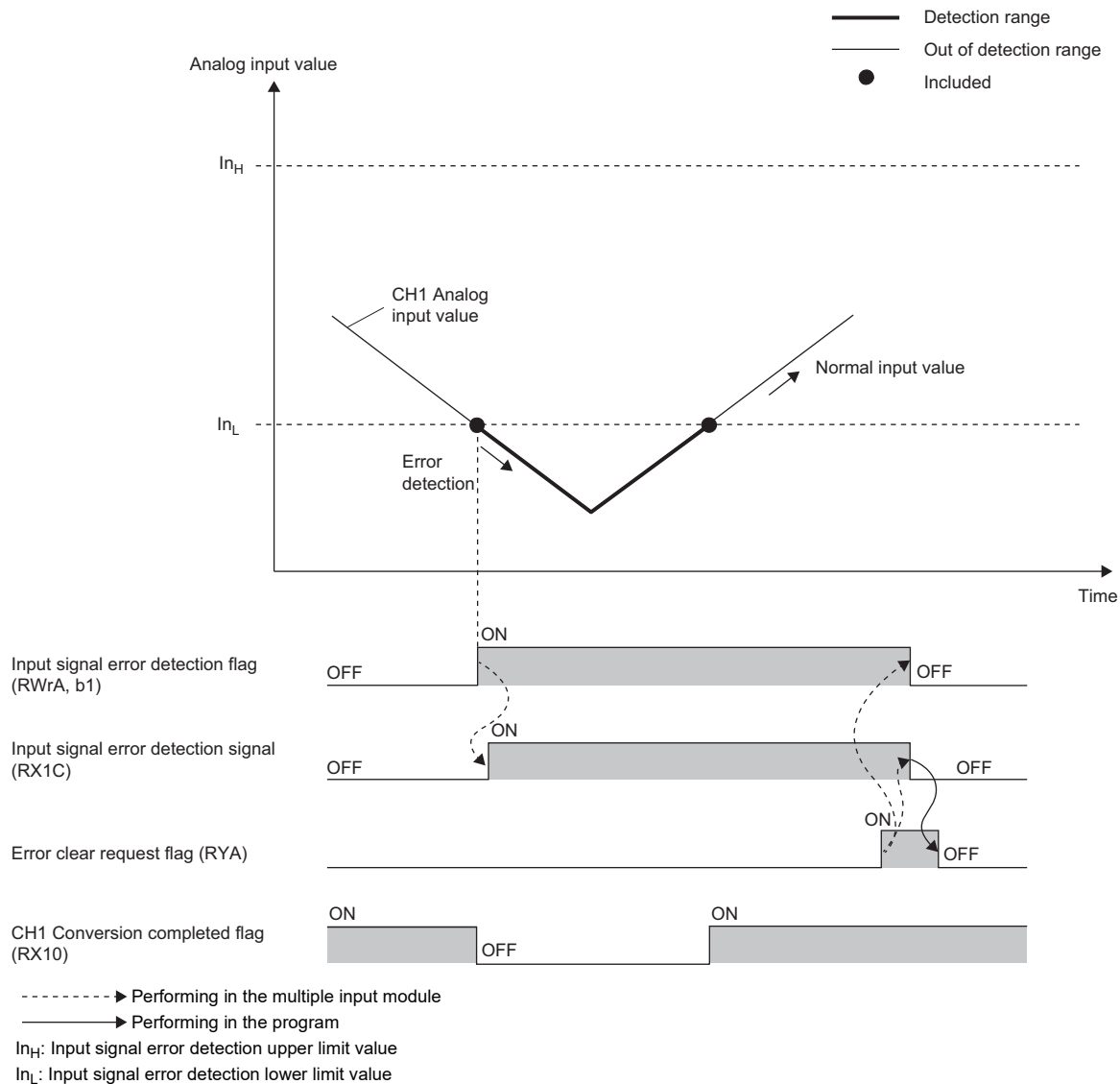
Point

The method for clearing input signal errors differs depending on the setting of Input signal error/disconnection detection automatic clear enable/disable setting (address: 0109H). (☞ Page 73 Clearing input signal errors).

Detection method

One of the following detection methods can be selected.

Detection method	Detection condition	
Disable (0H)	Input signal error detection is not performed.	
Upper and lower limit detection (1H)	When the analog input value becomes equal to or greater than the input signal error detection upper limit value, or becomes equal to or smaller than the input signal error detection lower limit value, an error is detected.	
Lower limit detection (2H)	When the analog input value becomes equal to or smaller than the input signal error detection lower limit value, an error is detected. If the analog input value becomes equal to or greater than the input signal error detection upper limit value, an error is not detected.	
Upper limit detection (3H)	When the analog input value becomes equal to or greater than the input signal error detection upper limit value, an error is detected. If the analog input value becomes equal to or smaller than the input signal error detection lower limit value, an error is not detected.	
Simple disconnection detection (4H)	Simple disconnection detection is performed. (☞ Page 72 Simple disconnection detection)	

V/I: Analog input value
t: Time
In$_H$: Input signal error detection upper limit value
In$_L$: Input signal error detection lower limit value

■Simple disconnection detection

Simple disconnection detection is enabled when current (4 to 20mA) (0010H) or voltage (1 to 5V) (0020H) is set in CH☐ Input type/range setting (address: 0100H to 0103H). When an analog input value satisfies the following conditions, the module determines a disconnection and turns on the corresponding bit of Disconnection detection flag (RWrD).

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

(1)0.5V or 2mA
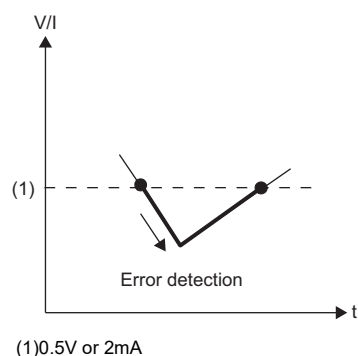
> **Point**
> - In the channel where Simple disconnection detection (4H) is set, the settings of CH☐ Input signal error detection setting value (address: 010BH to 010EH) are ignored.
> - If Simple disconnection detection (4H) is set in the channel where current (4 to 20mA) (0010H) or voltage (1 to 5V) (0020H) is not set in CH☐ Input type/range setting (address: 0100H to 0103H), Simple disconnection detection setting error (error code: 082☐H) will appear.

Notification

If an input signal error or a disconnection is detected, the error is notified by Input signal error detection flag (RWrA), Input signal error detection signal (RX1C), and the flashing ALM LED. Moreover, Input signal error detection (alarm code: 0B△☐) is stored in Latest warning code (RWr1).

The stored value of an alarm code differs depending on the content of the detected input signal error (upper limit detection, lower limit detection, or simple disconnection detection).

For details on the alarm codes to be stored, refer to the following.

Operation

On the channel where an error is detected, the digital output value obtained immediately before the error is detected is held. CH☐ Conversion completed flag (RX10 to RX13) turns off. The channels for which an input signal error is not detected continue conversion.

Detection cycle

This function is executed for every sampling processing.

Clearing input signal errors

The method for clearing input signal errors differs depending on the setting of Input signal error/disconnection detection automatic clear enable/disable setting (address: 0109H).

■When the setting is Enable (0H)

Once the analog input value is adjusted to fall within the setting range, the status will be automatically changed as follows.

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

■When the setting is Disable (1H)

When Error clear request flag (RYA) is turned on and off after the analog input value is adjusted to fall within the setting range, the status will be changed as follows.

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

How to set the input signal error detection setting value

Set the input signal error detection upper limit value and input signal error detection lower limit value by 1 (0.1%) based on the input signal error detection setting value. Both the input signal error detection upper limit value and the input signal error detection lower limit value reflect the input signal error detection setting value.

■Input signal error detection upper limit value

This value is calculated by adding "the value after multiplying the analog input range width (gain value - offset value) by Input signal error detection upper limit setting value (%)" to the gain value. Only the value equal to or greater than the gain value can be set.

To calculate the input signal error detection setting value based on the input signal error detection upper limit value, use the following equation:

$$In = \frac{In_H - V/I_G}{V/I_G - V/I_O} \times 1000$$

Item	Description
In	Input signal error detection setting value
In_H	Input signal error detection upper limit value
V/I_G	Gain value of each range
V/I_O	Offset value of each range

■Input signal error detection lower limit value

This value is calculated by subtracting "the value after multiplying the analog input range width (gain value - offset value) by Input signal error detection lower limit setting value (%)" from the lower limit value of each range. Only the value below the lower limit value of the range can be set.

To calculate the input signal error detection setting value based on the input signal error detection lower limit value, use the following equation:

$$\text{In} = \frac{\text{V/I}_L - \text{In}_L}{\text{V/I}_G - \text{V/I}_O} \times 1000$$

Item	Description
In	Input signal error detection setting value
V/I$_L$	Lower limit value of each range
In$_L$	Input signal error detection lower limit value
V/I$_G$	Gain value of each range
V/I$_O$	Offset value of each range

The following table lists the lower limit value, offset value, and gain value for each range.

Input range		Lower limit value	Offset value	Gain value
Voltage	0 to 10V	0V		10V
	0 to 5V	0V		5V
	1 to 5V	1V		5V
	-10 to 10V	-10V	0V	10V
Current	4 to 20mA	4mA		20mA
	0 to 20mA	0mA		20mA

Setting procedure

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

✎ CC IE Field configuration window ➯ Select a multiple input module in "List of stations". ➯ [CC IE Field Configuration] ➯ [Online] ➯ [Parameter Processing of Device Station]

2. Set "Input signal error/disconnection detection auto clear enable/disable setting" to either "0: Enable" or "1: Disable".

Setting item	Setting range
Input signal error/disconnection detection auto clear enable/disable setting	• 0: Enable • 1: Disable

3. Set the detection method in "CH□ Input signal error detection setting".

Setting item	Setting range
CH□ Input signal error detection setting	• 0: Disable • 1: Upper/Lower limit detection • 2: Lower limit detection • 3: Upper limit detection • 4: Simple disconnection detection

4. Set a value for "CH□ Input signal error detection setting value".

Setting item	Setting range
CH□ Input signal error detection setting value	0 to 250 (0 to 25.0%)

Setting example of input signal error detection

The following example shows the case when detecting an input signal error under the condition that the analog input value is below 2.4mA or beyond 21.6mA for the channel set as follows.

Item	Setting value
Input range	4 to 20mA
Input signal error/disconnection detection automatic clear enable/disable setting (address: 0109H)	Enable (0H)
Input signal error detection setting (address: 010AH)	Upper and lower limit detection (1H)

Substitute the following values into the equation to calculate the input signal error detection setting value.
- Input signal error detection lower limit value: 2.4mA
- Offset value: 4.0mA
- Gain value: 20.0mA

Input signal error detection setting value = $(4.0 - 2.4) \div (20.0 - 4.0) \times 1000 = 100$ (10.0%)

Thus, set CH□ Input signal error detection setting value (address: 010BH to 010EH) to 100 (10.0%). Therefore, detection can also be performed when the input signal error detection upper limit value is 21.6mA.

■Operation
The following figure illustrates the operation of input signal error detection.
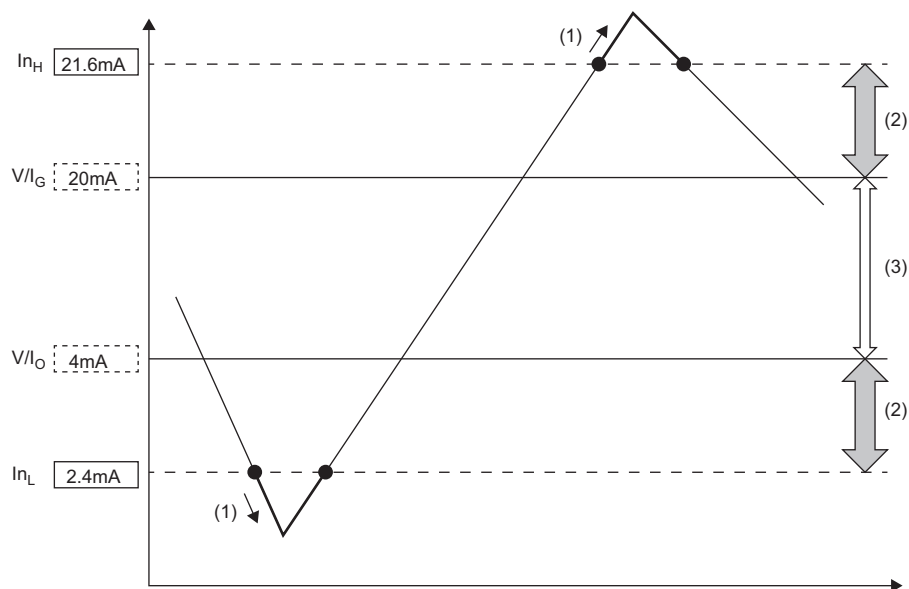
In_H: Input signal error detection upper limit value
V/I_G: Gain value
V/I_O: Offset value (lower limit value of the input range)
In_L: Input signal error detection lower limit value
(1)Error detection
(2)1.6mA (10.0% of 16mA)
(3)16mA (Gain value - Offset value)

7.7 Error Notification Function

When an error, warning, or alarm occurs, the occurrence of the error, warning, or alarm is notified to the master station using remote input signals and remote register.

> **Point**
>
> Notification of the error, warning, or alarm can be checked by the LEDs on the front of the multiple input module.
> For details, refer to the following.
> ☞ Page 12 PART NAMES

Notification of an error

The occurrence of an error is notified to the master station via the following method.

Item	Description	Reference
Error flag (RXA)	Turns on when a moderate or major error occurs.	Page 108 Error flag
Latest error code (RWr0)	An error code is stored when a moderate error or major error occurs.	Page 95 List of Error Codes

> **Point**
>
> Depending on the major error status such as a hardware failure of the multiple input module, Error flag (RXA) may not turn on, or an error code may not be stored in Latest error code (RWr0). In such a case, check the error occurrence with the LED indication on the front of the multiple input module, and please consult your local Mitsubishi representative.

■Method for clearing an error
The method for clearing an error depends on the error type.

Error type	Method for clearing an error
Major error	The error cannot be cleared.
Moderate error	Turn on and off Error clear request flag (RYA) or Initial data setting request flag (RY9) after removing the error cause.

Notification of a warning or alarm

The occurrence of a warning or alarm is notified to the master station via the following method.

Item	Description	Reference
Warning flag (RX7)	Turns on when a minor error occurs.	Page 106 Warning flag
Latest warning code (RWr1)	The error code or alarm code is stored when a minor error occurs.	Page 95 List of Error Codes Page 99 List of Alarm Codes

■Method for clearing a warning or alarm

Error type				Method for clearing an error
Minor error	Warning			A warning recovers in five seconds after the error cause is removed, then the status will be changed as follows. • Warning flag (RX7) turns off. • Latest warning code (RWr1) is cleared. • The ERR. LED turns off.
	Alarm	Input signal error detection	With automatic recovery	If the digital value returns within the input signal error detection range, the module recovers automatically.
			Without automatic recovery	Turn on and off Error clear request flag (RYA) or Initial data setting request flag (RY9) after the digital value returns to within the input signal error detection range.
		Disconnection detection	With automatic recovery	If the disconnection is recovered, the module recovers automatically.
			Without automatic recovery	Turn on and off Error clear request flag (RYA) or Initial data setting request flag (RY9) once the disconnection is recovered.

> **Point**
>
> If another minor error occurs and recovers first after an input signal error detection (without automatic recovery) or a disconnection detection (without automatic recovery) has occurred, Latest warning code (RWr1) is cleared even though the input signal error (without automatic recovery) or the disconnection detection (without automatic recovery) still occurs. The alarm codes that have occurred in the past can be checked in the error history of the engineering tool.
> ☞ Page 92 Checking by executing a command of the device station
> ☞ Page 123 Error history

Ex.
Operation to clear Station number switch change error (error code: 0940H)
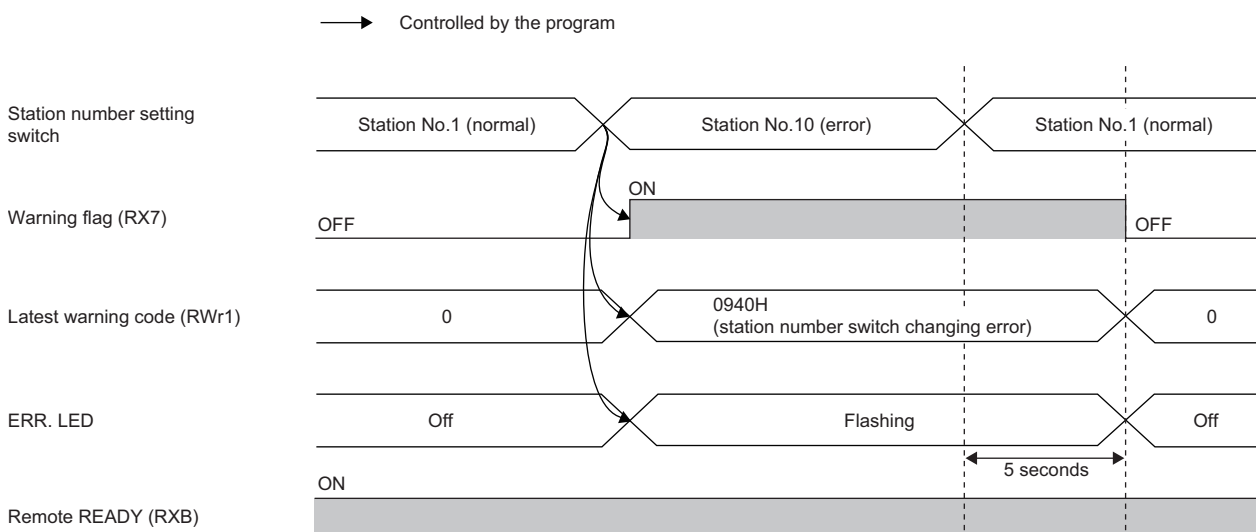
For clearing the alarm, refer to the following.
☞ Page 64 Disconnection Detection Function
☞ Page 70 Input Signal Error Detection Function

Method for clearing an error by executing the command of the device station

The following describes how to clear an error by executing the command of the device station.

1. Select the multiple input module in "List of stations" (1) on the CC IE Field configuration window.
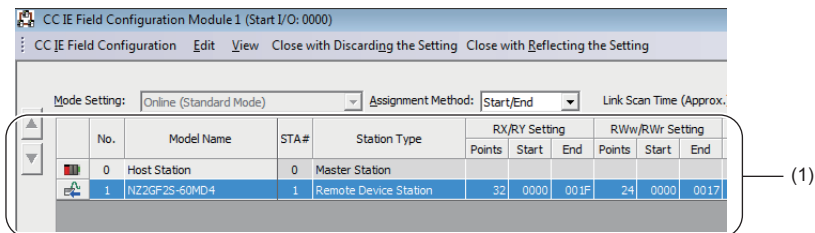
2. Open the "Command Execution of Device Station" window.

🖰 [CC IE Field Configuration] ➪ [Online] ➪ [Command Execution of Device Station]

3. Set "Method selection" to "Error clear request" and click the [Execute] button.
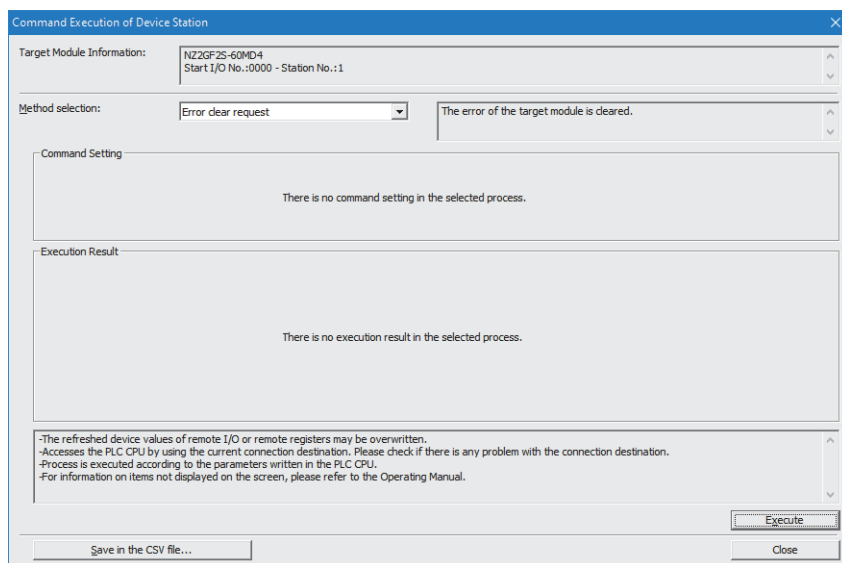
4. If the following window is displayed, click the [OK] button.
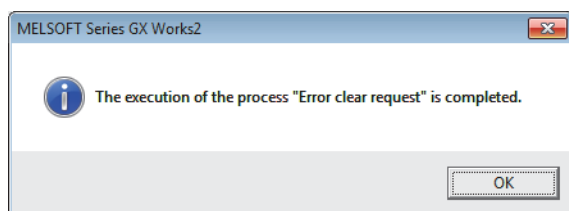
5. The error for the multiple input module is cleared.

7.8 CC-Link IE Field Network Diagnostic Function

This function allows the presence or absence of a network error to be checked by accessing the engineering tool connected to the CPU module.

How to use

The following instructions assume the use of GX Works2 as the engineering tool.

1. Connect GX Works2 to the CPU module.

2. Start CC-Link IE Field Network diagnostics from the menu of GX Works2.

👉 [Diagnostics] ⇨ [CC IE Field Diagnostics]
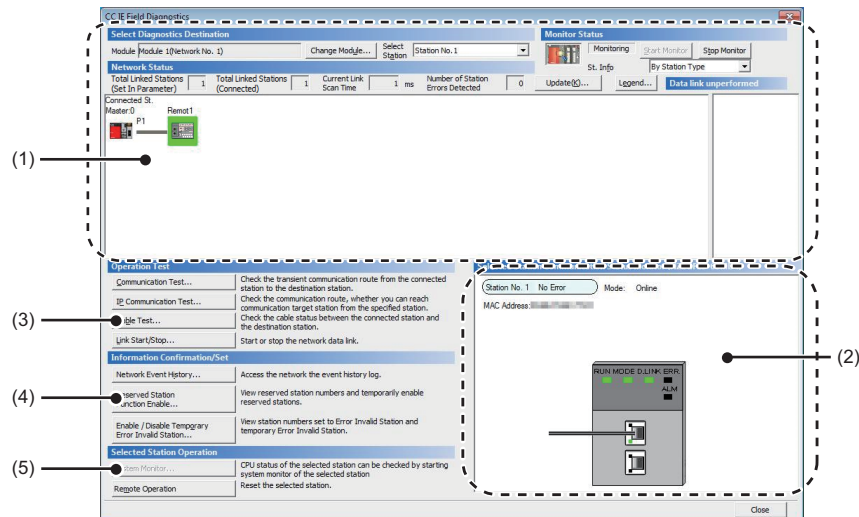
	Item to be diagnosed	Description	Reference
(1)	Display of the network map and error status	The status of the CC-Link IE Field Network can be checked. When an error or warning in the multiple input module occurs, the status of the station is displayed on an icon.	📖 User's manual for the master/local module used
(2)	Display of selected-station status and error details	The communication status of the station selected in "Networks Status" can be checked. "Selected Station Communication Status Monitor", which appears at the bottom right in the window, indicates the communication status of the multiple input module. For errors and warnings for the multiple input module, refer to the following. ☞ Page 92 Checking for the Error Codes and the Alarm Codes	
(3)	Communication Test	The transient communication route and whether the communication is established from the connected station to the communication target station can be checked.	
	IP Communication Test	The reaching time and the route of the IP communication from the connected station to the target station can be checked. This function is unavailable for the multiple input module.	
	Cable Test	The cable connection status between the station to be tested and the device connected to the port of the station to be tested can be checked.	
	Link Start/Stop	The data link can be started or stopped.	
(4)	Network Event History	The history of various events that occurred in the network can be checked.	
	Reserved Station Function Enable	A reservation for a station can be temporarily canceled, and the cancellation can be disabled. Also, the station numbers for the modules set as reserved stations can be checked on a list.	
	Enable/Disable Temporary Error Invalid Station	A station not set as an error invalid station can be temporarily set as an error invalid station, and the error invalid station setting can be disabled. Also, the station numbers for the modules set as (temporarily) error invalid stations can be checked on a list.	
(5)	System Monitor	The system monitor on the selected station is activated and the status of the module can be checked. This function is unavailable for the multiple input module.	
	Remote Operation	The selected station can be reset through the remote operation.	

Remote operation

1. Select a device station to be reset and click the [Remote Operation] button.
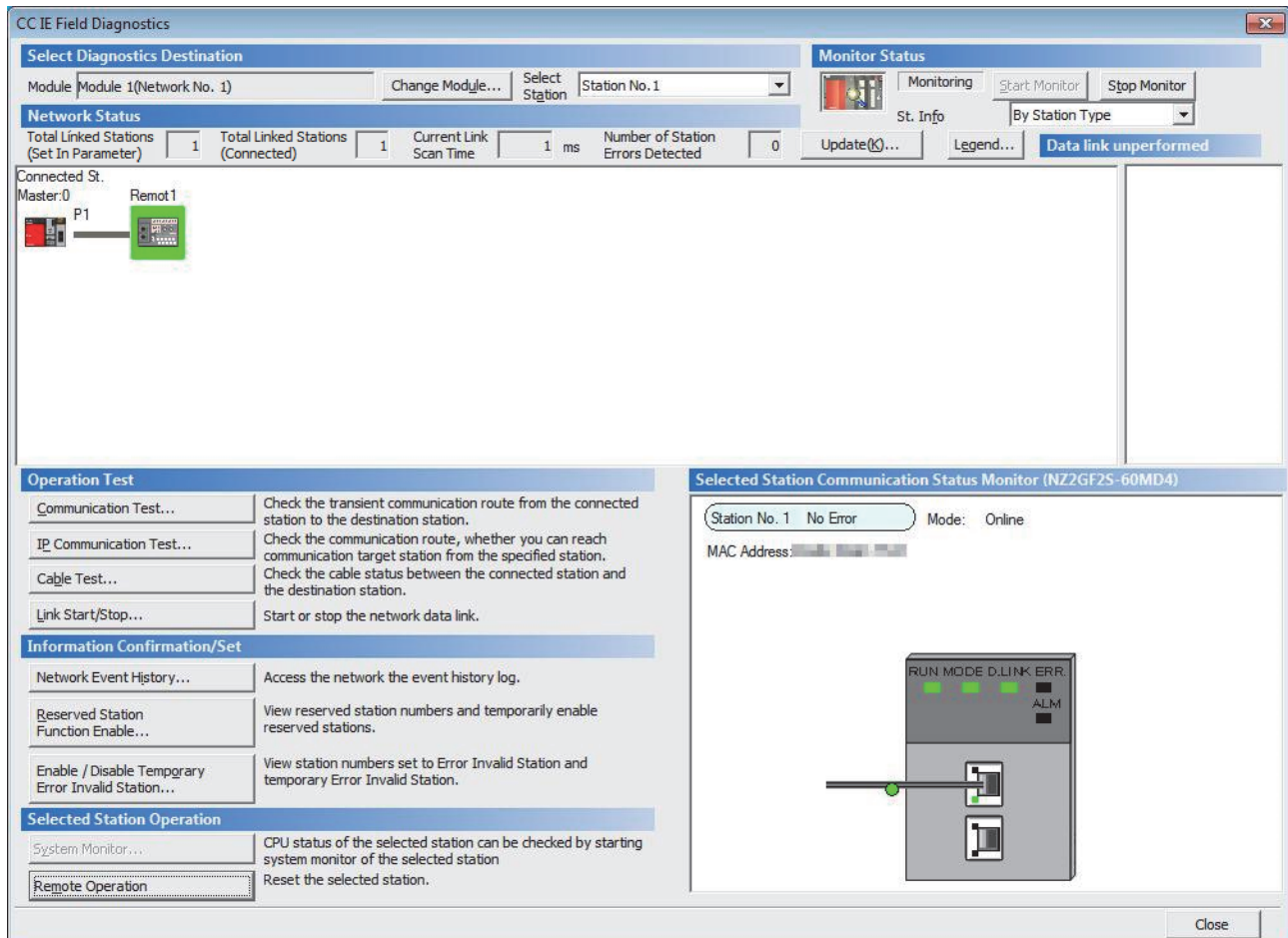
2. Clicking the [Yes] button in the following window initiates remote reset.
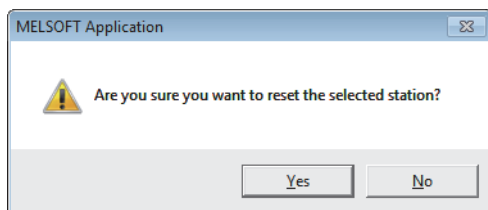
3. Click the [OK] button in the following window.
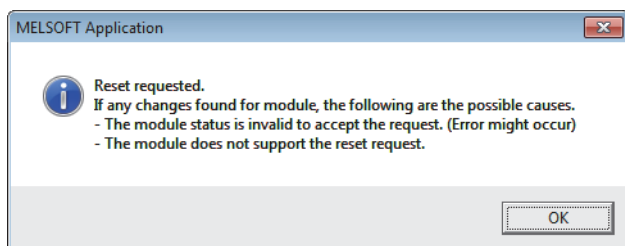
8 PROGRAMMING

This chapter describes the programming of the multiple input module.

8.1 Precautions for Programming

This section describes precautions to create CC-Link IE Field Network programs.

Cyclic transmission program

For a cyclic transmission program, interlock with the following link special relay (SB) and link special register (SW).
- Own station data link status (master station) (SB0049)
- Data link status (each station) (SW00B0 to SW00B7)

For details on the link special relay (SB) and link special register (SW), refer to the user's manual for the master/local module used.

Ex.
Interlock example
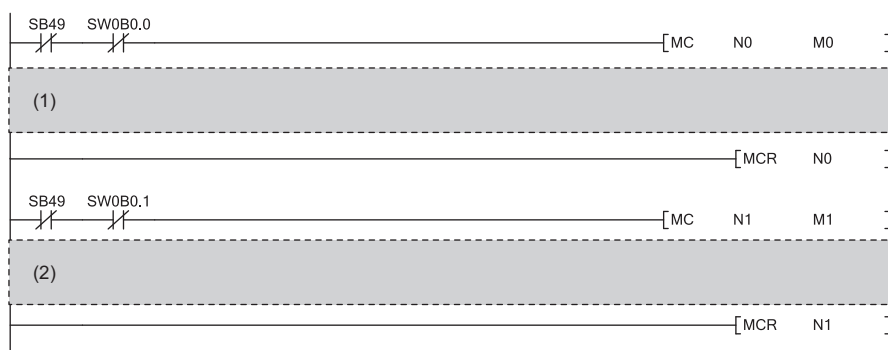
(1)Communication program with station No.1
(2)Communication program with station No.2

Transient transmission program

For a transient transmission program, interlock with the following link special relay (SB) and link special register (SW).
- Own station baton pass status (master station) (SB0047)
- Baton pass status (each station) (SW00A0 to SW00A7)

For details on the link special relay (SB) and link special register (SW), refer to the user's manual for the master/local module used.

Ex.
Interlock example
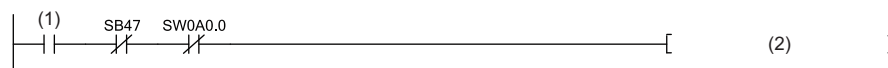
(1)Start contact
(2)Dedicated instructions to station No.1

8.2 Programming Procedure

Create a program to execute each function of the multiple input module according to the following procedure.

1. Parameter settings

☞ Page 50 Parameter Setting

2. Auxiliary program (error reset program) creation[1]

*1 A program which is added according to the control target (created as needed.)

8.3 Program Example

System configuration
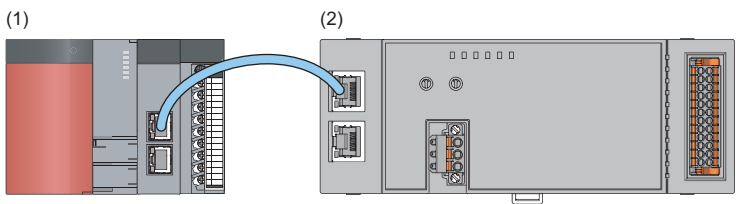
(1)Master station (station No.0)
 • Power supply module: Q62P
 • CPU module: Q10UDHCPU
 • For the master/local module: QJ71GF11-T2 (start I/O number: 0000H to 001FH)
 • Input module: QX40 (start I/O number: 0020H to 002FH)
(2)Remote device station (station No.1)
 • Multiple input module (NZ2GF2S-60MD4)

Point

The setting procedure assumes the use of GX Works2 as the engineering tool.

■Assignment of link devices
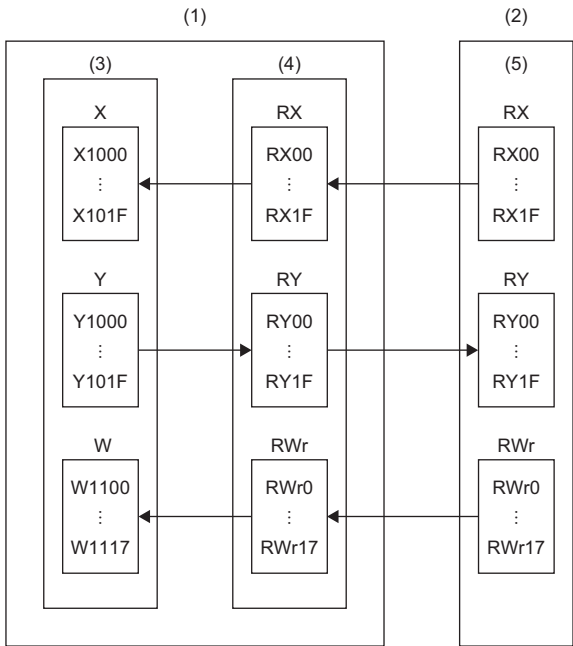
(1)Master station (station No.0)
(2)Remote device station (station No.1)
(3)CPU module
(4)Master module
(5)Multiple input module

Programming condition

Configure the settings for CH1 to CH4 to enable conversion and read the digital output values.

The following table lists the other programming conditions.

Item	Description			
	CH1	**CH2**	**CH3**	**CH4**
Input type/range setting	Voltage (1 to 5V)	Current (4 to 20mA)	Resistance temperature detector (Pt100 (-200 to 850℃)	Thermocouple (type R thermocouple (-50 to 1760℃)
Averaging process setting	Sampling processing	Count average (50 times)	Moving average (10 times)	Sampling processing
Function	Input signal error detection function	Input signal error detection function	Disconnection detection function	Disconnection detection function

Initial setting details

The following table lists the initial setting details of the multiple input module.

Setting item		Setting value
Input type/range setting	CH1 Input type/range setting	20h: 1 to 5V
	CH2 Input type/range setting	10h: 4 to 20mA
	CH3 Input type/range setting	40h: Pt100 (-200 to 850℃)
	CH4 Input type/range setting	51h: Thermocouple R (-50 to 1760℃)
Averaging process setting	CH1 Averaging process setting	0: Sampling processing
	CH2 Averaging process setting	2: Count average
	CH2 Time average/Count average/Moving average	50
	CH3 Averaging process setting	3: Moving average
	CH3 Time average/Count average/Moving average	10
	CH4 Averaging process setting	0: Sampling processing
Input signal error/disconnection detection auto clear enable/disable setting		0: Enable
Input signal error detection function	CH1 Input signal error detection setting	3: Upper limit detection
	CH1 Input signal error detection setting value	50
	CH2 Input signal error detection setting	2: Lower limit detection
	CH2 Input signal error detection setting value	50
Disconnection detection function	CH3 Conversion setting for disconnection detection	3: Value immediately before disconnection
	CH4 Conversion setting for disconnection detection	1: Down Scale

For parameters other than those mentioned above, set the default value.

Device for user

Device	Description	
X20	Digital output value read command	QX10 (X20 to X2F)
X22	Error reset command	
X1007	Warning flag	Multiple input module (RX0 to RX1F)
X1009	Initial data setting completion flag	
X100A	Error flag	
X100B	Remote READY	
X1010	CH1 Conversion completed flag	
X1011	CH2 Conversion completed flag	
X1012	CH3 Conversion completed flag	
X1013	CH4 Conversion completed flag	
X101B	Disconnection detection signal	
X101C	Input signal error detection signal	
Y100A	Error clear request flag	Multiple input module (RY0 to RY1F)
W1100	Latest error code	Multiple input module (RWr0 to RWr17)
W1101	Latest warning code	
W1102	CH1 Digital output value	
W1103	CH2 Digital output value	
W1114, W1115	CH3 Digital output value (32 bits)	
W1105	CH4 Digital output value	
W110A	Input signal error detection flag	
W110D	Disconnection detection flag	
D2002	Read results of CH1 Digital output value	Device for storage
D2003	Read results of CH2 Digital output value	
D2014, D2015	Read results of CH3 Digital output value (32 bits)	
D2005	Read results of CH4 Digital output value	
D2020	Latest error code	
D2021	Latest warning code	
D2022	Input signal error detection flag	
D2023	Disconnection detection flag	
F1	CH1 Input signal error upper limit occurs	Notification of the occurrence of an input signal error
F2	CH2 Input signal error lower limit occurs	
F3	CH3 Disconnection occurs	Notification of the occurrence of a disconnection
F4	CH4 Disconnection occurs	
SB49	Own station data link status (master station)	
SW0B0.0	Data link status (each station) (station No.1)	
M0	Negotiation condition establishment flag (station No.1)	
N0	Nesting (station No.1)	

Setting procedure

Connect GX Works2 to the master station to configure the setting.

1. Create a project on GX Works2.

Select "QCPU (Q mode)" for "Series" and select "Q10UDH" for "Type".

👆 [Project] ⇨ [New]

New Project	
Series:	QCPU (Q mode)
Type:	Q10UDEH
Project Type:	Simple Project
	☐ Use Label
Language:	Ladder
	OK Cancel

2. Display the network parameter setting window and configure the setting as follows.
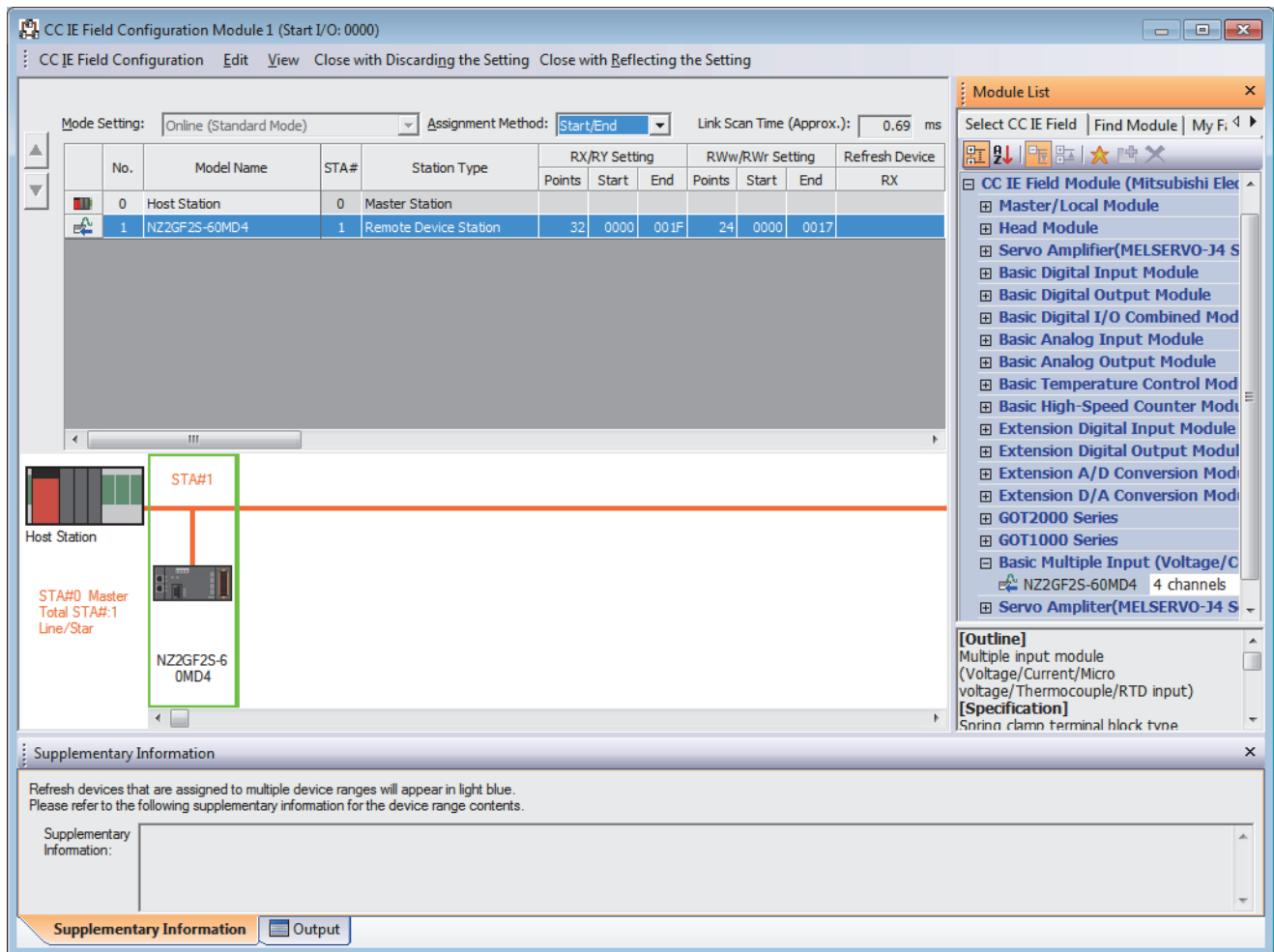
👆 Project window ⇨ [Parameter] ⇨ [Network Parameter] ⇨ [Ethernet / CC IE / MELSECNET]

☑ Set network configuration setting in CC IE Field configuration window

	Module 1	Module 2	Module 3
Network Type	CC IE Field (Master Station)	None	None
Start I/O No.	0000		
Network No.	1		
Total Stations	0		
Group No.			
Station No.	0		
Mode	Online (Normal Mode)		
	CC IE Field Configuration Setting		
	Network Operation Settings		
	Refresh Parameters		
	Interrupt Settings		
	Specify Station No. by Parameter		

3. Display the CC IE Field configuration window and configure the configuration and station number of the device station as follows.

👆 [CC IE Field Configuration Setting] button

4. Close the CC IE Field configuration window.

👆 [CC IE Field Configuration] ⇨ [Close with Reflecting the Setting]

5. Display the refresh parameter setting window and configure the setting as follows.

👆 [Refresh Parameters] button

6. Write the set parameter to the CPU module of the master station and reset the CPU module, or turn off and on the power supply.

⊘ [Online] ⇨ [Write to PLC]

7. Display the "Parameter Processing of Device Station" window.

⊘ Project window ⇨ [Parameter] ⇨ [Network Parameter] ⇨ [Ethernet / CC IE / MELSECNET] ⇨ [CC IE Field Configuration Setting] button ⇨ Select a multiple input in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Online] ⇨ [Parameter Processing of Device Station]

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

9. Set "Write Value". The procedures are as follows.
- Click the title cell of "Initial Value" to select all the items and copy them.
- Click the title cell of "Write Value" to select all the items and paste the copy.
- Select the items to be changed and set new values according to the initial setting details. (☞ Page 84 Initial setting details)

10. Click the [Execute Parameter Processing] button to write the parameter to the multiple input module.

Program example

1. Create the following program with GX Works2.

```
  SB49   SW0B0.0
  ─┤/├────┤/├──────────────────────────────[MC    N0      M0  ]

N0 ─ M0

  X20   X100B  X1009  X1010
  ─┤├────┤/├───┤/├────┤├────────────────────[MOV   W1102   D2002 ]   Read CH1 Digital output value.

                      X1011
                      ─┤├────────────────────[MOV   W1103   D2003 ]   Read CH2 Digital output value.

                      X1012
                      ─┤├────────────────────[DMOV  W1114   D2014 ]   Read CH3 Digital output value (32 bits).

                      X1013
                      ─┤├────────────────────[MOV   W1105   D2005 ]   Read CH4 Digital output value.

  SM400
  ─┤├──────────────────────────────────────[MOV   W110A   D2022 ]   Read Input signal error detection flag.

                                            [MOV   W110D   D2023 ]   Read Disconnection detection flag.

  D2022.0
  ─┤├────────────────────────────────────────────────(F1  )   Processing when an input signal error
                                                              (upper limit) has occurred in CH1.

  D2022.3
  ─┤├────────────────────────────────────────────────(F2  )   Processing when an input signal error
                                                              (lower limit) has occurred in CH2.

  D2023.2
  ─┤├────────────────────────────────────────────────(F3  )   Processing when a disconnection has
                                                              occurred in CH3.

  D2023.3
  ─┤├────────────────────────────────────────────────(F4  )   Processing when a disconnection has
                                                              occurred in CH4.

  X100A
  ─┤├──────────────────────────────────────[MOV   W1100   D2020 ]   Read Latest error code.

  X22
  ─┤├───────────────────────────────────────[SET   Y100A ]   Turn on Error clear request flag.

  Y100A  X101B  X101C  X100A
  ─┤├────┤/├───┤/├────┤/├─────────────────────[RST   Y100A ]   Turn off Error clear request flag.

  X1007
  ─┤├──────────────────────────────────────[MOV   W1101   D2021 ]   Read Latest warning code.

  X101B
  ─┤├──

  X101C
  ─┤├──

                                            [MCR   N0  ]

                                            [END ]
```

Point

If the master station does not receive a response for several link scans from the multiple input module, the multiple input module is determined as a cyclic transmission faulty station and the corresponding bit of the data link status (each station) (SW00B0 to SW00B7) turns on.

---

2. Write the program to the CPU module of the master station, and reset the CPU module, or turn off and on the power supply.

3. Change the status of the CPU module of the master station to RUN.

9 MAINTENANCE AND INSPECTION

The multiple input 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 user's manual of the CPU module used.

MEMO

10 TROUBLESHOOTING

This chapter describes error contents that may occur while the multiple input module is used and those troubleshooting. This chapter uses GX Works2 for explanations.

10.1 Checking for the Error Codes and the Alarm Codes

Error codes can be checked by any of the following methods:
☞ Page 92 Checking by executing a command of the device station
☞ Page 94 Checking by Latest error code (RWr0)
Warning codes and alarm codes can be checked by any of the following methods:
☞ Page 92 Checking by executing a command of the device station
☞ Page 94 Checking by Latest warning code (RWr1)

Checking by executing a command of the device station

This section describes how to check the errors by executing a command of the device station.

1. Select the multiple input module in "List of stations" (1) on the CC IE Field configuration window.
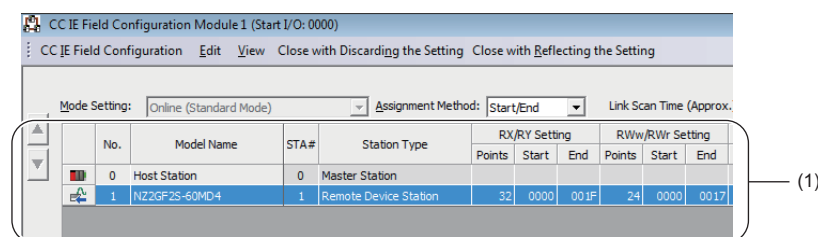
2. Open the "Command Execution of Device Station" window.

👆 [CC IE Field Configuration] ⇨ [Online] ⇨ [Command Execution of Device Station]

3. Set "Method selection" to "Error history read" and click the [Execute] button.
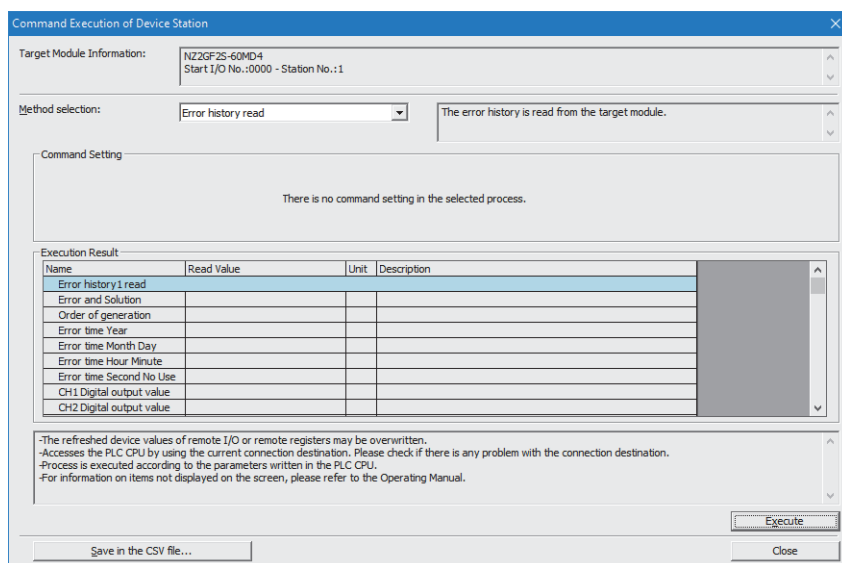
4. If the following window is displayed, click the [Yes] button.
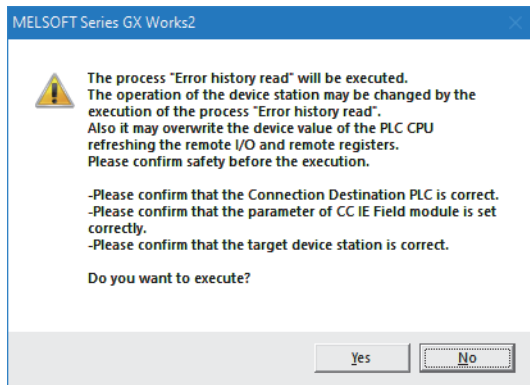
5. If the following window is displayed, click the [OK] button.
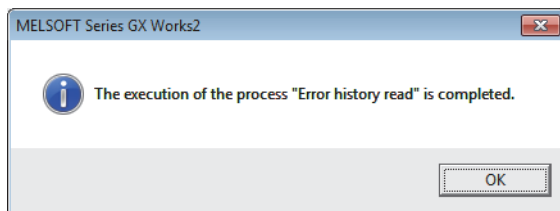
6. The error history of the multiple input module is displayed in "Execution Result".

Item	Storage content
Error and Solution	The action for the error that occurred is displayed.
Order of generation	The order of error occurrence is displayed. (A value between 0 and 65535 is stored.)
Error time Year	The date and time that the error occurred are displayed. (When the tens place of Month, Hour and Second is "0", "0" is omitted.)
Error time Month Day	
Error time Hour Minute	
Error time Second No Use	
CH1 Digital output value	CH1 Digital output value when an error has occurred is stored.
CH2 Digital output value	CH2 Digital output value when an error has occurred is stored.
CH3 Digital output value	CH3 Digital output value when an error has occurred is stored.
CH4 Digital output value	CH4 Digital output value when an error has occurred is stored.

Point

- The error history registers 15 errors at a maximum. If 16 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.
- Even after the module power supply is turned off and on, the error history remains.
- To initialize the error history, set "Method selection" to "Error history clear request" on the "Command Execution of Device Station" window and click the [Execute] button.
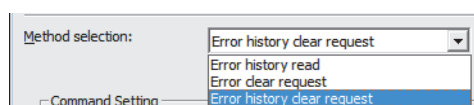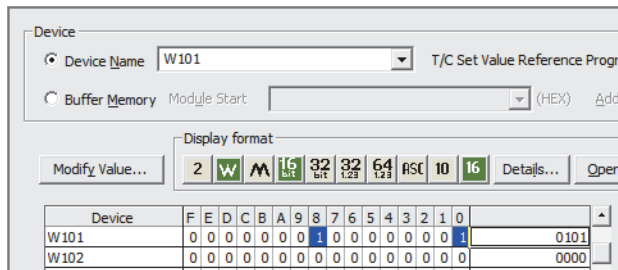
Checking by Latest error code (RWr0)

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

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

Ex.

When the refresh target device for Latest error code (RWr0) is W101
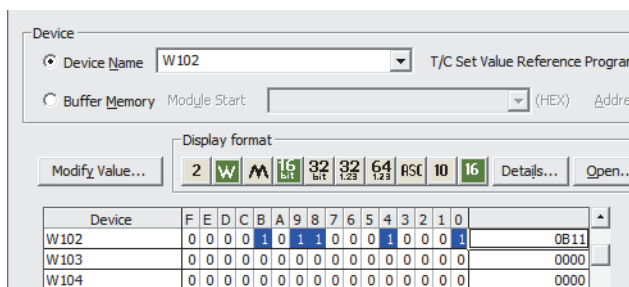
Checking by Latest warning code (RWr1)

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

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

Ex.

When the refresh target device for Latest warning code (RWr1) is W102

10.2 List of Error Codes

This section describes error codes.

Error codes are classified by error number as follows.

Error code and alarm code	Classification	Reference
0000H to 0FFFH, D52BH	Multiple input module error	Page 95 List of error codes (0000H to 0FFFH, D52BH)
D000H to DFFFH (excluding D52BH)	CC-Link IE Field Network error	Page 97 List of error codes (D000H to DFFFH (excluding D52BH))

List of error codes (0000H to 0FFFH, D52BH)

The errors can be classified into the following three types.

Classification	Description
Major error	Indicates an error that cannot be recovered. The RUN LED turns off.
Moderate error	Indicates an error where the module cannot continue to operate. The ERR. LED turns on.
Minor error	Indicates an error where the module can continue to operate. The ERR. LED flashes.

If an error occurs, check that the D LINK LED is on. Then take corrective actions as listed below.

Error code (hexadecimal)	Classification	Error name	Description and cause	Action
0010H	Major error	Hardware failure	Module hardware error	Turn off and on the module power supply. If this error persists, the module may be in failure. Please consult your local Mitsubishi representative.
010□H[*1]	Moderate error	Out of the input type/range setting range	A value outside the setting range is set in CH□ Input type/range setting (address: 0100H to 0103H). □ indicates the number of the channel in which an incorrect setting has been made.	Set a value within the range in CH□ Input type/range setting (address: 0100H to 0103H).
0130H[*1]	Moderate error	Non-volatile memory error (parameter)	The parameter data stored in the non-volatile memory are faulty.	• Set Not commanded (0), Commanded (1), and Not commanded (0) in Parameter area initialization command (address: 1002H) and set the parameters of the non-volatile memory to default. • Correct the parameter settings. • Take measures to reduce noise, such as using a shield wire for connection. • If this error persists, the module may be in failure. Please consult your local Mitsubishi representative.
0140H	Minor error	Non-volatile memory data error (error history)	The error history data stored in the non-volatile memory are faulty.	• The module will be automatically recovered immediately after the error occurs. Note that the error history of the errors that have occurred will be lost. • Take measures to reduce noise, such as using a shield wire for connection. • If this error persists, the module may be in failure. Please consult your local Mitsubishi representative.
0160H	Minor error	Remote buffer memory access error	Areas other than those of the remote buffer memory have been accessed with the REMFR/REMTO instructions.	Correct the setting data of the REMFR/REMTO instruction to access the areas within the remote buffer memory.
020□H[*1]	Moderate error	Out of the time average setting range	The time average setting value set in CH□ Time Average/Count Average/Moving Average (address: 0105H to 0108H) is out of the range of 160 to 5000ms. □ indicates the number of the channel where an error has occurred.	Set the time average setting value within the range of 160 to 5000ms.

Error code (hexadecimal)	Classification	Error name	Description and cause	Action
030☐H[*1]	Moderate error	Out of the count average setting range	The count average setting value set in CH☐ Time Average/Count Average/ Moving Average (address: 0105H to 0108H) is out of the range of 4 to 62500 times. ☐ indicates the number of the channel where an error has occurred.	Set the count average setting value within the range of 4 to 62500 times.
031☐H[*1]	Moderate error	Out of the moving average setting range	The moving average number setting value set in CH☐ Time Average/Count Average/ Moving Average (address: 0105H to 0108H) is out of the range of 2 to 1000 times. ☐ indicates the number of the channel where an error has occurred.	Set the moving average number setting value within the range of 2 to 1000 times.
080☐H[*1]	Moderate error	Out of the input signal error detection setting value setting range	The value set in CH☐ Input signal error detection setting value (address: 010BH to 010EH) is out of the range of 0 to 250. ☐ indicates the number of the channel where an error has occurred.	Set values within the range of 0 to 250 in CH☐ Input signal error detection setting value (address: 010BH to 010EH).
081☐H[*1]	Moderate error	Out of the input signal error detection setting range	A value other than 0 to 4 is set in any channel of Input signal error detection setting (address: 010AH). ☐ indicates the number of the channel where an error has occurred.	Set the channel with an error of Input signal error detection setting (address: 010AH) to either value of the following: • Disable (0H) • Upper and lower limit detection (1H) • Lower limit detection (2H) • Upper limit detection (3H) • Simple disconnection detection (4H)
082☐H[*1]	Moderate error	Simple disconnection detection setting error	In any channel, Input signal error detection setting (address: 010AH) is set to Simple disconnection detection (4H) while CH☐ Input type/range setting (address: 0100H to 0103H) is set to a value other than the following: • 4 to 20mA • 1 to 5V ☐ indicates the number of the channel where an error has occurred.	• For channels in which the simple disconnection detection is performed with the input signal error detection function, set CH☐ Input type/range setting (address: 0100H to 0103H) to 4 to 20mA or 1 to 5V. • For channels in which the simple disconnection detection is not performed, set the value of the corresponding channel of Input signal error disconnection setting (address: 010AH) to a value other than Simple disconnection detection (4H).
0940H	Minor error	Station number switch change error	A station number setting switch has been changed while the module power supply is on.	Reset the switch to the station number that was set when the module power supply was turned on.
0950H[*1]	Moderate error	Clock data outside the range error	The clock data acquired from the CPU module is incorrect.	There may be an influence from noise or a hardware failure. If the same error occurs again even after measures have been taken against noise, please consult your local Mitsubishi representative.
0960H	Major error	Communication error 3	Invalid data where the communication LSI setting changes have been received.	Take measures to reduce noise and reset the module. If the same error occurs again, the hardware of the module may be in failure. Please consult your local Mitsubishi representative.
0970H	Major error	Communication error 4	Invalid data where the communication LSI setting changes have been received.	Take measures to reduce noise and reset the module. If the same error occurs again, the hardware of the module may be in failure. Please consult your local Mitsubishi representative.
D52BH	Major error	Communication error 2	A hardware error has occurred in the communication LSI.	• A malfunction may have occurred due to noise or others. Check the wire and cable distance or grounding condition of each device. Then take measures against noise. • If the same error occurs again, the hardware of the module may be in failure. Please consult your local Mitsubishi representative.

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

> **Point**
>
> When multiple errors or alarms occur, only the latest error code or alarm code is stored in Latest error code (RWr0) or Latest warning code (RWr1).
>
> The errors or alarms that have occurred in the past can be checked in the error history of the engineering tool. For the error history, refer to the following.
>
> ☞ Page 92 Checking by executing a command of the device station
>
> ☞ Page 123 Error history

List of error codes (D000H to DFFFH (excluding D52BH))

■Communication system error in which the D LINK LED flashes or turns off

When this error occurs, the ERR. LED does not turn on. The D LINK LED flashes or turns off.

Troubleshoot the problem with the CC-Link IE Field Network diagnostics.

Error code (hexadecimal)	Classification	Error name	Description and cause	Action
D0E0H	Communication system error	Station type mismatch	The network parameter is incorrect or outside the range.	In the network configuration settings of the master station, change the station type of the module to remote device station.
D0E1H	Communication system error	Reserved station setting (own station)	The network parameter is incorrect or outside the range.	• In the network configuration settings of the master station, clear the reserved station specifications. • Change the station number of the module to a station number that is not reserved.
D0E2H	Communication system error	Station number duplication error (own station)	The station number switch setting is incorrect.	• Set a unique station number so as not to duplicate the station number of other stations. • After taking the above action, turn off and on or reset all the stations where this station number duplication error has been detected.
D0E3H	Communication system error	Station number outside the range error (own station)	The network parameter is incorrect or outside the range.	In the network configuration settings of the master station, add the station information of the module.
D72AH	Communication system error	Station number switch out of range	A station number out of the allowable range (a value other than 1 to 120) has been set.	Set the station number within the allowable range.

> **Point**
>
> When multiple errors or alarms occur, only the latest error code or alarm code is stored in Latest error code (RWr0) or Latest warning code (RWr1).
>
> The errors or alarms that have occurred in the past can be checked in the error history of the engineering tool. For the error history, refer to the following.
>
> ☞ Page 92 Checking by executing a command of the device station
>
> ☞ Page 123 Error history

■Communication system error in which the D LINK LED does not change

When this error occurs, the ERR. LED does not turn on. The D LINK LED also remains turned on.

Because this error is automatically resolved after occurring, CC-Link IE Field Network diagnostics cannot troubleshoot this error. Perform troubleshooting in the error history readout. (☞ Page 92 Checking by executing a command of the device station)

Error code (hexadecimal)	Classification	Error name	Description and cause	Action
D217H	Communication system error	Transient data request command error	The transient data request command is incorrect.	Correct the request command at the transient request source, and retry the operation.
D2A0H	Communication system error	Receive buffer full error	The target station is overloaded and cannot receive transient data.	• Check the network status using CC-Link IE Field Network diagnostics of the engineering tool to take the appropriate action. • When the target station is overloaded and cannot receive transient data, the data needs to be resent to the target station after a period of time.
D2A3H	Communication system error	Transient data length error	The received transient data is incorrect.	Correct the number of data (frame length) at the transient request source, and retry the operation.
DF01H	Communication system error	Transient data divided error	The divided transient data have been received.	Correct it to transient data that is not divided by setting the transient data size to a value which the module can handle, then retry the operation.

Point

When multiple errors or alarms occur, only the latest error code or alarm code is stored in Latest error code (RWr0) or Latest warning code (RWr1).

The errors or alarms that have occurred in the past can be checked in the error history of the engineering tool. For the error history, refer to the following.

☞ Page 92 Checking by executing a command of the device station

☞ Page 123 Error history

10.3 List of Alarm Codes

The following table lists the alarm codes.

Alarm code (hexadecimal)	Classification	Alarm name	Description and cause	Action
0B△□H	Minor error	Input signal error detection	An input signal error has occurred. □ indicates the number of the channel where an input signal error has occurred. △ indicates the corresponding one of the following states: • 1: Upper limit detection • 2: Lower limit detection • 3: Simple disconnection detection	• In the event that Input signal error/disconnection detection automatic clear enable/disable setting (address: 0109H) is Enable (0H), when the analog input value is adjusted to fall within the setting range, the corresponding bit of Input signal error detection flag (RWrA) turns off along with Input signal error detection signal (RX1C). • In the event that Input signal error/disconnection detection automatic clear enable/disable setting (address: 0109H) is Disable (1H), by turning on and off Error clear request flag (RYA) after the analog input value is adjusted to fall within the setting range, the corresponding bit of Input signal error detection flag (RWrA) turns off along with Input signal error detection signal (RX1C).
0C0□H	Minor error	Disconnection detection	A disconnection has been detected. □ indicates the number of the channel where a disconnection has been detected.	• Check the continuity of the external wiring (thermocouples, compensation lead wire, resistance temperature detector cables) to replace the disconnection point thereof. • In the event that Input signal error/disconnection detection automatic clear enable/disable setting (address: 0109H) is Enable (0H), when the disconnection detection cause is removed, the corresponding bit of Disconnection detection flag (RWrD) turns off along with Disconnection detection signal (RX1B). • In the event that Input signal error/disconnection detection automatic clear enable/disable setting (address: 0109H) is Disable (1H), by turning on and off Error clear request flag (RYA) after the disconnection detection cause is removed, the corresponding bit of Disconnection detection flag (RWrD) turns off along with Disconnection detection signal (RX1B).

10.4 Checking by the LEDs

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

When the PW LED does not turn on

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) turned on?	Turn on the module power supply (24VDC).
Is the voltage of the module power supply (24VDC) within the specified range?	Set the voltage value within the range of performance specifications.

When the RUN LED does not turn on

Check item	Action
Does the voltage of the module power supplied externally reach to the voltage of the specifications?	Check that module power supply voltage is within the range of performance specifications. (☞ Page 15 Performance Specifications)
Does any hardware failure occur?	After the check, 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 possible cause is a module failure. Please consult your local Mitsubishi representative.

When the MODE LED flashes

Check item	Action
Is the multiple input module in execution of the unit test?	When the multiple input module is in execution of the unit test, the MODE LED turns off after the unit test is completed. Take corrective action according to the result of the unit test. (☞ Page 103 Unit Test)

When the D LINK LED turns off

Check item	Action
Does the own station in network operate normally?	Connect the engineering tool to the master station, and then check that a data link is established in the own station by using CC-Link IE Field Network diagnostics. (📖 User's manual for the master/local module used)
Are 1000BASE-T-compliant Ethernet cables used?	Replace the cable with a 1000BASE-T-compliant Ethernet cable. (📖 User's manual for the master/local module used)
Is the station-to-station distance 100m or less?	Change the station-to-station distance 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 bending radius.
Is any Ethernet cable disconnected?	Replace the Ethernet cable.
Do other stations connected to the multiple input module normally operate?	Check that the power supplies of the other stations are turned on.
Does the switching hub normally operate?	• Check that a 1000BASE-T-compliant switching hub is used. (📖 User's manual for the master/local module used) • Check that the power supply of the switching hub is turned on.
Is the station number of the multiple input module duplicated with any of other stations?	Two or more stations are duplicated. Change the setting so that all the station numbers are different.

When the D LINK LED flashes

Check item	Action
Does the station number setting of the multiple input module match the station number of the multiple input module specified in the network configuration settings of the master station or in the CC IE Field configuration?	Match the station number of the multiple input module with the station number specified in the network configuration settings of the master station or in the CC IE Field configuration.
Is the station type a remote device station?	In the network configuration settings of the master station, change the station type of the module to remote device station.
Is the multiple input module a reserved station?	In the network configuration settings of the master station, change the setting of reserved/error invalid station to other than the reserved station.
Does the link stop occur through CC-Link IE Field Network diagnostics?	Check the link status through CC-Link IE Field Network diagnostics and start the link when the data link is stopped.
Is the station number setting switch set to a value other than 1 to 120?	Change the station number setting within the range from 1 to 120.
Has the connection been changed to the other master station with a different network number?	• Correct the connection to the previous master station. • To communicate with the master station with a different network number, power off and on the multiple input module.

When the L ER LED turns on

Check item	Action
Are Ethernet cables normal?	• Check that 1000BASE-T-compliant Ethernet cables are used. (📖 User's manual for the master/local module used) • Check that the station-to-station distance is 100m or less. • Check that the Ethernet cables are not disconnected.
Does the switching hub in the system normally operate?	• Check that a 1000BASE-T-compliant switching hub is used. (📖 User's manual for the master/local module used) • Check that the power supply of the switching hub is turned on.
Do other stations connected to the multiple input module normally operate?	Check that the power supplies of the other stations are turned on.
Is the mode of the master station set to something other than Online?	Change the mode of the master station to Online.
Is there any noise affecting the system?	• Check the wiring status of Ethernet cables. • Ground the control panel where the multiple input module is installed.
Is the loopback function enabled for the master station?	When the loopback function is enabled, check that the ring topology is correctly configured for the PORT where the L ER LED is on. (📖 User's manual for the master/local module used)

When the LINK LED turns off

Check item	Action
Are Ethernet cables normal?	• Check that 1000BASE-T-compliant Ethernet cables are used. (📖 User's manual for the master/local module used) • Check that the station-to-station distance is 100m or less. • Check that the Ethernet cables are not disconnected.
Do the switching hub and other stations in the system normally operate?	Check that the power supplies of the switching hub and other stations are turned on.

Point

If link-up processing is repeated due to a condition of a device on the line, it may take a longer time for the LINK LED to turn on.

This phenomenon may be eliminated by changing the module PORT into which the Ethernet cable is connected (example: PORT1 → PORT2).

For wiring of Ethernet cables, refer to the following.

☞ Page 39 Wiring of Ethernet cable

When the ERR. LED turns on

Check item	Action
Has any error occurred?	Identify the error factor of the multiple input module with the engineering tool to take the corrective action. ☞ Page 92 Checking for the Error Codes and the Alarm Codes

When the ALM LED flashes

Check item	Action
Has any cable been disconnected?	Check Disconnection detection flag (RWrD). If the external wiring is disconnected, Disconnection detection (1) is stored in the bit corresponding to the channel number of Disconnection detection flag (RWrD). When any bit of Disconnection detection flag (RWrD) is on, check whether an analog signal line is off or disconnected.
Has any input signal error occurred?	Check Input signal error detection flag (RWrA). When the analog input value becomes equal to or greater than the input signal error detection upper limit value, or becomes equal to or smaller than the input signal error detection lower limit value, an Error (1) is stored in the corresponding bit of Input signal error detection flag (RWrA). When any bit of Input signal error detection flag (RWrA) is on, check the external wiring and the voltage value or current value of the analog input signal.
Is a value of the micro voltage, resistance temperature detector, or thermocouple set to CH□ Input type/range setting (address: 0100H to 0103H) of a channel where no wire is to be connected?	Set Conversion disable (0H) to the channel where no wire is to be connected.

10.5 Unit Test

A unit test will check if there is any error in the hardware of the multiple input module.

Operating procedure

1. Power off the multiple input module.

2. Connect the PORT1 and PORT2 connectors of the multiple input module with an Ethernet cable.

3. Set the station number setting switch as follows.
 • x10: TEST
 • x1: 0

4. Power on the multiple input module.

5. Unit test begins.
The MODE LED flashes while the unit test is being executed.

6. The MODE LED turns off when the unit test is completed successfully.
 • If the test is completed successfully, the ERR. LED does not turn on, but remains off.
 • If the test is 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 multiple input module. Please consult your local Mitsubishi representative.

> **Point**
>
> If a unit test is completed with an error, the error details can be checked in the error history.
> To check the error history, return the station number setting switch of the multiple input module from TEST to the previous position and connect the module to the master station with an Ethernet cable.
> For the error history, refer to the following.
> ☞ Page 92 Checking by executing a command of the device station
> ☞ Page 123 Error history

10.6 Troubleshooting for Each Phenomenon

This section describes troubleshooting for each phenomenon.

Perform troubleshooting for each phenomenon when the multiple input module does not operate properly with no error. If an error occurs in the multiple input module, identify the cause of the error using the engineering tool.

When a digital output value cannot be read

Check item		Action
Is there any problem with wiring, such as off or disconnection of analog signal lines?		Check the faulty area by checking the signal line visually or conductively.
Does the terminal block come off?		Fit the terminal block securely.
Is the terminal connected correctly?		Check that wiring appropriate to the input type is used. ☞ Page 44 Wiring to the terminal block
Is the CPU module in the STOP state?		Change the state of the CPU module to the RUN state.
Is the input type/range setting correct?		Check CH□ Input type/range monitor (address: 0600H to 0603H) in the engineering tool. If the input type/range setting is incorrect, correct CH□ Input type/range setting (address: 0100H to 0103H).
Has Initial data setting request flag (RY9) been executed?		Turn on and off Initial data setting request flag (RY9) in the engineering tool and check whether a digital output value is stored. When a normal value is stored, check that Initial data setting request flag (RY9) operates normally during the program.
When the input type is current	Are the SH1 terminal and SH2 terminal connected at the current input?	For the current input, always connect the SH1 terminal and SH2 terminal. ☞ Page 48 Current input
When the input type is thermocouple	Is the connection between the thermocouple and compensation lead wires complete?	Securely connect the thermocouple and compensation lead wires.
	Are the thermocouple or compensation lead wires reversely connected?	Properly connect the thermocouple and compensation lead wires.
When the input type is resistance temperature detector	Is the connection of the resistance temperature detector complete?	Securely connect the resistance temperature detector.
Is the program to read a digital output value correct?		Check CH□ Digital output value (RWr2 to RWr5) and CH□ Digital output value (32 bits) (RWr10 to RWr17) in the engineering tool. If the digital output value is stored according to the analog input, correct the read program.

> **Point**
>
> If the digital output value cannot be read even after the above actions are taken, the multiple input module may be failed.
> Please consult your local Mitsubishi representative.

When a digital output value does not fall within the range of accuracy

Check item		Action
Is any measure to reduce noise taken?		Take measures to reduce noise, such as using a shield wire for connection.
When the input type is thermocouple	Has the thermocouple input been affected by noise?	Always use shielded compensation lead wires for the connection and ground the shield wire of the compensation lead wire for each channel. Check the influence from adjacent devices and take measures to reduce noise.
	Has there been a disturbance which results in a sudden temperature change in the vicinity of the multiple input module? (Does the wind or the like hit the multiple input module?)	Eliminate any disturbances which cause instability or non-uniformity in the temperature of the analog input terminal block because temperature measurement is carried out based on the temperature of the analog input terminal block.
When the input type is resistance temperature detector	Has the resistance temperature detector input been affected by noise?	Always use shielded cables for the connection and ground the shield wire for each channel. Check the influence from adjacent devices and take measures to reduce noise.
	Is the wiring resistance value too large or are the wiring lengths kept the same?	As the resistance value for each wiring increases, it causes errors in accuracy. Shorten the wiring lengths so that the wiring resistance value decreases, for example by installing the multiple input module close to the temperature measured object. ☞ Page 135 Accuracy of difference in conductor resistance values upon connection of RTD

When parameter read or write or CC-Link IE Field Network diagnostics fails

When parameter reading or writing or CC-Link IE Field Network diagnostics fail in the engineering tool, check the following items.

Check item	Action
Is the D LINK LED of the multiple input module turned on?	Check the D LINK LED of the multiple input module. If the D LINK LED is not on, refer to the following to perform troubleshooting. ☞ Page 100 When the D LINK LED turns off ☞ Page 101 When the D LINK LED flashes Refer to the following to check other LEDs. ☞ Page 100 Checking by the LEDs
Is the version of the module operating as the master station supported?	Check the serial number (first five digits) of the module operating as the master station, and if it is prior to the supported versions, replace the module with a module of the supported version. For the supported version, refer to the following. ☞ Page 28 Applicable master station
Is the version of the engineering tool supported?	Check the version of the engineering tool, and if it is prior to the supported versions, update it. For the supported version, refer to the following. ☞ Page 28 Applicable software package
Do the setting of the network parameter and that of the CPU module match?	Perform PLC verification on the network parameter to check those settings. If they do not match, execute writing and reading to match the settings of the network parameters to those of the CPU module, then write the module parameters of the device station.
Even after checking the above items, LEDs of the module, CC-Link IE Field Network diagnostics using the engineering tool, and error code, the online function cannot be executed using the engineering tool properly.	The module may be in failure. Please consult your local Mitsubishi representative.

APPENDICES

Appendix 1 Details of Remote I/O Signals

This section describes the details of the remote I/O signals assigned to the master/local module.

The assignment of each device number is for the case when the remote I/O signals of the multiple input module are assigned as follows.

- Remote input signal: RX0 to RX1F
- Remote output signal: RY0 to RY1F

Remote input signal

Warning flag

■Device number

Name	Device number
Warning flag	RX7

■Description

Warning flag (RX7) turns on when a minor error occurs.

Five seconds after the cause of the minor error is eliminated, Latest warning code (RWr1) is cleared (0000H is stored) and Warning flag (RX7) turns off.

(1)Occurrence of a minor error
(2)The minor error is cleared.
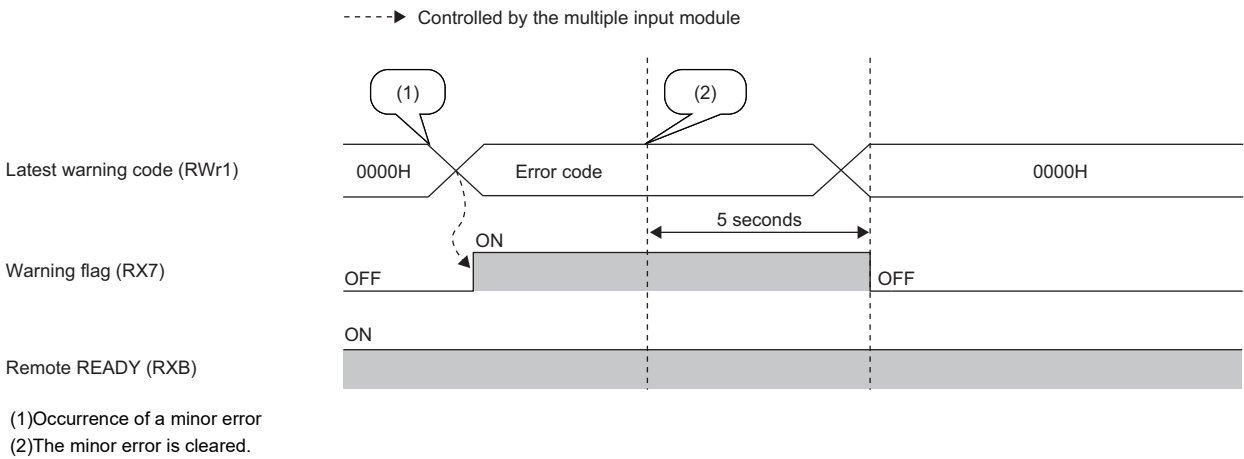
Initial data setting completion flag

■Device number

Name	Device number
Initial data setting completion flag	RX9

■Description

Regarding Initial data setting completion flag (RX9), turn on Initial data setting request flag (RY9) after writing parameter data to the remote buffer memory by the REMTO instruction. Once the change in operating conditions is completed, Initial data setting completion flag (RX9) turns on.

When the following settings are changed, the flag is used as an interlock condition to turn on and off Initial data setting request flag (RY9).

- CH□ Input type/range setting (address: 0100H to 0103H)
- Averaging process setting (address: 0104H)
- CH□ Time Average/Count Average/Moving Average (address: 0105H to 0108H)
- Input signal error detection setting (address: 010AH)
- CH□ Input signal error detection setting value (address: 010BH to 010EH)
- Cold junction temperature compensation setting (address: 0118H)
- Conversion setting for disconnection detection (address: 010FH)
- CH□ Conversion setting value for disconnection detection (address: 0110H to 0117H)
- Input signal error/disconnection detection automatic clear enable/disable setting (address: 0109H)
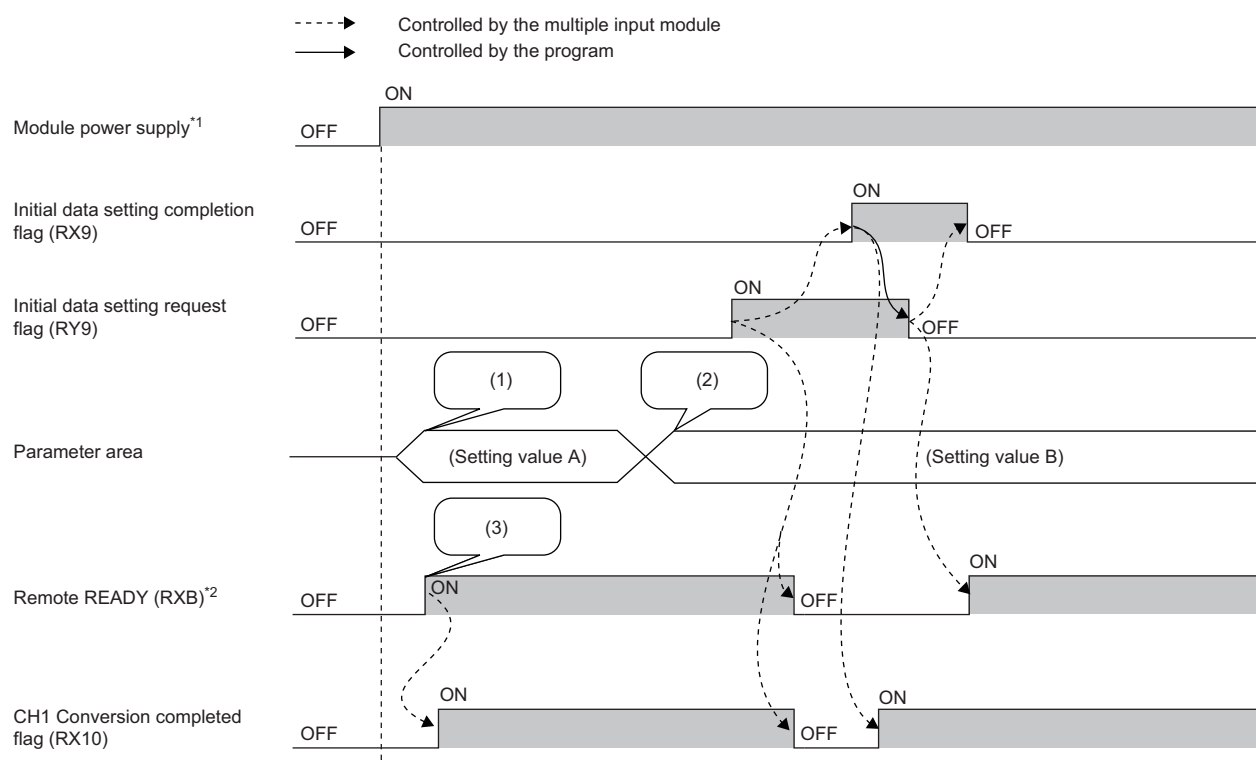
(1) Read the setting values from the non-volatile memory.
(2) Change the setting values.
(3) Start the operation with the setting value A.

*1 When data link is established at the same time as the module is powered on

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

Error flag

■Device number

Name	Device number
Error flag	RXA

■Description

Error flag (RXA) turns on when a moderate error or major error occurs.

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

■When a moderate error occurs

(1)Occurrence of an error

■When a major error occurs

(1)Occurrence of an error

(2)When a major error has occurred, the error is not cleared even if an error clear request is issued.
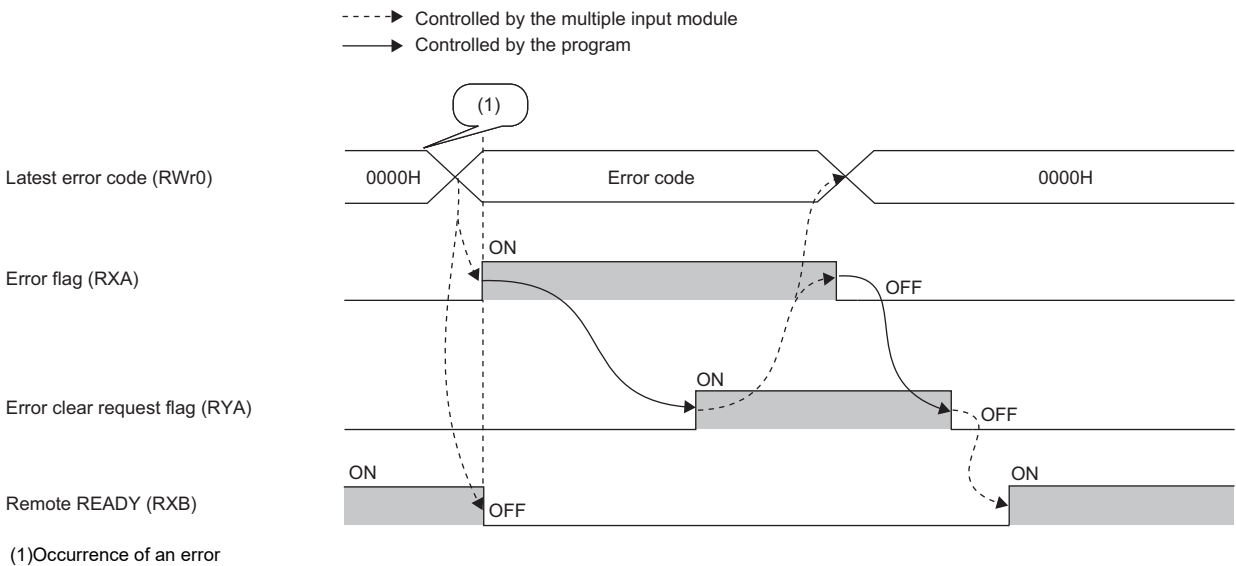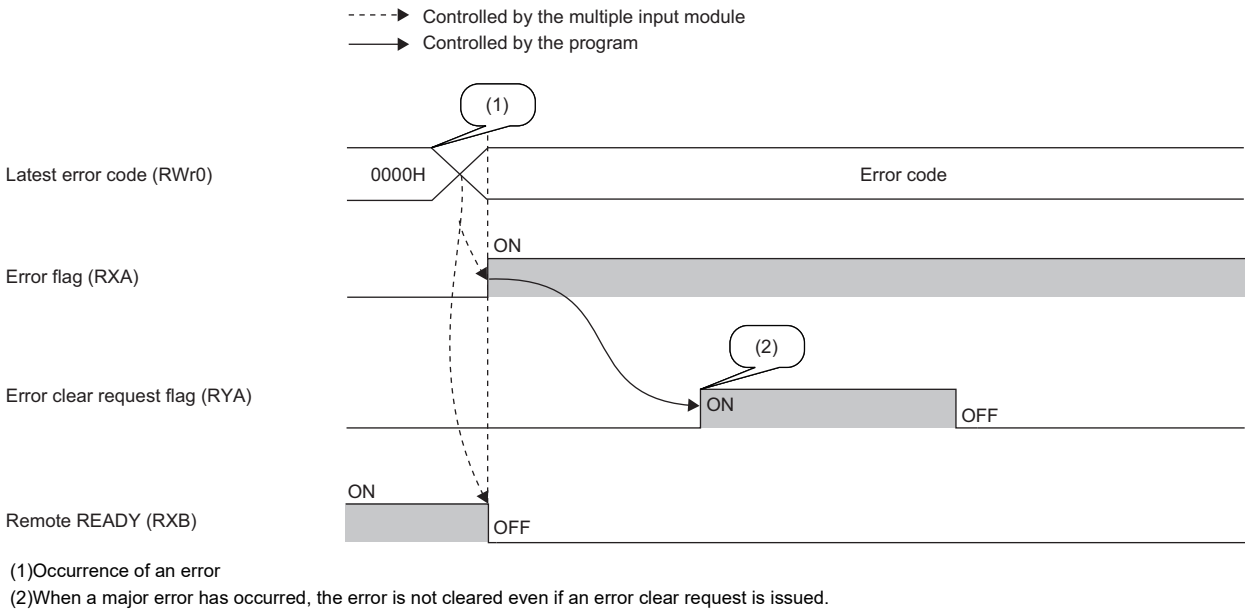
■Error history

The error history is not cleared even if Error clear request flag (RYA) is turned on and off. To clear the error history, use Error history clear command (address: 1000H). (☞ Page 124 Error history clear command)

Remote READY

■Device number

Name	Device number
Remote READY	RXB

■Description

Remote READY (RXB) turns on after the module power supply is powered on.

This Remote READY is used as an interlock condition when the master station reads/writes data from/to the remote register and remote buffer memory areas of the multiple input module.

When Error flag (RXA) turns on, Remote READY (RXB) turns off.

Conversion completed flag

■Device number

Name	Device number			
	CH1	CH2	CH3	CH4
CH□ Conversion completed flag	RX10	RX11	RX12	RX13

■Description

Once conversion in the channel at which conversion is enabled is completed, CH□ Conversion completed flag (RX10 to RX13) turns on.

When Initial data setting request flag (RY9) is turned on and off, the flag returns to the OFF state which is the default state.

Once conversion is completed, the flag turns on.

Disconnection detection signal

■Device number

Name	Device number
Disconnection detection signal	RX1B

■Description

Disconnection detection signal (RX1B) turns on when a disconnection has been detected even from only one channel among the channels in which conversion is enabled.

■ON state of Disconnection detection signal (RX1B)

When Disconnection detection signal (RX1B) turns on, the following operation is applied.

- One of "Value immediately before disconnection", "Up scale", "Down scale", or "Arbitrary value" specified in Conversion setting for disconnection detection (address: 010FH) is stored in CH□ Digital output value (RWr2 to RWr5) and CH□ Digital output value (32 bits) (RWr10 to RWr17).
- The ALM LED flashes.
- Disconnection detection flag (RWrD) turns on.
- Disconnection detection (alarm code: 0C0□H) is stored in Latest warning code (RWr1).

A

■OFF state of Disconnection detection signal (RX1B)

The OFF state of Disconnection detection signal (RX1B) depends on the setting of Input signal error/disconnection detection automatic clear enable/disable setting (address: 0109H).

• When the setting is Enable (0H)

Disconnection detection signal (RX1B) turns off when the disconnection is recovered and all Disconnection detection flags (RWrD) are turned off.

Point
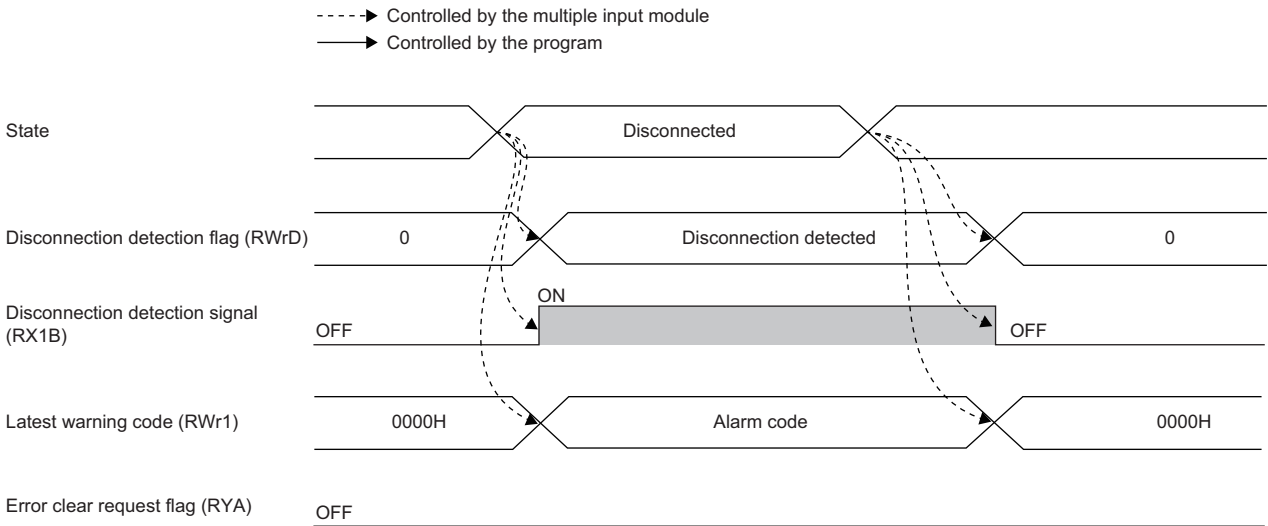
The averaging processing starts from the first after the conversion processing restarts.

• When the setting is Disable (1H)

When Error clear request flag (RYA) is turned on and off following recovery of the disconnection, Disconnection detection signal (RX1B) turns off.
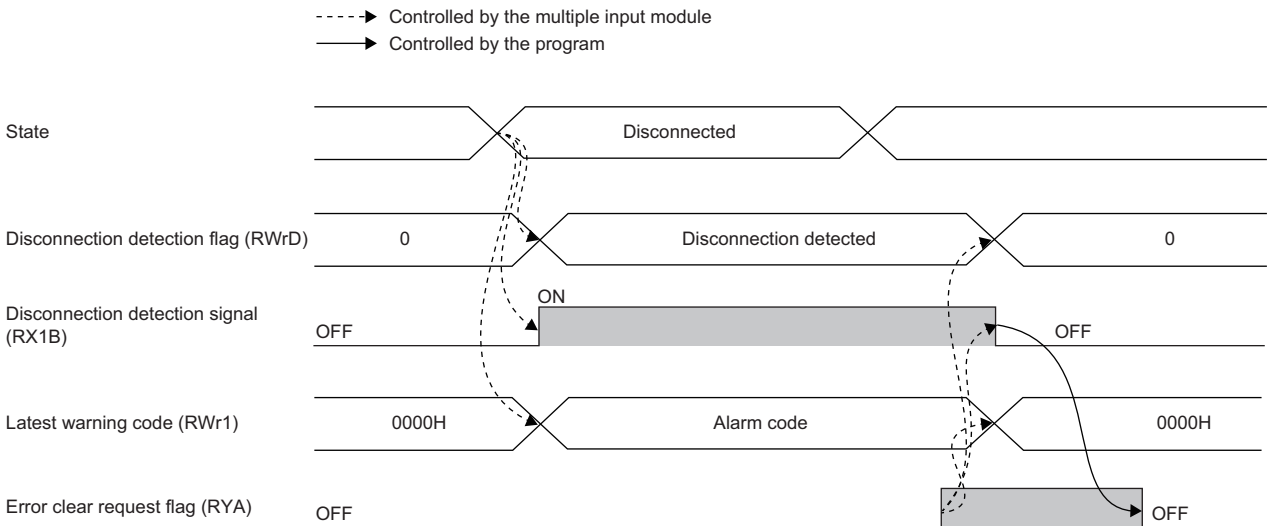
Point

The averaging processing starts from the first after the conversion processing restarts.

Input signal error detection signal

■Device number

Name	Device number
Input signal error detection signal	RX1C

■Description

Input signal error detection signal (RX1C) turns on when a detection condition is set in Input signal error detection setting (address: 010AH) and an analog input value exceeds the range set in CH□ Input signal error detection setting value (address: 010BH to 010EH) in any of the channels in which conversion is enabled. Moreover, when Simple disconnection detection (4H) is set, the setting of CH□ Input signal error detection setting value (address: 010BH to 010EH) is ignored and Input signal error detection signal (RX1C) turns on upon disconnection detection.

■ON state of Input signal error detection signal (RX1C)

When Input signal error detection signal (RX1C) turns on, the following operation is applied.
- The digital output value of the corresponding channel immediately before the error detection is held.
- The ALM LED flashes.
- The corresponding bit of Input signal error detection flag (RWrA) turns on.
- An alarm code is stored in Latest warning code (RWr1).

■OFF state of Input signal error detection signal (RX1C)

The OFF state of Input signal error detection signal (RX1C) depends on the setting of Input signal error/disconnection detection automatic clear enable/disable setting (address: 0109H).
- When the setting is Enable (0H)

Input signal error detection signal (RX1C) turns off when the analog input value is adjusted to fall within the setting range.
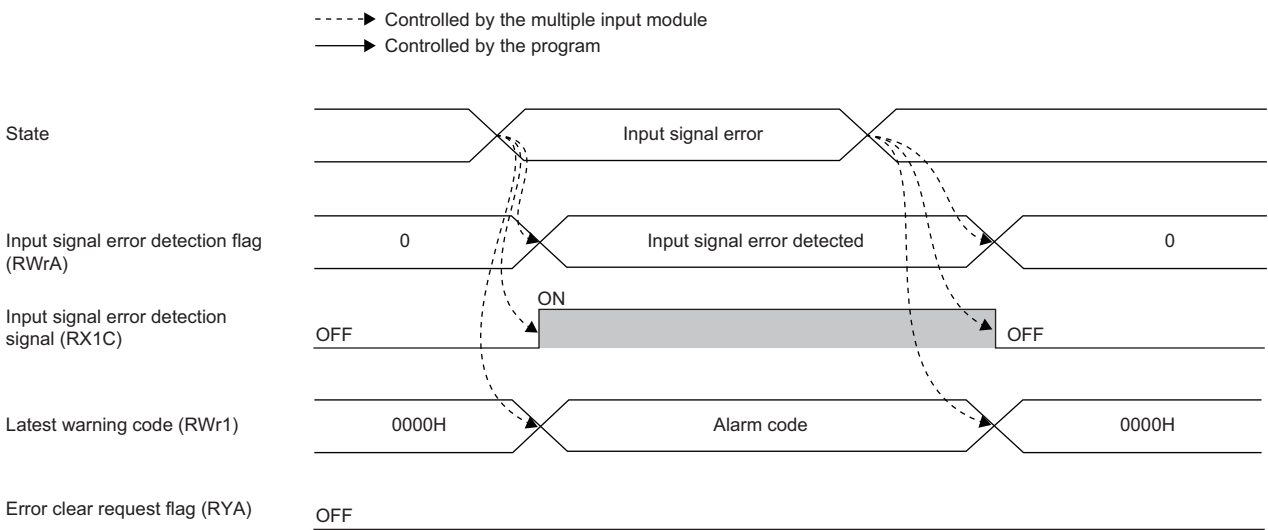
> **Point**
>
> When the analog input signal returns to a value within the setting range, conversion processing restarts. The averaging processing starts from the first after the conversion processing restarts.

• When the setting is Disable (1H)

When Error clear request flag (RYA) is turned on and off after the analog input value is adjusted to fall within the setting range, Input signal error detection signal (RX1C) turns off.

Legend:
- - - - ► Controlled by the multiple input module
───────► Controlled by the program

Signal		
State		Input signal error
Input signal error detection flag (RWrA)	0	Input signal error detected	0
Input signal error detection signal (RX1C)	OFF	ON	OFF
Latest warning code (RWr1)	0000H	Alarm code	0000H
Error clear request flag (RYA)	OFF	ON	OFF
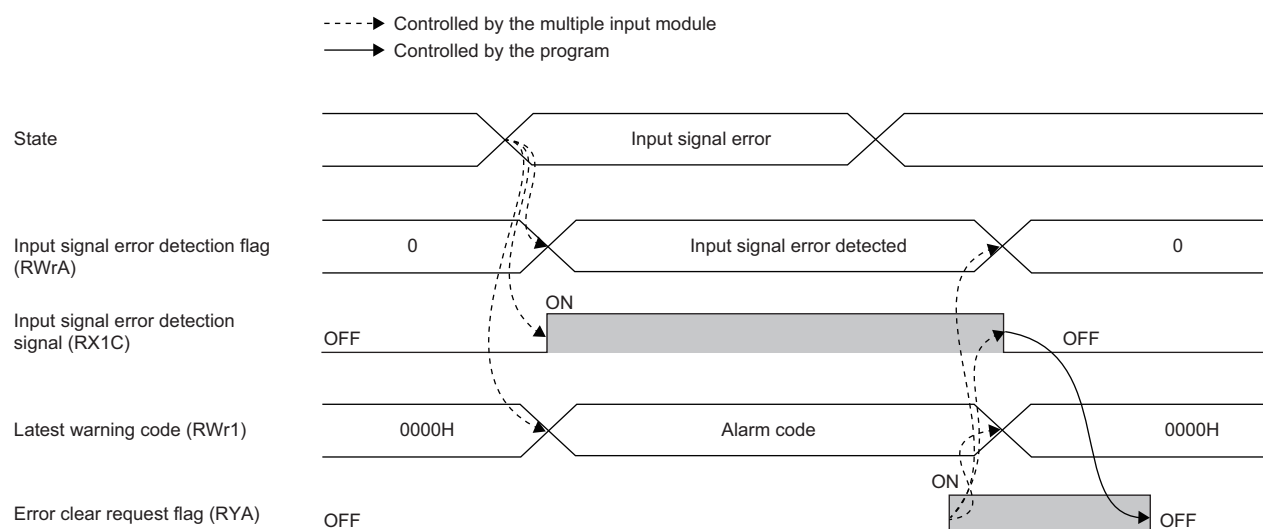
Point

• After the analog input value falls within the setting range, the conversion processing restarts regardless of turning on and off Error clear request flag (RYA). However, the ON state of Input signal error detection signal (RX1C) and the flashing state of the ALM LED are not cleared.
• The averaging processing starts from the first after the conversion processing restarts.

Remote output signal

Initial data setting request flag

■Device number

Name	Device number
Initial data setting request flag	RY9

■Description

Turn on Initial data setting request flag (RY9) after writing parameter data to the remote buffer memory in the program.

Once the change in operating conditions is completed, Initial data setting completion flag (RX9) turns on.

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

- Initial data setting completion flag (RX9) (☞ Page 107 Initial data setting completion flag)

Error clear request flag

■Device number

Name	Device number
Error clear request flag	RYA

■Description

Error clear request flag (RYA) is used to clear Error flag (RXA), Disconnection detection signal (RX1B), Input signal error detection signal (RX1C), Latest error code (RWr0), or Latest warning code (RWr1).

■When a moderate error, disconnection detection, or input signal error detection occurs

When Error clear request flag (RYA) is turned on and off after the cause of the error is eliminated, the error state is cleared and Error flag (RXA) turns off.

If Error clear request flag (RYA) is turned on and off before Error flag (RXA) turns off, Error flag (RXA) does not turn off.

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

- Error flag (RXA) (☞ Page 108 Error flag)
- Disconnection detection signal (RX1B) (☞ Page 109 Disconnection detection signal)
- Input signal error detection signal (RX1C) (☞ Page 111 Input signal error detection signal)

■When a major error occurs

Error flag (RXA) does not turn off even if Error clear request flag (RYA) is turned on and off.

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

- Error flag (RXA) (☞ Page 108 Error flag)

A

Appendix 2 Details of Remote Register

This section describes the details of remote register areas assigned to the master/local module.

The assignment of each device number is for the case when the remote register areas of the multiple input module are assigned as follows.

- RWr0 to RWr17
- RWw0 to RWw17

Latest error code

■Device number

Name	Device number
Latest error code	RWr0

■Description

An error code is stored in Latest error code (RWr0) when a moderate or major error occurs.

When Error clear request flag (RYA) is turned on and off after the cause of the error occurred is eliminated, the error code is cleared.

Errors that occurred in the past can be checked with Error history □ (address: 0A00H to 0AEFH). For error history, refer to the following.

- Error history □ (☞ Page 123 Error history)

Latest warning code

■Device number

Name	Device number
Latest warning code	RWr1

■Description

In Latest warning code (RWr1), an error code is stored when a minor error occurs and an alarm code is stored when an alarm occurs.

Five seconds after the cause of the minor error is eliminated, the error code is automatically cleared.

For the method for clearing an alarm code, refer to the following.

☞ Page 109 Disconnection detection signal

☞ Page 111 Input signal error detection signal

Errors or alarms that occurred in the past can be checked with Error history □ (address: 0A00H to 0AEFH). For error history, refer to the following.

- Error history □ (☞ Page 123 Error history)

Digital output value

■Device number

Name	Device number			
	CH1	CH2	CH3	CH4
CH□ Digital output value	RWr2	RWr3	RWr4	RWr5

■Description

For CH□ Digital output value (RWr2 to RWr5), the converted digital output value is stored in 16-bit signed binary format.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0: Positive 1: Negative	Data area														

Input signal error detection flag

■Device number

Name	Device number
Input signal error detection flag	RWrA

■Description

Input signal error detection flag (RWrA) enables us to check the input signal status of each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0								CH4		CH3		CH2		CH1	
								Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit
								0: Normal 1: Error							

■ON state of Input signal error detection flag (RWRA)

When an analog input value exceeds the range set in CH□ Input signal error detection setting value (address: 010BH to 010EH), the corresponding bit turns on.

■OFF state of Input signal error detection flag (RWrA)

- In the event that Input signal error/disconnection detection automatic clear enable/disable setting (address: 0109H) is Enable (0H), when the analog input value is adjusted to fall within the setting range
- In the event that Input signal error/disconnection detection automatic clear enable/disable setting (address: 0109H) is Disable (1H), when Error clear request flag (RYA) is turned on and off after the analog input value is adjusted to fall within the setting range
- When Initial data setting request flag (RY9) is turned on and off

Disconnection detection flag

■Device number

Name	Device number
Disconnection detection flag	RWrD

■Description

Disconnection detection flag (RWrD) allows us to check the disconnection state of each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0												CH4	CH3	CH2	CH1
												0: Normal 1: Disconnection detection			

■ON state of Disconnection detection flag (RWrD)

When a disconnection is detected, the bit corresponding to the disconnected channel turns on.

■OFF state of Disconnection detection flag (RWrD)

- In the event that Input signal error/disconnection detection automatic clear enable/disable setting (address: 0109H) is Enable (0H), when the disconnection is recovered
- In the event that Input signal error/disconnection detection automatic clear enable/disable setting (address: 0109H) is Disable (1H), when Error clear request flag (RYA) is turned on and off following recovery of the disconnection
- When Initial data setting request flag (RY9) is turned on and off

Digital output value (32 bits)

■Device number

Name	Device number			
	CH1	CH2	CH3	CH4
CH☐ Digital output value (32 bits)	RWr10, RWr11	RWr12, RWr13	RWr14, RWr15	RWr16, RWr17

■Description

For CH☐ Digital output value (32 bits) (RWr10 to RWr17), the converted digital output value is stored in 32-bit signed binary format.

Device number	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
RWr10 RWr12 RWr14 RWr16	Data area															
RWr11 RWr13 RWr15 RWr17	1: Negative 0: Positive	Data area														

Appendix 3 Details of Remote Buffer Memory Areas

This section describes the details of remote buffer memory areas of the multiple input module.

Input type/range setting

■Address

Name	Address			
	CH1	CH2	CH3	CH4
CH□ Input type/range setting	0100H	0101H	0102H	0103H

■Description

CH□ Input type/range setting (address: 0100H to 0103H) configures the settings of the input type and input range for each channel.

Input type	Input range	Setting value
Conversion disable		0000H (default value)
Current	4 to 20mA	0010H
	0 to 20mA	0011H
Voltage	1 to 5V	0020H
	0 to 5V	0021H
	-10 to 10V	0022H
	0 to 10V	0023H
Micro voltage	-100 to 100mV	0030H
Resistance temperature detector	Pt100 (-200 to 850℃)	0040H
	Pt100 (-20 to 120℃)	0041H
	Pt100 (0 to 200℃)	0042H
	JPt100 (-180 to 600℃)	0043H
	JPt100 (-20 to 120℃)	0044H
	JPt100 (0 to 200℃)	0045H
	Pt1000 (-200 to 850℃)	0046H
	Pt50 (-200 to 650℃)	0047H
	Pt500 (-200 to 850℃)	0048H
	Ni100 (-60 to 250℃)	0049H
	Ni120 (-60 to 250℃)	004AH
	Ni500 (-60 to 250℃)	004BH
	Cu50 (-180 to 200℃)	004CH
	Cu100 (-180 to 200℃)	004DH
Thermocouple	Type B thermocouple (0 to 1820℃)	0050H
	Type R thermocouple (-50 to 1760℃)	0051H
	Type S thermocouple (-50 to 1760℃)	0052H
	Type K thermocouple (-270 to 1370℃)	0053H
	Type E thermocouple (-270 to 1000℃)	0054H
	Type J thermocouple (-210 to 1200℃)	0055H
	Type T thermocouple (-270 to 400℃)	0056H
	Type N thermocouple (-270 to 1300℃)	0057H
	Type U thermocouple (-200 to 600℃)	0058H
	Type L thermocouple (-200 to 900℃)	0059H
	Type PLⅡ thermocouple (0 to 1390℃)	005AH
	Type W5Re/W26Re thermocouple (0 to 2300℃)	005BH

Point

Setting a value out of the above setting range results in conversion disable. Then for Latest error code (RWr0), Out of input type/range setting range (error code: 010□H) is stored.

■Enabling the setting details

Turn on and off Initial data setting request flag (RY9) to enable the setting details.

Averaging process setting

■Address

Name	Address
Averaging process setting	0104H

■Description

Averaging process setting (address: 0104H) is set when selecting sampling processing or averaging processing for each channel.

Averaging processing can be selected from among time average, count average, or moving average.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
CH4				CH3				CH2				CH1			

Processing method	Setting value
Sampling processing	0H (default value)
Time average	1H
Count average	2H
Moving average	3H

> **Point**
>
> A channel where a value out of the above setting range is written operates with Sampling processing (0H).

■Input type

Available: ○, Not available: ×

Voltage	Current	Micro voltage	Thermocouple	Resistance temperature detector
○	○	○	○	○

■Enabling the setting details

Turn on and off Initial data setting request flag (RY9) to enable the setting details.

Time Average/Count Average/Moving Average

■Address

Name	Address			
	CH1	CH2	CH3	CH4
CH□ Time Average/Count Average/Moving Average	0105H	0106H	0107H	0108H

■Description

CH□ Time Average/Count Average/Moving Average (address: 0105H to 0108H) configure the settings for the time for averaging, count for averaging, and the number for moving averaging, for each channel where the averaging process setting is set. The following table lists the setting range.

Action	Setting value
Time average	160 to 5000 (ms) (default value: 0)
Count average	4 to 62500 (times) (default value: 0)
Moving average	2 to 1000 (times) (default value: 0)

> **Point**
>
> For channels in which a value out of the setting range above is set, one of Out of the time average setting range (error code: 020□H), Out of the count average setting range (error code: 030□H), or Out of the moving average setting range (error code: 031□H) is stored in Latest error code (RWr0). Then Error flag (RXA) turns on (1) and processing is conducted with the setting before the error.

■Input type
Available: ○, Not available: ×

Voltage	Current	Micro voltage	Thermocouple	Resistance temperature detector
○	○	○	○	○

■Enabling the setting details
Turn on and off Initial data setting request flag (RY9) to enable the setting details.

Input signal error/disconnection detection automatic clear enable/disable setting

■Address

Name	Address
Input signal error/disconnection detection automatic clear enable/disable setting	0109H

■Description
Input signal error/disconnection detection automatic clear enable/disable setting (address: 0109H) configures the setting regarding whether to enable or disable the automatic clear upon an input signal error or disconnection using the input signal error detection function or disconnection detection function.

Input signal error/disconnection detection automatic clear enable/disable setting	Setting value
Enable	0H
Disable	1H (default value)

> **Point**
>
> When a value out of the setting range is set, an operation is conducted as the setting is disabled (1H).

■Input type
Available: ○, Not available: ×

Voltage	Current	Micro voltage	Thermocouple	Resistance temperature detector
○	○	○	○	○

■Enabling the setting details
Turn on and off Initial data setting request flag (RY9) to enable the setting details.

Input signal error detection setting

■Address

Name	Address
Input signal error detection setting	010AH

■Description
Input signal error detection setting (address: 010AH) configures the setting of the conditions to detect an error of input signals for each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
CH4				CH3				CH2				CH1			

Input signal error detection method	Setting value
Disable	0H (default value)
Upper and lower limit detection	1H
Lower limit detection	2H
Upper limit detection	3H
Simple disconnection detection	4H

- When a value out of the above setting range is set, Out of the input signal error detection setting range (error code: 081☐H) is stored in Latest error code (RWr0).
- Simple disconnection detection (4H) is enabled only when current (4 to 20mA) (0010H) or voltage (1 to 5V) (0020H) is set in CH☐ Input type/range setting (address: 0100H to 0103H). When Simple disconnection detection (4H) is set in other settings, Simple disconnection detection setting error (error code: 082☐H) is stored in Latest error code (RWr0).

■Input type

Available: ○, Not available: ×

Voltage	Current	Micro voltage	Thermocouple	Resistance temperature detector
○	○	×	×	×

■Enabling the setting details

Turn on and off Initial data setting request flag (RY9) to enable the setting details.

Input signal error detection setting value

■Address

Name	Address			
	CH1	CH2	CH3	CH4
CH☐ Input signal error detection setting value	010BH	010CH	010DH	010EH

■Description

CH☐ Input signal error detection setting value (address: 010BH to 010EH) configures the setting of the value to detect errors in the analog value input in each channel.

■Setting range

The setting range is between 0 and 250 (0 to 25.0%). Set the value in increments of 1 (0.1%). (Default value: 50)

- When a value out of the above setting range is set, Out of the input signal error detection setting value setting range (error code: 080☐H) is stored in Latest error code (RWr0).
- When Simple disconnection detection (4H) is set in Input signal error detection setting (address: 010AH), the settings in this area are ignored.

■Calculation method for the input signal error detection lower limit value

The input signal error detection lower limit value is calculated using the input signal error detection setting value as follows. The input signal error detection lower limit value to be calculated differs depending on the input range used.

- Input signal error detection lower limit value = Lower limit value of each range - (Gain value of each range - Offset value of each range) × (Input signal error detection setting value / 1000)

■Calculation method for the input signal error detection upper limit value

The input signal error detection upper limit value is calculated using the input signal error detection setting value as follows. The input signal error detection upper limit value to be calculated differs depending on the input range used.

- Input signal error detection upper limit value = Gain value of each range + (Gain value of each range - Offset value of each range) × (Input signal error detection setting value / 1000)

■Input type

Available: ○, Not available: ×

Voltage	Current	Micro voltage	Thermocouple	Resistance temperature detector
○	○	×	×	×

■Enabling the setting details

Turn on and off Initial data setting request flag (RY9) to enable the setting details.

Conversion setting for disconnection detection

■Address

Name	Address
Conversion setting for disconnection detection	010FH

■Description

Conversion setting for disconnection detection (address: 010FH) configures the setting of the stored value to CH□ Digital output value (RWr2 to RWr5) and CH□ Digital output value (32 bits) (RWr10 to RWr17) upon disconnection detection for each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
CH4				CH3				CH2				CH1			

Digital output value	Description	Setting value
Up scale	The up scale value of the input range currently set is stored.	0H
Down scale	The down scale value of the input range currently set is stored.	1H (default value)
Arbitrary value	The value set in CH□ Conversion setting value for disconnection detection (address: 0110H to 0117H) is stored.	2H
Value immediately before disconnection	The digital output value immediately before a disconnection occurs is maintained.	3H

Point

When a value out of the above setting range is set, the operation is made in Down scale (1H).

■Input type

Available: ○, Not available: ×

Voltage	Current	Micro voltage	Thermocouple	Resistance temperature detector
×	×	○	○	○

■Enabling the setting details

Turn on and off Initial data setting request flag (RY9) to enable the setting details.

Conversion setting value for disconnection detection

■Address

Name	Address			
	CH1	CH2	CH3	CH4
CH□ Conversion setting value for disconnection detection	0110H, 0111H	0112H, 0113H	0114H, 0115H	0116H, 0117H

■Description

When Arbitrary value (2H) is set in Conversion setting for disconnection detection (address: 010FH), for CH□ Conversion setting value for disconnection detection (address: 0110H to 0117H), the values set in this area are stored in CH□ Digital output value (RWr2 to RWr5) and CH□ Digital output value (32 bits) (RWr10 to RWr17) upon disconnection detection.

Point

When the value set is 32767 or greater, 32767 is stored in CH□ Digital output value (RWr2 to RWr5).
Moreover, the value set is -32768 or lower, -32768 is stored in CH□ Digital output value (RWr2 to RWr5).

■Input type

Available: ○, Not available: ×

Voltage	Current	Micro voltage	Thermocouple	Resistance temperature detector
×	×	○	○	○

■Setting range

The setting range is between -2147483648 and 2147483647. (Default value: 0)

> **Point**
>
> When the input type is set to the thermocouple or resistance temperature detector, set CH□ Conversion setting value for disconnection detection (address: 0110H to 0117H) as follows.
> - Thermocouple: Set the value in increments of 0.1℃.
> - Resistance temperature detector: Set the value in increments of 0.001℃.

■Enabling the setting details

Turn on and off Initial data setting request flag (RY9) to enable the setting details.

Cold junction temperature compensation setting

■Address

Name	Address
Cold junction temperature compensation setting	0118H

■Description

Cold junction temperature compensation setting (address: 0118H) configures the setting with or without cold junction compensation using the built-in temperature sensor in the multiple input module.

Cold junction temperature compensation setting	Setting value
With cold junction compensation	0H (default value)
Without cold junction compensation	Other than 0H

■Input type

Available: ○, Not available: ×

Voltage	Current	Micro voltage	Thermocouple	Resistance temperature detector
×	×	×	○	×

■Enabling the setting details

Turn on and off Initial data setting request flag (RY9) to enable the setting details.

Input type/range monitor

■Address

Name	Address			
	CH1	CH2	CH3	CH4
CH□ Input type/range monitor	0600H	0601H	0602H	0603H

■Description

CH□ Input type/range monitor (address: 0600H to 0603H) allows us to check the setting details of the CH□ Input type/range setting (address: 0100H to 0103H). (☞ Page 117 Input type/range setting)

Cold junction temperature compensation setting state

■Address

Name	Address
Cold junction temperature compensation setting state	0604H

■Description

Cold junction temperature compensation setting state (address: 0604H) allows us to check the setting details of Cold junction temperature setting (address: 0118H). (☞ Page 122 Cold junction temperature compensation setting)

> **Point**
>
> When a value other than 0H is set in Cold junction temperature compensation setting (address: 0118H), 1H is stored in Cold junction temperature compensation setting state (address: 0604H).

Error history

■Address

Name	Address
	1 to 15
CH□ Error history	0A00H to 0AEF

■Description

Error history □ (address: 0A00H to 0AEFH) records up to 15 errors generated in the module.

> **Point**
>
> Error history 2 (address: 0A10H to 0A1FH) to Error history 15 (address: 0AE0H to 0AEFH) store data in the same format as that of Error history 1 (address: 0A00H to 0A0FH).
> For the error code, refer to the following.
> ☞ Page 21 List of Remote Buffer Memory Areas

The following table shows the contents stored in Error history 1 (address: 0A00H to 0A0FH).

■Error history 1 (address: 0A00H to 0A0FH)

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0A00H	Error code															
0A01H	Order of generation															
0A02H	First two digits of the year								Last two digits of the year							
0A03H	Month								Day							
0A04H	Hour								Minute							
0A05H	Second								Fixed to 00H							
0A06H	CH1 Digital output value															
0A07H	CH2 Digital output value															
0A08H	CH3 Digital output value															
0A09H	CH4 Digital output value															
0A0AH ⋮ 0A0FH	System area															

Ex.
The following table shows the storage content and examples for each item of the error history.

Item	Storage content	Storage example[1]
Error code	The code of an error that has occurred is stored.	—
Order of generation	The order of error occurrence is stored. (A value between 0H and FFFFH is stored.)	0001H
First two digits of the year/Last two digits of the year	The value is stored in BCD code.	2012H
Month/Day		0901H
Hour/Minute		1330H
Second		5000H
CH1 Digital output value	CH1 Digital output value when an error has occurred is stored.	—
CH2 Digital output value	CH2 Digital output value when an error has occurred is stored.	—
CH3 Digital output value	CH3 Digital output value when an error has occurred is stored.	—
CH4 Digital output value	CH4 Digital output value when an error has occurred is stored.	—

*1 This example shows the values when a second error occurred at 13:30:50, September 1st, 2012.

*2 The clock information of the error that occurred is based on the clock information acquired from the CPU module of the master station. When an error has occurred before the clock information is acquired from the CPU module, the error time is not recorded.

A

■Storage order of the error history

The latest error is stored in Error history 1 (address: 0A00H to 0A0FH).

For Error history 2 (address: 0A10H to 0A1FH) to Error history 15 (address: 0AE0 to 0AEFH), errors that occurred in the past are stored in reverse chronological order.

If 16 or more errors occur, errors are deleted from the oldest.

Error history clear command

■Address

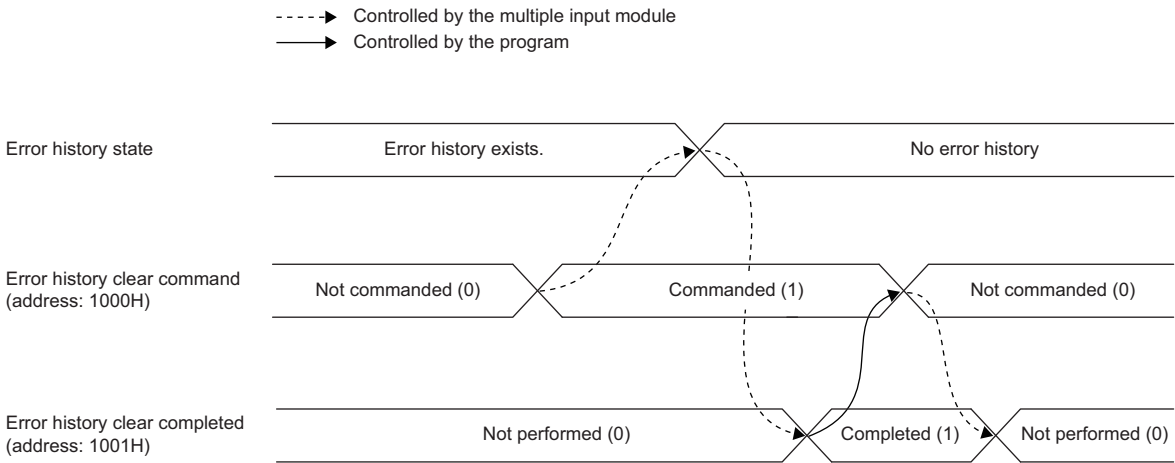| Name	Address
Error history clear command	1000H

■Description

Error history clear command (address: 1000H) is used to clear the error history stored in the non-volatile memory.

Error history clear command	Setting value
Not commanded	0H (default value)
Commanded	1H

■Operation of error history clear

When Error history clear command (address: 1000H) is set to Commanded (1), an error history is cleared.

Error history clear completed

■Address

Name	Address
Error history clear completed	1001H

■Description

Error history clear completed (address: 1001H) shows whether clearing the error history stored in the non-volatile memory has completed or not.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0															(1)

(1) 0: Not performed, 1: Completed

■Operation of error history clear

When the error history clear has completed, Error history clear completed (address: 1001H) becomes Completed (1).

For the timing when the bit is turned to Not performed (0) → Completed (1) → Not performed (0), refer to the following.

☞ Page 124 Error history clear command

Parameter area initialization command

■Address

| Name	Address
Parameter area initialization command	1002H

■Description

Parameter area initialization command (address: 1002H) sets the parameters stored in a remote buffer memory and non-volatile memory to the default value.

When Non-volatile memory data error (parameter) (error code: 0130H) occurs, the module can be recovered using this command.

Parameter area initialization command	Setting value
Not commanded	0H (default value)
Commanded	1H

■Operation of the parameter area initialization

When Parameter area initialization command (address: 1002H) is set to Commanded (1), the parameters stored in a non-volatile memory are set to the default value.
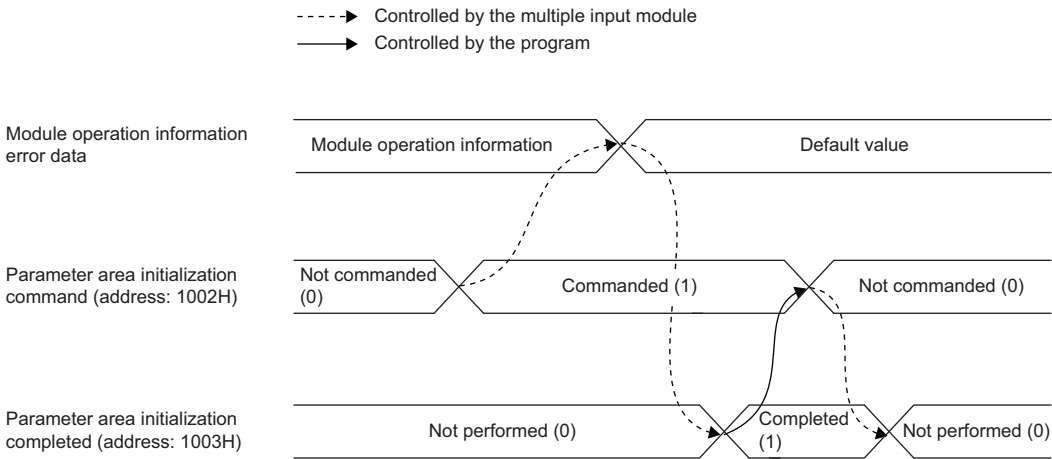
> **Point**
>
> Even if Parameter area initialization command (address: 1002H) is carried out, the following remote input signals are not cleared.
> - Warning flag (RX7)
> - Error flag (RXA)
> - Disconnection detection signal (RX1B)
> - Input signal error detection signal (RX1C)
>
> Following execution of Parameter area initialization command (address: 1002H), normal operation is carried out by turning off and on the module power supply.

Parameter area initialization completed

■Address

Name	Address
Parameter area initialization completed	1003H

Parameter area initialization completed (address: 1003H) shows whether initialization of the parameters stored in a non-volatile memory has completed or not.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0															(1)

(1) 0: Not performed, 1: Completed

■Operation of the parameter area initialization

When setting the parameters stored in a non-volatile memory to the default values has completed, Parameter area initialization completed (address: 1003H) becomes Completed (1). For the timing when the bit is turned to Not performed (0) → Completed (1) → Not performed (0), refer to the following.

☞ Page 125 Parameter area initialization command

Appendix 4 I/O Conversion Characteristic

The I/O conversion characteristic of voltage or current is the slope of the line that joins the offset value and gain value, both of which are used when an analog signal (voltage or current) from outside the programmable controller is converted to the corresponding digital output value.
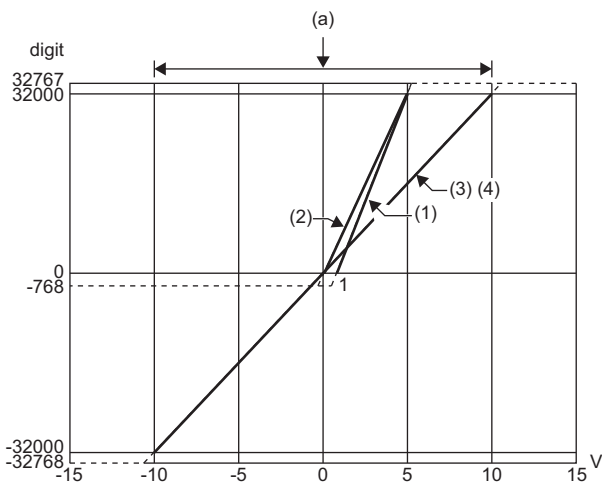
Offset value

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 32000

Voltage input characteristic

The following figure and tables show the analog input range list at voltage input and a graph of the voltage input characteristics.

digit: Digital output value
V: Analog input voltage [V]
(a) Practical analog input range

No.	Input range setting	Offset value	Gain value	Digital output value[1]	Resolution
(1)	1 to 5V	1V	5V	0 to 32000	125µV
(2)	0 to 5V	0V	5V		156.25µV
(3)	-10 to 10V	0V	10V	-32000 to 32000	312.5µV
(4)	0 to 10V			0 to 32000	

[1] When an analog input exceeds the range of digital output values, the corresponding digital output value is fixed to the maximum or minimum.
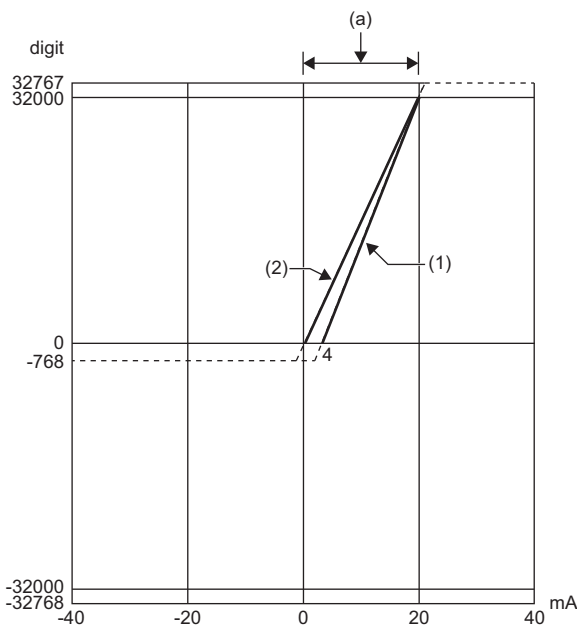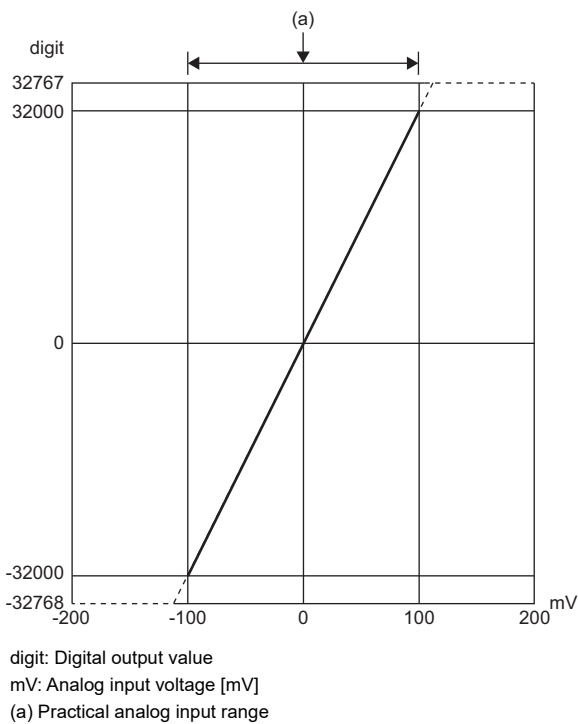
Input range setting	Digital output value	
	Minimum	Maximum
1 to 5V	-768	32767
0 to 5V		
-10 to 10V	-32768	
0 to 10V	-768	

Point

- The application needs to be within the practical analog input range of each input range. If a value is out of the range, the resolution and accuracy may not fall within the range of performance specifications. (Do not use the values in the dotted line area in the above voltage input characteristics graph.)
- Do not input a voltage of ±15V or higher/lower. This may damage the elements.

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Current input characteristic

The following figure and tables show the analog input range list at current input and a graph of the current input characteristics.

digit: Digital output value
mA: Analog input current [mA]
(a) Practical analog input range

No.	Input range setting	Offset value	Gain value	Digital output value[*1]	Resolution
(1)	4 to 20mA	4mA	20mA	0 to 32000	500nA
(2)	0 to 20mA	0mA	20mA		625nA

*1 When an analog input exceeds the range of digital output values, the corresponding digital output value is fixed to the maximum or minimum.

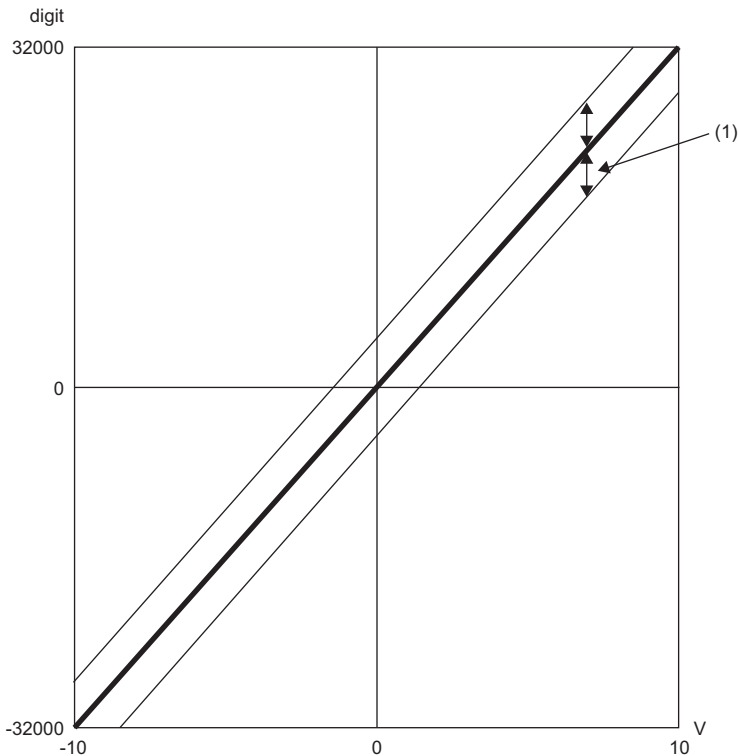| Input range setting	Digital output value	
	Minimum	Maximum
4 to 20mA	-768	32767
0 to 20mA		

Point

- The application needs to be within the practical analog input range of each input range. If a value is out of the range, the resolution and accuracy may not fall within the range of performance specifications. (Do not use the values in the dotted line area in the above current input characteristics graph.)
- Do not input a current of ±30mA or higher/lower. This may damage the elements.

Micro voltage input characteristic

The following figure and tables show the analog input range list at micro voltage input and a graph of the micro voltage input characteristics.

digit: Digital output value
mV: Analog input voltage [mV]
(a) Practical analog input range

Input range setting	Offset value	Gain value	Digital output value[1]	Resolution
-100 to 100mV	0mV	100mV	-32000 to 32000	3.125µV

*1 When an analog input exceeds the range of digital output values, the corresponding digital output value is fixed to the maximum or minimum.

Input range setting	Digital output value	
	Minimum	Maximum
-100 to 100mV	-32768	32767

Point

- The application needs to be within the practical analog input range of each input range. If a value is out of the range, the resolution and accuracy may not fall within the range of performance specifications. (Do not use the values in the dotted line area in the above micro voltage input characteristics graph.)
- Do not input a voltage of ±15V or higher/lower. This may damage the elements.

A

Appendix 5 Accuracy

The accuracy of the multiple input module is the accuracy of the maximum digital output value.

The following graph shows the fluctuation range of accuracy when the range of -10 to 10V is selected.

digit: Digital output value
V: Analog input value (V)
(1) Fluctuation range

The fluctuation range differs depending on the ambient temperature and the input range as described in the following table.

The influence of noise is not considered in the following.

Input range setting		Ambient temperature	
		25±5℃	**0 to 55℃**
Voltage	0 to 10V	Within ±0.1% (±32 digit)	Within ±0.2% (±64 digit)
	-10 to 10V		
	0 to 5V		
	1 to 5V		
Current	0 to 20mA		
	4 to 20mA		
Micro voltage	-100 to 100mV		

Measured temperature range accuracy at thermocouple input

The calculation method of the accuracy when a thermocouple is connected is shown below.

Accuracy (℃) = (Conversion accuracy) + (Cold junction compensation accuracy) + (Allowable difference of thermocouple used)

Ex.

In the event of application under the following conditions

- Thermocouple: Type B thermocouple
- Operating ambient temperature: 30℃
- Measured temperature: 1000℃

(±0.7℃) + (±2.0℃) + (±(1000℃ × 0.005)) = ±7.7℃

■Measured temperature range accuracy at thermocouple input

Type of thermocouple	Measured temperature range	Conversion accuracy (at operating ambient temperature 25±5℃)	Maximum temperature error at ambient temperature 55℃ within the range from 0 to 55℃	Influence by 1Ω wiring resistance (℃/Ω)
Type B thermocouple	0 to 600℃	—*1	—*1	—*1
	600 to 1700℃	0.7℃	1.1℃	0.021℃/Ω
	1700 to 1820℃	—*1	—*1	—*1
Type R thermocouple	-50 to 0℃	—*1	—*1	—*1
	0 to 1600℃	1.5℃	1.7℃	0.025℃/Ω
	1600 to 1760℃	—*1	—*1	—*1
Type S thermocouple	-50 to 0℃	—*1	—*1	—*1
	0 to 1600℃	1.5℃	1.8℃	0.025℃/Ω
	1600 to 1760℃	—*1	—*1	—*1
Type K thermocouple	-270 to -200℃	—*1	—*1	—*1
	-200 to -150℃	0.5℃	0.7℃	0.008℃/Ω
	-150 to -100℃	0.5℃	0.7℃	0.005℃/Ω
	-100 to 1200℃	0.8℃	1.4℃	0.004℃/Ω
	1200 to 1370℃	—*1	—*1	—*1
Type E thermocouple	-270 to -200℃	—*1	—*1	—*1
	-200 to -150℃	0.3℃	0.4℃	0.005℃/Ω
	-150 to -100℃	0.7℃	0.7℃	0.003℃/Ω
	-100 to 900℃	0.9℃	1.3℃	0.003℃/Ω
	900 to 1000℃	—*1	—*1	—*1
Type J thermocouple	-210 to -40℃	—*1	—*1	—*1
	-40 to 0℃	0.3℃	0.5℃	0.003℃/Ω
	0 to 750℃	0.3℃	0.5℃	0002℃/Ω
	750 to 1200℃	—*1	—*1	—*1
Type T thermocouple	-270 to -200℃	—*1	—*1	—*1
	-200 to -150℃	1.2℃	1.2℃	0.008℃/Ω
	-150 to -100℃	1.2℃	1.2℃	0.006℃/Ω
	-100 to 0℃	1.2℃	1.2℃	0.004℃/Ω
	0 to 350℃	0.3℃	0.4℃	0.003℃/Ω
	350 to 400℃	—*1	—*1	—*1
Type N thermocouple	-270 to -200℃	—*1	—*1	—*1
	-200 to -150℃	1.0℃	1.2℃	0.013℃/Ω
	-150 to -100℃	0.9℃	0.9℃	0.008℃/Ω
	-100 to 0℃	0.9℃	0.9℃	0.006℃/Ω
	0 to 1250℃	0.4℃	0.9℃	0.005℃/Ω
	1250 to 1300℃	—*1	—*1	—*1

A

Type of thermocouple	Measured temperature range	Conversion accuracy (at operating ambient temperature 25±5℃)	Maximum temperature error at ambient temperature 55℃ within the range from 0 to 55℃	Influence by 1Ω wiring resistance (℃/Ω)
Type U thermocouple	-200 to -150℃	3.4℃	3.4℃	0.013℃/Ω
	-150 to -100℃	2.0℃	2.1℃	0.006℃/Ω
	-100 to 0℃	2.1℃	2.1℃	0.006℃/Ω
	0 to 600℃	0.2℃	0.4℃	0.003℃/Ω
Type L thermocouple	-200 to -150℃	0.5℃	0.5℃	0.006℃/Ω
	-150 to -100℃	0.5℃	0.5℃	0.004℃/Ω
	-100 to 900℃	0.5℃	0.9℃	0.003℃/Ω
Type PLⅡ thermocouple	0 to 1390℃	0.5℃	1.2℃	0.004℃/Ω
Type W5Re/W26Re thermocouple	0 to 1000℃	0.5℃	0.9℃	0.009℃/Ω
	1000 to 1500℃	0.5℃	1.1℃	0.008℃/Ω
	1500 to 2000℃	1.0℃	2.1℃	0.010℃/Ω
	2000 to 2300℃	1.9℃	3.5℃	0.013℃/Ω

*1 Although it is possible to measure the temperature, the accuracy cannot be guaranteed.

■Cold junction compensation accuracy

Measured temperature	Accuracy
-100℃ or higher	±2.0℃
-150 to -100℃	±3.0℃
-200 to -150℃	±5.0℃

■Allowable difference of type B thermocouple

Measured temperature	Class	Allowable difference
Between 600℃ and 1700℃ (1700℃ not included)	Class 2	±0.25% of the measured temperature
Between 600℃ and 800℃ (800℃ not included)	Class 3	±4.0℃
Between 800℃ and 1700℃ (1700℃ not included)		±0.5% of the measured temperature

■Allowable differences of type R thermocouple and type S thermocouple

Measured temperature	Class	Allowable difference
Between 0℃ and 1100℃ (1100℃ not included)	Class 1	±1.0℃
Between 0℃ and 600℃ (600℃ not included)	Class 2	±1.5℃
Between 600℃ and 1600℃ (1600℃ not included)		±0.25% of the measured temperature

■Allowable difference of type N thermocouple

Measured temperature	Class	Allowable difference
Between -40℃ and 375℃ (375℃ not included)	Class 1	±1.0℃
Between 375℃ and 1000℃ (1000℃ not included)		±0.4% of the measured temperature
Between -40℃ and 333℃ (333℃ not included)	Class 2	±2.5℃
Between 333℃ and 1200℃ (1200℃ not included)		±0.75% of the measured temperature
Between -167℃ and 40℃ (40℃ not included)	Class 3	±2.5℃
Between -200℃ and -167℃ (-167℃ not included)		±1.5% of the measured temperature

■Allowable difference of type E thermocouple

Measured temperature	Class	Allowable difference
Between -40℃ and 375℃ (375℃ not included)	Class 1	±1.0℃
Between 375℃ and 800℃ (800℃ not included)		±0.4% of the measured temperature
Between -40℃ and 333℃ (333℃ not included)	Class 2	±2.5℃
Between 333℃ and 900℃ (900℃ not included)		±0.75% of the measured temperature
Between -167℃ and 40℃ (40℃ not included)	Class 3	±2.5℃
Between -200℃ and -167℃ (-167℃ not included)		±1.5% of the measured temperature

■Allowable difference of type T thermocouple

Measured temperature	Class	Allowable difference
Between -40℃ and 125℃ (125℃ not included)	Class 1	±0.5℃
Between 125℃ and 350℃ (350℃ not included)		±0.4% of the measured temperature
Between -40℃ and 133℃ (133℃ not included)	Class 2	±1.0℃
Between 133℃ and 350℃ (350℃ not included)		±0.75% of the measured temperature
Between -67℃ and 40℃ (40℃ not included)	Class 3	±1.0℃
Between -200℃ and -67℃ (-67℃ not included)		±1.5% of the measured temperature

■Allowable difference of type J thermocouple

Measured temperature	Class	Allowable difference
Between -40℃ and 375℃ (375℃ not included)	Class 1	±1.5℃
Between 375℃ and 750℃ (750℃ not included)		±0.4% of the measured temperature
Between -40℃ and 333℃ (333℃ not included)	Class 2	±2.5℃
Between 333℃ and 750℃ (750℃ not included)		±0.75% of the measured temperature

■Allowable difference of type K thermocouple

Measured temperature	Class	Allowable difference
Between -40℃ and 375℃ (375℃ not included)	Class 1	±1.5℃
Between 375℃ and 1000℃ (1000℃ not included)		±0.4% of the measured temperature
Between -40℃ and 333℃ (333℃ not included)	Class 2	±2.5℃
Between 333℃ and 1200℃ (1200℃ not included)		±0.75% of the measured temperature
Between -167℃ and 40℃ (40℃ not included)	Class 3	±2.5℃
Between -200℃ and -167℃ (-167℃ not included)		±1.5% of the measured temperature

A

Measured temperature range accuracy at input of a resistance temperature detector

The calculation method of the accuracy when a resistance temperature detector is connected is shown below.

Accuracy (℃) = (Conversion accuracy) + (Allowable difference of resistance temperature detector used)

Ex.

In the event of application under the following conditions

- Resistance temperature detector: Pt100 in class A (-200 to 850℃)
- Operating ambient temperature: 40℃
- Measured temperature: 800℃

Accuracy of temperature measuring range = (±1.8℃) + (±(0.15℃ + 0.002 × 800℃)) = ±3.55℃

■Measured temperature range accuracy at input of a resistance temperature detector

Type of resistance temperature detector	Measured temperature range	Resolution	Conversion accuracy (at ambient temperature 25±5℃)	Maximum temperature error at ambient temperature 55℃
Pt100	-200 to 850℃	0.025℃/0.1℃	0.350℃	1.800℃
	-20 to 120℃		0.250℃	0.800℃
	0 to 200℃		0.300℃	0.900℃
JPt100	-180 to 600℃		0.300℃	1.400℃
	-20 to 120℃		0.250℃	0.800℃
	0 to 200℃		0.250℃	0.900℃
Pt1000	-200 to 850℃		0.300℃	1.600℃
Pt50	-200 to 650℃		0.400℃	1.800℃
Pt500	-200 to 850℃		0.400℃	1.700℃
Ni100	-60 to 250℃		0.200℃	1.100℃
Ni120	-60 to 250℃		0.200℃	0.900℃
Ni500	-60 to 250℃		0.200℃	0.900℃
Cu50	-180 to 200℃		0.250℃	1.000℃
Cu100	-180 to 200℃		0.200℃	0.800℃

■Allowable differences of Pt100, Pt500, and Pt1000 (IEC 751 1983, DIN EN 60751-2009)

Class	Allowable difference
AA	±(0.1 + 0.0017|t|)℃
A	±(0.15 + 0.002|t|)℃
B	±(0.3 + 0.005|t|)℃
C	±(0.6 + 0.01|t|)℃

■Allowable differences of JPt100 and Pt50

Class	Allowable difference
0.15	±(0.15 + 0.0015|t|)℃
0.2	±(0.15 + 0.002|t|)℃
0.5	±(0.3 + 0.005|t|)℃

■Allowable differences of Ni100, Ni120, and Ni500 (DIN 43760 1987)

Class	Allowable difference
0 to 250℃	±(0.4 + 0.007|t|)℃
-60 to 0℃	±(0.4 + 0.0028|t|)℃

■Allowable differences of Cu100 and Cu50 (GOST 6651-2009)

Class	Allowable difference
AA	±(0.1 + 0.0017|t|)℃
A	±(0.15 + 0.002|t|)℃
B	±(0.3 + 0.005|t|)℃
C	±(0.6 + 0.01|t|)℃

Accuracy of difference in conductor resistance values upon connection of RTD
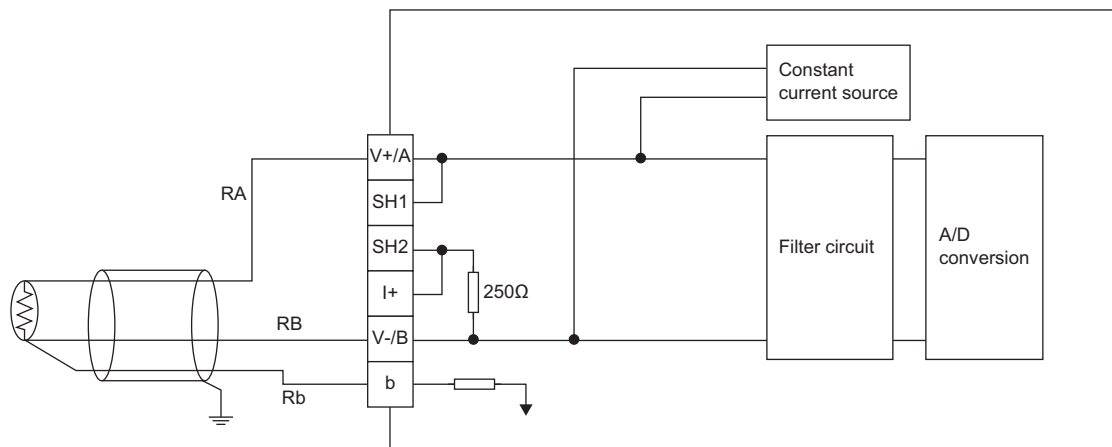
- Install a resistance temperature detector so as to shorten the wiring length (minimize the conductor resistance values of RA, RB, and Rb) and set each conductor resistance value of RA, RB, and Rb to 150Ω or less. An accuracy error occurs with the following ratio by 1Ω conductor resistance value.

Type of resistance temperature detector	Accuracy error by 1Ω conductor resistance value
Pt100	0.007℃/Ω
JPt100	0.006℃/Ω
Pt1000	0.001℃/Ω
Pt50	0.012℃/Ω
Pt500	0.003℃/Ω
Ni100	0.005℃/Ω
Ni120	0.004℃/Ω
Ni500	0.002℃/Ω
Cu50	0.009℃/Ω
Cu100	0.005℃/Ω

- Arrange the wiring length so that RA and RB are equal in conductor resistance values.

A

Appendix 6 Processing Time of CC-Link IE Field Network

The processing time of CC-Link IE Field Network is the time taken from reading analog input values in the multiple input module to storage of the data in the device of the CPU module of the master station.

The processing time of CC-Link IE Field Network is determined in accordance with the following processing times.

 • Sequence scan time of the master station

 • Link scan time

 • Processing time of the remote device station: Conversion cycle

For details on the processing time of CC-Link IE Field Network, refer to the user's manual for the master/local module used.

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 the module to comply with the EMC Directive. These precautions are based on the requirements of the EMC Directive and the harmonized standards. However, they do not guarantee that the entire machinery constructed according to the descriptions complies with the EMC Directive. The manufacturer of the machinery must determine the testing method for compliance and declare conformity to the EMC Directive.

A

EMC Directive related standards

■Emission requirements

Specifications	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 (10m in measurement range)[1] • 230M to 1000MHz, QP: 47dBµV/m (10m in measurement range)
	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 value, Mean: Average value

*2   The module is an open-type device (a device designed to be embedded 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

Specifications	Test item	Test details	Standard value
EN61131-2: 2007	EN61000-4-2 Electrostatic discharge immunity[1]	Immunity test in which electrostatic is applied to the cabinet of the equipment.	• 8kV air discharge • 4kV contact discharge
	EN61000-4-3 Radiated, radio-frequency electromagnetic field immunity[1]	Immunity test in which electric fields are irradiated to the product	80% AM modulation@1kHz • 80M to 1000MHz: 10V/m • 1.4G to 2.0GHz: 3V/m • 2.0G to 2.7GHz: 1V/m
	EN61000-4-4 Electrical first transient burst immunity[1]	Immunity test in which burst noise is applied to the power line and signal line	• AC/DC main power, I/O power, AC I/O (unshielded): 2kV • DC I/O, analog, communication cable: 1kV
	EN61000-4-5 Surge immunity[1]	Immunity test in which lightning surge is applied to the power line and signal line	• AC power line, AC I/O power, AC I/O (unshielded): 2kV CM, 1kV DM • DC power line, DC I/O power: 0.5kV CM, DM • DC I/O, AC I/O (shielded), analog[2], communication: 1kV CM
	EN61000-4-6 Conducted RF immunity[1]	Immunity test in which 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]	Immunity test in which the product is installed in inductive magnetic field	50Hz/60Hz, 30A/m
	EN61000-4-11 Voltage dips and interruption immunity[1]	Immunity test in which power supply voltage is momentarily interrupted	• 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 embedded 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%.

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, radio wave may be emitted. 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 ground point to the control panel. Ground the FG terminal with the thickest and shortest possible ground cable (30cm or shorter).

A

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.

■Cables for the CC-Link IE Field Network

Shielded cables should be used for the CC-Link IE Field Network. Strip a part of the jacket as shown below and ground the exposed shield in the largest possible area.
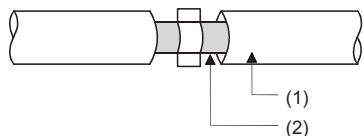
(1)Cables for the CC-Link IE Field Network
(2)Shield

■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.)
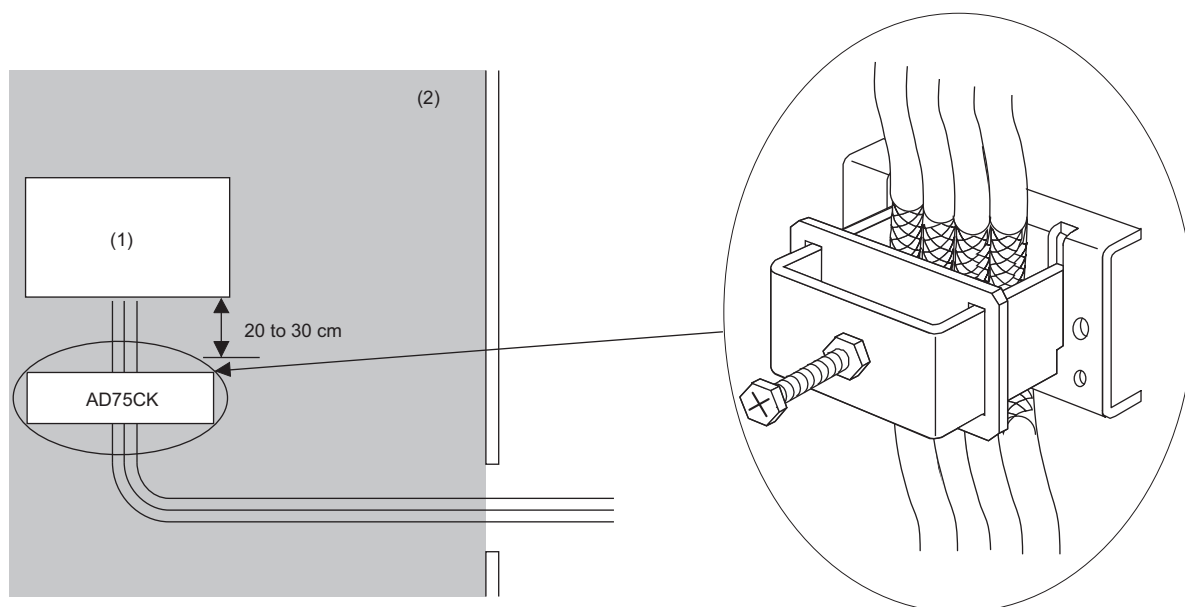
(1)Module
(2)Inside a control panel

For details on the AD75CK, refer to the following manual.
📖 AD75CK-type Cable Clamping Instruction Manual

■Analog input signal

Use a signal line of 30m or shorter when connecting it to the analog input and output 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 for the tests conducted by Mitsubishi Electric Corporation: TDK-Lambda DLP-120-24-1, IDEC PS5R-SF24, PS5R-F24)
• Use a power cable of 10m or shorter when connecting it to the module power supply terminal.
• Use a power cable of 30m or shorter when connecting it to the external power supply for output part.

Others

■Ferrite core

A ferrite core has the effect of reducing radiated 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 on a multiple input module that is connected to the external power supply and CC-Link IE Field Network cables, attach a ferrite core 4cm apart from the module.

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

Ex.
Example
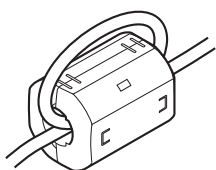
■Noise filter (power supply line filter)

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 a multiple input module. Use a noise filter with the damping characteristics equivalent to those of MA1206 (manufactured by TDK-Lambda Corporation). Note that a noise filter is not required if the module is used in Zone A defined in 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.

• Defect example
When input wiring and output wiring are bundled, noise is induced.
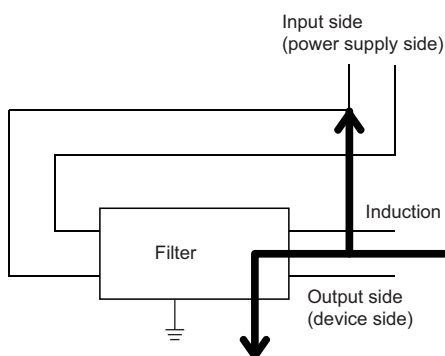
• Improvement example
Carry out cable laying taking the distance between input wiring and output wiring.
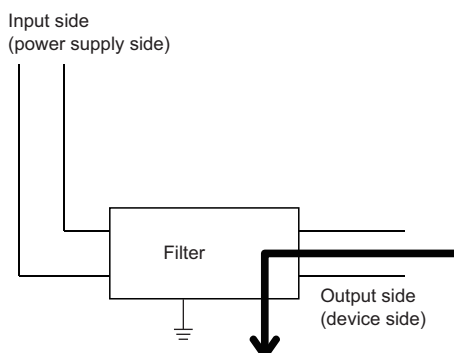
- Ground the noise filter grounding terminal to the control panel with the shortest cable possible (approx. 10cm).

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 the Serial Number and Function Version

The serial number and function version of the multiple input module can be checked on the rating plate.
The serial number can be checked with "Production Information" of the CC-Link IE Field Network diagnostics as well.

Checking on the rating plate
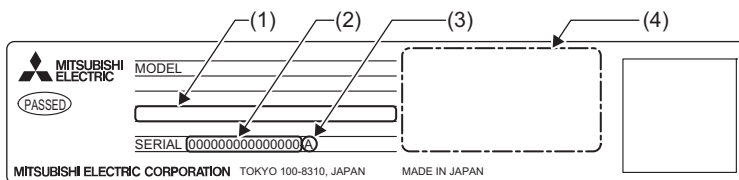
(1)MAC address
(2)Serial number
(3)Function version
(4)Compatible standard symbols

Checking with the CC-Link IE Field Network diagnostics

1. Connect GX Works2 to the CPU module.

2. Start CC-Link IE Field Network diagnostics from the menu of GX Works2.

   ☞ [Diagnostics] ⇨ [CC IE Field Diagnostics]

3. Right-click on the device station to display the production information and select "Production Information".
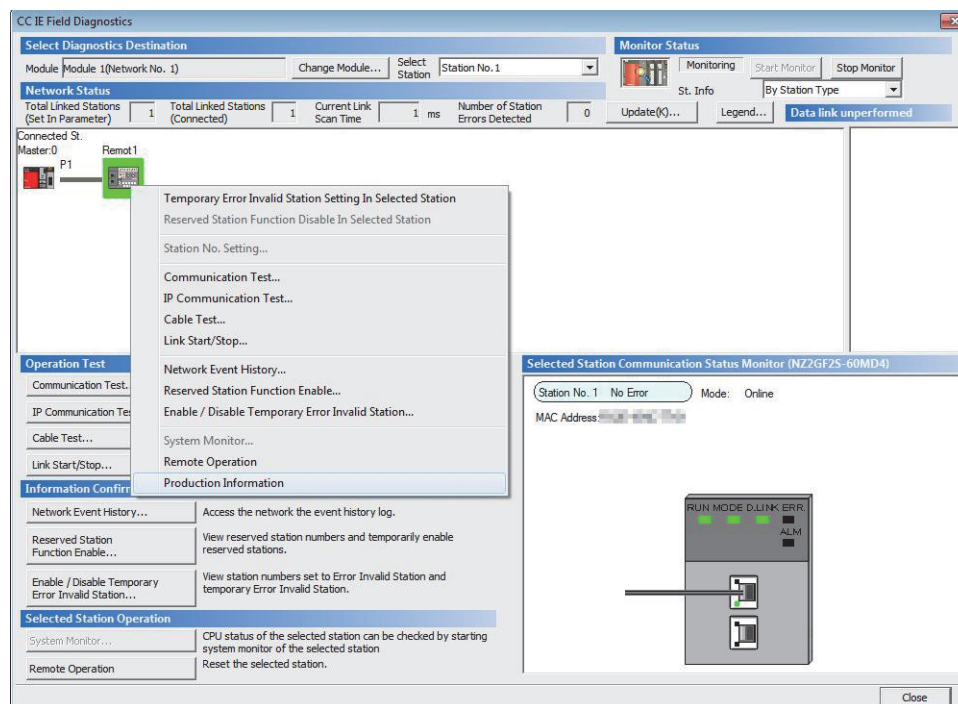
4. The production information is displayed.

The serial number on the rating plate is displayed in "Production Information".
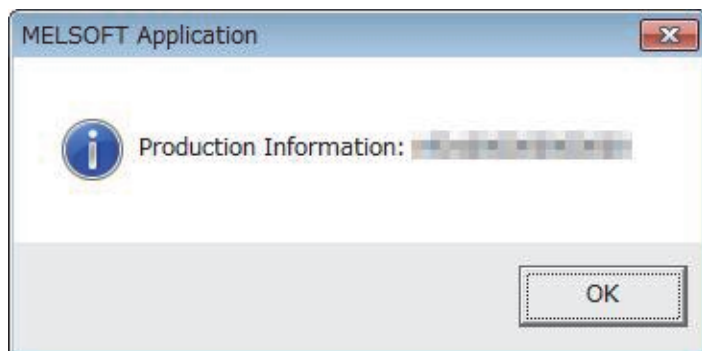
Appendix 9 External Dimensions

The following figure shows the external dimensions of the multiple input module.

(Unit: mm)

INDEX

MEMO

REVISIONS

Revision date	*Manual number	Description
April 2017	SH(NA)-081682ENG-A	First edition
March 2021	SH(NA)-081682ENG-B	■Added or modified parts SAFETY PRECAUTIONS, CONDITIONS OF USE FOR THE PRODUCT
November 2022	SH(NA)-081682ENG-C	■Added or modified part Appendix 7
June 2024	SH(NA)-081682ENG-D	■Added or modified parts RELEVANT MANUALS, TERMS, Section 2.3, 5.4, 6.1, 6.2, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 8.3, 10.1, 10.2, 10.5, 10.6, Appendix 8

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

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Specifications subject to change without notice.