MITSUBISHI ELECTRIC

Programmable Controller

CC-Link IE Field Network
Digital-Analog Converter Module (e-CON Type)
User's Manual

-NZ2GFCE-60DAV8
-NZ2GFCE-60DAI8

SAFETY PRECAUTIONS

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the user's manual for the CPU module used.

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

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

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

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

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

[Design Precautions]

⚠WARNING

● 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.

● Configure safety circuits external to the programmable controller to ensure that the entire system operates safely even when a fault occurs in the external power supply or the programmable controller. Failure to do so may result in an accident due to an incorrect output or malfunction.

  (1) The status of analog output depends on the setting of various functions that control the analog output. Exercise great caution when setting those functions. For details on the status of analog output, refer to Page 54 Analog Output HOLD/CLEAR Function.

  (2) Due to failure of the output element or internal circuit, normal output may not be obtained correctly. Configure an external circuit for monitoring output signals that could cause a serious accident.

[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.

● At power-on/off, a voltage may occur or a current may flow between output terminals for a moment. In this case, start the control after analog outputs become stable.

[Security Precautions]

⚠WARNING

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

[Installation Precautions]

⚠WARNING

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

[Installation Precautions]

⚠CAUTION

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

[Wiring Precautions]

⚠WARNING

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

[Wiring Precautions]

⚠CAUTION

● 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.

● 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.

● 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.

● Dust covers or non-wired e-CON plugs must be attached to unused e-CON connectors. Failure to do so may cause the module to fail or malfunction.

● A non-wired one-touch connector plug for power supply and FG must be connected to the unused connector for module power supply and FG. Failure to do so may cause the module to fail or malfunction. Do not carry out transition wiring by connecting the CC-Link IE Field Network remote I/O module to the connector for module power supply and FG.

● 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.

[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 connecting/removing connectors. 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.
- After the first use of the product, do not connect/remove connectors more than 50 times. (IEC 61131-2 compliant).
- 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 digital-analog converter module (e-CON type) (hereafter abbreviated as D/A converter module).

This manual describes the procedures, system configuration, parameter settings, functions, and troubleshooting of the D/A converter module.

Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the D/A converter module to handle the product correctly.

When applying the program examples introduced in this manual to an actual system, ensure the applicability and confirm that it will not cause system control problems.

■ Relevant modules: NZ2GFCE-60DAV8, NZ2GFCE-60DAI8

Point

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

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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]	Specifications, procedures before operation, system configuration, installation and wiring, functions, programming, troubleshooting of CC-Link IE Field Network and LJ71GF11-T2	Print book
		e-Manual PDF
MELSEC-Q CC-Link IE Field Network Master/Local Module User's Manual [SH-080917ENG]	Specifications, procedures before operation, system configuration, installation and wiring, functions, programming, troubleshooting of CC-Link IE Field Network and QJ71GF11-T2	Print book
		PDF
MELSEC iQ-R Simple Motion Module User's Manual (Network) [IB-0300307ENG]	Functions, programming, troubleshooting related to CC-Link IE Field Network of RD77GF	Print book
		e-Manual PDF
MELSEC-Q QD77GF Simple Motion Module User's Manual (Network) [IB-0300203]	Functions, programming, troubleshooting related to CC-Link IE Field Network of 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.
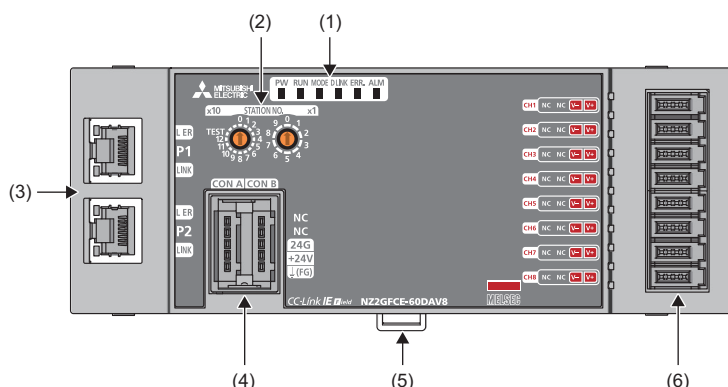 • Pages that users often browse can be bookmarked.

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 are periodically exchanged among stations on the network using link devices
D/A converter module	The abbreviation for the CC-Link IE Field Network digital-analog converter module (e-CON type)
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
Disconnection	A process of stopping data link if a data link error occurs
Engineering tool	Another name of the software package for the MELSEC programmable controllers
Extension module	A remote module with no CC-Link IE Field Network communication function. This module cannot be used as a single module. However, connecting the module to the main module will increase the number of I/O points per station.
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 is capable of transient transmission. This station responds to a transient transmission (request) from another station. This station also issues 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)	16 bits (1 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
Main module	A module with the CC-Link IE Field Network communication function, which can be used as a single remote module.
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	A generic term for the CC-Link IE Field Network master/local 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 another station.
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 (16-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.)
Remote register (RWw)	Word data (16-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.)
REMTO	The abbreviation for ZP.REMTO
Reserved station	Stations without actual connection with network. Stations reserved for future use. These stations are included in the total number of stations of the network.
Simple motion module	Abbreviation for the QD77GF simple motion module and RD77G simple motion module
Transient transmission	A function of communications with other stations, which is used when requested by a dedicated instruction or engineering tool

1 PART NAMES

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

No.	Name	Application
(1)	PW LED	Indicates the power supply status of the D/A converter module. • On: Power-on • Off: Power-off
	RUN LED	Indicates the operating status of the D/A converter module. • On: In normal operation • Off: Major error occurred
	MODE LED	Indicates the mode of the D/A converter module. • On: In online mode • Flashing: In unit test mode • Off: Unit test completed
	D LINK LED	Indicates the data link status of the D/A converter module. • On: Data link (cyclic transmission being performed) • Flashing: Data link (cyclic transmission stopped) • Off: Data link not performed (disconnected)
	ERR. LED	Indicates the error status of the D/A converter module. • On: Moderate error or major error occurred • Flashing: Warning issued • Off: In normal operation
	ALM LED	Indicates the alert status of the D/A converter module. On: Alert issued Flashing: Out-of-range digital value error occurred. On: In normal operation
(2)	Station number setting switch	A rotary switch for the following setting and test. • Station Number Setting (☞ Page 28 Station Number Setting) • Unit test (☞ Page 97 Unit Test) When operating the station number setting switch, use a flathead screwdriver with 3.5mm or less width of the tip.
(3)	P1	PORT1 connector for the connection to CC-Link IE Field Network (RJ45 connector) Connect an Ethernet cable. (☞ Page 37 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	Indicates the port status. • On: Module received abnormal data, or module performing loopback. • Off: Module received normal data, or module not performing loopback.
	LINK LED	Indicates the link status. • On: Link-up • Off: Link-down
	P2	PORT2 connector for the connection to CC-Link IE Field Network (RJ45 connector) Connect an Ethernet cable. (☞ Page 37 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	Same as the LEDs of the P1 connector
	LINK LED	
(4)	Connector for module power supply and FG	Connector to connect with module power supply (24VDC) and FG
(5)	DIN rail hook	A hook for mounting a module on a DIN rail
(6)	e-CON	Connector for external devices

Module status and LED status

The following table shows how module status and LED status correspond each other.

Module status		Data link status	LED status					
			PW LED	RUN LED	MODE LED	D LINK LED	ERR. LED	ALM LED
Normal mode	Disconnecting	Disconnection	On	On	On	Off	Off	Off
	Data link in operation	Data link in operation	On	On	On	On	Off	Off
	Reserved station specification in progress	Cyclic stop	On	On	On	Flashing	Off	Off
	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 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	Alert issued	—	On	On	On	*1	*1	On
	Out-of-range digital value error occurred	—	On	On	On	*1	*1	Flashing

*1 Either On, Flashing, or Off.

*2 Either On or Off.

*3 A failure of the module may not allow the LED to turn on.

2 SPECIFICATIONS

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

2.1 General Specifications

Item	Specifications					
Operating ambient temperature	0 to 55℃					
Storage ambient temperature	-25 to 75℃					
Operating ambient humidity	5 to 95%RH, non-condensing					
Storage ambient humidity						
Vibration resistance	Compliant with JIS B 3502 and IEC 61131-2		Frequency	Constant acceleration	Half amplitude	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/s^2	—	
		Under continuous vibration	5 to 8.4Hz	—	1.75mm	—
			8.4 to 150Hz	4.9m/s^2	—	
Shock resistance	Compliant with JIS B 3502 and IEC 61131-2 (147m/s^2, 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 D/A converter module under pressure higher than the atmospheric pressure of altitude 0m. Doing so may cause malfunction. When using the D/A converter 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

For compliance with the EMC Directive, refer to "EMC and Low Voltage Directives" in this manual. (☞ Page 124 EMC and Low Voltage Directives)

2.2 Performance Specifications

NZ2GFCE-60DAV8

Item		Description			
Station type		Remote device station			
Number of analog output channels		8 points (8 channels)/module			
Digital input		16-bit signed binary data (-16384 to 16383, -288 to 12287)			
Analog output	Voltage	-10 to 10VDC (external load resistance value: 1kΩ to 1MΩ)			
I/O characteristics, maximum resolution[1]		Output	Output range	Digital value	Maximum resolution
		Voltage	-10 to 10V	-16000 to 16000	0.625mV
			0 to 5V	0 to 12000	0.416mV
			1 to 5V		0.333mV
Conversion accuracy[2]	Ambient temperature (25±5℃)	±0.2%			
	Ambient temperature (0 to 55℃)	±0.3%			
Conversion speed		1ms/channel			
Output short circuit protection		Protected			
Isolation method		Between communication system terminal and all analog output terminals: Digital isolator isolation Between power supply system terminal and all analog output terminals: Transformer isolation Between output channels: Non-isolation			
Withstand voltage		Between all power supply and communication system terminals and all analog output terminals 500VDC for 1 minute			
Noise immunity		Noise voltage 500Vp-p, noise width 1μs, noise frequency 25 to 60Hz (noise simulator condition)			
External interface	Communication part	RJ45 connector			
	Module power supply part	Connector for module power supply and FG (five pins, crimping type) For details on applicable plugs, refer to the following: ☞ Page 33 Compatible plugs			
	I/O part	e-CON (four pins, crimping type) For details on e-CON plugs, refer to the following: ☞ Page 39 List of connection devices			
Applicable DIN rail		TH35-7.5Fe, TH35-7.5Al (compliant with IEC 60715)			
Applicable wire size	For power supply	Core: 0.66 to 0.98㎟ (18 AWG)			
	For I/O	Core: 0.08 to 0.5㎟ (28 to 20 AWG)			
Cyclic transmission	RX/RY points	32 points			
	RWr/RWw points[3]	24 points			
Communication cable		An Ethernet cable that meets the 1000BASE-T standard: Category 5e or higher (double shielded, STP), straight cable			
Applicability of extension module		Mounting not allowed			
External power supply		24VDC (20.4 to 28.8VDC) Inrush current: 13.0A, 0.2ms or lower Current consumption: 160mA			
Weight		0.22kg			

*1 For details on the I/O conversion characteristics, refer to the following:
   ☞ Page 120 I/O Conversion Characteristics of D/A Conversion
*2 Except for the conditions under noise influence.
*3 Default value set by an engineering tool. The number of points to be used can be changed using the engineering tool. For details on how to set the number of points to be used, refer to the following:
   ☞ Page 42 Parameter Settings

NZ2GFCE-60DAI8

Item		Description
Station type		Remote device station
Number of analog output channels		8 points (8 channels)/module
Digital input		16-bit signed binary data (-288 to 12287)
Analog output	Current	0 to 20mADC (external load resistance value: 0Ω to 600Ω)

I/O characteristics, maximum resolution[1]		Output	Output range	Digital value	Maximum resolution
		Current	0 to 20mA	0 to 12000	1.66μA
			4 to 20mA		1.33μA

Item		Description
Conversion accuracy[2]	Ambient temperature (25±5℃)	±0.2%
	Ambient temperature (0 to 55℃)	±0.3%
Conversion speed		1ms/channel
Output short circuit protection		Protected
Isolation method		Between communication system terminal and all analog output terminals: Digital isolator isolation Between power supply system terminal and all analog output terminals: Transformer isolation Between output channels: Non-isolation
Withstand voltage		Between all power supply and communication system terminals and all analog output terminals 500VDC for 1 minute
Noise immunity		Noise voltage 500Vp-p, noise width 1μs, noise frequency 25 to 60Hz (noise simulator condition)
External interface	Communication part	RJ45 connector
	Module power supply part	Connector for module power supply and FG (five pins, crimping type) For details on applicable plugs, refer to the following: ☞ Page 33 Compatible plugs
	I/O part	e-CON (four pins, crimping type) For details on e-CON plugs, refer to the following: ☞ Page 39 List of connection devices
Applicable DIN rail		TH35-7.5Fe, TH35-7.5Al (compliant with IEC 60715)
Applicable wire size	For power supply	Core: 0.66 to 0.98㎟ (18 AWG)
	For I/O	Core: 0.08 to 0.5㎟ (28 to 20 AWG)
Cyclic transmission	RX/RY points	32 points
	RWr/RWw points[3]	24 points
Communication cable		An Ethernet cable that meets the 1000BASE-T standard: Category 5e or higher (double shielded, STP), straight cable
Applicability of extension module		Mounting not allowed
External power supply		24VDC (20.4 to 28.8VDC) Inrush current: 13.0A, 0.2ms or lower Current consumption: 330mA
Weight		0.22kg

*1   For details on the I/O conversion characteristics, refer to the following:
☞ Page 120 I/O Conversion Characteristics of D/A Conversion

*2   Except for the conditions under noise influence.

*3   Default value set by an engineering tool. The number of points to be used can be changed using the engineering tool. For details on how to set the number of points to be used, refer to the following:
☞ Page 42 Parameter Settings

2.3 Function List

Item	Description	Reference
D/A conversion enable/disable function	Allows D/A conversion to be enabled or disabled for each channel. Disabling the D/A conversion for unused channels reduces the conversion cycles.	Page 52 D/A Conversion Enable/Disable Function
D/A output enable/disable function	Allows the selection of whether to output the D/A conversion value or the offset value for each channel. Whether the output is enabled or disabled, the conversion cycle is constant.	Page 52 D/A Output Enable/Disable Function
Range switching function	Allows the output range to be selected for each channel from the following: • Voltage: 1 to 5V, 0 to 5V, -10 to 10V • Current: 4 to 20mA, 0 to 20mA	Page 53 Range Switching Function
Analog output HOLD/CLEAR function	Allows the selection of whether to hold or clear the analog value output when the CPU module is in the following operating status: RUN, STOP, or a stop error.	Page 54 Analog Output HOLD/CLEAR Function
Cyclic data update watch function	Monitors the update intervals of cyclic data. For the cyclic transmission stop lasting longer than the specified monitoring time, whether to hold or clear the last output value can be selected.	Page 56 Cyclic Data Update Watch Function
Scaling function	Performs scale conversion on a digital value within the range of the scaling upper limit value and the scaling lower limit value, both of which are set at desired values. This function reduces the time and effort to create a program of the scale conversion.	Page 57 Scaling Function
Shift function	Provides analog output, adding the set shift value to a digital value. This function facilitates fine adjustment at the system start-up.	Page 61 Shift Function
Digital value range check function	Outputs an error when a digital value is out of the digital input range of the output range setting.	Page 65 Digital Value Range Check Function
Alert output function	Outputs an alert when a digital value falls within the alert output range set in advance.	Page 68 Alert Output Function
Error notification function	Notifies an error to the master station by the remote input signal if a moderate error or a major error occurs in the D/A converter module.	Page 71 Error Notification Function
CC-Link IE Field Network diagnostic function	Allows the presence or absence of a network error to be checked by accessing the engineering tool connected to the CPU module.	Page 74 CC-Link IE Field Network Diagnostic Function
iQ Sensor Solution data backup/restoration function	Backs up such data as device station setting data in the SD memory card in the CPU module of the master station. Restores such data as setting data backed up in the SD memory card of the master station CPU module into 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 I/O signals assignment shown assumes that the remote I/O signals of the D/A converter module are assigned to RX0 to RX1F and RY0 to RY1F.

Remote input (RX) indicates the input signal from D/A converter module to master/local module.

Remote output (RY) indicates the output signal from master/local module to D/A converter module.

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

☞ Page 100 Details of Remote I/O Signals

Point

Do not use any "Use prohibited" remote I/O signals. Otherwise, an accident may occur due to an incorrect output or malfunction.

Remote input		Remote output	
Signal direction: D/A converter module→Master/local module		Signal direction: Master/local module→D/A converter module	
Device No.	Description	Device No.	Description
RX0	Use prohibited	RY0	Use prohibited
RX1	Use prohibited	RY1	Use prohibited
RX2	Use prohibited	RY2	Use prohibited
RX3	Use prohibited	RY3	Use prohibited
RX4	Use prohibited	RY4	Use prohibited
RX5	Use prohibited	RY5	Use prohibited
RX6	Use prohibited	RY6	Use prohibited
RX7	Warning flag	RY7	Use prohibited
RX8	Use prohibited	RY8	Use prohibited
RX9	Initial data setting completed 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	Use prohibited
RXD	Use prohibited	RYD	Use prohibited
RXE	Use prohibited	RYE	Use prohibited
RXF	Use prohibited	RYF	Use prohibited
RX10	Use prohibited	RY10	CH1 Output enable/disable flag
RX11	Use prohibited	RY11	CH2 Output enable/disable flag
RX12	Use prohibited	RY12	CH3 Output enable/disable flag
RX13	Use prohibited	RY13	CH4 Output enable/disable flag
RX14	Use prohibited	RY14	CH5 Output enable/disable flag
RX15	Use prohibited	RY15	CH6 Output enable/disable flag
RX16	Use prohibited	RY16	CH7 Output enable/disable flag
RX17	Use prohibited	RY17	CH8 Output enable/disable flag
RX18	Use prohibited	RY18	Use prohibited
RX19	Use prohibited	RY19	Use prohibited
RX1A	Use prohibited	RY1A	Use prohibited
RX1B	Use prohibited	RY1B	Use prohibited
RX1C	Use prohibited	RY1C	Use prohibited
RX1D	Use prohibited	RY1D	Use prohibited
RX1E	Alert output signal	RY1E	Alert output clear request flag
RX1F	Use prohibited	RY1F	Use prohibited

2.5 List of Remote Registers

This section lists remote registers for a master/local module.

The remote register area assignment shown assumes that the remote register areas of the D/A converter module are assigned to RWr0 to RWr17 and RWw0 to RWw17.

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

Remote register (RWw) is the information output from master/local module to D/A converter module.

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

☞ Page 106 Details of Remote Registers

Point

> Do not read/write data from/to any "Use prohibited" remote register areas. Otherwise, an accident may occur due to an incorrect output or malfunction.

Remote register (RWr)		Remote register (RWw)	
Signal direction: D/A converter module→Master/local module		**Signal direction: Master/local module→D/A converter module**	
Device No.	**Description**	**Device No.**	**Description**
RWr0	Latest error code	RWw0	Use prohibited
RWr1	Latest warning code	RWw1	Use prohibited
RWr2	CH1 Set value check code	RWw2	CH1 Digital value
RWr3	CH2 Set value check code	RWw3	CH2 Digital value
RWr4	CH3 Set value check code	RWw4	CH3 Digital value
RWr5	CH4 Set value check code	RWw5	CH4 Digital value
RWr6	CH5 Set value check code	RWw6	CH5 Digital value
RWr7	CH6 Set value check code	RWw7	CH6 Digital value
RWr8	CH7 Set value check code	RWw8	CH7 Digital value
RWr9	CH8 Set value check code	RWw9	CH8 Digital value
RWrA	Alert output flag	RWwA	Use prohibited
RWrB	Use prohibited	RWwB	Use prohibited
RWrC	Use prohibited	RWwC	Use prohibited
RWrD	Use prohibited	RWwD	Use prohibited
RWrE	Use prohibited	RWwE	Use prohibited
RWrF	Use prohibited	RWwF	Use prohibited
RWr10	Use prohibited	RWw10	CH1 Shifting set value
RWr11	Use prohibited	RWw11	CH2 Shifting set value
RWr12	Use prohibited	RWw12	CH3 Shifting set value
RWr13	Use prohibited	RWw13	CH4 Shifting set value
RWr14	Use prohibited	RWw14	CH5 Shifting set value
RWr15	Use prohibited	RWw15	CH6 Shifting set value
RWr16	Use prohibited	RWw16	CH7 Shifting set value
RWr17	Use prohibited	RWw17	CH8 Shifting set value

2.6 List of Remote Buffer Memory Areas

This section lists the remote buffer memory areas of the D/A converter module.

Remote buffer memory notation

■D/A conversion enable/disable setting (address: 0102H)

D/A conversion enable/disable setting (address: 0102H) is used for explanation as follows:

Term	Description
D/A conversion enable/disable setting	Setting item
(Address: 0102H)	Indicates the remote buffer memory address.

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

○: Access permitted, ×: Access not permitted

Remote buffer memory 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	○[2]	○
256 to 511	0100H to 01FFH		Module-based parameter data		
512 to 1279	0200H to 04FFH		System area		
1280 to 1535	0500H to 05FFH	Monitor 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 42 Parameter Settings)
   Error history area (☞ Page 88 How to Check Error Codes and Alarm Codes)

> **Point**
>
> Do not access any system area using the REMFR or REMTO instruction. Doing so may cause malfunction.

Parameter area (address: 0000H to 04FFH)

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.

The parameters backed up to the non-volatile memory are read out to the parameter area when the module power supply is turned off and on or the module is reset by 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. For the parameters written using the REMTO instruction, the timing of the write to the non-volatile memory is at the time of turning off and on Initial data setting request flag (RY9). At this time, even an invalid parameter is written to the non-volatile memory as well. With an invalid parameter written, turning off and on the power supply causes the invalid parameter to be read from the non-volatile memory, resulting in the error code being stored into Latest error code (RWr0). Take corrective action with reference to the error code list. (☞ Page 91 Error Code List)

■Station-based parameter data

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

Address		Description	Default value[1]	Read/Write	Necessity of RY9[2]
Decimal	Hexadecimal				
0 to 6	0000H to 0006H	System area	—	—	—
7	0007H	Cyclic data update watch time setting	0000H	R/W	○
8 to 255	0008H to 00FFH	System area	—	—	—

[1] This value is the value of factory default or the value of initialization by Parameter area initialization command (address: 1002H).
[2] This shows the items enabled by tuning on and off Initial data setting request flag (RY9).

■Module-based parameter data

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

Address		Description	Default value[1]	Read/Write	Necessity of RY9[2]
Decimal	Hexadecimal				
256 to 257	0100H to 0101H	System area	—	—	—
258	0102H	D/A conversion enable/disable setting	00FFH	R/W	○
259	0103H	Range setting (CH1 to CH4)	[3]	R/W	○
260	0104H	Range setting (CH5 to CH8)	[3]	R/W	○
261	0105H	Analog output HOLD/CLEAR setting (CH1 to CH4)	0000H	R/W	○
262	0106H	Analog output HOLD/CLEAR setting (CH5 to CH8)	0000H	R/W	○
263	0107H	Alert output setting	00FFH	R/W	○
264	0108H	CH1 Alert output upper limit value	0000H	R/W	○
265	0109H	CH1 Alert output lower limit value	0000H	R/W	○
266	010AH	CH2 Alert output upper limit value	0000H	R/W	○
267	010BH	CH2 Alert output lower limit value	0000H	R/W	○
268	010CH	CH3 Alert output upper limit value	0000H	R/W	○
269	010DH	CH3 Alert output lower limit value	0000H	R/W	○
270	010EH	CH4 Alert output upper limit value	0000H	R/W	○
271	010FH	CH4 Alert output lower limit value	0000H	R/W	○
272	0110H	CH5 Alert output upper limit value	0000H	R/W	○
273	0111H	CH5 Alert output lower limit value	0000H	R/W	○
274	0112H	CH6 Alert output upper limit value	0000H	R/W	○
275	0113H	CH6 Alert output lower limit value	0000H	R/W	○
276	0114H	CH7 Alert output upper limit value	0000H	R/W	○
277	0115H	CH7 Alert output lower limit value	0000H	R/W	○
278	0116H	CH8 Alert output upper limit value	0000H	R/W	○
279	0117H	CH8 Alert output lower limit value	0000H	R/W	○
280	0118H	Scaling enable/disable setting	00FFH	R/W	○
281	0119H	CH1 Scaling lower limit value	0000H	R/W	○

Address		Description	Default value[1]	Read/Write	Necessity of RY9[2]
Decimal	Hexadecimal				
282	011AH	CH1 Scaling upper limit value	0000H	R/W	○
283	011BH	CH2 Scaling lower limit value	0000H	R/W	○
284	011CH	CH2 Scaling upper limit value	0000H	R/W	○
285	011DH	CH3 Scaling lower limit value	0000H	R/W	○
286	011EH	CH3 Scaling upper limit value	0000H	R/W	○
287	011FH	CH4 Scaling lower limit value	0000H	R/W	○
288	0120H	CH4 Scaling upper limit value	0000H	R/W	○
289	0121H	CH5 Scaling lower limit value	0000H	R/W	○
290	0122H	CH5 Scaling upper limit value	0000H	R/W	○
291	0123H	CH6 Scaling lower limit value	0000H	R/W	○
292	0124H	CH6 Scaling upper limit value	0000H	R/W	○
293	0125H	CH7 Scaling lower limit value	0000H	R/W	○
294	0126H	CH7 Scaling upper limit value	0000H	R/W	○
295	0127H	CH8 Scaling lower limit value	0000H	R/W	○
296	0128H	CH8 Scaling upper limit value	0000H	R/W	○
297 to 511	0129H 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).

*2 This shows the items enabled by tuning on and off Initial data setting request flag (RY9).

*3 For NZ2GFCE-60DAV8: 2222H, For NZ2GFCE-60DAI8: 0000H

■System area

Address		Description
Decimal	Hexadecimal	
512 to 1279	0200H to 04FFH	System area

Monitor area (address: 0500H to 09FFH)

■Station-based monitor data

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

■Module-based monitor data

R: Readable from a program

Address		Description	Default value[1]	Read/Write
Decimal	Hexadecimal			
1536	0600H	Range setting monitor (CH1 to CH4)	[2]	R
1537	0601H	Range setting monitor (CH5 to CH8)	[2]	R
1538 to 1791	0602H to 06FFH	System area	—	—

*1 Value at the time of turning off and on the module power supply or at the time of remote reset.

*2 For NZ2GFCE-60DAV8: 2222H, For NZ2GFCE-60DAI8: 0000H

■System area

Address		Description
Decimal	Hexadecimal	
1792 to 2559	0700H to 09FFH	System area

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

■Station-based error history data

R: Readable from a program

Address		Description		Default value[1]	Read/Write
Decimal	Hexadecimal				
2560	0A00H	Error history data 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/00H (Fixed)	0000H	R
2566	0A06H		CH1 Digital value	0000H	R
2567	0A07H		CH2 Digital value	0000H	R
2568	0A08H		CH3 Digital value	0000H	R
2569	0A09H		CH4 Digital value	0000H	R
2570	0A0AH		CH5 Digital value	0000H	R
2571	0A0BH		CH6 Digital value	0000H	R
2572	0A0CH		CH7 Digital value	0000H	R
2573	0A0DH		CH8 Digital value	0000H	R
2574 to 2575	0A0EH to 0A0FH		System area	—	—
2576 to 2591	0A10H to 0A1FH	Error history data 2	Same as Error history data 1.		
2592 to 2607	0A20H to 0A2FH	Error history data 3	Same as Error history data 1.		
2608 to 2623	0A30H to 0A3FH	Error history data 4	Same as Error history data 1.		
2624 to 2639	0A40H to 0A4FH	Error history data 5	Same as Error history data 1.		
2640 to 2655	0A50H to 0A5FH	Error history data 6	Same as Error history data 1.		
2656 to 2671	0A60H to 0A6FH	Error history data 7	Same as Error history data 1.		
2672 to 2687	0A70H to 0A7FH	Error history data 8	Same as Error history data 1.		
2688 to 2703	0A80H to 0A8FH	Error history data 9	Same as Error history data 1.		
2704 to 2719	0A90H to 0A9FH	Error history data 10	Same as Error history data 1.		
2720 to 2735	0AA0H to 0AAFH	Error history data 11	Same as Error history data 1.		
2736 to 2751	0AB0H to 0ABFH	Error history data 12	Same as Error history data 1.		
2752 to 2767	0AC0H to 0ACFH	Error history data 13	Same as Error history data 1.		
2768 to 2783	0AD0H to 0ADFH	Error history data 14	Same as Error history data 1.		
2784 to 2799	0AE0H to 0AEFH	Error history data 15	Same as Error history data 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 14FFH)

■Station-based control data

R: Readable from a program, W: Writable from 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   Value at the time of turning off and on the module power supply or at the time of remote reset.

■Module-based control data

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

■System area

Address		Description
Decimal	Hexadecimal	
4608 to 5375	1200H to 14FFH	System area

3 PROCEDURES BEFORE OPERATION

This chapter describes the procedures before operation.

1. Station number setting

Set a station number for the D/A converter module using the station number setting switch.

2. Mounting

Mount the D/A converter module to the DIN rail.

3. Wiring

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

4. Parameter settings and programming

Set parameters and create a program.

*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 remove the D/A converter module.
> - Prepare a new D/A converter module and follow the steps from "Station number setting" to "Parameter settings and programming" mentioned above. (Re-setting network parameters of the master station is not required.)
> - Carry out operation check and then restart the control.

MEMO

4 SYSTEM CONFIGURATION

This chapter describes how to configure the system using D/A converter modules.

For the configuration on CC-Link IE Field Network, refer to the following:

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

4.1 Applicable Systems

Supported master station

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

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

Information on "Supported master station" described above is the ones at the point when this manual was issued.

For latest information, please visit the website of CC-Link Partner Association.

www.cc-link.org

Ethernet cables

For the specifications of the Ethernet cable, refer to the following:

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

Supported software package

Configuring and diagnosing the D/A converter module require GX Works2 or GX Works3. According to the master station used, install the following version of GX Works2 or GX Works3.

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 D/A converter module is necessary, please consult your local Mitsubishi representative.
>
> The profile is a setting file that stores information required for the start-up, operation, and maintenance of devices supporting the CC-Link family. A module is added to "Module List" of the CC IE Field configuration window by profile registration to GX Works2 or GX Works3. For the profile registration, 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 D/A converter module.

5.1 Station Number Setting

Setting method

Set the station number with the rotary switch on the front of the module. Set the station number in the power-off state because the set value is enabled at power-on.

- The dial x10 is used to set the hundreds and tens place of a station number.
- The dial x1 is used to set the ones place of a station number.

Ex.
For the station number 115, set the switch as shown below.

Setting range

Set the station number, which can be from 1 to 120. A value other than 1 to 120 causes a communication error, resulting in the D LINK LED flashing.

Point
- While the module power supply is in an on state, changing the station number setting switch causes a minor error, resulting in the ERR. LED flashing. When the station number setting switch is set back to the previous state, the module recovers from the error after five seconds, resulting in the ERR. LED turning off.
- For the station number setting, avoid duplication with the other station numbers. Number duplication causes a communication error, which does not allow the D LINK LED to light up.

5.2 Installation Environment and Installation Position

Installation environment

Installation location

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

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

Installation surface

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

Installation position

When installing the D/A converter module in a control panel, provide a clearance of at least 60mm (1) from the surroundings including adjacent structures and modules to ensure good ventilation and easy module replacement.
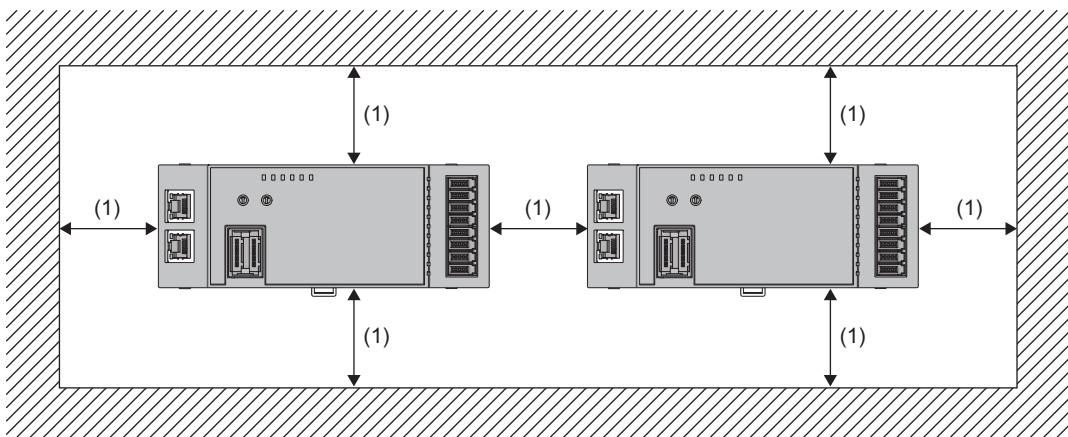
Installation direction

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

Use a DIN rail (1) to install the module.

(1)

5.3 Installation

How to mount a module on a DIN rail

> **Point**
>
> The usage instructions for a DIN rail stopper is shown as one example. Fix the module according to the manual of the DIN rail stopper used.

Mounting procedure
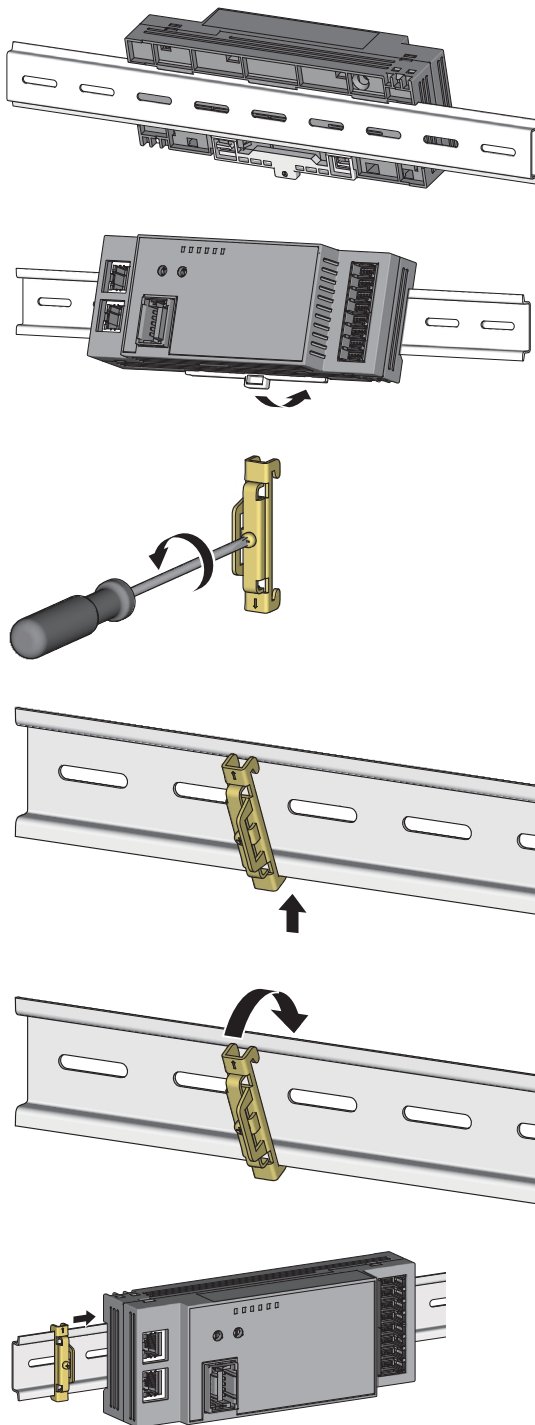
1. Hang the upper latch of the module on the top of the DIN rail.

2. Push the module down until the DIN rail hook on the module clicks.

3. Loosen the screw on the DIN rail stopper.

4. Hitch the bottom hook of the DIN rail stopper to the bottom of the DIN rail. Locate the stopper 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.
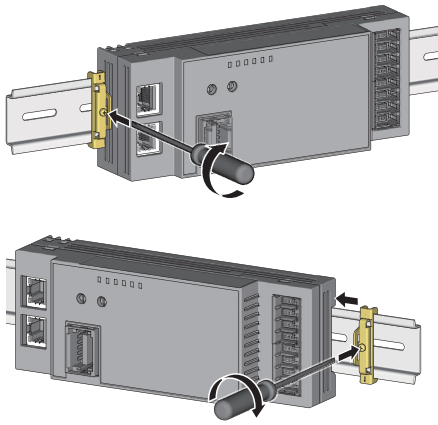
7. Hold the DIN rail stopper in the direction opposite to the arrow on the stopper and tighten the screw with a screwdriver.

8. Install the DIN rail stopper on the right side of the module in the same procedure. For the installation on the right side, be aware that the orientation of the DIN rail stopper is upside down.

Point

Do not slide a module from the edge of the DIN rail when mounting it. Doing so may damage the metal part located on the back of the module.
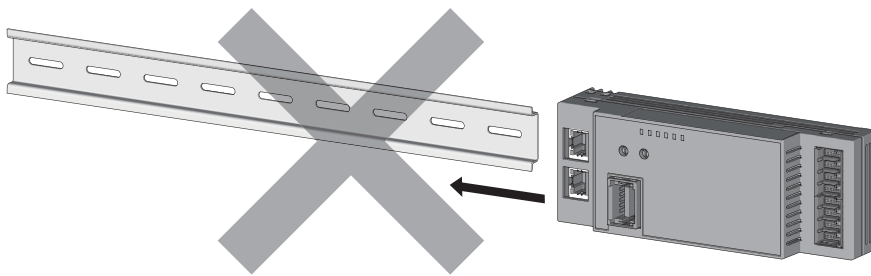
Removal procedure
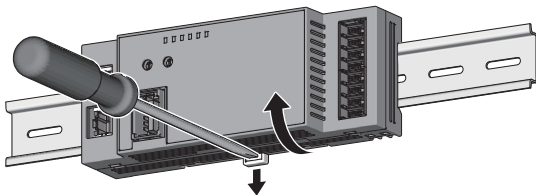
1. Remove the DIN rail stopper. Remove the stoppers from the DIN rail in a procedure opposite to the installation procedure.

2. While pushing the DIN rail hook downward with a flathead screwdriver, pull the bottom part of the module to remove it from the DIN rail.

Applicable DIN rail model (compliant with IEC 60715)

- TH35-7.5Fe
- TH35-7.5Al

Space between DIN rail mounting screws

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

DIN rail stopper

Use a stopper that is attachable to the DIN rail.

5.4 Wiring

Wiring of a connector for module power supply and FG

This section describes how to connect a connector for module power supply and FG to the D/A converter module.

Compatible plugs

A one-touch connector plug for power supply and FG is necessary for a D/A converter module.

The following table shows the compatible plugs.

Product name	Mitsubishi Electric product model name	Part model name (manufacturer)	Specifications			Color of the cover
			Core size of compatible cables	Outer size of compatible cables	Maximum rated current	
One-touch connector plug for power supply and FG[1][2][3]	A6CON-PW5P	35505-6080-A00 GF (3M Japan Limited)	0.75mm² (0.66 to 0.98mm²) (18 AWG) Wire diameter 0.16mm or more Insulating coating material PVC (heat resistant vinyl)	φ2.2 to 3.0mm	7A[5]	Gray
	A6CON-PW5P-SOD	35505-6180-A00 GF (3M Japan Limited)		φ2.0 to 2.3mm		Blue
Online connector for power supply and FG[4]	A6CON-PWJ5P	35720-L200-A00 AK (3M Japan Limited)	—	—	—	—

[1] The A6CON-□□5P manufactured by Mitsubishi Electric Corporation consists of 10 pieces.
[2] Once crimped, a one-touch connector plug for power supply and FG cannot be reused.
[3] Choose a suitable connector by checking the jacket diameter of compatible cables.
[4] The A6CON-□□J5P manufactured by Mitsubishi Electric Corporation consists of 5 pieces.
[5] Use the cables and modules to be connected within their allowable current value.
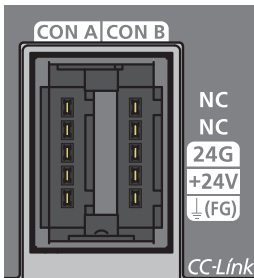
For information about how to contact the plug manufacturer, refer to the following:

3M Japan Limited

Terminal layout of a connector for module power supply and FG

The following shows the terminal layout of a connector for module power supply and FG.

External appearance of connector for module power supply and FG	Terminal layout		
	Pin number	CON A	CON B
	1	FG	FG
	2	+24V	+24V
	3	24G	24G
	4	NC	NC
	5	NC	NC

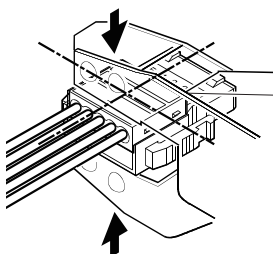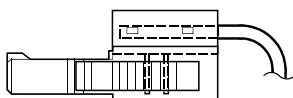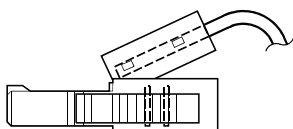### Reference tool products used for wiring

Pliers can be used to crimp one-touch connector plug for module power supply and FG. However, use the following tool for secure crimping.

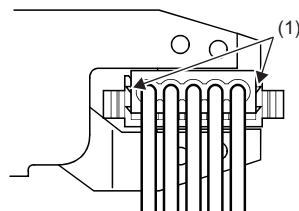| Product name	Model	Contact
Simple crimping tool	M-Tool-N	Suzuden Corporation

Wiring procedure
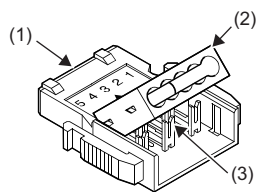
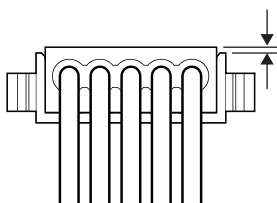
(1) Plug body
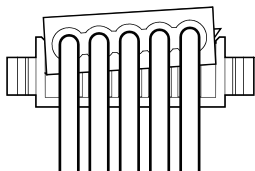(2) Plug cover
(3) Metal contact



Side view

(1) Latches
Correct crimping example

1. Check that the plug cover is attached to the plug body. Do not push the plug cover into the plug body before inserting cables. Once a plug is crimped, it cannot be reused.

2. Lift up the rear part of the plug cover and push cables into the plug body to the end.[*1] If cables are not inserted all the way to the end, a crimping error may occur.

3. After inserting cables, make the plug cover parallel to the plug body and place it in a position that allows the metal contact to go into the plug cover.

4. Hold the center of the plug cover with a special crimping tool and press the cover vertically.[*2] Push the latch holding sections of the plug cover in place. In addition, ensure that the latches are applied to the plug body.

5. Check that the plug body is parallel to the plug cover when seen from the direction of wiring. And ensure that the part of the plug cover that appears above the plug body is 0.2mm or less. If the plug cover inclines upward as shown in the incorrect crimping example, or if the part of the plug cover that appears above the plug body exceeds 0.2mm, a crimping error occurs. To perform crimping as shown in the correct crimping example, be sure to push the plug cover in place with a special tool for crimping.
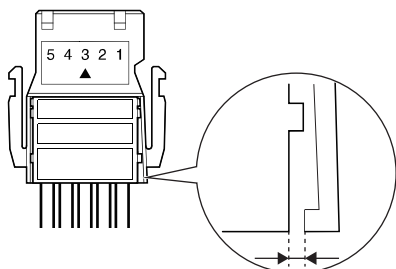
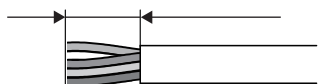Incorrect crimping example

Correct crimping example


```
5 4 3 2 1
    ▲
```

Incorrect crimping example


```
5 4 3 2 1
    ▲
```

6. Check that there is no gap between the plug body and the plug cover when seen from above. If the latches are not applied properly, a gap appears between the plug body and the plug cover as shown in the incorrect example. To perform crimping as shown in the correct crimping example, be sure to push the plug cover in place with a special tool for crimping.
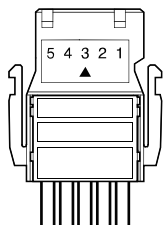
*1 Use compatible cables.
*2 For details on a special tool for crimping, refer to the following.
☞ Page 33 Reference tool products used for wiring

Point

To use a cabtyre cable, peel 2cm or more of cable jacket. If the length of each cable is not the same, cut the end with nippers so that it becomes uniform when inserted into the connector.

Precautions on transition wiring

When transition wiring is carried out using a connector for module power supply and FG, an electric current flows in the module. For transition wiring, design a circuit in such a way that the following module allowable current value is not exceeded.

(example: NZ2GFCE-60DAV8)

(example: NZ2GFCE-60DAI8)
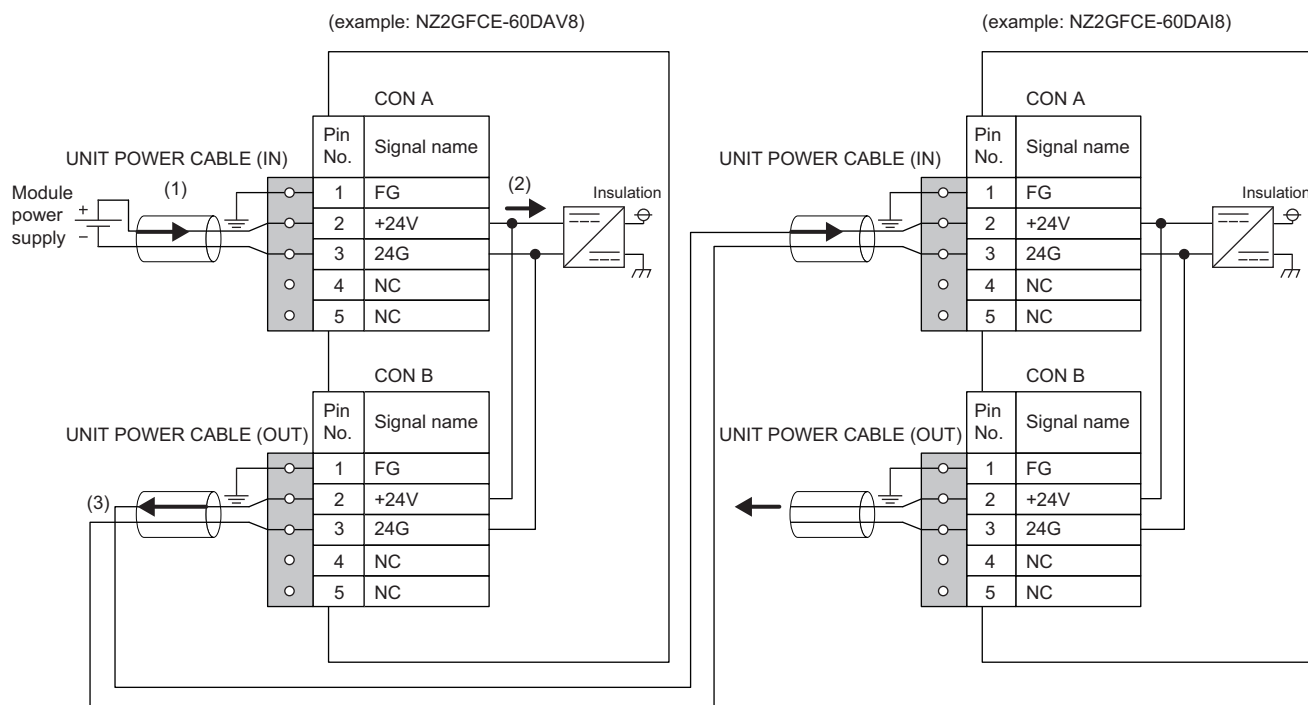
No.	Name	Description	Maximum current consumption value	Module allowable current value
(1)	Module power supply (IN)	External power supply for module operation	—	1.5A[*1][*2]
(2)	Module power supply	Power supply for module operation	Module current consumption[*3]	—
(3)	Module power supply (OUT)	Power supply to feed power to other units connected through transition wiring	Depending on the connected module	—

*1   1.5A for both NZ2GFCE-60DAV8 and NZ2GFCE-60DAI8
*2   Design (1) so that the module allowable current value becomes a value obtained by (2)+(3) (the number of connected modules).
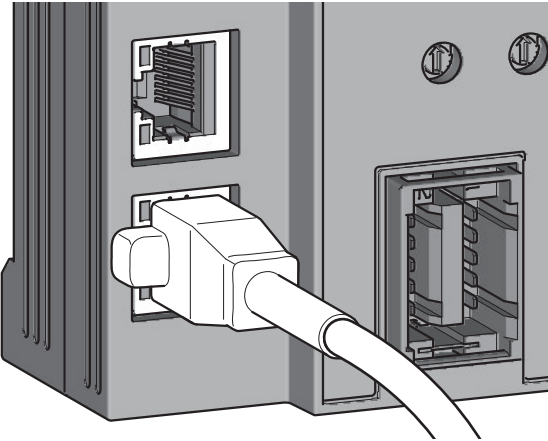*3   For details on the module current consumption, refer to the following:
        ☞ Page 14 Performance Specifications

Wiring of Ethernet cable

Connecting an Ethernet cable

■Connecting

1. Turn off the module power supply of the D/A converter module and the power supply of the external device.

2. With attention to the orientation of the cable, push the Ethernet cable connector into the D/A converter module until it clicks.
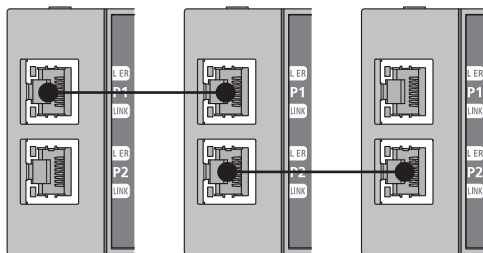
3. Power on the module.

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.

Point

- PORT1 connector and PORT2 connector need not to be distinguished. When only one connector is used in star topology, either PORT1 connector or PORT2 connector can be used.
- When two connectors are used in line topology or ring topology, there is no restriction on the connection combination of PORT1 connector and PORT2 connector. For example, the connection from PORT1 to PORT1 and the connection from PORT1 to PORT2 are both possible.
- Connection from PORT1 to PORT1 and from PORT2 to PORT2

- Connection from PORT1 to PORT2
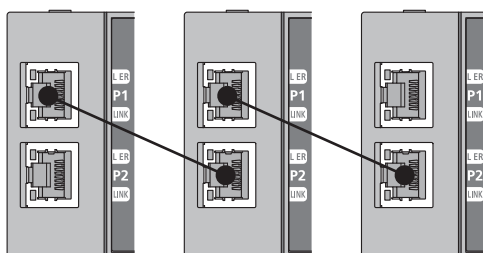
■Disconnecting
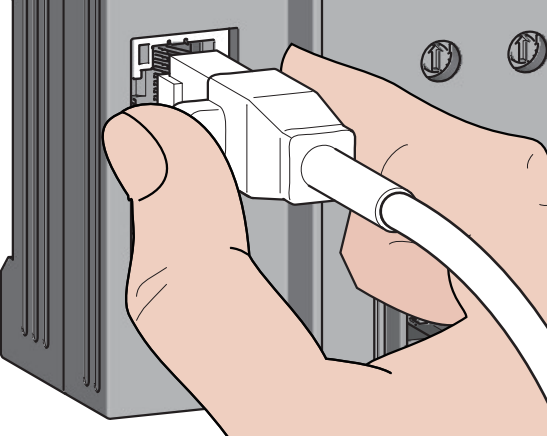
1. Power off the module.

2. With the latch of the Ethernet cable pressed, unplug the cable.

Precautions

■Laying Ethernet cables

- The Ethernet cables must be placed in the duct or fixed by clamp. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact.
- Do not touch the core of the connector of the cable or the module, and protect it from dirt and dust. If any oil from your hand, or any dirt or dust sticks to the core, it can increase transmission loss, causing data link to fail.
- Check the following:
  - Is any Ethernet cable disconnected?
  - Does any Ethernet cable short?
  - Are the connectors securely connected?

■Broken cable latch

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

■Connecting and disconnecting an Ethernet cable

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

■Connector to which an Ethernet cable is not connected

To prevent dust from entering the module, attach the provided connector cover.

■Maximum station-to-station distance of an Ethernet cable (maximum 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 an Ethernet cable

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

Wiring of external devices

List of connection devices
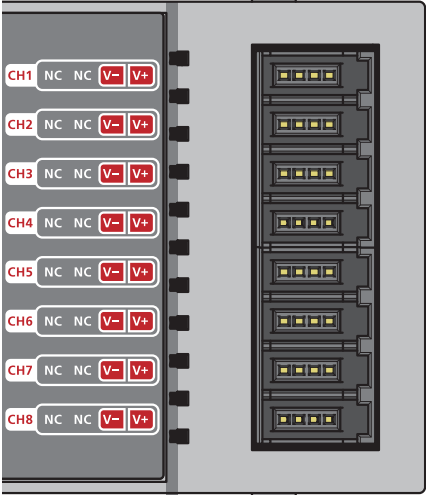
The following table shows a list of e-CON plugs.

Model name	Manufacturer	Specifications			Color of the cover
		Core size of compatible cables	Outer size of compatible cables	Maximum rated current	
ECN-M014R	Mitsubishi Electric System & Service Co., Ltd.	0.14 to 0.30mm² (26 to 24 AWG)	φ0.8 to 1.0mm	2.0A	Red
ECN-M024Y			φ1.0 to 1.2mm		Yellow
ECN-M034OR			φ1.2 to 1.6mm		Orange
ECN-M044GN		0.30 to 0.50mm² (22 to 20 AWG)	φ1.0 to 1.2mm		Green
ECN-M054BL			φ1.2 to 1.6mm		Blue
ECN-M064GY			φ1.6 to 2.0mm		Gray

For details on how to wire e-CON plugs, refer to the manufacturer's Website.
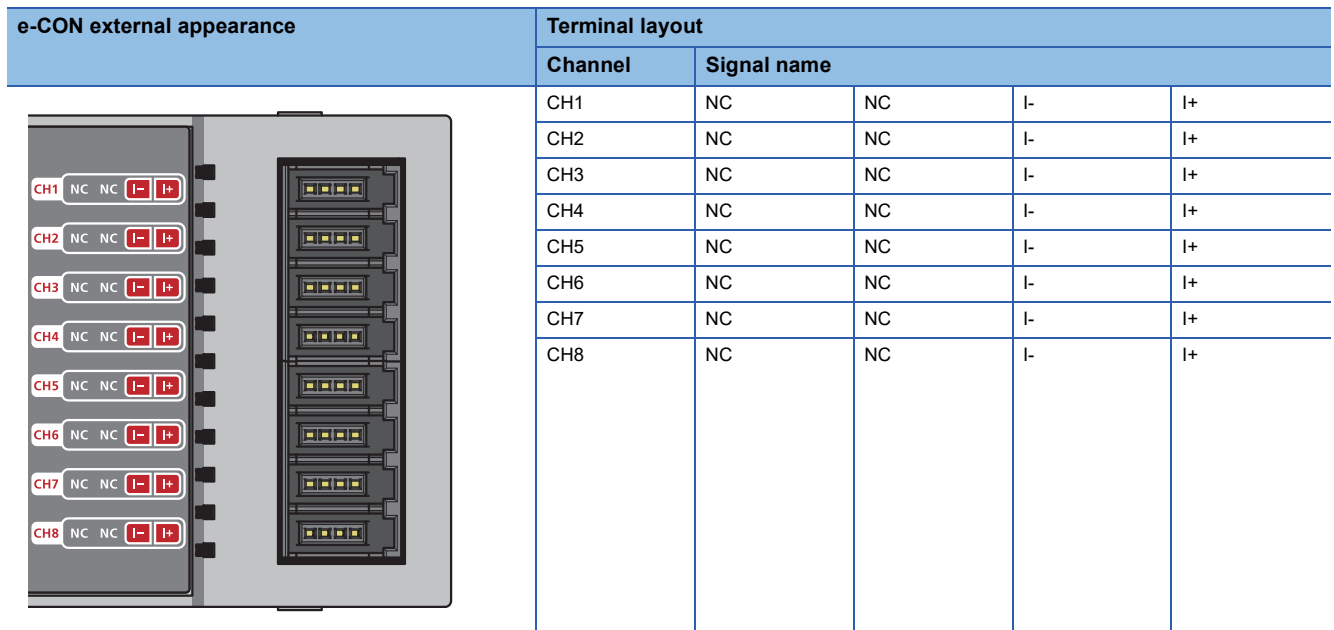
Mitsubishi Electric System & Service Co., Ltd.

e-CON terminal layout

The following table shows an e-CON terminal layout.

■NZ2GFCE-60DAV8

e-CON external appearance	Terminal layout			
	Channel	Signal name		
	CH1	NC	NC	V-	V+
	CH2	NC	NC	V-	V+
	CH3	NC	NC	V-	V+
	CH4	NC	NC	V-	V+
	CH5	NC	NC	V-	V+
	CH6	NC	NC	V-	V+
	CH7	NC	NC	V-	V+
	CH8	NC	NC	V-	V+

■NZ2GFCE-60DAI8

e-CON external appearance	Terminal layout				
	Channel	**Signal name**			
	CH1	NC	NC	I-	I+
	CH2	NC	NC	I-	I+
	CH3	NC	NC	I-	I+
	CH4	NC	NC	I-	I+
	CH5	NC	NC	I-	I+
	CH6	NC	NC	I-	I+
	CH7	NC	NC	I-	I+
	CH8	NC	NC	I-	I+

Point

Do not wire the NC terminals. Incorrect wiring may cause malfunction or failure of the module.

Precautions

To obtain the maximum performance from the functions of the D/A converter module and improve the system reliability, an external wiring with high durability against noise is required.
The following shows wiring precautions.

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

External wiring

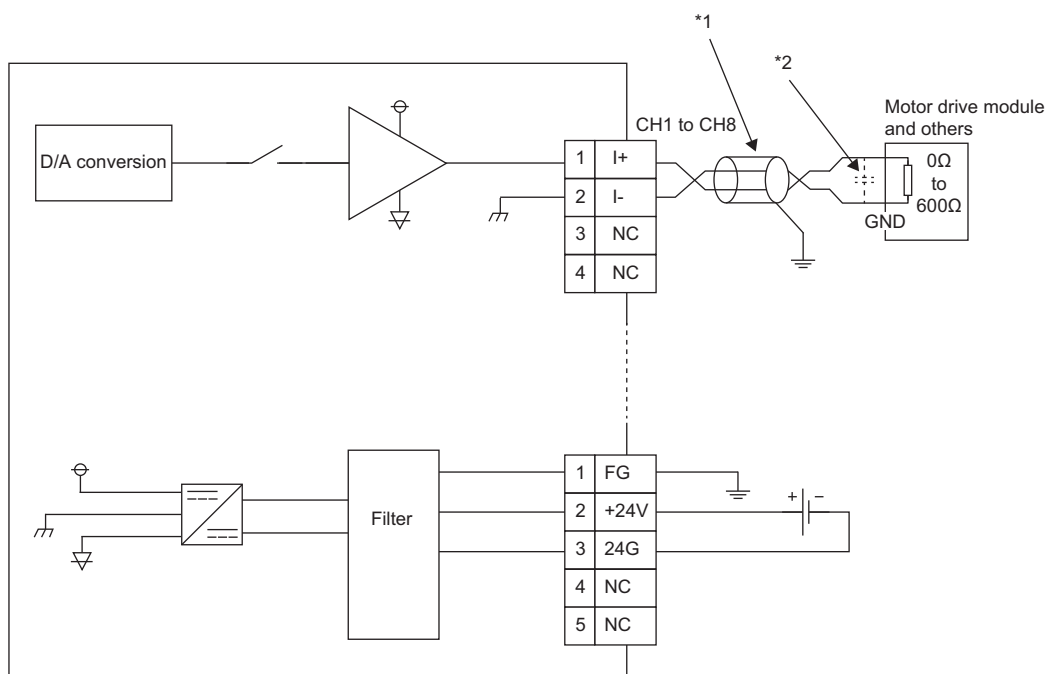The following figure shows the external wiring.

■NZ2GFCE-60DAV8
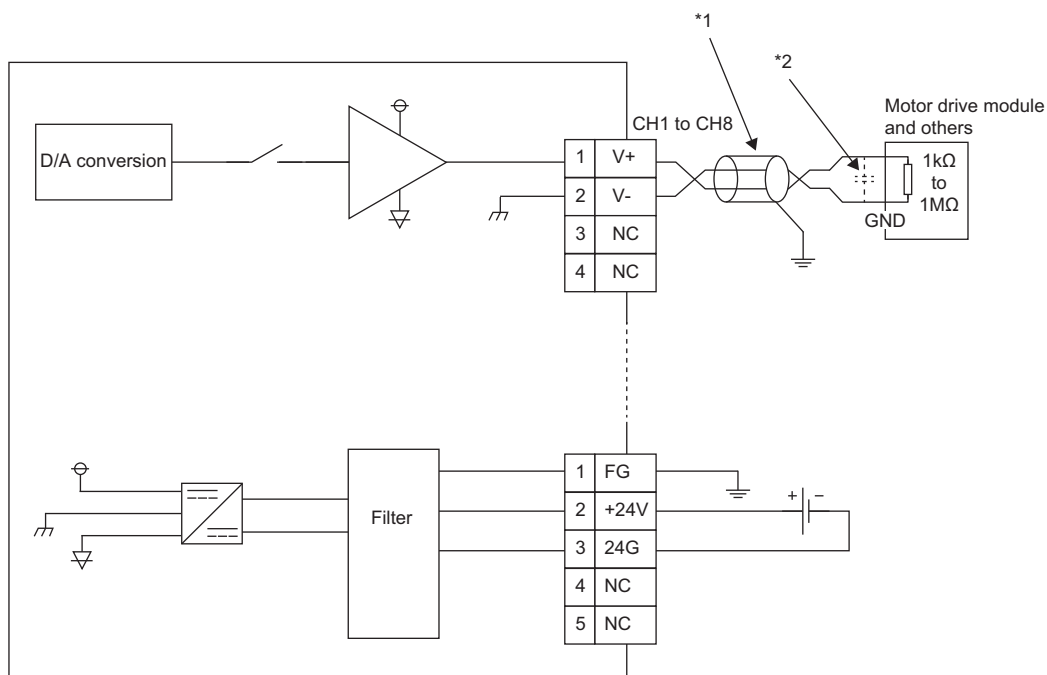
*1 For the cable, use the 2-core shielded twisted pair cable.
*2 If there is noise or ripples in the external wiring, connect a 0.1 to 0.47μF capacitor (25V or higher voltage-resistant product) to the input terminal of the external device.

■NZ2GFCE-60DAI8

*1 For the cable, use the 2-core shielded twisted pair cable.
*2 If there is noise or ripples in the external wiring, connect a 0.1 to 0.47μF capacitor (25V or higher voltage-resistant product) to the input terminal of the external device.

6 VARIOUS SETTINGS

This chapter describes the setting methods of the D/A converter module.

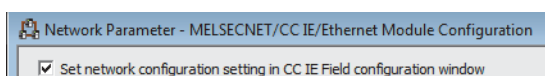In this chapter, the procedures are explained by using GX Works2.

6.1 Parameter Settings

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:

📖 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.
>
> 🖾 Network Parameter - MELSECNET/CC IE/Ethernet Module Configuration
> ☑ Set network configuration setting in CC IE Field configuration window
>
> • Setting fewer points of the remote I/O signal or remote register than actual points that the D/A converter module possesses does not cause an error. In this case, data of all the set points are subject to cyclic transmission in order.
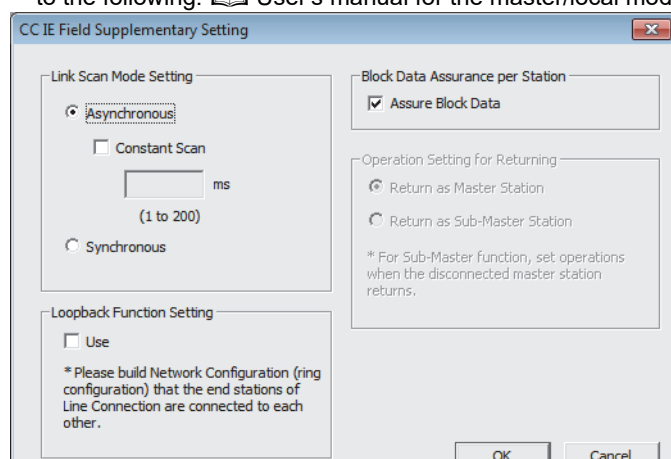
Precautions

■Before parameter settings

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

📖 GX Works3 Operating Manual

📖GX Works2 Version 1 Operating Manual (Common)

■Parameter settings

• When using the D/A converter module, always enable the station-based block data assurance. If it is disabled, correct operation of the D/A converter module cannot be guaranteed. For details on the station-based block data assurance, refer to the following: 📖 User's manual for the master/local module used.

CC IE Field Supplementary Setting

Link Scan Mode Setting
- ⦿ Asynchronous
  - ☐ Constant Scan
    - [   ] ms
    - (1 to 200)
- ○ Synchronous

Loopback Function Setting
- ☐ Use
- * Please build Network Configuration (ring configuration) that the end stations of Line Connection are connected to each other.

Block Data Assurance per Station
- ☑ Assure Block Data

Operation Setting for Returning
- ⦿ Return as Master Station
- ○ Return as Sub-Master Station
- * For Sub-Master function, set operations when the disconnected master station returns.

[OK] [Cancel]

• Do not set the parameters using the CCPASET instruction in the master station. Executing the CCPASET instruction results in the module operating with the station-based block data assurance deactivated, where proper performance as the D/A converter module cannot be guaranteed. (The CCPASET instruction is an instruction for setting parameters to the master/local module. For details on the CCPASET instruction, refer to the following: 📖 User's manual for the master/local module used.)
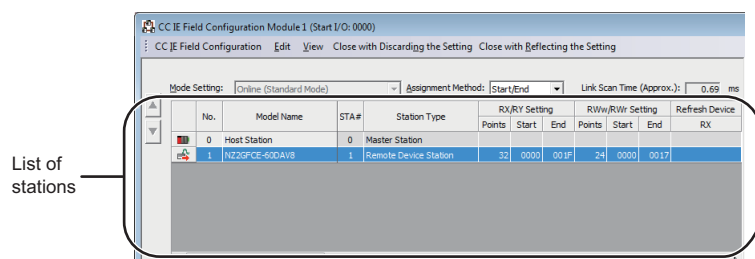
Setting procedure

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
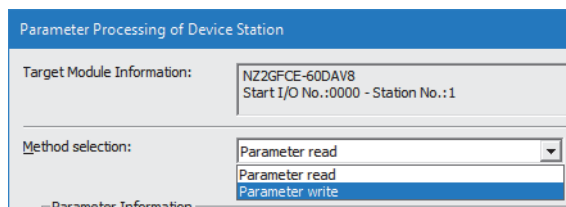
2. On the "CC IE Field Configuration" window, select the D/A converter module from "List of stations".

List of stations

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 be changed, and enter the setting value.

• Items to be selected from a pull-down list

Double-click the item to be set, and from the pull-down list that appears, select the desired item.

• Items to be entered via text box

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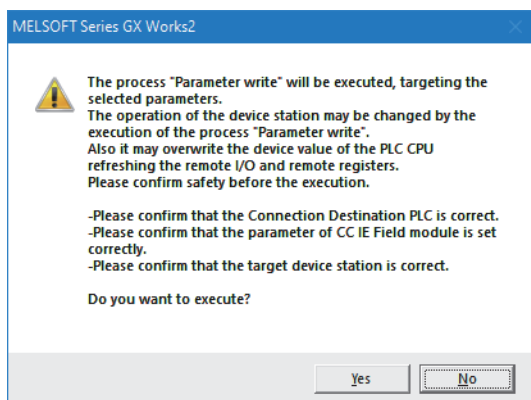

• Station parameter

Setting item	Reference
Cyclic data update watch time setting	Page 56 Cyclic Data Update Watch Function

• Basic module parameter

Setting item		Reference
D/A conversion enable/disable setting	CH1 D/A conversion enable/disable setting	Page 52 D/A Conversion Enable/ Disable Function
	CH2 D/A conversion enable/disable setting	
	CH3 D/A conversion enable/disable setting	
	CH4 D/A conversion enable/disable setting	
	CH5 D/A conversion enable/disable setting	
	CH6 D/A conversion enable/disable setting	
	CH7 D/A conversion enable/disable setting	
	CH8 D/A conversion enable/disable setting	
Range setting	CH1 Range setting	Page 53 Range Switching Function
	CH2 Range setting	
	CH3 Range setting	
	CH4 Range setting	
	CH5 Range setting	
	CH6 Range setting	
	CH7 Range setting	
	CH8 Range setting	
Analog output HOLD/CLEAR setting	CH1 Analog output HOLD/CLEAR setting	Page 54 Analog Output HOLD/ CLEAR Function
	CH2 Analog output HOLD/CLEAR setting	
	CH3 Analog output HOLD/CLEAR setting	
	CH4 Analog output HOLD/CLEAR setting	
	CH5 Analog output HOLD/CLEAR setting	
	CH6 Analog output HOLD/CLEAR setting	
	CH7 Analog output HOLD/CLEAR setting	
	CH8 Analog output HOLD/CLEAR setting	

Setting item		Reference
Alert output function	CH1 Alert output setting	Page 68 Alert Output Function
	CH1 Alert output upper limit value	
	CH1 Alert output lower limit value	
	CH2 Alert output setting	
	CH2 Alert output upper limit value	
	CH2 Alert output lower limit value	
	CH3 Alert output setting	
	CH3 Alert output upper limit value	
	CH3 Alert output lower limit value	
	CH4 Alert output setting	
	CH4 Alert output upper limit value	
	CH4 Alert output lower limit value	
	CH5 Alert output setting	
	CH5 Alert output upper limit value	
	CH5 Alert output lower limit value	
	CH6 Alert output setting	
	CH6 Alert output upper limit value	
	CH6 Alert output lower limit value	
	CH7 Alert output setting	
	CH7 Alert output upper limit value	
	CH7 Alert output lower limit value	
	CH8 Alert output setting	
	CH8 Alert output upper limit value	
	CH8 Alert output lower limit value	
Scaling function	CH1 Scaling enable/disable setting	Page 57 Scaling Function
	CH1 Scaling upper limit value	
	CH1 Scaling lower limit value	
	CH2 Scaling enable/disable setting	
	CH2 Scaling upper limit value	
	CH2 Scaling lower limit value	
	CH3 Scaling enable/disable setting	
	CH3 Scaling upper limit value	
	CH3 Scaling lower limit value	
	CH4 Scaling enable/disable setting	
	CH4 Scaling upper limit value	
	CH4 Scaling lower limit value	
	CH5 Scaling enable/disable setting	
	CH5 Scaling upper limit value	
	CH5 Scaling lower limit value	
	CH6 Scaling enable/disable setting	
	CH6 Scaling upper limit value	
	CH6 Scaling lower limit value	
	CH7 Scaling enable/disable setting	
	CH7 Scaling upper limit value	
	CH7 Scaling lower limit value	
	CH8 Scaling enable/disable setting	
	CH8 Scaling upper limit value	
	CH8 Scaling lower limit value	

6. Click the [Execute Parameter Processing] button to open the following window.
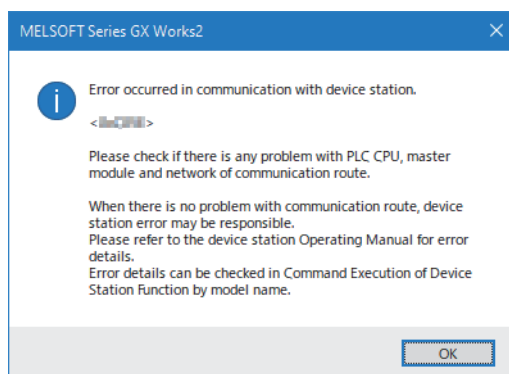
MELSOFT Series GX Works2 ×

⚠ 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 parameters are written to the D/A converter module.

Point 🔑

- Set all the items for the parameter. If any blank exists, the parameters cannot be written to the D/A converter module.
- To read the parameters from the D/A converter module, set "Method selection" to "Parameter read" and click the [Execute Parameter Processing] button.
- The parameters are checked when they are written to the D/A converter module. If the following message is displayed during the writing, take corrective action for the error code in < >. For details on the error codes, refer to the list of error codes (☞ Page 91 Error Code List) and the user's manual of the master/local module used.

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

6.2 How to Change the Parameters

This section describes the procedures to change the parameters.

The precautions to take when changing the parameters are the same as the following:

☞ Page 42 Precautions

Changing the network configuration

To change the network configuration reusing the already created project, set the parameters in the following steps:

1. Turn off the module power supply.

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

3. Turn 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. Set up the device station with drag and drop, and enter the station number for the device station. Change values as necessary.
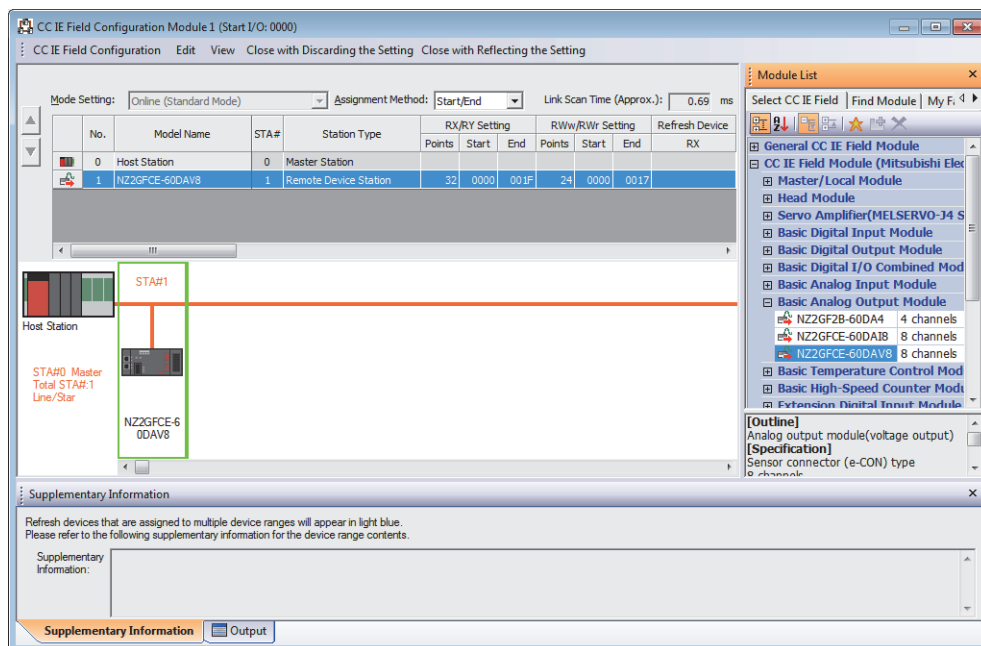
6. Close the "CC IE Field Configuration" window.

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

7. Click the [Refresh Parameters] button to open the refresh parameter setting window.

	0
Online (Normal Mode)	▼
CC IE Field Configuration Setting	
Network Operation Settings	
Refresh Parameters	
Interrupt Settings	
Specify Station No. by Parameter	▼

8. Set up the refresh parameters. Change values 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	RWw ▼	24	0000	0017	↔	W ▼	24	001000	001017	
Transfer 4	RWr ▼	24	0000	0017	↔	W ▼	24	001100	001117	
Transfer 5	▼				↔	▼				
Transfer 6	▼				↔	▼				
Transfer 7	▼				↔	▼				
Transfer 8	▼				↔	▼				

9. Write the set parameters to the CPU module of the master station, and reset the CPU module.

10. Put the CPU module of the master station into RUN.

Setting up the network configuration is now complete.

Changing the parameters without changing the network configuration

To change only the module parameters of the already set-up device station without changing the network configuration, take the following steps:

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. On the "CC IE Field Configuration" window, select the D/A converter module from "List of stations".
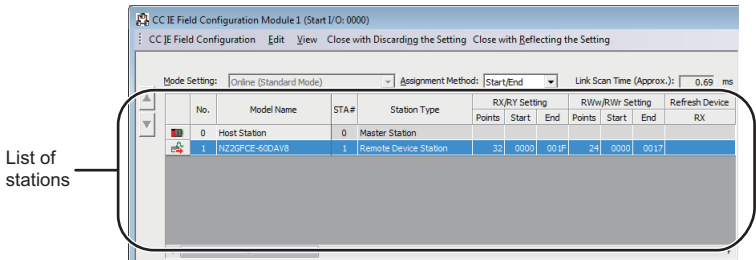
3. Open the "Parameter Processing of Device Station" window.

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

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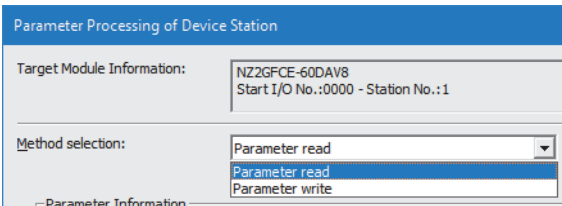
5. Click the [Execute Parameter Processing] button to open the following window.
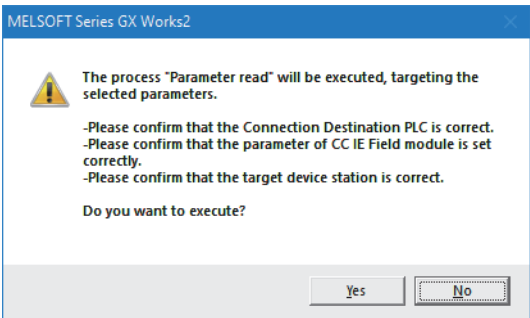
6. Click the [Yes] button.

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

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

Parameter Processing of Device Station	
Target Module Information:	NZ2GFCE-60DAV8 Start I/O No.:0000 - Station No.:1
Method selection:	Parameter read ▼
	Parameter read
	Parameter write
Parameter Information	

9. Set "Write Value". Follow the next steps to set the value:
- 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.

	Name	Initial Value	Unit	Read Value	Unit	Write Value	Unit	Setting Range
	Station parameter							
✓	Cyclic data update watch tim...	0	×100ms		×100ms	1	×100ms	0 to 20
	Basic module parameter							
✓	⊟ D/A conversion enable/disab...							
	CH1 D/A conversion enabl...	1: Disable				0: Enable		
	CH2 D/A conversion enabl...	1: Disable				1: Disable		
	CH3 D/A conversion enabl...	1: Disable				1: Disable		
	CH4 D/A conversion enabl...	1: Disable				1: Disable		
	CH5 D/A conversion enabl...	1: Disable				1: Disable		
	CH6 D/A conversion enabl...	1: Disable				1: Disable		
	CH7 D/A conversion enabl...	1: Disable				1: Disable		
	CH8 D/A conversion enabl...	1: Disable				1: Disable		

10. Click the [Execute Parameter Processing] button to open the following window.

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⚠ 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]

11. Click the [Yes] button.

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

Setting the module parameters of the device station is complete.

7 FUNCTIONS

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

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

☞ Page 100 Details of Remote I/O Signals

☞ Page 106 Details of Remote Registers

☞ Page 110 Details of Remote Buffer Memory Addresses

> **Point**
>
> In △ of an error code and alarm code each described in this chapter, the numerical value corresponding to the relevant error definition is entered. For details on such numerical values, refer to the following:
>
> ☞ Page 91 Error Code List
>
> ☞ Page 94 Alarm Code List

7.1 Mode Shift at Power-On

At power-on, the D/A converter module enters any of the following modes:

- Unit test mode
- Normal mode

Unit test mode

If x10 of the station number setting switch is set to TEST and x1 of the switch is set to 0, the mode shifts to the unit test mode. For details, refer to the following:

☞ Page 97 Unit Test

Normal mode

If the station number setting switch is set to a value in the range 1 to 120, the mode shifts to normal mode.

7.2 D/A Conversion Enable/Disable Function

This function allows D/A conversion to be enabled or disabled for each channel.

Disabling the D/A conversion for unused channels reduces the conversion cycles.

Setting method

The setting method for the D/A converter module is as follows:

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

✍ CC IE Field Configuration window ⇒ Select the D/A converter module in "List of stations" ⇒ [CC IE Field Configuration] ⇒ [Online] ⇒ [Parameter Processing of Device Station]

2. In "Basic module parameter", set "CH□ D/A conversion enable/disable setting" to either "0: Enable" or "1: Disable".

7.3 D/A Output Enable/Disable Function

This function allows the selection of whether to output the D/A conversion value or the offset value for each channel.

Whether the output is enabled or disabled, the conversion cycle is constant.

Setting method

Use CH□ Output enable/disable flag (RY10 to RY17) for the setting.

CH□ Output enable/disable flag (RY10 to RY17)	Analog output
Output enable (ON)	The D/A conversion value is output.
Output disable (OFF)	The offset value is output.

7.4 Conversion Speed and Conversion Cycle

Conversion speed is the rate at which the D/A converter module converts and outputs digital values. The conversion speed is 1ms/channel.

The conversion cycle is the period for D/A conversion in a channel.

The conversion cycle changes according to the number of conversion enabled channels and conversion speed.

Conversion cycle [ms] = Number of conversion enabled channels × Conversion speed (1ms)

7.5 Range Switching Function

The output range can be selected for each channel from the following ranges:

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

Setting method

The setting method for the D/A converter module is as follows:

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

👆 CC IE Field Configuration window ⇨ Select the D/A converter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Online] ⇨ [Parameter Processing of Device Station]

2. In "Basic module parameter", set "CH☐ D/A conversion enable/disable setting" to "0: Enable".

☑	⊟ D/A conversion enable/disab...				
	⋯ CH1 D/A conversion enabl...	1: Disable			▾
	⋯ CH2 D/A conversion enabl...	1: Disable			
	⋯ CH3 D/A conversion enabl...	1: Disable			0: Enable
	⋯ CH4 D/A conversion enabl...	1: Disable			1: Disable

3. In "Basic module parameter", set up "CH☐ Range setting".

☑	⊟ Range setting				
	⋯ CH1 Range setting	2: 1 to 5V			▾
	⋯ CH2 Range setting	2: 1 to 5V			
	⋯ CH3 Range setting	2: 1 to 5V			2: 1 to 5V
	⋯ CH4 Range setting	2: 1 to 5V			3: 0 to 5V
	⋯ CH5 Range setting	2: 1 to 5V			4: −10 to 10V

> **Point**
>
> When "CH☐ D/A conversion enable/disable setting" is set to "1: Disable", the range does not change. When switching the output range, set "CH☐ D/A conversion enable/disable setting" to "0: Enable" and set CH☐ Output enable/disable flag (RY10 to RY17) to Disable (OFF) before setting a value (within the range an external device allows) for CH☐ Digital value (RWw2 to RWw9). For example, when the output range is from 0 to 5V and CH☐ Digital value (RWw2 to RWw9) is 12000, 5V is output. In this condition, if the output range is changed to -10 to 10V, 7.5V is output because CH☐ Digital value (RWw2 to RWw9) remains as 12000.

7.6 Analog Output HOLD/CLEAR Function

This function allows the selection of whether to hold or clear the analog value output when the CPU module is in the following operating status: RUN, STOP, or a stop error.

Combination of analog output status

The following table shows how the analog output status changes, depending on the combination of settings for D/A conversion enable/disable setting (address: 0102H) and CH☐ Output enable/disable flag (RY10 to RY17).

D/A conversion enable/disable setting (address: 0102H)	Enable			Disable
CH☐ Output enable/disable flag (RY10 to RY17)	Enable		Disable	Enable or disable
Analog output HOLD/CLEAR setting (address: 0105H to 0106H)	HOLD	CLEAR	HOLD or CLEAR	HOLD or CLEAR
Analog output status while the CPU module is in RUN	The analog value D/A-converted from the digital value is output.		Offset value	0V/0mA
Analog output status while the CPU module is in STOP	Hold	Offset value	Offset value	0V/0mA
Analog output status while the CPU module is in stop error	Hold	Offset value	Offset value	0V/0mA
Analog output status while the D LINK LED is off[*1]	Hold	Offset value	Offset value	0V/0mA
Analog output status while the instruction of data link stop is received from the master station	Hold	Offset value	Offset value	0V/0mA
Analog output status while reserved from the master station	Hold	Offset value	Offset value	0V/0mA
Analog output status of when the out-of-range digital value error occurs	The upper limit value or lower limit value of analog value is output.		Offset value	0V/0mA
Analog output status of when the out-of-range setting error occurs	0V/0mA	0V/0mA	0V/0mA	0V/0mA
Analog output status of when a hardware failure[*2] occurs	0V/0mA	0V/0mA	0V/0mA	0V/0mA

*1 The analog output HOLD/CLEAR function may be executed even when the D LINK LED is on if the cyclic data update watch time is set. For details, refer to the following:
  ☞ Page 56 Cyclic Data Update Watch Function
*2 Indicates the case that the operation of a program is not completed within the expected time in the CPU module due to a hardware failure in the D/A converter module or other factors. In this case, Remote READY (RXB) turns off and the RUN LED of the D/A converter module goes out.

Setting method

The setting method for the D/A converter module is as follows:

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

✐ CC IE Field Configuration window ⇨ Select the D/A converter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Online] ⇨ [Parameter Processing of Device Station]

2. In "Basic module parameter", set "CH☐ D/A conversion enable/disable setting" to "0: Enable".

☑	⊟ D/A conversion enable/disab...						
	┈ CH1 D/A conversion enabl...	1: Disable					▾
	┈ CH2 D/A conversion enabl...	1: Disable					
	┈ CH3 D/A conversion enabl...	1: Disable				0: Enable	
	┈ CH4 D/A conversion enabl...	1: Disable				1: Disable	

3. In "Basic module parameter", set up "CH☐ Analog output HOLD/CLEAR setting".

☑	⊟ Analog output HOLD/CLEAR ...						
	┈ CH1 Analog output HOLD/...	0: CLEAR					▾
	┈ CH2 Analog output HOLD/...	0: CLEAR					
	┈ CH3 Analog output HOLD/...	0: CLEAR				0: CLEAR	
	┈ CH4 Analog output HOLD/...	0: CLEAR				1: HOLD	

7

7.7 Cyclic Data Update Watch Function

The update intervals of cyclic data are monitored. The last output value is held or cleared when the cyclic transmission stop status continues longer than the set monitoring time.

The cyclic transmission stop status is the status that the D LINK LED is flashing (Data link in operation (cyclic transmission stopped)) or off (Data link not performed (disconnected)).

Set whether to hold or clear the output value using the analog output HOLD/CLEAR setting function.

For the analog output HOLD/CLEAR setting function, refer to the following:

Analog output HOLD/CLEAR setting function (☞ Page 54 Analog Output HOLD/CLEAR Function)
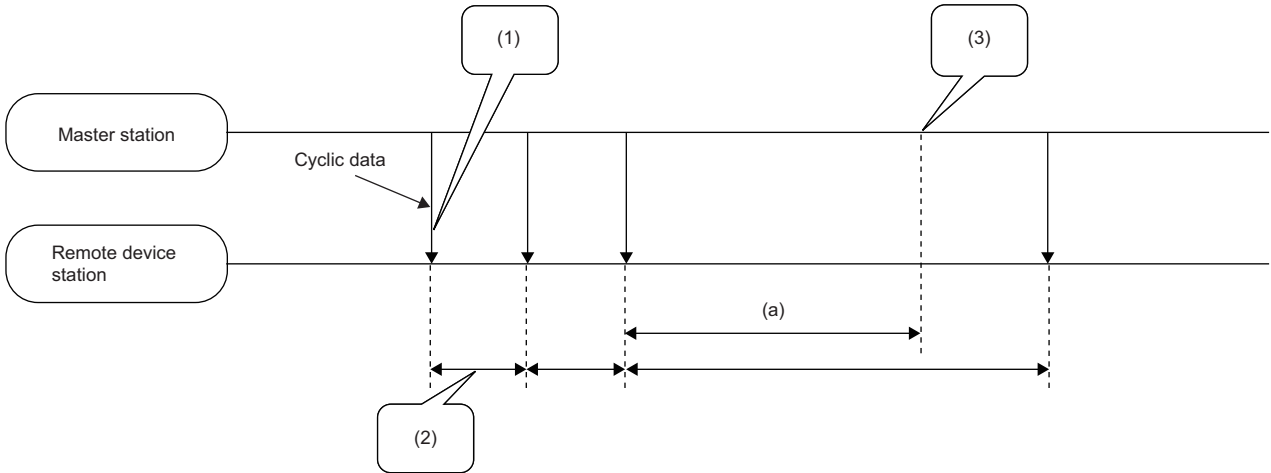
(a) Cyclic data update watch time setting
(1) Monitoring starts when initial cyclic data is received.
(2) Cyclic data is updated within the data link update time range.
(3) Output turns into the HOLD/CLEAR state when the cyclic data update interval exceeds the preset time.

Setting method

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

☞ CC IE Field Configuration window ⇨ Select the D/A converter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Online] ⇨ [Parameter Processing of Device Station]

2. In "Station parameter", set the monitoring time for "Cyclic data update watch time setting".

Item	Setting range
Cyclic data update watch time setting	• 0 (Not monitor) • 1 to 20 (0.1 to 2 seconds in units of 100ms)

> **Point** ℘
>
> For the cyclic data update watch time setting, set a greater value than the link scan time.

7.8 Scaling Function

The D/A converter module scale-converts the digital value to the set range of the scaling upper limit value and scaling lower limit value. This function reduces the time and effort to create a program of the scale conversion.

How to interpret the scaling setting

Set a value corresponding to the upper limit value of the analog output value in the range setting for the scaling upper limit value.

Set a value corresponding to the lower limit value of the analog output value in the range setting for the scaling lower limit value.

Calculation of the scaling value

Scale conversion is performed on the digital values using the following formula:

(Values after the decimal point are rounded down during scale conversion.)

- When the output range is -10 to 10V

$$D_Y = \frac{12000}{S_H - S_L} \times (D_X - S_L)$$

- When the output range is 4 to 20mA, 0 to 20mA, 1 to 5V, or 0 to 5V

$$D_Y = \frac{32000}{S_H - S_L} \times (D_X - S_L) - 16000$$

Item	Description
D_Y	Digital value used for D/A conversion
D_X	Digital value
S_H	Scaling upper limit value
S_L	Scaling lower limit value

Setting procedure

The setting method for the D/A converter module is as follows:

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

🖰 CC IE Field Configuration window ⇨ Select the D/A converter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Online] ⇨ [Parameter Processing of Device Station]

2. In "Basic module parameter", set "CH□ D/A conversion enable/disable setting" to "0: Enable".

3. In "Basic module parameter", set "CH□ Scaling enable/disable setting" to "0: Enable".

4. In "Basic module parameter", set the values for "CH□ Scaling lower limit value" and "CH□ Scaling upper limit value".

Item	Setting range
CH□ Scaling upper limit value	-32000 to 32000
CH□ Scaling lower limit value	

Point

- Even if the scaling upper limit value and the scaling lower limit value are set so that the change is larger than the maximum resolution described in the performance specifications, the resolution will not increase.
- The settings must satisfy the condition: Scaling upper limit value > Scaling lower limit value.

Example of the scaling setting

Ex.

When the following settings are made for channel 1 with the output range 0 to 5V set to it

- "CH1 Scaling enable/disable setting": "0: Enable"
- "CH1 Scaling upper limit value": 10000
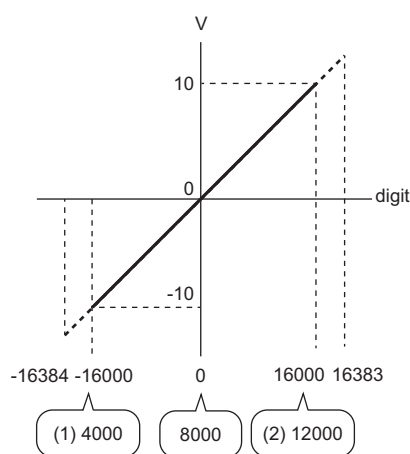- "CH1 Scaling lower limit value": 2000
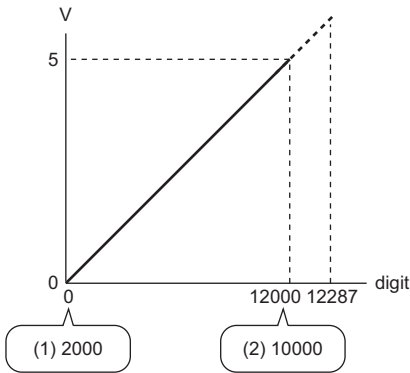
digit: Digital value
V: Analog output voltage (V)
(1) Scaling lower limit value
(2) Scaling upper limit value

Digital value	Digital value after scale conversion	Analog output voltage
2000	0	0V
3600	2400	1V
5200	4800	2V
6800	7200	3V
8400	9600	4V
10000	12000	5V

Ex.

When the following settings are made for channel 1 with the output range -10 to 10V set to it

- "CH1 Scaling enable/disable setting": "0: Enable"
- "CH1 Scaling upper limit value": 12000
- "CH1 Scaling lower limit value": 4000

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

Digital value	Digital value after scale conversion	Analog output voltage
4000	-16000	-10V
6000	-8000	-5V
8000	0	0V
10000	8000	5V
12000	16000	10V

Point

- When using the scaling function, the digital value before scaling can be set to a value out of the range of the scaling upper and lower limit values (dotted line area in the I/O characteristics). However, use the scaling function within the range of the analog output practical range (solid line area in the I/O characteristics). If the value is out of the analog output practical range, the maximum resolution and accuracy may not fall within the range of performance specifications.
- The default digital value "0" may not be appropriate depending on the scaling function setting. Especially in the above examples, an out-of-range digital value error (error code: 060☐H) occurs if CH☐ Output enable/disable flag (RY10 to RY17) is turned on with the digital value being "0". Therefore, set an appropriate digital value within the scaling range before turning on CH☐ Output enable/disable flag (RY10 to RY17).

7.9 Shift Function

Using this function, the D/A converter module outputs the converted digital value with the shifting set value added, in analog. When the shifting set value is changed, it is reflected to the analog output value in real time. Therefore, fine adjustment can be easily performed when the system starts.

Operation

The shifting set value is added to a digital value, and the added digital value is output in analog.

When the scaling function is used, the scale conversion is executed after the addition by the shift function.

If some value is set to the shifting set value, the shifting set value is added regardless of the status change (OFF→ON→OFF) of Initial data setting request flag (RY9).

Setting method

The setting method for the D/A converter module is as follows:

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

👉 CC IE Field Configuration window ⇨ Select the D/A converter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Online] ⇨ [Parameter Processing of Device Station]

2. In "Basic module parameter", set "CH□ D/A conversion enable/disable setting" to "0: Enable".

3. Set a value for CH□ Shifting set value (RWw10 to RWw17).

| Item	Setting range
CH□ Shifting set value (RWw10 to RWw17)	-32768 to 32767 (Default value: 0)

Point

If the digital value exceeds the range from -32768 to 32767 as a result of shift-and-add operation, the digital operation value is fixed to the lower limit value (-32768) or the upper limit value (32767).

Setting example

Ex.

When the shifting set value "10" is added for channel 1 with the output range 0 to 5V set to it
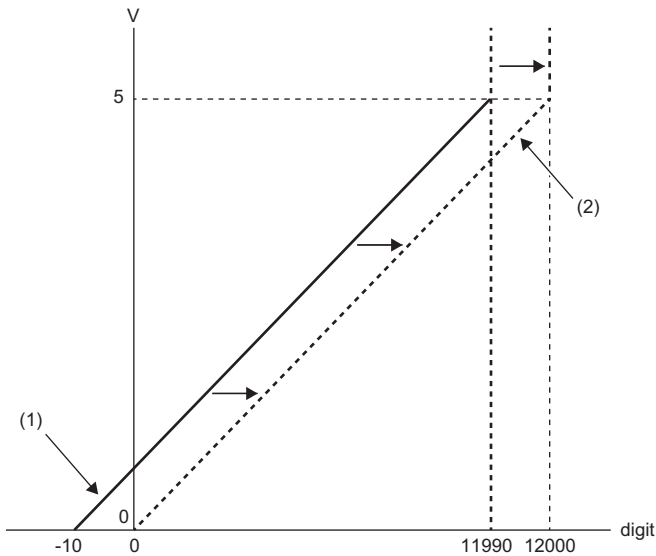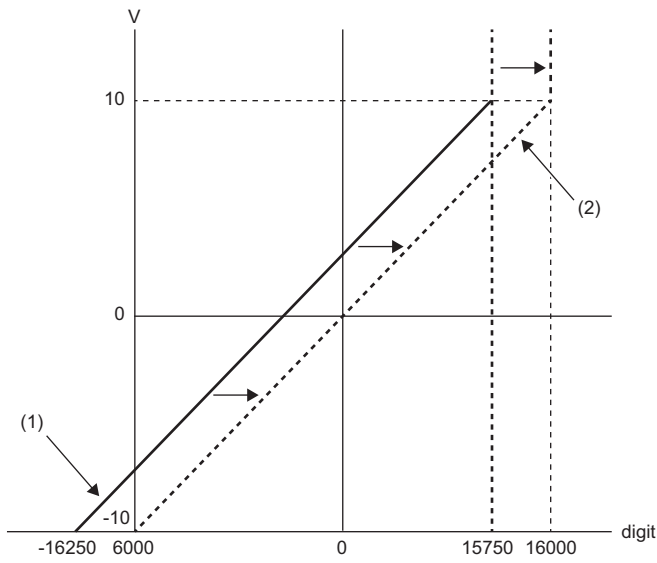

digit: Digital value

V: Analog output voltage (V)

(1) CH1 Digital value (RWw2)
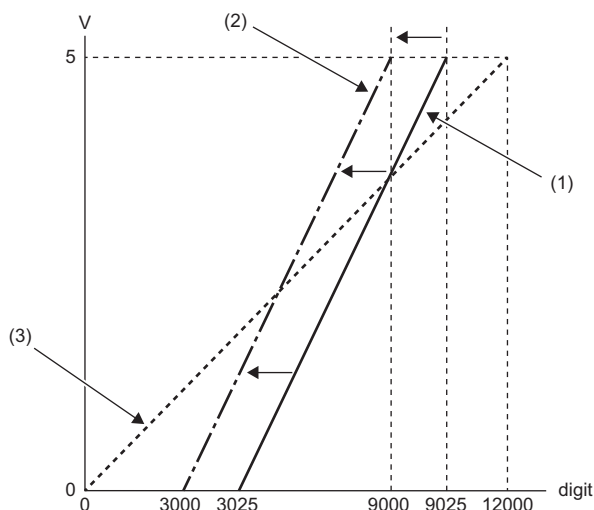
(2) Digital value after shift-and-add operation

Digital value	Digital value after shift-and-add operation	Analog output voltage
-10	0	0V
11990	12000	5V

Ex.

When the shifting set value "250" is added for channel 1 with the output range -10 to 10V set to it

digit: Digital value

V: Analog output voltage (V)

(1) CH1 Digital value (RWw2)

(2) Digital value after shift-and-add operation

Digital value	Digital value after shift-and-add operation	Analog output voltage
-16250	-16000	-10V
-8250	-8000	-5V
-250	0	0V
7750	8000	5V
15750	16000	10V

7

Example of combined use of scaling function and shift function

Ex.

When the following settings are made for channel 1 with the output range 0 to 5V set to it

- "CH1 Scaling enable/disable setting": "0: Enable"
- "CH1 Scaling upper limit value": 9000
- "CH1 Scaling lower limit value": 3000
- "CH1 Shifting set value (RWw10)": -25

digit: Digital value
V: Analog output voltage (V)
(1) CH1 Digital value (RWw2)
(2) Digital value after shift-and-add operation
(3) Digital value after scale conversion

Digital value	Digital value after shift-and-add operation	Digital value after scale conversion	Analog output voltage
3025	3000	0	0V
4225	4200	2400	1V
5425	5400	4800	2V
6625	6600	7200	3V
7825	7800	9600	4V
9025	9000	12000	5V

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

🖱 CC IE Field Configuration window ⇨ Select the D/A converter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Online] ⇨ [Parameter Processing of Device Station]

2. In "Basic module parameter, set "CH1 D/A conversion enable/disable setting" to "0: Enable".

3. In "Basic module parameter", set "CH1 Scaling enable/disable setting" to "0: Enable".

4. In "Basic module parameter", set values for "CH1 Scaling lower limit value" and "CH1 Scaling upper limit value".

5. Set "-25" for "CH1 Shifting set value (RWw10)".

7.10 Digital Value Range Check Function

An error is output when the digital value is out of the digital input range for the output range.

Notification

When the digital value is greater than the upper limit of the setting range or smaller than the lower limit of the setting range, it is notified with the following operation.

- The check code is stored in CH□ Set value check code (RWr2 to RWr9).

For details on the check codes, refer to the following:

☞ Page 107 Set value check code

- Digital value outside the range (error code: 060□H) is stored in Latest warning code (RWr1).
- Warning flag (RX7) turns on.
- The ALM LED flashes.

For the setting range for the digital value, refer to the following:

Output range setting	When the scaling function is disabled		When the scaling function is enabled[1]
	Setting range (Actual range)	Digital value when a value out of the setting range is written	Setting range
4 to 20mA	-288 to 12287 (Actual range: 0 to 12000)	12288 or more: 12287 -289 or less: -288	-32768 to 32767 (Maximum actual range: -32000 to 32000)
0 to 20mA			
1 to 5V			
0 to 5V			
-10 to 10V	-16384 to 16383 (Actual range: -16000 to 16000)	16384 or more: 16383 -16385 or less: -16384	

[1] The setting range and the actual range of when the scaling function is enabled depend on the settings in the scaling upper limit value and the scaling lower limit value.

Operation

When the digital value is greater than the upper limit of the setting range or smaller than the lower limit of the setting range, analog output is as follows:

- When the digital value is greater than the upper limit of the setting range, the analog value is output with the upper limit of the setting range.
- When the digital value is smaller than the lower limit of the setting range, the analog value is output with the lower limit of the setting range.

The analog output value returns to the normal value when the digital value falls within the setting range. However, the indicated notification remains as follows:

- Once a check code is stored, it is not reset automatically.
- Warning flag (RX7) remains ON.
- ALM LED remains flashing.

Resetting a check code

The check codes can be reset by either of the following two methods.
- Write a digital value within the setting range, and turn on and off Error clear request flag (RYA).
- Turn on and off Initial data setting request flag (RY9).

When the scaling function is enabled

When Scaling enable/disable setting (address: 0118H) is set to Enable (0), the scale-converted digital value is the target for the check code.

> **Point**
>
> When the scale-converted digital value is out of the setting range, a slight inaccuracy may be contained in the target digital value for the check code when the check code is stored due to an operational error in the scale conversion.

When the shift function is enabled

When a value is set for CH□ Shifting set value (RWw10 to RWw17), the value with the shifting set value added is the target for the check code.

Operation example of the check code detection

Ex.

When the following settings are made for channel 1 with the output range -10 to 10V set to it

- "CH1 Scaling enable/disable setting": "0: Enable"
- "CH1 Scaling upper limit value": 24000
- "CH1 Scaling lower limit value": -24000
- "CH1 Shifting set value (RWw10)": -200
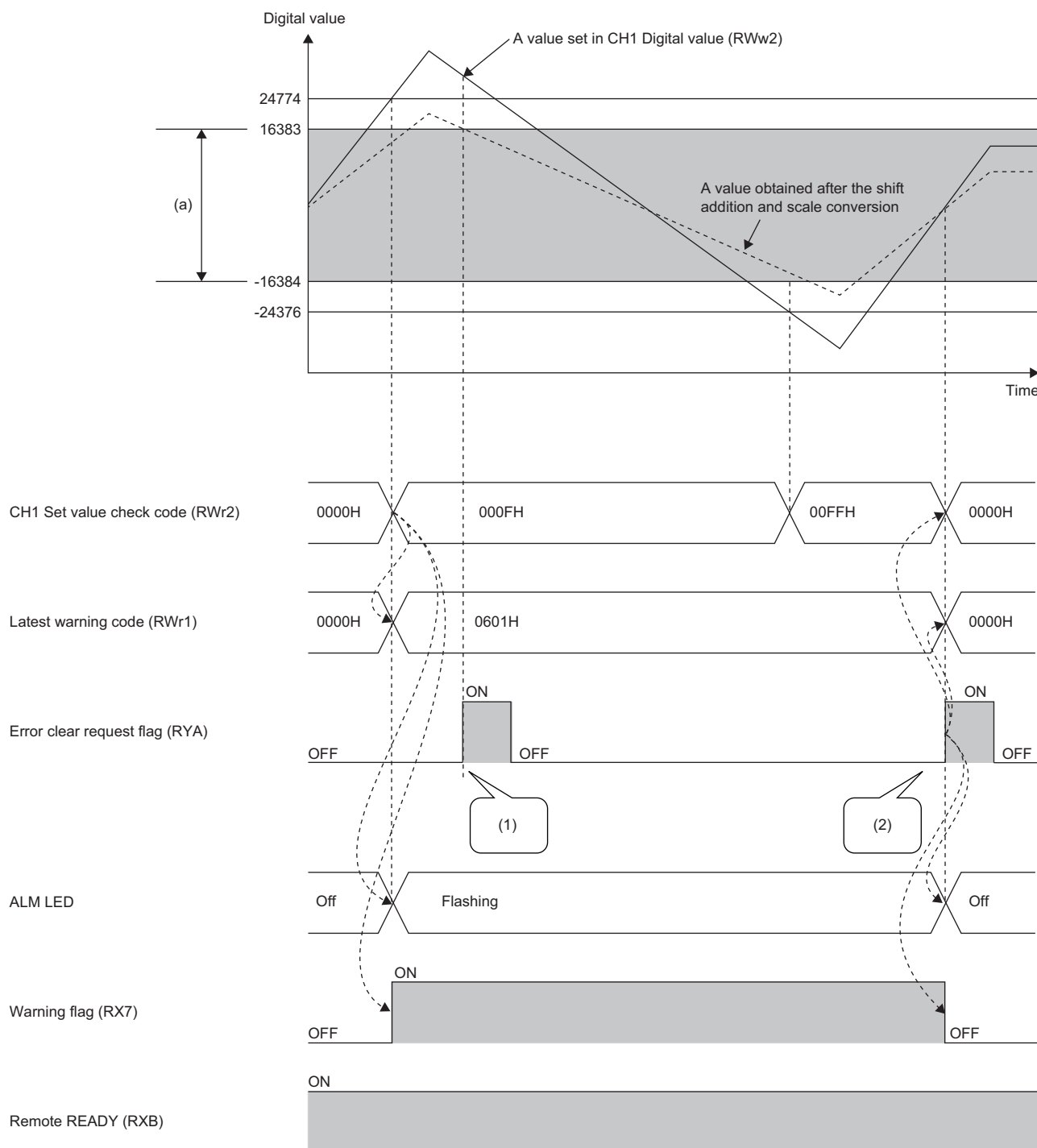
(a) Setting range after shift-and-add operation, scale conversion
(1) For a value outside the setting range, the check code is not reset.
(2) For a value within the setting range, the check code is reset.

7.11 Alert Output Function

This function outputs an alert when a digital value falls within the alert output range set in advance.

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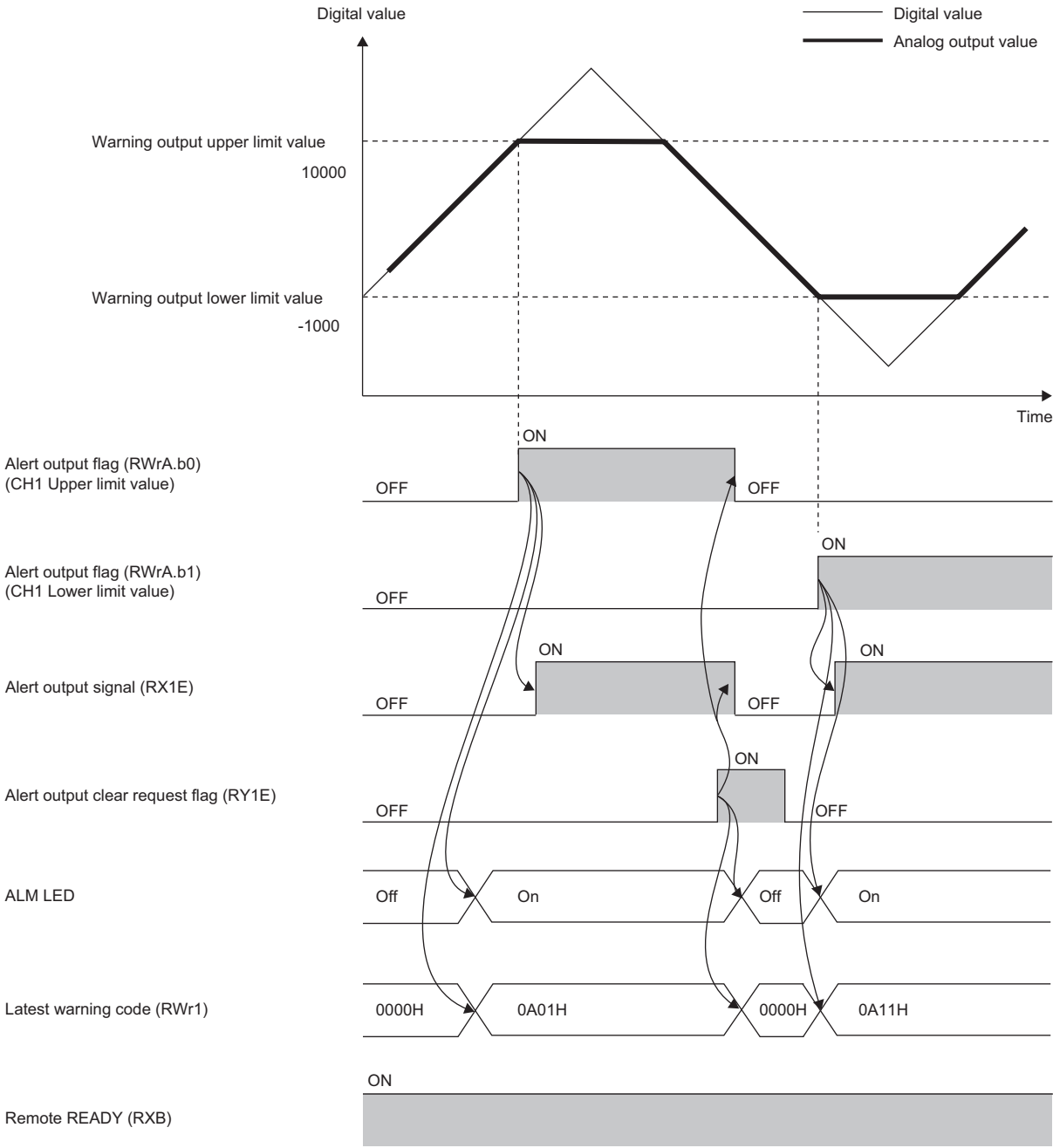
Notification

When the digital value is greater than the alert output upper limit value, or smaller than the alert output lower limit value, an alert is indicated by Alert output flag (RWrA), Alert output signal (RX1E), and the lighted up ALM LED.

- Alert output flag (RWrA): The bit corresponding to the contents of the alert turns on (☞ Page 108 Alert output flag).
- Alert output signal (RX1E): ON
- ALM LED of the D/A converter module: On

In addition, an alert occurrence (alarm code: 0A△□H) is stored in Latest warning code (RWr1).

Operation

When the digital value exceeds the alert output upper limit value or is below the alert output lower limit value, an alert is output and the analog output value becomes any of the following:

- When the digital value exceeds the alert output upper limit value: An analog value converted from the digital value of the alert output upper limit value is output.
- When the digital value is below the alert output lower limit value: An analog value converted from the digital value of the alert output lower limit value is output.

After an alert occurs, the analog output value returns to the normal value by changing the digital value to a value within the setting range. However, Alert output flag (RWrA) and Alert output signal (RX1E) are not cleared. (ALM LED remains turned on.)

Clearing the alert output

The alert output can be cleared by either of the following two methods.

- Turning on and off Alert output clear request flag (RY1E)
- Turning on and off Initial data setting request flag (RY9)

When the alert output is cleared, the D/A converter module results in the following state:

- Alert output flag (RWrA): OFF
- Alert output signal (RX1E): OFF
- ALM LED of the D/A converter module: Off
- The alert occurrence (alarm code: 0A△□H), which is stored in Latest warning code (RWr1), is cleared.

When the scaling function is enabled

When Scaling enable/disable setting (address: 0118H) is set to Enable (0), the scale-converted digital value is the target for the alert.

When setting CH1 Alert output upper limit value (address: 0108H) to CH8 Alert output lower limit value (address: 0117H), set values considering the scaling range.

7

When the shift function is enabled

When a value is set to CH□ Shifting set value (RWw10 to RWw17), the value with the shifting set value added is the target for the alert.

Setting method

The setting method for the D/A converter module is as follows:

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

☜ CC IE Field Configuration window ⇨ Select the D/A converter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Online] ⇨ [Parameter Processing of Device Station]

2. In "Basic module parameter", set "CH□ D/A conversion enable/disable setting" to "0: Enable".

☑	⊟ D/A conversion enable/disab...						
	┈ CH1 D/A conversion enabl...	1: Disable					▼
	┈ CH2 D/A conversion enabl...	1: Disable					
	┈ CH3 D/A conversion enabl...	1: Disable				0: Enable	
	┈ CH4 D/A conversion enabl...	1: Disable				1: Disable	

3. In "Basic module parameter", set "CH□ Alert output setting" to "0: Enable".

☑	⊟ Alert output function						
	┈ CH1 Alert output setting	1: Disable					▼
	┈ CH1 Alert output upper lim...	0					
	┈ CH1 Alert output lower lim...	0				0: Enable	
	┈ CH2 Alert output setting	1: Disable				1: Disable	

4. In "Basic module parameter", set the values for "CH□ Alert output upper limit value" and "CH□ Alert output lower limit value".

☑	⊟ Alert output function						
	┈ CH1 Alert output setting	1: Disable				0: Enable	
	┈ CH1 Alert output upper lim...	0				16000	
	┈ CH1 Alert output lower lim...	0				4000	

Item	Setting range
CH□ Alert output upper limit value	-32768 to 32767
CH□ Alert output lower limit value	

7.12　Error Notification Function

When an error, warning, or alarm occurs, the D/A converter module notifies the master station of it using remote input signals and the remote register.

> **Point**
>
> The notification of the error, warning, or alarm can be checked on the LED on the front of the module.
> For details, refer to the following:
> ☞ Page 11 PART NAMES

Notification of an error

The D/A converter module notifies the master station of an error in the following method.

Item	Description	Reference
Error flag (RXA)	Turns on when a moderate error or major error occurs.	Page 102 Error flag
Latest error code (RWr0)	An error code is stored when a moderate error or major error occurs.	Page 106 Latest error code

■Method for clearing an error

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

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

Notification of a warning or alarm

The D/A converter module notifies that a warning or alarm occurs to the master station in the following method.

Item	Description	Reference
Warning flag (RX7)	Turns on when a minor error occurs.	Page 100 Warning flag
Latest warning code (RWr1)	The error code or alarm code is stored when a minor error occurs.	Page 106 Latest warning code

7

■How to clear a warning or an alarm

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

Error type			Clearing an error
Minor error	Warning		A warning is cleared five seconds after the error cause is removed.
	Alarm	Check code	Turn on Error clear request flag (RYA) or Initial data setting request flag (RY9) after writing a digital value within the setting range.
		Alert occurrence	Turn on Alert output clear request flag (RY1E) or Initial data setting request flag (RY9) after writing a digital value within the warning output range.

A warning results in the following state five seconds after the error cause is removed.

- Warning flag (RX7) turns off.
- Latest warning code (RWr1) is cleared.
- The ERR. LED turns off.

The alarm is not automatically cleared. Latest warning code (RWr1) is cleared when the other minor errors are cleared in the alarm status. The warning codes can be checked in the error history on engineering tools. For the error history, refer to the following:

☞ Page 88 Checking by executing a command of the device station

☞ Page 116 Error history data

Ex.

Operation to clear Station number switch changing error (error code: 0940H)
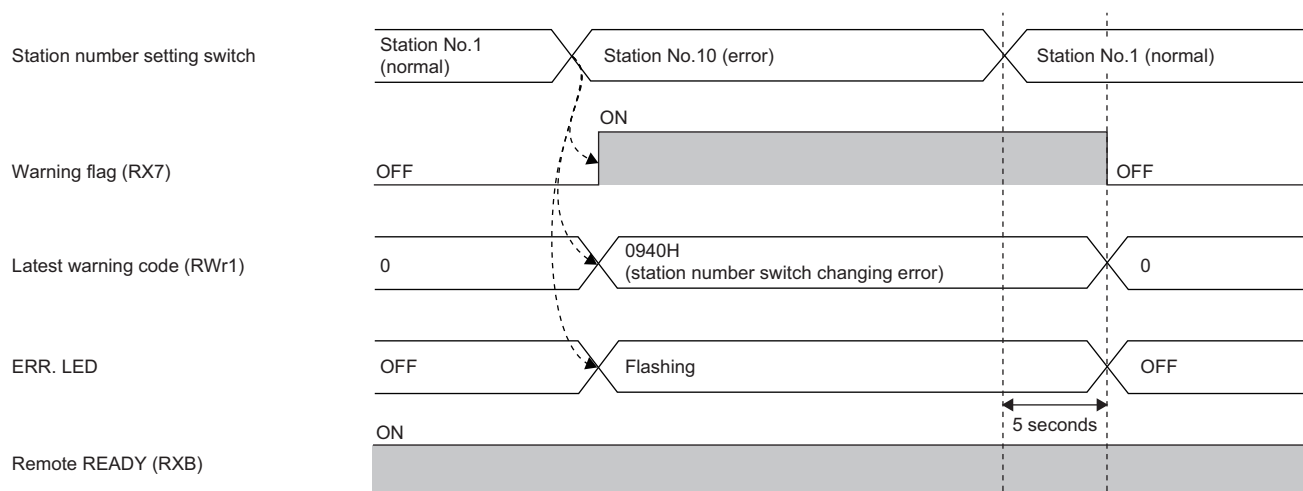
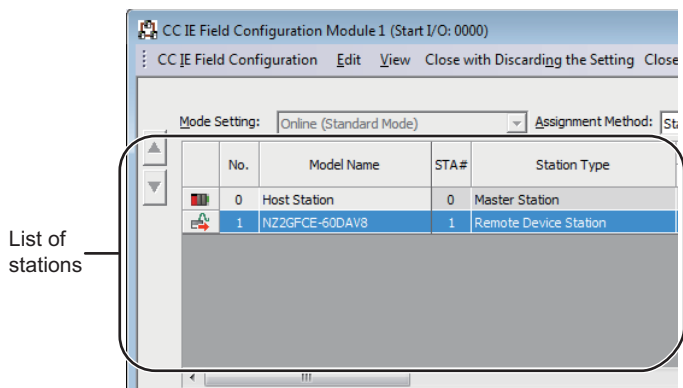-------▶ Executed by the D/A converter module

For the method for clearing an alarm, refer to the following:

☞ Page 65 Digital Value Range Check Function

☞ Page 68 Alert Output Function

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

The following shows how to clear an error by executing the command of the device station. A moderate error and an out-of-range digital value can be cleared.
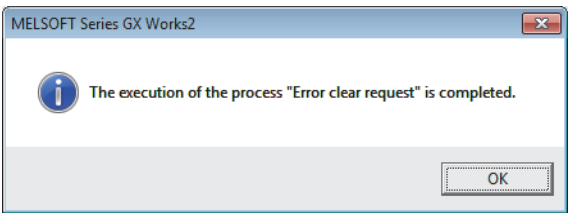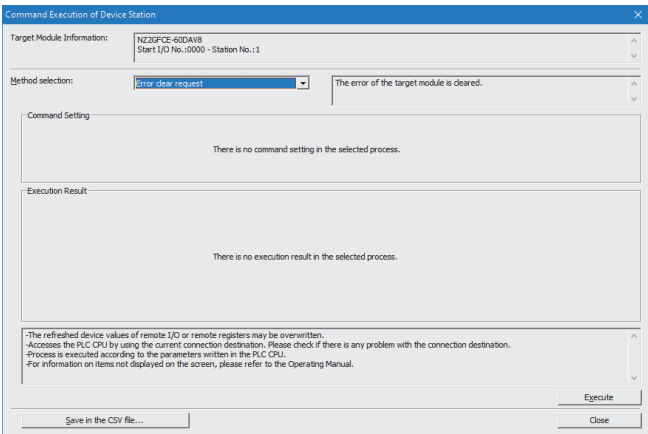

List of stations

1. On the "CC IE Field Configuration" window, select the D/A converter module from "List of stations".

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. In the window that appears (shown left), click the [OK] button.

5. The error for the D/A converter module is cleared.

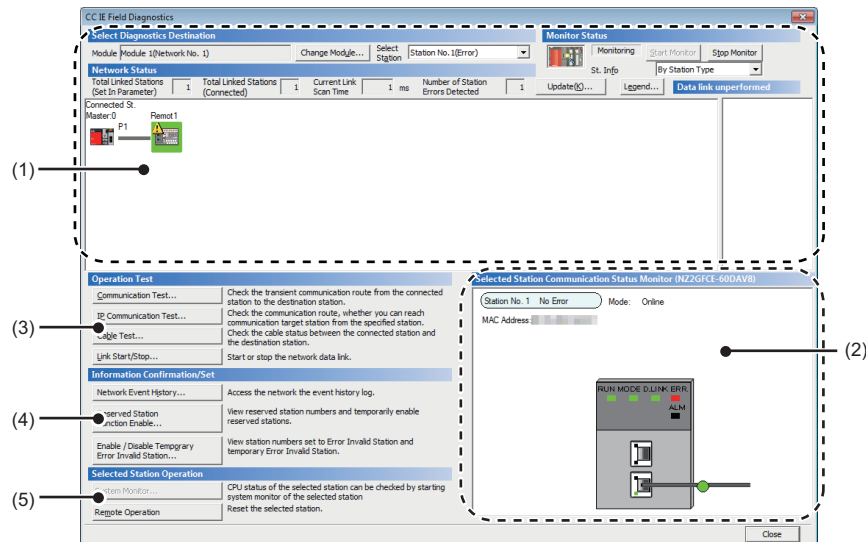# 7.13 CC-Link IE Field Network Diagnostic Function

This function can be used by accessing the engineering tool connected to the CPU module, enabling the detection of a network error.

How to use the function

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

1. Establish a connection between GX Works2 and the CPU module.

2. Go to the menu of GX Works2 and start up the CC-Link IE Field Network diagnostics.

👉 [Diagnostics] ⇨ [CC IE Field Diagnostics]

| Item to be diagnosed		Description	Reference
(1)	Network configuration and error condition	Allows the condition of the CC-Link IE Field Network to be checked. If an error or a warning occurs in the D/A converter module, an icon appears to show the status of the station.	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.	
(3)	Communication Test	The transient communication route and whether the communication is established from the connected station to the destination 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.	
	Cable Test	The cable status between the connected station and the destination station can be checked.	
	Link Start/Stop	The network data link can be started and 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 (temporary) 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 D/A converter module.	
	Remote Operation	The selected station can be reset through the remote operation.	Page 75 Remote operation

■Remote operation

1. Select the device station to be reset and click the [Remote Operation] button.
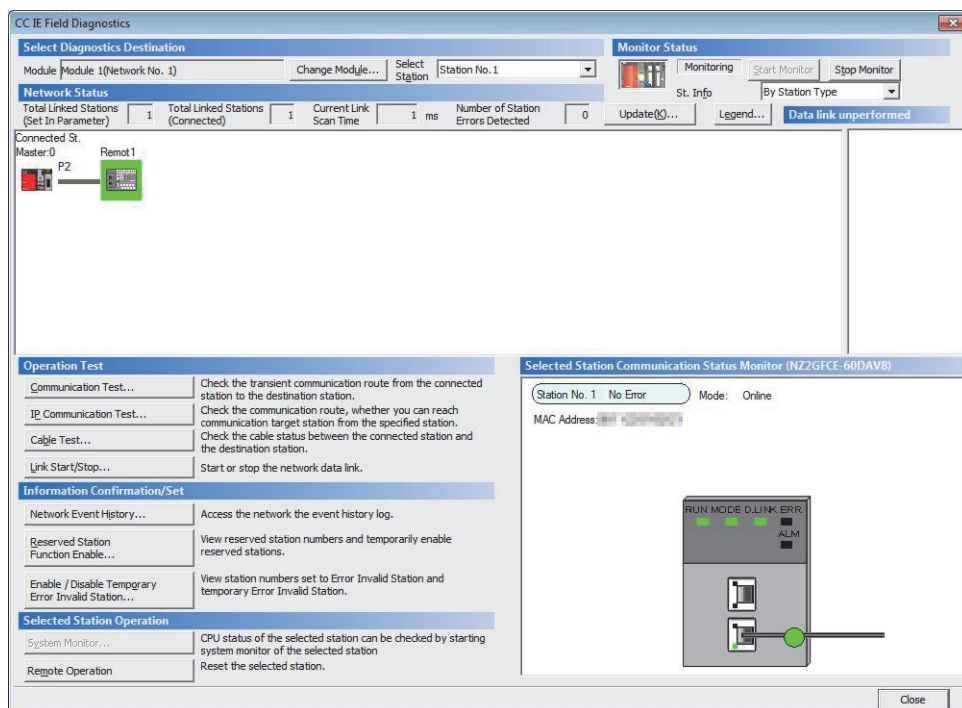
2. In the dialog box that appears (shown below), click the [Yes] button to start remote reset.
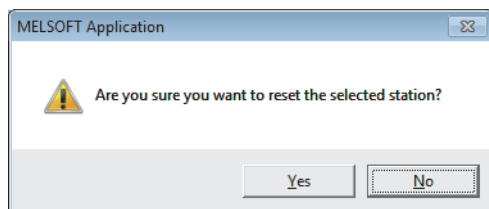
3. In the dialog box that appears (shown below), click the [OK] button.
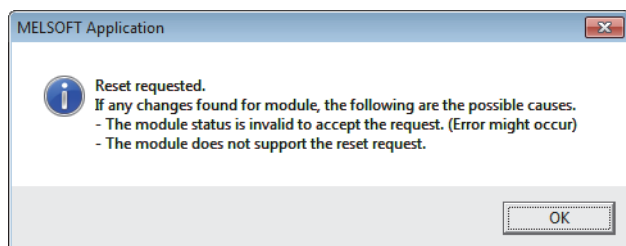
8 PROGRAMMING

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

8.1 Precautions for Programming

This section describes precautions when creating the program of CC-Link IE Field Network.

Program for cyclic transmission

For a program for cyclic transmission, provide interlock between the following link special relay (SB) and the link special register (SW).
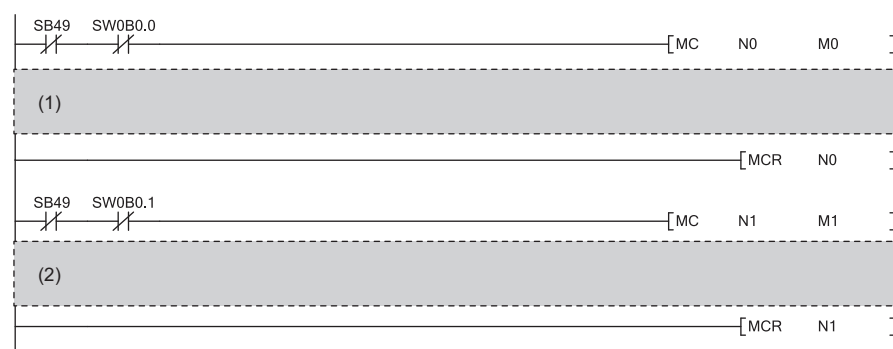- Data link status of the own station (master station) (SB0049)
- Data link status of each station (SW00B0 to SW00B7)

For the link special relay (SB) and link special register (SW), refer to the following:
📖 User's manual for the master/local module used

Ex.
Interlock example

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

Program for transient transmission

For a program for transient transmission, provide interlock between the following link special relay (SB) and the link special register (SW).
- Baton pass status of the own station (master station) (SB0047)
- Baton pass status of each station (SW00A0 to SW00A7)

For the link special relay (SB) and link special register (SW), refer to the following:
📖 User's manual for the master/local module used

Ex.
Interlock example

(1) Start contact
(2) Dedicated instruction for station No.1

8.2 Programming Procedure

Create a program to execute D/A conversion as illustrated by the following procedure.
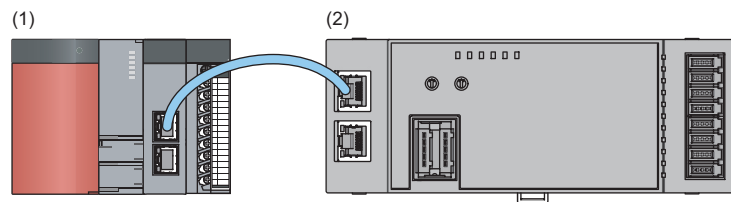
1. Parameter settings

☞ Page 42 Parameter Settings

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

[1] A program to be added depending on the details of control (to be created as needed)

8.3 Program Example

System configuration

(1)   (2)

(1) Master station (station No.0)
 • Power supply module: Q62P
 • CPU module: Q10UDHCPU
 • Master/local module: QJ71GF11-T2 (start I/O number: 0000H to 001FH)
 • Input module: QX10 (start I/O number: 0020H to 002FH)
(2) Remote device station (station No.1)
 • D/A converter module (NZ2GFCE-60DAV8)

Point

For the settings using the engineering tool, the procedure is described based on the use of GX Works2.

■Assignment of link devices
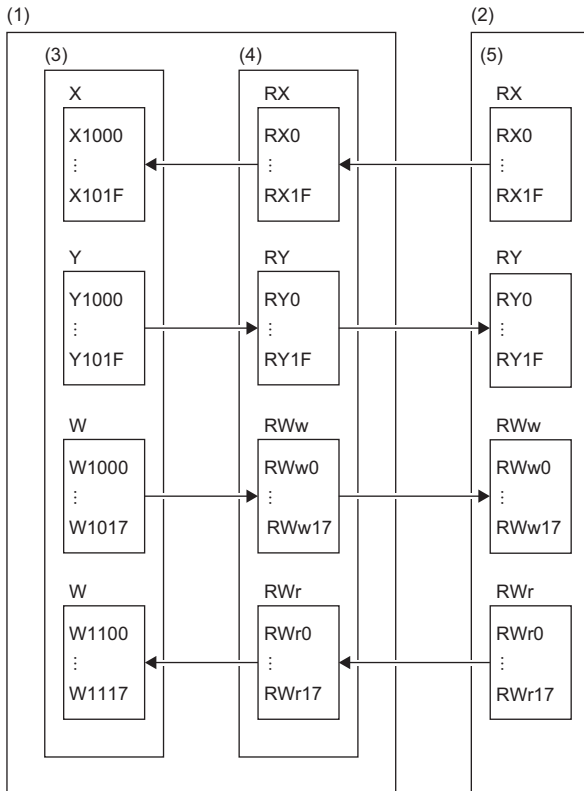
(1) Master station (station No.0)
(2) Remote device station (station No.1)
(3) CPU module
(4) Master/local module
(5) D/A converter module

Programming conditions

D/A conversion in CH1, CH2, CH5, and CH6 of the D/A converter module is enabled and the written digital values are output as analog data. Scaling conversion is performed in CH1 and CH5 and alert output is performed in CH2 and CH6.

Initial settings

■Station parameter

Setting item	Setting value
Cyclic data update watch time setting	5

■Basic module parameter

Setting item		Setting value
D/A conversion enable/disable setting	CH1 D/A conversion enable/disable setting	0: Enable
	CH2 D/A conversion enable/disable setting	0: Enable
	CH5 D/A conversion enable/disable setting	0: Enable
	CH6 D/A conversion enable/disable setting	0: Enable
Analog output HOLD/CLEAR setting	CH1 Analog output HOLD/CLEAR setting	1: HOLD
	CH5 Analog output HOLD/CLEAR setting	1: HOLD
Alert output function	CH2 Alert output setting	0: Enable
	CH2 Alert output upper limit value	10000
	CH2 Alert output lower limit value	3000
	CH6 Alert output setting	0: Enable
	CH6 Alert output upper limit value	10000
	CH6 Alert output lower limit value	3000
Scaling function	CH1 Scaling enable/disable setting	0: Enable
	CH1 Scaling upper limit value	32000
	CH1 Scaling lower limit value	0
	CH5 Scaling enable/disable setting	0: Enable
	CH5 Scaling upper limit value	32000
	CH5 Scaling lower limit value	0

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

8

Devices used by user

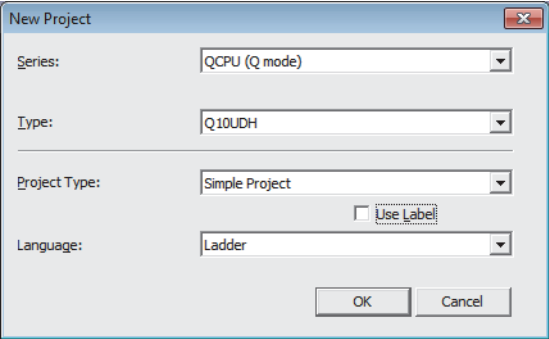| Device	Description	
X20	Digital value write command	QX10 (X20 to X2F)
X22	Batch analog output enable command	
X24	Alert output clear command	
X26	Error clear command	
X1007	Warning flag	NZ2GFCE-60DAV8 (X1000 to X101F)
X1009	Initial data setting completed flag	
X100A	Error flag	
X100B	Remote READY	
X101E	Alert output signal	
Y100A	Error clear request flag	NZ2GFCE-60DAV8 (Y1000 to Y101F)
Y1010	CH1 Output enable/disable flag	
Y1011	CH2 Output enable/disable flag	
Y1014	CH5 Output enable/disable flag	
Y1015	CH6 Output enable/disable flag	
Y101E	Alert output clear request flag	
W1002	CH1 Digital value	Remote register RWw
W1003	CH2 Digital value	
W1006	CH5 Digital value	
W1007	CH6 Digital value	
W1100	Latest error code	Remote register RWr
W1101	Latest warning code	
D2002	CH1 Digital value	Device for storage
D2003	CH2 Digital value	
D2006	CH5 Digital value	
D2007	CH6 Digital value	
D2100	Latest error code	
D2110	Alert output flag	
D2120	Latest warning code	
D2130	CH1 Set value check code	
D2131	CH2 Set value check code	
D2134	CH5 Set value check code	
D2135	CH6 Set value check code	
F0	CH2 Upper limit alert occurrence	
F1	CH2 Lower limit alert occurrence	
F2	CH6 Upper limit alert occurrence	
F3	CH6 Lower limit alert occurrence	
SM400	Always ON	
SB49	Data link status of the own station (master station)	
SW0B0.0	Data link status of each station (station number 1)	
M0	Communication ready flag (station number 1)	
N0	Nesting (station number 1)	

Setting procedure

Connect GX Works2 to the master station to set up the settings.

1. Create a project on GX Works2.

On "Series", select "QCPU (Q mode)" and on "Type", select "Q10UDH".
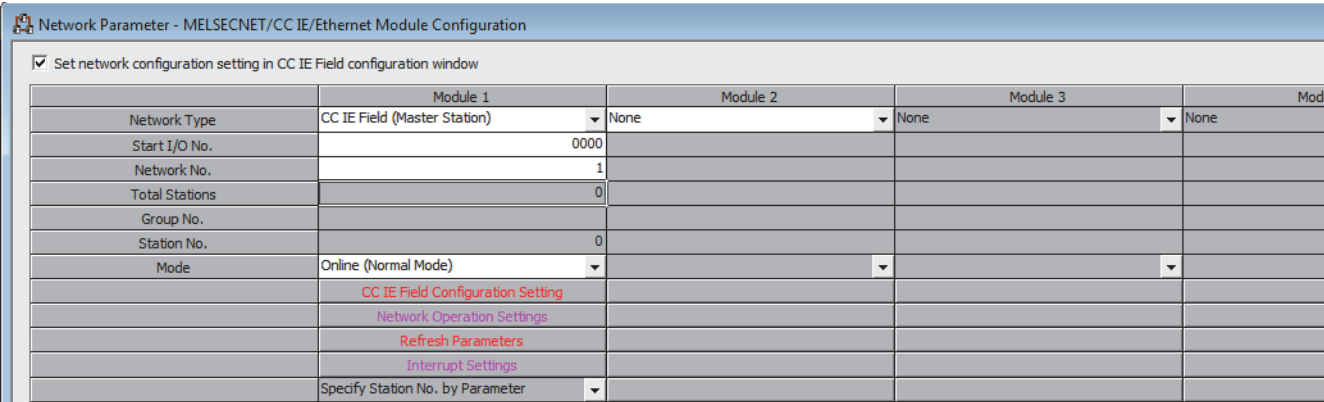
⬯ [Project] ⇨ [New]

New Project	
Series:	QCPU (Q mode)
Type:	Q10UDH
Project Type:	Simple Project
	☐ Use Label
Language:	Ladder
	OK Cancel

2. Open the network parameter setting window and configure the settings as shown below.

⬯ Project window ⇨ [Parameter] ⇨ [Network Parameter] ⇨ [Ethernet / CC IE / MELSECNET]

Network Parameter - MELSECNET/CC IE/Ethernet Module Configuration

☑ Set network configuration setting in CC IE Field configuration window

	Module 1	Module 2	Module 3	Mod
Network Type	CC IE Field (Master Station)	None	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			

8

3. Open the CC IE Field Configuration window and set up the configuration and station number of a device station as shown below.

☞ [CC IE Field Configuration Setting] button
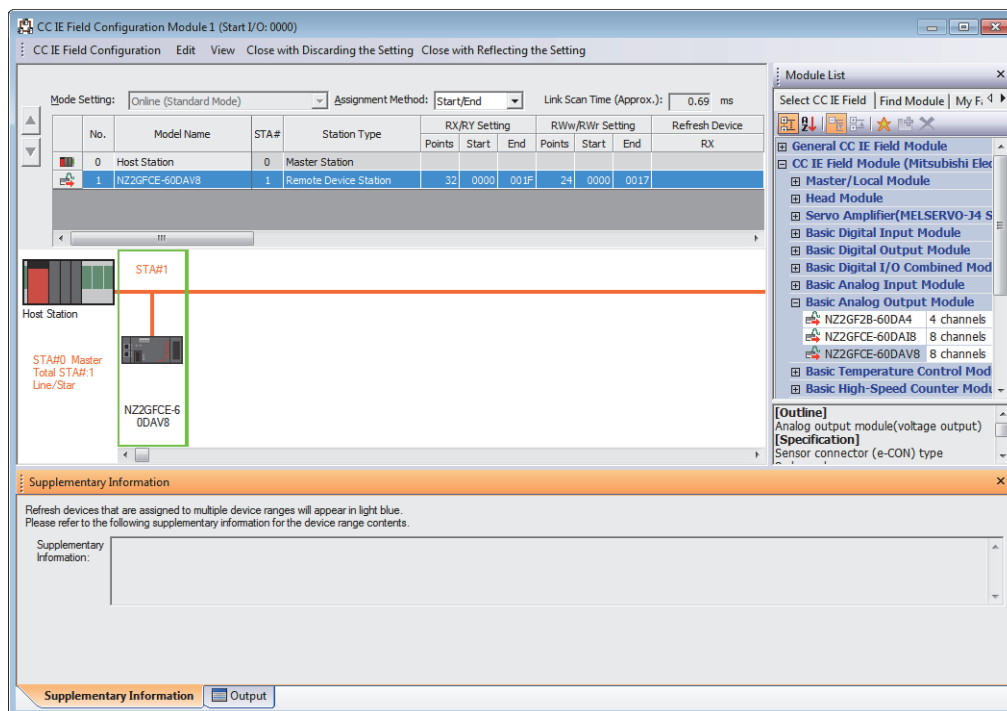
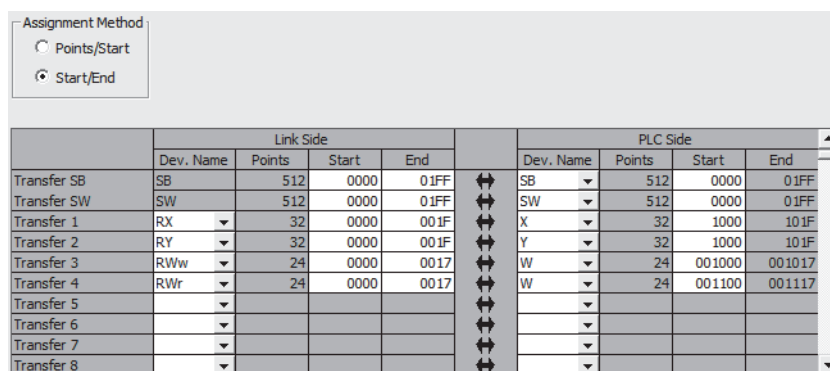**4.** Close the CC IE Field Configuration window.

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

5. Open the refresh parameter setting window and configure the settings as shown below.

☞ [Refresh Parameters] button

		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	RWw	24	0000	0017	↔	W	24	001000	001017
Transfer 4	RWr	24	0000	0017	↔	W	24	001100	001117
Transfer 5					↔				
Transfer 6					↔				
Transfer 7					↔				
Transfer 8					↔				

6. Write the set parameters 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. Open the "Parameter Processing of Device Station" window.

☞ Project window ⇨ [Parameter] ⇨ [Network Parameter] ⇨ [Ethernet / CC IE / MELSECNET] ⇨ [CC IE Field Configuration Setting] button ⇨ Select the main D/A converter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Online] ⇨ [Parameter Processing of Device Station]

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

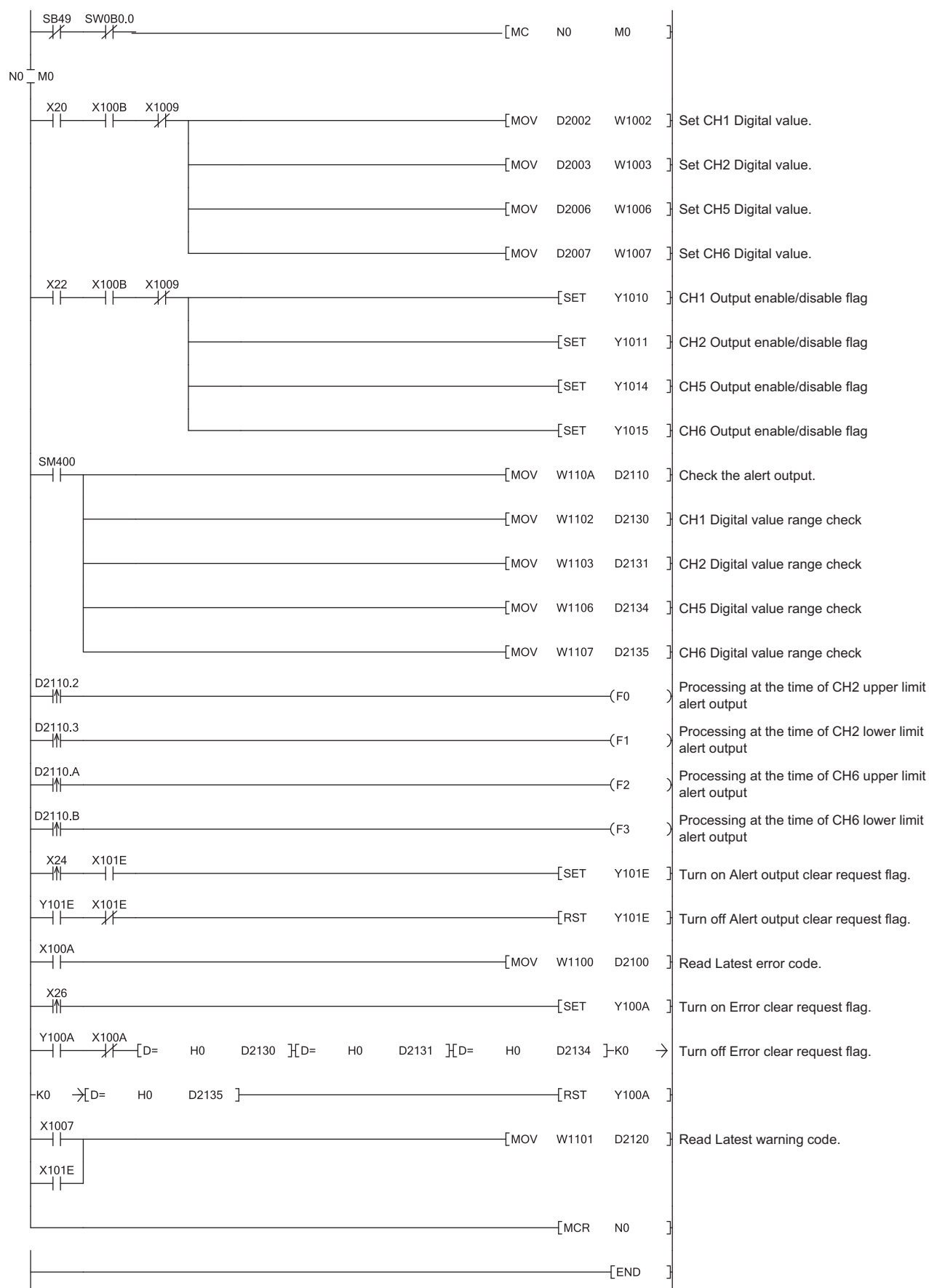**9.** Set "Write Value". Follow the next steps to set the value:
- Click the title cell of "Initial Value" to select all the items, and copy them.
- Click the title cell of "Write Value" to select all the items, and paste the copy.
- Select the items to be changed, and set new values as described in Initial settings (☞ Page 79 Initial settings).

10. Click the [Execute Parameter Processing] button to write the parameters to the D/A converter module.

Program example

1. Create the following programs with GX Works2.

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

        X20   X100B  X1009
         |     |      /|                                  ─[MOV   D2002    W1002 ]   Set CH1 Digital value.

                                                          ─[MOV   D2003    W1003 ]   Set CH2 Digital value.

                                                          ─[MOV   D2006    W1006 ]   Set CH5 Digital value.

                                                          ─[MOV   D2007    W1007 ]   Set CH6 Digital value.

        X22   X100B  X1009
         |     |      /|                                  ─[SET            Y1010 ]   CH1 Output enable/disable flag

                                                          ─[SET            Y1011 ]   CH2 Output enable/disable flag

                                                          ─[SET            Y1014 ]   CH5 Output enable/disable flag

                                                          ─[SET            Y1015 ]   CH6 Output enable/disable flag

        SM400
         |                                                ─[MOV   W110A    D2110 ]   Check the alert output.

                                                          ─[MOV   W1102    D2130 ]   CH1 Digital value range check

                                                          ─[MOV   W1103    D2131 ]   CH2 Digital value range check

                                                          ─[MOV   W1106    D2134 ]   CH5 Digital value range check

                                                          ─[MOV   W1107    D2135 ]   CH6 Digital value range check

      D2110.2
        |↑|                                                        (F0  )   Processing at the time of CH2 upper limit
                                                                            alert output
      D2110.3
        |↑|                                                        (F1  )   Processing at the time of CH2 lower limit
                                                                            alert output
      D2110.A
        |↑|                                                        (F2  )   Processing at the time of CH6 upper limit
                                                                            alert output
      D2110.B
        |↑|                                                        (F3  )   Processing at the time of CH6 lower limit
                                                                            alert output
        X24   X101E
        |↑|    |                                          ─[SET            Y101E ]   Turn on Alert output clear request flag.

      Y101E  X101E
        |     /|                                          ─[RST            Y101E ]   Turn off Alert output clear request flag.

      X100A
        |                                                 ─[MOV   W1100    D2100 ]   Read Latest error code.

        X26
        |↑|                                               ─[SET            Y100A ]   Turn on Error clear request flag.

      Y100A  X100A
        |     /|   ─[D=    H0   D2130 ]─[D=   H0   D2131 ]─[D=   H0   D2134 ]─K0   →  Turn off Error clear request flag.

      K0  →─[D=    H0   D2135 ]─                          ─[RST            Y100A ]

      X1007
        |                                                 ─[MOV   W1101    D2120 ]   Read Latest warning code.
      X101E
        |

                                                          ─[MCR   N0    ]

                                                          ─[END  ]
```

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

3. Put the CPU module of the master station into RUN.

8

9 MAINTENANCE AND INSPECTION

There are no special inspection item as a D/A converter module; however, to maintain the best condition of the system, perform the inspection in accordance with the items described in the user's manual for the CPU module used.

MEMO

10 TROUBLESHOOTING

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

10.1 How to Check Error Codes and Alarm Codes

Error codes can be checked by any of the following methods:
- Checking by executing a command of the device station (☞ Page 88 Checking by executing a command of the device station)
- Checking by Latest error code (RWr0) (☞ Page 90 Checking by Latest error code (RWr0))
- Checking by Latest warning code (RWr1) (☞ Page 90 Checking by Latest warning code (RWr1))

Alarm codes can be checked by any of the following methods:
- Checking by executing a command of the device station (☞ Page 88 Checking by executing a command of the device station)
- Checking by Latest warning code (RWr1) (☞ Page 90 Checking by Latest warning code (RWr1))

Checking by executing a command of the device station

The procedure below shows how to check the errors by executing a command of the device station.

1. On the "CC IE Field Configuration" window, select the D/A converter module from "List of stations".
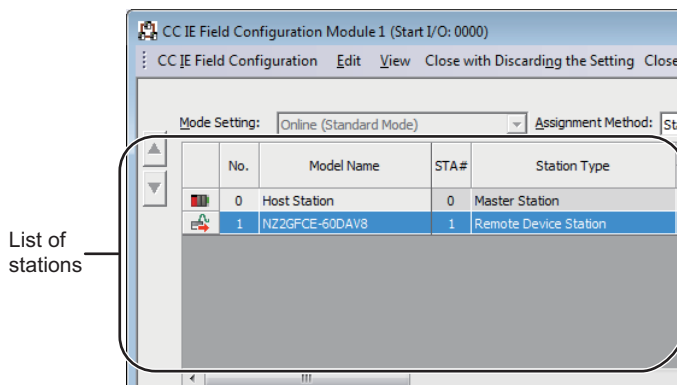
2. Open the "Command Execution of Device Station" window.

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

3. Set "Method selection" to "Error history read" and click the [Execute] button.

4. In the window that appears (shown left), click the [Yes] button.

5. In the window that appears (shown left), click the [OK] button.

6. The error history of the D/A converter module is displayed in "Execution Result".

Item	Description
Error and Solution	Shows how to take the appropriate action for the error that has occurred.
Order of generation	Shows the order of error occurrence. (A value between 0 and 65535 is stored.)
[Error time] First two digits of the year/Last two digits of the year	Shows the date and time of error occurrence. (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 value	Stores the value in CH☐ Digital value (RWw2 to RWw9) at the time of occurrence of an error.
CH2 Digital value	
CH3 Digital value	
CH4 Digital value	
CH5 Digital value	
CH6 Digital value	
CH7 Digital value	
CH8 Digital value	

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.
- The clock information of occurred error is based on the clock information acquired from the CPU module of the master station. To obtain the accurate data and time of an error, synchronize the clock information of the CPU module to the real time.
- Reading the error history of this module requires the CPU module to be in the STOP status. With the RUN status, the read would fail.
- 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.
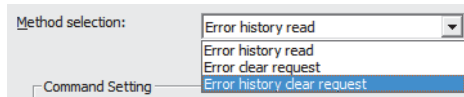
Checking by Latest error code (RWr0)

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

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

Ex.
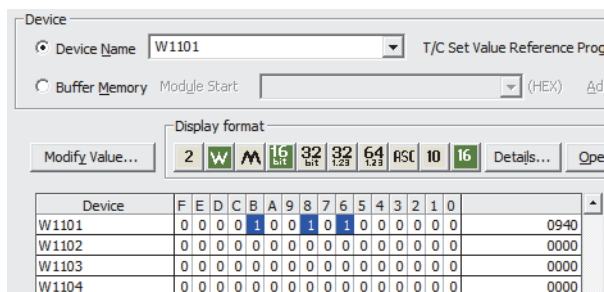When the refresh target device for Latest error code (RWr0) is W1100
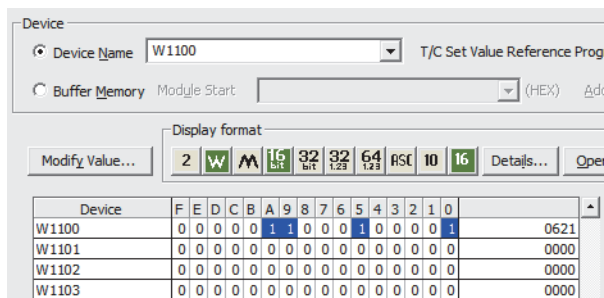
Checking by Latest warning code (RWr1)

Check the error 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 W1101

10.2 Error Code List

This section describes error codes.

Error codes are classified by error number as follows.

Error code	Classification	Reference
0000H to 0FFFH, 1F00H to 1F40H, D52BH	Errors relating to the D/A converter module	Page 91 List of error codes (0000H to 0FFFH, 1F00H to 1F40H, D52BH)
D000H to DFFFH (D52BH excluded)	Errors relating to the CC-Link IE Field Network (communication error)	Page 93 List of error codes (D000H to DFFFH (D52BH excluded))

List of error codes (0000H to 0FFFH, 1F00H to 1F40H, D52BH)

The errors are classified into the following three types:

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

If any of these errors occurs, check that the D LINK LED lights up, and take the corrective actions corresponding to the error code with the list 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 failure of the module is a possible cause. Please consult your local Mitsubishi representative.
010□H	Moderate error	Range setting out-of-range	The value set in Range setting (CH1 to CH4) (address: 0103H) or Range setting (CH5 to CH8) (address: 0104H) is out of the range. □ indicates the number of the channel that has been incorrectly set.	Set a value again in Range setting (CH1 to CH4) (address: 0103H) or Range setting (CH5 to CH8) (address: 0104H).
0130H[1]	Moderate error	Non-volatile memory data error (parameter)	The parameter data stored in the non-volatile memory are abnormal.	• To set the parameters of the non-volatile memory back to their default, change Parameter area initialization command (address: 1002H) as follows: Not commanded (0)→Commanded (1)→Not commanded (0). • Set the parameters again. • Take measures to reduce noise, such as using a shield wire for connection. • If this error persists, the failure of the module is a possible cause. 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 abnormal.	• 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 failure of the module is a possible cause. Please consult your local Mitsubishi representative.
0160H	Minor error	Remote buffer memory access error	A buffer memory area other than the remote buffer memory areas has been accessed using the REMFR/REMTO instruction.	Correct the setting data of the REMFR/REMTO instruction to access the remote buffer memory.
062□H[1]	Moderate error	Alert output upper/lower limit value inversion	The alert output lower limit value has been set equal to or greater than the alert output upper limit value in CH1 Alert output upper limit value (address: 0108H) to CH8 Alert output lower limit value (address: 0117H). □ indicates the number of the channel where an error has occurred.	Correct the settings of CH1 Alert output upper limit value (address: 0108H) to CH8 Alert output lower limit value (address: 0117H) so that the alert output lower limit value is smaller than the alert output upper limit value.

Error code (hexadecimal)	Classification	Error name	Description and cause	Action
090□H[*1]	Moderate error	Scaling setting out-of-range	The values set in CH1 Scaling lower limit value (address: 0119H) to CH8 Scaling upper limit value (address: 0128H) are out of the range from -32000 to 32000. □ indicates the number of the channel where an error has occurred.	Adjust CH1 Scaling lower limit value (address: 0119H) to CH8 Scaling upper limit value (address: 0128H) to fall within the range from -32000 to 32000.
091□H[*1]	Moderate error	Scaling upper/lower limit value inverted	CH1 Scaling lower limit value (address: 0119H) to CH8 Scaling upper limit value (address: 0128H) have been set as follows: Scaling lower limit value ≥ Scaling upper limit value. □ indicates the number of the channel where an error has occurred.	Adjust the settings of CH1 Scaling lower limit value (address: 0119H) to CH8 Scaling upper limit value (address: 0128H) as follows: Scaling lower limit value < Scaling upper limit value.
0930H	Moderate error	Cyclic data update watch time setting out-of-range	The value set in Cyclic data update watch time (address: 0007H) is out of the range from 0 to 20.	Set a value within the range from 0 to 20 in Cyclic data update watch time (address: 0007H).
0940H	Minor error	Station number switch changing error	The setting of the station number switch has been changed while the module power is on.	While the module power is on, set the switch again to the station number that has been set before.
0950H	Moderate error	Clock data out-of-range	The clock data acquired from the CPU module is invalid.	The influence of noise or the hardware failure is a possible cause. 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	An invalid data that implies an altered setting of the communication LSI has been received.	Take measures against noise and reset the module. If the same error occurs again, the hardware failure of the module is a possible cause. Please consult your local Mitsubishi representative.
0970H	Major error	Communication error 4	An invalid data that implies an altered setting of the communication LSI has been received.	Take measures against noise and reset the module. If the same error occurs again, the hardware failure of the module is a possible cause. Please consult your local Mitsubishi representative.
D52BH	Major error	Communication error 2	An error has occurred in the communication.	• The malfunction due to noise or other factors is a possible cause. Check the distance of the wire and cables and the grounding condition of the individual devices, and then take measures against noise. • Execute a unit test for the module. If the same error occurs again, the hardware failure of the module is a possible cause. Please consult your local Mitsubishi representative.

*1 To clear the error, modify the set value within the range and perform one of the following two operations:
Turning on and off Error clear request flag (RYA)
Turning on and off Initial data setting request flag (RY9)

Point

In the event of multiple errors, only the latest error code is stored in Latest error code (RWr0) or Latest warning code (RWr1).

The errors 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 88 Checking by executing a command of the device station
☞ Page 116 Error history data

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

While any of these errors occurs, the ERR. LED does not turn on. Based on the behavior of the D LINK LED at the occurrence of an error, the errors are classified into two types, each of which requires different troubleshooting.

■Communication errors where the D LINK LED flashes or turns off

This type of communication error results in the D LINK LED flashing or being turned off. Troubleshoot the problem with the CC-Link IE Field Network diagnostics. (☞ Page 74 CC-Link IE Field Network Diagnostic Function)

Error code (hexadecimal)	Error name	Description and cause	Action
D0E0H	Station type mismatch	The network parameters are incorrect or out of the range.	In the network configuration settings of the master station, change the station type of the module to the remote device station.
D0E1H	Own station set to reserved station	The network parameters are incorrect or out of the range.	• In the network configuration settings of the master station, cancel the reserved station specification. • Change the station number of the module to a station number that is not specified as a reserved station.
D0E2H	Own station's station number duplication error	The settings of the station number switch are invalid or out of the range.	• Change the station number avoiding duplication of the station number with other stations. • After taking the above action, power off and on or reset all the stations where a own station's station number error has been detected.
D0E3H	Own station's station number out-of-range	The network parameters are incorrect or out of the range.	Add the station information of the module to the network configuration settings of the master station.
D72AH	Station number switch out-of-range (a value other than 1 to 120)	A station number out of the range has been set.	Set the station number within the allowable range.

■Communication errors where the D LINK LED does not change

This type of communication error results in no change of the D LINK LED. These errors are not shown in CC-Link IE Field Network diagnostics because they are automatically recovered after the occurrence. Troubleshooting them requires the error history to be read out. (☞ Page 88 Checking by executing a command of the device station)

Error code (hexadecimal)	Error name	Description and cause	Action
D217H	Transient data request command error	The transient data request command is incorrect.	Correct the request command at the transient request source, and execute the command again.
D2A0H	Receive buffer full error	There is an overload of the received transient data.	• Check the network status using CC-Link IE Field Network diagnostics of the engineering tool to take the appropriate action. • If the received transient data of the target station is overloaded, leave the send source for a certain time and try to send the data.
D2A3H	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 execution.
DF01H	Received transient split error	The received transient data is split.	Set the transient data size that the module can accommodate, and modify the transient data to the one that is not split. Then send it again.

Point

In the event of multiple errors, only the latest error code is stored in Latest error code (RWr0) or Latest warning code (RWr1).

The errors 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 88 Checking by executing a command of the device station

☞ Page 116 Error history data

10.3 Alarm Code List

Here is the list of alarm codes:

Alarm code (hexadecimal)	Classification	Alarm name	Description and cause	Action
060□H[*1]	Minor error	Digital value out-of-range	The value set in CH□ Digital value (RWw2 to RWw9) is out of the range. □ indicates the number of the channel where an error has occurred.	Set the value of CH□ Digital value (RWw2 to RWw9) within the allowable output range.
0A△□H	Minor error	Alert occurrence	An alert is occurring. □ indicates the number of the channel where an alert has been issued. △ indicates the status as follows: 0: Upper limit alert 1: Lower limit alert	Adjust the digital value to fall within the range, and turn on and off Alert output clear request flag (RY1E).

*1 To clear the error, modify the set value within the range and perform one of the following two operations:
Turning on and off Error clear request flag (RYA)
Turning on and off Initial data setting request flag (RY9)

10.4 Checking 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?	If any LED other than the PW LED turns on, the hardware failure is a possible cause. 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).
Does the voltage of the module power supply (24VDC) conform to the specified range?	Adjust the voltage value to conform to the range of performance specifications.

When the RUN LED does not turn on

Check item	Action
Does the voltage of the module power supplied externally reach to the voltage of the performance specifications?	Verify that the voltage of the module power supply lies in the range of performance specifications. ☞ Page 14 Performance Specifications After the check, turn off and on the module power supply.
Does any hardware error occur?	If the RUN LED does not turn on even after the module power supply is turned from off to on, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.

When the MODE LED flashes

Check item	Action
Is the D/A converter module in the unit test?	If the D/A converter module is in 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 97 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 if 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 bend radius.
Is any Ethernet cable disconnected?	Replace the Ethernet cable.
Do other stations connected to the D/A converter module operate normally?	Check if the power supplies of the other stations are turned on.
Does the switching hub normally operate?	• Check if a 1000BASE-T-compliant switching hub is used. 📖 User's manual for the master/local module used • Check if the power supply of the switching hub is turned on.
Does the station number of the D/A converter module overlap with the other stations?	Two or more stations are overlapping. Change the setting so that all the station numbers differ.

When the D LINK LED flashes

Check item	Action
Does the set station number of the D/A converter module match the station number of the D/A converter module that is set up in the network configuration settings of the master station or in the CC IE Field configuration?	Match the station number of the D/A converter module with the station number that is set up in the network configuration settings of the master station or in the CC IE Field configuration.
Is the station type remote device station?	In the network configuration settings of the master station, change the station type of the module to the remote device station.
Is the D/A converter module a reserved station?	Change the setting of reserved/invalid error station to other than the reserved station in the network configuration settings of the master station.
Is stop of the data link checked 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?	The setting range for the station number setting switch is 1 to 120. Set a number 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 a master station with a different network number, power off and on the D/A converter module.

When the L ER LED turns on

Check item	Action
Are Ethernet cables normal?	• Check if 1000BASE-T-compliant Ethernet cables are used. 📖 User's manual for the master/local module used • Check if the station-to-station distance is 100m or less. • Check if the Ethernet cables are not disconnected.
Does the switching hub used in the system operate normally?	• Check if a 1000BASE-T-compliant switching hub is used. 📖 User's manual for the master/local module used • Check if the power supply of the switching hub is turned on.
Do other stations connected to the D/A converter module operate normally?	Check if the power supplies of the other stations are turned on.
Is the mode of the master station set to other than Online?	Change the mode of the master station to Online.
Is there any noise affecting the system?	• Check the wiring condition of the Ethernet cables. • Ground the control panel in which the D/A converter module was installed.
Is the loopback function enabled for the master station?	When the loopback function is enabled, check if 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 if 1000BASE-T-compliant Ethernet cables are used. 📖 User's manual for the master/local module used • Check if the station-to-station distance is 100m or less. • Check if the Ethernet cables are not disconnected.
Do the switching hub and other stations used in the system operate normally?	Check if 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 the wiring of Ethernet cable, refer to the following.
> ☞ Page 37 Wiring of Ethernet cable

When the ERR. LED turns on

Check item	Action
Does any error occur?	Identify the error factor of the D/A converter module with the engineering tool to take corrective action. ☞ Page 88 How to Check Error Codes and Alarm Codes

When the ALM LED turns on or flashes

■When ALM LED turns on

Check item	Action
Has an alert been output in the D/A converter module?	Check Alert output flag (RWrA).

■When the ALM LED flashes

Check item	Action
Has an out-of-range digital value error occurred in the D/A converter module?	Check Set value check code (RWr2 to RWr9) of the corresponding channel.

10.5 Unit Test

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

1. Turn off the module power supply.

2. Connect the PORT1 and PORT2 connectors of the D/A converter module with an Ethernet cable.

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

4. Turn on the module power supply.

5. Unit test begins.
The MODE LED flashes during the unit test.

6. Upon the completion of the unit test, the MODE LED turns off.
 • When completed normally, the ERR. LED does not turn on, remaining off.
 • When completed with an error, the ERR. LED turns on. If the unit test is completed with an error, replace the Ethernet cable and run the test again. If the test is completed with an error again, the hardware failure in the D/A converter module is a possible cause. Please consult your local Mitsubishi representative.

Point

When the unit test is completed with an error, the error details can be checked in the error history.

To check the error history, set the station number of the D/A converter module and connect the module to the master station with an Ethernet cable.

For the error history, refer to the following:
☞ Page 88 Checking by executing a command of the device station
☞ Page 116 Error history data

10.6 Troubleshooting by Symptom

This section describes troubleshooting problem by problem.

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

When the analog output value is not output

Check item	Action
Is there any problem with the wiring, such as looseness or disconnection of analog signal lines?	Check the faulty area by checking signal line visually or conductively.
Does the voltage of the module power supplied externally reach to the voltage of the performance specifications?	Verify that the voltage of the module power supply lies in the range of performance specifications. ☞ Page 14 Performance Specifications 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 from off to on, the failure of the module is a possible cause. Please consult your local Mitsubishi representative.
Is the CPU module in the STOP status?	Change the status of the CPU module to RUN.
Is the output range setting correct?	Verify Range setting (CH1 to CH4) (address: 0103H) and Range setting (CH5 to CH8) (address: 0104H) by using the engineering tool or the dedicated instruction. If the output range setting is incorrect, set the range again by the program or the parameter settings.
Is D/A conversion disabled for the channels where the analog value is to be output?	Check D/A conversion enable/disable setting (address: 0102H) by using the engineering tool or the dedicated instruction. Then, set the D/A conversion to be enabled by the program or the parameter settings.
Is CH□ Output enable/disable flag (RY10 to RY17) set to OFF for the channels where the analog value is to be output?	Check the setting for CH□ Output enable/disable flag (RY10 to RY17) on the monitor of the engineering tool. When CH□ Output enable/disable flag (RY10 to RY17) is in an off state, check the program again.
Is a digital value written to the channel where the analog value is to be output?	Check the setting for CH□ Digital value (RWw2 to RWw9) on the monitor of the engineering tool.
Is Initial data setting request flag (RY9) executed?	Check if the analog value is output properly after turning on and off Initial data setting request flag (RY9) using the engineering tool. If the output is performed properly, check the program again.

Point

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

When the analog output value is not held

Check item	Action
Is the setting for the analog output HOLD/CLEAR function correct?	Set HOLD for the analog output HOLD/CLEAR function using the engineering tool. Check the values set for Analog output HOLD/CLEAR setting (CH1 to CH4) (address: 0105H) and Analog output HOLD/CLEAR setting (CH5 to CH8) (address: 0106H).

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

Check item	Action
Is the D LINK LED of the D/A converter module on?	Check the D LINK LED of the D/A converter module and if it is not on, perform troubleshooting by referring to the following: ☞ Page 95 When the D LINK LED turns off ☞ Page 95 When the D LINK LED flashes Check for other LEDs by referring to the following. ☞ Page 94 Checking the LEDs
Is the version of the module on the master station correct?	Check the serial number (first five digits) of the module on 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 26 Supported 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 the engineering tool. For the supported version, refer to the following: ☞ Page 26 Supported software package
Are network parameter settings same as the settings of the CPU module?	Perform "Verify with PLC" and check that network parameter settings match the settings of the CPU module. If they differ, match the settings by performing "Read from PLC" and "Write to PLC", and write the parameters to modules on device stations.

APPENDICES

Appendix 1 Details of Remote I/O Signals

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

The described assignment of device numbers assumes that the remote I/O signals of D/A converter modules are assigned as follows:

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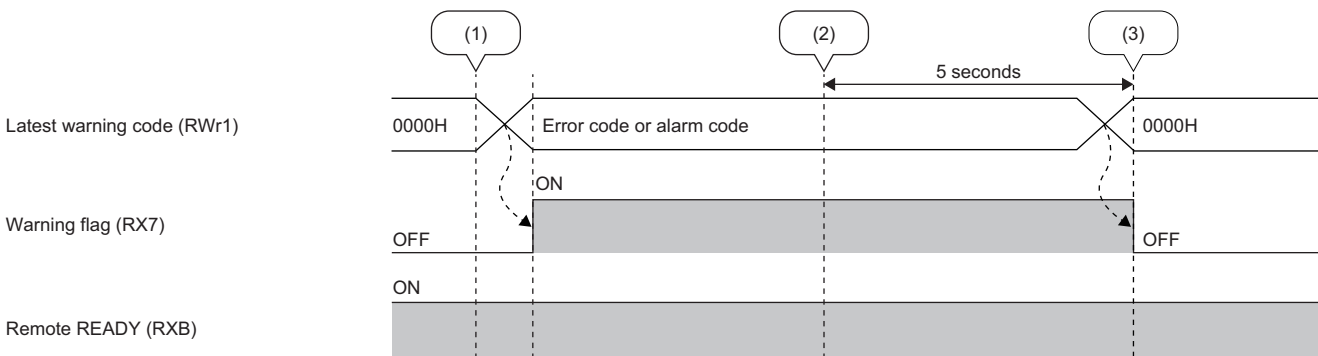
Remote input signals

Warning flag

■Device number

Signal name	Device number
Warning flag	RX7

■Description

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

Eliminating the cause of the minor error occurred and waiting for five seconds results in Latest warning code (RWr1) turning to 0000H and Warning flag (RX7) turning off.

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

(1) A minor error occurs.

(2) A minor error is resolved.

(3) 5 seconds have passed.

Initial data setting completed flag

■Device number

| Signal name	Device number
Initial data setting completed flag	RX9

■Description

Initial data setting completed flag (RX9) turns on after the following actions are executed and the change of operating conditions is completed.

1. Write the parameter data to a remote buffer memory area using the REMTO instruction.

2. Turn on Initial data setting request flag (RY9).

For the remote buffer memory areas that require Initial data setting request flag (RY9) to be turned on and off to enable written parameter data, refer to the following:

☞Page 19 List of Remote Buffer Memory Areas
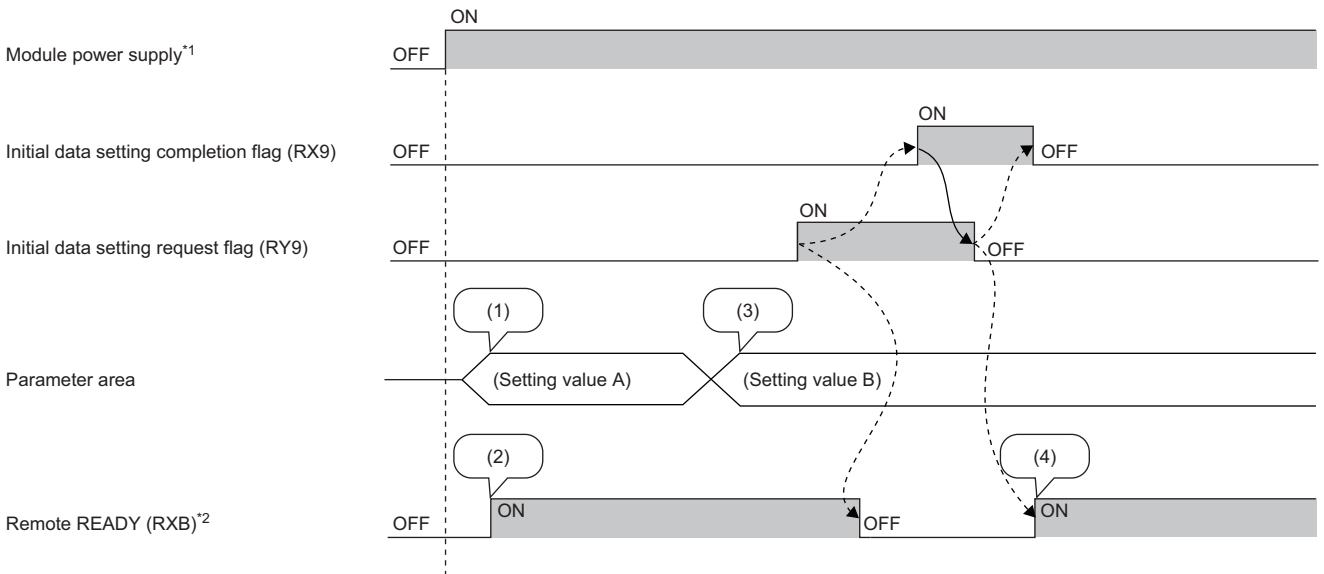
- - - - - - - ▶ Executed by the D/A converter module
─────▶ Executed by the program
(1) The setting is read from non-volatile memory.
(2) With Setting value A, action starts.
(3) The setting value is changed by the user.
(4) Action with Parameter setting value B starts in this timing.

*1 For data link to be made at the power-on of the module power supply
*2 When turning on and off Initial data setting request flag (RY9), check that Remote READY (RXB) turns on before starting the control.
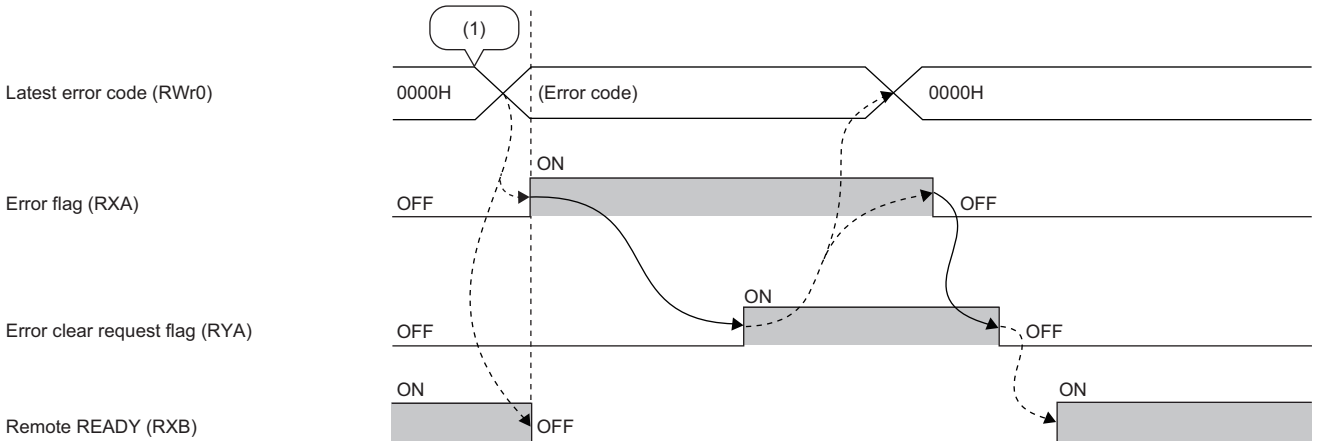
A

Error flag

■Device number

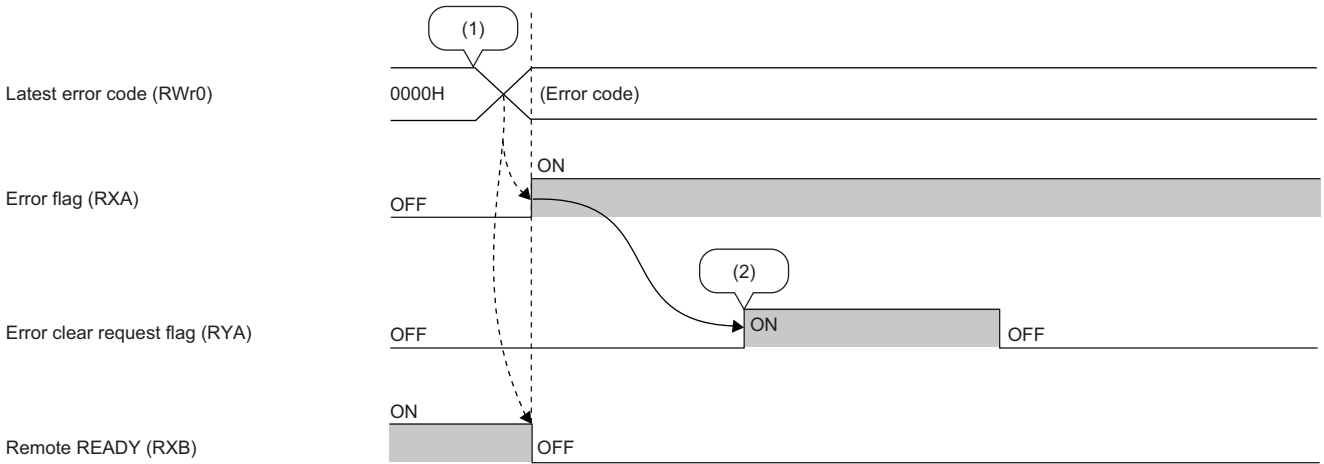| Signal name	Device number
Error flag	RXA

■Description

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

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

• When a moderate error occurs

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

────▶ Executed by the program

(1) An error occurs.

• When a major error occurs

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

────▶ Executed by the program

(1) An error occurs.

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

■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, set "1" in Error history clear command (address: 1000H).

For the error history clear, refer to the following:

☞Page 117 Error history clear command

Remote READY

■Device number

Signal name	Device number
Remote READY	RXB

■Description

Remote READY (RXB) turns on when the module power supply is turned on.

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

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

Alert output signal

■Device number

Signal name	Device number
Alert output signal	RX1E

■Description

Alert output signal (RX1E) turns on if a digital value falls into any of the following conditions even in one channel out of all the channels where D/A conversion is enabled:

- Digital value > Alert output upper limit value
- Digital value < Alert output lower limit value


```
----------▶ Executed by the D/A converter module
——————▶ Executed by the program
```
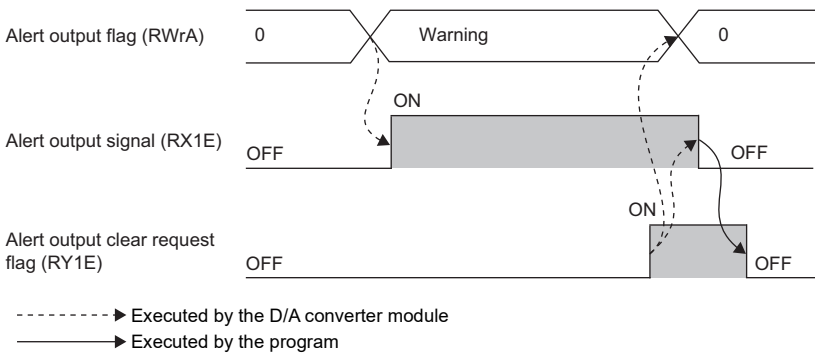
■How to turn off the alert output signal

Turn off the signal by either of the following methods:

- Turning on and off Alert output clear request flag (RY1E)
- Turning on and off Initial data setting request flag (RY9)

An alarm code, if stored in Latest warning code (RWr1), is cleared.

Remote output signals

Initial data setting request flag

■Device number

Signal 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 using the program.

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

For the timing of when to turn on and off, refer to the following:

Error clear request flag

■Device number

Signal name	Device number
Error clear request flag	RYA

■Description

Error clear request flag (RYA) is used to clear Error flag (RXA) and Latest error code (RWr0).

■When a moderate error occurs

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

Before Error flag (RXA) turns off, turning on and off Error clear request flag (RYA) does not allow Error flag (RXA) to turn off.

For the timing of when to turn on and off, refer to the following:

■When a major error occurs

Error flag (RXA) does not turn off even by turning on and off Error clear request flag (RYA).

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

Output enable/disable flag

■Device number

Signal name	Device number							
	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
CH☐ Output enable/disable flag	RY10	RY11	RY12	RY13	RY14	RY15	RY16	RY17

■Description

CH☐ Output enable/disable flag (RY10 to RY17) sets whether to output the D/A conversion value or the offset value for each channel.

• ON: D/A conversion value
• OFF: Offset value

■D/A conversion cycle

Regardless of turning off and on CH☐ Output enable/disable flag (RY10 to RY17), the conversion cycle is fixed.

Alert output clear request flag

■Device number

Signal name	Device number
Alert output clear request flag	RY1E

■Description

When the alert output is cleared, Alert output clear request flag (RY1E) turns on and off.

For the timing of when to turn on and off, refer to the following:

☞ Page 103 Alert output signal

A

Appendix 2 Details of Remote Registers

This section describes the details of the remote registers for a master/local module.

The described assignment of device numbers assumes that the remote registers of D/A converter modules are assigned as follows:

- RWr0 to RWr17
- RWw0 to RWw17

Latest error code

■Device number

Remote register name	Device number
Latest error code	RWr0

■Description

For Latest error code (RWr0), an error code is stored when a moderate error or major error occurs.

Turning on Error clear request flag (RYA) after eliminating the cause of the error clears the error code.

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

Latest warning code

■Device number

Remote register name	Device number
Latest warning code	RWr1

■Description

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

After a minor error has occurred, eliminating the cause of the error and then waiting for five seconds result in the error code being automatically cleared.

For details on how to clear an alarm code, refer to the following:

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

Set value check code

■Device number

Remote register name	Device number							
	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
CH□ Set value check code	RWr2	RWr3	RWr4	RWr5	RWr6	RWr7	RWr8	RWr9

■Description

For CH□ Check Set value check code (RWr2 to RWr9), when the set digital value is out of the setting range, the check code is stored.

The following table lists the check codes.

Check code	Description
000FH	A digital value exceeding the setting range is written.
00F0H	A digital value less than the setting range is written.
00FFH	Digital values greater and less than the setting range are written. For example, the check code 00FFH is stored when a digital value less than the setting range is written after a digital value greater than the setting range is written and the check code is not reset.

For all channels, 0000H (within setting range) is stored as the default value.

The stored check code is not cleared even if the digital value falls within the setting range.

When Scaling enable/disable setting (address: 0118H) is set to Enable (0), the scale-converted digital value is the target for the check code. However, when the scale-converted digital value is out of the setting range, a slight inaccuracy may be contained in the target digital value for the check code when the check code is stored due to an operational error in the scale conversion.

When a value is set for CH□ Shifting set value (RWw10 to RWw17), the value with the shifting set value added is the target for the check code.

For details on the digital value range check function, refer to the following:

☞ Page 65 Digital Value Range Check Function

■Resetting a check code

The check codes can be reset by either of the following two methods.
- Write a digital value within the setting range, and turn on and off Error clear request flag (RYA).
- Turn on and off Initial data setting request flag (RY9).

A

Alert output flag

■Device number

Remote register name	Device number
Alert output flag	RWrA

■Description

For Alert output flag (RWrA), whether the upper limit value or the lower limit value causes the alert can be checked for each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
CH8		CH7		CH6		CH5		CH4		CH3		CH2		CH1	
(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)

(1) Upper limit value (0: Normal (Default value), 1: Alarm ON)
(2) Lower limit value (0: Normal (Default value), 1: Alarm ON)

For details on the alert output function, refer to the following:

■The state of Alert output flag

On any of the following conditions, Alert (1) is stored to Alert output flag corresponding to each channel.

• Digital value > Alert output upper limit value
• Digital value < Alert output lower limit value

Of the channels where D/A conversion is enabled and alert output is enabled, an alert detected even in one channel results in Alert output signal (RX1E) turning on.

■Clearing Alert output flag

Alert output flag (RWrA) is cleared by either of the following two methods.

• Turning on and off Alert output clear request flag (RY1E)
• Turning on and off Initial data setting request flag (RY9)

Digital value

■Device number

Remote register name	Device number							
	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
CH□ Digital value	RWw2	RWw3	RWw4	RWw5	RWw6	RWw7	RWw8	RWw9

■Description

CH□ Digital value (RWw2 to RWw9) is an area where the digital value for D/A conversion is written, in 16-bit signed binary data, from the CPU module.

Output range setting	When the scaling function is disabled		When the scaling function is enabled[1]
	Setting range (Actual range)	Digital value when a value out of the setting range is written	Setting range
4 to 20mA	-288 to 12287 (Actual range: 0 to 12000)	12288 or more: 12287 -289 or less: -288	-32768 to 32767 (Maximum actual range: -32000 to 32000)
0 to 20mA			
1 to 5V			
0 to 5V			
-10 to 10V	-16384 to 16383 (Actual range: -16000 to 16000)	16384 or more: 16383 -16385 or less: -16384	

*1 The setting range and the actual range of when the scaling function is enabled depend on the settings in the scaling upper limit value and the scaling lower limit value.

For all channels, 0 is stored as the default value.

■When a value out of the setting range is written

D/A conversion is performed with the upper and lower limit value of the setting range. Simultaneously, the following status notifies that the setting is out of the range.

• The check code is stored in CH□ Set value check code (RWr2 to RWr9).

For details on the check codes, refer to the following:

• Out-of-range digital value (error code: 060□H) is stored in Latest warning code (RWr1).
• Warning flag (RX7) turns on.
• The ALM LED flashes.

Shifting set value

■Device number

Remote register name	Device number							
	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
CH□ Shifting set value	RWw10	RWw11	RWw12	RWw13	RWw14	RWw15	RWw16	RWw17

■Description

Set the shifting set value that is to be used for the shift function in 16-bit signed binary data. The digital value with shift addition is D/A converted.

For details on the shift function, refer to the following:

■Setting range

-32768 to 32767 (Default value: 0)

■Enabling the setting

Once a value is set, the shifting set value is valid regardless of turning on and off Initial data setting request flag (RY9).

A

Appendix 3 Details of Remote Buffer Memory Addresses

This appendix indicates the details of remote buffer memory addresses.

Cyclic data update watch time setting

■Address

Remote buffer memory name	Address
Cyclic data update watch time setting	0007H

■Description

Cyclic data update watch time setting (address: 0007H) sets the time to monitor the data update interval of the cyclic transmission (monitoring time).

A cyclic transmission stop status that persists over the cyclic data update watch time is regarded as being in disconnection, where the status becomes HOLD or CLEAR according to Analog output HOLD/CLEAR setting (CH1 to CH4) (address: 0105H) and Analog output HOLD/CLEAR setting (CH5 to CH8) (address: 0106H).

For Analog output HOLD/CLEAR setting (address: 0104H), refer to the following:

☞ Page 112 Analog output HOLD/CLEAR setting

> **Point**
>
> Setting a value out of the range results in the error code (0930H) being stored in Latest error code (RWr0), Error flag (RXA) turning on, and the ERR. LED lighting up, with the I/O operation stopping.

■Setting range

Item	Setting range
Cyclic data update watch time setting	• 0 (Not monitor) (default value) • 1 to 20 (0.1 to 2 seconds in units of 100ms)

■Enabling the setting

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

D/A conversion enable/disable setting

■Address

Remote buffer memory name	Address							
	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
D/A conversion enable/disable setting	0102H							

■Description

D/A conversion enable/disable setting (address: 0102H) sets whether to enable or disable D/A conversion for each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed as 0								CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1
								0: D/A conversion enabled 1: D/A conversion disabled (default value)							

■Enabling the setting

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

Range setting

■Address

Remote buffer memory name	Address
Range setting (CH1 to CH4)	0103H
Range setting (CH5 to CH8)	0104H

■Description

Range setting (CH1 to CH4) (address: 0103H) and Range setting (CH5 to CH8) (address: 0104H) each set the output range for each channel.

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0103H	CH4				CH3				CH2				CH1			
0104H	CH8				CH7				CH6				CH5			

If D/A conversion enable/disable setting (address: 0102H) is set to D/A conversion disabled, the range is not changed. To change the range, set D/A conversion enable/disable setting (address: 0102H) to D/A conversion enabled and turn on and off Initial data setting request flag (RY9).

■Setting value

The following table shows the set values.

Output range	Setting value	
	NZ2GFCE-60DAV8	NZ2GFCE-60DAI8
4 to 20mA	—	0H (default value)
0 to 20mA	—	1H
1 to 5V	2H (default value)	—
0 to 5V	3H	—
-10 to 10V	4H	—

> **Point**
>
> Setting data other than the above results in Range setting out-of-range (error code: 010□H) being stored in Latest error code (RWr0), Error flag (RXA) turning on, and the ERR. LED lighting up.

■Enabling the setting

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

A

Analog output HOLD/CLEAR setting

■Address

Remote buffer memory name	Address
Analog output HOLD/CLEAR setting (CH1 to CH4)	0105H
Analog output HOLD/CLEAR setting (CH5 to CH8)	0106H

■Description

Analog output HOLD/CLEAR setting (CH1 to CH4) (address: 0105H) and Analog output HOLD/CLEAR setting (CH5 to CH8) (address: 0106H) each set whether to hold or clear the analog value that was output when the CPU module was in the RUN state, either when in the STOP state or when an error occurs for each channel.

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0105H	CH4				CH3				CH2				CH1			
0106H	CH8				CH7				CH6				CH5			

■Setting value

Analog output HOLD/CLEAR setting	Setting value
CLEAR	0H (default value)
HOLD	1H to FH

■Enabling the setting

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

Alert output setting

■Address

Remote buffer memory name	Address
Alert output setting	0107H

■Description

Alert output setting (address: 0107H) sets whether to enable or disable alert output for each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed as 0								CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1
								0: Enable 1: Disable (default value)							

■Enabling the setting

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

Alert output upper limit value and Alert output lower limit value

■Address

Remote buffer memory name	Address							
	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
CH□ Alert output upper limit value	0108H	010AH	010CH	010EH	0110H	0112H	0114H	0116H
CH□ Alert output lower limit value	0109H	010BH	010DH	010FH	0111H	0113H	0115H	0117H

■Description

- CH□ Alert output upper limit value (address: 0108H, 010AH, 010CH, 010EH, 0110H, 0112H, 0114H, or 0116H) sets the upper limit value for the alert output range.
- CH□ Alert output lower limit value (address: 0109H, 010BH, 010DH, 010FH, 0111H, 0113H, 0115H, or 0117H) sets the lower limit value for the alert output range.

For details on the alert output function, refer to the following:

☞ Page 68 Alert Output Function

> **Point**
>
> - The settings must satisfy the condition: Alert output upper limit value > Alert output lower limit value. A channel that does not satisfy the condition causes an error with Alert output upper/lower limit value inversion (062□H) being stored in Latest error code (RWr0), Error flag (RXA) turning on, and the ERR. LED lighting up.
> - As 0 is set as a default value, change the setting value when using the alert output function.
> - When the scaling function or shift function is used, the digital value that reflects the operation of each function is the target for alert. The set digital value should allow for the operation results of each function.
> - If Alert output setting (address: 0107H) is set to Disabled (1), the settings of CH□ Alert output upper limit value and CH□ Alert output lower limit value are ignored.

■Setting range

-32768 to 32767 (Default value: 0)

■Enabling the setting

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

Scaling enable/disable setting

■Address

Remote buffer memory name	Address
Scaling enable/disable setting	0118H

■Description

Scaling enable/disable setting (address: 0118H) sets whether to enable or disable scaling for each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Fixed as 0								CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1
								0: Enable 1: Disable (default value)							

For details on the scaling function, refer to the following:
☞ Page 57 Scaling Function

■Enabling the setting

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

Scaling

■Address

Remote buffer memory name	Address							
	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
CH□ Scaling lower limit value	0119H	011BH	011DH	011FH	0121H	0123H	0125H	0127H
CH□ Scaling upper limit value	011AH	011CH	011EH	0120H	0122H	0124H	0126H	0128H

■Description

- CH□ Scaling lower limit value (address: 0119H, 011BH, 011DH, 011FH, 0121H, 0123H, 0125H, or 0127H) sets the lower limit value for the range of scale conversion.
- CH□ Scaling upper limit value (address: 011AH, 011CH, 011EH, 0120H, 0122H, 0124H, 0126H, or 0128H) sets the upper limit value for the range of scale conversion.

For details on the scaling function, refer to the following:
☞ Page 57 Scaling Function

■Setting range

-32000 to 32000 (Default value: 0)

> **Point**
> - A channel where a value out of the range above is set causes an error with Scaling setting out-of-range (error code: 090□H) being stored in Latest error code (RWr0), Error flag (RXA) turning on, and the ERR. LED lighting up.
> - The settings must satisfy the condition: Scaling upper limit value > Scaling lower limit value. A channel that does not satisfy the condition causes an error with Scaling setting upper/lower limit inversion (091□H) being stored in Latest error code (RWr0), Error flag (RXA) turning on, and the ERR. LED lighting up.
> - If Scaling enable/disable setting (address: 0118H) is set to Disabled (1), the settings of CH□ Scaling lower limit value (address: 0119H, 011BH, 011DH, 011FH, 0121H, 0123H, 0125H, or 0127H) and CH□ Scaling upper limit value (address: 011AH, 011CH, 011EH, 0120H, 0122H, 0124H, 0126H, or 0128H) are ignored.

■Enabling the setting

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

Range setting monitor

■Address

Remote buffer memory name	Address
Range setting monitor (CH1 to CH4)	0600H
Range setting monitor (CH5 to CH8)	0601H

■Description

Range setting monitor (CH1 to CH4) (address: 0600H) and Range setting monitor (CH5 to CH8) (address: 0601H) are used to check the output range values that have been set.

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0600H	CH4				CH3				CH2				CH1			
0601H	CH8				CH7				CH6				CH5			

> **Point**
>
> If D/A conversion enable/disable setting (address: 0102H) is set to D/A conversion disabled, the range is not changed. Thus, values in Range setting monitor (CH1 to CH4) (address: 0600H) and Range setting monitor (CH5 to CH8) (address: 0601H) are not updated. For details, refer to the following:
>
> ☞ Page 53 Range Switching Function

■Monitored values

The following table shows the monitored values.

D/A converter module	Monitored value	Description
NZ2GFCE-60DAI8	0H (default value)	4 to 20mA
	1H	0 to 20mA
NZ2GFCE-60DAV8	2H (default value)	1 to 5V
	3H	0 to 5V
	4H	-10 to 10V

A

Error history data

■Address

Remote buffer memory name	Address
Error history data□	0A00H to 0AEFH

■Description

Up to 15 errors occurred in the module are recorded in Error history data □ (address: 0A00H to 0AEFH).

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

The following shows the contents stored in Error history 1 data (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								00H (Fixed)							
0A06H ⋮ 0A0DH	CH1 Digital value ⋮ CH8 Digital value															
0A0EH	System area															
0A0FH																

> **Point**
>
> Error history data 2 to Error history data 15 (address: 0A10H to 0AEFH) are stored in the same format as that of Error history data 1 (address: 0A00H to 0A0FH).
>
> For the error code, refer to the following:
>
> ☞ Page 91 Error Code List

Ex.

The following table shows the descriptions of data stored for each error history data item and an example of stored data.

Item	Storage contents	Storage example[1]
Error code	The error code of the error that 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[2]	The items on the left are stored in BCD code.	2012H
Month/Date[2]		0901H
Hour/Minute[2]		1330H
Second/00H (Fixed)[2]		5000H
CH1 Digital value ⋮ CH8 Digital value	Stores the value in CH□ Digital value (RWw2 to RWw9) at the time of occurrence of an error.	—

[1] This example assumes that a second error has occurred at 13:30:50 on Saturday, September 1, 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.

■Storage order of the error history

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

Errors that occurred in the past are stored in Error history data 2 to Error history data 15 (address: 0A10H to 0AEFH) in reverse chronological order.

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

Error history clear command

■Address

Remote buffer memory 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.

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

(1) 0: Not commanded (default value), 1: Commanded

■Behavior of error history clear

Setting Error history clear command (address: 1000H) to Commanded (1) allows the error history to be cleared.

- - - - - - - ▶ Executed by the D/A converter module
———————▶ Executed by the program
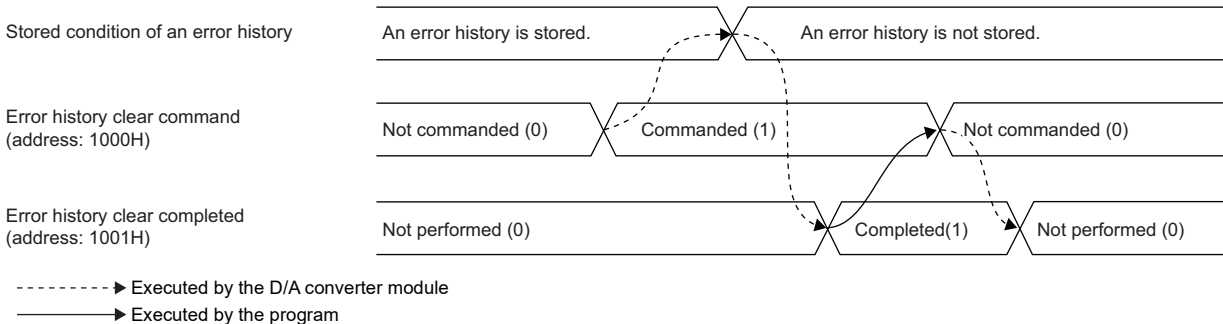
Error history clear completed

■Address

The remote buffer memory address of this area is as follows:

Remote buffer memory name	Address
Error history clear completed	1001H

■Description

Error history clear completed (address: 1001H) shows the error history clear completed status stored in the non-volatile memory.

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

(1) 0: Not performed (default value), 1: Completed

■Behavior of error history clear

Upon completion of the error history clear, Error history clear completed (address: 1001H) turns to Completed (1).

For the timing "Not performed (0)→Completed (1)→Not performed (0)", refer to the following:

Parameter area initialization command

■Address

Remote buffer memory name	Address
Parameter area initialization command	1002H

■Description

Parameter area initialization command (address: 1002H) sets parameters in remote buffer memory areas and non-volatile memory as default values.

In the event of a non-volatile memory data error (parameter) (error code: 0130H), using this command makes it possible to recover the module.

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

(1) 0: Not commanded (default value), 1: Commanded

■Behavior of parameter area initialization

Setting Parameter area initialization command (address:1002H) to Commanded (1) sets the parameters in the non-volatile memory back to default values.

Parameter of nonvolatile memory — Set parameter — Default value

Parameter area initialization command (address: 1002H) — Not commanded (0) — Commanded (1) — Not commanded (0)

Parameter area initialization completed (address: 1003H) — Not performed (0) — Completed(1) — Not performed (0)

- - - - - - - ▶ Executed by the D/A converter module
───────▶ Executed by the program
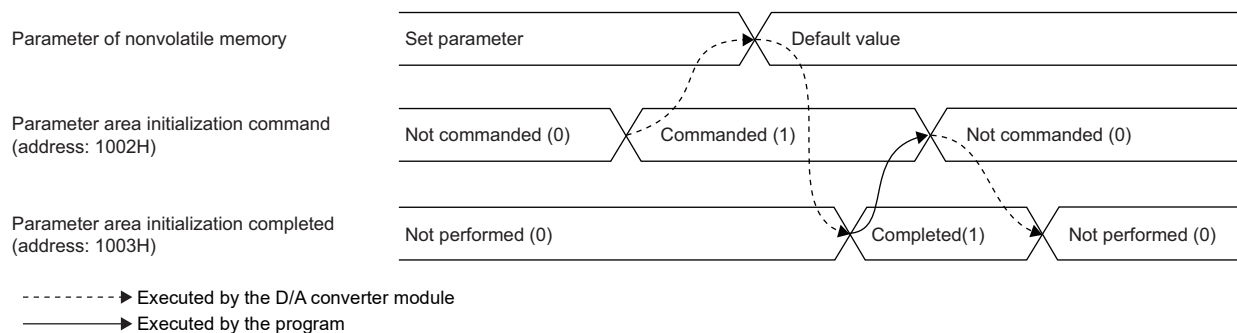
> **Point**
>
> An execution of Parameter area initialization command (address: 1002H) does not clear the following remote input signals and remote register:
> - Warning flag (RX7)
> - Error flag (RXA)
> - Alert output signal (RX1E)
>
> In addition, Remote READY (RXB) does not turn on.
>
> After the execution of Parameter area initialization command (address: 1002H), turning off and on the module power supply enables the module to operate normally.

Parameter area initialization completed

■Address

Remote buffer memory name	Address
Parameter area initialization completed	1003H

■Description

Parameter area initialization completed (address: 1003H) shows whether the initialization process for the parameters stored in the non-volatile memory has been completed.

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

(1) 0: Not performed (default value), 1: Completed

■Behavior of parameter area initialization

Upon the completion of setting the parameters stored in the non-volatile memory back to their default values, Parameter area initialization completed (address: 1003H) turns to Completed (1). For the timing "Not performed (0)→Completed (1)→Not performed (0)", refer to the following:

☞ Page 118 Parameter area initialization command

A

Appendix 4 I/O Conversion Characteristics of D/A Conversion

The I/O conversion characteristics of D/A conversion are expressed by the slope of the straight line connecting the offset value and the gain value, both of which are used when a digital value written from the CPU module is converted to the corresponding analog output value (voltage or current).

Offset value

An analog output value (voltage or current) corresponding to the digital value 0 under the condition that the scaling function and the shift function are not used.

Gain value

An analog output value (voltage or current) corresponding to the following digital value under the condition that the scaling function and the shift function are not used.
- 12000 (When the output range is set to 0 to 5V, 1 to 5V, 0 to 20mA, or 4 to 20mA)
- 16000 (When the output range is set to -10 to 10V)

Voltage output characteristics

The following graph shows the voltage output characteristics.
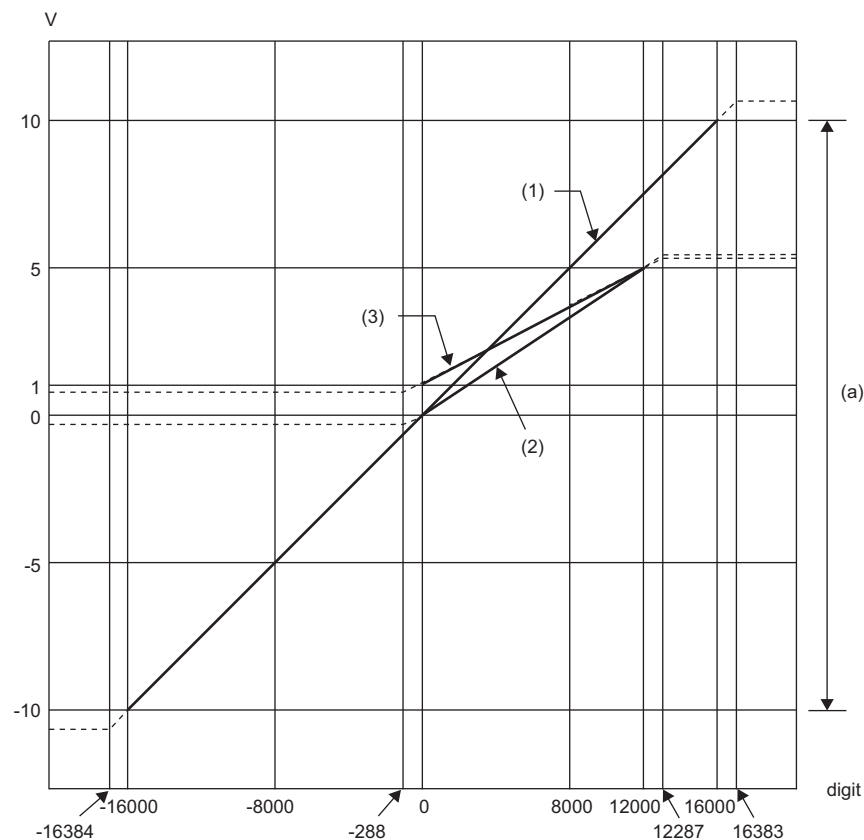
digit: Digital input value
V: Analog output value (V)
(a) Analog output practical range

No.	Output range setting	Offset value	Gain value	Digital value	Maximum resolution
(1)	-10 to 10V	0V	10V	-16000 to 16000	0.625mV
(2)	0 to 5V	0V	5V	0 to 12000	0.416mV
(3)	1 to 5V	1V	5V		0.333mV

Use the value within the practical digital input range and practical analog output range. If a value is out of the range, the maximum resolution and accuracy may not fall within the range of performance specifications. (Do not use the value in the dotted line region in the above graph.)

Current output characteristics

The following graph shows the current output characteristics.
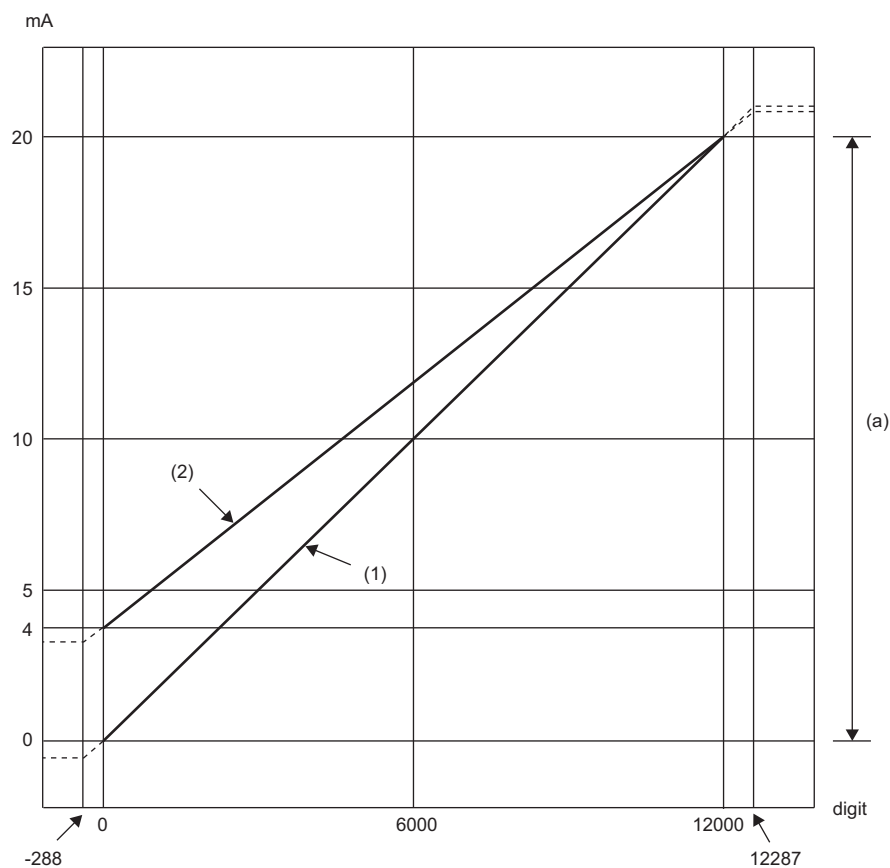
digit: Digital input value
mA: Analog output value (mA)
(a) Analog output practical range

No.	Output range setting	Offset value	Gain value	Digital value	Maximum resolution
(1)	0 to 20mA	0mA	20mA	0 to 12000	1.66μA
(2)	4 to 20mA	4mA	20mA		1.33μA

Use the value within the practical digital input range and practical analog output range. If a value is out of the range, the maximum resolution and accuracy may not fall within the range of performance specifications. (Do not use the value in the dotted line region in the above graph.)

Appendix 5 Accuracy of D/A Conversion

Accuracy of D/A conversion is the accuracy for the maximum value of analog output value.

An output characteristic change caused by changing the output range does not sacrifice the accuracy, which is maintained within the described range of the performance specifications.

The following graph shows the fluctuation range of accuracy with the range of 0 to 5V selected.

The accuracy of analog output is ±0.2% (±10mV) at an ambient temperature of 25±5℃; ±0.3% (±15mV) at an ambient temperature of 0 to 55℃. (Except for the conditions under noise influence.)
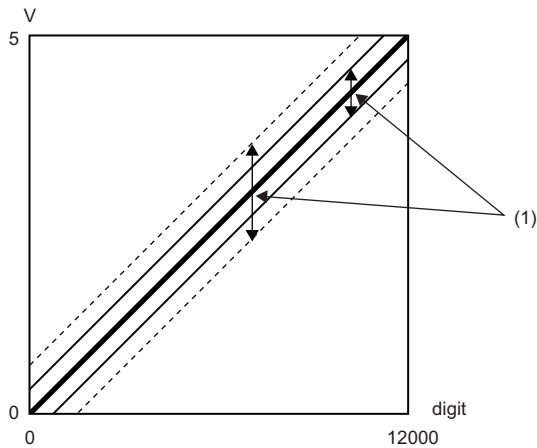
digit: Digital input value
V: Analog output value (V)
(1) Fluctuation range

Appendix 6 Processing Time of CC-Link IE Field Network

The processing time of CC-Link IE Field Network is the time taken for the D/A converter module to perform D/A conversion on a digital value written with the CPU module of the master station, and output the actual analog output value.

The processing time of CC-Link IE Field Network depends on the following processing time:

- Sequence scan time of the master station
- Link scan time
- Processing time of the remote device station: conversion cycle (☞ Page 52 Conversion Speed and Conversion Cycle)

For details on the processing time of CC-Link IE Field Network, refer to the following:

📖 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 modules to comply with the EMC Directive.

These precautions are based on the requirements of the EMC Directive and the harmonized standards. However, they do not guarantee that the entire machinery constructed according to the descriptions complies with the EMC Directive.

The manufacturer of the machinery must determine the testing method for compliance and declare conformity to the EMC Directive.

EMC Directive related standards

■Emission requirements

Standard	Test item	Test description	Standard value
EN61131-2: 2007	CISPR16-2-3 Radiated emission[2]	Radio waves from the product are measured.	• 30M to 230MHz QP: 40dBµV/m (measured over 10m)[1] • 230M to 1000MHz QP: 47dBµV/m (measured over 10m)
	CISPR16-2-1, CISPR16-1-2 Conducted emission[2]	Noise from the product to the power line is measured.	• 150k to 500kHz QP: 79dB, Mean: 66dB[1] • 500k to 30MHz QP: 73dB, Mean: 60dB

*1   QP (Quasi-peak): quasi-peak value, Mean: mean value
*2   The module is an open-type device (a device designed to be housed in other equipment) and must be installed inside a conductive control panel. The tests were conducted with the programmable controller installed in a control panel.

■Immunity requirements

Standard	Test item	Test description	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 supply, I/O power supply, 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 supply line, AC I/O power supply, AC I/O (unshielded): 2kV CM, 1kV DM • DC power supply line, DC I/O power supply: 0.5kV CM, DM • DC I/O, AC I/O (shielded), analog[*2], communication: 1kV CM
	EN61000-4-6 Conducted RF immunity[*1]	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 housed in other equipment) and must be installed inside a conductive control panel. The tests were conducted with the programmable controller installed in a control panel.

*2   The accuracy of a D/A converter module can indicate momentary fluctuation 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 programmable controller-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 grounding point to the control panel. Ground the FG terminal with the thickest and shortest possible ground cable (30cm or shorter).

Cables

Use shielded cables for the cables which are connected to the module and run out from the control panel. If a shielded cable is not used or not grounded correctly, the noise immunity will not meet the specified value.

■Cables for the CC-Link IE Field Network

CC-Link IE Field Network cables are made up of shielded wires. Strip a part of the jacket as shown below and ground the exposed shield in the largest possible area.
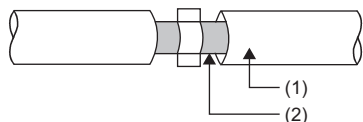
(1) Cables for the CC-Link IE Field Network
(2) Shield

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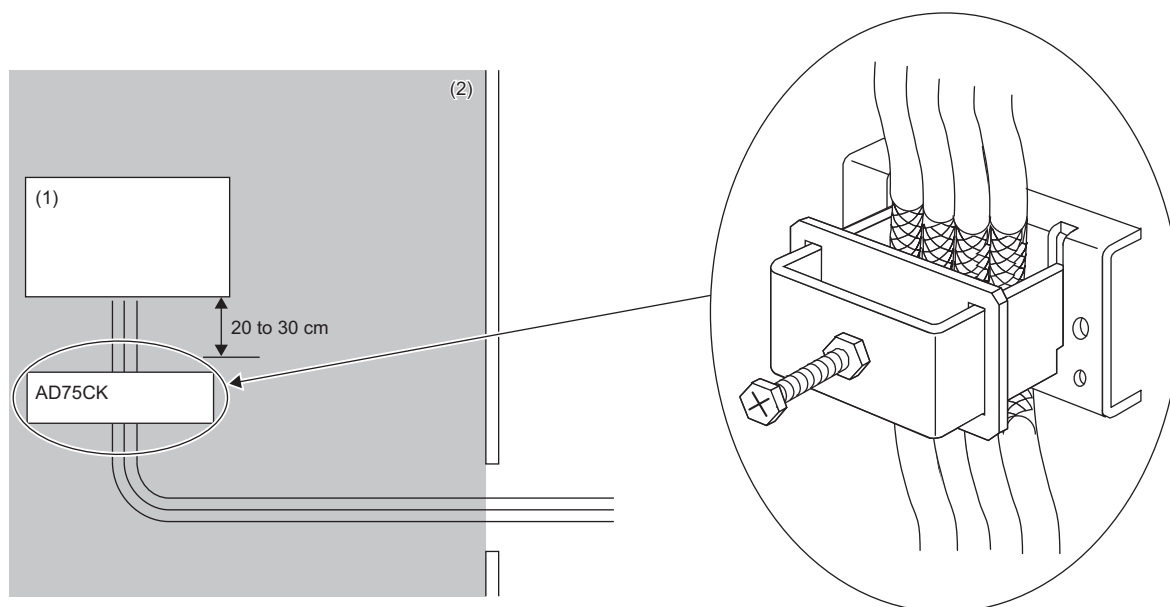
(1) Module
(2) Inside a control panel

For details on the AD75CK, refer to the following:
📖 AD75CK Cable Clamping Instruction Manual

■Analog I/O signal line

Use a signal line of 30m or shorter when connecting it to the analog I/O terminals of the module.

External power supply

- Use a CE-marked product for an external power supply and always ground the FG terminal. (External power supply used 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.

Others

■Ferrite core

A ferrite core has the effect of reducing radiation noise in the 30MHz to 100MHz band.

It is recommended to attach ferrite cores if shielded cables coming out of the control panel do not provide sufficient shielding effects.

Note that the ferrite cores must be attached at the position closest to the cable hole inside the control panel. If attached at an improper position, the ferrite core will not produce any effect.

For the FG terminal on a D/A converter module that is connected to the external power supply and for CC-Link IE Field Network cables, attach a ferrite core 4cm away from the module.

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

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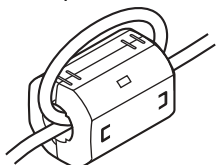
■Noise filter (power supply line filter)

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 the D/A converter 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.
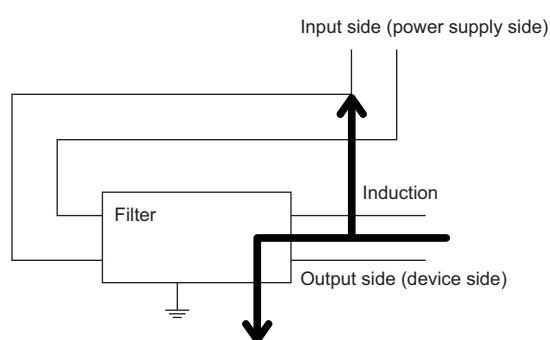
• Problem example
Noise is caused if wires for input and wires for output are bundled together.
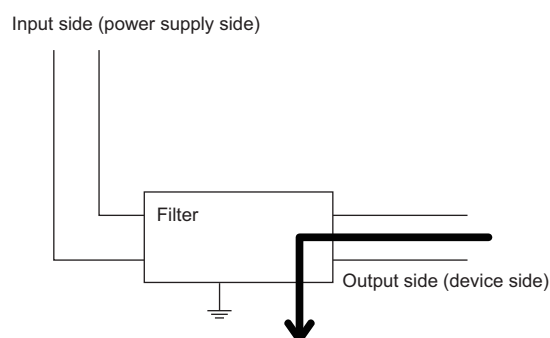
• Improvement example
Lay wires for input away from wires for output.

• 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 Serial Number and Function Version

The serial number and the function version of the D/A converter module can be checked on the rating plate.
The serial number can also be checked on the production information in CC-Link IE Field Network diagnostics.

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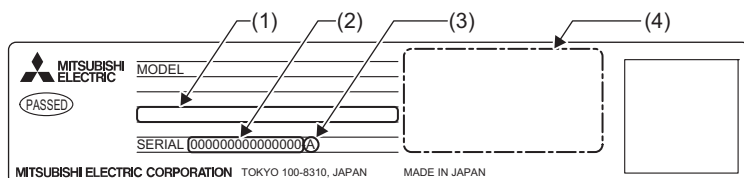
(1) MAC address
(2) Serial number
(3) Function version
(4) Compliant standard symbol

Checking on 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 the device station and then select "Production Information" to display the production information.
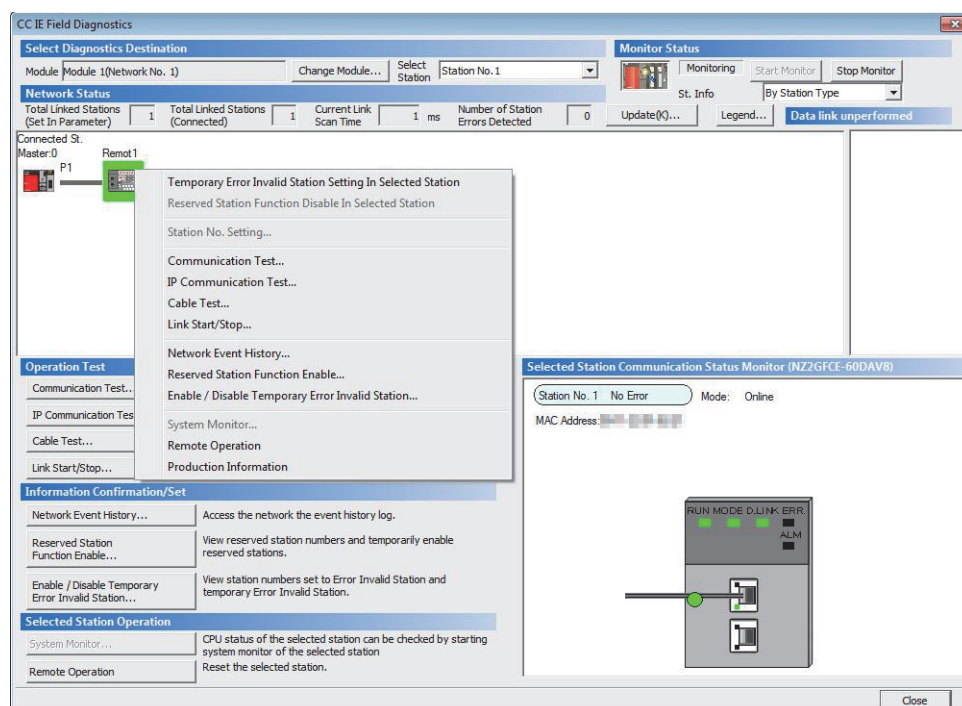
4. The production information is displayed.

The production information shows the serial number marked on the rating plate.

A
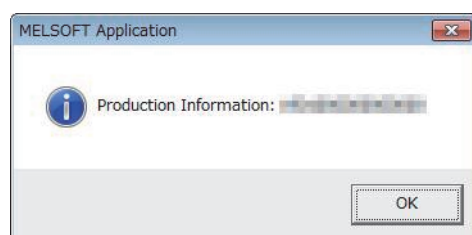
Appendix 9 External Dimensions

The following shows the external dimensions of the D/A converter module.
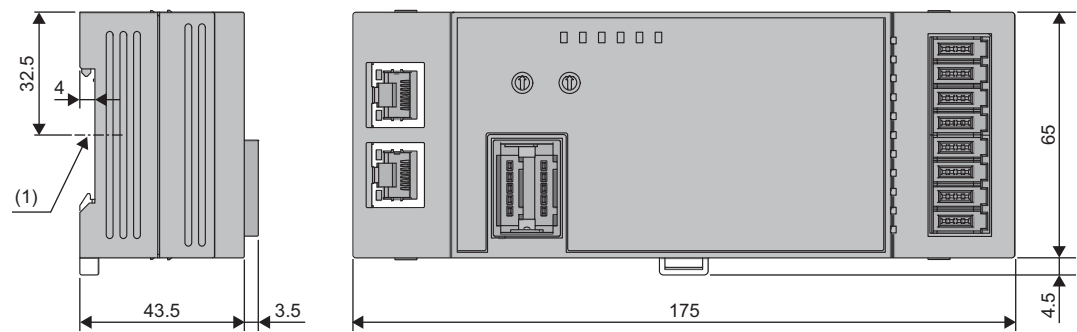
(Unit: mm)
(1) DIN rail center

MEMO

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REVISIONS

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

The company names, system names and product names mentioned in this manual are either registered trademarks or trademarks of their respective companies.

In some cases, trademark symbols such as '™' or '®' are not specified in this manual.

MITSUBISHI ELECTRIC CORPORATION

Specifications subject to change without notice.