MITSUBISHI ELECTRIC

Mitsubishi Programmable Controller

MELSEC iQ-R series

MELSEC iQ-R Channel Isolated Digital-Analog Converter Module User's Manual (Application)

-R60DA8-G
-R60DA16-G

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 MELSEC iQ-R Module Configuration Manual.

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

● 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) Emergency stop circuits, protection circuits, and protective interlock circuits for conflicting operations (such as forward/reverse rotations or upper/lower limit positioning) must be configured external to the programmable controller.

(2) When the programmable controller detects an abnormal condition, it stops the operation and all outputs are:
   • Turned off if the overcurrent or overvoltage protection of the power supply module is activated.
   • Held or turned off according to the parameter setting if the self-diagnostic function of the CPU module detects an error such as a watchdog timer error.

(3) All outputs may be turned on if an error occurs in a part, such as an I/O control part, where the CPU module cannot detect any error. To ensure safety operation in such a case, provide a safety mechanism or a fail-safe circuit external to the programmable controller. For a fail-safe circuit example, refer to "General Safety Requirements" in the MELSEC iQ-R Module Configuration Manual.

(4) Outputs may remain on or off due to a failure of a component such as a relay and transistor in an output circuit. Configure an external circuit for monitoring output signals that could cause a serious accident.

● In an output circuit, when a load current exceeding the rated current or an overcurrent caused by a load short-circuit flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.

● Configure a circuit so that the programmable controller is turned on first and then the external power supply. If the external power supply is turned on first, an accident may occur due to an incorrect output or malfunction.

● For the operating status of each station after a communication failure, refer to manuals relevant to the network. Incorrect output or malfunction due to a communication failure may result in an accident.

● When connecting an external device with a CPU module or intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents.

● Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.

● Do not write any data to the "system area" and "write-protect area" of the buffer memory in the module. Also, do not use any "use prohibited" signals as an output signal from the CPU module to each module. Doing so may cause malfunction of the programmable controller system. For the "system area", "write-protect area", and the "use prohibited" signals, refer to the user's manual for the module used.

[Design Precautions]

⚠WARNING

- If a communication cable is disconnected, the network may be unstable, resulting in a communication failure of multiple stations. Configure an interlock circuit in the program to ensure that the entire system will always operate safely even if communications fail. Failure to do so may result in an accident due to an incorrect output or malfunction.
- To maintain the safety of the programmable controller system against unauthorized access from external devices via the network, take appropriate measures. To maintain the safety against unauthorized access via the Internet, take measures such as installing a firewall.
- Analog outputs may remain on due to a failure of the module. Configure an external interlock circuit for 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.
- During control of an inductive load such as a lamp, heater, or solenoid valve, a large current (approximately ten times greater than normal) may flow when the output is turned from off to on. Therefore, use a module that has a sufficient current rating.
- After the CPU module is powered on or is reset, the time taken to enter the RUN status varies depending on the system configuration, parameter settings, and/or program size. Design circuits so that the entire system will always operate safely, regardless of the time.
- Do not power off the programmable controller or reset the CPU module while the settings are being written. Doing so will make the data in the flash ROM undefined. The values need to be set in the buffer memory and written to the flash ROM again. Doing so also may cause malfunction or failure of the module.
- When changing the operating status of the CPU module from external devices (such as the remote RUN/STOP functions), select "Do Not OPEN in Program" for "Open Method Setting" in the module parameters. If "OPEN in Program" is selected, an execution of the remote STOP function causes the communication line to close. Consequently, the CPU module cannot reopen the line, and external devices cannot execute the remote RUN function.
- Power on or off the external power supply while the programmable controller is on. Failure to do so may result in incorrect output or malfunction.
- At on/off of the power or external power supply, or at the output range switching, 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.

[Installation Precautions]

⚠WARNING

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

[Installation Precautions]

⚠CAUTION

● Use the programmable controller in an environment that meets the general specifications in the Safety Guidelines included with the base unit. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
● To mount a module, place the concave part(s) located at the bottom onto the guide(s) of the base unit, and push in the module until the hook(s) located at the top snaps into place. Incorrect interconnection may cause malfunction, failure, or drop of the module.
● When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.
● Tighten the screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
● When using an extension cable, connect it to the extension cable connector of the base unit securely. Check the connection for looseness. Poor contact may cause malfunction.
● When using an SD memory card, fully insert it into the SD memory card slot. Check that it is inserted completely. Poor contact may cause malfunction.
● Securely insert an extended SRAM cassette into the cassette connector of the CPU module. After insertion, close the cassette cover and check that the cassette is inserted completely. Poor contact may cause malfunction.
● Do not directly touch any conductive parts and electronic components of the module, SD memory card, extended SRAM cassette, or connector. Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠WARNING

● Shut off the external power supply (all phases) used in the system before installation and wiring. Failure to do so may result in electric shock or cause the module to fail or malfunction.
● After installation and wiring, attach the included terminal cover to the module before turning it on for operation. Failure to do so may result in electric shock.

[Wiring Precautions]

⚠CAUTION

- Individually ground the FG and LG terminals of the programmable controller with a ground resistance of 100 ohms or less. Failure to do so may result in electric shock or malfunction.
- Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
- Check the rated voltage and signal layout before wiring to the module, and connect the cables correctly. Connecting a power supply with a different voltage rating or incorrect wiring may cause fire or failure.
- Connectors for external devices must be crimped or pressed with the tool specified by the manufacturer, or must be correctly soldered. Incomplete connections may cause short circuit, fire, or malfunction.
- Securely connect the connector to the module. Poor contact may cause malfunction.
- 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.
- 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 clamp the extension cables with the jacket stripped.
- Check the interface type and correctly connect the cable. Incorrect wiring (connecting the cable to an incorrect interface) may cause failure of the module and external device.
- Tighten the terminal screws or connector screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, fire, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, fire, or malfunction.
- When disconnecting the cable from the module, do not pull the cable by the cable part. For the cable with connector, hold the connector part of the cable. For the cable connected to the terminal block, loosen the terminal screw. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.
- Prevent foreign matter such as dust or wire chips from entering the module. Such foreign matter can cause a fire, failure, or malfunction.
- A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring. Do not remove the film during wiring. Remove it for heat dissipation before system operation.
- Programmable controllers must be installed in control panels. Connect the main power supply to the power supply module in the control panel through a relay terminal block. Wiring and replacement of a power supply module must be performed by qualified maintenance personnel with knowledge of protection against electric shock.
  For wiring, refer to the MELSEC iQ-R Module Configuration Manual.
- For Ethernet cables to be used in the system, select the ones that meet the specifications in the user's manual for the module used. If not, normal data transmission is not guaranteed.
- Individually ground the shielded cables 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.
- Correctly connect the battery connector. Do not charge, disassemble, heat, short-circuit, solder, or throw the battery into the fire. Also, do not expose it to liquid or strong shock. Doing so will cause the battery to produce heat, explode, ignite, or leak, resulting in injury and fire.
- Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal screws, connector screws, or module fixing screws. Failure to do so may result in electric shock.

[Startup and Maintenance Precautions]

⚠CAUTION

- When connecting an external device with a CPU module or intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents.
- Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
- Do not disassemble or modify the modules. Doing so may cause failure, malfunction, injury, or a fire.
- Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) more than 25cm away in all directions from the programmable controller. Failure to do so may cause malfunction.
- Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may cause the module to fail or malfunction.
- Tighten the screws within the specified torque range. Undertightening can cause drop of the component or wire, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- After the first use of the product, do not mount/remove the module to/from the base unit, and the terminal block to/from the module, and do not insert/remove the extended SRAM cassette to/from the CPU module more than 50 times (IEC 61131-2 compliant) respectively. Exceeding the limit may cause malfunction.
- After the first use of the product, do not insert/remove the SD memory card to/from the CPU module more than 500 times. Exceeding the limit may cause malfunction.
- Do not touch the metal terminals on the back side of the SD memory card. Doing so may cause malfunction or failure of the module.
- Do not touch the integrated circuits on the circuit board of an extended SRAM cassette. Doing so may cause malfunction or failure of the module.
- Do not drop or apply shock to the battery to be installed in the module. Doing so may damage the battery, causing the battery fluid to leak inside the battery. If the battery is dropped or any shock is applied to it, dispose of it without using.
- Startup and maintenance of a control panel must be performed by qualified maintenance personnel with knowledge of protection against electric shock. Lock the control panel so that only qualified maintenance personnel can operate it.
- Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Failure to do so may cause the module to fail or malfunction.

[Operating Precautions]

⚠CAUTION

- When changing data and operating status, and modifying program of the running programmable controller from an external device such as a personal computer connected to an intelligent function module, read relevant manuals carefully and ensure the safety before operation. Incorrect change or modification may cause system malfunction, damage to the machines, or accidents.
- Do not power off the programmable controller or reset the CPU module while the setting values in the buffer memory are being written to the flash ROM in the module. Doing so will make the data in the flash ROM undefined. The values need to be set in the buffer memory and written to the flash ROM again. Doing so can cause malfunction or failure of the module.

[Disposal Precautions]

⚠CAUTION

- When disposing of this product, treat it as industrial waste.
- When disposing of batteries, separate them from other wastes according to the local regulations. For details on battery regulations in EU member states, refer to the MELSEC iQ-R Module Configuration Manual.

[Transportation Precautions]

⚠CAUTION

- When transporting lithium batteries, follow the transportation regulations. For details on the regulated models, refer to the MELSEC iQ-R Module Configuration Manual.
- The halogens (such as fluorine, chlorine, bromine, and iodine), which are contained in a fumigant used for disinfection and pest control of wood packaging materials, may cause failure of the product. Prevent the entry of fumigant residues into the product or consider other methods (such as heat treatment) instead of fumigation. The disinfection and pest control measures must be applied to unprocessed raw wood.

CONDITIONS OF USE FOR THE PRODUCT

(1) Mitsubishi 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 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'S USER, 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 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 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 representative in your region.

INTRODUCTION

Thank you for purchasing the Mitsubishi MELSEC iQ-R series programmable controllers.

Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the MELSEC iQ-R series programmable controller to handle the product correctly.

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

Please make sure that the end users read this manual.

Point

Unless otherwise specified, this manual provides program examples in which the I/O numbers of X/Y0 to X/YF are assigned to the D/A converter module. Assign I/O numbers when applying the program examples to an actual system. For I/O number assignment, refer to the following.

📖 MELSEC iQ-R Module Configuration Manual

Relevant products

R60DA8-G, R60DA16-G

CONTENTS

CONTENTS

11

RELEVANT MANUALS

Manual name [manual number]	Description	Available form
MELSEC iQ-R Channel Isolated Digital-Analog Converter Module User's Manual (Application) [SH-081491ENG] (this manual)	Functions, parameter settings, troubleshooting, I/O signals, and buffer memory of the D/A converter module	Print book
		e-Manual EPUB PDF
MELSEC iQ-R Channel Isolated Digital-Analog Converter Module User's Manual (Startup) [SH-081489ENG]	Performance specifications, procedures before operation, wiring, operation examples, and offset/gain setting of the D/A converter module	Print book
		e-Manual EPUB PDF
MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks) [SH-081266ENG]	Instructions for the CPU module, dedicated instructions for the intelligent function modules, and standard functions/function blocks	e-Manual EPUB PDF

Point

e-Manual refers to the Mitsubishi 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
D/A converter module	The abbreviation for the MELSEC iQ-R series channel isolated digital-analog converter module
GX Works3	The product name of the software package for the MELSEC programmable controllers
Q compatible mode	A mode in which the module operates with the buffer memory map converted to the equivalent one of the MELSEC Q series
R mode	A mode in which the module operates with the buffer memory map that has been newly laid out in the MELSEC iQ-R series
Watchdog timer error	An error that occurs if the internal processing of the D/A converter module fails. The module monitors its own internal processing by using the watchdog timer.
Engineering tool	Another term for GX Works3
Offset/gain setting mode	A mode used for performing the offset/gain setting
Global label	A label that is valid for all the program data when multiple program data are created in the project. There are two types of global label: a module specific label (module label), which is generated automatically by GX Works3, and an optional label, which can be created for any specified device.
Factory default setting	A generic term for analog output ranges of 4 to 20mA, 0 to 20mA, 1 to 5V, 0 to 5V, -10 to 10V, -12 to 12V, 4 to 20mA (extended mode), and 1 to 5V (extended mode). In the window on the engineering tool, 4 to 20mA (extended mode) and 1 to 5V (extended mode) are displayed as the following: • 4 to 20mA (Extension) • 1 to 5V (Extension)
Normal mode	A mode used for normal D/A conversion. In the engineering tool, the item name of the mode is displayed as "Normal mode (D/A conversion process)".
Buffer memory	A memory in an intelligent module for storing data (such as setting values and monitored values) to be transferred to the CPU module
User range	An analog output range where any value can be set. This range can be set in the offset/gain setting.
Module Label	A label that represents one of memory areas (I/O signals and buffer memory areas) specific to each module in a given character string. For the module used, GX Works3 automatically generates this label, which can be used as a global label.

1 FUNCTIONS

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

For details on the I/O signals and the buffer memory, refer to the following.

☞ Page 64 I/O Signals

☞ Page 76 Buffer Memory Areas

> **Point**
>
> This chapter describes I/O signals and buffer memory addresses for CH1.
>
> For details on the I/O signals after CH2, refer to the following.
>
> ☞ Page 64 List of I/O signals
>
> For details on the buffer memory addresses after CH2, refer to the following.
>
> ☞ Page 76 List of buffer memory addresses

1.1 Modes

The D/A converter module has the normal mode and offset/gain setting mode. Change the mode according to the function used.

The following describes each mode.

> **Point**
>
> In each operation mode, the Q compatible mode function that is executed with the buffer memory layout of the D/A converter module converted to the equivalent of the Q series can also be selected.

Normal mode

This mode is for performing the normal D/A conversion. The value set in 'CH1 Digital value' (Un\G460) is output in analog after the D/A conversion.

The following figure shows the sequence to output the value in analog.
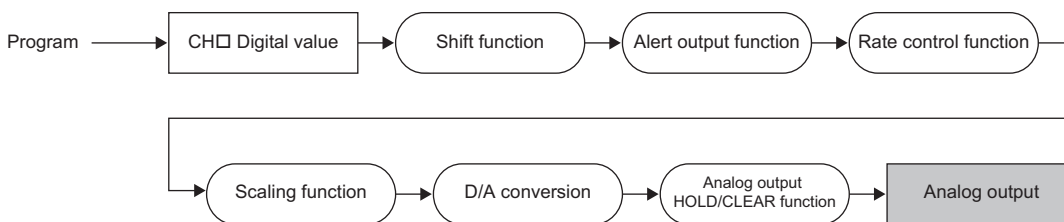
Offset/gain setting mode

This mode is for performing the offset/gain setting.

For details on the offset/gain setting, refer to the following.

MELSEC iQ-R Channel Isolated Digital-Analog Converter Module User's Manual (Startup)

Mode transitions

The following figure and table describe the transition conditions for each mode.

No.	Transition condition		
(1)	Set "Operation mode setting" to "Normal mode (D/A conversion process)" in "Basic setting" of the engineering tool.		
(2)	Set "Operation mode setting to "Offset/gain setting mode" in "Basic setting" of the engineering tool.		
(3)	Perform the mode transition by either of the following methods.		
	Method 1	Execute the G(P).OFFGAN instruction (Argument "S": 0: Transition to the normal mode).	
	Method 2	Set the following values for 'Mode switching setting' (Un\G296, Un\G297) and turn on and off 'Operating condition setting request' (Y9). • Un\G296: 5260H • Un\G297: 4441H	
(4)	Perform the mode transition by either of the following methods.		
	Method 1	Execute the G(P).OFFGAN instruction (Argument "S": 1: Transition to the offset/gain setting mode).	
	Method 2	Set the following values for 'Mode switching setting' (Un\G296, Un\G297) and turn on and off 'Operating condition setting request' (Y9). • Un\G296: 4441H • Un\G297: 5260H	

Setting procedure

Set "Operation mode setting" to "Normal mode (D/A conversion process)" or "Offset/gain setting mode".

✎ Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Module name ⇨ [Module Parameter] ⇨ "Basic setting" ⇨ "Operation mode setting function"

Checking method

The currently selected mode can be checked with the following items.

Mode	RUN LED status	'Offset/gain setting mode status flag' (XA)
Normal mode	On	OFF[1]
Offset/gain setting mode	Flashing	ON[1]

*1   When 'User range write request' (YA) is off

1.2 Range Switching Function

This function allows switching the output range of an analog output for each channel.

Switching the range makes it possible to change the I/O conversion characteristic.

Operation

The data set in 'CH1 Digital value' (Un\G460) is converted to an analog value within the analog output range of the output range set in "Output range setting" and the analog value is output.

Set a value between -32768 and 32767 in 'CH1 Digital value' (Un\G460).

Setting procedure

Set the output range to be used in "Output range setting".

Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Module name ⇨ [Module Parameter] ⇨ "Basic setting" ⇨ "Range switching function"

Output range setting	Digital input range
4 to 20mA	0 to 32000
0 to 20mA	
1 to 5V	0 to 32000
0 to 5V	
-10 to 10V	-32000 to 32000
-12 to 12V	
4 to 20mA (extended mode)	-8000 to 36000
1 to 5V (extended mode)	
User range setting 3	-32000 to 32000
User range setting 2	
User range setting 1	

After the data is written, the range is switched when the programmable controller power supply is turned off and on or when the CPU module is reset.

> **Point**
>
> The range can be switched or set with the following buffer memory areas.
> - 'CH1 Range setting' (Un\G598)
> - 'CH1 Range setting monitor' (Un\G430)
>
> For details on the buffer memory addresses, refer to the following.
>
> ☞ Page 111 CH1 Range setting
>
> ☞ Page 98 CH1 Range setting monitor

How to output the extended part of the extended mode of the output range

The data of the extended part of the extended mode of the output range (the digital values in the range of 32768 to 36767 that correspond to the analog values higher than 20mA/5V) can be output with the scaling function or shift function.

For details, refer to the following.

☞ Page 20 Scaling Function

☞ Page 23 Shift Function

1.3 D/A Conversion Enable/Disable Setting Function

Controls whether to enable or disable the D/A conversion for each channel.

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

Setting procedure

Set "D/A conversion enable/disable setting" to "D/A conversion enable" or "D/A conversion disable".

✎ Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Module name ⇨ [Module Parameter] ⇨ "Basic setting" ⇨
"D/A conversion enable/disable function"

1.4 D/A Output Enable/Disable Setting Function

Specify whether to output the D/A conversion value or the offset value for each channel.

The conversion speed is a constant, regardless of the output enable/disable state.

Setting procedure

Set to enable or disable the D/A output for each channel with 'CH1 Output enable/disable flag' (Y1).

'CH1 Output enable/disable flag' (Y1)	Analog output
Enable (ON)	The D/A conversion value is output.
Disable (OFF)	The offset value is output.

1.5 Analog Output HOLD/CLEAR Function

Set whether to hold or clear the analog output value that was output when the operating status of the CPU module is STOP or stop error.

The HOLD/CLEAR setting can be checked with 'CH1 HOLD/CLEAR function setting monitor' (Un\G431).

Operation

When the operating status of the CPU module is RUN, STOP, or stop error, the analog output status changes as shown in the following table, depending on the combination of the settings of the analog output HOLD/CLEAR setting, 'CH1 D/A conversion enable/disable setting' (Un\G500), and 'CH1 Output enable/disable flag' (Y1).

Execution status	'CH1 D/A conversion enable/disable setting' (Un\G500)	Enable			Disable
	'CH1 Output enable/disable flag' (Y1)	Enable		Disable	Enable or disable
	Analog output HOLD/ CLEAR setting	HOLD	CLEAR	HOLD or CLEAR	HOLD or CLEAR
Analog output produced when the CPU module is in the RUN status		The digital value converted in analog is output.		Offset value	0V/0mA
Analog output produced when the CPU module is in the STOP state		Hold	Offset value	Offset value[*2]	0V/0mA
Analog output produced when the CPU module is in the stop error state		Hold	Offset value	Offset value	0V/0mA
Analog output produced when a watchdog timer error[*1] occurs		0V/0mA	0V/0mA	0V/0mA	0V/0mA

*1 The error occurs due to a hardware failure of the D/A converter module or other causes. 'Module READY' (X0) and the RUN LED of the D/A converter module turn off.
When a watchdog timer error occurs, 'Module READY' (X0) and the RUN LED of the D/A converter module turn off.

*2 The following operation is performed when the CPU module is in the STOP state, the D/A conversion enable/disable setting is set to D/A conversion enable (0) for the channel where HOLD is set, and 'Operating condition setting request' (Y9) is turned on and off.
When Output enable/disable flag is off: Outputs 0V/0mA.
When Output enable/disable flag is turned on: Outputs the offset value.

Setting procedure

Set "Analog output HOLD/CLEAR setting" to "HOLD" or "CLEAR".

✎ Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Module name ⇨ [Module Parameter] ⇨ "Basic setting" ⇨ "Output mode setting function"

Precautions

The error time output mode of the CPU module is disabled for the D/A converter module.

1.6 Analog Output Test Function when the CPU module is in STOP Status

This function allows performing the analog output test when the CPU module is in the STOP status.

The following functions are enabled during the analog output test.

- Scaling function (☞ Page 20 Scaling Function)
- Shift function (☞ Page 23 Shift Function)
- Alert output function (☞ Page 25 Alert Output Function)

When a digital value that is out of the setting range is written, a digital value setting range error (error code: 191□H) occurs and the corresponding check code is stored in 'CH1 Set value check code' (Un\G400).

Operation

By forcibly turning on 'CH1 Output enable/disable flag' (Y1) when the CPU module is in the STOP state, the analog output value is changed from the offset value to the D/A-converted analog output value. Hereafter, when 'CH1 Digital value' (Un\G460) is updated, the analog output value is updated as well.

The following figure shows the relation between 'CH1 Output enable/disable flag' (Y1) and the analog output value of the CPU module in the STOP state when the analog output HOLD/CLEAR setting is set to CLEAR (0).
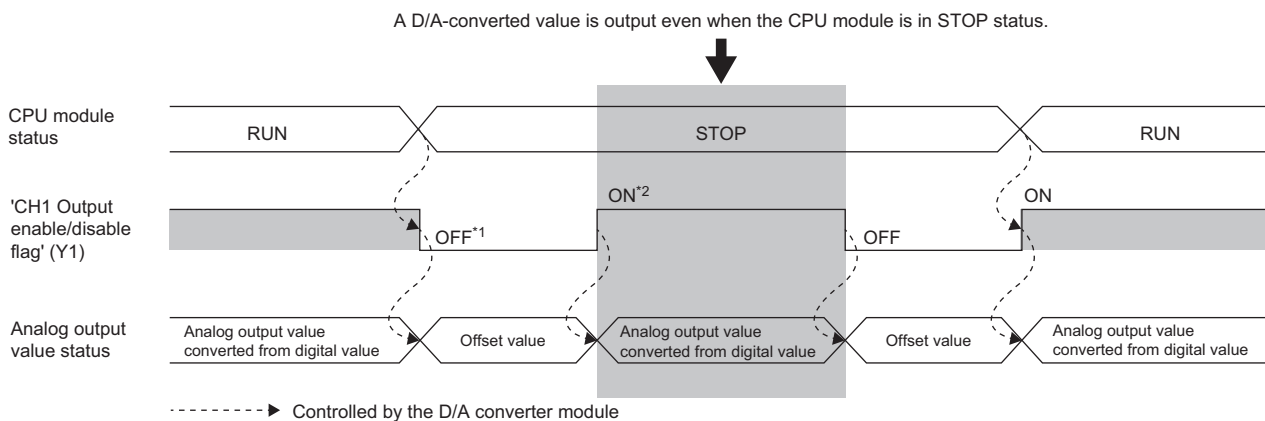
*1 'CH1 Output enable/disable flag' (Y1) turns off when the status of the CPU module is changed into STOP.

*2 By forcibly turning on 'CH1 Output enable/disable flag' (Y1), the analog output value is changed from the offset value to the D/A-converted analog output value.

Setting procedure

To perform an analog output test, configure the settings in the device test of the engineering tool following the procedure shown below.

1. Set "D/A conversion enable/disable setting" to "D/A conversion enable".

☞ Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Module name ⇨ [Module Parameter] ⇨ "Basic setting" ⇨ "D/A conversion enable/disable function"

2. Turn on 'Operating condition setting request' (Y9).

3. Check that 'Operating condition setting completed flag' (X9) turns off, and turn off 'Operating condition setting request' (Y9).

4. Set the digital value equivalent to the analog value to be output for 'CH1 Digital value' (Un\G460) in the buffer memory.

5. Turn on 'CH1 Output enable/disable flag' (Y1).

1.7 Scaling Function

This function performs the scale conversion on digital values within a specified range between a scaling upper limit value and a scaling lower limit value. This function helps reduce the time taken for creating a scale conversion program.

Operation

The scale conversion is performed for the set 'CH1 Digital value' (Un\G460) using 'CH1 Scaling upper limit value' (Un\G504) and 'CH1 Scaling lower limit value' (Un\G506), and the value after the scale conversion is used for the D/A conversion. (In the scale conversion, values after the decimal point are rounded off.)

Concept of scaling setting

The necessary settings for the scaling lower limit value and scaling upper limit value depend on whether the factory default setting or the user range setting is used for the analog output range.

■When the factory default setting is used for the analog output range
 • For the scaling upper limit value, set a value corresponding to the upper limit value of the set analog output value.
 • For the scaling lower limit value, set a value corresponding to the lower limit value of the set analog output value.

■When the user range setting is used for the analog output range
 • Set a value corresponding to the gain value for the scaling upper limit value.
 • Set a value corresponding to the offset value for the scaling lower limit value.

Calculating the scaling value

For D/A conversion, the scaling value is calculated based on the following calculation formulas.

■When the factory default setting is used for the output range
 • When the voltage is 1 to 5V, 0 to 5V, or 1 to 5V (extended mode) and the current is 4 to 20mA, 0 to 20mA, or 4 to 20mA (extended mode)

$$\text{Digital value used for D/A conversion} = \frac{32000}{S_H - S_L} \times (D_X - S_L)$$

 • When the voltage is -10 to 10V or -12 to 12V

$$\text{Digital value used for D/A conversion} = \frac{64000}{S_H - S_L} \times (D_X - S_L) - 32000$$

■When the user range setting is used for the output range

$$\text{Digital value used for D/A conversion} = \frac{32000}{S_H - S_L} \times (D_X - S_L)$$

Item	Description
D_X	Digital value
S_H	Scaling upper limit value
S_L	Scaling lower limit value

Point
 • If the relation between the values is the scaling lower limit value > the scaling upper limit value, the scale conversion can be performed according to a negative slope.
 • Set the scaling with the condition "Scaling upper limit value ≠ Scaling lower limit value".

Setting procedure

1. Set "D/A conversion enable/disable setting" to "D/A conversion enable".

☞ Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Module name ⇨ [Module Parameter] ⇨ "Basic setting" ⇨ "D/A conversion enable/disable function"

2. Set "Scaling enable/disable setting" to "Enable".

☞ Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Module name ⇨ [Module Parameter] ⇨ "Application setting" ⇨ "Scaling setting"

3. Set values for "Scaling upper limit value" and "Scaling lower limit value".

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

Setting example of scaling

Ex.

When 14000 is set to the scaling upper limit value and 4000 is set to the scaling lower limit value for the channel with the output range of 0 to 5V
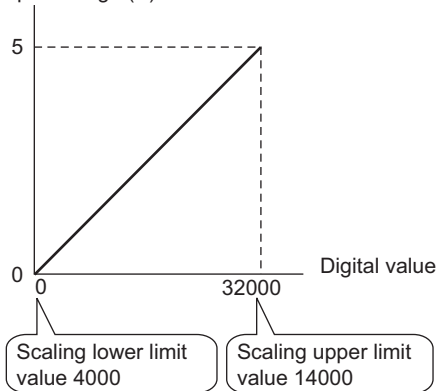
Digital value	Digital value after scaling	Output voltage (V)
4000	0	0
6000	6400	1
8000	12800	2
10000	19200	3
12000	25600	4
14000	32000	5

Outputting the analog values corresponding to the extended part of the output range

When the digital values in the extended part of the extended mode of the output range (the digital values in the range of 32768 to 36767 that correspond to the analog values higher than 20mA/5V) are scaled to the 16-bit data range while the scaling function is enabled, the analog values corresponding to the extended part can be output.

Ex.

When 24000 is set to the scaling upper limit value and 0 is set to the scaling lower limit value for the channel with the output range of 1 to 5V (extended mode)
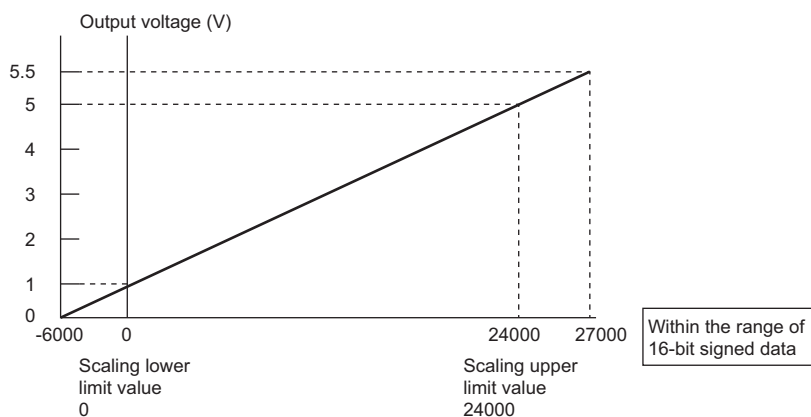
The digital value 27000 corresponds to the analog output voltage 5.5V. Thus, the analog values corresponding to the extended range can be output by setting 'CH1 Digital value' (Un\G460).

When the scaling function is used, the resolution may be reduced. To perform the D/A conversion to output the analog value while keeping the resolution, use the shift function. (☞ Page 23 Shift Function)

Precautions

- When the scaling function is used, the digital value can be set to a value out of the range between the scaling upper limit value and scaling lower limit value (in the dotted lines in the I/O conversion characteristic graph) before being scaled. However, use the scaling function within the range of the analog output practical range (in the solid line in the I/O conversion characteristic graph). If the value exceeds the analog output practical range, the maximum resolution and accuracy may not fall within the range of the performance specifications.
- The default digital value "0" may not be appropriate, depending on the scaling function setting.
  In particular in the examples of when the output range is 0 to 5V, an out-of-range digital value error occurs if 'CH1 Output enable/disable flag' (Y1) is turned on with the digital value "0". A digital value setting range error (error code: 191□H) occurs and 'Error flag' (XF) turns on, and the ERR LED turns on.
  Therefore, set an appropriate digital value within the scaling range before turning on 'CH1 Output enable/disable flag' (Y1).
- When using the user range, note that the scaling lower limit value is equal to the offset value.
- When the scaling function is enabled and the digital value after the scaling conversion is out of the digital setting range, a digital value setting range error (error code: 191□H) occurs and the corresponding check code is stored in 'CH1 Set value check code' (Un\G400).
- When the scaling function is used while the output range is set to 4 to 20mA (extended mode) or 1 to 5V (extended mode), the digital values in the extended range may exceed the range of -32768 to 32767 and the setting may be disabled.

1.8 Shift Function

This function allows adding the set input value shift amount to the digital value.

The analog output value reflects the change in the input value shift amount on a realtime basis. Therefore, fine adjustment can be easily performed when the system starts.

Operation

When the D/A conversion is performed on the digital value, the value obtained by adding 'CH1 Input value shift amount' (Un\G480) to 'CH1 Digital value' (Un\G460) is used for the D/A conversion.

When the digital value after the addition exceeds the range as the result of the shift processing, the value is fixed to the lower limit value or the upper limit value.

When a value is written to 'CH1 Input value shift amount' (Un\G480), the set value is added to the digital input value regardless of the ON/OFF state of 'Operating condition setting request' (Y9).

Setting procedure

Set a value for "Input value shift amount".

✎ Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Module name ⇨ [Module Parameter] ⇨ "Application setting" ⇨ "Shift function"

Item	Setting range
Input value shift amount	-32768 to 32767

Setting example

Ex.

When the input value shift amount is set to +50 for the channel where the output range of 0 to 5V is set
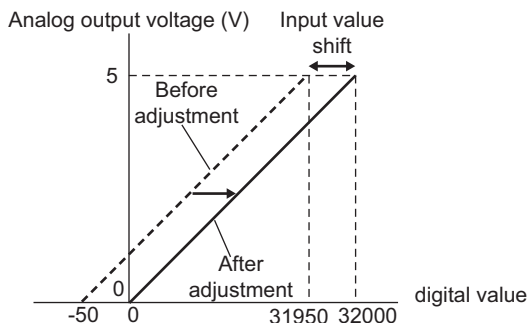
Digital value		Analog output voltage (V)
Before adjustment	After adjustment	
-50	0	0
31950	32000	5

Outputting the analog values corresponding to the extended part of the output range

By using the shift function, the analog values corresponding to the extended part of the extended mode of the output range (the digital values in the range of 32768 to 36767 that correspond to the analog values higher than 20mA/5V) can be output. The sum of the digital value and the input value shift amount must be within the range of 32768 to 36767.

Ex.

When the output range is set to 4 to 20mA (extended mode), 'CH1 Digital value' (Un\G460) is set to 32000, and 'CH1 Input value shift amount' (Un\G480) is set to 4000
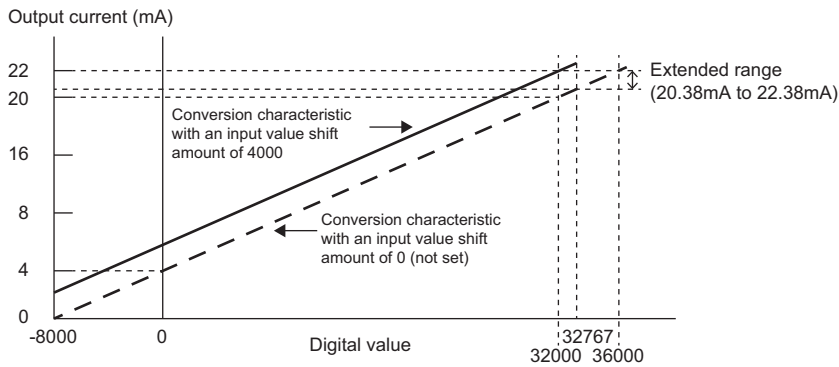
The current 22.00mA corresponding to the digital value 36000, which is the sum of 'CH1 Digital value' (Un\G460) and the input value shift amount, is output and the analog values corresponding to the extended part of the extended mode can be output.

Precautions

- Based on the digital value on which the shift-and-add is performed, the alert output function, scaling function, and rate control function are executed.
- When the value obtained by adding 'CH1 Input value shift amount' (Un\G480) to 'CH1 Digital value' (Un\G460) is out of the digital setting range, a digital value setting range error (error code: 191□H) occurs and the corresponding check code is stored in 'CH1 Set value check code' (Un\G400).

1.9 Alert Output Function

This function outputs an alert when the digital value is larger than the alert output upper limit value or is smaller than the alert output lower limit value.

'CH1 Alert output upper limit value' (Un\G510)

'CH1 Alert output lower limit value' (Un\G512)

'CH1 Alert output upper limit flag' (Un\G36.b0)

'CH1 Alert output lower limit flag' (Un\G37.b0)

'Alert output signal' (XE)

'Alert output clear request' (YE)

- - - - - - ▶ Controlled by the D/A converter module
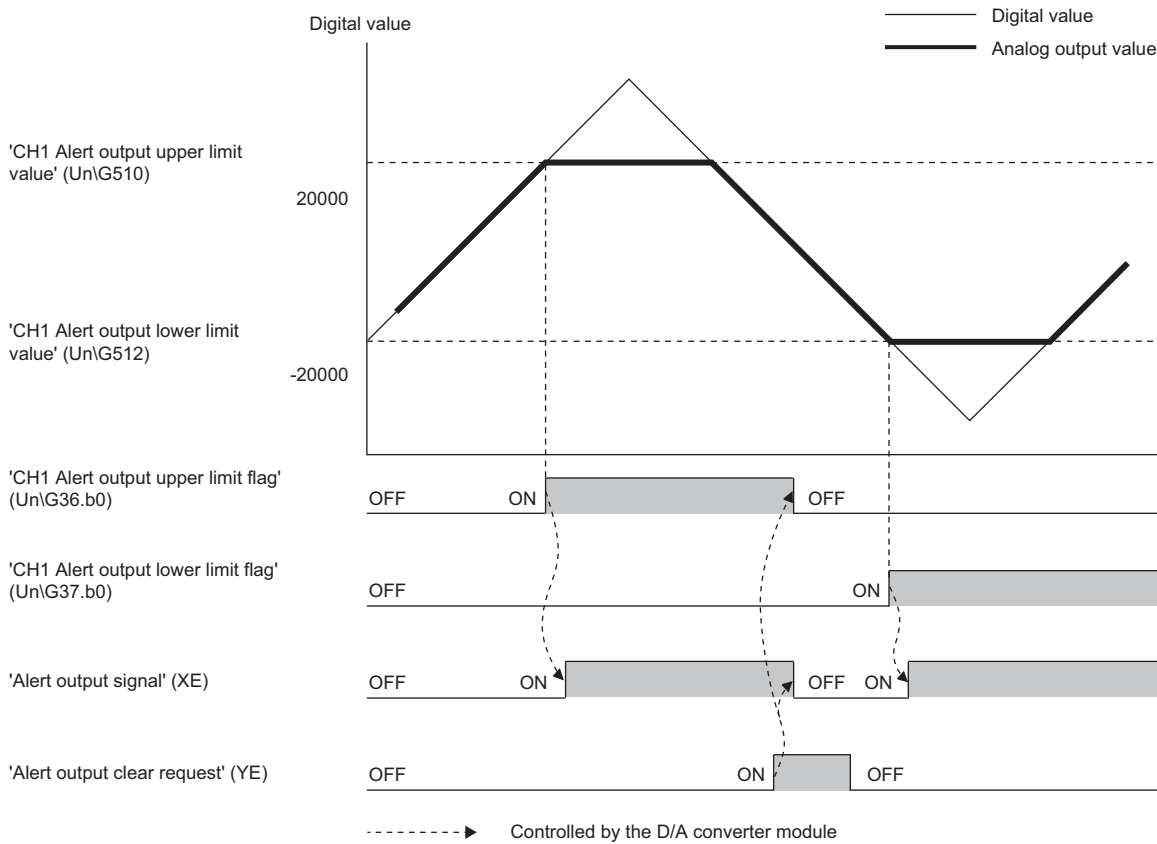
Operation

■Alert output notification

When 'CH1 Digital value' (Un\G460) is larger than 'CH1 Alert output upper limit value' (Un\G510) or is smaller than 'CH1 Alert output lower limit value' (Un\G512), either of 'Alert output upper limit flag' (Un\G36) or 'Alert output lower limit flag' (Un\G37), 'Alert output signal' (XE), and the ALM LED turn on to output an alert. In addition, an alarm code (080□H or 081□H) is stored in 'Latest alarm code' (Un\G2) when an alert has occurred.

When an alert has occurred, the set value of the alert output upper limit value or the alert output lower limit value is used as the digital value for the D/A conversion.

When 'CH1 Digital value' (Un\G460) is changed to a value smaller than 'CH1 Alert output upper limit value' (Un\G510) and larger than 'CH1 Alert output lower limit value' (Un\G512) after an alert has occurred, the analog output value returns to a normal value. However, 'Alert output upper limit flag' (Un\G36), 'Alert output lower limit flag' (Un\G37), and 'Alert output signal' (XE) are not cleared.

Clearing an alert

The alert output can be cleared in the following two methods:

After 'CH1 Digital value' (Un\G460) is set to be smaller than 'CH1 Alert output upper limit value' (Un\G510) and larger than 'CH1 Alert output lower limit value' (Un\G512)

- Turning on and off 'Alert output clear request' (YE)
- Turning on and off 'Operating condition setting request' (Y9)

The D/A converter module arranges the following status when an alert output is cleared.

- Clearing 'Alert output upper limit flag' (Un\G36) and 'Alert output lower limit flag' (Un\G37)
- Turning off 'Alert output signal' (XE)
- Turning off the ALM LED
- Clearing the alarm code stored in 'Latest alarm code' (Un\G2)

Setting procedure

1. Set "Warning output function" to "enable".

☞ Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Module name ⇨ [Module Parameter] ⇨ "Application setting" ⇨ "Warning output function"

2. Set values for "Warning output upper limit value" and "Warning output lower limit value".

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

Point 🔑

Set the values that satisfy the condition "alert output upper limit value > alert output lower limit value".

When a value out of the range is set, an alert output upper lower limit value inversion error (error code: 1B1□H) occurs.

Precautions

When the shift function is used, 'CH1 Digital value' (Un\G460) on which the shift-and-add is performed is the alert detection target. Set the alert output upper/lower limit values in consideration of the shift-and-add.

1.10 Rate Control Function

This function allows prevents the sudden change of the analog output value by limiting the increment/decrement of the analog output value per 1ms.

Operation

When the change amount of 'CH1 Digital value' (Un\G460) is larger than the value set in 'CH1 Increase digital limit value' (Un\G514) or 'CH1 Decrease digital limit value' (Un\G516), this function changes 'CH1 Digital value' (Un\G460) by the limit values set for each digital limit value.

The increment/decrement values per 1ms are set for 'CH1 Increase digital limit value' (Un\G514) and 'CH1 Decrease digital limit value' (Un\G516). However, the actual update cycle of the output value of the corresponding channel is (1ms × Number of conversion enabled channels).

Therefore, the analog output value increases or decreases per update cycle as follows:

First time: The D/A conversion value of the increase/decrease digital limit value

Second time or later: The D/A conversion value of (Increase/decrease digital limit value × Number of conversion-enabled channels)

Setting procedure

*1.* Set "Rate control enable/disable setting" to "Enable".

✎ Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Module name ⇨ [Module Parameter] ⇨ "Application setting" ⇨ "Rate control function"

2. Set values for "Increase digital limit value" and "Decrease digital limit value".

Item	Setting range
Increase digital limit value	0 to 64000
Decrease digital limit value	

Operation example of the rate control function

The following figure shows an operation example when the number of conversion enabled channels is 3. Set CH1 Rate control enable/disable setting to CH3 Rate control enable/disable setting to Enable (0) and set the increase digital limit values to 600, 400, and 200.
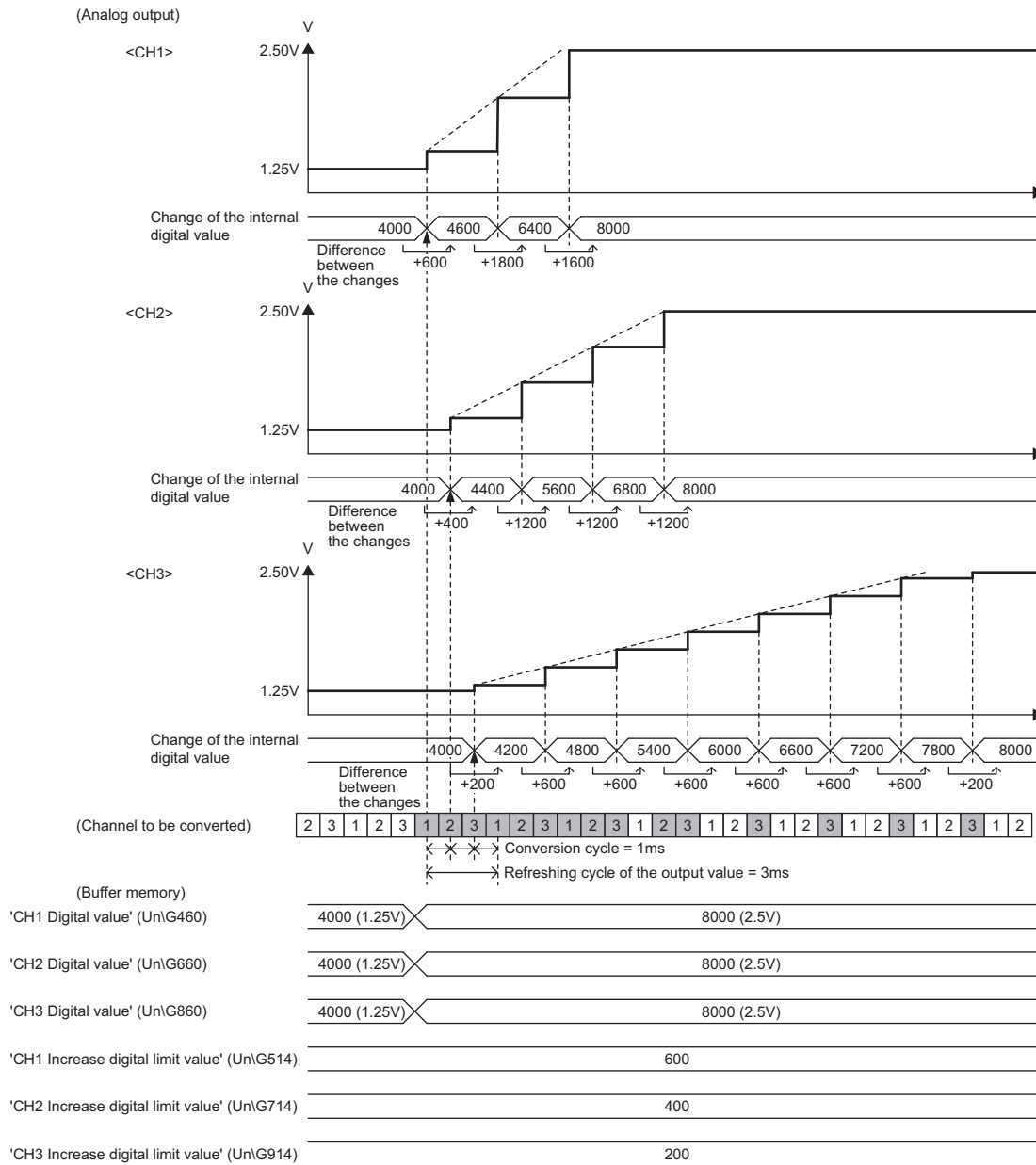
Precautions

- The setting of the shift function is enabled during the rate control.
- When the alert output function is enabled, the alert determination is performed to the set 'CH1 Digital value' (Un\G460). Note that an alert does not occur at the timing when the digital value changed by the rate control function exceeds the upper/lower limit value.
- The rate control does not function during the analog output test for when the CPU module is in the STOP state.
- With the analog output HOLD/CLEAR setting set to other than Previous value, the analog output changes when the CPU module is in the STOP state but the rate control does not function.
- When the CPU module status changes while the D/A conversion and D/A output are enabled and the analog output HOLD/ CLEAR setting is set to CLEAR, the rate control function operates as follows:
  When the CPU module status changes from RUN to STOP (error), the rate control does not function. When the CPU module status changes from STOP (error) to RUN, the rate control functions.
- While the rate control is enabled, the analog output is restarted from the offset value when the CPU module status is changed from STOP (error) to RUN with the D/A conversion enabled, the D/A output enabled, and the analog output set to HOLD.
- When the D/A conversion is enabled and the D/A output is disabled, the rate control does not function.
- When a value out of the setting range is written to 'CH1 Digital value' (Un\G460) during the rate control, the rate control is performed with the upper or lower limit value of the setting range.
  In addition, the check result is stored in 'CH1 Setting value check code' (Un\G400).
- When the external power supply is turned off during the rate control, the rate control does not function and the analog output value changes to 0V/0mA. When the external power supply is recovered, the rate control is restarted from the offset value.

1.11 External Power Supply Disconnection Detection Function

This function detects that the external power supply 24VDC is not supplied or the supply stops.

When the external power supply disconnection is detected, 'External power supply READY flag (CH1 to CH8)' (X7) turns off, and the analog output value becomes 0V/0mA regardless of the other settings.

Operation

When the external power supply is not input or when 200ms has not yet elapsed after the power supply is input, the power supply is regarded as disconnected and 'External power supply READY flag (CH1 to CH8)' (X7) turns off.

When the external power supply input stops, the external power supply is regarded as disconnected and 'External power supply READY flag (CH1 to CH8)' (X7) turns off.

Precautions

When the external power supply does not satisfy the requirements of the performance specifications, the external power supply is regarded as disconnected.

For the performance specifications of the external power supply, refer to the following.

📖 MELSEC iQ-R Channel Isolated Digital-Analog Converter Module User's Manual (Startup)

1.12 Disconnection Detection Function

This function allows detecting the disconnection by monitoring the analog output value. This function is enabled only when the analog output range is 4 to 20mA. A disconnection can be detected for each channel.
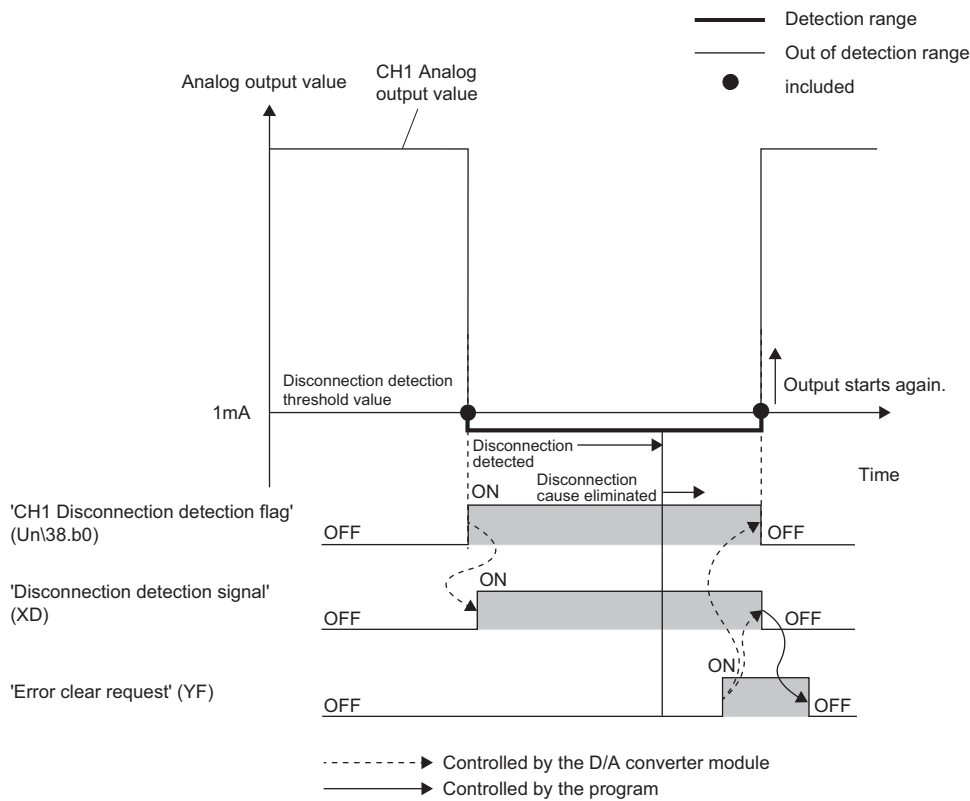
Operation

■Disconnection detection

A disconnection can be detected when the analog output range is 4 to 20mA and 'CH1 D/A conversion enable/disable setting' (Un\G500) is set to D/A conversion enabled (0).

The R60DA8-G requires 8ms and the R60DA16-G requires 16ms at a maximum to detect a disconnection.

■Operations performed when a disconnection is detected

When a disconnection is detected, the disconnection is notified by turning on 'Disconnection detection flag' (Un\G38), 'Disconnection detection signal' (XD), and the ERR LED.

In addition, an error code (1C4☐H) is stored in 'Latest error code' (Un\G0).

Even if the disconnection cause is eliminated, the analog output does not restart automatically to prevent an incorrect output.

To restart the analog output, check 'CH1 Digital value' (Un\G460) and turn on and off 'Error clear request' (YF). According to the status of 'CH1 Output enable/disable flag' (Y1), the analog output restarts.

When the analog output restarts, 'Disconnection detection flag' (Un\G38) of the corresponding channel is cleared. When the analog output of all the channels restarts, 'Disconnection detection signal' (XD) is cleared.

1.13 Interrupt Function

The D/A converter module executes the interrupt program of the CPU module when an interrupt factor such as a disconnection or alert output is detected.

For the D/A converter module, the maximum number of interrupt pointers available is 16 per module.

Operation

■Detecting an interrupt factor

When an interrupt factor occurs, an interrupt request is sent to the CPU module at the same time as 'Interrupt factor detection flag [n]' (Un\G4 to Un\G19) is turned to Interrupt factor (1).

■How to reset an interrupt factor

When Reset request (1) is set to 'Interrupt factor reset request [n]' (Un\G156 to Un\G171) corresponding to the interrupt factor, the specified interrupt factor is reset and 'Interrupt factor detection flag [n]' (Un\G4 to Un\G19) changes to No interrupt factor (0).

Setting procedure

To use the interrupt function, set "Condition target setting", "Condition target channel setting", "Interrupt factor transaction setting", and "Interrupt pointer" with the engineering tool. After completing the settings, write the project to enable the settings.

✎ Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Module name ⇨ [Module Parameter] ⇨ "Interrupt setting"

The following table shows the setting items on the interrupt setting window.

Item	Description
Condition target setting	Select a factor of the target for the interrupt detection.
Condition target channel setting	Select a target channel when the condition target setting for the interrupt detection is channel specification.
Interrupt factor transaction setting	Set an interrupt request for when the same interrupt factor occurs during the interrupt factor detection.
Interrupt pointer	Specify the number of an interrupt pointer that is initiated at the detection of an interrupt factor.

■Condition target setting

Select a factor of the condition target setting for the interrupt detection.

For details on the factors to be detected, refer to the following.

■Condition target channel setting

Select a target channel when the condition target setting for the interrupt detection is channel specification.

For details on the setting, refer to the following.

■Interrupt factor transaction setting

Set an interrupt request for when the same interrupt factor occurs during the interrupt factor detection.

 • When Interrupt resend request (0) is set and the same interrupt factor occurs during the interrupt factor detection, an interrupt request is sent to the CPU module again.

 • When No interrupt resend request (1) is set and the same interrupt factor occurs during the interrupt factor detection, an interrupt request is not sent to the CPU module.

■Interrupt pointer

Specify the number of an interrupt pointer that is initiated at the detection of an interrupt factor. For details on the interrupt pointers, refer to the following.

📖 MELSEC iQ-R CPU Module User's Manual (Application)

Point

- If 'Condition target setting [n]' (Un\G232 to Un\G247) is Disable (0), an interrupt request is not sent to the CPU module.
- To reset the interrupt factor, set Reset request (1) until 'Interrupt factor detection flag [n]' (Un\G4 to Un\G19) changes to No interrupt factor (0).
- Resetting interrupt factors is executed only when 'Interrupt factor reset request [n]' (Un\G156 to Un\G171) changes from No reset request (0) to Reset request (1).
- Multiple interrupt pointers can also share the same setting of 'Condition target setting [n]' (Un\G232 to Un\G247). When interrupts with the same settings occur in 'Condition target setting [n]' (Un\G232 to Un\G247), the interrupt program is executed in order of the priority of the interrupt pointers. For the priority of the interrupt pointers, refer to the following.

📖 MELSEC iQ-R CPU Module User's Manual (Application)

- When All channels (0) is set for 'Condition target channel setting [n]' (Un\G264 to Un\G279) and an interrupt detection target for each channel is set to 'Condition target setting [n]' (Un\G232 to Un\G247), the interrupt requests that have the same interrupt factor are sent to the CPU module if alerts are issued in multiple channels. In this case, the CPU module executes multiple interrupt programs and judges that the program cannot be normally finished due to the scan monitoring function, and a CPU module error may occur. When a CPU error occurs, refer to the following.

📖 MELSEC iQ-R CPU Module User's Manual (Application)

Setting example

Ex.

When the interrupt program (I50) is executed at the disconnection detection in any channel

• Parameter setting

Set "Interrupt setting" of [Module Parameter] as follows.

No.	Condition target setting	Condition target channel setting	Interrupt pointer
1	Disconnection detection flag	All channels	I50

• Label settings

Classification	Label name	Description	Device
Module Label	RCPU.stSM.bAlways_ON	Always ON	SM400
	RCPU.stSM.bAfter_RUN1_Scan_ON	ON for one scan after RUN	SM402
	R60DAG_1.unInterruptFactorMask_D[0]	Interrupt factor mask [1]	U0\G124.0
	R60DAG_1.unInterruptFactorResetRequest_D[0]	Interrupt factor reset request [1]	U0\G156.0
Labels to be defined	Define global labels as shown below:		

	Label Name	Data Type		Class	Assign (Device/Label)
1	G.bDisconnectDetection	Bit	...	VAR_GLOBAL	F0
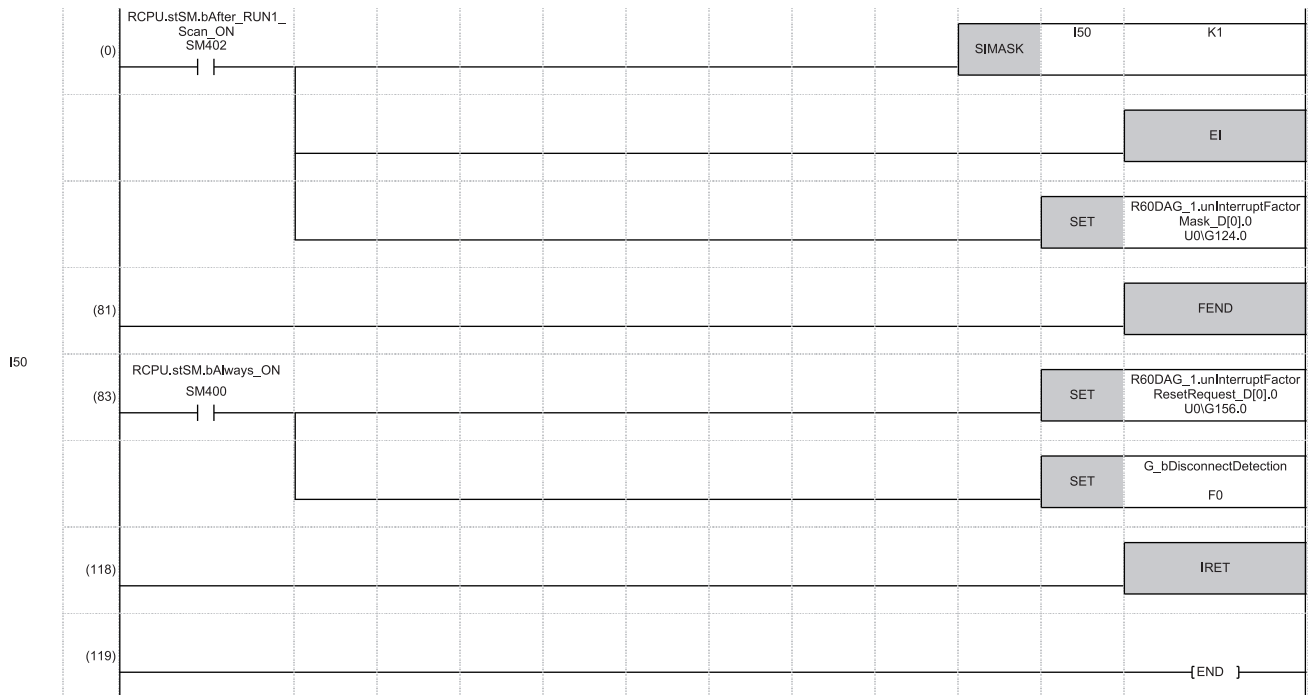
(0)   Enable only the interrupt pointer I50.
       Enable the interruption.
       Clear Interrupt factor mask [1].

(83)   Turn on Interrupt factor reset request [1].
       Perform the processing of when a disconnection is detected.

1.14 Error History Function

This function records errors and alarms that occurred in the D/A converter module to store them into the buffer memory area. Up to 16 errors and alarms are stored.

Operation

When an error occurs, the error code and the error time are stored from 'Error history 1' (Un\G3600 to Un\G3609) in order.

When an alarm occurs, the alarm code and the alarm code time are stored from 'Alarm history 1' (Un\G3760 to Un\G3769) in order.

• Detail of the error code assignment

	b15	to	b8	b7	to	b0
Un\G3600			Error code			
Un\G3601		First two digits of the year			Last two digits of the year	
Un\G3602		Month			Day	
Un\G3603		Hour			Minute	
Un\G3604		Second			Day of the week	
Un\G3605		Millisecond (Upper)			Millisecond (Lower)	
Un\G3606 to Un\G3609			System area			

• Detail of the alarm code assignment

	b15	to	b8	b7	to	b0
Un\G3760			Alarm code			
Un\G3761		First two digits of the year			Last two digits of the year	
Un\G3762		Month			Day	
Un\G3763		Hour			Minute	
Un\G3764		Second			Day of the week	
Un\G3765		Millisecond (Upper)			Millisecond (Lower)	
Un\G3766 to Un\G3769			System area			

Ex.

Storing example of error history and alarm history

Item	Storage contents	Storage example[1]
First two digits of the year/Last two digits of the year	Stored in BCD code.	2015H
Month/Day		131H
Hour/Minute		1234H
Second		56H
Day of the week	One of the following values is stored in BCD code. Sunday: 0, Monday: 1, Tuesday: 2, Wednesday: 3 Thursday: 4, Friday: 5, Saturday: 6	6H
Millisecond (upper)	Stored in BCD code.	7H
Millisecond (lower)		89H

*1   Values stored when an error occurs at 12:34:56.789 on Saturday, January 31st, 2015.

The start address of Error history where the latest error is stored can be checked in 'Latest address of error history' (Un\G1).

The start address of Alarm history where the latest alarm is stored can be checked in 'Latest address of alarm history' (Un\G3).

Ex.

When the third error occurs:

The third error is stored in Error history No.3, and the value 3620 (start address of Error history No.3) is stored to 'Latest address of error history' (Un\G1).

```
┌──────────────────────────────┐
│ 'Latest address of error history' │
│ (Un\G1): 3620                │
└──────────────────────────────┘
          │
          │        Un\G3600  ┌──────────────────────────┐
          │                  │ Error history No.1       │
          │                  │   ┌──────────────────┐   │
          │                  │   │ 1st error        │   │
          │                  │   └──────────────────┘   │
          │        Un\G3610  ├──────────────────────────┤
          │                  │ Error history No.2       │
          │                  │   ┌──────────────────┐   │
          │                  │   │ 2nd error        │   │         New
          │                  │   └──────────────────┘   │          ☆
          └──► Un\G3620      ├──────────────────────────┤     ┌──────────────┐
                             │ Error history No.3       │  ◄── │ 3rd error    │
                             │                          │      └──────────────┘
                             │        (Empty)           │
                             ├ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─┤
                             │                          │
                             │                          │
                             │                          │
                   Un\G3750  ├──────────────────────────┤
                             │ Error history No.16      │
                             │                          │
                             │        (Empty)           │
                             └──────────────────────────┘
```
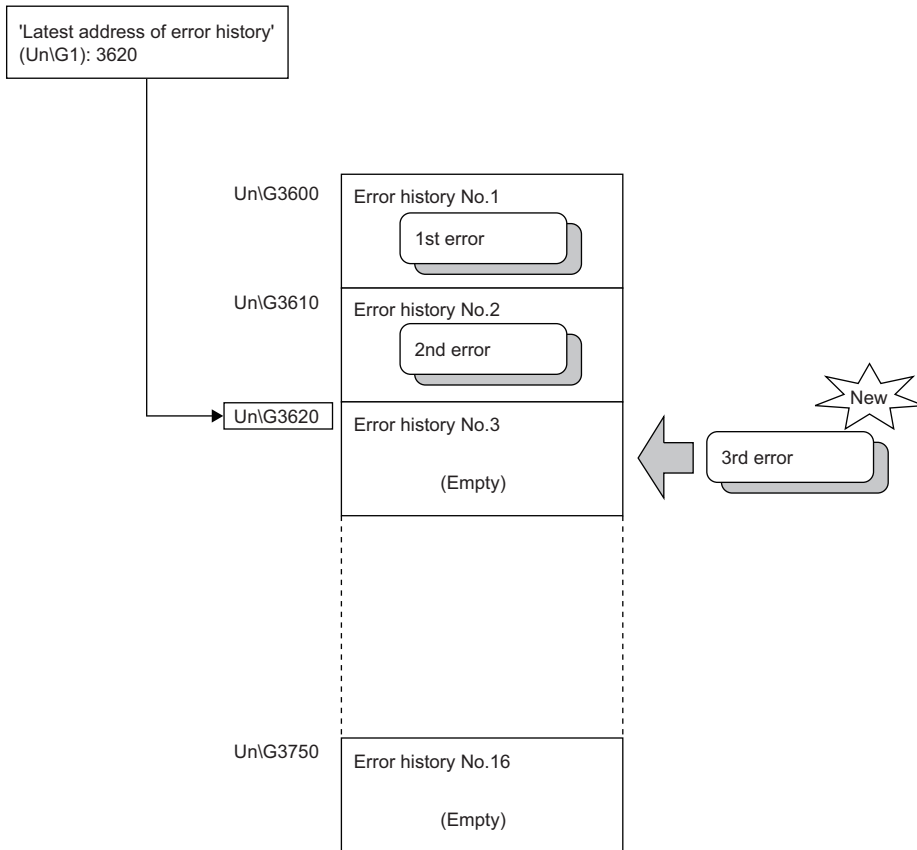
Ex.

When the 17th error occurs:

The 17th error is stored in Error history No.1, and the value 3600 (start address of Error history No.1) is stored to 'Latest address of error history' (Un\G1).
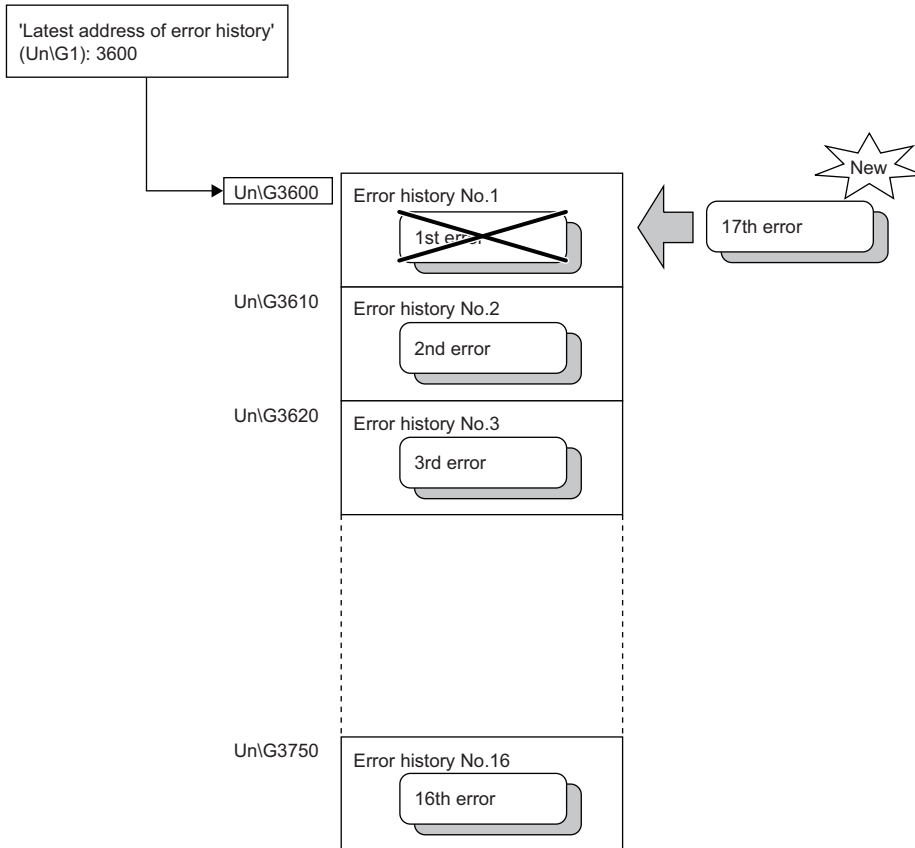
Point

- Once the error history storage area becomes full, subsequent error information will overwrite the existing data, starting from 'Error history No.1' (Un\G3600 to Un\G3609), and continues sequentially thereafter. The overwritten history is deleted.
- The same processing is performed for Alarm history when an alarm occurs.
- The stored error history is cleared when the D/A converter module is powered off, or when the CPU module is reset.

1.15 Event History Function

This function collects generated errors, alarms, or executed operations in the D/A converter module as event information in the CPU module.

The CPU module collects the event information occurred in the D/A converter module and keeps them in the data memory inside of the CPU module or an SD memory card.

The event information collected by the CPU module can be displayed on an engineering tool to check the occurrence history in a time series.

Event type	Classification	Description
System	Error	An error detected by the self diagnostics in each module.
	Warning	A warning (alarm) detected in each module.
	Information	The operation by the normal detection of the system that is not classified as Error or Warning, or the operation performed automatically by the system.
Security	Warning	Operation that is judged as an unauthorized access to each module.
	Information	Operation that is hard to be judged as the success of unlocking passwords or an unauthorized access.
Operation	Warning	Deleting (data clear) operations that may change the action. (These operations are not judged as errors by the self diagnostics.)
	Information	Operations performed by users to change the system operation or configuration in the offset/gain setting.

Setting procedure

The event history function can be set from the event history setting window of the engineering tool. For the setting method, refer to the following.

📖 MELSEC iQ-R CPU Module User's Manual (Application)

Displaying event history

Access to the menu window of the engineering tool. For details on the operating procedure and how to view the contents, refer to the following.

📖 GX Works3 Operating Manual

List of event history data

The following table lists the events that occur in the D/A converter module when the event type is Operation.

Event code	Event class	Event name	Event detail	Additional information
20010	Information	Offset/gain setting execution	In the user range setting, offset/gain values has been set.	Total number of writes
20100	Information	Error clear	The error clear request has been executed.	—

1.16 Backing up, Saving, and Restoring Offset/Gain Values

The D/A converter module makes it possible to back up, save, and restore the offset/gain values of the user range setting.
 • Back up: Creates a module-specific backup parameter and saves offset/gain values.
 • Save: Saves the offset/gain information, registered in this module by making the offset/gain setting, in the CPU module.
 • Restoration: Writes the information backed up and saved in the CPU module to this module.

In the event that the D/A converter module fails and needs to be replaced, the offset/gain values of the failed D/A converter module can be restored onto the new D/A converter module.

However, if the offset/gain values are saved and restored, the accuracy after the restoration decreases by approximately three times compared to that before the restoration. Reconfigure the offset/gain setting when required.

Only when the model where the offset/gain values are to be saved and the model where the offset/gain values are to be restored are the same, the offset/gain values can be saved and restored. Each procedure differs depending on whether a module-specific backup parameter is used or not.

When the module-specific backup parameter is used

Offset/gain values are automatically restored when the failed module is replaced with a new one using the online module change. For details on the online module change, refer to the following.
📖 MELSEC iQ-R Online Module Change Manual

Details of the module-specific backup parameter

A module-specific backup parameter is a file created in an SD memory card or the data memory of the control CPU. The contents of the parameter are the offset/gain value of the user range stored in the non-volatile memory of the D/A converter module.

The file name of a module-specific backup parameter is determined as follows based on the start I/O number of the D/A converter module.

UBPmmmnn.BPR
 • mmm indicates a value calculated by dividing the module I/O No. by 10H (3 digits in hexadecimal).
 • nn indicates a consecutive number of the module-specific backup parameters for each module and fixed to 00.

Creating and updating a module-specific backup parameter

A module-specific backup parameter is created or updated when the offset/gain values stored in the non-volatile memory of the D/A converter module are updated.

Timing when backup data is created or updated	Description
When the offset/gain setting is completed with "Offset/gain setting" of the engineering tool	A module-specific backup parameter is created or updated when the offset/gain setting is completed with "Offset/gain setting" of the engineering tool.
When 'User range write request' (YA) is turned on in the offset/gain setting mode	A module-specific backup parameter is created or updated when the offset/gain values of the user range are changed in the offset/gain setting mode.
When 'User range write request' (YA) is turned on in the normal mode	When 'User range write request' (YA) is turned on in the normal mode, the offset/gain values of the user range are restored based on the settings of the buffer memory areas (Save data type, CH1 Factory default setting offset value to CH16 User range setting gain value). At this timing, module-specific backup parameters are updated.
When the G(P).OGSTOR instruction is executed in the normal mode	When the G(P).OGSTOR instruction is executed in the normal mode, the offset/gain values of the user range are restored. At this timing, module-specific backup parameters are updated.
When a new module is recognized after the online module change	When a new module is mounted and recognized after the online module change, the offset/gain values of the user range are restored. At this timing, module-specific backup parameters are updated.

When no module-specific backup parameter exists in the data memory of the control CPU and a module-specific backup parameter needs to be created with the current setting, change the mode of the D/A converter module to the offset/gain setting mode and turn on 'User range write request' (YA). A module-specific backup parameter is created with the current setting of the flash memory.

■Precautions

If the creation of a module-specific backup parameter fails because the data memory of the control CPU does not have sufficient free space or the module-specific backup parameter is being used, a module-specific backup parameter creation error (error code: 17E1H) occurs.

Reading of module-specific backup parameters

To read a module-specific backup parameter and restore offset/gain values, set "Auto restore of Offset/gain setting with the module change" of the module parameter to "Enable" in advance.

✐ Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ "Application setting" ⇨ "Online module change"

■Reading timing

Module-specific backup parameters are read when a new module is mounted and recognized after the online module change. When the programmable controller is powered off and the module is replaced with a new one, module-specific backup parameters are not read.

■Precautions

When the module-specific backup parameter for the target slot does not exist in an SD memory card or the data memory of the control CPU, the subsequent restoration of the offset/gain values is not performed. If the offset/gain values cannot be restored even though the module-specific backup parameter exists, a module-specific backup parameter restore error (error code: 17E0H) occurs.

Restoration of the offset/gain values of the user range

When reading module-specific backup parameters are completed with no errors, the values are converted (restored) into the offset/gain values of the user range for the new module, and stored in the non-volatile memory. At the same timing, the module-specific backup parameter in the data memory of the control CPU is updated with the setting of the new module.

Restrictions on the module-specific backup parameter

Offset/gain values cannot be backed up or restored with a module-specific backup parameter in the following cases.

 • When the control CPU is not the process CPU
 • When the programmable controller is powered off and the D/A converter module is replaced with a new one
 • When "Auto restore of Offset/gain setting with the module change" of the module parameter is set to "Disable"

In any of the cases above, back up or restore offset/gain values by the following method.

When the module-specific backup parameter is not used

Back up or restore offset/gain values by one of the following methods.
 • Saving and restoring by dedicated instructions
 • Saving and restoring by reading from and writing to the buffer memory

With the method above, offset/gain values can be restored to a new module, or the offset/gain values set in one module can be applied to the other modules in the same system.
 • To restore offset/gain values onto a new replaced module:

1. Save offset/gain values.
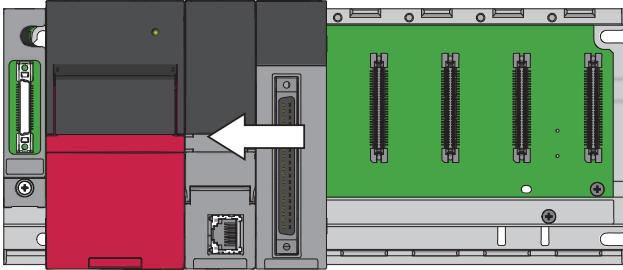
2. Power off the programmable controller and replace the D/A converter module with a new one.
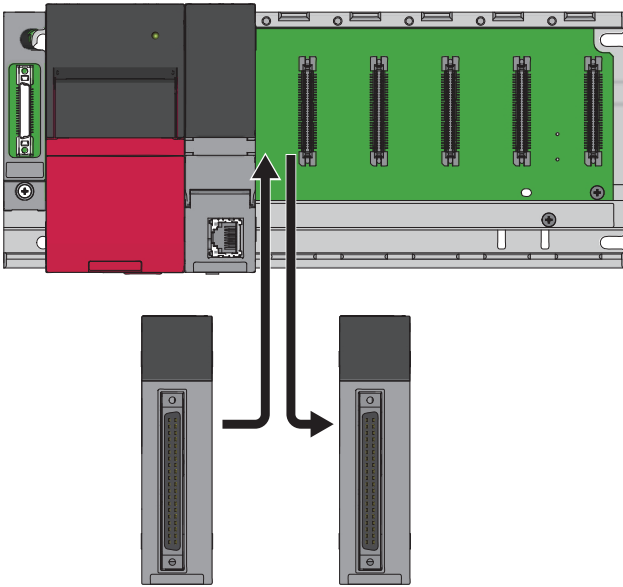
3. Restore the offset/gain values.
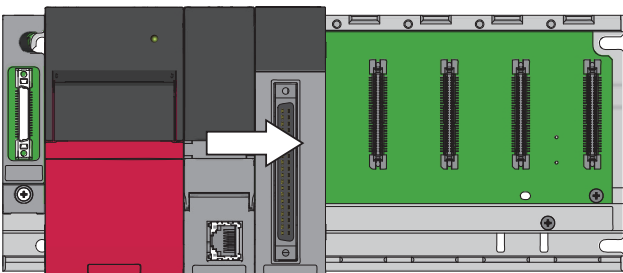
• To apply the offset/gain values set in one module to the other modules in the same system:

Ex.

When the offset/gain values in module No.1 are applied to modules No.2 to No.4
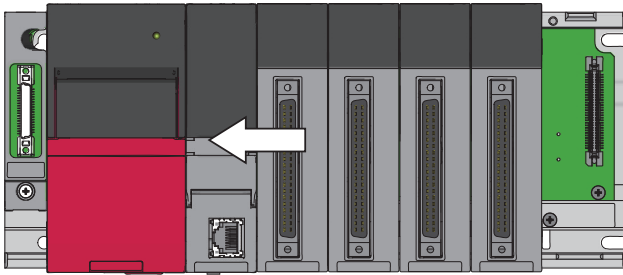
4. Save the offset/gain values in module No.1.
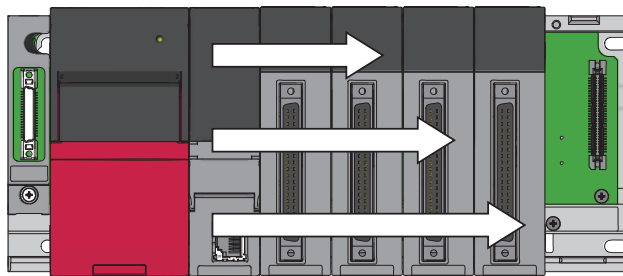
5. Apply the offset/gain values to modules No.2 to No.4

Saving and restoring by dedicated instructions

Use the dedicated instruction G(P).OGLOAD to temporarily save the offset/gain values of the source D/A converter module to the internal device of the CPU, then use G(P).OGSTOR to write the values to the destination D/A converter module. Prevent the saved offset/gain setting data from being deleted, by one of the following methods before replacing the modules:

• Use latch settings for the internal device of the destination module.

• Save the data onto an SD memory card. (To write data: use the SP.FWRITE instruction. To read data: use the SP.FREAD instruction.)

• Store the saved data.

For use of dedicated instructions, refer to the following.

📖 MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks)

Saving and restoring by reading from and writing to the buffer memory

Use Save data type setting, CH1 Factory default setting offset value to CH16 User range setting gain value, and 'User range write request' (YA) to read the offset/gain values from the source D/A converter module. Use the buffer memory again to write the values to the destination D/A converter module.

The following describes the procedure for using the buffer memory.

■To restore offset/gain values onto a new replaced module:

When offset/gain values are restored onto the source D/A converter module

1. Set Save data type setting.

2. Turn on and off 'Operating condition setting request' (Y9).

3. Save the stored values of Save data type setting and CH1 Factory default setting offset value to CH16 User range setting gain value.

When the power of the module is off

4. Replace the D/A converter module.

When offset/gain values are restored onto the destination D/A converter module

5. Write the data saved in Save data type setting and CH1 Factory default setting offset value to CH16 User range setting gain value.

6. Turn on 'User range write request' (YA).

7. Check that 'Offset/gain setting mode status flag' (XA) is on.

8. Turn off 'User range write request (YA)'.

9. Check whether the destination D/A converter module operates with the offset/gain values that are restored.

> **Point**
>
> When replacing modules, prevent the saved offset/gain setting data from being deleted, by one of the following methods before powering off the module.
> • Use latch settings for the internal device of the destination module.
> • Save the data onto an SD memory card. (To write data: use the SP.FWRITE instruction. To read data: use the SP.FREAD instruction.)
> • Store the saved data.

■To apply the offset/gain values set in one module to the other modules in the same system:

When offset/gain values are restored onto the source D/A converter module

1. Set Save data type setting.

2. Turn on and off 'Operating condition setting request' (Y9).

3. Save the stored values of Save data type setting and CH1 Factory default setting offset value to CH16 User range setting gain value.

When offset/gain values are restored onto the destination D/A converter module

4. Write the data saved in Save data type setting and CH1 Factory default setting offset value to CH16 User range setting gain value.

5. Turn on 'User range write request' (YA).

6. Check that 'Offset/gain setting mode status flag' (XA) is on.

7. Turn off 'User range write request (YA)'.

8. Check whether the destination D/A converter module operates with the offset/gain values that are restored.

Range reference table

The following describes the range reference tables used for saving and restoring offset/gain values.

■Factory default setting

The following describes the buffer memory addresses of the factory default setting.

R60DA8-G: 'CH1 Factory default setting offset value' (Un\G4004) to 'CH8 Factory default setting gain value' (Un\G4019)

R60DA16-G: 'CH1 Factory default setting offset value (Un\G4004)' to 'CH16 Factory default setting gain value' (Un\G4035)

• For the R60DA8-G

Address (decimal)								Description	Range type[1]	Analog value	Reference value (hexadecimal)
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8				
4004	4006	4008	4010	4012	4014	4016	4018	Factory default setting offset value	Voltage (0 to 5V)	0V	0A3DH
									Voltage (-10 to 10V)	0V	8000H
									Voltage (-12 to 12V)	0V	8000H
									Current (0 to 20mA)	0mA	0AD9H
4005	4007	4009	4011	4013	4015	4017	4019	Factory default setting gain value	Voltage (0 to 5V)	5V	D70AH
									Voltage (-10 to 10V)	10V	FD00H
									Voltage (-12 to 12V)	12V	FE6CH
									Current (0 to 20mA)	20mA	E3CCH

*1 The reference values differ depending on the setting of 'Save data type setting (Save data type setting 1)' (Un\G4002) (voltage or current).

- For the R60DA16-G

Address (decimal)								Description	Range type[*1]	Analog value	Reference value (hexadecimal)
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8				
4004	4006	4008	4010	4012	4014	4016	4018	Factory default setting offset value	Voltage (0 to 5V)	0V	0A3DH
									Voltage (-10 to 10V)	0V	8000H
									Voltage (-12 to 12V)	0V	8000H
									Current (0 to 20mA)	0mA	0AD9H
4005	4007	4009	4011	4013	4015	4017	4019	Factory default setting gain value	Voltage (0 to 5V)	5V	D70AH
									Voltage (-10 to 10V)	10V	FD00H
									Voltage (-12 to 12V)	12V	FE6CH
									Current (0 to 20mA)	20mA	E3CCH

*1 The reference values differ depending on the setting of 'Save data type setting (Save data type setting 1)' (Un\G4002) (voltage or current).

Address (decimal)								Description	Range type[*2]	Analog value	Reference value (hexadecimal)
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
4020	4022	4024	4026	4028	4030	4032	4034	Factory default setting offset value	Voltage (0 to 5V)	0V	0A3DH
									Voltage (-10 to 10V)	0V	8000H
									Voltage (-12 to 12V)	0V	8000H
									Current (0 to 20mA)	0mA	0AD9H
4021	4023	4025	4027	4029	4031	4033	4035	Factory default setting gain value	Voltage (0 to 5V)	5V	D70AH
									Voltage (-10 to 10V)	10V	FD00H
									Voltage (-12 to 12V)	12V	FE6CH
									Current (0 to 20mA)	20mA	E3CCH

*2 The reference values differ depending on the setting of 'Save data type setting 2' (Un\G4003) (voltage or current).

■User range setting

The following describes the buffer memory addresses of the user range setting.

R60DA8-G: 'CH1 User range setting offset value' (Un\G4020) to 'CH8 User range setting gain value' (Un\G4035)

R60DA16-G: 'CH1 User range setting offset value' (Un\G4036) to 'CH16 User range setting gain value' (Un\G4067)

• For the R60DA8-G

Address (decimal)								Description	Range type[*1]	Analog value	Reference value (hexadecimal)
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8				
4020	4022	4024	4026	4028	4030	4032	4034	User range setting offset value	Current specification	4mA	363CH
									Voltage specification	0V	8000H
									Voltage specification	0V	8000H
4021	4023	4025	4027	4029	4031	4033	4035	User range setting gain value	Current specification	20mA	E3CCH
									Voltage specification	10V	E95AH
									Voltage specification	5V	BE80H

*1 The reference values differ depending on the setting of 'Save data type setting 1' (Un\G4002) (voltage or current).

• For the R60DA16-G

Address (decimal)								Description	Range type[*1]	Analog value	Reference value (hexadecimal)
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8				
4036	4038	4040	4042	4044	4046	4048	4050	User range setting offset value	Current specification	4mA	363CH
									Voltage specification	0V	8000H
									Voltage specification	0V	8000H
4037	4039	4041	4043	4045	4047	4049	4051	User range setting gain value	Current specification	20mA	E3CCH
									Voltage specification	10V	E95AH
									Voltage specification	5V	BE80H

*1 The reference values differ depending on the setting of 'Save data type setting 1' (Un\G4002) (voltage or current).

Address (decimal)								Description	Range type[*2]	Analog value	Reference value (hexadecimal)
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
4052	4054	4056	4058	4060	4062	4064	4066	User range setting offset value	Current specification	4mA	363CH
									Voltage specification	0V	8000H
									Voltage specification	0V	8000H
4053	4055	4057	4059	4061	4063	4065	4067	User range setting gain value	Current specification	20mA	E3CCH
									Voltage specification	10V	E95AH
									Voltage specification	5V	BE80H

*2 The reference values differ depending on the setting of 'Save data type setting 2' (Un\G4003) (voltage or current).

1.17 Q Compatible Mode Function

This function allows setting the same buffer memory addresses of the A/D converter module as the buffer memory addresses of the MELSEC-Q series module.

This compatibility makes it possible to reuse sequence programs that have exhibited high performance on the MELSEC-Q series modules.

The following table lists the compatible modules of the MELSEC-Q series.

MELSEC iQ-R series D/A converter module	Compatible D/A converter module
R60DA8-G	Q66DA-G

Point

The R60DA16-G does not support the Q compatible mode function.

Operation

Only the buffer memory assignment is changed in the Q compatible mode.

- The I/O signal assignment is the same as that of the R mode. Some signals have been changed. However, the signals that change the module operation maintain the compatibility. Therefore, when a MELSEC-Q series sequence program is diverted, a significant modification of the program is not required. The following table shows a difference between the R60DA8-G and Q66DA-G.

Device number	R60DA8-G	Q66DA-G
X8	Use prohibited	High resolution mode status flag (ON: High resolution mode, OFF: Normal resolution mode)
XD	Disconnection detection signal (ON: Disconnection is detected, OFF: No disconnection is detected)	Use prohibited

Point

- When a MELSEC-Q series sequence program is diverted, check digital values and the operation timing and modify the sequence program if necessary because the specifications such as the resolution and update timing are changed.
- When a MELSEC-Q series sequence program is diverted and an error code is set as the operating condition or interlock condition, the program does not operate normally.
- When the Q compatible mode function is enabled, a program that uses FB or labels cannot be created. When FB or labels is used, create a program in the R mode.

Setting procedure

1. When adding a new module, select the module whose module name has "(Q)" at the end.

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

2. Configure the same parameter setting as the one of when the R mode is used.

3. Restart the CPU module after the module parameter is written.

Point

- During the module operation, the mode cannot be switched between the R mode and Q compatible mode.
- The project of the compatible D/A converter module created by GX Works2 can be read with the other format read function of GX Works3. The read project keeps various settings of the compatible D/A converter module as the settings of the D/A converter module of the MELSEC iQ-R series. The settings to be kept are the switch setting, parameter setting, auto refresh setting, and I/O assignment setting.

2 PARAMETER SETTINGS

Set the parameters of each channel.

Setting parameters here eliminates the need to program them.

2.1 Basic Setting

Setting procedure

Open "Basic setting" of the engineering tool.

1. Start Module parameter.

✎ Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Module name ⇨ [Module Parameter] ⇨ "Basic setting"
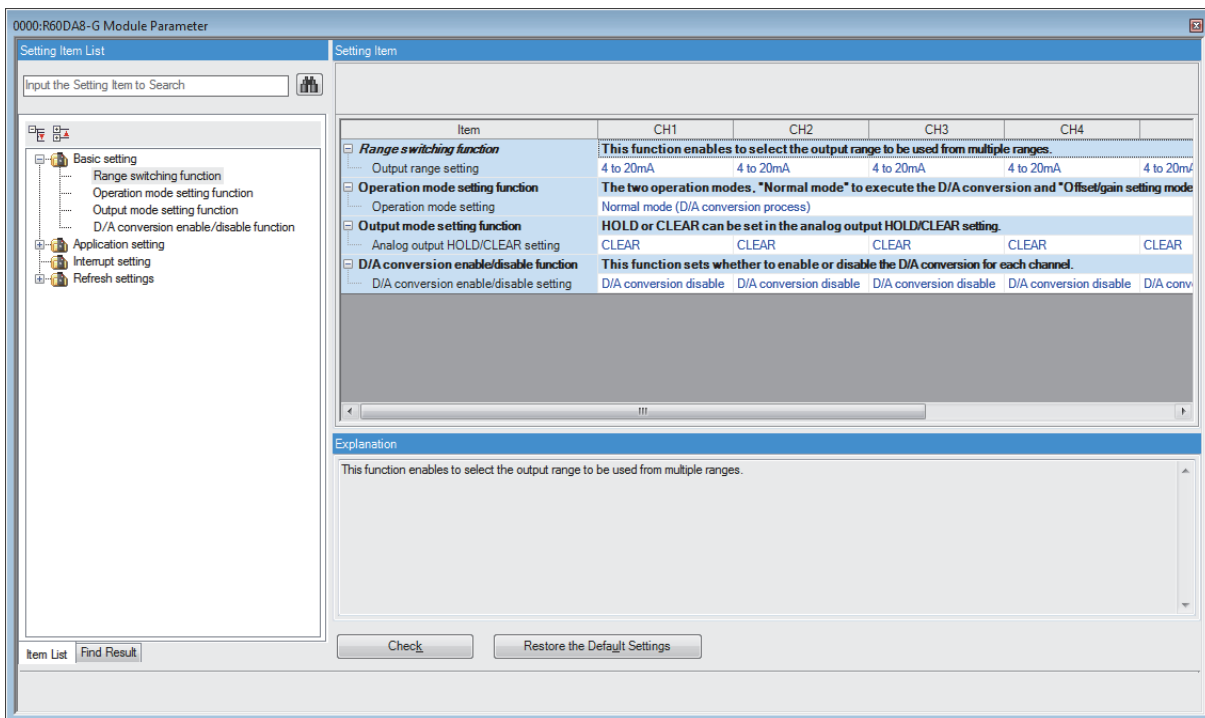
2. Enter setting values.

• Item where a value is selected from the pull-down list

Click the [▼] button of the item to be set, and from the pull-down list that appears, select the value.

2.2 Application Setting

Setting procedure

Open "Application setting" of the engineering tool.

1. Start Module parameter.

👆 Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Module name ⇨ [Module Parameter] ⇨ "Application setting"

2. Enter setting values.

• Item where a value is selected from the pull-down list

Click the [▼] button of the item to be set, and from the pull-down list that appears, select the value.

• Item where a value is entered into the text box

Double-click the item to be set to enter the numeric value.

2.3 Interrupt Setting

Setting procedure

Open "Interrupt setting" of the engineering tool.

1. Start Module parameter.

☞ Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Module name ⇨ [Module Parameter] ⇨ "Interrupt setting"

```
0000:R60DA8-G Module Parameter                                                                    ☒

Setting Item List              │ Setting Item
┌─────────────────────────┐    │
│ Input the Setting Item to Search  🔍 │
│                         │    │  No. │ Condition target setting │ Condition target channel setting │ Interrupt factor transaction setting │ Interrupt pointer │
│                         │    │  1   │ Disable            ▼ │ All CH specification │ Interrupt reissue requests │
│ ⊟  ⊞                    │    │  2   │ Disable              │ All CH specification │ Interrupt reissue requests │
│  ⊞ 🗋 Basic setting      │    │  3   │ Disable              │ All CH specification │ Interrupt reissue requests │
│  ⊞ 🗋 Application setting │    │  4   │ Disable              │ All CH specification │ Interrupt reissue requests │
│    🗋 Interrupt setting   │    │  5   │ Disable              │ All CH specification │ Interrupt reissue requests │
│  ⊞ 🗋 Refresh settings    │    │  6   │ Disable              │ All CH specification │ Interrupt reissue requests │
│                         │    │  7   │ Disable              │ All CH specification │ Interrupt reissue requests │
│                         │    │  8   │ Disable              │ All CH specification │ Interrupt reissue requests │
│                         │    │  9   │ Disable              │ All CH specification │ Interrupt reissue requests │
│                         │    │  10  │ Disable              │ All CH specification │ Interrupt reissue requests │
│                         │    │  11  │ Disable              │ All CH specification │ Interrupt reissue requests │
│                         │    │  12  │ Disable              │ All CH specification │ Interrupt reissue requests │
│                         │    │  13  │ Disable              │ All CH specification │ Interrupt reissue requests │
│                         │    │  14  │ Disable              │ All CH specification │ Interrupt reissue requests │
│                         │    │  15  │ Disable              │ All CH specification │ Interrupt reissue requests │
│                         │    │  16  │ Disable              │ All CH specification │ Interrupt reissue requests │
│                         │    │
│                         │    │ Explanation
│                         │    │ (1) Set an interrupt factor to be detected.
│                         │    │   • Disable
│                         │    │   • Error flag
│                         │    │   • Warning output flag
│                         │    │   • Disconnection detection flag
│                         │    │   • External power supply READY flag(CH1_CH8)
│                         │    │ (2) If Error flag or Warning output flag or Disconnection detection flag set in Condition target setting is turned off and on, or External power supply READY flag(CH1_CH8)
│                         │    │ set in Condition target setting is turned on and off, an interrupt request is issued to the CPU.
│                         │    │
│ Item List │ Find Result  │    │   [ Check ]    [ Restore the Default Settings ]
└─────────────────────────┘
```

2. Click the interrupt setting number (No.1 to 16) to be changed to enter the setting value.

• Item where a value is selected from the pull-down list

Click the [▼] button of the item to be set, and from the pull-down list that appears, select the value.

• Item where a value is entered into the text box

Double-click the item to be set to enter the numeric value.

2.4   Refresh Setting

Setting procedure

Set the buffer memory area of the D/A converter module to be refreshed automatically.

This refresh setting eliminates the need for reading/writing data by programming.

1.   Start Module parameter.

✎   Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Module name ⇨ [Module Parameter] ⇨ "Refresh settings"
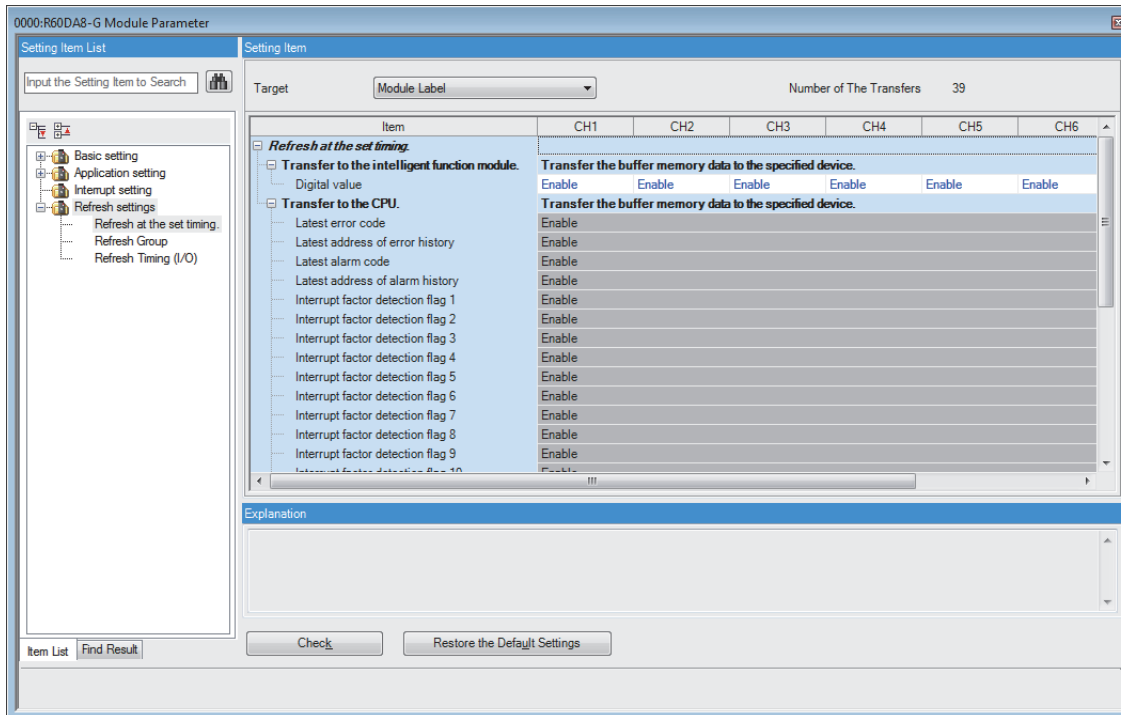
2.   Click "Target" and set the refresh destination.

• When "Target" is "Module label"

Set whether to enable or disable the auto refresh by setting "Digital value" to Enable or Disable.

• When "Target" is "Refresh Data Register (RD)"

Setting the start device for "Top Device Name" automatically sets the transfer destinations for all the items.

• When "Target" is "Device"

Double-click the item to be set to enter the refresh destination device.

3.   Click "Refresh Group" to set the refresh timing.

Set "Refresh Group" to "At the Execution Time of END Instruction" or "At the Execution Time of Specified Program".

When "At the Execution Time of Specified Program" is set, double-click "Group [n] (n: 1-64)" and set a value of 1 to 64.

> **Point** 🖉
>
> When the refresh is enabled, the values of the refresh destination are enabled at the refresh timing set with the engineering tool. At this time, the buffer memory areas are overwritten with the values of the refresh destination. To change the value in the refresh target buffer memory area, create a program to change the module label of the refresh destination and the device value.

Refresh processing time

The refresh processing time [μs] is a constituent of the scan time of the CPU module. For details on the scan time, refer to the following.

📖 MELSEC iQ-R CPU Module User's Manual (Application)

The refresh processing time [μs], which is taken for refresh, is given by:

- Refresh processing time [μs] = Refresh read time (time for transferring refresh data to the CPU module) + Refresh write time (time for transferring refresh data to the intelligent function module)

According to the setting of "Target", the refresh read time and the refresh write time vary.

When "Target" is a module label or a refresh data register (RD)

The following table lists the refresh read time and the refresh write time when the R□CPU is used.

Model	Classification	When using the refresh settings
R60DA8-G	Refresh read time	22.88μs
	Refresh write time	13.82μs
R60DA16-G	Refresh read time	31.12μs
	Refresh write time	18.54μs
R60DA8-G (Q compatible mode)	Refresh read time	17.96μs
	Refresh write time	9.76μs

When "Target" is a specified device

Calculate the refresh read time and refresh write time according to the number of items and the number of their transfer data (in units of word) that are set to be refreshed. For the calculation method, refer to the following.

📖 MELSEC iQ-R CPU Module User's Manual (Application)

In addition, substitute the following values in the calculation formula to calculate the refresh processing time.

Item		Description
Refresh read time	Number of refresh read settings	Number of devices used
	Refresh time for items of 1st to nth (A)	0.05μs per one word[1]
Refresh write time	Number of refresh write settings	Number of devices used
	Refresh time for items of 1st to nth (B)	0.01μs per one word[1]

*1 These values are the time with an R□CPU used.

Ex.

If all the 31 items (31 words in total) are set in the refresh read settings of the R60DA8-G

$31 \times 0.98 + 0.05 \times 31 + 11.6 = 43.53μs$

The refresh read time, therefore, is 43.53μs.

Ex.

If all the 8 items (8 words in total) are set in the refresh write settings of the R60DA8-G

$8 \times 0.58 + +0.01 \times 8 + +9.10 = 13.82μs$

The refresh write time, therefore, is 13.82μs.

3 TROUBLESHOOTING

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

3.1 Troubleshooting with the LEDs

Checking the display status of LEDs enables the primary diagnosis without an engineering tool and can narrow the range of trouble causes.

The D/A converter module status can be checked using the RUN LED, ERR LED, and ALM LED. The following table lists the correspondence relation between each LED and the D/A converter module status.

Name	Description
RUN LED	Indicates the operating status of the module. On: Normal operation Flashing (1s cycles): In offset/gain setting mode Flashing (400ms cycles): Selected as a module for the online module change Off: 5V power supply interrupted, watchdog timer error occurred, or exchanging the module is allowed in the process of the online module change.
ERR LED	Indicates the error status of the module.[1] On: Error occurred Off: Normal operation
ALM LED	Indicates the alarm status of the module.[2] On: Alert occurred Off: Normal operation

[1] For details, refer to the following.
☞ Page 59 List of Error Codes
[2] For details, refer to the following.
☞ Page 61 List of Alarm Codes

3.2 Checking the State of the Module

The following functions are available in the "Module Diagnostics" window of the D/A converter module.

FUNCTIONS	Application
Error information	Displays the description of errors that has occurred. Clicking the [Event History] button displays the errors that have occurred on the network and the history of the errors detected and the operations executed on each module.
Module Information List	Displays each status information of the D/A converter module.

Error Information

Check the description and the actions of the errors that have occurred.

👈 [Diagnostics] ⇨ [System Monitor] ⇨ Right-click the module to be checked. ⇨ "Module Diagnostics"
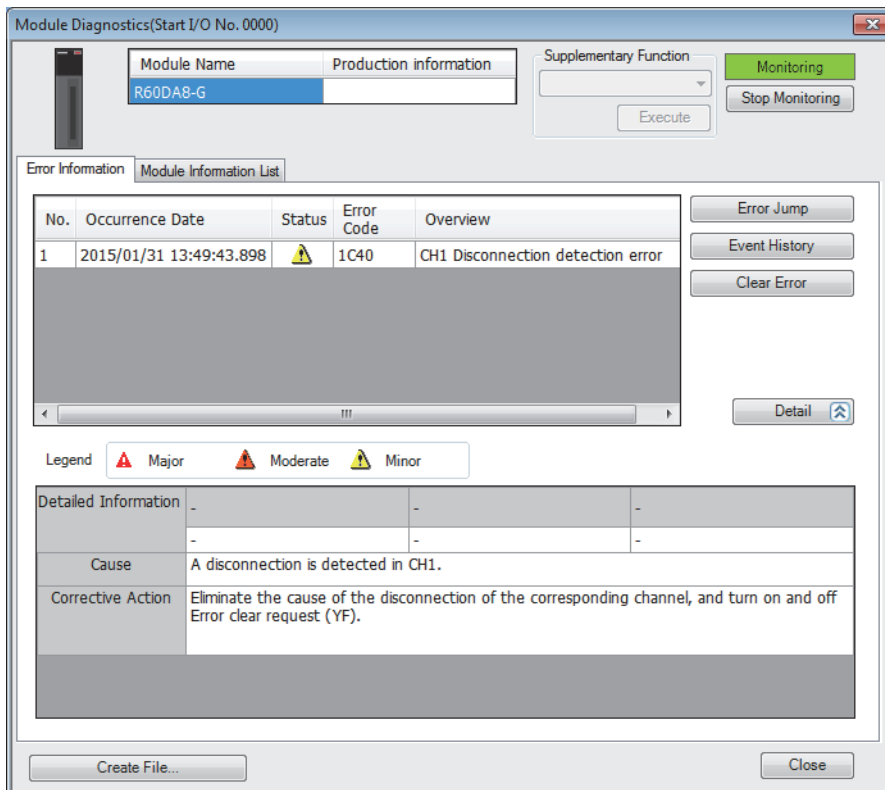
Item	Description
Status	Major: An error such as a hardware failure or memory failure. The module stops operating.
	Moderate: An error, such as a parameter error, which affects module operation. The module stops operating.
	Minor: An error such as a communication failure. The module continues operating.
Detailed Information	Displays detailed information about each error (maximum of 3 pieces).
Cause	Displays the detailed error causes.
Action	Displays the actions to eliminate the error causes.

Module Information List

Switch to the "Module Information List" tab to display each status information of the D/A converter module.
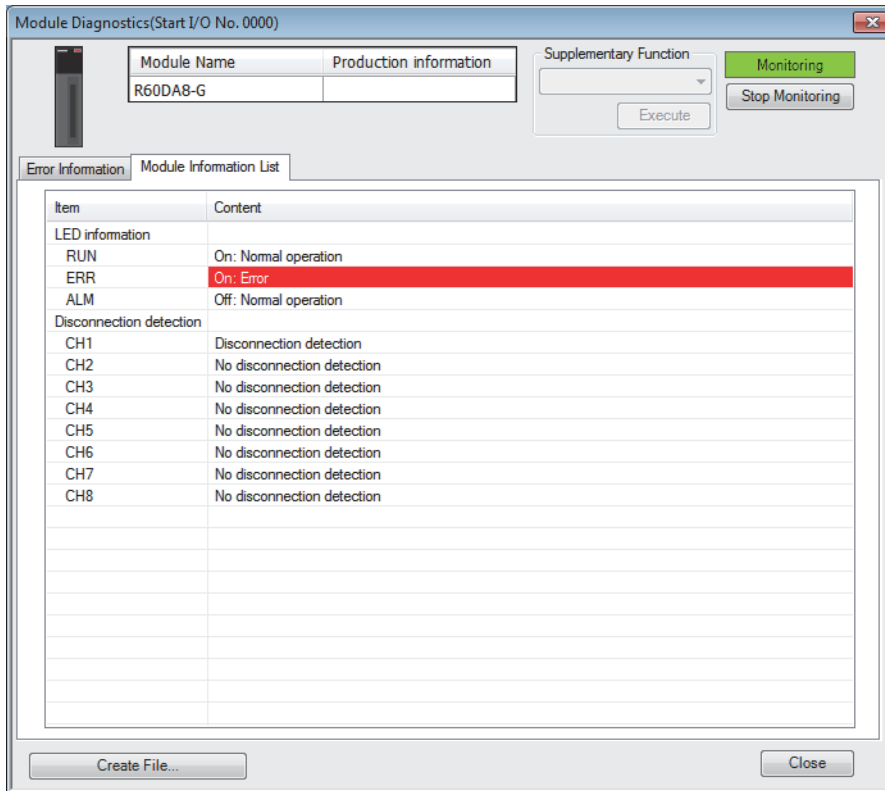
Item	Description
LED information	Displays the LED status of the D/A converter module.
Disconnection detection	Displays the detection status for the disconnection of the D/A converter module for each channel.

3.3 Troubleshooting by Symptom

When the RUN LED flashes or turns off

When flashing

Check item	Cause	Action
Check whether the module is in offset/gain setting mode.	In the module parameter setting of the engineering tool, the programmable controller power supply has been turned off and on, or the CPU module has been reset when "Operation mode setting" is "Offset/gain setting mode".	In the module parameter setting of the engineering tool, set "Operation mode setting" to "Normal mode (D/A conversion process)" and turn off and on the programmable controller power supply, or reset the CPU module.
	The G(P).OFFGAN instruction has been executed with the mode switched to offset/gain setting mode.	Review the program that uses the G(P).OFFGAN instruction to check whether the mode has been switched erroneously.
	The value in the mode switching setting has been changed and the mode has been switched to offset/gain setting mode.	Review the program that uses the mode switching setting to check whether the mode has been switched erroneously.
Check whether the module is selected as the target module for online module change.	The base number and slot number of the D/A converter module are set in SD1600 and SD1601.	Turn on Module selection cancel request flag (SM1615).

When turning off

Check item	Action
Check whether the power is supplied.	Check that the supply voltage of the power supply module is within the rated range.
Check whether the capacity of the power supply module is enough.	Calculate the current consumption of mounted modules, such as the CPU module, I/O modules, and intelligent function modules to check that the power capacity is enough.
Check whether the module is mounted properly.	Check the mounting state of the module.
Check whether exchanging the module is allowed in the process of the online module change.	Perform the online module change. For details, refer to the following. 📖 MELSEC iQ-R Online Module Change Manual
The case other than the above	Reset the CPU module, and check if the RUN LED turns on. If the RUN LED still remains off, the possible cause is a failure of the module. Please consult your local Mitsubishi representative.

When the ERR LED turns on

When turning on

Check item	Corrective action
Check whether any error has occurred.	Check 'Latest error code' (Un\G0) and take actions described in the list of error codes. ☞ Page 59 List of Error Codes

When the ALM LED turns on

When turning on

Check item	Corrective action
Check whether any alert has been issued.	Check 'Alert output upper limit flag' (Un\G36) or 'Alert output lower limit flag' (Un\G37). Take actions described in the list of alarm codes. (☞ Page 61 List of Alarm Codes)

When the analog output is not performed

Check item	Corrective action
Check whether the 24VDC external power supply is supplied.	Supply 24VDC to the R60DA8-G (pin numbers A19, A20, B19, and B20) or R60DA16-G (pin numbers 1A19, 1A20, 1B19, 1B20, 2A19, 2A20, 2B19, and 2B20).
Check whether there is any problem with the wiring, such as looseness or disconnection of analog signal lines.	Check the faulty area by checking the signal line visually or conductively.
Check whether the CPU module is in the STOP state.	Change the state of the CPU module to RUN.
Check whether the offset/gain setting is correct.	When the output range setting is set to the user range setting 1, user range setting 2, or user range setting 3, turn on and off 'Operating condition setting request' (Y9), and compare the values of CH□ User range setting offset value and CH□ User range setting gain value with the values in the range reference tables. If the stored values are not desired offset/gain values, perform the offset/gain setting again. For the range reference table, refer to the following. ☞ Page 45 Range reference table
Check whether the output range setting is correct.	Check CH□ Range setting monitor using the engineering tool. If the output range setting is incorrect, correct the output range setting of the engineering tool or setting of CH□ Range setting.
Is D/A conversion disabled set to D/A conversion enable/disable setting of the channel to output a value?	Check CH□ D/A conversion enable/disable setting, and set D/A conversion enable/disable setting to D/A conversion enabled with a program or the engineering tool.
Check whether 'CH□ Output enable/disable flag' (Y1 to Y8, Y11 to Y18) of the channel to be output is off.	Check the on/off state of 'CH□ Output enable/disable flag' (Y1 to Y8, Y11 to Y18). If 'CH□ Output enable/disable flag' (Y1 to Y8, Y11 to Y18) is off, correct the program. Check that the CPU module is not in the STOP state.
Check whether the program to write a digital value is correct.	Check CH□ Digital value with the engineering tool. If the value set to Digital value is not stored, correct the write program.
Has 'Operating condition setting request' (Y9) been executed?	Turn on and off 'Operating condition setting request' (Y9) with the engineering tool, and check that the analog output is performed properly. If it is performed properly, check if 'Operating condition setting request' (Y9) operates correctly in the program.

When HOLD of an analog output value is not available

Check item	Action
Check whether the analog output HOLD/CLEAR function setting is correct.	Check CH□ HOLD/CLEAR function setting monitor. If the setting is incorrect, set "Analog output HOLD/CLEAR setting" to "HOLD" in the module parameter setting of the engineering tool, and turn off and on the programmable controller or reset the CPU module.

Point

If the module does not operate properly even after the above actions are taken, the module may be failed. Please consult your local Mitsubishi representative.

3.4 List of Error Codes

When an error occurs during operation, the D/A converter module stores an error code in 'Latest error code' (Un\G0) of the buffer memory. In addition, 'Error flag' (XF) turns on. Turning on 'Error clear request' (YF) clears the error code in 'Latest error code' (Un\G0), and 'Error flag' (XF) turns off.

Error codes of the D/A converter module are classified in minor errors or moderate errors.

- Minor error: An error generated by an incorrect setting of a program or parameter. The D/A conversion continues with the parameter setting before the change. (1000H to 1FFFH)
- Moderate error: An error such as hardware failure. The D/A conversion does not continue. (3000H to 3FFFH)

The following table shows the error codes stored.

□ in error codes: Indicates the channel number of a generated error. A numerical value of 0 to F is used to correspond to channel 1 to 16.

(CH1: 0, CH2: 1, CH3: 2, CH4: 3, CH5: 4, CH6: 5, CH7: 6, CH8: 7, CH9: 8, CH10: 9, CH11: A, CH12: B, CH13: C, CH14: D, CH15: E, CH16: F)

△ in error codes: Indicates the interrupt setting corresponding to an error (0: Setting 1 to F: Setting 16).

Error code	Error name	Description and cause	Action
0000H	—	There is no error.	—
1080H	Number of writes to offset/gain settings reach limit error	The number of offset/gain settings has exceeded the guaranteed maximum number.	Any further setting of offset/gain values may not be reflected correctly.
17E0H	Module-specific backup parameter restore error	Offset/gain values cannot be restored with the module-specific backup parameter.	The module-specific backup parameter file may be damaged. Readjust the user range.
17E1H	Module-specific backup parameter creation error	The module-specific backup parameter has not been created.	Check the free space on the data memory of the control CPU module and the SD memory card, and recreate a module-specific backup parameter. ☞ Page 39 Backing up, Saving, and Restoring Offset/Gain Values
180△H	Interrupt factor generation setting range error	A value other than 0 to 1 is set in Interrupt factor generation setting [n].	Set Interrupt factor generation setting [n] to 0 or 1.
181△H	Condition target setting range error	A value other than 0 to 6 is set in Condition target setting [n] (for the R60DA8-G, a value other than 0 to 4).	Set Condition target setting [n] to 0 to 6 (for the R60DA8-G, 0 to 4).
182△H	Condition target channel setting range error	A value other than 0 to 16 is set in Condition target channel setting [n] (for the R60DA8-G, a value other than 0 to 8).	Set Condition target channel setting [n] to 0 to 16 (for the R60DA8-G, 0 to 8).
1860H	G(P).OGSTOR instruction execution error in offset/gain setting mode	The G(P).OGSTOR instruction has been executed in offset/gain setting mode.	Do not execute the G(P).OGSTOR instruction in the offset/gain setting mode.
1861H	Offset/gain setting continuous write occurrence error	The G(P).OGSTOR instruction has been executed continuously or a setting value has been continuously written to the flash memory 26 times or more in the offset/gain setting.	For the G(P).OGSTOR instruction, execute it only once per module. For the offset/gain setting, write the setting value only once per setting.
1862H	Model mismatch error at the execution of OGSTOR	The G(P).OGSTOR instruction has been executed on a module different from the one on which the G(P).OGLOAD instruction was executed. The G(P).OGSTOR instruction has been executed ahead of the G(P).OGLOAD instruction.	Execute the G(P).OGLOAD and G(P).OGSTOR instructions on the same module. As the other way, execute the G(P).OGLOAD instruction on the module whose data is to be restored, and then execute the G(P).OGSTOR instruction on the module to which the data is to be restored.
1863H	Save data type setting error	• A value outside the setting range is set in Save data type setting (Save data type setting 1 or Save data type setting 2. • At the execution of the G(P).OGLOAD instruction or the G(P).OGSTOR instruction, a value outside the setting range is set in Save data type setting (Save data type setting 1) or Save data type setting 2 of the control data.	Set a value within the range of 0H to 2H for Save data type setting (Save data type setting 1) and Save data type setting 2 for each channel.
190□H	Range setting range error	A value out of the range is set in CH□ Range setting.	Set CH□ Range setting to the following values: 0 to 5, A, B, D, E, F (hexadecimal)
191□H	Digital value setting range error	A value outside the range is set for CH□ Digital value.	Set an appropriate value for CH□ Digital value.

Error code	Error name	Description and cause	Action
1A0□H	Scaling enable/disable setting range error	A value other than 0 and 1 is set in CH□ Scaling enable/disable setting.	Set CH□ Scaling enable/disable setting to 0 or 1.
1A1□H	Scaling setting range error	A value other than -32000 to 32000 is set in CH□ Scaling lower limit value or CH□ Scaling upper limit value.	Set CH□ Scaling lower limit value and CH□ Scaling upper limit value to -32000 to 32000.
1A2□H	Scaling upper/lower limit value setting error	CH□ Scaling upper limit value and CH□ Scaling lower limit value are set as the scaling upper limit value = the scaling lower limit value.	Set CH□ Scaling upper limit value and CH□ Scaling lower limit value as the scaling upper limit value ≠ the scaling lower limit value.
1B0□H	Alert output setting range error	A value other than 0 and 1 is set in CH□ Alert output setting.	Set CH□ Alert output setting to 0 or 1.
1B1□H	Alert output upper/lower limit value inversion error	Values that do not satisfy the following relation are set in CH□ Alert output upper limit value and CH□ Alert output lower limit value: Upper limit value > Lower limit value	Set values so that CH□ Alert output upper limit value is larger than CH□ Alert output lower limit value.
1B8□H	Rate control enable/disable setting range error	A value other than 0 and 1 is set in CH□ Rate control enable/disable setting.	Set 0 or 1 for CH□ Rate control enable/disable setting.
1B9□H	Digital limit value range error	A value other than 0 to 64000 is set in CH□ Increase digital limit value or CH□ Decrease digital limit value.	Set a value within 0 to 64000 in CH□ Increase digital limit value and CH□ Decrease digital limit value.
1C4□H	Disconnection detection error	A disconnection is detected in CH□.	Eliminate the cause of the disconnection of the corresponding channel, and turn on and off 'Error clear request' (YF).
1E50H	Offset/gain setting channel specification error	Multiple channels are set at the same time during the offset/gain setting. In the offset/gain setting, "1: Setting channel" is set for both CH□ Offset/gain setting mode (offset specification) and CH□ Offset/gain setting mode (gain specification), or "0: Disable" is set.	Correctly set CH□ Offset/gain setting mode (offset specification) and CH□ Offset/gain setting mode (gain specification).
1E51H	User range data invalid (CH identification disabled)	An invalid value is set in the offset/gain setting. The number of the channel in which this error occurs cannot be identified.	Perform the offset/gain setting again for all channels where the user range is set. If the error occurs again, the possible cause is a failure of the module. Please consult your local Mitsubishi representative.
1E52H	Analog adjustment output setting out-of-range error	A value other than -3000 to 3000 is set to Offset/gain adjustment value specification.	Set a value within the range of -3000 to 3000 to Offset/gain adjustment value specification.
1E6□H	User range data invalid (CH identification allowed)	An invalid value is set in CH□ Offset/gain setting.	Perform the offset/gain setting again for the channels where the error has occurred. If the error occurs again, the possible cause is a failure of the module. Please consult your local Mitsubishi representative.
1E7□H	Offset/gain value inversion error	The offset value and gain value to be saved in the flash memory are as follows: Offset value ≥ Gain value	Perform the offset/gain setting again so that the following condition is satisfied: Offset value < Gain value
1E8□H	Offset/gain setting channel range error	A value other than 0 and 1 is set in CH□ Offset/gain setting mode (offset specification) and CH□ Offset/gain setting mode (gain specification).	Set CH□ Offset/gain setting mode (offset specification) and CH□ Offset/gain setting mode (gain specification) to 0 or 1.
1E9□H	Offset/gain setting range error	When the offset and gain are set, a value other than D, E, or F is set for CH□ Offset/gain setting mode (range specification).	Set D, E, or F for CH□ Offset/gain setting mode (range specification).
3001H	Hardware error	A hardware error has occurred in the module.	Power off and on the module. If the error occurs again, the possible cause is a failure of the module. Please consult your local Mitsubishi representative.
3030H	Flash memory error	The data in the flash memory is abnormal.	Check the analog output value. If the values are abnormal, please consult your local Mitsubishi representative.

3.5 List of Alarm Codes

When an alarm occurs during operation, the D/A converter module stores an alarm code in 'Latest alarm code' (Un\G2) of the buffer memory. Turning on 'Alert output clear request' (YE) or 'Operating condition setting request' (Y9) clears the alarm code in 'Latest alarm code' (Un\G2).

□ in alarm codes: Indicates the channel of a generated error. A numerical value of 0 to F is used to correspond to channel 1 to 16.

(CH1: 0, CH2: 1, CH3: 2, CH4: 3, CH5: 4, CH6: 5, CH7: 6, CH8: 7, CH9: 8, CH10: 9, CH11: A, CH12: B, CH13: C, CH14: D, CH15: E, CH16: F)

Alarm code	Alarm name	Description and cause	Action
080□H	Alert output alarm (upper limit)	The alert output alarm (upper limit) has occurred in CH□.	Adjust CH□ Digital value to fall within the range, and turn on and off 'Alert output clear request' (YE). As a result, the corresponding bit of 'Alert output upper limit flag' (Un\G36) and/or 'Alert output lower limit flag' (Un\G37), and 'Alert output signal' (XE) turn off.
081□H	Alert output alarm (lower limit)	The alert output alarm (lower limit) has occurred in CH□.	
0C0□H	CH□ Under-output range change denial alarm	The range has been switched during analog output in CH□.	To switch the range, turn off 'CH□ Output enable/disable flag' (Y1 to Y8, Y11 to Y18) of the corresponding channel, and turn on and off 'Operating condition setting request' (Y9).

APPENDICES

Appendix 1 Module Label

The functions of the D/A converter module can be set by using module labels.

Module labels of I/O signals

The module label names of I/O signals are defined as follows.

"Module name"_"Module number".b"Label name" or "Module name"_"Module number".b"Label name"_D

Ex.

R60DAG_1.bModuleREADY_D

■Module name

The character string of a module model name is given.

■Module number

A number starting from 1 is added to identify modules that have the same module name.

■Label name

The label identifier unique to a module is given.

■_D

This string indicates that the module label is for the direct access input (DX) or direct access output (DY). A module label without the string is for the input (X) or output (Y) of the refresh processing.

Module labels of buffer memory areas

The module label name of a buffer memory area is defined with the following structure:

"Module name"_"Module number"."Data type"_D["(Channel)"]."Data format""Label name"_D

Ex.

R60DAG_1.stnControl_D[0].wDigitalValue_D

■Module name

The character string of a module model name is given.

■Module number

A number starting from 1 is added to identify modules that have the same module name.

■Data type

The data type to sort a buffer memory area is given. Each data type is as follows:

Data type	Description
stnMonitor	Monitor
stnControl	Control
stnSetting	Setting

■Channel

The channel number corresponding to a module label is given. A numerical value of 0 to 15 is used to correspond to CH1 to CH16.

(CH1: 0, CH2: 1, CH3: 2, CH4: 3, CH5: 4, CH6: 5, CH7: 6, CH8: 7, CH9: 8, CH10: 9, CH11: 10, CH12: 11, CH13: 12, CH14: 13, CH15: 14, CH16: 15)

■**Data format**

The string that represents the data size of a buffer memory area is given. Each data format is as follows:

Data format	Description
u	Word [Unsigned]/Bit string [16-bit]
w	Word [Signed]
z	System area

■**Label name**

The label identifier unique to a module is given.

■**_D**

This string indicates that the module label is for the direct access. A module label without the string is for the auto refresh. The following table shows the differences between the auto refresh and direct access.

Type	Description	Access timing	Example
Auto refresh	Values that are read from or written to the module label are reflected in the module collectively at the auto refresh. The run time of the program can be reduced. To use the auto refresh, set "Target" to the module label in "Refresh settings" of "Module Parameter".	At auto refresh	R60DAG_1.stnControl[0].wDigitalValue
Direct access	Values that are read from or written to the module label is reflected in the module instantly. Compared with the auto refresh, the run time of the program becomes longer. However, the responsiveness is high.	At reading/writing from/to the module label	R60DAG_1.stnControl_D[0].wDigitalValue_D

Precautions

When using the R60DA8-G, do not use the module labels assigned to CH9 to CH16.

Doing so may cause malfunction.

Appendix 2 I/O Signals

List of I/O signals

The following table lists the I/O signals of the D/A converter module.

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

☞ Page 66 Details of input signals

☞ Page 73 Details of output signals

> **Point** 🖉
>
> • The I/O signals (X/Y) described below show the case that the start I/O number of the D/A converter module is set to "0".
> • Do not use the "Use prohibited" signals shown below because the system uses them. If users use (turn off and on) the signals, the functions of the D/A converter module cannot be guaranteed.

Input signal

Device number	Signal name
X0	Module READY
X1 to X6	Use prohibited
X7	External power supply READY flag (CH1 to CH8)
X8	Use prohibited
X9	Operating condition setting completed flag
XA	Offset/gain setting mode status flag
XB	Channel change completed flag
XC	Set value change completed flag
XD	Disconnection detection signal
XE	Alert output signal
XF	Error flag
X10 to X16[*1]	Use prohibited
X17[*1]	External power supply READY flag (CH9 to CH16)
X18 to X1F[*1]	Use prohibited

*1 For the R60DA8-G, only X0 to XF are available because the number of I/O points is 16.

Output signal

Device number	Signal name
Y0	Use prohibited
Y1	CH1 Output enable/disable flag
Y2	CH2 Output enable/disable flag
Y3	CH3 Output enable/disable flag
Y4	CH4 Output enable/disable flag
Y5	CH5 Output enable/disable flag
Y6	CH6 Output enable/disable flag
Y7	CH7 Output enable/disable flag
Y8	CH8 Output enable/disable flag
Y9	Operating condition setting request
YA	User range write request
YB	Channel change request
YC	Value change request
YD	Use prohibited
YE	Alert output clear request
YF	Error clear request
Y10[*1]	Use prohibited
Y11[*1]	CH9 Output enable/disable flag
Y12[*1]	CH10 Output enable/disable flag
Y13[*1]	CH11 Output enable/disable flag
Y14[*1]	CH12 Output enable/disable flag
Y15[*1]	CH13 Output enable/disable flag
Y16[*1]	CH14 Output enable/disable flag
Y17[*1]	CH15 Output enable/disable flag
Y18[*1]	CH16 Output enable/disable flag
Y19 to Y1F[*1]	Use prohibited

*1 For the R60DA8-G, only Y0 to YF are available because the number of I/O points is 16.

Details of input signals

The following describes the details of the input signals for the D/A converter module which are assigned to the CPU module. The I/O numbers (X/Y) described in Appendix 2 are for the case when the start I/O number of the D/A converter module is set to 0.

Point

This section describes buffer memory addresses for CH1.

For details on the buffer memory addresses after CH2, refer to the following.

Module READY

Module READY (X0) turns on to indicate the preparation for the D/A conversion is completed after the power-on or the reset operation of the CPU module.

In the following cases, 'Module READY' (X0) turns off.

 • In the offset/gain setting mode (In this case, the D/A conversion is performed.)
 • When a watchdog timer error occurs in the D/A converter module (In this case, the D/A conversion is not performed.)

■Device number

The following shows the device number of this input signal.

Signal name	CH1 to CH16
Module READY	X0

External power supply READY flag (CH1 to CH8)/(CH9 to CH16)

■Device number
The following shows the device number of this input signal.

Signal name	CH1 to CH8	CH9 to CH16
External power supply READY flag (CH1 to CH8)	X7	—
External power supply READY flag (CH9 to CH16)	—	X17

Point

Two external power supplies are provided for the R60DA16-G. One is for CH1 to CH8 and the other is for CH9 to CH16. The status of each external power supply (the power is being supplied or not) is indicated by 'External power supply READY flag (CH1 to CH8)' (X7) and 'External power supply READY flag (CH9 to CH16)' (X17).
The following shows examples of CH1 to CH8. When using CH9 to CH16, regard X7 as X17.

■When the external power supply is off, or when 200ms has not yet elapsed after the power-on
'External power supply READY flag (CH1 to CH8)' (X7) remains off and the D/A conversion processing is not performed.
In this case, the analog output value is 0V/0mA.

■When the external power supply is turned off and on
After 200ms, 'External power supply READY flag (CH1 to CH8)' (X7) turns on. The D/A conversion is started on the channels where the D/A conversion is enabled.
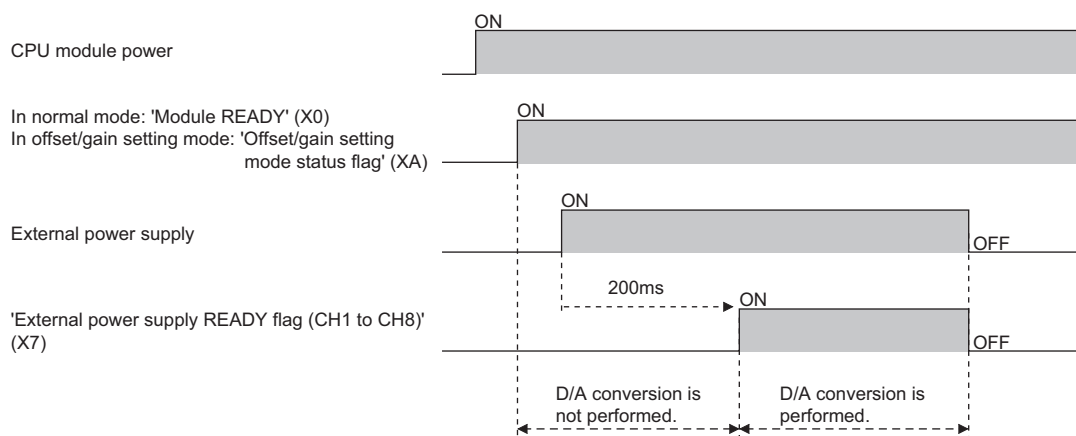
■When the external power supply is turned on and off
'External power supply READY flag (CH1 to CH8)' (X7) turns off and the D/A conversion processing stops.
In this case, the analog output value is 0V/0mA.
When the external power supply is turned off and on again, 'External power supply READY flag (CH1 to CH8)' (X7) turns on after 200ms as described above and the D/A conversion is restarted.

■Precautions
Use the external power supply that satisfies the specifications described in the performance specifications. Otherwise, 'External power supply READY flag (CH1 to CH8)' (X7) does not turn on. For the performance specifications, refer to the following.
📖 MELSEC iQ-R Channel Isolated Digital-Analog Converter Module User's Manual (Startup)

Operating condition setting completed flag

■Device number

The following shows the device number of this input signal.

Signal name	CH1 to CH16
Operating condition setting completed flag	X9

When changing the settings, use Operating condition setting completed flag (X9) as an interlock condition to turn on and off 'Operating condition setting request' (Y9).

For the buffer memory addresses which require turning on and off of 'Operating condition setting request' (Y9) to enable the changed values, refer to the following.

☞Page 76 List of buffer memory addresses

In the following state, 'Operating condition setting completed flag' (X9) turns off.

• When 'Operating condition setting request' (Y9) is on
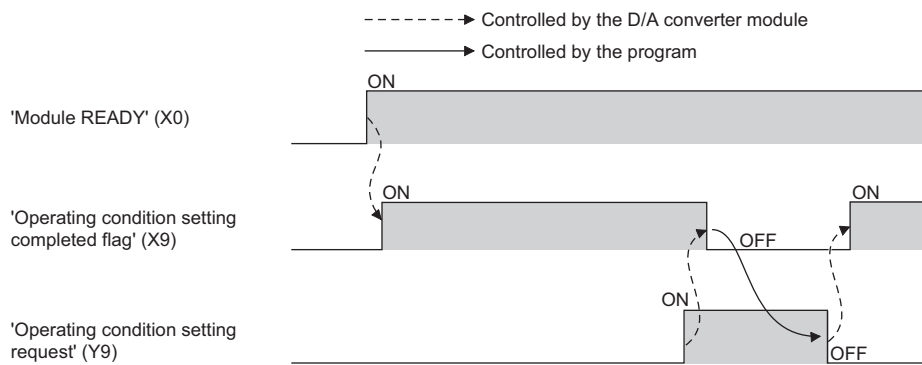
Offset/gain setting mode status flag

■Device number

The following shows the device number of this input signal.

Signal name	CH1 to CH16
Offset/gain setting mode status flag	XA

■In the offset/gain setting mode

When registering the value that has been adjusted with the offset/gain setting, use this flag as an interlock condition to turn on and off 'User range write request' (YA).

When the offset/gain setting is configured from the offset/gain setting window of an engineering tool, the setting is performed properly on the window. Therefore, a program is not required to perform the setting.

When a sequence program used for the MELSEC-Q series D/A converter module is utilized to configure the offset/gain setting, check that this flag is used as an interlock.

For the sequence programs for the MELSEC-Q series D/A converter module, refer to the following.

Channel Isolated Digital-Analog Converter Module User's Manual
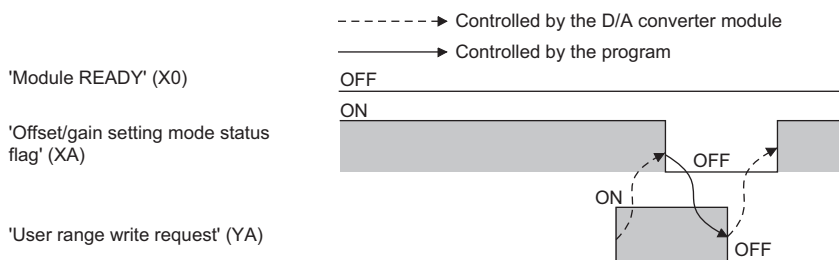
■In the normal mode

When restoring the user range setting, use this flag as an interlock condition to turn on and off 'User range write request' (YA).

For user range setting restoration, refer to the following.

☞Page 39 Backing up, Saving, and Restoring Offset/Gain Values
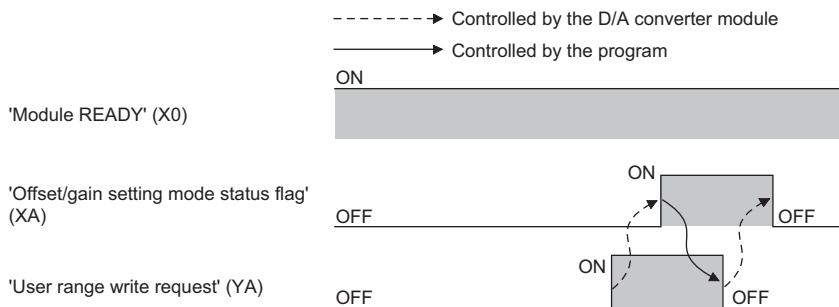
Channel change completed flag

When changing a channel to perform the offset/gain setting, use Channel change completed flag (XB) as an interlock condition to turn on and off 'Channel change request' (YB).

When the offset/gain setting is configured from the offset/gain setting window of an engineering tool, the setting is performed properly on the window. Therefore, a program is not required to perform the setting.

When a sequence program used for the MELSEC-Q series D/A converter module is utilized to configure the offset/gain setting, check that this flag is used as an interlock.

For the sequence programs for the MELSEC-Q series D/A converter module, refer to the following.

📖Channel Isolated Digital-Analog Converter Module User's Manual

■Device number

The following shows the device number of this input signal.

Signal name	CH1 to CH16
Channel change completed flag	XB

Set value change completed flag

When adjusting the offset/gain setting, use Set value change completed flag (XC) as an interlock condition to turn on and off 'Value change request' (YC).

When the offset/gain setting is configured from the offset/gain setting window of an engineering tool, the setting is performed properly on the window. Therefore, a program is not required to perform the setting.

When a sequence program used for the MELSEC-Q series D/A converter module is utilized to configure the offset/gain setting, check that this flag is used as an interlock.

For the sequence programs for the MELSEC-Q series D/A converter module, refer to the following.

📖Channel Isolated Digital-Analog Converter Module User's Manual

■Device number

The following shows the device number of this input signal.

Signal name	CH1 to CH16
Set value change completed flag	XC

■When the external power supply is off

'Set value change completed flag' (XC) does not turn on. Turn on the external power supply, and turn on and off 'Value change request' (YC) again.

Disconnection detection signal

Disconnection detection signal (XD) turns on when a disconnection is detected in a channel while the output range is 4 to 20mA.

'Disconnection detection signal' (XD) turns off by turning on and off 'Error clear request' (YF) or 'Operating condition setting request' (Y9) after the cause of the disconnection is eliminated.
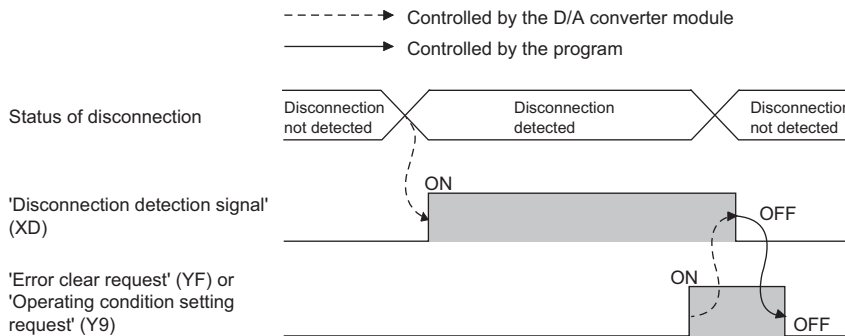
■Device number

The following shows the device number of this input signal.

Signal name	CH1 to CH16
Disconnection detection signal	XD

Alert output signal

Alert output signal turns on when the value in 'CH1 Digital value' (Un\G460) is larger than the value in 'CH1 Alert output upper limit value' (Un\G510) or is smaller than the value in 'CH1 Alert output lower limit value' (Un\G512) while the D/A conversion is enabled.

By turning on and off 'Alert output clear request' (YE) or turning off and on 'Operating condition setting request' (Y9) after the cause of the warning is eliminated, 'Alert output signal' (XE) turns off and 'Latest alarm code (Un\G2)' is cleared.
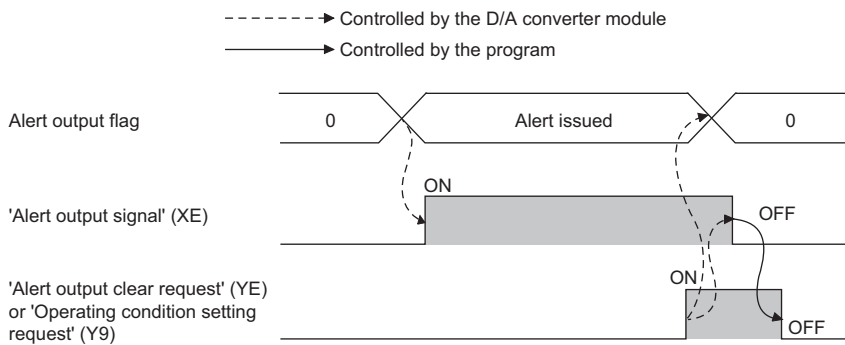
■Device number

The following shows the device number of this input signal.

Signal name	CH1 to CH16
Alert output signal	XE

Error flag

'Error flag' (XF) turns on when an error occurs.

By turning on and off 'Error clear request' (YF) after the cause of the error is eliminated, 'Error flag' (XF) turns off and 'Latest error code' (Un\G0) is cleared.
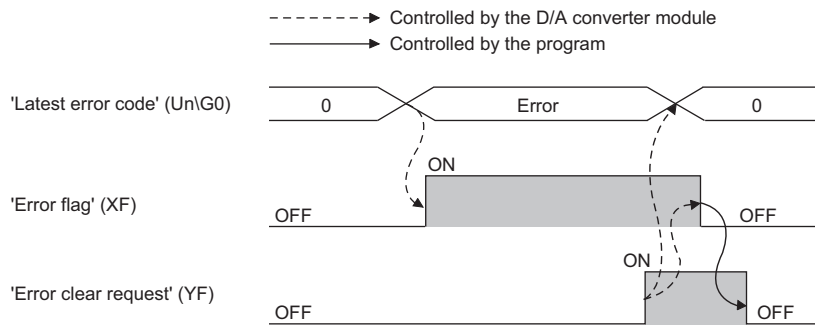
■Device number

The following shows the device number of this input signal.

Signal name	CH1 to CH16
Error flag	XF

Details of output signals

The following describes the details of the output signals for the D/A converter module which are assigned to the CPU module. The I/O numbers (X/Y) described in Appendix 2 are for the case when the start I/O number of the D/A converter module is set to 0.

> **Point**
>
> This section describes I/O signals and buffer memory addresses for CH1.
>
> For details on the buffer memory addresses after CH2, refer to the following.
>
> ☞ Page 76 List of buffer memory addresses

CH1 Output enable/disable flag

Set whether to output the D/A conversion value or offset value.

On: D/A conversion value

Off: Offset value

■Device number

The following shows the device number of this output signal.

- CH☐ Output enable/disable flag

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y11[*1]	Y12[*1]	Y13[*1]	Y14[*1]	Y15[*1]	Y16[*1]	Y17[*1]	Y18[*1]

*1 For the R60DA8-G, only Y0 to YF are available because the number of I/O points is 16.

Operating condition setting request

Turn on and off Operating condition setting request to enable the setting of the D/A converter module.

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

☞ Page 68 Operating condition setting completed flag

For details on the buffer memory areas to be enabled, refer to the following.

☞ Page 76 List of buffer memory addresses

■Device number

The following shows the device number of this output signal.

Signal name	CH1 to CH16
Operating condition setting request	Y9

User range write request

■Device number
The following shows the device number of this output signal.

Signal name	CH1 to CH16
User range write request	YA

■In the offset/gain setting mode
Turn on and off User range write request to register values adjusted with the offset/gain setting in the D/A converter module.

The data is written to the flash memory when this signal is turned off and on.

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

☞Page 69 In the offset/gain setting mode

■In the normal mode
Turn on and off User range write request (YA) to restore the user range.

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

☞Page 69 In the normal mode

Channel change request

Turn on and off Channel change request (YB) to change a channel to perform the offset/gain setting.

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

☞Page 70 Channel change completed flag

■Device number
The following shows the device number of this output signal.

Signal name	CH1 to CH16
Channel change request	YB

Value change request

Turn on and off Value change request (YC) to change the analog output value to adjust the offset/gain setting.

The analog output value increases or decreases depending on the value set for 'Offset/gain adjustment value specification' (Un\G4130).

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

☞Page 70 Set value change completed flag

■Device number
The following shows the device number of this output signal.

Signal name	CH1 to CH16
Value change request	YC

Alert output clear request

Turn on and off 'Alert output clear request' (YE) to clear 'Alert output signal' (XE) and 'Latest alarm code' (Un\G2).

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

☞ Page 71 Alert output signal

■Device number

The following shows the device number of this output signal.

Signal name	CH1 to CH16
Alert output clear request	YE

Error clear request

Turn on and off Error clear request (YF) to clear 'Error flag' (XF) and 'Latest error code' (Un\G0).

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

☞ Page 72 Error flag

■Device number

The following shows the device number of this output signal.

Signal name	CH1 to CH16
Error clear request	YF

Appendix 3 Buffer Memory Areas

List of buffer memory addresses

The following table lists the buffer memory addresses of the D/A converter module.

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

- ☞ Page 89 Details of buffer memory addresses

The buffer memory areas of the D/A converter module are classified by the following data types.

Data type	Description	
Setting data	Description	Set this data according to the connected device and the use of the system.
	Write/read attribute	Data can be read and written from/to this area.
	Setting procedure	Set this data using an engineering tool or in a program.
	Setting timing	After changing the values, turn on and off 'Operating condition setting request' (Y9) to enable the set values.
Control data	Description	Use this data to control the D/A converter module.
	Write/read attribute	Data can be read and written from/to this area.
	Setting procedure	Set this data using an engineering tool or in a program.
	Setting timing	As soon as the values are changed, the set values become enabled.
Monitor data	Description	Use this data to monitor the status of the D/A converter module.
	Write/read attribute	Writing data is only allowed. Reading data is not allowed.
	Setting procedure	—
	Setting timing	—
User range setting data	Description	Use this data to update the user range setting of the D/A converter module.
	Write/read attribute	Data can be read and written from/to this area.
	Setting procedure	Set this data using an engineering tool or in a program.
	Setting timing	After changing the values, turn on and off 'User range write request' (YA) to enable the set values.

> **Point**
>
> - Do not write data to the system areas and areas whose data types are monitor in the buffer memory. Writing data into these areas can cause the malfunction of the module.
> - When the R60DA8-G is used, the areas corresponding to CH9 to CH16 are used as system areas.

In R mode

■Un\G0 to Un\G399

Address (decimal)	Address (hexadecimal)	Name	Default value	Data type	Auto refresh
0	0H	Latest error code	0	Monitor	○
1	1H	Latest address of error history	0	Monitor	○
2	2H	Latest alarm code	0	Monitor	○
3	3H	Latest address of alarm history	0	Monitor	○
4 to 19	4H to 13H	Interrupt factor detection flag [n][1]	0	Monitor	○
20 to 35	14H to 23H	System area	—	—	—
36	24H	Alert output upper limit flag	0000H	Monitor	○
37	25H	Alert output lower limit flag	0000H	Monitor	○
38	26H	Disconnection detection flag	0000H	Monitor	○
39 to 123	27H to 7BH	System area	—	—	—
124 to 139	7CH to 8BH	Interrupt factor mask [n][1]	0	Control	×
140 to 155	8CH to 9BH	System area	—	—	—
156 to 171	9CH to ABH	Interrupt factor reset request [n][1]	0	Control	×
172 to 199	ACH to C7H	System area	—	—	—
200 to 215	C8H to D7H	Interrupt factor generation setting [n][1]	0	Setting	×
216 to 231	D8H to E7H	System area	—	—	—

Address (decimal)	Address (hexadecimal)	Name	Default value	Data type	Auto refresh
232 to 247	E8H to F7H	Condition target setting [n][1]	0	Setting	×
248 to 263	F8H to 107H	System area	—	—	—
264 to 279	108H to 117H	Condition target channel setting [n][1]	0	Setting	×
280 to 295	118H to 127H	System area	—	—	—
296, 297	128H, 129H	Mode switching setting	0	Setting	×
298 to 399	12AH to 18FH	System area	—	—	—

*1   [n] in the table indicates an interrupt setting number. (n = 1 to 16)

A

■Un\G400 to Un\G3599

Address Decimal (hexadecimal)								Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ Setting value check code	0	Monitor	○
400 (190H)	600 (258H)	800 (320H)	1000 (3E8H)	1200 (4B0H)	1400 (578H)	1600 (640H)	1800 (708H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2000 (7D0H)	2200 (898H)	2400 (960H)	2600 (A28H)	2800 (AF0H)	3000 (BB8H)	3200 (C80H)	3400 (D48H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	System area	—	—	—
401 to 429 (191H to 1ADH)	601 to 629 (259H to 275H)	801 to 829 (321H to 33DH)	1001 to 1029 (3E9H to 405H)	1201 to 1229 (4B1H to 4CDH)	1401 to 1429 (579H to 595H)	1601 to 1629 (641H to 65DH)	1801 to 1829 (709H to 725H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2001 to 2029 (7D1H to 7EDH)	2201 to 2229 (899H to 8B5H)	2401 to 2429 (961H to 97DH)	2601 to 2629 (A29H to A45H)	2801 to 2829 (AF1H to B0DH)	3001 to 3029 (BB9H to BD5H)	3201 to 3229 (C81H to C9DH)	3401 to 3429 (D49H to D65H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ Range setting monitor	0000H	Monitor	×
430 (1AEH)	630 (276H)	830 (33EH)	1030 (406H)	1230 (4CEH)	1430 (596H)	1630 (65EH)	1830 (726H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2030 (7EEH)	2230 (8B6H)	2430 (97EH)	2630 (A46H)	2830 (B0EH)	3030 (BD6H)	3230 (C9EH)	3430 (D66H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ HOLD/CLEAR function setting monitor	0	Monitor	×
431 (1AFH)	631 (277H)	831 (33FH)	1031 (407H)	1231 (4CFH)	1431 (597H)	1631 (65FH)	1831 (727H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2031 (7EFH)	2231 (8B7H)	2431 (97FH)	2631 (A47H)	2831 (B0FH)	3031 (BD7H)	3231 (C9FH)	3431 (D67H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	System area	—	—	—
432 to 459 (1B0H to 1CBH)	632 to 659 (278H to 293H)	832 to 859 (340H to 35BH)	1032 to 1059 (408H to 423H)	1232 to 1259 (4D0H to 4EBH)	1432 to 1459 (598H to 5B3H)	1632 to 1659 (660H to 67BH)	1832 to 1859 (728H to 743H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2032 to 2059 (7F0H to 80BH)	2232 to 2259 (8B8H to 8D3H)	2432 to 2459 (980H to 99BH)	2632 to 2659 (A48H to A63H)	2832 to 2859 (B10H to B2BH)	3032 to 3059 (BD8H to BF3H)	3232 to 3259 (CA0H to CBBH)	3432 to 3459 (D68H to D83H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ Digital value	0	Control	○
460 (1CCH)	660 (294H)	860 (35CH)	1060 (424H)	1260 (4ECH)	1460 (5B4H)	1660 (67CH)	1860 (744H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2060 (80CH)	2260 (8D4H)	2460 (99CH)	2660 (A64H)	2860 (B2CH)	3060 (BF4H)	3260 (CBCH)	3460 (D84H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	System area	—	—	—
461 to 479 (1CDH to 1DFH)	661 to 679 (295H to 2A7H)	861 to 879 (35DH to 36FH)	1061 to 1079 (425H to 437H)	1261 to 1279 (4EDH to 4FFH)	1461 to 1479 (5B5H to 5C7H)	1661 to 1679 (67DH to 68FH)	1861 to 1879 (745H to 757H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2061 to 2079 (80DH to 81FH)	2261 to 2279 (8D5H to 8E7H)	2461 to 2479 (99DH to 9AFH)	2661 to 2679 (A65H to A77H)	2861 to 2879 (B2DH to B3FH)	3061 to 3079 (BF5H to C07H)	3261 to 3279 (CBDH to CCFH)	3461 to 3479 (D85H to D97H)				

Address Decimal (hexadecimal)								Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ Input value shift amount	0	Control	×
480 (1E0H)	680 (2A8H)	880 (370H)	1080 (438H)	1280 (500H)	1480 (5C8H)	1680 (690H)	1880 (758H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2080 (820H)	2280 (8E8H)	2480 (9B0H)	2680 (A78H)	2880 (B40H)	3080 (C08H)	3280 (CD0H)	3480 (D98H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	System area	—	—	—
481 to 499 (1E1H to 1F3H)	681 to 699 (2A9H to 2BBH)	881 to 899 (371H to 383H)	1081 to 1099 (439H to 44BH)	1281 to 1299 (501H to 513H)	1481 to 1499 (5C9H to 5DBH)	1681 to 1699 (691H to 6A3H)	1881 to 1899 (759H to 76BH)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2081 to 2099 (821H to 833H)	2281 to 2299 (8E9H to 8FBH)	2481 to 2499 (9B1H to 9C3H)	2681 to 2699 (A79H to A8BH)	2881 to 2899 (B41H to B53H)	3081 to 3099 (C09H to C1BH)	3281 to 3299 (CD1H to CE3H)	3481 to 3499 (D99H to DABH)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ D/A conversion enable/disable setting	1	Setting	×
500 (1F4H)	700 (2BCH)	900 (384H)	1100 (44CH)	1300 (514H)	1500 (5DCH)	1700 (6A4H)	1900 (76CH)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2100 (834H)	2300 (8FCH)	2500 (9C4H)	2700 (A8CH)	2900 (B54H)	3100 (C1CH)	3300 (CE4H)	3500 (DACH)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	System area	—	—	—
501 (1F5H)	701 (2BDH)	901 (385H)	1101 (44DH)	1301 (515H)	1501 (5DDH)	1701 (6A5H)	1901 (76DH)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2101 (835H)	2301 (8FDH)	2501 (9C5H)	2701 (A8DH)	2901 (B55H)	3101 (C1DH)	3301 (CE5H)	3501 (DADH)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ Scaling enable/disable setting	1	Setting	×
502 (1F6H)	702 (2BEH)	902 (386H)	1102 (44EH)	1302 (516H)	1502 (5DEH)	1702 (6A6H)	1902 (76EH)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2102 (836H)	2302 (8FEH)	2502 (9C6H)	2702 (A8EH)	2902 (B56H)	3102 (C1EH)	3302 (CE6H)	3502 (DAEH)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	System area	—	—	—
503 (1F7H)	703 (2BFH)	903 (387H)	1103 (44FH)	1303 (517H)	1503 (5DFH)	1703 (6A7H)	1903 (76FH)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2103 (837H)	2303 (8FFH)	2503 (9C7H)	2703 (A8FH)	2903 (B57H)	3103 (C1FH)	3303 (CE7H)	3503 (DAFH)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ Scaling upper limit value	0	Setting	×
504 (1F8H)	704 (2C0H)	904 (388H)	1104 (450H)	1304 (518H)	1504 (5E0H)	1704 (6A8H)	1904 (770H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2104 (838H)	2304 (900H)	2504 (9C8H)	2704 (A90H)	2904 (B58H)	3104 (C20H)	3304 (CE8H)	3504 (DB0H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	System area	—	—	—
505 (1F9H)	705 (2C1H)	905 (389H)	1105 (451H)	1305 (519H)	1505 (5E1H)	1705 (6A9H)	1905 (771H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2105 (839H)	2305 (901H)	2505 (9C9H)	2705 (A91H)	2905 (B59H)	3105 (C21H)	3305 (CE9H)	3505 (DB1H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ Scaling lower limit value	0	Setting	×
506 (1FAH)	706 (2C2H)	906 (38AH)	1106 (452H)	1306 (51AH)	1506 (5E2H)	1706 (6AAH)	1906 (772H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2106 (83AH)	2306 (902H)	2506 (9CAH)	2706 (A92H)	2906 (B5AH)	3106 (C22H)	3306 (CEAH)	3506 (DB2H)				

Address Decimal (hexadecimal)								Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	System area	—	—	—
507 (1FBH)	707 (2C3H)	907 (38BH)	1107 (453H)	1307 (51BH)	1507 (5E3H)	1707 (6ABH)	1907 (773H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2107 (83BH)	2307 (903H)	2507 (9CBH)	2707 (A93H)	2907 (B5BH)	3107 (C23H)	3307 (CEBH)	3507 (DB3H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ Alert output setting	1	Setting	×
508 (1FCH)	708 (2C4H)	908 (38CH)	1108 (454H)	1308 (51CH)	1508 (5E4H)	1708 (6ACH)	1908 (774H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2108 (83CH)	2308 (904H)	2508 (9CCH)	2708 (A94H)	2908 (B5CH)	3108 (C24H)	3308 (CECH)	3508 (DB4H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ Rate control enable/ disable setting	1	Setting	×
509 (1FDH)	709 (2C5H)	909 (38DH)	1109 (455H)	1309 (51DH)	1509 (5E5H)	1709 (6ADH)	1909 (775H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2109 (83DH)	2309 (905H)	2509 (9CDH)	2709 (A95H)	2909 (B5DH)	3109 (C25H)	3309 (CEDH)	3509 (DB5H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ Alert output upper limit value	0	Setting	×
510 (1FEH)	710 (2C6H)	910 (38EH)	1110 (456H)	1310 (51EH)	1510 (5E6H)	1710 (6AEH)	1910 (776H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2110 (83EH)	2310 (906H)	2510 (9CEH)	2710 (A96H)	2910 (B5EH)	3110 (C26H)	3310 (CEEH)	3510 (DB6H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	System area	—	—	—
511 (1FFH)	711 (2C7H)	911 (38FH)	1111 (457H)	1311 (51FH)	1511 (5E7H)	1711 (6AFH)	1911 (777H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2111 (83FH)	2311 (907H)	2511 (9CFH)	2711 (A97H)	2911 (B5FH)	3111 (C27H)	3311 (CEFH)	3511 (DB7H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ Alert output lower limit value	0	Setting	×
512 (200H)	712 (2C8H)	912 (390H)	1112 (458H)	1312 (520H)	1512 (5E8H)	1712 (6B0H)	1912 (778H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2112 (840H)	2312 (908H)	2512 (9D0H)	2712 (A98H)	2912 (B60H)	3112 (C28H)	3312 (CF0H)	3512 (DB8H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	System area	—	—	—
513 (201H)	713 (2C9H)	913 (391H)	1113 (459H)	1313 (521H)	1513 (5E9H)	1713 (6B1H)	1913 (779H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2113 (841H)	2313 (909H)	2513 (9D1H)	2713 (A99H)	2913 (B61H)	3113 (C29H)	3313 (CF1H)	3513 (DB9H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ Increase digital limit value	64000	Setting	×
514 (202H)	714 (2CAH)	914 (392H)	1114 (45AH)	1314 (522H)	1514 (5EAH)	1714 (6B2H)	1914 (77AH)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2114 (842H)	2314 (90AH)	2514 (9D2H)	2714 (A9AH)	2914 (B62H)	3114 (C2AH)	3314 (CF2H)	3514 (DBAH)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	System area	—	—	—
515 (203H)	715 (2CBH)	915 (393H)	1115 (45BH)	1315 (523H)	1515 (5EBH)	1715 (6B3H)	1915 (77BH)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2115 (843H)	2315 (90BH)	2515 (9D3H)	2715 (A9BH)	2915 (B63H)	3115 (C2BH)	3315 (CF3H)	3515 (DBBH)				

Address Decimal (hexadecimal)								Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH☐ Decrease digital limit value	64000	Setting	×
516 (204H)	716 (2CCH)	916 (394H)	1116 (45CH)	1316 (524H)	1516 (5ECH)	1716 (6B4H)	1916 (77CH)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2116 (844H)	2316 (90CH)	2516 (9D4H)	2716 (A9CH)	2916 (B64H)	3116 (C2CH)	3316 (CF4H)	3516 (DBCH)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	System area	—	—	—
517 to 597 (205H to 255H)	717 to 797 (2CDH to 31DH)	917 to 997 (395H to 3E5H)	1117 to 1197 (45DH to 4ADH)	1317 to 1397 (525H to 575H)	1517 to 1597 (5EDH to 63DH)	1717 to 1797 (6B5H to 705H)	1917 to 1997 (77DH to 7CDH)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2117 to 2197 (845H to 895H)	2317 to 2397 (90DH to 95DH)	2517 to 2597 (9D5H to A25H)	2717 to 2797 (A9DH to AEDH)	2917 to 2997 (B65H to BB5H)	3117 to 3197 (C2DH to C7DH)	3317 to 3397 (CF5H to D45H)	3517 to 3597 (DBDH to E0DH)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH☐ Range setting	0	Setting	×
598 (256H)	798 (31EH)	998 (3E6H)	1198 (4AEH)	1398 (576H)	1598 (63EH)	1798 (706H)	1998 (7CEH)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2198 (896H)	2398 (95EH)	2598 (A26H)	2798 (AEEH)	2998 (BB6H)	3198 (C7EH)	3398 (D46H)	3598 (E0EH)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	System area	—	—	—
599 (257H)	799 (31FH)	999 (3E7H)	1199 (4AFH)	1399 (577H)	1599 (63FH)	1799 (707H)	1999 (7CFH)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
2199 (897H)	2399 (95FH)	2599 (A27H)	2799 (AEFH)	2999 (BB7H)	3199 (C7FH)	3399 (D47H)	3599 (E0FH)				

■Error history (Un\G3600 to Un\G3759)

Address (decimal)	Address (hexadecimal)	Name				Default value	Data type	Auto refresh
3600	E10H	Error history 1	Error code			0	Monitor	×
3601	E11H		Error time	First two digits of the year	Last two digits of the year			
3602	E12H			Month	Day			
3603	E13H			Hour	Minute			
3604	E14H			Second	Day of the week			
3605	E15H			Millisecond				
3606 to 3609	E16H to E19H	System area				—	—	—
3610 to 3615	E1AH to E1FH	Error history 2	Same as error history 1			0	Monitor	×
3616 to 3619	E20H to E23H	System area				—	—	—
3620 to 3625	E24H to E29H	Error history 3	Same as error history 1			0	Monitor	×
3626 to 3629	E2AH to E2DH	System area				—	—	—
3630 to 3635	E2EH to E33H	Error history 4	Same as error history 1			0	Monitor	×
3636 to 3639	E34H to E37H	System area				—	—	—
3640 to 3645	E38H to E3DH	Error history 5	Same as error history 1			0	Monitor	×
3646 to 3649	E3EH to E41H	System area				—	—	—
3650 to 3655	E42H to E47H	Error history 6	Same as error history 1			0	Monitor	×
3656 to 3659	E48H to E4BH	System area				—	—	—
3660 to 3665	E4CH to E51H	Error history 7	Same as error history 1			0	Monitor	×
3666 to 3669	E52H to E55H	System area				—	—	—
3670 to 3675	E56H to E5BH	Error history 8	Same as error history 1			0	Monitor	×
3676 to 3679	E5CH to E5FH	System area				—	—	—
3680 to 3685	E60H to E65H	Error history 9	Same as error history 1			0	Monitor	×
3686 to 3689	E66H to E69H	System area				—	—	—
3690 to 3695	E6AH to E6FH	Error history 10	Same as error history 1			0	Monitor	×
3696 to 3699	E70H to E73H	System area				—	—	—
3700 to 3705	E74H to E79H	Error history 11	Same as error history 1			0	Monitor	×
3706 to 3709	E7AH to E7DH	System area				—	—	—
3710 to 3715	E7EH to E83H	Error history 12	Same as error history 1			0	Monitor	×
3716 to 3719	E84H to E87H	System area				—	—	—
3720 to 3725	E88H to E8DH	Error history 13	Same as error history 1			0	Monitor	×
3726 to 3729	E8EH to E91H	System area				—	—	—
3730 to 3735	E92H to E97H	Error history 14	Same as error history 1			0	Monitor	×
3736 to 3739	E98H to E9BH	System area				—	—	—
3740 to 3745	E9CH to EA1H	Error history 15	Same as error history 1			0	Monitor	×
3746 to 3749	EA2H to EA5H	System area				—	—	—
3750 to 3755	EA6H to EABH	Error history 16	Same as error history 1			0	Monitor	×
3756 to 3759	EACH to EAFH	System area				—	—	—

■Alarm history (Un\G3760 to Un\G3999)

Address (decimal)	Address (hexadecimal)	Name					Default value	Data type	Auto refresh
3760	EB0H	Alarm history 1	Alarm code				0	Monitor	×
3761	EB1H		Alarm time	First two digits of the year		Last two digits of the year			
3762	EB2H			Month		Day			
3763	EB3H			Hour		Minute			
3764	EB4H			Second		Day of the week			
3765	EB5H			Millisecond					
3766 to 3769	EB6H to EB9H	System area					—	—	—
3770 to 3775	EBAH to EBFH	Alarm history 2	Same as alarm history 1				0	Monitor	×
3776 to 3779	EC0H to EC3H	System area					—	—	—
3780 to 3785	EC4H to EC9H	Alarm history 3	Same as alarm history 1				0	Monitor	×
3786 to 3789	ECAH to ECDH	System area					—	—	—
3790 to 3795	ECEH to ED3H	Alarm history 4	Same as alarm history 1				0	Monitor	×
3796 to 3799	ED4H to ED7H	System area					—	—	—
3800 to 3805	ED8H to EDDH	Alarm history 5	Same as alarm history 1				0	Monitor	×
3806 to 3809	EDEH to EE1H	System area					—	—	—
3810 to 3815	EE2H to EE7H	Alarm history 6	Same as alarm history 1				0	Monitor	×
3816 to 3819	EE8H to EEBH	System area					—	—	—
3820 to 3825	EECH to EF1H	Alarm history 7	Same as alarm history 1				0	Monitor	×
3826 to 3829	EF2H to EF5H	System area					—	—	—
3830 to 3835	EF6H to EFBH	Alarm history 8	Same as alarm history 1				0	Monitor	×
3836 to 3839	EFCH to EFFH	System area					—	—	—
3840 to 3845	F00H to F05H	Alarm history 9	Same as alarm history 1				0	Monitor	×
3846 to 3849	F06H to F09H	System area					—	—	—
3850 to 3855	F0AH to F0FH	Alarm history 10	Same as alarm history 1				0	Monitor	×
3856 to 3859	F10H to F13H	System area					—	—	—
3860 to 3865	F14H to F19H	Alarm history 11	Same as alarm history 1				0	Monitor	×
3866 to 3869	F1AH to F1DH	System area					—	—	—
3870 to 3875	F1EH to F23H	Alarm history 12	Same as alarm history 1				0	Monitor	×
3876 to 3879	F24H to F27H	System area					—	—	—
3880 to 3885	F28H to F2DH	Alarm history 13	Same as alarm history 1				0	Monitor	×
3886 to 3889	F2EH to F31H	System area					—	—	—
3890 to 3895	F32H to F37H	Alarm history 14	Same as alarm history 1				0	Monitor	×
3896 to 3899	F38H to F3BH	System area					—	—	—
3900 to 3905	F3CH to F41H	Alarm history 15	Same as alarm history 1				0	Monitor	×
3906 to 3909	F42H to F45H	System area					—	—	—
3910 to 3915	F46H to F4BH	Alarm history 16	Same as alarm history 1				0	Monitor	×
3916 to 3999	F4CH to F9FH	System area					—	—	—

A

■Offset/gain setting (For the R60DA8-G) (Un\G4000 to Un\G4129)

Address Decimal (hexadecimal) CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	Name	Default value	Data type	Auto refresh
4000, 4001 (FA0H, FA1H)								System area	—	—	—
4002 (FA2H)								Save data type setting	0000H	User range setting	×
4003 (FA3H)								System area	—	—	—
4004 (FA4H)	4006 (FA6H)	4008 (FA8H)	4010 (FAAH)	4012 (FACH)	4014 (FAEH)	4016 (FB0H)	4018 (FB2H)	CH□ Factory default setting offset value	0	User range setting	×
4005 (FA5H)	4007 (FA7H)	4009 (FA9H)	4011 (FABH)	4013 (FADH)	4015 (FAFH)	4017 (FB1H)	4019 (FB3H)	CH□ Factory default setting gain value	0	User range setting	×
4020 (FB4H)	4022 (FB6H)	4024 (FB8H)	4026 (FBAH)	4028 (FBCH)	4030 (FBEH)	4032 (FC0H)	4034 (FC2H)	CH□ User range setting offset value	0	User range setting	×
4021 (FB5H)	4023 (FB7H)	4025 (FB9H)	4027 (FBBH)	4029 (FBDH)	4031 (FBFH)	4033 (FC1H)	4035 (FC3H)	CH□ User range setting gain value	0	User range setting	×
4036 to 4129 (FC4H to 1021H)								System area	—	—	—

■Offset/gain setting (For the R60DA16-G) (Un\G4000 to Un\G4129)

Address Decimal (hexadecimal)								Name	Default value	Data type	Auto refresh
CH1 to CH16 / 4000, 4001 (FA0H, FA1H)								System area	—	—	—
CH1 to CH8 / 4002 (FA2H)								Save data type setting 1	0000H	User range setting	×
CH9 to CH16 / 4003 (FA3H)								Save data type setting 2	0000H	User range setting	×
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ Factory default setting offset value	0	User range setting	×
4004 (FA4H)	4006 (FA6H)	4008 (FA8H)	4010 (FAAH)	4012 (FACH)	4014 (FAEH)	4016 (FB0H)	4018 (FB2H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
4020 (FB4H)	4022 (FB6H)	4024 (FB8H)	4026 (FBAH)	4028 (FBCH)	4030 (FBEH)	4032 (FC0H)	4034 (FC2H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ Factory default setting gain value	0	User range setting	×
4005 (FA5H)	4007 (FA7H)	4009 (FA9H)	4011 (FABH)	4013 (FADH)	4015 (FAFH)	4017 (FB1H)	4019 (FB3H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
4021 (FB5H)	4023 (FB7H)	4025 (FB9H)	4027 (FBBH)	4029 (FBDH)	4031 (FBFH)	4033 (FC1H)	4035 (FC3H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ User range setting offset value	0	User range setting	×
4036 (FC4H)	4038 (FC6H)	4040 (FC8H)	4042 (FCAH)	4044 (FCCH)	4046 (FCEH)	4048 (FD0H)	4050 (FD2H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
4052 (FD4H)	4054 (FD6H)	4056 (FD8H)	4058 (FDAH)	4060 (FDCH)	4062 (FDEH)	4064 (FE0H)	4066 (FE2H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ User range setting gain value	0	User range setting	×
4037 (FC5H)	4039 (FC7H)	4041 (FC9H)	4043 (FCBH)	4045 (FCDH)	4047 (FCFH)	4049 (FD1H)	4051 (FD3H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
4053 (FD5H)	4055 (FD7H)	4057 (FD9H)	4059 (FDBH)	4061 (FDDH)	4063 (FDFH)	4065 (FE1H)	4067 (FE3H)				
CH1 to CH16 / 4068 to 4129 (FE4H to 1021H)								System area	—	—	—

■Un\G4130 to Un\G9999

Address Decimal (hexadecimal)								Name	Default value	Data type	Auto refresh
CH1 to CH16								Offset/gain adjustment value specification	0	Control	×
4130 (1022H)											
CH1 to CH16								System area	—	—	—
4131 (1023H)											
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ Offset/gain setting mode (offset specification)	0	Setting	×
4132 (1024H)	4134 (1026H)	4136 (1028H)	4138 (102AH)	4140 (102CH)	4142 (102EH)	4144 (1030H)	4146 (1032H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
4148 (1034H)	4150 (1036H)	4152 (1038H)	4154 (103AH)	4156 (103CH)	4158 (103EH)	4160 (1040H)	4162 (1042H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ Offset/gain setting mode (gain specification)	0	Setting	×
4133 (1025H)	4135 (1027H)	4137 (1029H)	4139 (102BH)	4141 (102DH)	4143 (102FH)	4145 (1031H)	4147 (1033H)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
4149 (1035H)	4151 (1037H)	4153 (1039H)	4155 (103BH)	4157 (103DH)	4159 (103FH)	4161 (1041H)	4163 (1043H)				
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH□ Offset/gain setting mode (range specification)	0	Setting	×
4164 (1044H)	4165 (1045H)	4166 (1046H)	4167 (1047H)	4168 (1048H)	4169 (1049H)	4170 (104AH)	4171 (104BH)				
CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16				
4172 (104CH)	4173 (104DH)	4174 (104EH)	4175 (104FH)	4176 (1050H)	4177 (1051H)	4178 (1052H)	4179 (1053H)				
CH1 to CH16								System area	—	—	—
4180 to 9999 (1054H to 270FH)											

A

In Q compatible mode

■Un\G0 to Un\G199

Address Decimal (hexadecimal)								Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8				
0 (0H)								D/A conversion enable/ disable setting	00FFH	Setting	×
1 (1H)	2 (2H)	3 (3H)	4 (4H)	5 (5H)	6 (6H)	7 (7H)	8 (8H)	CH□ Digital value	0	Control	○
9 (9H), 10 (AH)								System area	—	—	—
11 (BH)	12 (CH)	13 (DH)	14 (EH)	15 (FH)	16 (10H)	17 (11H)	18 (12H)	CH□ Setting value check code	0	Monitor	○
19 (13H)								Latest error code	0	Monitor	○
20 (14H)				21 (15H)				Range setting monitor (CH1 to CH4) Range setting monitor (CH5 to CH8)	0000H	Monitor	×
22 (16H)								Offset/gain setting mode (offset specification)	0000H	Setting	×
23 (17H)								Offset/gain setting mode (gain specification)	0000H	Setting	×
24 (18H)								Offset/gain adjustment value specification	0	Control	×
25 (19H)								Offset/gain setting mode (range specification)	0	Setting	×
26 (1AH)				27 (1BH)				HOLD/CLEAR function setting monitor (CH1 to CH4) HOLD/CLEAR function setting monitor (CH5 to CH8)	0	Monitor	×
28 to 45 (1CH to 2DH)								System area	—	—	—
46 (2EH)								Rate control enable/ disable setting	00FFH	Setting	×
47 (2FH)								Alert output setting	00FFH	Setting	×
48 (30H)								Alert output flag	0000H	Monitor	○
49 (31H)								Disconnection detection flag	0000H	Monitor	○
50 to 52 (32H to 34H)								System area	—	—	—
53 (35H)								Scaling enable/disable setting	00FFH	Setting	×
54 (36H)	56 (38H)	58 (3AH)	60 (3CH)	62 (3EH)	64 (40H)	66 (42H)	68 (44H)	CH□ Scaling lower limit value	0	Setting	×
55 (37H)	57 (39H)	59 (3BH)	61 (3DH)	63 (3FH)	65 (41H)	67 (43H)	69 (45H)	CH□ Scaling upper limit value	0	Setting	×
70 (46H)	72 (48H)	74 (4AH)	76 (4CH)	78 (4EH)	80 (50H)	82 (52H)	84 (54H)	CH□ Increase digital limit value	64000	Setting	×
71 (47H)	73 (49H)	75 (4BH)	77 (4DH)	79 (4FH)	81 (51H)	83 (53H)	85 (55H)	CH□ Decrease digital limit value	64000	Setting	×
86 (56H)	88 (58H)	90 (5AH)	92 (5CH)	94 (5EH)	96 (60H)	98 (62H)	100 (64H)	CH□ Alert output upper limit value	0	Setting	×
87 (57H)	89 (59H)	91 (5BH)	93 (5DH)	95 (5FH)	97 (61H)	99 (63H)	101 (65H)	CH□ Alert output lower limit value	0	Setting	×
102 to 149 (66H to 95H)								System area	—	—	—
150 (96H)	151 (97H)	152 (98H)	153 (99H)	154 (9AH)	155 (9BH)	156 (9CH)	157 (9DH)	CH□ Input value shift amount	0	Control	×
158, 159 (9EH, 9FH)								Mode switching setting	0	Setting	×
160 to 199 (A0H to C7H)								System area	—	—	—

■Un\G200 to Un\G233

Address Decimal (hexadecimal)								Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8				
200 (C8H)								Save data type setting	0000H	User range setting	×
201 (C9H)								System area	—	—	—
202 (CAH)	204 (CCH)	206 (CEH)	208 (D0H)	210 (D2H)	212 (D4H)	—	—	CH□ Factory default setting offset value (CH1 to CH6)	0	User range setting	×
203 (CBH)	205 (CDH)	207 (CFH)	209 (D1H)	211 (D3H)	213 (D5H)	—	—	CH□ Factory default setting gain value (CH1 to CH6)	0	User range setting	×
214 (D6H)	216 (D8H)	218 (DAH)	220 (DCH)	222 (DEH)	224 (E0H)	—	—	CH□ User range setting offset value (CH1 to CH6)	0	User range setting	×
215 (D7H)	217 (D9H)	219 (DBH)	221 (DDH)	223 (DFH)	225 (E1H)	—	—	CH□ User range setting gain value (CH1 to CH6)	0	User range setting	×
—	—	—	—	—	—	226 (E2H)	228 (E4H)	CH□ Factory default setting offset value (CH7, CH8)	0	User range setting	×
—	—	—	—	—	—	227 (E3H)	229 (E5H)	CH□ Factory default setting gain value (CH7, CH8)	0	User range setting	×
—	—	—	—	—	—	230 (E6H)	232 (E8H)	CH□ User range setting offset value (CH7, CH8)	0	User range setting	×
—	—	—	—	—	—	231 (E7H)	233 (E9H)	CH□ User range setting gain value (CH7, CH8)	0	User range setting	×

■Un\G234 to Un\G3749

Address Decimal (hexadecimal)								Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8				
234 to 401 (EAH to 191H)								System area	—	—	—
402 (192H)				403 (193H)				Range setting (CH1 to CH4) Range setting (CH5 to CH8)	0	Setting	×
404 to 1799 (194H to 707H)								System area	—	—	—
1800 (708H)								Latest address of error history	0	Monitor	○
1801 to 1809 (709H to 711H)								System area	—	—	—
1810 to 1969 (712H to 7B1H)								Error history 1 to 16	0	Monitor	×
1970 to 3749 (7B2H to EA5H)								System area	—	—	—

■Un\G3750 to Un\G9999

Address (decimal)	Address (hexadecimal)	Name	Default value	Data type	Auto refresh
3750	EA6H	Latest alarm code	0	Monitor	○
3751	EA7H	Latest address of alarm history	0	Monitor	○
3752 to 3759	EA8H to EAFH	System area	—	—	—
3760 to 3919	EB0H to F4FH	Alarm history 1 to 16	0	Monitor	×
3920 to 3999	F50H to F9FH	System area	—	—	—
4000 to 4015	FA0H to FAFH	Interrupt factor detection flag [n][1]	0	Monitor	○
4016 to 4031	FB0H to FBFH	System area	—	—	—
4032 to 4047	FC0H to FCFH	Interrupt factor mask [n][1]	0	Control	×
4048 to 4063	FD0H to FDFH	System area	—	—	—
4064 to 4079	FE0H to FEFH	Interrupt factor reset request [n][1]	0	Control	×
4080 to 4095	FF0H to FFFH	System area	—	—	—
4096 to 4111	1000H to 100FH	Interrupt factor generation setting [n][1]	0	Setting	×
4112 to 4127	1010H to 101FH	System area	—	—	—
4128 to 4143	1020H to 102FH	Condition target setting [n][1]	0	Setting	×
4144 to 4159	1030H to 103FH	System area	—	—	—
4160 to 4175	1040H to 104FH	Condition target channel setting [n][1]	0	Setting	×
4176 to 9999	1050H to 270FH	System area	—	—	—

[1] [n] in the table indicates an interrupt setting number. (n = 1 to 16)

Details of buffer memory addresses

The following section describes the details of the buffer memory addresses of the D/A converter module.

Latest error code

The latest error code detected in the D/A converter module is stored. For details, refer to the following.

☞ Page 59 List of Error Codes

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7	CH 8	CH 9	CH 10	CH 11	CH 12	CH 13	CH 14	CH 15	CH 16
Latest error code	0															
Latest error code (in Q compatible mode)	19							—								

■Clearing an error

Turn on and off 'Error clear request' (YF).

Latest address of error history

Among 'Error history □' (Un\G3600 to Un\G3759), a buffer memory address which stores the latest error code is stored. In the Q compatible mode, the error history is stored in Un\G1810 to Un\G1969.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7	CH 8	CH 9	CH 10	CH 11	CH 12	CH 13	CH 14	CH 15	CH 16
Latest address of error history	1															
Latest address of error history (in Q compatible mode)	1800							—								

Latest alarm code

The latest alarm code detected in the D/A converter module is stored. For details, refer to the following.

☞ Page 61 List of Alarm Codes

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7	CH 8	CH 9	CH 10	CH 11	CH 12	CH 13	CH 14	CH 15	CH 16
Latest alarm code	2															
Latest alarm code (in Q compatible mode)	3750							—								

■Clearing an alarm

Turn on and off 'Alert output clear request' (YE) or 'Operating condition setting request' (Y9).

Latest address of alarm history

Among 'Alarm history □' (Un\G3760 to Un\G3999), a buffer memory address which stores the latest alarm code is stored.

■Buffer memory address
The following shows the buffer memory address of this area.

Buffer memory name	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7	CH 8	CH 9	CH 10	CH 11	CH 12	CH 13	CH 14	CH 15	CH 16
Latest address of alarm history	3															
Latest address of alarm history (in Q compatible mode)	3751								—							

Interrupt factor detection flag [n]

The detection status of the interrupt factor is stored.

Monitor value	Description
0	No interrupt factor
1	Interrupt factor

When an interrupt factor occurs, an interrupt request is sent to the CPU module at the same time as 'Interrupt factor detection flag [n]' (Un\G4 to Un\G19) is turned to Interrupt factor (1).

"n" indicates an interrupt setting number. (n = 1 to 16)

■Buffer memory address
The following shows the buffer memory address of this area.

Buffer memory name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Interrupt factor detection flag [n]	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Interrupt factor detection flag [n] (in Q compatible mode)	4000	4001	4002	4003	4004	4005	4006	4007	4008	4009	4010	4011	4012	4013	4014	4015

Alert output upper limit flag

The upper limit alarm can be checked for each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH9	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1

- 0: Normal, 1: Alert alarm ON
- b8 to b15 of the R60DA8-G are fixed to 0.

■Buffer memory address
The following shows the buffer memory address of this area.

Buffer memory name	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7	CH 8	CH 9	CH 10	CH 11	CH 12	CH 13	CH 14	CH 15	CH 16
Alert output upper limit flag	36															

■Alert output upper limit flag status
- When the value is out of the range specified in the alert output upper limit value, Alert alarm ON (1) is stored in 'Alert output upper limit flag' (Un\G36) corresponding to each channel.
- When an alert is detected in any channel where the D/A conversion and the alert output setting are enabled, 'Alert output signal' (XE) also turns on.

■Clearing Alert output upper limit flag
Turn on and off 'Alert output clear request' (YE) or 'Operating condition setting request' (Y9).

Alert output lower limit flag

The lower limit alarm can be checked for each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH9	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1

- 0: Normal, 1: Alert alarm ON
- b8 to b15 of the R60DA8-G are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7	CH 8	CH 9	CH 10	CH 11	CH 12	CH 13	CH 14	CH 15	CH 16
Alert output lower limit flag	37															

■Alert output lower limit flag status

- When the value is out of the range specified in the alert output lower limit value, Alert alarm ON (1) is stored in 'Alert output lower limit flag' (Un\G37) corresponding to each channel.
- When an alert is detected in any channel where the D/A conversion and the alert output setting are enabled, 'Alert output signal' (XE) also turns on.

■Clearing Alert output lower limit flag

Turn on and off 'Alert output clear request' (YE) or 'Operating condition setting request' (Y9).

Alert output flag [Q compatible mode]

When the Q compatible mode function is used, the upper/lower limit alert can be checked.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
CH8 Lower limit value	CH8 Upper limit value	CH7 Lower limit value	CH7 Upper limit value	CH6 Lower limit value	CH6 Upper limit value	CH5 Lower limit value	CH5 Upper limit value	CH4 Lower limit value	CH4 Upper limit value	CH3 Lower limit value	CH3 Upper limit value	CH2 Lower limit value	CH2 Upper limit value	CH1 Lower limit value	CH1 Upper limit value

0: Normal, 1: Alarm ON

■Buffer memory address

The following shows the buffer memory address of this area.

Only the R60DA8-G can use this area.

Buffer memory name	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Alert output flag (in Q compatible mode)	48							

■Alert output flag status

- When the value is out of the range specified in the alert output upper limit value or alert output lower limit value, Alert alarm ON (1) is stored in 'Alert output flag' (Un\G48) corresponding to each channel.
- When an alert is detected in any channel where the D/A conversion and the alert output setting are enabled, 'Alert output signal' (XE) also turns on.

■Clearing Alert output flag

Turn on and off 'Alert output clear request' (YE) or 'Operating condition setting request' (Y9).

Disconnection detection flag

By setting 4 to 20mA for the analog output range and enabling the D/A conversion, a disconnection can be detected for each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH9	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1

- 0: Normal, 1: Disconnection detection
- b8 to b15 of the R60DA8-G are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7	CH 8	CH 9	CH 10	CH 11	CH 12	CH 13	CH 14	CH 15	CH 16
Disconnection detection flag	38															
Disconnection detection flag (When the Q compatible mode function is used)	49								—							

■Disconnection detection flag status

- When a disconnection is detected, Disconnection detection (1) is stored in 'Disconnection detection flag' (Un\G38) corresponding to each channel.
- When a disconnection is detected in any channel, 'Disconnection detection signal' (XD) turns on.

■Clearing Disconnection detection flag

Even if the disconnection cause is eliminated, the analog output does not restart automatically to prevent an incorrect output. To restart the analog output, check CH□ Digital value and turn on and off 'Error clear request' (YF). According to the status of 'CH□ Output enable/disable flag' (Y1 to Y8, Y11 to Y18), the analog output restarts.

When the analog output restarts, the disconnection detection flag of the corresponding channel is cleared.

Interrupt factor mask [n]

Set Interrupt factor mask to be used.

Setting value	Setting content
0	Mask (Interrupt unused)
1	Mask clear (Interrupt used)

When 'Interrupt factor mask [n]' (Un\G124 to Un\G139) is changed to Mask clear (Interrupt used) (1) and an interrupt factor occurs, an interrupt request is sent to the CPU module. When the set value is two or larger, the setting is regarded as Mask clear (Interrupt used) (1).

"n" indicates an interrupt setting number. (n = 1 to 16)

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Interrupt factor mask [n]	124	125	126	127	128	129	130	131	132	133	134	135	136	137	13	139
Interrupt factor mask [n] (in Q compatible mode)	4032	4033	4034	4035	4036	4037	4038	4039	4040	4041	4042	4043	4044	4045	4046	4047

■Default value

The default value is set to Mask (Interrupt unused) (0) for all channels.

Interrupt factor reset request [n]

An interrupt factor reset request is sent.

Setting value	Setting content
0	No reset request
1	Reset request

When Reset request (1) is set to 'Interrupt factor reset request [n]' (Un\G156 to Un\G171) corresponding to the interrupt factor, the interrupt factor corresponding to the specified interrupt is reset. After that, 'Interrupt factor reset request [n]' (Un\G156 to Un\G171) turns to No reset request (0). When the set value is two or larger, the setting is regarded as Reset request (1). Interrupt factors can also be reset by turning on and off 'Operating condition setting request' (Y9).

"n" indicates an interrupt setting number. (n = 1 to 16)

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Interrupt factor reset request [n]	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171
Interrupt factor reset request [n] (in Q compatible mode)	4064	4065	4066	4067	4068	4069	4070	4071	4072	4073	4074	4075	4076	4077	4078	4079

■Default value

The default value is No reset request (0) for all buffer memory areas.

Interrupt factor generation setting [n]

Set an interrupt request for when the same interrupt factor occurs during the interrupt factor detection.

Setting value	Setting content
0	Interrupt resend request
1	No interrupt resend request

- When 'Interrupt factor generation setting [n]' (Un\G200 to Un\G215) is Interrupt resend request (0) and the same interrupt factor occurs during the interrupt factor detection, an interrupt request is sent to the CPU module again.
- When 'Interrupt factor generation setting [n]' (Un\G200 to Un\G215) is No interrupt resend request (1) and the same interrupt factor occurs during the interrupt factor detection, an interrupt request is not sent to the CPU module.

If a value other than the above is set, an interrupt factor generation setting range error (error code: 180△H) occurs.

"n" indicates an interrupt setting number. (n = 1 to 16)

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Interrupt factor generation setting [n]	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215
Interrupt factor generation setting [n] (in Q compatible mode)	4096	4097	4098	4099	4100	4101	4102	4103	4104	4105	4106	4107	4108	4109	4110	4111

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is Interrupt resend request (0) for all buffer memory areas.

Condition target setting [n]

Set an interrupt factor to be detected.

Setting value[*1]	Setting content
0	Disable
1	Error flag (XF)
2	Alert output flag
3	Disconnection detection flag
4	External power supply READY flag (CH1 to CH8) (X7)
5	External power supply READY flag (CH9 to CH16) (X17)
6	External power supply READY flag (CH1 to CH8) (X7) or External power supply READY flag (CH9 to CH16) (X17)

*1 When the R60DA8-G is used, only 0 to 4 can be set.

If a value other than the above is set, a condition target setting range error (error code: 181△H) occurs.

When 'Error flag' (XF) or the buffer memory areas are set in 'Condition target setting [n]' (Un\G232 to Un\G247) and turn on, an interrupt request is sent to the CPU module. When 'External power supply READY flag (CH1 to CH8)' (X7) or 'External power supply READY flag (CH9 to CH16)' (X17) is set in 'Condition target setting [n]' (Un\G232 to Un\G247) and turns off, an interrupt request is sent to the CPU module.

"n" indicates an interrupt setting number. (n = 1 to 16)

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Condition target setting [n]	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247
Condition target setting [n] (in Q compatible mode)	4128	4129	4130	4131	4132	4133	4134	4135	4136	4137	4138	4139	4140	4141	4142	4143

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is Disable (0) for all buffer memory areas.

Condition target channel setting [n]

Set a channel where an interrupt is detected.

Setting value[*1]	Setting content
0	All channels
1	CH1
2	CH2
3	CH3
4	CH4
5	CH5
6	CH6
7	CH7
8	CH8
9	CH9
10	CH10
11	CH11
12	CH12
13	CH13
14	CH14
15	CH15
16	CH16

*1 When the R60DA8-G is used, only 0 to 8 can be set.

When a factor for the channel specification is set to 'Condition target setting [n]' (Un\G232 to Un\G247), an interrupt factor in the channel set by this area is monitored. When a factor of the input signal (X) is set, the setting in this area is ignored. If a value other than the above is set, a condition target channel setting range error (error code: 182△H) occurs.

"n" indicates an interrupt setting number. (n = 1 to 16)

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Condition target channel setting [n]	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279
Condition target channel setting [n] (in Q compatible mode)	4160	4161	4162	4163	4164	4165	4166	4167	4168	4169	4170	4171	4172	4173	4174	4175

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is All CH specification (0) for all buffer memory areas.

Mode switching setting

Set a setting value for the mode to be switched.

Switching mode	Setting value	
	296	297
Normal mode	5260H	4441H
Offset/gain setting mode	4441H	5260H

When a value other than the above is set, the mode switching is not executed and only the operating condition is changed.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7	CH 8	CH 9	CH 10	CH 11	CH 12	CH 13	CH 14	CH 15	CH 16
Mode switching setting	296, 297															
Mode switching setting (in Q compatible mode)	158, 159								—							

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■After the mode is switched

When the mode is switched, this area is cleared to 0 and 'Operating condition setting completed flag' (X9) turns off.

After checking that 'Operating condition setting completed flag' (X9) is off, turn off 'Operating condition setting request' (Y9).

CH1 Set value check code

The check result of whether the set digital value is within the setting range can be checked.

The check target is 'CH1 Digital value' (Un\G460).

When a digital value out of the setting range is written, one of the following check codes is stored.

Check code	Description
000FH	A digital value exceeding the setting range has been written.
00F0H	A digital value falling short of the setting range has been written.
00FFH	A digital value falling short of the setting range and a digital value exceeding the setting range have been written. This check code may be stored when a check code is not reset.

Once the check code is stored, the code is not reset even when the digital value falls within the setting range.

To reset the check code, rewrite the digital value to a value within the setting range and turn on and off 'Error clear request' (YF).

When the scaling function is used, the value of 'CH1 Digital value' (Un\G460) which has undergone a scale conversion is checked. Note that some errors may be observed in the target digital value for a check code to be stored due to the calculation error of scale conversion when a scale-converted value exceeds the setting range.

■Buffer memory address

The following shows the buffer memory address of this area.

• CH□ Setting value check code

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
400	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400

• CH□ Setting value check code (When the Q compatible mode function is used)

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
11	12	13	14	15	16	17	18	—							

CH1 Range setting monitor

The output range value set to the output range setting or 'CH1 Range setting' (Un\G598) can be checked.

Monitor value	Description
0H	4 to 20mA
1H	0 to 20mA
2H	1 to 5V
3H	0 to 5V
4H	-10 to 10V
5H	-12 to 12V
AH	4 to 20mA (extended mode)
BH	1 to 5V (extended mode)
DH	User range setting 3
EH	User range setting 2
FH	User range setting 1

■Buffer memory address

The following shows the buffer memory address of this area.

• CH□ Range setting monitor

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
430	630	830	1030	1230	1430	1630	1830	2030	2230	2430	2630	2830	3030	3230	3430

Range setting monitor [Q compatible mode]

When the Q compatible mode function is used, the output range value set in the output range setting can be checked.

Range setting monitor (Un\G20)
(setting range CH1 to CH4)

Range setting monitor (Un\G21)
(setting range CH5 to CH8)

■Buffer memory address

The following shows the buffer memory address of this area.

Only the R60DA8-G can use this area.

Buffer memory name	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Range setting monitor (in Q compatible mode)	20				21			

The monitor value of the output range is the same as the one for the R mode.

CH1 HOLD/CLEAR function setting monitor

The setting status of the HOLD/CLEAR function can be checked.

Monitor value	Description
0	CLEAR
1	HOLD

■Buffer memory address

The following shows the buffer memory address of this area.

- CH□ HOLD/CLEAR function setting monitor

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
431	631	831	1031	1231	1431	1631	1831	2031	2231	2431	2631	2831	3031	3231	3431

HOLD/CLEAR function setting monitor [Q compatible mode]

When the Q compatible mode function is used, the setting status of the HOLD/CLEAR function can be checked.

HOLD/CLEAR function setting monitor (Un\G26)

b15 ... b12	b11 ... b8	b7 ... b4	b3 ... b0
CH4	CH3	CH2	CH1

HOLD/CLEAR function setting monitor (Un\G27)

b15 ... b12	b11 ... b8	b7 ... b4	b3 ... b0
CH8	CH7	CH6	CH5

0: CLEAR, 1 to F: HOLD

■Buffer memory address

The following shows the buffer memory address of this area.

Only the R60DA8-G can use this area.

Buffer memory name	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
HOLD/CLEAR function setting monitor (in Q compatible mode)	26				27			

CH1 Digital value

Set the digital value in 16-bit signed binary for the D/A conversion from the CPU module.

Output range setting	When the scaling function is disabled	When the scaling function is enabled[1]
	Setting range (practical range)	Setting range
0: 4 to 20mA	-768 to 32767 (practical range: 0 to 32000)	-32000 to 32000
1: 0 to 20mA		
2: 1 to 5V		
3: 0 to 5V		
4: -10 to 10V	-32768 to 32767 (practical range: -32000 to 32000)	
5: -12 to 12V		
D: User range setting 3		
E: User range setting 2		
A: 4 to 20mA (extended mode)	-8768 to 32767 (practical range: -8000 to 32767)	
B: 1 to 5V (extended mode)		
F: User range setting 1	-768 to 32767 (practical range: 0 to 32000)	

[1] The available setting range and practical range of when the scaling function is enabled differ depending on the setting of the scaling upper limit value and scaling lower limit value.

When a value out of the available setting range is written, the D/A conversion is performed with the upper or lower limit value of the available setting range.

A check code is stored in 'CH1 Set value check code' (Un\G400) and a digital value setting range error (error code: 191□H) is stored in 'Latest error code' (Un\G0).

> **Point**
>
> When the output range is set to 4 to 20mA (extended mode) or 1 to 5V (extended mode) and the scaling function is disabled, the analog output value ranges as shown below.
>
> • 4 to 20mA (extended mode): 0 to 20.48mA
> • 1 to 5V (extended mode): 0 to 5.12V
>
> To output 22mA or 5.5V, use the scaling function or shift function.
>
> For details on the scaling function and shift function, refer to the following.
>
> ☞ Page 20 Scaling Function
> ☞ Page 23 Shift Function

■Buffer memory address

The following shows the buffer memory address of this area.

• CH□ Digital value

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
460	660	860	1060	1260	1460	1660	1860	2060	2260	2460	2660	2860	3060	3260	3460

• CH□ Digital value (When the Q compatible mode function is used)

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
1	2	3	4	5	6	7	8	—							

CH1 Input value shift amount

The set value is added to the digital value regardless of the on/off state of 'Operating condition setting request' (Y9).

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

☞ Page 23 Shift Function

■Buffer memory address

The following shows the buffer memory address of this area.

• CH□ Input value shift amount

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
480	680	880	1080	1280	1480	1680	1880	2080	2280	2480	2680	2880	3080	3280	3480

• CH□ Input value shift amount (When the Q compatible mode function is used)

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
150	151	152	153	154	155	156	157	—							

■Setting range

The setting range is from -32768 to 32767.

■Default value

The default value is 0 for all channels.

CH1 D/A conversion enable/disable setting

Set whether to enable or disable the D/A conversion.

For details on the D/A conversion enable/disable function, refer to the following.

☞ Page 17 D/A Conversion Enable/Disable Setting Function

Setting value	Description
0	D/A conversion enabled
1	D/A conversion disabled

When a value other than the above is set, the value is processed as D/A conversion disable (1).

■Buffer memory address

The following shows the buffer memory address of this area.

• CH□ D/A conversion enable/disable setting

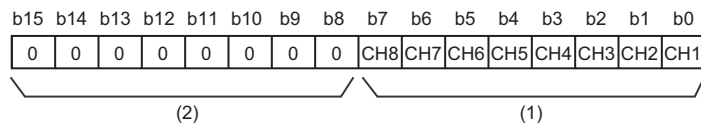| CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
500	700	900	1100	1300	1500	1700	1900	2100	2300	2500	2700	2900	3100	3300	3500

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is D/A conversion disable (1) for all channels.

D/A conversion enable/disable setting [Q compatible mode]

When the Q compatible mode function is used, set whether to enable or disable the D/A conversion.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	0	0	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1

(2) ⟵───────────────────⟶ (1) ⟵───────────────────────────────⟶

(1) 0: D/A conversion enabled, 1: D/A conversion disabled

(2) b8 to b15 are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Only the R60DA8-G can use this area.

Buffer memory name	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
D/A conversion enable/disable setting (in Q compatible mode)	0							

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is D/A conversion disable (1) for all channels.

CH1 Scaling enable/disable setting

Set whether to enable or disable the scaling.

For details on the scaling function, refer to the following.

☞ Page 20 Scaling Function

Setting value	Description
0	Enable
1	Disable

If a value other than the above is set, a scaling enable/disable setting range error (error code: 1A0□H) occurs.

■Buffer memory address

The following shows the buffer memory address of this area.

• CH□ Scaling enable/disable setting

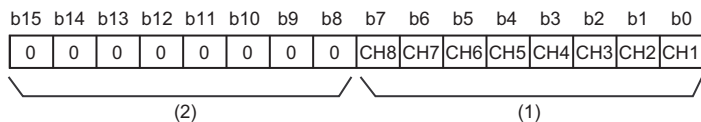| CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
502	702	902	1102	1302	1502	1702	1902	2102	2302	2502	2702	2902	3102	3302	3502

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is Disable (1) for all channels.

Scaling enable/disable setting [Q compatible mode]

When the Q compatible mode function is used, set whether to enable or disable the scaling.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	0	0	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1

(2) — (1)

(1) 0: Scaling enabled, 1: Scaling disabled

(2) b8 to b15 are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Only the R60DA8-G can use this area.

Buffer memory name	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Scaling enable/disable setting (in Q compatible mode)	53							

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is Disable (1) for all channels.

CH1 Scaling upper limit value

Set the range of the scale conversion.

For details on the scaling function, refer to the following.

☞ Page 20 Scaling Function

■Buffer memory address

The following shows the buffer memory address of this area.

• CH□ Scaling upper limit value

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
504	704	904	1104	1304	1504	1704	1904	2104	2304	2504	2704	2904	3104	3304	3504

• CH□ Scaling upper limit value (in Q compatible mode)

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
55	57	59	61	63	65	67	69	—							

■Setting range

The setting range is from -32000 to 32000.

In the channel where a value out of the range is set, a scaling setting range error (error code: 1A1□H) occurs.

In the channel where a set value does not satisfy the condition "the scaling upper limit value ≠ the scaling lower limit value", a scaling upper/lower limit value setting error (error code: 1A2□H) occurs.

When 'CH1 Scaling enable/disable setting' (Un\G502) is set to Disable (1), the setting for 'CH1 Scaling upper limit value' (Un\G504) is ignored.

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is 0 for all channels.

CH1 Scaling lower limit value

Set the range of the scale conversion.

For details on the scaling function, refer to the following.

☞ Page 20 Scaling Function

■Buffer memory address

The following shows the buffer memory address of this area.

• CH□ Scaling lower limit value

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
506	706	906	1106	1306	1506	1706	1906	2106	2306	2506	2706	2906	3106	3306	3506

• CH□ Scaling lower limit value (in Q compatible mode)

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
54	56	58	60	62	64	66	68	—							

■Setting range

The setting range is from -32000 to 32000.

In the channel where a value out of the range is set, a scaling setting range error (error code: 1A1□H) occurs.

In the channel where a set value does not satisfy the condition "the scaling upper limit value ≠ the scaling lower limit value", a scaling upper/lower limit value setting error (error code: 1A2□H) occurs.

When 'CH1 Scaling enable/disable setting' (Un\G502) is set to Disable (1), the setting for 'CH1 Scaling lower limit value' (Un\G506) is ignored.

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is 0 for all channels.

CH1 Alert output setting

Set whether to enable or disable the alert output.

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

☞ Page 25 Alert Output Function

Setting value	Description
0	Enable
1	Disable

If a value other than the above is set, an alert output setting range error (error code: 1B0□H) occurs.

■Buffer memory address

The following shows the buffer memory address of this area.

• CH□ Alert output setting

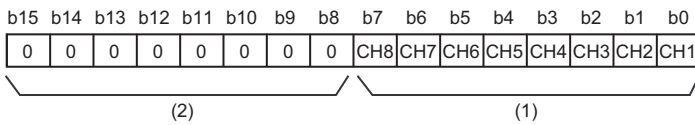| CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
508	708	908	1108	1308	1508	1708	1908	2108	2308	2508	2708	2908	3108	3308	3508

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is Disable (1) for all channels.

Alert output setting [Q compatible mode]

When the Q compatible mode function is used, set whether to enable or disable the disconnection detection or alert output.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	0	0	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1

(2)   (1)

(1) 0: Alert output enable, 1: Alert output disable

(2) b8 to b15 are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Only the R60DA8-G can use this area.

Buffer memory name	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Alert output setting (in Q compatible mode)	47							

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is Alert output disable (1) for all channels.

CH1 Rate control enable/disable setting

Set whether to enable or disable the rate control.

For details on the rate control function, refer to the following.

☞Page 27 Rate Control Function

Setting value	Description
0	Enable
1	Disable

If a value other than the above is set, a rate control enable/disable setting range error (error code: 1B8□H) occurs.

■Buffer memory address

The following shows the buffer memory address of this area.

• CH□ Rate control enable/disable setting

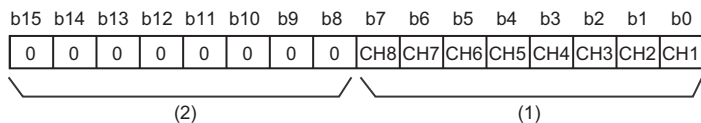| CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
509	709	909	1109	1309	1509	1709	1909	2109	2309	2509	2709	2909	3109	3309	3509

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is Disable (1) for all channels.

Rate control enable/disable setting [Q compatible mode]

When the Q compatible mode function is used, set whether to enable or disable the rate control.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	0	0	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1

(2) / (1)

(1) 0: Rate control enable, 1: Rate control disable
(2) b8 to b15 are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Only the R60DA8-G can use this area.

Buffer memory name	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Rate control enable/disable setting (in Q compatible mode)	46							

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is Rate control disable (1) for all channels.

CH1 Alert output upper limit value

Set the range of digital values to output alerts.

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

☞ Page 25 Alert Output Function

■Buffer memory address

The following shows the buffer memory address of this area.

• CH□ Alert output upper limit value

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
510	710	910	1110	1310	1510	1710	1910	2110	2310	2510	2710	2910	3110	3310	3510

• CH□ Alert output upper limit value (When the Q compatible mode function is used)

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
86	88	90	92	94	96	98	100	—							

■Setting range

The setting range is from -32768 to 32767. In the channel where a set value does not satisfy the condition "alert output upper limit value > alert output lower limit value", an alert output upper/lower limit value inversion error (error code: 1B1□H) occurs. When 'CH1 Alert output setting' (Un\G508) is set to Disable (1), the setting of 'CH1 Alert output upper limit value' (Un\G510) is ignored.

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is 0 for all channels.

■Precautions

When the shift function is used, always set a value in consideration of 'CH1 Input value shift amount' (Un\G480).

CH1 Alert output lower limit value

Set the range of digital values to output alerts.

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

☞ Page 25 Alert Output Function

■Buffer memory address

The following shows the buffer memory address of this area.

- CH□ Alert output lower limit value

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
512	712	912	1112	1312	1512	1712	1912	2112	2312	2512	2712	2912	3112	3312	3512

- CH□ Alert output lower limit value (When the Q compatible mode function is used)

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
87	89	91	93	95	97	99	101	—							

■Setting range

The setting range is from -32768 to 32767. In the channel where a set value does not satisfy the condition "alert output upper limit value > alert output lower limit value", an alert output upper/lower limit value inversion error (error code: 1B1□H) occurs. When 'CH1 Alert output setting' (Un\G508) is set to Disable (1), the setting of 'CH1 Alert output lower limit value' (Un\G512) is ignored.

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is 0 for all channels.

■Precautions

When the shift function is used, always set a value in consideration of 'CH1 Input value shift amount' (Un\G480).

CH1 Increase digital limit value

Set the increment value per conversion cycle (1ms) when using the rate control function.

For details on the rate control function, refer to the following.

☞Page 27 Rate Control Function

■Buffer memory address

The following shows the buffer memory address of this area.

• CH□ Increase digital limit value

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
514	714	914	1114	1314	1514	1714	1914	2114	2314	2514	2714	2914	3114	3314	3514

• CH□ Increase digital limit value (When the Q compatible mode function is used)

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
70	72	74	76	78	80	82	84	—							

■Setting range

The setting range is from 0 to 64000 (FA00H). If a value out of the setting range is set for a channel where the conversion and rate control are enabled, a digital limit value range error (error code: 1B9□H) occurs.

When the scaling setting is enabled, the increase digital limit value of the input digital value converted within the scaling range is applied.

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is 64000 for all channels.

■Precautions

When a value exceeding 32767 is set in 'CH1 Increase digital limit value' (Un\G514) with the program, the value must be input in hexadecimal.

CH1 Decrease digital limit value

Set the decrement value per conversion cycle (1ms) when using the rate control function.

For details on the rate control function, refer to the following.

☞ Page 27 Rate Control Function

■Buffer memory address

The following shows the buffer memory address of this area.

- CH□ Decrease digital limit value

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
516	716	916	1116	1316	1516	1716	1916	2116	2316	2516	2716	2916	3116	3316	3516

- CH□ Decrease digital limit value (in Q compatible mode)

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
71	73	75	77	79	81	83	85	—							

■Setting range

The setting range is from 0 to 64000 (FA00H). If a value out of the setting range is set for a channel where the conversion and rate control are enabled, a digital limit value range error (error code: 1B9□H) occurs.

When the scaling setting is enabled, the decrease digital limit value of the input digital value converted within the scaling range is applied.

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is 64000 for all channels.

■Precautions

When a value exceeding 32767 is set in 'CH1 Decrease digital limit value' (Un\G516) with the program, the value must be input in hexadecimal.

CH1 Range setting

This area is for setting an output range.

Output range	Setting value
4 to 20mA	0H
0 to 20mA	1H
1 to 5V	2H
0 to 5V	3H
-10 to 10V	4H
-12 to 12V	5H
4 to 20mA (extended mode)	AH
1 to 5V (extended mode)	BH
User range setting 3	DH
User range setting 2	EH
User range setting 1	FH

If a value other than the above is set, a range setting range error (error code: 190□H) occurs.

To prevent a sudden change of the analog output, CH□ Under-output range change denial alarm (alarm code: 0C0□H) occurs when the range switching is attempted to be executed with the D/A conversion and output enabled. Thus, the range switching is not executed. To execute the range switching, turn off 'CH1 Output enable/disable flag' (Y1).

■Buffer memory address

The following shows the buffer memory address of this area.

• CH□ Range setting

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
598	798	998	1198	1398	1598	1798	1998	2198	2398	2598	2798	2998	3198	3398	3598

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is 0H for all channels.

Range setting [Q compatible mode]

This area is for setting an output range when the Q compatible mode function is used.

Range setting (Un\G402)
(setting range: CH1 to CH4)

b15	…	b12	b11	…	b8	b7	…	b4	b3	…	b0
CH4			CH3			CH2			CH1		

Range setting (Un\G403)
(setting range: CH5 to CH8)

b15	…	b12	b11	…	b8	b7	…	b4	b3	…	b0
CH8			CH7			CH6			CH5		

■Buffer memory address

The following shows the buffer memory address of this area.

Only the R60DA8-G can use this area.

Buffer memory name	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Range setting (in Q compatible mode)	402				403			

The output range setting value is the same as the one for the R mode.

■Enabling the setting

Turn on and off 'Operating condition setting request' (Y9).

■Default value

The default value is 0H for all channels.

Error history

Up to 16 errors that occurred in the module are recorded.

	b15	to	b8	b7	to	b0
Un\G3600		Error code				
Un\G3601	First two digits of the year			Last two digits of the year		
Un\G3602	Month			Day		
Un\G3603	Hour			Minute		
Un\G3604	Second			Day of the week		
Un\G3605	Millisecond (Upper)			Millisecond (Lower)		
Un\G3606 to Un\G3609	System area					

Item	Storage contents	Storage example[1]
First two digits of the year/Last two digits of the year	Stored in BCD code.	2015H
Month/Day		131H
Hour/Minute		1234H
Second		56H
Day of the week	One of the following values is stored in BCD code. Sunday: 0, Monday: 1, Tuesday: 2, Wednesday: 3 Thursday: 4, Friday: 5, Saturday: 6	6H
Millisecond (upper)	Stored in BCD code.	7H
Millisecond (lower)		89H

*1 Values stored when an error occurs at 12:34:56.789 on Saturday, January 31st, 2015.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	No.1 to No.16
Error history	3600 to 3759
Error history (in Q compatible mode)	1810 to 1969

Alarm history

Up to 16 alarms that occurred in the module are recorded.

	b15	to	b8	b7	to	b0
Un\G3760	Alarm code					
Un\G3761	First two digits of the year			Last two digits of the year		
Un\G3762	Month			Day		
Un\G3763	Hour			Minute		
Un\G3764	Second			Day of the week		
Un\G3765	Millisecond (Upper)			Millisecond (Lower)		
Un\G3766	System area					
to						
Un\G3769						

Item	Storage contents	Storage example[1]
First two digits of the year/Last two digits of the year	Stored in BCD code.	2015H
Month/Day		131H
Hour/Minute		1234H
Second		56H
Day of the week	One of the following values is stored in BCD code. Sunday: 0, Monday: 1, Tuesday: 2, Wednesday: 3 Thursday: 4, Friday: 5, Saturday: 6	6H
Millisecond (upper)	Stored in BCD code.	7H
Millisecond (lower)		89H

*1 Values stored when an alarm occurs at 12:34:56.789 on Saturday, January 31st, 2015.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	No.1 to No.16
Alarm history	3760 to 3919
Alarm history (in Q compatible mode)	3760 to 3919

Save data type setting (Save data type setting 1)

> **Point**
>
> This area is intended for the R60DA8-G or CH1 to CH8 of the R60DA16-G. When using CH9 to CH16 of the R60DA16-G, refer to the following.
>
> ☞ Page 114 Save data type setting 2

This area saves and restores the offset/gain setting value in user range setting.

Specify the range setting of the offset/gain value to be saved and restored.

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

00: User range setting 1, 01: User range setting 2, 10: User range setting 3

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Save data type setting (Save data type setting 1)	4002							
Save data type setting (in Q compatible mode)	200							

■Default value

The default value is 0 for all channels.

Save data type setting 2

> **Point**
>
> This area is intended for CH9 to CH16 of the R60DA16-G. In using the R60DA8-G, this area is a system area. When using the R60DA8-G or CH1 to CH8 of the R60DA16-G, refer to the following.
>
> ☞ Page 114 Save data type setting (Save data type setting 1)

This area saves and restores the offset/gain setting value in user range setting.

Specify the range setting of the offset/gain value to be saved and restored.

b15 b14	b13 b12	b11 b10	b9 b8	b7 b6	b5 b4	b3 b2	b1 b0
CH16	CH15	CH14	CH13	CH12	CH11	CH10	CH9

00: User range setting 1, 01: User range setting 2, 10: User range setting 3

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
Save data type setting 2	4003							

■Default value

The default value is 0 for all channels.

CH1 Factory default setting

This area restores the offset/gain setting value in user range setting. For details, refer to the following.

CH1 User range setting

This area restores the offset/gain setting value in user range setting.

■Buffer memory address

The following shows the buffer memory address of this area.

• For the R60DA8-G

Buffer memory name	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
CH□ Factory default setting offset value	4004	4006	4008	4010	4012	4014	4016	4018
CH□ Factory default setting gain value	4005	4007	4009	4011	4013	4015	4017	4019
CH□ User range setting offset value	4020	4022	4024	4026	4028	4030	4032	4034
CH□ User range setting gain value	4021	4023	4025	4027	4029	4031	4033	4035
CH□ Factory default setting offset value (When the Q compatible mode function is used)	202	204	206	208	210	212	226	228
CH□ Factory default setting gain value (When the Q compatible mode function is used)	203	205	207	209	211	213	227	229
CH□ User range setting offset value (When the Q compatible mode function is used)	214	216	218	220	222	224	230	232
CH□ User range settings gain value (When the Q compatible mode function is used)	215	217	219	221	223	225	231	233

• For the R60DA16-G

Buffer memory name	Address							
CH□ Factory default setting offset value	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
	4004	4006	4008	4010	4012	4014	4016	4018
	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
	4020	4022	4024	4026	4028	4030	4032	4034
CH□ Factory default setting gain value	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
	4005	4007	4009	4011	4013	4015	4017	4019
	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
	4021	4023	4025	4027	4029	4031	4033	4035
CH□ User range setting offset value	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
	4036	4038	4040	4042	4044	4046	4048	4050
	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
	4052	4054	4056	4058	4060	4062	4064	4066
CH□ User range setting gain value	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
	4037	4039	4041	4043	4045	4047	4049	4051
	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
	4053	4055	4057	4059	4061	4063	4065	4067

When the following operations are performed, the data to be used is stored (saved).

• Writing the initial setting by engineering tool

• Turning off and on 'Operating condition setting request' (Y9) (Data is not saved when the mode is switched from the normal mode to the offset/gain setting mode by the mode switching setting.)

• Writing an offset/gain value in the offset/gain setting mode (When 'User range write request' (YA) is turned off and on)

When restoring the offset/gain setting value in user range setting, set the same data as the saved data in this area to the corresponding area of the D/A converter module that is the restoration destination.

For details on the offset/gain setting, refer to the following.

📖 MELSEC iQ-R Channel Isolated Digital-Analog Converter Module User's Manual (Startup)

■Default value

The default value is 0 for all channels.

Offset/gain adjustment value specification

Set the adjustment amount of the analog output value in the offset/gain setting mode.

For details on the offset/gain setting, refer to the following.

📖 MELSEC iQ-R Channel Isolated Digital-Analog Converter Module User's Manual (Startup)

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7	CH 8	CH 9	CH 10	CH 11	CH 12	CH 13	CH 14	CH 15	CH 16
Offset/gain adjustment value specification	4130															
Offset/gain adjustment value specification (When the Q compatible mode function is used)	24								—							

■Setting range

The setting range is from -3000 to 3000.

Ex.

When the setting value is 1000

Analog output values are adjusted as shown below.

User range setting	Analog output value
User range setting 1	Approx. 0.36mA
User range setting 2	Approx. 370mV
User range setting 3	Approx. 97mV

■Enabling the setting

Turn off and on 'Set value change request' (YC).

■Default value

The default value is 0 for all channels.

> Point🔎
>
> When the offset/gain setting is configured from the offset/gain setting window of an engineering tool, the setting is performed properly on the window. Therefore, a program is not required to perform the setting.
> When a sequence program used for the MELSEC-Q series D/A converter module is utilized to configure the offset/gain setting, check that an appropriate value has been set in this area.
> For the sequence programs for the MELSEC-Q series D/A converter module, refer to the following.
> 📖Channel Isolated Digital-Analog Converter Module User's Manual

CH1 Offset/gain setting mode

Specify the channel where the offset/gain setting is adjusted.
- Offset/gain setting mode (offset specification): Channel to adjust the offset
- Offset/gain setting mode (gain specification): Channel to adjust the gain

Setting value	Description
0	Disable
1	Setting channel

Multiple channels cannot be set at the same time. Set Disable (0) in Offset/gain setting mode (offset specification) or in Offset/gain setting mode (gain specification).

When a value other than the above is set, an offset/gain setting channel range error (error code: 1E8□H) occurs.

In the following cases, an offset/gain setting channel specification error (error code: 1E50H) occurs.
- When Setting channel (1) is set for both of Offset/gain setting mode (offset specification) and Offset/gain setting mode (gain specification)
- When Disable (0) is set for both of Offset/gain setting mode (offset specification) and Offset/gain setting mode (gain specification)
- When multiple channels are set at the same time

■Buffer memory address

The following shows the buffer memory address of this area.
- CH□ Offset/gain setting mode (offset specification)

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
4132	4134	4136	4138	4140	4142	4144	4146	4148	4150	4152	4154	4156	4158	4160	4162

- CH□ Offset/gain setting mode (gain specification)

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
4133	4135	4137	4139	4141	4143	4145	4147	4149	4151	4153	4155	4157	4159	4161	4163

■Enabling the setting

Turn off and on 'Channel change request' (YB).

■Default value

The default value is Disable (0) for all channels.

Offset/gain setting mode [Q compatible mode]

When the Q compatible mode function is used, specify the channel where the offset/gain setting is adjusted.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	0	0	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1

(2)   (1)
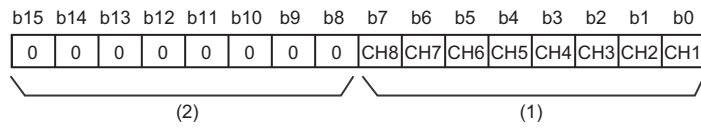
(1) 0: Disable, 1: Setting channel

(2) b8 to b15 are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Only the R60DA8-G can use this area.

Buffer memory name	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Offset/gain setting mode (offset specification) (in Q compatible mode)	22							
Offset/gain setting mode (gain specification) (in Q compatible mode)	23							

■Enabling the setting

Turn off and on 'Channel change request' (YB).

■Default value

The default value is Disable (0) for all channels.

> **Point**
>
> When the offset/gain setting is configured from the offset/gain setting window of an engineering tool, the setting is performed properly on the window. Therefore, a program is not required to perform the setting. When a sequence program used for the MELSEC-Q series D/A converter module is utilized to configure the offset/gain setting, check that an appropriate value has been set in this area.
>
> For the sequence programs for the MELSEC-Q series D/A converter module, refer to the following.
>
> ☐Channel Isolated Digital-Analog Converter Module User's Manual

CH1 Offset/gain setting mode (range specification)

The output range can be changed in the offset/gain setting.

The output range is changed to the set one by 'Channel change request' (YB).

Setting value	Description
DH	User range setting 3
EH	User range setting 2
FH	User range setting 1

When a value other than the above is set, an offset/gain setting range error (error code: 1E9□H) occurs.

■Buffer memory address

The following shows the buffer memory address of this area.

• CH□ Offset/gain setting mode (range specification)

CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12	CH13	CH14	CH15	CH16
4164	4165	4166	4167	4168	4169	4170	4171	4172	4173	4174	4175	4176	4177	4178	4179

■Enabling the setting

Turn off and on 'Channel change request' (YB).

■Default value

The default value is 0H for all channels.

> **Point**
>
> When the offset/gain setting is configured from the offset/gain setting window of an engineering tool, the setting is performed properly on the window. Therefore, a program is not required to perform the setting. When a sequence program used for the MELSEC-Q series D/A converter module is utilized to configure the offset/gain setting, check that an appropriate value has been set in this area.
>
> For the sequence programs for the MELSEC-Q series D/A converter module, refer to the following.
>
> ⊞Channel Isolated Digital-Analog Converter Module User's Manual

Offset/gain setting mode (range specification) [Q compatible mode]

The output range can be changed in the offset/gain setting when the Q compatible mode function is used.

The setting written in 'Offset/gain setting mode (range specification)' (Un\G25) is applied to all the channels.

Setting value	Description
DH	User range setting 3
EH	User range setting 2
FH	User range setting 1

■Buffer memory address

The following shows the buffer memory address of this area.

Only the R60DA8-G can use this area.

Buffer memory name	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Offset/gain setting mode (range specification) (in Q compatible mode)	25							

■Enabling the setting

Turn off and on 'Channel change request' (YB).

■Default value

The default value is 0H for all channels.

> **Point**
>
> When the offset/gain setting is configured from the offset/gain setting window of an engineering tool, the setting is performed properly on the window. Therefore, a program is not required to perform the setting.
> When a sequence program used for the MELSEC-Q series D/A converter module is utilized to configure the offset/gain setting, check that an appropriate value has been set in this area.
> For the sequence programs for the MELSEC-Q series D/A converter module, refer to the following.
> 📖Channel Isolated Digital-Analog Converter Module User's Manual

Appendix 4 Dedicated Instructions

Instruction list

The following table lists the dedicated instructions that can be used in the D/A converter module.

Instruction	Description
G(P).OFFGAN	Switches normal mode to offset/gain setting mode. Switches offset/gain setting mode to normal mode.
G(P).OGLOAD	Reads out the offset/gain setting value in the user range setting to write it into the CPU module.
G(P).OGSTOR	Restores the offset/gain setting value in the user range setting stored in the CPU module into the D/A converter module.

For details on the dedicated instructions, refer to the following.

📖 MELSEC iQ-R Programming Manual (Instructions, Standard Functions/Function Blocks)

INDEX

U

V

I

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 of damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products, special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products, 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

Microsoft, Windows, Windows Vista, Windows NT, Windows XP, Windows Server, Visio, Excel, PowerPoint, Visual Basic, Visual C++, and Access are either registered trademarks or trademarks of Microsoft Corporation in the United States, Japan, and other countries.

Intel, Pentium, and Celeron are either registered trademarks or trademarks of Intel Corporation in the United States and other countries.

Ethernet is a trademark of Xerox Corp.

The SD and SDHC logos are either registered trademarks or trademarks of SD-3C, LLC.

All other company names and product names used in this manual are either trademarks or registered trademarks of their respective companies.

When exported from Japan, this manual does not require application to the
Ministry of Economy, Trade and Industry for service transaction permission.

Specifications subject to change without notice.