

MELSEC System Q

Programmable Logic Controllers

User's Manual

Q62DA-FG

Channel Isolated

Digital-Analog Converter Module

• SAFETY PRECAUTIONS •

(Always read these instructions before using this equipment.)

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

The instructions given in this manual are concerned with this product. For the safety instructions of the PLC system, please read the user's manual of the CPU module to use.

In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".




DANGER

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 medium or slight personal injury or physical damage.

Note that the  CAUTION level may lead to a serious consequence according to the circumstances. Always follow the instructions of both levels because they are important to personal safety.

Please save this manual to make it accessible when required and always forward it to the end user.

[DESIGN PRECAUTION]

DANGER

- Do not write data into the "system area" of the buffer memory of intelligent function modules. Also, do not use any "prohibited to use" signals as an output signal to an intelligent function module from the PLC CPU. Writing data into the "system area" or outputting a signal for "prohibited to use" may cause a PLC system malfunction.

CAUTION

- Do not bunch the control wires or communication cables with the main circuit or power wires, or install them close to each other. They should be installed 100mm(3.9inch) or more from each other. Not doing so could result in noise that may cause malfunction.

[INSTALLATION PRECAUTIONS]

CAUTION

- Use the PLC in an environment that meets the general specifications contained in the user's manual of the CPU module to use.
Using this PLC in an environment outside the range of the general specifications may cause electric shock, fire, malfunction, and damage to or deterioration of the product.
- When installing the module, securely insert the module fixing tabs into the mounting holes of the base unit while pressing the installation lever located at the bottom of the module downward. Improper installation may result in malfunction, breakdown or the module coming loose and dropping.
Securely fix the module with screws if it is subject to vibration during use.
- Tighten the screws within the range of specified torque.
If the screws are loose, it may cause the module to fallout, short circuits, or malfunction.
If the screws are tightened too much, it may cause damage to the screw and/or the module, resulting in fallout, short circuits or malfunction.
- Switch all phases of the external power supply off when mounting or removing the module.
Not doing so may cause damage to the module.
In the system where a CPU module supporting the online module change is used and on the MELSECNET/H remote I/O stations, modules can be replaced online (during energizing). However, there are some restrictions on replaceable modules and the replacement procedures are predetermined for each module.
For details, refer to the chapter of the online module change in this manual.
- Do not directly touch the conductive area or electronic components of the module.
Doing so may cause malfunction or failure in the module.

[WIRING PRECAUTIONS]

CAUTION

- Always ground the FG terminal for the PLC.
There is a risk of electric shock or malfunction.
- When turning on the power and operating the module after wiring is completed, always attach the terminal cover that comes with the product.
There is a risk of electric shock if the terminal cover is not attached.
- Tighten the terminal screws within the range of specified torque.
If the terminal screws are loose, it may result in short circuits or malfunction.
If the terminal screws are tightened too much, it may cause damage to the screw and/or the module, resulting in short circuits or malfunction.
- Be careful not to let foreign matter such as sawdust or wire chips get inside the module.
They may cause fires, failure or malfunction.
- The top surface of the module is covered with protective film to prevent foreign objects such as cable offcuts from entering the module when wiring.
Do not remove this film until the wiring is complete.
Before operating the system, be sure to remove the film to provide adequate ventilation.

[STARTING AND MAINTENANCE PRECAUTIONS]

CAUTION

- Do not disassemble or modify the modules.
Doing so could cause failure, malfunction injury or fire.
- Switch all phases of the external power supply off when mounting or removing the module.
Not doing so may cause failure or malfunction of the module.
In the system where a CPU module supporting the online module change is used and on the MELSECNET/H remote I/O stations, modules can be replaced online (during energizing).
However, there are some restrictions on replaceable modules and the replacement procedures are predetermined for each module.
For details, refer to the chapter of the online module change in this manual.
- Do not touch the connector while the power is on.
Doing so may cause malfunction.
- Switch all phases of the external power supply off when cleaning or retightening the terminal screws and module installation screws.
Not doing so may cause failure or malfunction of the module.
If the screws are loose, it may cause the module to fallout, short circuits, or malfunction.
If the screws are tightened too much, it may cause damages to the screws and/or the module, resulting in the module falling out, short circuits or malfunction.
- Always make sure to touch the grounded metal to discharge the electricity charged in the body, etc., before touching the module.
Failure to do so may cause a failure or malfunctions of the module.

[DISPOSAL PRECAUTIONS]

CAUTION

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

REVISIONS

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

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Japanese Manual Version SH-080280-E

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INTRODUCTION

Thank you for purchasing the MELSEC-Q series PLC.

Before using the equipment, please read this manual carefully to develop full familiarity with the functions and performance of the Q series PLC you have purchased, so as to ensure correct use.

Please forward a copy of this manual to the end user.

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About Manuals

The following manuals are also related to this product.

If necessary, order them by quoting the details in the tables below.

Related Manuals

Manual Name	Manual Number (Model Code)
GX Developer Version 8 Operating Manual Describes the methods of using GX Developer to create a program and print out, monitor, and debug the program. (Sold separately)	SH-080373E (13JU41)
GX Developer Version 8 Operating Manual (Function Block) Describes the methods of using GX Developer to create a function block and print out the function block. (Sold separately)	SH-080376E (13JU44)

REMARK

If you would like to obtain a manual individually, printed matters are available separately. Order the manual by quoting the manual number on the table above (model code).

Conformation to the EMC Directive and Low Voltage Instruction

For details on making Mitsubishi PLC conform to the EMC directive and low voltage instruction when installing it in your product, please see Chapter 3, "EMC Directive and Low Voltage Instruction" of the User's Manual (Hardware) of the CPU module to use.

The CE logo is printed on the rating plate on the main body of the PLC that conforms to the EMC directive and low voltage instruction.

By making this product conform to the EMC directive and low voltage instruction, it is not necessary to make those steps individually.

About the Generic Terms and Abbreviations

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

Abbreviation/general terms	Description of the abbreviation/general terms
DOS/V personal computer	IBM PC/AT® or compatible computer with DOS/V.
GX Developer	Generic product name of the product types SWnD5C-GPPW-E, SWnD5C-GPPW-EA, SWnD5C-GPPW-EV and SWnD5C-GPPW-EVA. "n" in the model name is 4 or greater.
GX Configurator-DA	Generic term for digital-analog conversion module setting and monitor tool GX Configurator-DA (SW2D5C-QDAU-E).
QCPU (Q mode)	Generic term for Q00JCPU, Q00CPU, Q01CPU, Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU, Q25HCPU, Q12PHCPU and Q25PHCPU.
QnPHCPU	Generic term for Q12PHCPU and Q25PHCPU.
Personal computer	Generic term for DOS/V personal computer.
Industrial shipment setting	Generic term for analog input ranges 0 to 5V, 1 to 5V, -10 to 10V, 0 to 20mA and 4 to 20mA.
FB	Abbreviation of function block.

Product Structure

The product structure of this product is given in the table below.

Manual Name	Product name	Quantity
Q62DA-FG	Q62DA-FG Model Channel Isolated Digital-Analog Converter module	1
SW2D5C-QDAU-E	GX Configurator-DA Version 2(1-license product) (CD-ROM)	1
SW2D5C-QDAU-EA	GX Configurator-DA Version 2(Multiple-license product) (CD-ROM)	1

1 OVERVIEW

This User's Manual describes the specifications, handling and programming methods for the Q62DA-FG type channel isolated digital-analog converter module (hereinafter referred to as the Q62DA-FG) which are used in conjunction with MELSEC-Q series CPU module (hereinafter referred to as the PLC CPU).

1.1 Features

(1) Channel isolated

The module is isolated between the channels and between the external supply power and channels.

(2) High accuracy

The reference accuracy ^{*1} is as high as $\pm 0.1\%$ and the temperature coefficient ^{*2} is as high as $\pm 80\text{ppm}/^\circ\text{C}$.

*1: Accuracy attained at the ambient temperature when offset/gain setting has been made

*2: Accuracy per temperature change of 1°C

Example) Accuracy when the ambient temperature varies from 25°C to 30°C
 0.1% (reference accuracy) + $0.008\%/^\circ\text{C}$ (temperature coefficient)
 $\times 5^\circ\text{C}$ (temperature variation difference) = 0.14%

(3) Output range switching

The output range ^{*1} switching can be set easily from GX Developer.

*1: The output range indicates the offset/gain setting type. Besides the generally often used output ranges available as defaults, the user can make offset/gain settings and use the values.

(4) Analog output hold/clear function

This function is used to set whether the analog output value will be held or cleared when the CPU module is in a STOP status or when a stop error occurs.

(5) Output monitor function

The analog output value output by D/A conversion is reconverted into a digital value within the Q62DA-FG and the result is stored into the buffer memory as an output monitor value.

(6) Warning output function

A warning is output if a digital input value falls outside the setting range.

(7) Rate control function

The increment and decrement of the analog output value per conversion cycle can be restricted.

(8) Disconnection detection function

When the analog output range is 4 to 20mA or user range setting 1, the output monitor value is watched to detect disconnection.

(9) Online module change

The module can be changed without the system being stopped.

Further, the dedicated instruction (G. OGLOAD, G. OGSTOR), write to the buffer memory, or turning ON the Y signal enables "inheritance of offset/gain settings to the new Q62DA-FG replacing the old one changed online" and "transfer of offset/gain settings to the other Q62DA-FG mounted on the other slot". (These apply to the modules of the same model.)

(10) Offset/gain setting

GX Configurator-DA, dedicated instruction (G. OFFGAN) or mode switching setting allows a shift to the offset/gain setting mode easily.

(11) Easy settings using the utility package

A utility package is sold separately (GX Configurator-DA).

The utility package is not a required item, however, it is useful for on-screen setting of the intelligent function module parameters (initial setting/auto refresh setting). In addition, FB * 1 can be generated automatically from the intelligent function module parameters that have been set up and used in a sequence program.

*1: FB is the function for making a circuit block used in a sequence program repeatedly a part (FB) to use it in the sequence program.

This function can improve the efficiency of program development and minimize program bugs to improve program qualities.

For the details of FB, refer to "GX Developer Version 8 Operating Manual (Function Block)."

2 SYSTEM CONFIGURATION

2.1 Applicable Systems

This section describes the system configuration for the Q62DA-FG.

- (1) Applicable module and the number of modules that can be installed
The following are the CPU module and network module (for remote I/O stations) in which the Q62DA-FG can be installed and the number of modules that can be installed.

Applicable module		Number of modules that can be installed	Remarks
CPU module	Q00JCPU	Maximum 16	(*1)
	Q00CPU Q01CPU	Maximum 24	
	Q02CPU Q02HCPU Q06HCPU Q12HCPU Q25HCPU	Maximum 64	Can be installed in Q mode only (*1)
	Q12PHCPU Q25PHCPU	Maximum 64	(*1)
Network module	QJ72LP25-25 QJ72BR15 QJ72LP25G QJ71LP25GE	Maximum 64	MELSECNET/H Remote I/O station (*2)

*1 See User's Manual (Function Explanation, Program Fundamentals) for the CPU module to use.

*2 See Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O network).

- (2) Base unit in which the conversion module can be installed

The Q62DA-FG can be installed in any I/O slot (*3) of the base unit. However, a power shortage may occur depending on the combination with other installed modules and the number of modules used, so always take into consideration the power supply capacity when installing modules.

*3 Limited to the range of the number of I/O points in the CPU module and network module (for remote I/O stations).

- (3) Compatibility with a multiple PLC system

First read the QCPU (Q mode) user's manual (Function Explanation, Program Fundamentals) if the Q62DA-FG is used with a multiple PLC system.

- (a) Compatible Q62DA-FG

Use a Q62DA-FG with function version C or higher if using the module in a multiple PLC system.

- (b) Intelligent function module parameters

Perform PLC write of the intelligent function module parameters to the control PLC of the Q62DA-FG only.

(4) Compatibility with online module change

To make an online module change, use the module of function version C or later.

POINT	The Q62DA-FG does not have modules of function versions A and B. The function version C is compatible with a multiple PLC system and online module change.
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2

(5) Software packages supported

Correspondence between systems which use Q62DA-FG and software packages are as shown below.

The GX Developer is necessary when using a Q62DA-FG.

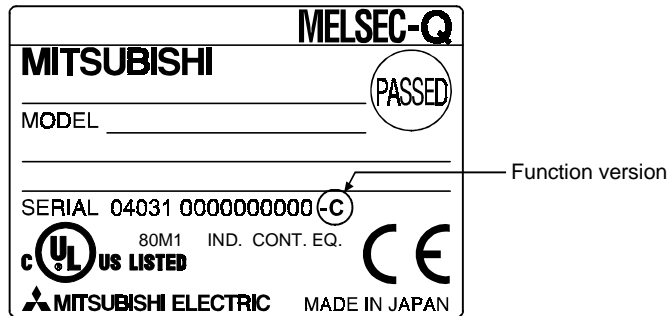
		Software Version	
		GX Developer	GX Configurator-DA
Q00J/Q00/Q01CPU	Single PLC system	Version 7 or later	Version 1.14Q or later
	Multiple PLC system	Version 8 or later	
Q02/Q02H/Q06H/ Q12H/Q25HCPU	Single PLC system	Version 4 or later	
	Multiple PLC system	Version 6 or later	
Q12PH/Q25PHCPU	Single PLC system	Version 7.10L or later	
	Multiple PLC system		
If installed in a MELSECNET/H remote I/O station		Version 6 or later	

2.2 How to Check the Function Version and Software Version

This section describes how to check the function version of the Q62DA-FG and the GX Configuration-DA software version.

(1) How to check the function version of the Q62DA-FG

- (a) To check the version using the "SERIAL column of the rating plate" located on the side of the module



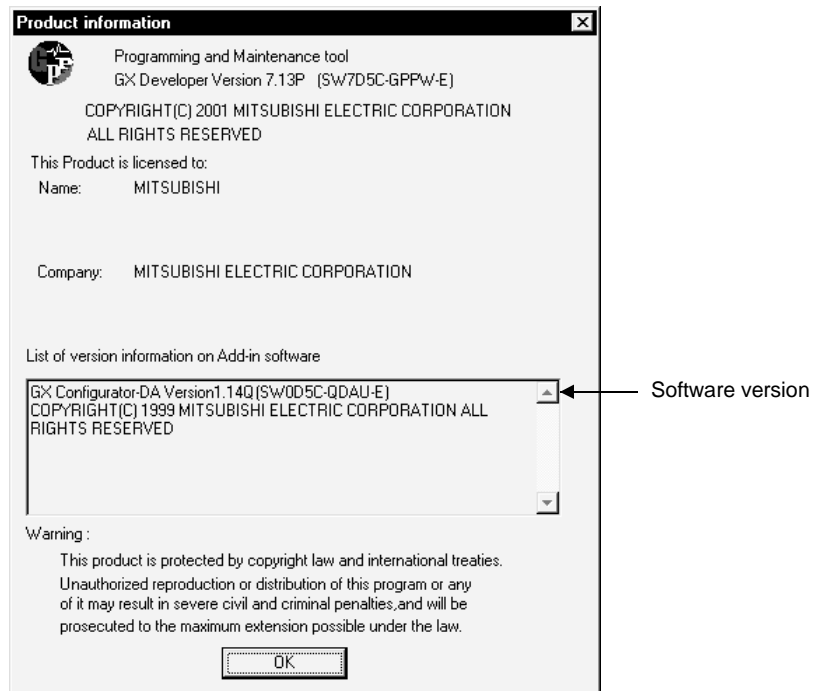
- (b) To check the version using the GX Developer
See Section 8.2.5 of this manual.

(2) How to check the GX Configuration-DA software version

The GX Configuration-DA software version can be checked in GX Developer's "Product information" screen.

[Startup procedure]

GX Developer → "Help" → Product information



(In the case of GX Developer Version 7)

REMARK

The version indication for the GX Configurator-DA has been changed as shown below from the SW0D5C-QDAU-E 60G upgrade product.

Previous product		Upgrade and subsequent versions
SW0D5C-QDAU-E 60G	→	GX Configurator-DA Version 1.10L

3 SPECIFICATIONS

3.1 Performance Specifications

3.1.1 Performance specifications list

Table 3.1 Performance specifications list

Item		Type	Q62DA-FG				
Number of analog outputs			2 points (2 channels)				
Digital input			16-bit signed binary (-12288 to 12287, -16384 to 16383)				
Analog output	Voltage		-12 to 12VDC (External load resistance: 1k to 1MΩ)				
	Current		0 to 20mADC (External load resistance: 0 to 600Ω) 0 to 22mADC (Please refer to Note 3)				
I/O characteristics maximum resolution	Voltage	Analog output range		Digital input value	Maximum resolution		
		0 to 5V		0 to 12000	0.416mV		
		1 to 5V			0.333mV		
		-10 to 10V		-16000 to 16000		0.625mV	
		User range setting 2		-12000 to 12000		0.366mV	
	User range setting 3		0.183mV				
	Current	0 to 20mA		0 to 12000		1.66 μA	
		4 to 20mA				1.33 μA	
		User range setting 1		-12000 to 12000		0.671 μA	
	Accuracy (Accuracy relative to maximum analog output value)	Reference accuracy*1	Within ± 0.1% (Voltage: ± 10mV, Current: ± 20 μA)				
Temperature coefficient*2		± 80ppm/ °C (0.008%/ °C)					
Conversion speed		10ms/2 channels					
Absolute maximum output	Voltage	± 13V					
	Current	23mA					
Output monitor	Resolution	12bit					
	Reference accuracy*1	± 0.2%					
	Temperature coefficient*2	± 160ppm/ °C (0.016%/ °C)					
Maximum number of writes for E ² PROM		100,000					
Output short-circuit protection		Available					
Isolation specifications	Specific isolated area		Isolation method	Dielectric withstand voltage	Insulation resistance		
	Between the I/O terminal and PLC power supply		Photocoupler isolation	1780VAC rms/3 cycles (elevation 2000m)	500VDC 10MΩ or more		
	Between analog output channels		Transformer isolation				
	Between external supply power and analog output channel		Transformer isolation				
Number of I/O occupied points		16 points					
Connected terminal		18 points terminal block					
Applicable wire size		0.3 to 0.75mm ²					
Applicable solderless terminals		R 1.25-3 (Solderless terminals with sleeves are not applicable)					
External supply power	24VDC, +20%, -15%						
	Ripple, spike within 500 mV p-p						
	Inrush current: 5.2A, within 300 μs						
Internal current consumption (5 VDC)	0.3A						
	0.37A						
Weight		0.20kg					

3

*1: Accuracy of offset/gain setting at ambient temperature

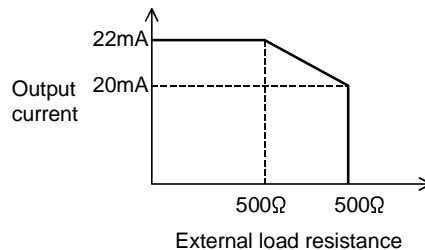
Q62DA-FG needs to be powered on 30 minutes prior to operation for compliance to the specification (accuracy).

*2: Accuracy per temperature change of 1 °C

Example: Accuracy when temperature changes from 25 to 30 °C

$$0.1\% (\text{Reference accuracy}) + 0.008\% / ^\circ\text{C} (\text{temperature coefficient}) \times 5 ^\circ\text{C} (\text{temperature change difference}) = 0.14\%$$

*3: The following indicates the external load resistance when output current is 20mA or more.



REMARK

See the user's manual for the CPU module being used for the general specifications for the Q62DA-FG.

3.1.2 I/O conversion characteristics

I/O conversion characteristics are used for converting the digital value written from the PLC CPU to an analog output value (voltage or current output), and represented by inclined straight lines when offset and gain values are included.

Offset value

The offset value becomes the analog output value (voltage or current) when the digital input value set from the PLC CPU is 0.

Gain value

The gain value denotes the analog output value (voltage or current) when the digital input value set from the PLC CPU is

12000 (when 1 to 5V, 0 to 5V, 4 to 20 mA, 0 to 20 mA or the user range setting 1 to 3 is selected),

16000 (when -10 to 10V is selected).

(1) Voltage output characteristic

Figure 3.1 shows a graph of the voltage output characteristic.

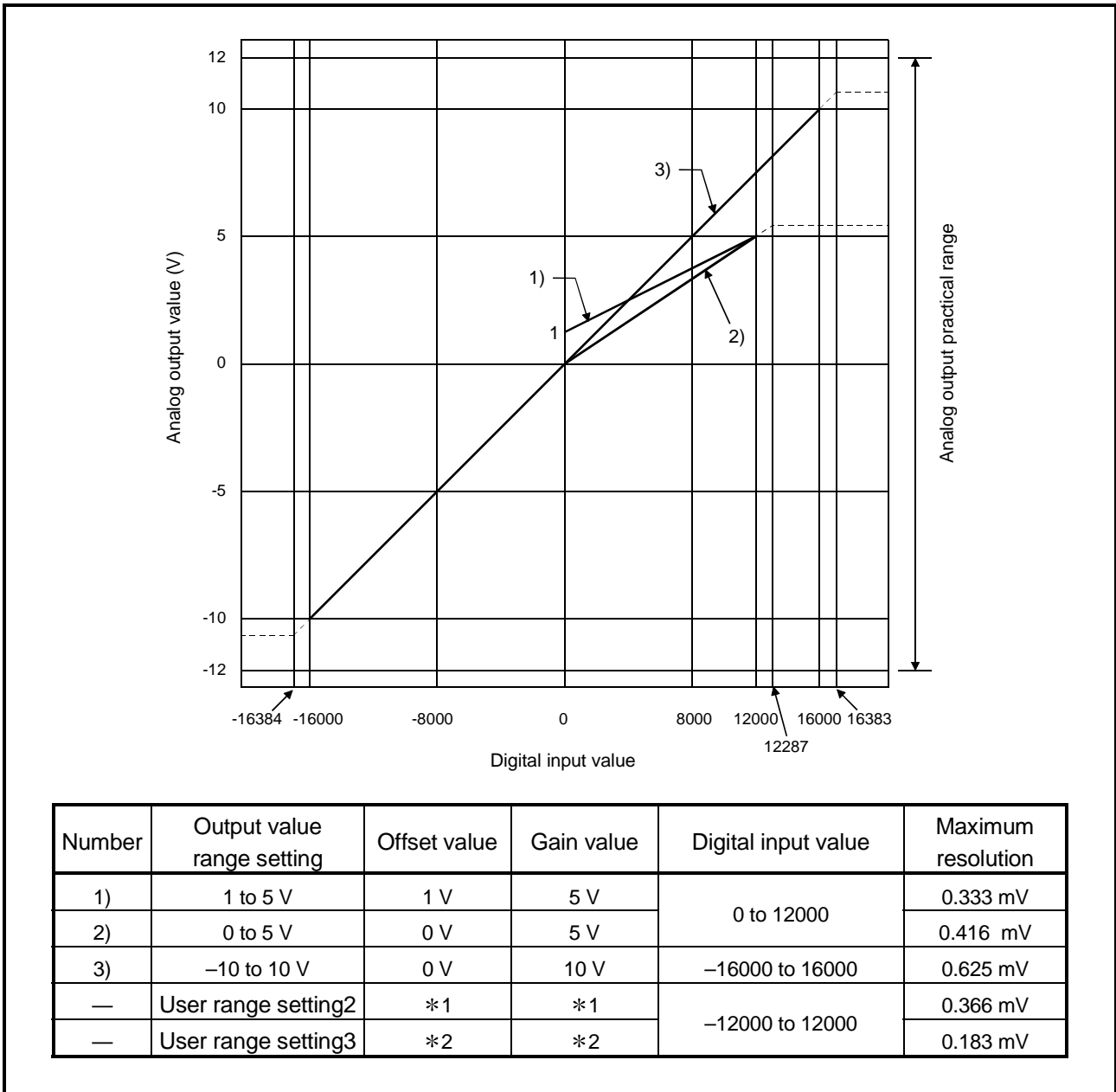


Figure 3.1 Voltage output characteristic

POINT
<p>(1) Set within the digital input range and analog output range for each output range. If these ranges are exceeded, the maximum resolution and accuracy may not fall within the performance specifications. (Avoid using the dotted line area shown in Figures 3.1.)</p> <p>(2) Set the offset/gain values for the user range setting2 *1 within a range in which the following conditions are satisfied.</p> <ul style="list-style-type: none">(a) Setting range is from -12 to 12 V.(b) $\{ (\text{Gain value}) - (\text{Offset value}) \} > 4.5\text{A}$ <p>(3) Set the offset/gain values for the user range setting3 *2 within a range in which the following conditions are satisfied.</p> <ul style="list-style-type: none">(a) Setting range is from 0.5 to 6 V.(b) $\{ (\text{Gain value}) - (\text{Offset value}) \} > 3\text{A}$

(2) Current output characteristic

Figure 3.2 shows a graph of the current output characteristic.

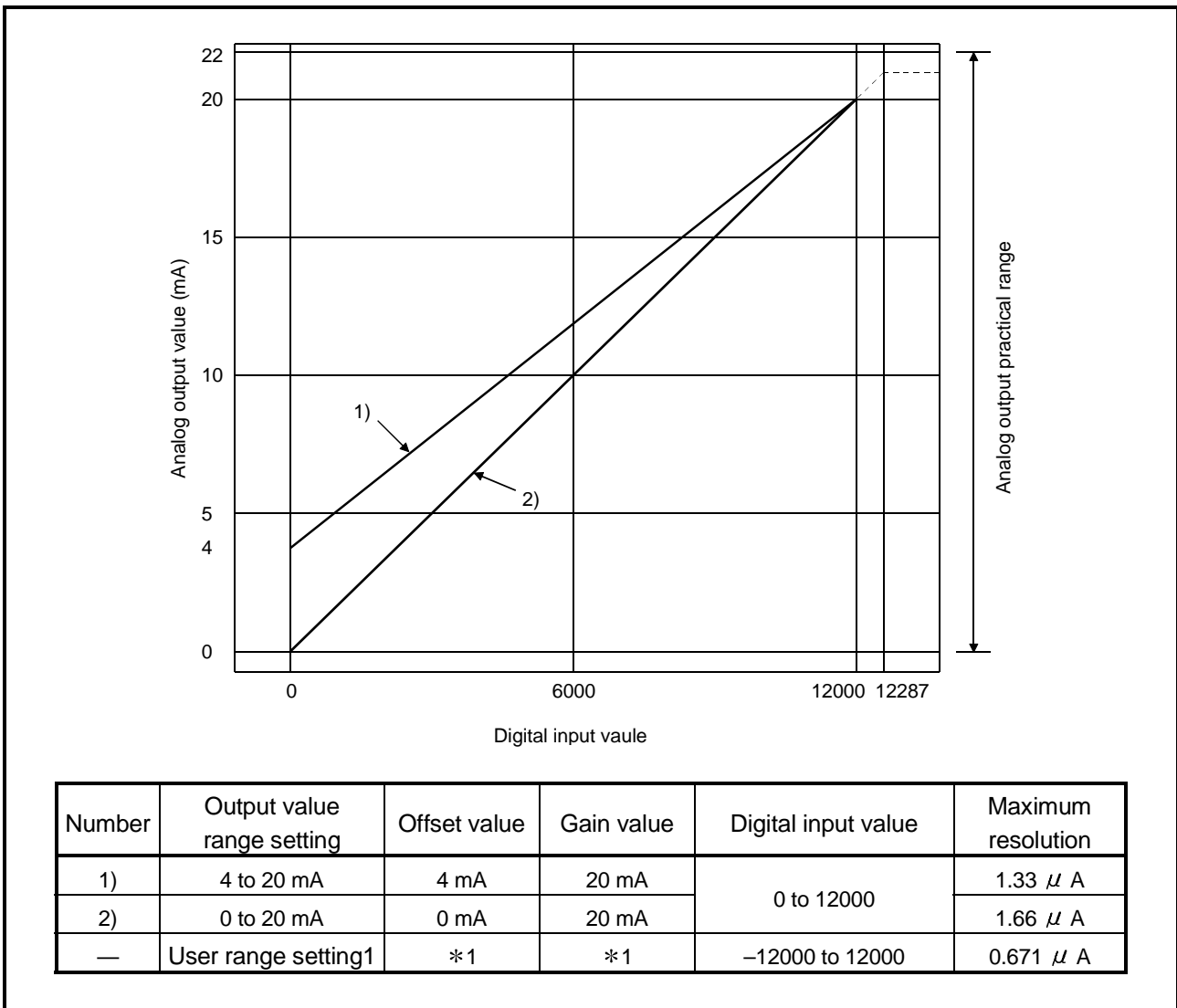


Figure 3.2 Current output characteristic

POINT
<p>(1) Set within the digital input range and analog output range for each output range. If these ranges are exceeded, the maximum resolution and accuracy may not fall within the performance specifications. (Avoid using the dotted line area shown in Figures 3.2.)</p> <p>(2) Set the offset/gain values for the user range setting1 *1 within a range in which the following conditions are satisfied.</p> <p>(a) Setting range is from 0 to 22 mA</p> <p>(b) { (Gain value) – (Offset value) } > 10mA</p>

3.1.3 Accuracy

The reference accuracy is the accuracy at the ambient temperature for offset/gain setting.

The temperature coefficient is the accuracy per temperature variation of 1°C.

The reference accuracy is the accuracy relative to the maximum value of the full scale. If you change the offset/gain setting or input range to change the input characteristic, the reference accuracy and temperature coefficient do not vary and kept within the ranges given in the performance specifications.

Example) Accuracy when the temperature varies from 25°C to 30°C

$$0.1\% \text{ (reference accuracy)} + 0.008\%/^{\circ}\text{C} \text{ (temperature coefficient)} \times 5^{\circ}\text{C} \text{ (temperature variation difference)} = 0.14\%$$

3.2 Function List

Table 3.2 shows the function of the Q62DA-FG.

Table 3.2 Function list

Item	Function	Reference section
D/A conversion enable/disable function	<ul style="list-style-type: none"> Specifies whether to enable or disable the D/A conversion for each channel. The conversion speed is 10ms regardless of the number of conversion enabled channels. 	Section 3.4.2
D/A output enable/disable function	<ul style="list-style-type: none"> Specifies whether to output the D/A converted value or the offset value for each channel. The conversion speed is 10ms constant independently of whether the output is enabled or disabled. 	Section 3.3.1
Analog output HOLD/CLEAR function	<ul style="list-style-type: none"> The output analog value can be retained when the PLC CPU module is placed in the STOP status or when an error occurs. 	Section 3.2.1
Analog output test during PLC CPU STOP	<ul style="list-style-type: none"> When the CH□ output enable/disable flag is forced ON during PLC CPU STOP, the D/A converted analog value is output. 	Section 3.2.2
Output monitor function	<ul style="list-style-type: none"> The analog output value output by D/A conversion is reconverted into a digital value within the Q62DA-FG and the result is stored into the buffer memory as an output monitor value. 	Section 3.2.3
Warning output function	<ul style="list-style-type: none"> A warning is output if a digital input value falls outside the setting range. 	Section 3.2.4
Rate control function	<ul style="list-style-type: none"> The increment and decrement of the analog output value per conversion cycle can be restricted. 	Section 3.2.5
Disconnection detection function	<ul style="list-style-type: none"> When the output range is 4 to 20mA or user range setting 1, the output monitor value is watched to detect disconnection. 	Section 3.2.6
Online module change	<ul style="list-style-type: none"> The module can be changed without the system being stopped. 	Chapter 7

3.2.1 Analog output HOLD/CLEAR function

Whether the output analog value will be retained or cleared according to the PLC CPU operating status (RUN, STOP, and Stop error) can be set using the intelligent function module switch (see Section 4.5).

Table 3.3 lists available analog output status based on the combinations of D/A conversion enable/disable and CH□ output enable/disable.

Perform settings according to the system application.

Table 3.3 Analog output status combination list

Setting combination execution status	D/A conversion enable/disable Setting (buffer memory address 0: Un\G0)	Enable		Disable	
	CH□ output enable/disable flags (Y1, Y2)	Enable		Disable	Enable or disable
	HOLD/CLEAR setting	HOLD	CLEAR	HOLD or CLEAR	HOLD or CLEAR
Analog output status when PLC CPU is running		Outputs the analog value of the D/A converted digital value. *2		Offset	0 V/0 mA
Analog output status when PLC CPU is stopped		Hold	Offset	Offset	0 V/0 mA
Analog output status when a PLC CPU stop error occurs		Hold	Offset	Offset	0 V/0 mA
Analog output status when a watchdog timer *1 error occurs in Q62DA-FG		0 V/0 mA	0 V/0 mA	0 V/0 mA	0 V/0 mA

*1 This occurs when program operations are not completed within the scheduled time due to a hardware problem of the Q62DA-FG. When a watchdog timer error occurs, module ready (X0) turns OFF and the Q62DA-FG RUN LED turns off.

*2 The rate control function is activated.

POINT
Design the system so that the D/A conversion enable/disable setting (buffer memory address 0: Un\G0) changes to "Enable" after the external power (see Section 4.3) is supplied. Analog output may not properly be performed if the external power is not at the specified voltage.

3.2.2 Analog output test during PLC CPU STOP

When the PLC CPU stops, an analog output test as shown in Table 3.4 can be performed.

The analog output test performs the following operations in GX Developer device testing or GX Configurator-DA selection testing described in Section 5.6.1.

- (1) Set D/A Conversion enable/disable setting (buffer memory address 0: Un\G0) of the channel to be tested to enable.
- (2) Switch the operating condition setting request (Y9) from OFF to ON to OFF. (Refer to Section 3.3.2.)
- (3) Sets the output enable/disable flag (Y1, Y2) for the channel to be tested to enable (OFF → ON).
- (4) Writes a digital value equivalent to the analog value to be output in CH□ digital value (see Table 3.6 in Section 3.4.1) in the buffer memory.

Table 3.4 List of analog output test

Setting combination	D/A conversion enable/disable Setting (buffer memory address 0: Un\G0)	Enable		Disable	
	CH□ output enable/disable flags (Y1, Y2)	Enable	Disable	Enable	disable
Analog output test		Allowed	Not allowed	Not allowed *1	

*1 Perform the analog output test after changing the D/A conversion enable/disable setting (buffer memory address 0: Un\G0) to enable.

POINT

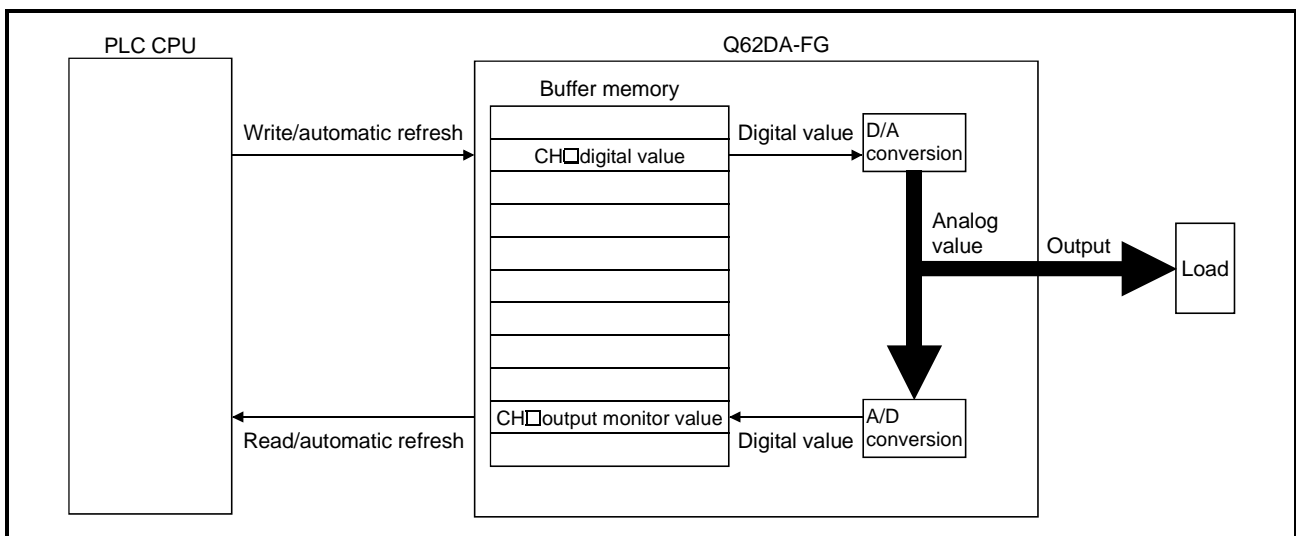
When the digital value storage device has been set in the automatic refresh setting of GX Configurator-DA, the buffer memory is overwritten since automatic refresh is performed if the PLC CPU is during STOP.
In this case, write a digital value to the digital value storage device instead of the buffer memory.

3.2.3 Output monitor function

To check the actually output analog value, the analog output value is converted into a digital value within the Q62DA-FG and the result is stored at the buffer memory addresses 38,39 (Un\G38, Un\G39) as an output monitor value.

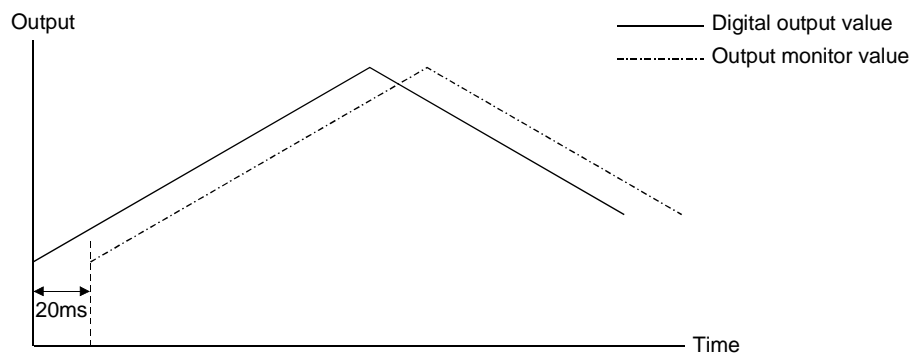
The monitor start flag (X8) is turned ON when the A/D conversion of the analog output value is completed.

A/D conversion is performed on the D/A conversion-enabled channel to update the output monitor value.



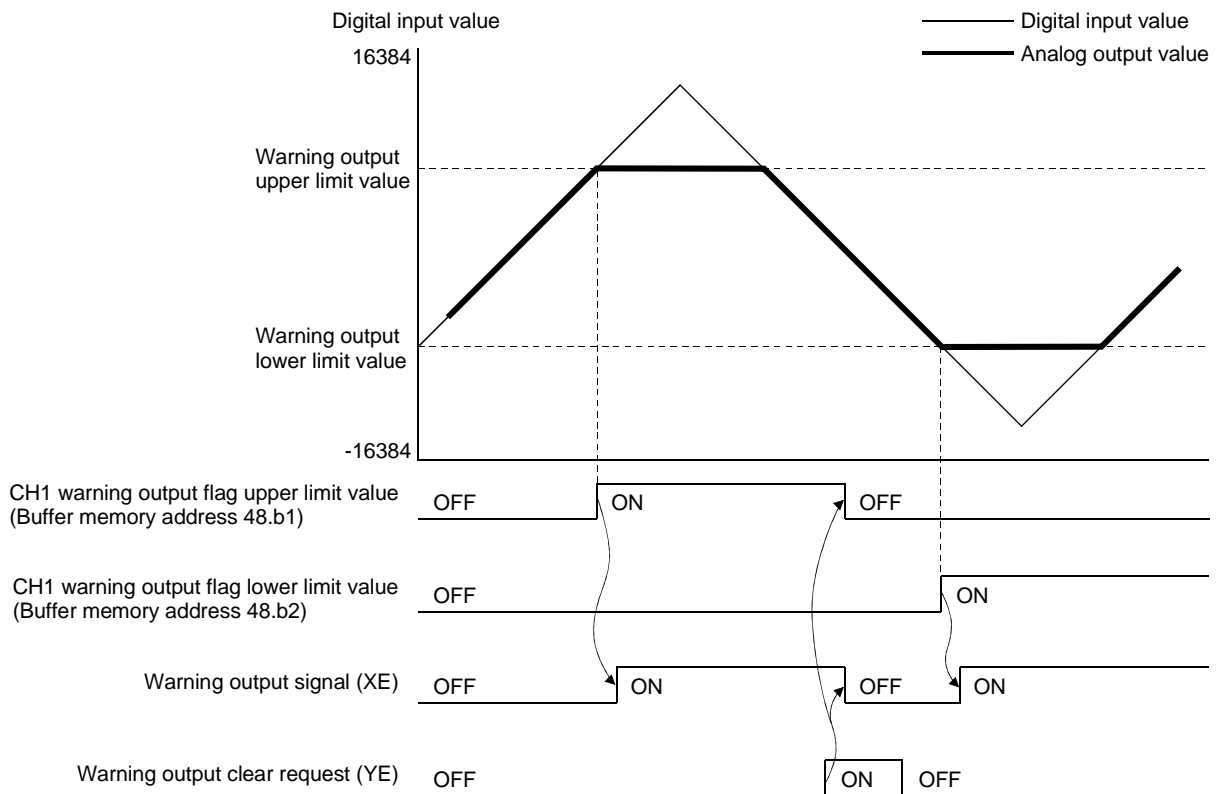
POINT

The output monitor value is stored into the buffer memory a maximum of two conversion cycles (20ms) after the digital input value has been written. Hence, the digital input value and output monitor value compared immediately after write will not be the same.



3.2.4 Warning output function

- (1) If the digital value written to the buffer memory is equal to or greater than the warning output upper limit value is equal to or less than the warning output lower limit value, the warning output flag (buffer memory address 48: Un\G48) and warning output signal (XE) turn ON to give a warning.
The warning is output for the D/A conversion enabled channel only.
- (2) At occurrence of the warning, the analog output value is converted from the digital value at the warning output upper limit value or warning output lower limit value.
- (3) The warning output flag (buffer memory address 48: Un\G48) and warning output signal (XE) turn OFF when the operating condition setting request (Y9) or warning output clear request (YE) turns ON.
- (4) For the warning output function, the disconnection detection/warning output setting (buffer memory address 47: Un\G47) allows enable/disable of the warning output to be specified for each channel. To enable the warning output, write "0" to the bit position corresponding to the channel number and turn ON the operating condition setting request (Y9). The default is all-channel disable.
- (5) Set the warning output upper and lower limit values to the buffer memory addresses 86 to 89 (Un\G86 to Un\G89).



POINT

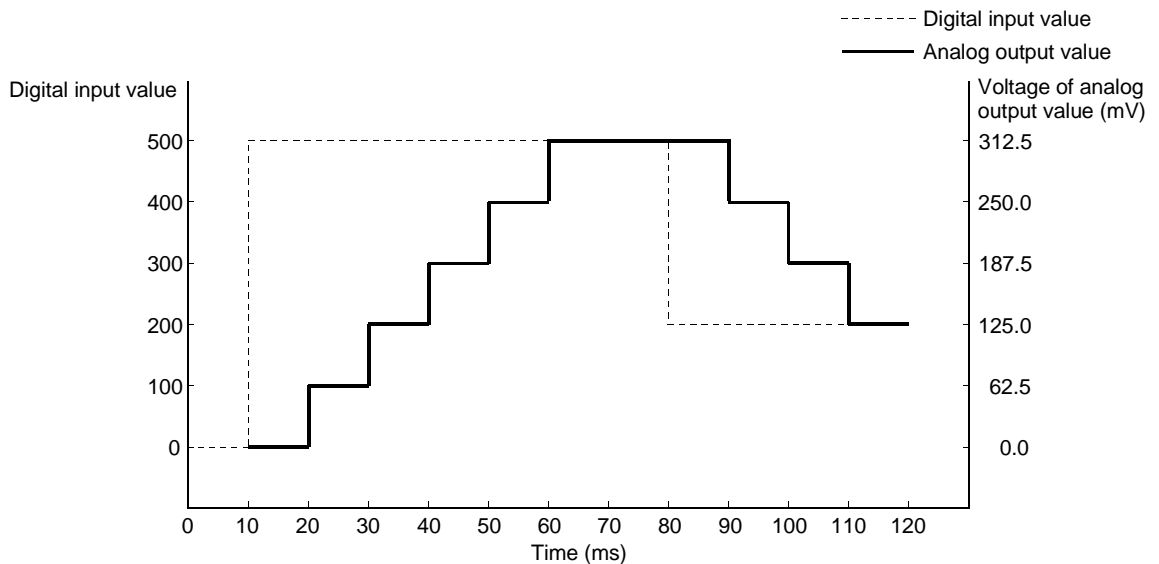
- (1) If the warning is output immediately after D/A conversion is enabled, make a warning output clear request after writing the digital value that is less than the warning output upper limit value and is greater than the warning output lower limit value.
- (2) During an analog output test, the warning output function is invalid.

3.2.5 Rate control function

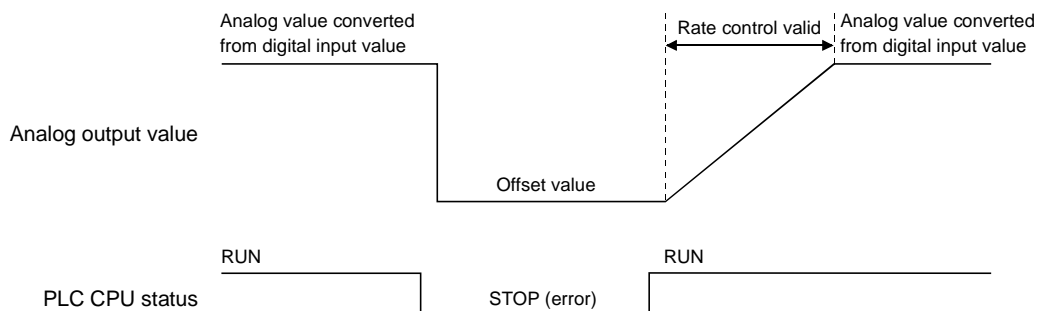
- (1) The increment and decrement of the analog output value per conversion cycle are restricted to prevent a sudden change of the analog output value.
- (2) For the rate control function, the rate control enable/disable setting (buffer memory address 46: Un\G46) allows enable/disable of the rate control to be specified for each channel.
To enable the rate control, write "0" to the bit position corresponding to the channel number and turn ON the operating condition setting request (Y9). The default is all-channel disable.
- (3) Set the increase digital limit value and decrease digital limit value (buffer memory addresses 70 to 73: Un\G70 to Un\G73).

Example) The control example in the following case is indicated below.

Output range: -10 to 10V
 Increase digital limit value: 100
 Decrease digital limit value: 100

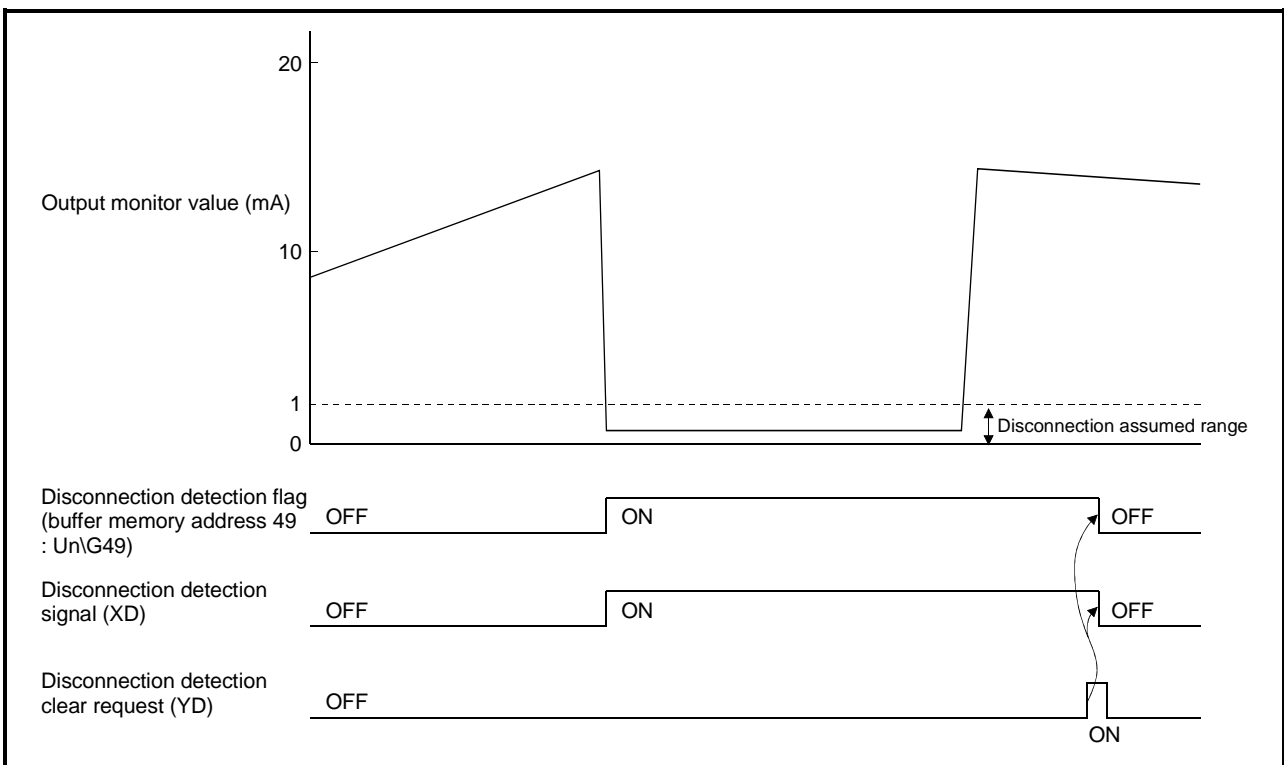


- (4) If the operation of the PLC CPU varies at the setting of D/A conversion enable, D/A output enable and analog output clear, the rate control functions as indicated below.
 - If the PLC CPU has switched from RUN to STOP (error): Rate control does not function.
 - If the PLC CPU has switched from STOP (error) to RUN: Rate control functions.



3.2.6 Disconnection detection function

- (1) When the analog output value falls to or below 1mA \pm accuracy (1.0%) in the output range of 4 to 20mA or user range setting 1, the disconnection detection flag (buffer memory address 49: Un\G49) and disconnection detection signal (XD) turn ON and disconnection is detected. Disconnection is detected only on the channel set for D/A conversion enable and D/A output enable.
- (2) The disconnection detection flag (buffer memory address 49: Un\G49) and disconnection detection signal (XD) turn OFF when the operating condition setting request (Y9) or disconnection detection clear request (YD) turns ON.
- (3) For the disconnection detection function, the disconnection detection/warning output setting (buffer memory address 47: Un\G47) allows enable/disable of the disconnection detection to be specified for each channel. To enable the disconnection detection, write "0" to the bit position corresponding to the channel number and turn ON the operating condition setting request (Y9). The default is all-channel disable.



POINT

If the analog output value is 1mA or less at the user range setting 1, disconnection is detected if disconnection has not occurred actually.
 When the analog output value is 1mA or less, disable the disconnection detection function.

3.3 I/O Signals for the PLC CPU

3.3.1 List of I/O signals

Table 3.5 shows a list of the I/O signals for the Q62DA-FG.

Note that I/O numbers (X/Y) shown in this chapter and thereafter are the values when the start I/O number for the Q62DA-FG is set to 0.

Table 3.5 List of I/O signal

Signal direction	Q62DA-FG → CPU module	Signal direction	CPU module ← Q62DA-FG
Device No	Signal name	Device No.	Signal name
X0	Module ready	Y0	Use prohibited *1
X1	Use prohibited *1	Y1	CH1 Output enable/disable flag
X2		Y2	CH2 Output enable/disable flag
X3		Y3	Use prohibited *1
X4		Y4	
X5		Y5	
X6		Y6	
X7		Y7	
X8		Monitor start flag	Y8
X9	Operating condition setting completed flag	Y9	Operating condition setting request
XA	Offset/gain setting mode flag	YA	User range writing request
XB	Channel change completed flag	YB	Channel change request
XC	Set value change completed flag	YC	Set value change request
XD	Disconnection detection signal	YD	Disconnection detection clear request
XE	Warning output signal	YE	Warning output clear request
XF	Error flag	YF	Error clear request

POINT

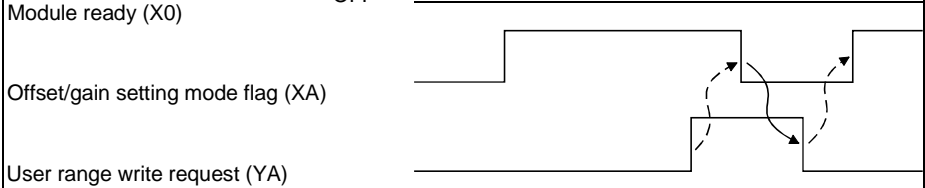

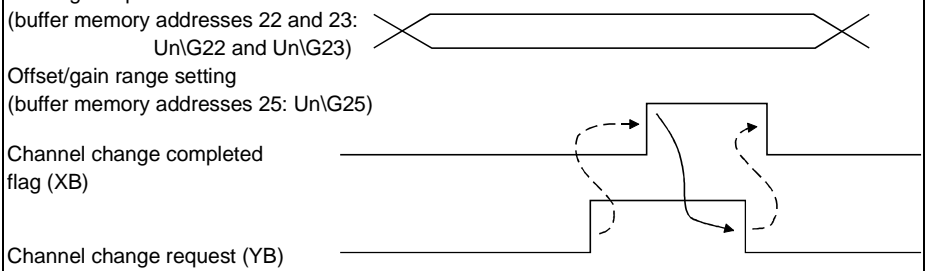
*1 These signals cannot be used by the user since they are used by the system. If these are turned ON/OFF by the sequence program, the functioning of the Q62DA-FG cannot be guaranteed.

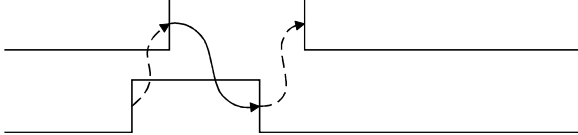


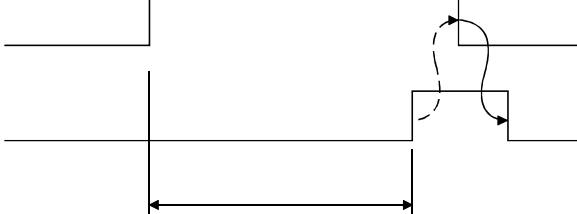
3.3.2 Details of I/O signals

I/O signals for the Q62DA-FG are explained in detail below.

(1) Input signals

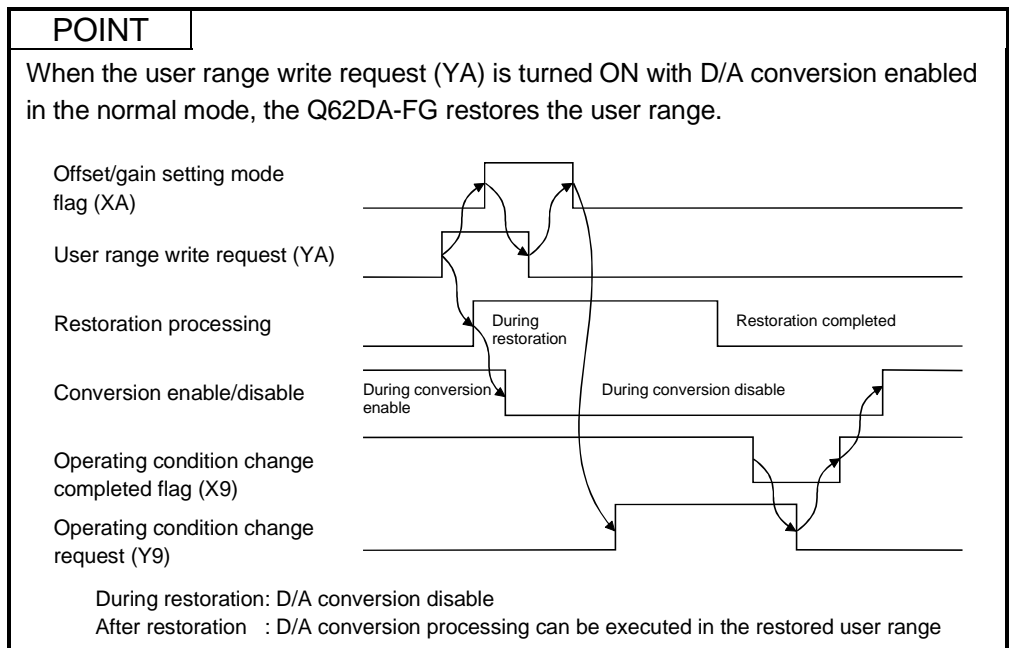
Device No.	Signal name	Description
X0	Module ready	<p>(1) When the PLC CPU is powered on or reset, this signal turns on once the preparation for D/A conversion has been completed, and D/A conversion processing is then performed.</p> <p>(2) When the Module ready (X0) signal is off, D/A conversion processing is not performed. Module ready (X0) turns off in the following situations:</p> <ul style="list-style-type: none"> • During offset/gain setting mode • When the Q62DA-FG has a watchdog timer error
X8	Monitor start flag	<p>(1) This flag turns ON at completion of the A/D conversion of the output analog value, and the output monitor value is stored.</p> <p>(2) The monitor start flag turns OFF when the operating condition setting request (Y9) turns ON.</p>
X9	Operating condition setting completed flag	<p>(1) This is used as an interlock condition for turning ON/OFF the operating condition setting request (Y9) when any of the following settings is changed.</p> <ul style="list-style-type: none"> • D/A conversion enable/disable setting (buffer memory address 0: Un\G0) • Rate control enable/disable setting (buffer memory address 46: Un\G46) • Disconnection detection/warning output setting (buffer memory address 47: Un\G47) • Increase/decrease digital limit value (buffer memory addresses 70 to 73: Un\G70 to 73) <p>(2) Under the following conditions, the operating condition setting completed flag (X9) turns OFF.</p> <ul style="list-style-type: none"> • When operating condition setting request (Y9) is ON <div style="text-align: right; margin-right: 50px;"> <p>-----> Performed by the Q62DA-FG</p> <p>—————> Performed by the sequence program</p> </div> <p>The diagram shows three signals: Module ready (X0), Operating condition setting completed flag (X9), and Operating condition setting request (Y9). X0 starts high, then drops to low when Y9 is set high. X9 is high when Y9 is high. Dashed arrows indicate Q62DA-FG actions, and solid arrows indicate sequence program actions.</p>

Device No.	Signal name	Description
XA	Offset/gain setting mode flag	<p>[In offset/gain setting mode]</p> <p>(1) This is used as an interlock condition for setting the user range write request (YA) to ON/OFF when registering the value after adjustment of the offset/gain settings have been completed.</p> <p>(2) See Section 4.6 regarding the offset/gain settings.</p> <p style="text-align: right;"> -----> Performed by the Q62DA-FG —————> Performed by the sequence program </p> <p>Module ready (X0) OFF</p> 
		<p>[In normal mode]</p> <p>(1) This is signal is used as an interlock condition to run ON/OFF the User range writing request (YA) when the user range is restored.</p> <p>(2) See Chapter 7 regarding the user range restoration.</p> <p style="text-align: right;"> -----> Performed by the Q62DA-FG —————> Performed by the sequence program </p> <p>Module ready (X0) ON</p> 
XB	Channel change completed flag	<p>(1) This is used as an interlock condition for turning ON/OFF the channel change request (YB) when changing the channel where offset/gain settings will be performed or changing the offset/gain range settings.</p> <p>(2) See Section 4.6 regarding the offset/gain settings.</p> <p style="text-align: right;"> -----> Performed by the Q62DA-FG —————> Performed by the sequence program </p> <p>Offset/gain setting mode</p> <p>Offset/gain specifications (buffer memory addresses 22 and 23: Un\G22 and Un\G23)</p>  <p>Offset/gain range setting (buffer memory addresses 25: Un\G25)</p> <p>Channel change completed flag (XB)</p> <p>Channel change request (YB)</p>

Device No.	Signal name	Description
XC	Set value change completed flag	<p>(1) This is used as an interlock condition for setting the set value change request (YC) to ON/OFF when adjusting the offset/gain settings.</p> <p>(2) See Section 4.6 regarding the offset and gain settings.</p> <p>-----> Performed by the Q62DA-FG ———> Performed by the sequence program</p> <p>Set value change completed flag (XC)</p>  <p>Set value change request (YC)</p>
XD	Disconnection detection signal	<p>(1) This turns ON if disconnection is detected on any one channel at 4 to 20mA or user range setting 1.</p> <p>(2) Turning ON the disconnection detection clear request (YD) or operating condition setting request (Y9) turns OFF the disconnection detection signal (XD).</p> <p>-----> Performed by the Q62DA-FG ———> Performed by the sequence program</p> <p>Disconnection detection signal (XD)</p>  <p>Disconnection detection clear request (YD)</p>
XE	Warning output signal	<p>(1) This turns ON if the digital input value on any of the channels enabled for D/A conversion rises to or above the warning output upper limit value or falls below the warning output lower limit value.</p> <p>(2) Turning ON the warning output clear request (YE) or operating condition setting request (Y9) turns OFF the warning output signal (XE).</p> <p>-----> Performed by the Q62DA-FG ———> Performed by the sequence program</p> <p>Warning output signal (XE)</p>  <p>Warning output clear request (YE)</p>
XF	Error flag	<p>(1) The error flag turns ON when a write error occurs.</p> <p>(2) To turn the error flag (XF) OFF, remove the cause of the error and set the error clear request (YF) to ON.</p> <p>The error code (buffer memory address 19: Un\G19) changes to 0 and the ERR. LED turns off.</p> <p>-----> Performed by the Q62DA-FG ———> Performed by the sequence program</p> <p>Error flag (XF)</p>  <p>Error clear request (YF)</p> <p>Error code is read during this interval.</p>

(2) Output signals

Device No.	Signal name	Description
Y1 to Y2	CH□ output enable/disable flag	<p>(1) Specifies whether to output the D/A converted value or offset value for each channel. ON: D/A converted value OFF: Offset value</p> <p>(2) The D/A conversion speed is constant regardless of whether the output enable/disable flag is ON or OFF.</p>
Y9	Operating condition setting request	<p>(1) Turn ON this signal when changing any of the following settings and making the setting valid.</p> <ul style="list-style-type: none"> • D/A conversion enable/disable setting (buffer memory address 0: Un\G0) • Rate control enable/disable setting (buffer memory address 46: Un\G46) • Disconnection detection/warning output setting (buffer memory address 47: Un\G47) • Increase/decrease digital limit value (buffer memory addresses 70 to 73: Un\G70 to 73) <p>(2) See the X9 column for the ON/OFF timing.</p>
YA	User range write request	<p>[In offset/gain setting mode]</p> <p>(1) This turns ON when the values for the adjusted offset/gain settings are registered in the Q62DA-FG.</p> <p>(2) See the XA column for ON/OFF timing. See Section 4.6 for offset/gain settings.</p>
		<p>[In normal mode]</p> <p>(1) Turn ON this signal when restoring the user range.</p> <p>(2) See the XA column for the ON/OFF timing. See Chapter 7 for the user range restoration.</p>
YB	Channel change request	<p>(1) Turn ON this signal when changing the channel where the offset/gain settings will be performed or changing the offset/gain range settings.</p> <p>(2) See the XB column for the ON/OFF timing.</p>
YC	Set value change request	<p>(1) This turns ON/OFF when increasing or decreasing the analog output value during adjustment of the offset/gain settings.</p> <p>(2) The analog output is incremented or decremented depending on the value set to the offset/gain adjustment value specification (buffer memory address 24: Un\G24).</p>
YD	Disconnection detection clear request	<p>(1) Turn ON this signal when clearing the disconnection detection.</p> <p>(2) See the XD column for the ON/OFF timing.</p>
YE	Warning output clear request	<p>(1) Turn ON this signal when clearing the warning output.</p> <p>(2) See the XE column for the ON/OFF timing.</p>
YF	Error clear request	<p>(1) This turns ON when a write error is cleared.</p> <p>(2) See the XF column for ON/OFF timing.</p>



3.4 Buffer Memory

3.4.1 Buffer memory assignment

Table 3.6 indicates the buffer memory assignment of the Q62DA-FG.

Table 3.6 Buffer memory assignment (1/2)

Address		Description	Default *1	Read/write *2
Hexadecimal	Decimal			
0H	0	D/A conversion enable/disable setting	0003H	R/W
1H	1	CH1 Digital value	0	R/W
2H	2	CH2 Digital value	0	R/W
3H to AH	3 to 10	System area	—	—
BH	11	CH1 Set value check code	0	R
CH	12	CH2 Set value check code	0	R
DH to 12H	13 to 18	System area	—	—
13H	19	Error code	0	R
14H	20	Setting range (CH1, CH2)	0	R
15H	21	System area	—	—
16H	22	Offset/gain setting mode Offset specification	0	R/W
17H	23	Offset/gain setting mode Gain specification	0	R/W
18H	24	Offset/gain adjustment value specification	0	R/W
19H	25	Offset/gain range setting	0	R/W
1AH to 25H	26 to 37	System area	—	—
26H	38	CH1 Output monitor value	0	R
27H	39	CH2 Output monitor value	0	R
28H to 2DH	40 to 45	System area	—	—
2EH	46	Rate control enable/disable setting	0003H	R/W
2FH	47	Disconnection detection/Warning output setting	3003H	R/W
30H	48	Warning output flag	0	R
31H	49	Disconnection detection flag	0	R
32H to 45H	50 to 69	System area	—	—

*1 This is the initial value set after the power is turned on or the PLC CPU is reset.

*2 Indicates whether reading and writing to/from a sequence program are enabled.

R : Reading enabled W : Writing enabled

Table 3.6 Buffer memory assignment (2/2)

Address		Description	Default *1	Read/write *2
Hexadecimal	Decimal			
46H	70	CH1 Increase digital limit value	32000	R/W
47H	71	CH1 Decrease digital limit value	32000	R/W
48H	72	CH2 Increase digital limit value	32000	R/W
49H	73	CH2 Decrease digital limit value	32000	R/W
4AH to 55H	74 to 85	System area	—	—
56H	86	CH1 Warning output upper limit value	0	R/W
57H	87	CH1 Warning output lower limit value	0	R/W
58H	88	CH2 Warning output upper limit value	0	R/W
59H	89	CH2 Warning output lower limit value	0	R/W
5AH to 9DH	90 to 157	System area	—	—
9EH	158	Mode switching setting	0	R/W
9FH	159		0	R/W
A0H to C7H	160 to 199	System area	—	—
C8H	200	Pass data classification setting *3	0	R/W
C9H	201	System area	—	—
CAH	202	CH1 Industrial shipment settings offset value (used for D/A) *3	0	R/W
CBH	203	CH1 Industrial shipment settings gain value (used for D/A) *3	0	R/W
CAH	204	CH2 Industrial shipment settings offset value (used for D/A) *3	0	R/W
CDH	205	CH2 Industrial shipment settings gain value (used for D/A) *3	0	R/W
CEH	206	CH1 Industrial shipment settings offset value (used for monitor output) *3	0	R/W
CFH	207	CH1 Industrial shipment settings gain value (used for monitor output) *3	0	R/W
D0H	208	CH2 Industrial shipment settings offset value (used for monitor output) *3	0	R/W
D1H	209	CH2 Industrial shipment settings gain value (used for monitor output) *3	0	R/W
D2H	210	CH1 User range settings offset value (used for D/A) *3	0	R/W
D3H	211	CH1 User range settings gain value (used for D/A) *3	0	R/W
D4H	212	CH2 User range settings offset value (used for D/A) *3	0	R/W
D5H	213	CH2 User range settings gain value (used for D/A) *3	0	R/W
D6H	214	CH1 User range settings offset value (used for monitor output) *3	0	R/W
D7H	215	CH1 User range settings gain value (used for monitor output) *3	0	R/W
D8H	216	CH2 User range settings offset value (used for monitor output) *3	0	R/W
D9H	217	CH2 User range settings gain value (used for monitor output) *3	0	R/W

*1 This is the initial value set after the power is turned on or the PLC CPU is reset.

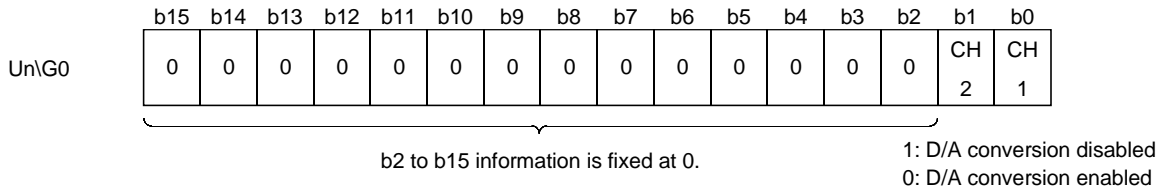
*2 Indicates whether reading and writing to/from a sequence program are enabled.

R : Reading enabled W : Writing enabled

*3 Areas used to restore the user range settings offset/gain values when online module change is made.
Refer to chapter 7 for details of online module change.

3.4.2 D/A conversion enable/disable setting (buffer memory address 0: Un\G0)

- (1) Set whether D/A conversion is enabled or disabled for each channel.
- (2) It is necessary to set the operating condition setting request (Y9) to ON/OFF to validate the D/A conversion enable/disable setting. (See Section 3.3.2.)
- (3) By default, all channels are set to D/A conversion disabled.



3.4.3 CH□ digital values (buffer memory addresses 1, 2: Un\G1, Un\G2)

- (1) This area is used to write digital values for performing D/A conversion from the PLC CPU as 16-bit signed binary code.
- (2) Settings for digital values to be D/A converted when a value outside the valid digital value setting range is used are listed in Table 3.7.
When a value outside the valid range is written, a check code is stored in the set value check codes (Un\G11, Un\G12).

Table 3.7 Output range settings and valid range

Output range setting	Valid range (practical range)	Digital value that is set when a value outside the valid range is written
0: 4 to 20 mA	0 to 12287 (Practical range: 0 to 12000)	12288 or larger: 12287 -1 or smaller: 0
1: 0 to 20 mA		
2: 1 to 5 V		
3: 0 to 5 V		
4: -10 to 10 V	-16384 to 16383 (Practical range: -16000 to 16000)	16384 or larger: 16383 -16385 or smaller: 16384
D: User range setting3	-12288 to 12287 (Practical range: -12000 to 12000)	12288 or larger: 12287 -12289 or smaller: -12288
E: User range setting2		
F: User range setting1		

3.4.4 CH□ set value check codes (buffer memory addresses 11, 12: Un\G11, Un\G12)

- (1) This area stores the result of checking whether a digital value that was set is within or outside the valid range.
- (2) When a digital value outside the valid range (see Table 3.7) is written, one of the check codes listed in Table 3.8 is stored.

Table 3.8 Check code list

Check code	Description
000FH	A digital value exceeding the valid range was written.
00F0H	A digital value that falls short of the valid range was written.
00FFH	A digital value that either falls short or exceeds the valid range was written.

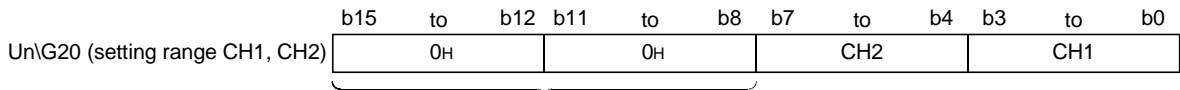
- (3) Once a check code is stored, it will not be reset even if the digital value is within the valid range.
- (4) To reset the CH□ set value check code, set the error clear request (YF) to ON after rewriting the digital value so that it is within the valid range.

3.4.5 Error codes (buffer memory address 19: Un\G19)

- (1) The error codes detected by the Q62DA-FG are stored.
- (2) See Section 8.1 for more details of the error codes.

3.4.6 Setting range (buffer memory address 20: Un\G20)

(1) This area is used to confirm the setting range of the Q62DA-FG.

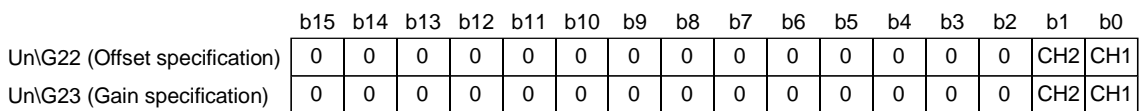


b8 to b15 information is fixed at 0.

Output range	Setting value
4 to 20 (mA)	0H
0 to 20 (mA)	1H
1 to 5 (V)	2H
0 to 5 (V)	3H
-10 to 10 (V)	4H
User range setting3	DH
User range setting2	EH
User range setting1	FH

3.4.7 Offset/gain setting mode and offset/gain specification (buffer memory addresses 22, 23: Un\G22, Un\G23)

- (1) Specifies the channel to be adjusted for the offset/gain settings.
- (2) The channel change request (YB) must be turned ON/OFF to validate the offset/gain setting offset specification or gain specification. (Refer to Section 3.3.2.)
- (3) Specification can be made for 1 channel only.
If setting is made for two or more channels simultaneously, an error occurs and the corresponding error code (buffer memory address 19: Un\G19) is stored.
- (4) See Section 4.6 for the details of the offset/gain settings.



b2 to b15 information is fixed at 0.

1: Channel to be set
0: Invalid

3.4.8 Offset/gain adjustment value specification (buffer memory address 24: Un\G24)

- (1) This area is used to set the amount of adjustment for analog output values in the offset/gain setting mode.
- (2) Turning the set value change request (YC) from OFF to ON increments or decrements the analog output value by the adjustment value.
- (3) The valid input range is from -3000 to 3000.
When the input value is 1000, the analog output values can be adjusted by about 0.33 V (user range setting2) and about 0.18 V (user range setting3) for voltage output and about 0.67 mA for current output.
- (4) See Section 4.6 for the details of the offset/gain settings.

3.4.9 Offset/gain range setting (buffer memory address 25: Un\G25)

- (1) This area is used to change the output range in the offset/gain setting mode. Turning ON the channel change request (YB) changes the output range into the set one. If any value outside the setting range is set, an error occurs and the corresponding error code (buffer memory address 19: Un\G19) is stored.

Output range	Set value
User range setting 1	000FH
User range setting 2	000EH
User range setting 3	000DH

- (2) The channel change request (YB) must be turned ON/OFF to validate the offset/gain range setting. (Refer to Section 3.3.2.)
- (3) Refer to Section 4.6 for details of offset/gain setting.

3.4.10 CH□ output monitor value (buffer memory addresses 38, 39: Un\G38, Un\G39)

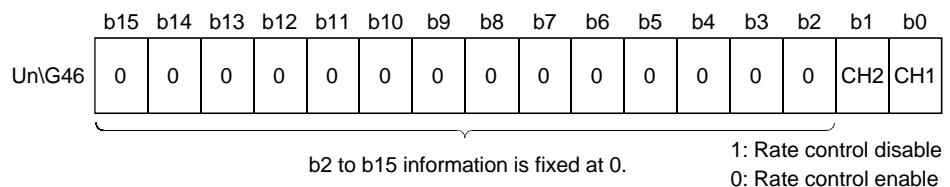
- (1) The analog value being output is always reconverted into a digital value within the Q62DA-FG and the result is stored. (Refer to Section 3.2.3.)

Output range setting	Output monitor value
0 to 20 mA	0 to 12000
4 to 20 mA	
User range setting 1	
1 to 5 V	
0 to 5 V	
-10 to 10 V	-16000 to 16000
User range setting 2	-12000 to 12000
User range setting 3	0 to 12000

- (2) Turning ON the operating condition setting request (Y9) clears the output monitor value.

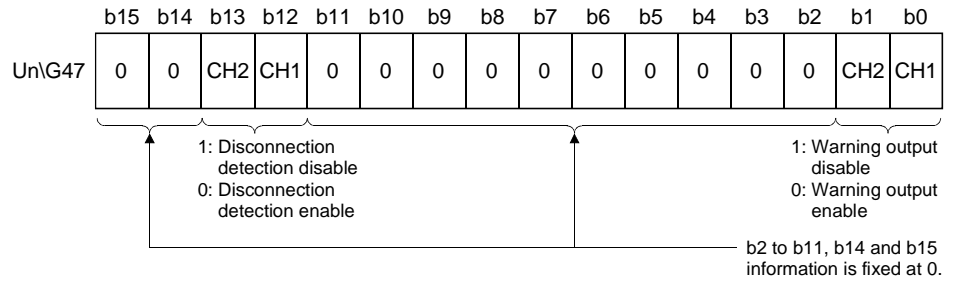
3.4.11 Rate control enable/disable setting (buffer memory address 46: Un\G46)

- (1) Set whether to enable or disable the rate control on each channel. (Refer to Section 3.2.5.)
- (2) The operating condition setting request (Y9) must be turned ON/OFF to validate the rate control enable/disable setting. (Refer to Section 3.3.2.)
- (3) The default setting is all-channel rate control disable.



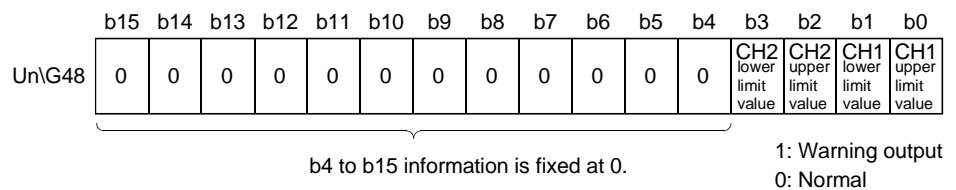
3.4.12 Disconnection detection/warning output setting (buffer memory address 47: Un\G47)

- (1) Set whether to enable or disable the disconnection detection and warning output on each channel. (Refer to Section 3.2.4 and Section 3.2.6.)
- (2) The operating condition setting request (Y9) must be turned ON/OFF to validate the disconnection detection/warning output setting. (Refer to Section 3.3.2.)
- (3) The default setting is all-channel disconnection detection/warning output disable.



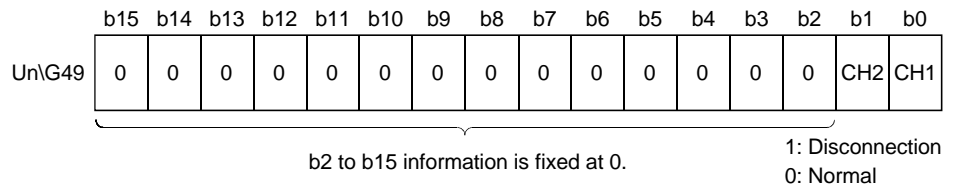
3.4.13 Warning output flag (buffer memory address 48: Un\G48)

- (1) When the digital input value falls outside the CH□ warning output upper limit value/lower limit value (buffer memory addresses 86 to 89: Un\G86 to Un\G89) range, the bit corresponding to the channel turns to "1". (Refer to Section 3.2.4.)
- (2) Whether the warning is the upper or lower limit value warning can be checked on each channel.
- (3) If the warning is detected on any of the channels enabled for conversion, the warning output signal (XE) also turns ON.
- (4) Turning ON the operating condition setting request (Y9) or warning output clear request (YE) clears the warning output flag.



3.4.14 Disconnection detection flag (buffer memory address 49: Un\G49)

- (1) If disconnection occurs in the output range of 4 to 20mA or user range setting 1, the bit corresponding to the channel turns to "1". (Refer to Section 3.2.6.)
- (2) If disconnection is detected on any one channel, the disconnection detection signal (XD) also turns ON.
- (3) Turning ON the operating condition setting request (Y9) or disconnection detection clear request (YD) clears the disconnection detection flag.



3.4.15 CH□ increase/decrease digital limit values (buffer memory addresses 70 to 73: Un\G70 to Un\G73)

- (1) For rate control, set the range where the digital value can be incremented and decremented in a single conversion cycle (10ms). (Refer to Section 3.2.5.)
- (2) The setting range is 0 to 32000.
If any value outside the setting range is set, an error occurs and the corresponding error code (buffer memory address 19: Un\G19) is stored.
- (3) The operating condition setting request (Y9) must be turned ON/OFF to validate the increase digital limit values and decrease digital limit values. (Refer to Section 3.3.2.)

3.4.16 CH□ warning output upper limit value/lower limit value (buffer memory addresses 86 to 89: Un\G86 to Un\G89)

- (1) Set the upper and lower limit values of the digital input value for providing the warning output. (Refer to Section 3.2.4.)
- (2) The setting range is -16384 to 16383.
Make setting so that the upper limit value is greater than the lower limit value.
If any value outside the setting range is set, an error occurs and the corresponding error code (buffer memory address 19: Un\G19) is stored.
- (3) The operating condition setting request (Y9) must be turned ON/OFF to validate the warning output upper and lower limit values. (Refer to Section 3.3.2.)

3.4.17 Mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159)

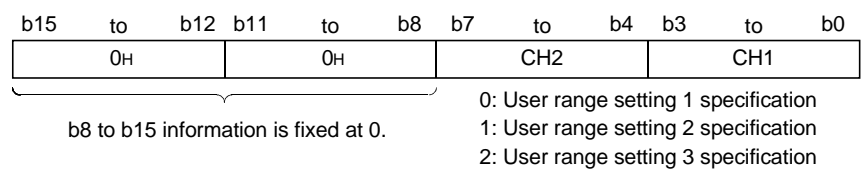
- (1) Set the values of the mode to which you want to switch.
- (2) After setting the values, turning the operation condition setting request (Y9) from OFF to ON switches to that mode.
- (3) When mode switching is performed, this area is cleared to zero and the operating condition setting completed flag (X9) turns OFF.
After confirming that the operating condition setting completed flag (X9) has turned OFF, turn OFF the operation condition setting request (Y9).

Mode to be switched to	Set values	
	Buffer memory address 158	Buffer memory address 159
Normal mode	0964H	4144H
Offset/gain setting mode	4144H	0964H

POINT
If the values written are other than the above, mode switching is not performed and only the operating condition is changed.

3.4.18 Pass data classification setting (buffer memory addresses 200: Un\G200)

- (1) Areas used to restore the user range settings offset/gain values when online module change is made.
Refer to chapter 7 for details of online module change.
- (2) Specify the user range setting to be saved/restored when saving/restoring the offset/gain values of any of the user range settings 1 to 3.



POINT
Refer to Section 4.6 for the offset/gain value setting method.

3.4.19 Industrial shipment settings and user range settings offset/gain values (buffer memory addresses 202 to 217: Un\G202 to Un\G217)

- (1) Areas used to restore the user range settings offset/gain values when online module change is made.
Refer to chapter 7 for details of online module change.
- (2) When the offset/gain values of the user range setting are restored, the used data are stored.
The data are stored (saved) when:
 - Initial setting write is performed by the utility;
 - The operating condition is set (Y9 turns from OFF to ON*); or
 - The offset/gain values are written in the offset/gain setting mode (YA turns from OFF to ON).

*: The data are not saved when values have been written to the mode switching setting area (buffer memory addresses 158, 159: Un\G158, Un\G159).
- (3) When restoring the offset/gain values of the user range setting, set the data saved here similarly into the corresponding area of the module where the data will be restored.
- (4) Buffer memory saving recording procedure for online module change
 - 1) Set the pass data classification setting (buffer memory addresses 200: Un\G200).
 - 2) Turn the operation condition setting request (Y9) from OFF to ON.
 - 3) Compare the offset/gain values of the industrial shipment settings and user range settings (buffer memory addresses 202 to 217: Un\G202 to Un\G217) with the range reference values. Refer to Section 7.4 for the range reference values.
 - 4) If the values are proper, record the offset/gain values of the pass data classification setting, industrial shipment settings and user range settings.

POINT

Refer to Section 4.6 for the offset/gain value setting method.
--

4 SETUP AND PROCEDURES BEFORE OPERATION

4.1 Handling Precautions

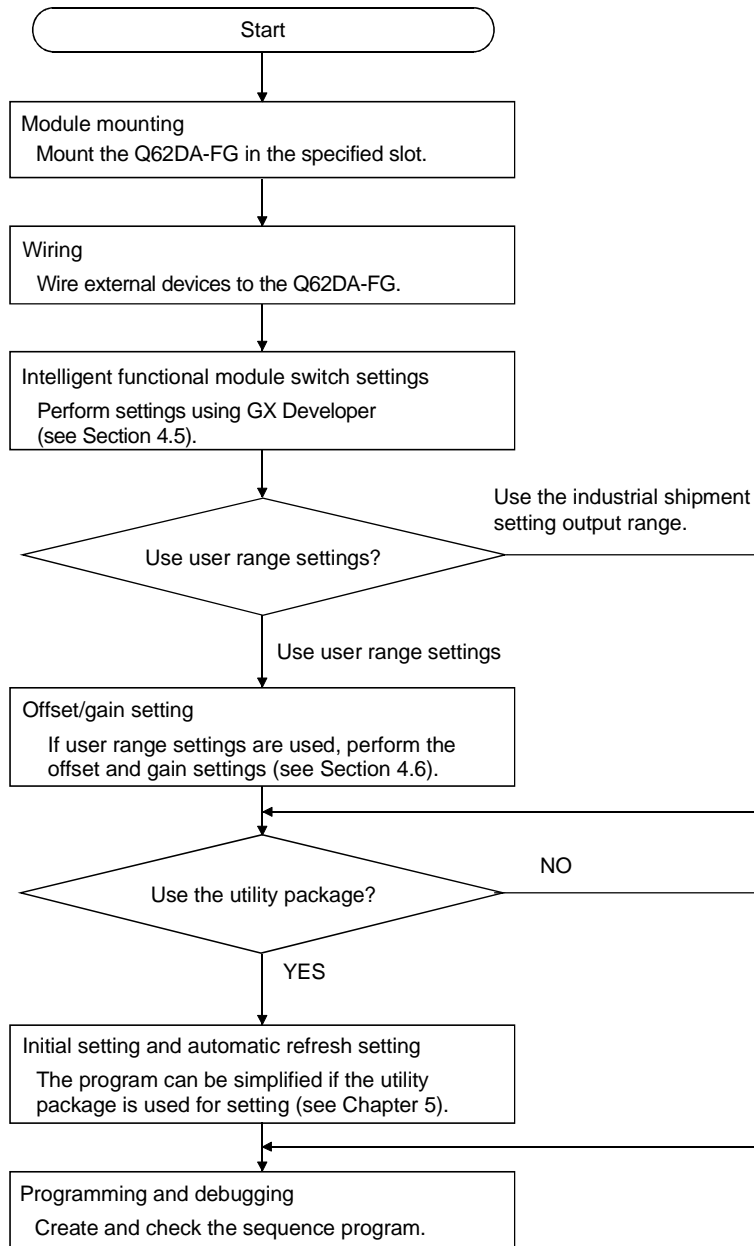
- (1) Do not drop the module case or subject it to heavy impact.
- (2) Do not remove the PCB of the module from its case. Doing so may cause the module to fail.
- (3) Be careful not to let foreign particles such as swarf or wire chips enter the module. They may cause a fire, mechanical failure or malfunction.
- (4) The top surface of the module is covered with a protective film to prevent foreign objects such as wire burrs from entering the module during wiring. Do not remove this film until the wiring is complete. Before operating the system, be sure to remove the film to provide adequate heat ventilation.
- (5) Tighten the terminal screws using torque within the following ranges. Loose screws may cause short circuits, mechanical failures or malfunctions.

Screw location	Clamping torque range
Module mounting screws (M3 screws)	36 to 48 N · cm
Terminal block screws (M3 screws)	42 to 58 N · cm
Terminal block mounting screws (M3.5 screws)	66 to 89 N · cm

- (6) To mount the module on the base, securely insert the module fastening latch into the fastening hole on the base. Improper installation may result in a module malfunction, or may cause the module to fall off.

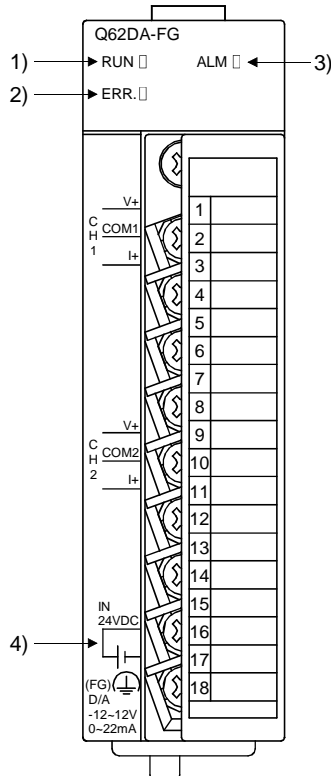
4.2 Setup and Procedures before Operation

4



4.3 Part Identification Nomenclature

The name of each part in the Q62DA-FG is listed below.



Number	Name	Description
1)	RUN LED	Displays the operating status of the Q62DA-FG. On : Normal operation Flashing : During offset/gain setting mode Off : 5V power supply interrupted, watch dog timer error, 5V power switched off, watchdog timer error occurred, or online module change enabled.
2)	ERR. LED	Displays the error status of the Q62DA-FG. On : Error * Flashing : Error in switch settings Switch No. 5 of the intelligent function module has been set to a value other than zero "0". Off : Normal operation
3)	ALM LED	Indicates the warning status of the Q62DA-FG. On : During warning output occurrence Flashing : During disconnection detection Off : Normal operation
4)	External power supply terminal	This is the terminal for connecting the 24 V DC external power supply.

* Check the error code for details.

POINT

When two or more errors have occurred, the latest error found by the Q62DA-FG is displayed on the LED.

Terminal number	Signal name	
1	CH1	V +
2		COM1
3		I +
4	Vacant	
5	Vacant	
6	Vacant	
7	Vacant	
8	Vacant	
9	CH2	V +
10		COM2
11		I +
12	Vacant	
13	Vacant	
14	Vacant	
15	Vacant	
16	24V	
17	24G	
18	FG	

4.4 Wiring

The wiring precautions and examples of module connection are provided below.

4.4.1 Wiring precautions

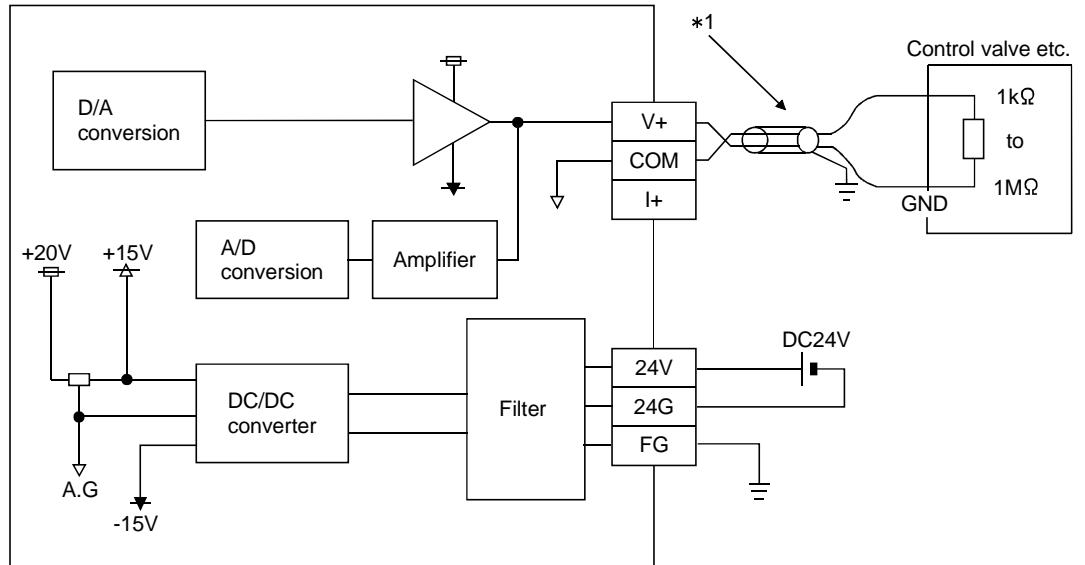
In order to optimize the functions of the Q62DA-FG and ensure system reliability, external wiring that is protected from noise is required.

Please observe the following precautions for external wiring:

- (1) Use separate cables for the alternating-current control circuit and the external output signals and external supply power of the Q62DA-FG in order to avoid AC surges and induction effects.
- (2) Do not mount the cables close to or bundle them with the main circuit line, a high-voltage cable or a load cable from other than the PLC. This may increase the effects of noise, surges and induction.
- (3) Perform a one-point grounding for shielded lines and the shields of sealed cables.
- (4) A solderless terminal with insulating sleeve cannot be used for the terminal block. Covering the cable-connection portion of the solderless terminal with a marked tube or an insulation tube is recommended.

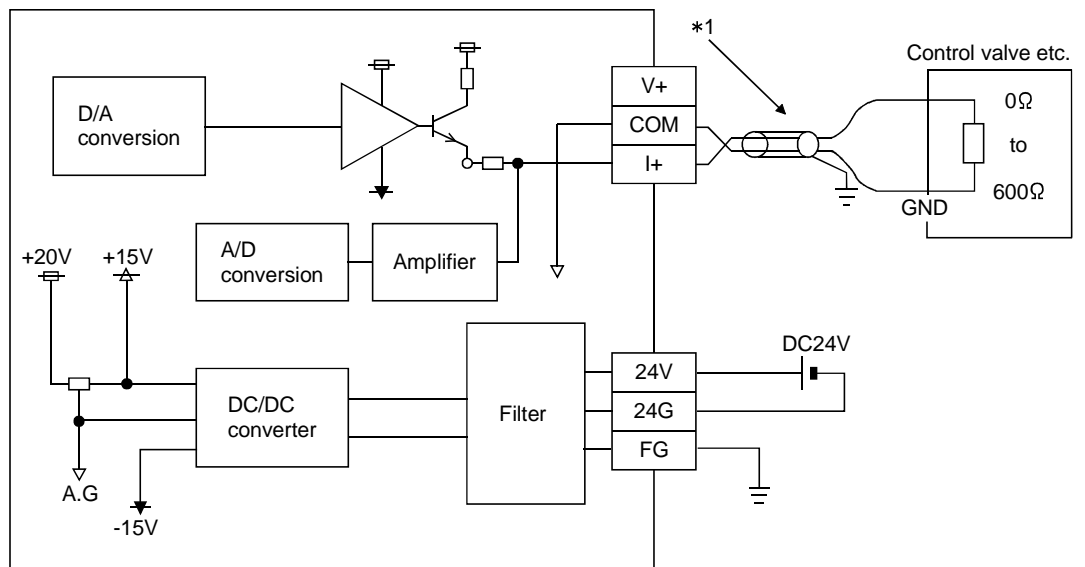
4.4.2 External wiring

(1) For voltage output



*1 Use a twisted two core shielded wire for the power wire.

(2) For current output



*1 Use a twisted two core shielded wire for the power wire.

POINT

Q62DA-FG needs to be powered on 30 minutes prior to operation for compliance to the specification (accuracy).

Therefore, power on 30 minutes prior to offset/gain setting or after online module replacement.

4.5 Switch Setting for Intelligent Function module

The settings for the intelligent function module are performed using the I/O assignment settings of GX Developer.

(1) Setting item

The intelligent function module switches consist of switches 1 to 5 and are set using 16 bit data. When the intelligent function module switches are not set, the default value for switches 1 to 5 is 0.

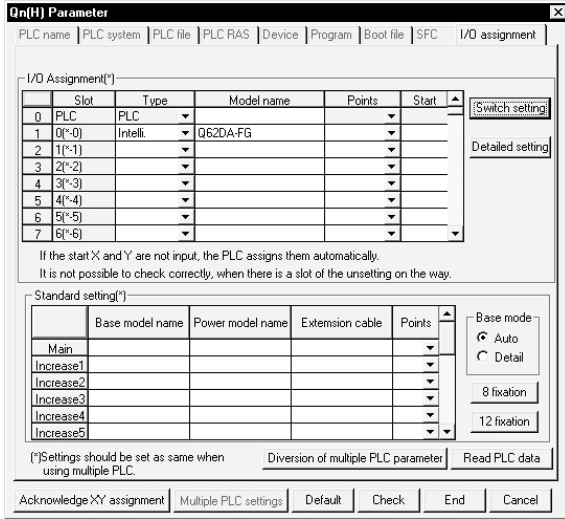
Table 4.1 Switch setting item for intelligent function module

		Setting item																		
Switch 1		<table border="1"> <thead> <tr> <th>Analog output range</th> <th>Output range setting value</th> </tr> </thead> <tbody> <tr> <td>4 to 20 mA</td> <td>0H</td> </tr> <tr> <td>0 to 20 mA</td> <td>1H</td> </tr> <tr> <td>1 to 5 V</td> <td>2H</td> </tr> <tr> <td>0 to 5 V</td> <td>3H</td> </tr> <tr> <td>- 10 to 10 V</td> <td>4H</td> </tr> <tr> <td>User range setting3</td> <td>DH</td> </tr> <tr> <td>User range setting2</td> <td>EH</td> </tr> <tr> <td>User range setting1</td> <td>FH</td> </tr> </tbody> </table>	Analog output range	Output range setting value	4 to 20 mA	0H	0 to 20 mA	1H	1 to 5 V	2H	0 to 5 V	3H	- 10 to 10 V	4H	User range setting3	DH	User range setting2	EH	User range setting1	FH
Analog output range	Output range setting value																			
4 to 20 mA	0H																			
0 to 20 mA	1H																			
1 to 5 V	2H																			
0 to 5 V	3H																			
- 10 to 10 V	4H																			
User range setting3	DH																			
User range setting2	EH																			
User range setting1	FH																			
Switch 2		Not used																		
Switch 3		<p>HOLD/CLEAR function setting</p> <p>0H : CLEAR</p> <p>1 to FH(numeric value other than 0H) : HOLD</p>																		
Switch 4		<p>000H: Fixed</p> <p>0H : Normal mode (D/A conversion processing)</p> <p>1 to FH (numeric value other than 0H)* : Offset/gain setting mode</p>																		
Switch 5		0 : Fixed																		

* Setting any value within the setting range will provide the same operation. When the setting range is 1 to FH, set 1 for example.

(2) Operating procedure

Start the settings with GX Developer I/O assignment setting screen.



(a) I/O assignment setting screen

Set the following for the slot in which the Q62DA-FG is mounted.

The type setting is required; set other items as needed.

Type : Select "intelli."

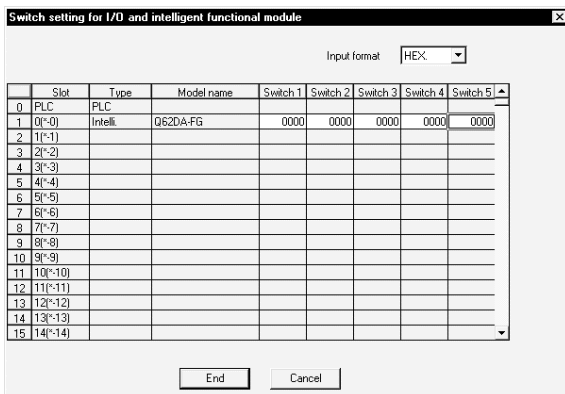
Model name : Enter the module model name.

Points : Select 16 points.

Start XY : Enter the start I/O number for the Q62DA-FG.

Detailed setting : Specify the control PLC for the Q62DA-FG.

It is unnecessary to set the "Error time output mode" or "H/W error time PLC operation mode" since these settings are invalid for the Q62DA-FG.



(b) Switch setting for intelligent function module screen

Click on [Switch setting] on the I/O assignment setting screen to display the screen shown at the left, then set switches 1 to 5.

The switches can easily be set if values are entered in hexadecimal. Change the entry format to hexadecimal and then enter the values.

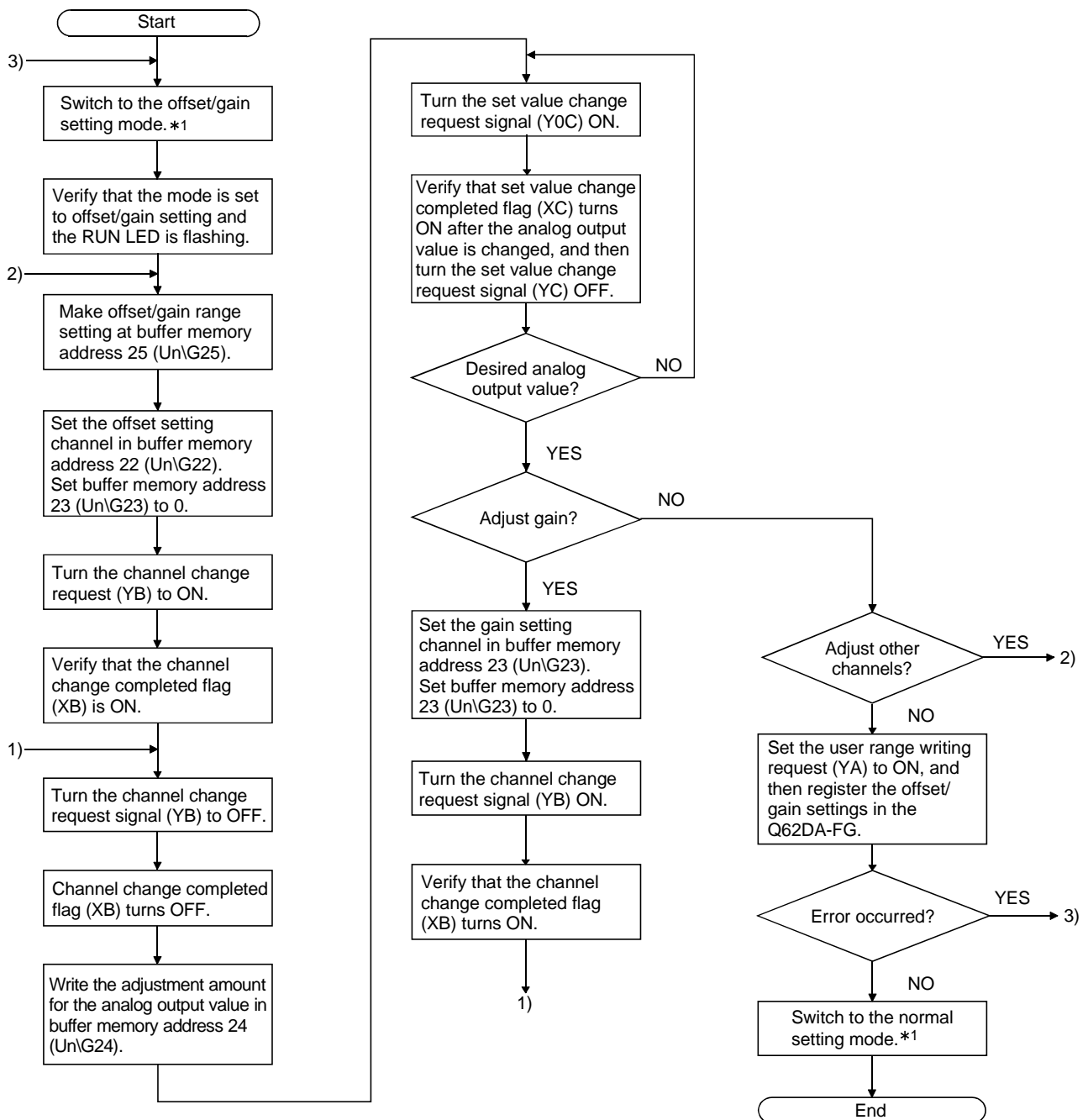
4.6 Offset/Gain Settings

When the user range setting is used, perform the offset and gain settings according to the following procedure.

When the industrial shipment setting is used, offset/gain setting is not necessary.

If the utility package is installed, perform the offset/gain settings according to the procedure described in Section 5.6.2.

(1) Offset/gain setting procedure



*1 The mode switching (normal mode to offset/gain setting mode to normal mode) method is given below.

- Dedicated instruction (G.OFFGAN) Refer to Section 4.6 (2), (a)
- Setting made to mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159) and turning the operation condition setting request (Y9) from OFF to ON Refer to Section 4.6 (2), (b)
- Intelligent function module switch setting Refer to Section 4.5, Section 4.6 (2), (c) (After intelligent function module switch setting, reset the PLC CPU or switch power OFF, then ON.)

POINT
<p>(1) Perform the offset/gain settings in the range that satisfies the conditions specified in Section 3.1.2, (1) and (2). When the setting exceeds this range, the maximum resolution or total accuracy may not be within the range indicated in the performance specification.</p>
<p>(2) Perform the offset/gain settings separately for each channel. If channels are set in buffer memory addresses 22 (Un\G22) and 23 (Un\G23) at the same time, an error will occur and the ERR. LED will be lit.</p>
<p>(3) After the offset and gain settings are completed, verify that the offset and gain values have been set correctly under actual usage conditions.</p>
<p>(4) The offset and gain values are stored into the E²PROM and are not erased at power-off.</p>
<p>(5) At the time of offset/gain setting, turn ON the user range write request (YA) to write the values to the E²PROM. Data can be written to the E²PROM up to 100 thousand times. To prevent accidental write to the E²PROM, an error will occur and the error code (buffer memory address 19: Un\G19) will be stored if write is performed 26 consecutive times.</p>
<p>(6) If an error (error code: 40 □ * 1) occurs during offset/gain setting, re-set the correct offset/gain value. The offset/gain value of the channel where the error has occurred is not written to the Q62DA-FG. (*1: □ indicates the corresponding channel number.)</p>
<p>(7) Module Ready (X0) turns from OFF to ON when the offset/gain setting mode switches to the normal mode by the dedicated instruction (G.OFFGAN) or the setting of the mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159). Note that initial setting processing will be executed if there is a sequence program that makes initial setting when Module Ready (X0) turns ON.</p>
<p>(8) D/A conversion is discontinued if the mode is switched (from the normal mode to the offset/gain setting mode or from the offset/gain setting mode to the normal mode) by the dedicated instruction (OFFGAN) or the setting of the mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159).</p>
<p>(9) Buffer memory addresses 200 (Un\G200), 202 to 217 (Un\G202 to Un\G217) are the areas used to restore the user range settings offset/gain values when online module change is made. Refer to chapter 7 for details of online module change.</p>

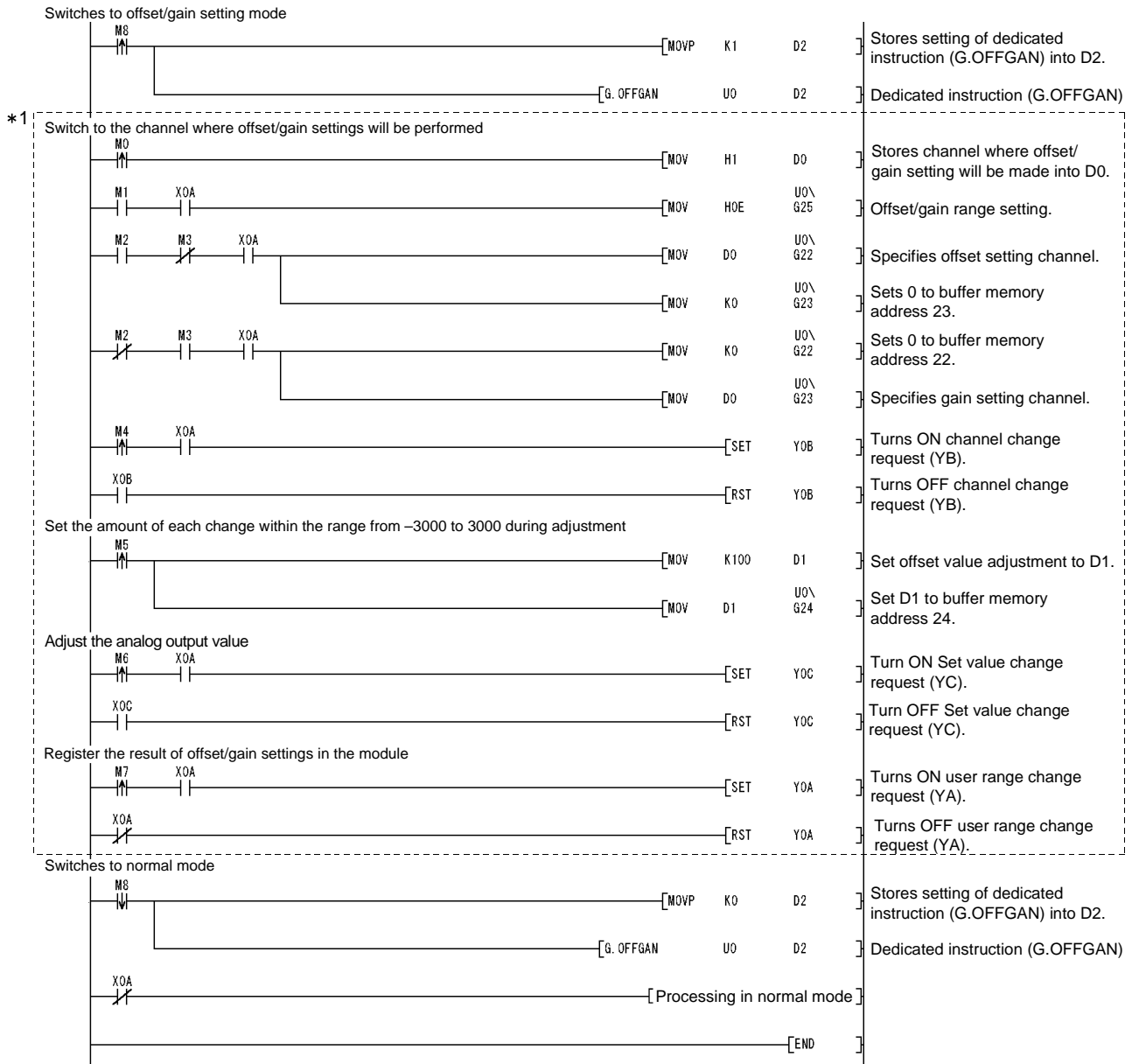
(2) Program examples

The program in the dotted area of (a) is common to (a), (b) and (c).

In this example, the I/O signals for the Q62DA-FG are X/Y0 to X/YF.

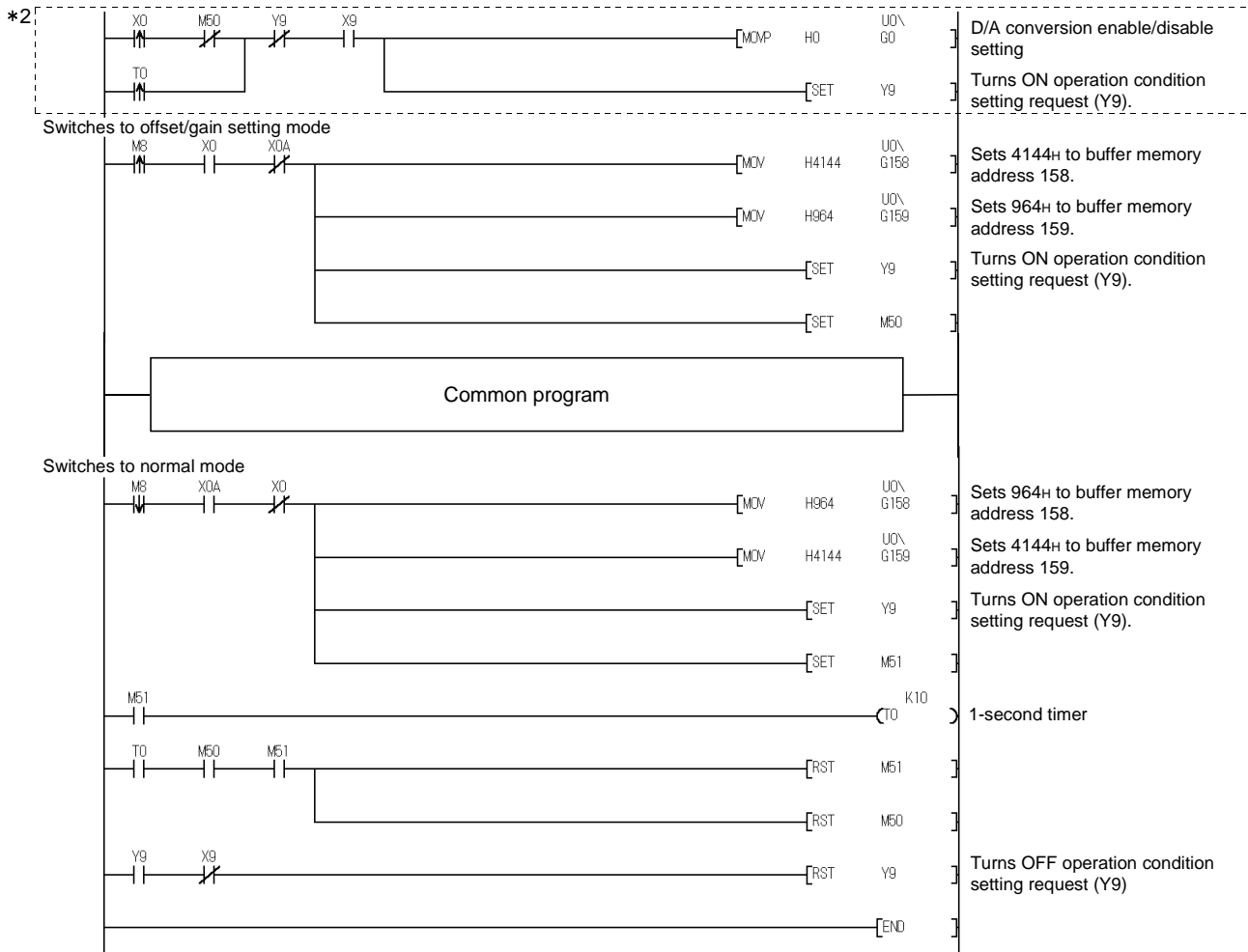
- Channel selection M0
- Offset/gain range setting M1
- Offset setting M2
- Gain setting M3
- Channel change command M4
- Writing the adjustment amount M5
- Analog output value adjust command M6
- Offset/gain setting value write command to the module M7
- Mode switching M8
- Normal mode checking signal M50
- Channel designation storage device D0
- Dedicated instruction (G.OFFGAN) setting storage device D2
- Offset/gain adjustment storage device D1

- (a) When switching the mode using the dedicated instruction (G.OFFGAN)
 The following sample program switches to the offset/gain setting mode with the dedicated instruction (G.OFFGAN), changes the channel where offset/gain setting will be made, adjusts the offset/gain values, and writes the offset/gain values to the Q62DA-FG.



*1 The program in the dotted area is a common program.

(b) When switching the mode using the setting of the mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159) and operation condition setting request (Y9)



POINT

When switching the mode using the setting of the mode switching setting and operating condition setting request, correct the initial setting program into the program marked *2.

(c) When switching the mode by making intelligent function module switch setting
Only the common program is necessary.

5 UTILITY PACKAGE (GX Configurator-DA)

5.1 Utility Package Functions

Table 5.1 shows an overview of the utility package functions.

Table 5.1 Utility package (GX Configurator-DA) function list

Item	Description	Reference section
Initial setting *1	<p>(1) Set the following items that require initial setting.</p> <ul style="list-style-type: none"> • D/A conversion enable/disable setting • Rate control enable/disable setting • Increase/decrease digital limit values • Disconnection detection setting • Warning output setting • Warning output upper limit value/lower limit value <p>(2) The data for which initial setting has been completed is registered in the parameters for the PLC CPU, and automatically written to the Q62DA-FG when the PLC CPU changes to RUN status.</p>	Section 5.4
Automatic refresh setting *1	<p>(1) Sets automatic refresh for the Q62DA-FG buffer memory.</p> <p>(2) The buffer memory that was set for automatic refresh is automatically read and written to the specified device when the END command for the PLC CPU is executed.</p>	Section 5.5
Monitor/Test	<p>(1) Monitor/Test The buffer memory and I/O signals for the Q62DA-FG are monitored and tested.</p> <p>(2) Operating condition setting Changes the D/A conversion enable/disable during operation.</p> <p>(3) Offset/gain setting When setting the offset/gain to a value selected by the user (when the analog output range setting is user range setting), the offset and gain can be easily set while viewing the screen.</p> <p>(4) Pass data The pass data (pass data classification setting, industrial shipment settings offset/gain values, user range settings offset/gain values) can be monitored and set.</p>	Section 5.6
FB conversion	Generates FB automatically from the intelligent function module parameter (initial setting/auto refresh setting).	Section 5.7

POINT

*1 If initial setting and automatic refresh setting are performed, the intelligent function module parameters require a maximum of 24 bytes per module.

5.2 Installing and Uninstalling the Utility Package

See "Method of installing the MELSOFT Series" attached with the utility package regarding the install and uninstall operation for the utility package.

5.2.1 User precautions

The following are precautions when using GX Configurator-DA:

(1) **Important safety information**

Since GX Configurator-DA is add-in software for GX Developer, read "Safety Precautions" and the basic operating procedures in GX Developer's operating manual.

(2) **About installation**

The GX Configurator-DA is an add-in package for GX Developer Version 4 or later products. Therefore, install GX Configurator-DA in a personal computer in which the GX Developer Version 4 or a later product has been installed.

(3) **About display-screen errors while using the intelligent function module utility**

There may be cases in which the screen will not properly display while the intelligent function module utility is being used, due to a lack of system resources. If this occurs, close the intelligent function module utility first and then GX Developer (program, comments, etc.) and other applications. Next, restart GX Developer and the intelligent function module utility.

(4) **To start the intelligent function module utility**

(a) In GX Developer, select "QCPU (Q mode)" for the PC series and specify the project.

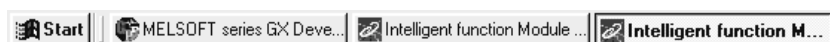
If something other than "QCPU (Q mode)" is selected for the PC series, or if the project is not specified, the intelligent function module utility will not start.

(b) Multiple intelligent function module utilities can be started.

However, the [Open parameter]/[Save parameter] intelligent function module's parameter operations can only be performed by a single session of the intelligent function module utility. Other intelligent function module utilities can only perform [Monitor/test] operation.

(5) **How to switch screens when two or more intelligent function module utilities are started**

When two or more intelligent function module utility screens cannot be displayed side by side, use the task bar to change the intelligent function module utility screen so that it is displayed on top of other screens.



(6) About the number of parameters that can be set in GX Configurator-DA

The number of parameters that can be set by the GX Configurator for an intelligent function module installed in the CPU module and in a remote I/O station of the MELSECNET/H network system is limited.

Intelligent function module installation object	Maximum number of parameter settings	
	Initial setting	Automatic refresh setting
Q00J/Q00/Q01CPU	512	256
Q02/Q02H/Q06H/Q12H/Q25HCPU	512	256
Q12PH/Q25PHCPU	512	256
MELSECNET/H remote I/O station	512	256

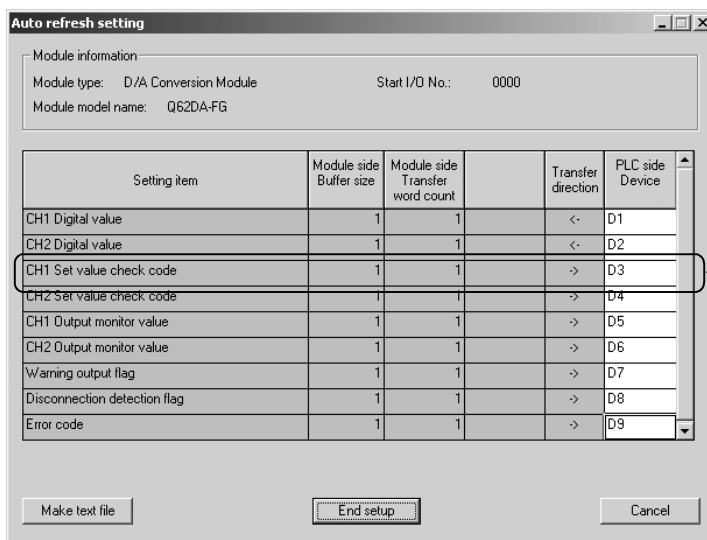
For example, if multiple intelligent function modules are installed in a remote I/O station, set the GX Configurator so that the number of parameter settings of all the intelligent function modules does not exceed the maximum number of parameter settings.

The total number of parameter settings is calculated separately for the initial setting and for the automatic refresh setting.

The number of parameter settings that can be set for one module in the GX Configurator-DA is as shown below.

Object Module	Initial setting	Automatic refresh setting
Q62DA-FG	4 (Fixed)	9 (Maximum number of settings)

Example) Counting the number of parameter settings in the automatic refresh setting



The number of settings in this one line is counted as one setting. The number of settings is not counted by columns. Add up all the setting items in this setting screen, then add them to the total for the other intelligent function modules to get a grand total.

5.2.2 Operating environment

The operating environment of the personal computer where the GX Configurator-DA is used is explained.

Item	Peripheral devices	
Installation (Add-in) destination *1	Add-in to GX Developer Version 4 (English version) or later *2	
Computer main unit	Personal computer on which Windows® operates.	
	Refer to the following table "Used operating system and performance required for personal computer".	
CPU		
	Required memory	
Hard disk free space	For installation	65 MB or more
	For operation	20 MB or more
Display	800 × 600 dot or more resolution *3	
Operating system	Microsoft® Windows® 95 Operating System (English version) Microsoft® Windows® 98 Operating System (English version) Microsoft® Windows® Millennium Edition Operating System (English version) Microsoft® Windows NT® Workstation Operating System Version 4.0 (English version) Microsoft® Windows® 2000 Professional Operating System (English version) Microsoft® Windows® XP Professional Operating System (English version) Microsoft® Windows® XP Home Edition Operating System (English version)	

*1: Install the GX Configurator-DA in GX Developer Version 4 or higher in the same language.

GX Developer (English version) and GX Configurator-DA (Japanese version) cannot be used in combination, and GX Developer (Japanese version) and GX Configurator-DA (English version) cannot be used in configuration.

*2: GX Configurator-DA cannot be used as an add-in with GX Developer Version 3 or earlier versions.

In addition, GX Developer Version 8 or later is necessary to use the FB conversion function.

*3: Setting fonts Size of Windows® for "Large Fonts" may cause the text to extend off screen. Therefore, choose "Small Fonts".

Used operating system and performance required for personal computer


Operating system	Performance Required for Personal Computer	
	CPU	Required memory
Windows® 95	Pentium® 133MHz or more	32MB or more
Windows® 98	Pentium® 133MHz or more	32MB or more
Windows® Me	Pentium® 150MHz or more	32MB or more
Windows NT® Workstation 4.0	Pentium® 133MHz or more	32MB or more
Windows® 2000 Professional	Pentium® 133MHz or more	64MB or more
Windows® XP Professional	"XP compatibility mode" and "Fast User Switching" are not supported.	Pentium® 300MHz or more
Windows® XP Home Edition		Pentium® 300MHz or more

5.3 Explanation of Utility Package Operation

5.3.1 How to perform common utility package operations

(1) Available control keys

Special keys that can be used during operation of the utility package and their applications are shown in the table below.

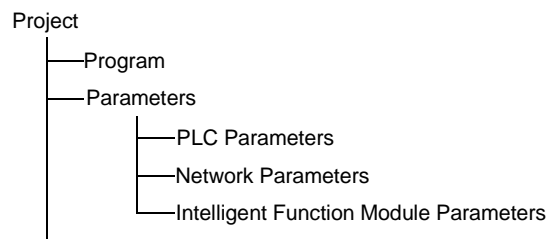
Name of key	Application
Esc	Cancels a newly entered value when entering data in a cell. Closes the window.
Tab	Moves between controls in the window.
Ctrl	Use in conjunction with the mouse when multiple cells are selected in the selection test.
Delete	Deletes the character where the cursor is positioned. When a cell is selected, clears all of the setting contents.
Back Space	Deletes the character where the cursor is positioned.
	Moves the cursor.
Page Up	Moves the cursor one page up.
Page Down	Moves the cursor one page down.
Enter	Confirms the value entered in the cell.

(2) Data to be created with the utility package

The data and files shown below that are created with the utility package are also processed using GX Developer operation. Figure 5.1 shows which operation processes which data or file.

<Intelligent function module parameters>

- (a) This data is created with the automatic refresh setting, and stored in the intelligent function module parameter file of the project to be created using GX Developer.



- (b) Steps 1) to 3) shown in Figure 5.1 are performed using the following operations.

- 1) Operating from GX Developer.
[Project] → [Open existing project] / [Save project] / [Save project as]
- 2) Operating from the utility parameter setting module selection screen.
[Intelligent function module parameter] → [Open parameter] / [Save parameter]
- 3) Operating from GX Developer.
[Online] → [Read from PLC] / [Write to PLC] → "Intelligent function module parameters"
Or, operate from the utility parameter setting module selection screen.
[Online] → [Read from PLC] / [Write to PLC]

<Text file>

- (a) A text file is created by performing the initial setting or automatic refresh setting, or selecting text file creation in the monitor/test screen. The text files can be utilized to create user documents.

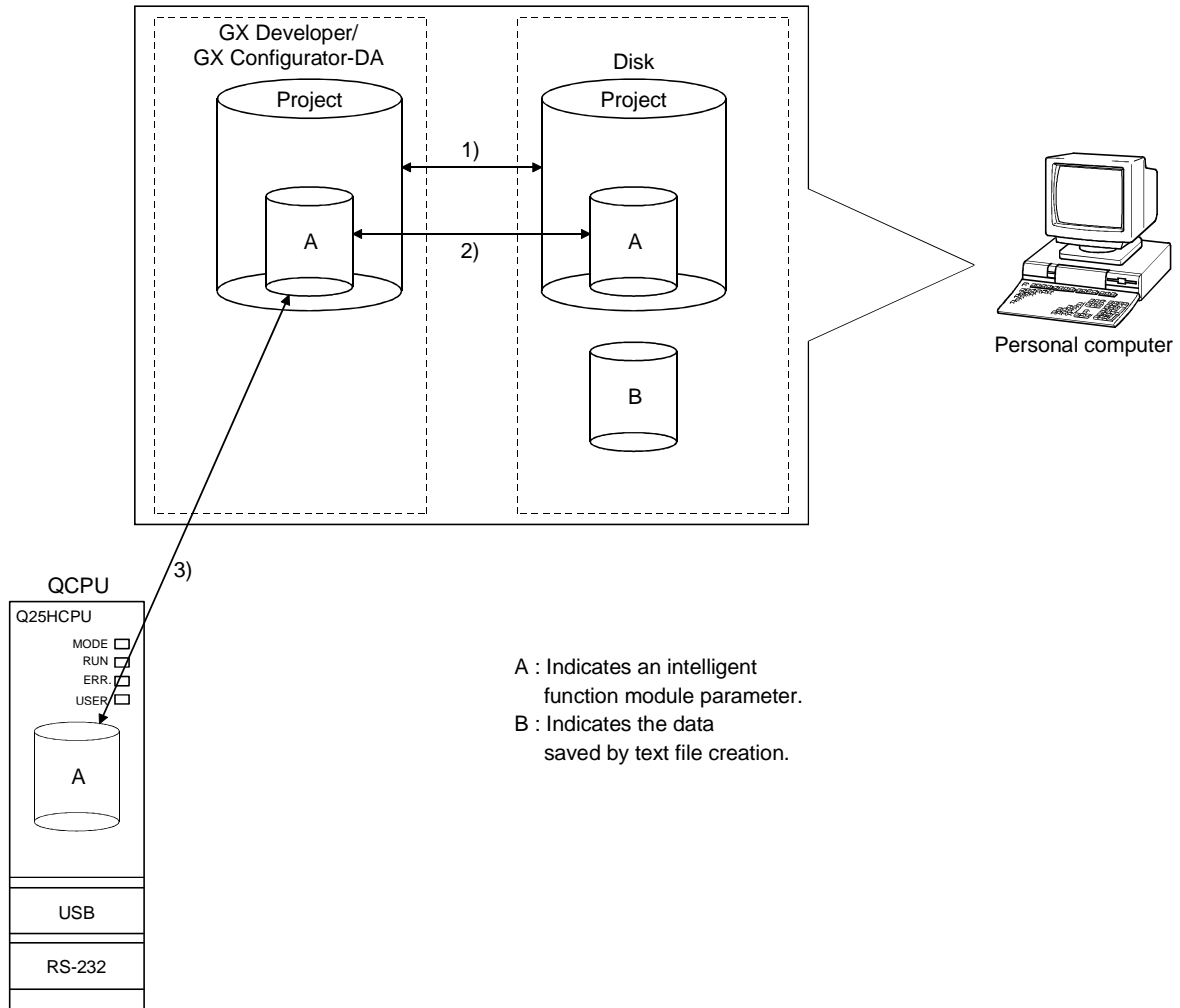
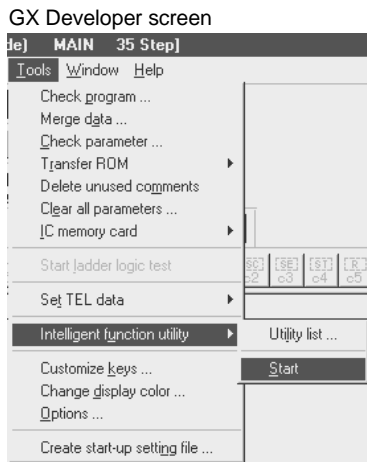


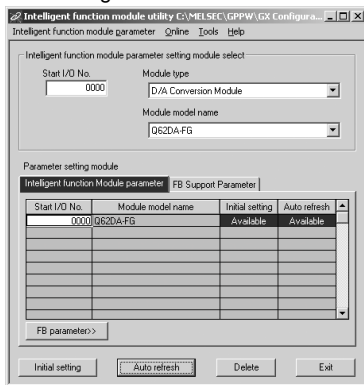
Figure 5.1 Correlation chart for data created using the utility package

5.3.2 Operation overview



[Tools] – [Intelligent function utility] – [Start]

Intelligent function module parameter setting module select screen



→ 1)

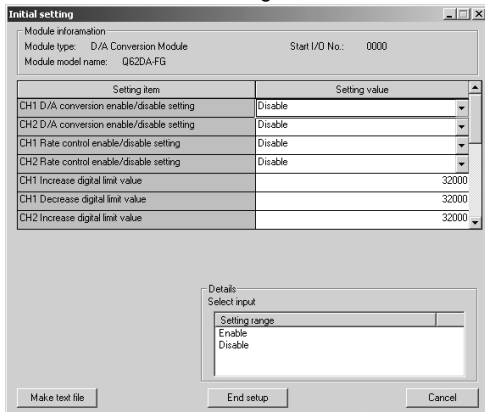
See Section 5.3.3

Enter "Start I/O No.", then select "Module type" and "Module model name".

Initial setting

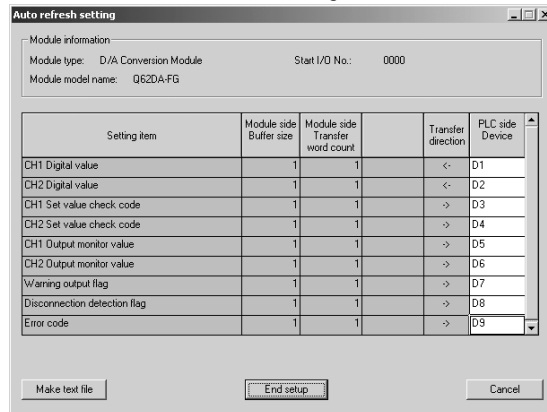
Auto refresh

Initial setting screen

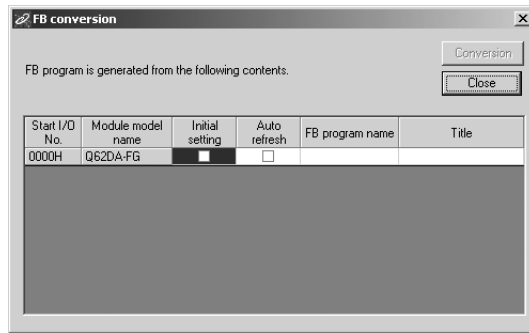
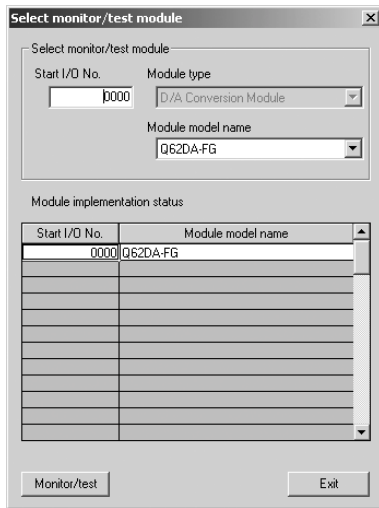
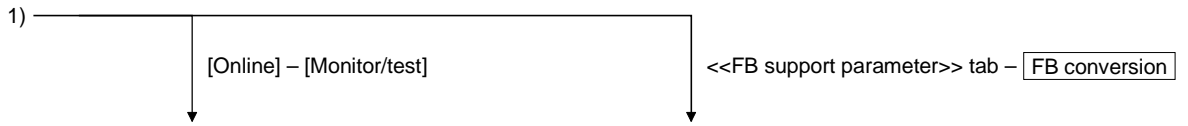


See Section 5.4

Auto refresh setting screen



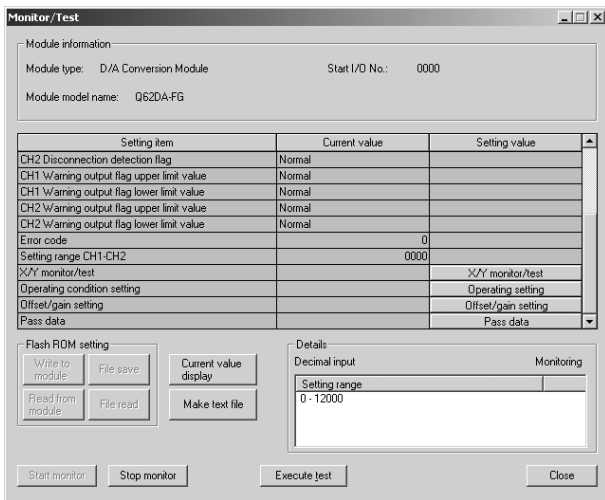
See Section 5.5



See Section 5.7

Enter "Start I/O No.", then select "Module type" and "Module model name".

Monitor/test screen



See Section 5.6

5.3.3 Starting the intelligent function module utility

[Purpose of setting]

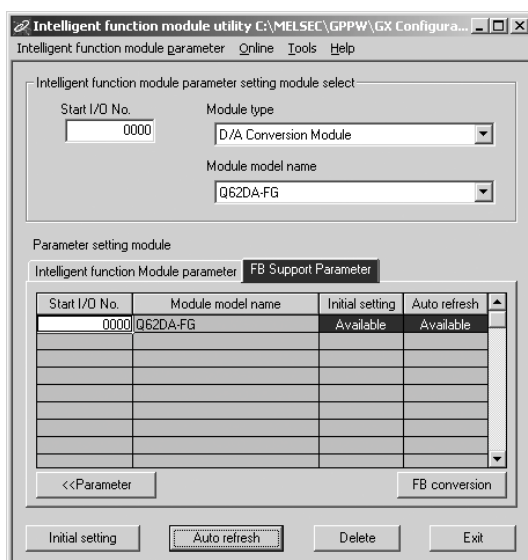
Start the intelligent function module utility from GX Developer, and display the module selection screen for the intelligent function module utility parameter setting. The screens for performing initial setting, automatic refresh setting and monitor/test module selection (selecting the module for which testing/monitoring is to be performed) for Q62DA-FG, can be started from this screen.

[Startup procedure]

[Tools] → [Intelligent function utility] → [Start]

[Setting screen]

Display when the <<FB support parameter>> tab is selected



[Explanation of items]

(1) How to start each screen

Common operations to the <<Intelligent function module parameter>> tab and <<FB support parameter>> tab

(a) Starting initial setting

"Start I/O No.*" → "Module type" → "Module model name" → Initial setting

(b) Starting automatic refresh setting

"Start I/O No.*" → "Module type" → "Module model name" → Auto refresh

(c) Monitor/test module selection screen

[Online] → [Monitor/test]

* Enter the start I/O numbers in hexadecimal.

On the <<FB support parameter>> tab

(a) Start-up of the FB conversion screen

<<FB support parameter>> tab → FB conversion

POINT

The <<FB support parameter>> tab is displayed when the project which is being edited is a label project.

(2) Explanation of screen command buttons

Common operations to the <<Intelligent function module parameter>> tab and <<FB support parameter>> tab

Delete

Deletes the initial setting and automatic refresh setting for the selected module.

However, if initial setting and auto refresh setting have been prepared and the cell of initial setting or auto refresh setting is selected and executed, only the setting of the selected cell is deleted.

Exit

Ends the Intelligent function module utility.

When the <<FB support parameter>> tab is selected

<<Parameter

Moves the setting of the selected line to the <<Intelligent function module parameter>> tab.

When the <<Intelligent Function Module Parameter>> tab is selected

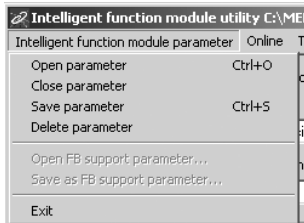
FB parameter>>

Moves the setting of the selected line to the <<FB support parameter>> tab.

(3) Menu bar

(a) File items

With file operation, the intelligent function module parameters for the project opened by GX Developer can be processed.



[Open parameter]:

Reads the parameter file.

[Close parameter]:

Closes the parameter file. If revisions were made, a dialog box asking whether to save the file appears.

[Save parameter]:

Saves the parameter file.

[Delete parameter]:

Deletes the parameter file.

[Open FB support parameter]:

Opens the FB support parameter file.

[Save as FB support parameter]:

Saves the FB support parameter file.

[Exit]:

Quits the intelligent function module utility.

(b) Online items

[Monitor/test]:

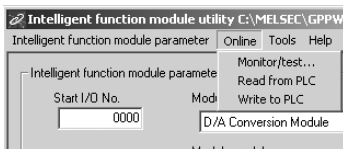
Starts the monitor/test module selection screen.

[Read from PLC]:

Reads the intelligent function module parameters from the CPU module.

[Write to PLC]:

Writes the intelligent function module parameters to the CPU module.



POINT
(1) Saving the intelligent function module parameter files Since files cannot be saved using the GX Developer project save operation, save the files using the module selection screen for intelligent function module parameter setting described above.
(2) Reading from and writing to PLC operations for the intelligent function module parameters using GX Developer (a) After the intelligent function module parameters are saved in a file, they can be read from and written into the PLC. (b) Set the target PLC CPU using GX Developer [Online] → [Transfer setup]. (c) When the Q62DA-FG is installed to the remote I/O station, use "Read from PLC" and "Write to PLC".
(3) Checking for the required utility The head I/O is displayed in the Intelligent function module utility setting screen, but a "*" may be displayed for the model name. This means that either the required utility is not installed or that the utility cannot be started from the GX Developer. Check for the required utility in [Tools] - [Intelligent function utility] - [Utility list...] in GX Developer, and set it.

5.4 Initial Setting

[Purpose of setting]

Set the following items in the initial setting parameters.

- D/A conversion enable/disable setting
- Rate control enable/disable setting
- Increase/decrease digital limit values
- Disconnection detection setting
- Warning output setting
- Warning output upper limit value/lower limit value

This initial setting makes sequence program setting unnecessary.

[Startup procedure]

"Start I/O No.*" → "Module type" → "Module model name" → Initial setting

[Setting screen]

Setting item	Setting value
CH1 D/A conversion enable/disable setting	Disable
CH2 D/A conversion enable/disable setting	Disable
CH1 Rate control enable/disable setting	Disable
CH2 Rate control enable/disable setting	Disable
CH1 Increase digital limit value	32000
CH1 Decrease digital limit value	32000
CH2 Increase digital limit value	32000

[Explanation of items]

(1) Setting contents

Set the D/A conversion enable/disable setting, rate control enable/disable setting and others for each channel.

(2) Explanation of command buttons

- | | |
|--|---|
| Make text file | Outputs the screen display in text file format. |
| End setup | Confirms the setting data and ends the operation. |
| Cancel | Cancels the setting data and ends the operation. |

POINT

Initial settings are stored in the intelligent function module parameters. After being written to the CPU module, the initial setting is made effective by either (1) or (2).

(1) Cycle the RUN/STOP switch of the CPU module: STOP → RUN → STOP → RUN.

(2) With the RUN/STOP switch set to RUN, turn off and then on the power or reset the CPU module.

When using a sequencer program to write the initial settings, when the CPU is switched from STOP to RUN the initial settings will be written, So ensures that programming is carried out to re-execute the initial settings.

5.5 Automatic Refresh Setting

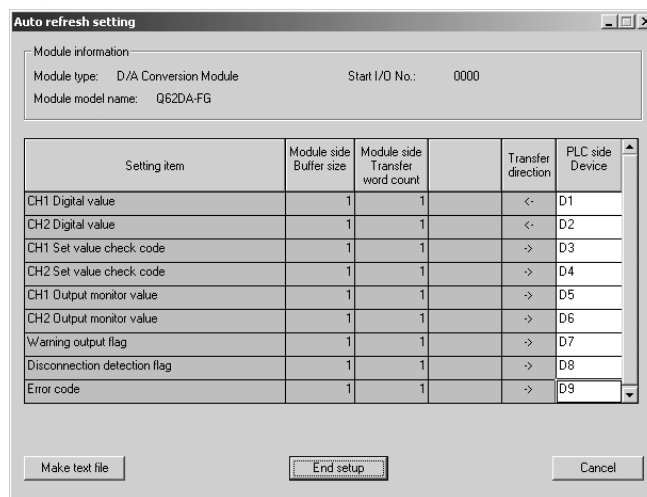
[Purpose of setting]

Sets the buffer memory for the Q62DA-FG to be automatically refreshed.

[Startup procedure]

"Start I/O No.*" → "Module type" → "Module model name" →

[Setting screen]



[Explanation of items]

(1) Contents of the screen display

- Model side Buffer size** : Displays the size of the buffer memory for the setting item (fixed at one word).
- Model side Transfer word count** : Displays the number of words to be transferred to the CPU devices from the designated address (fixed at one word).
- Transfer direction** : " \leftarrow " indicates that data is written from the device to the buffer memory.
" \rightarrow " indicates that data is read from the buffer memory to the device.
- PLC side Device** : Enter the device in the CPU module to be automatically refreshed.
The devices that can be used are X, Y, M, L, B, T, C, ST, D, W, R, ZR. When using bit devices, X, Y, M, L or B, set a number that can be divided by 16 points (examples: X10, Y120, M16).
Also, buffer memory data is stored in 16 point blocks starting from the device number that was set. For example, if X10 is set, data will be stored from X10 to X1F.

(2) Explanation of command buttons

A file containing the screen contents is created in text file format.

Confirms the setting data and ends the operation.

Cancels the setting data and ends the operation.

POINT

The automatic refresh settings are stored in the intelligent function module parameters. After the automatic refresh settings are written to the CPU module, they are validated by performing STOP → RUN → STOP → RUN operations for the CPU module, turning the power OFF and then ON, or resetting the CPU module. The automatic refresh settings cannot be changed from the sequence program. However, it is possible to add a process similar to automatic refresh by using the FROM/TO instructions of the sequence program.

5.6 Monitor/Test

5.6.1 Monitor/test screen

[Purpose of setting]

Buffer memory monitoring/testing, I/O signals monitoring/testing, operating condition setting, offset/gain settings (see Section 5.6.2), pass data (see Section 5.6.3) are started from this screen.

[Startup procedure]

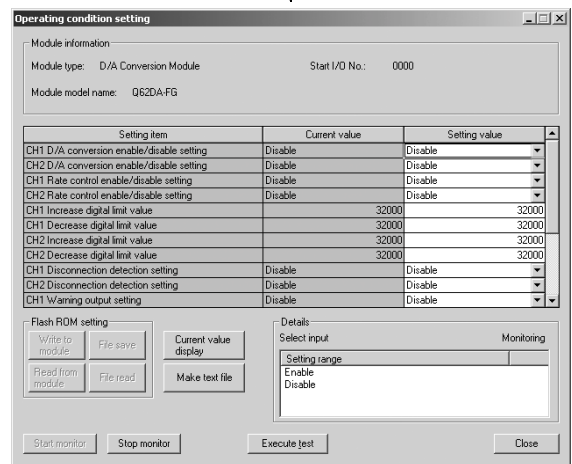
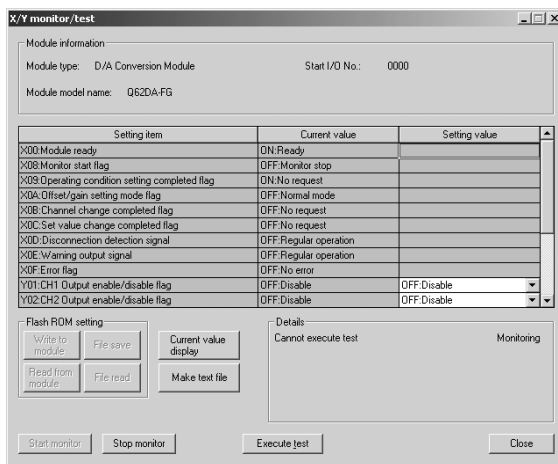
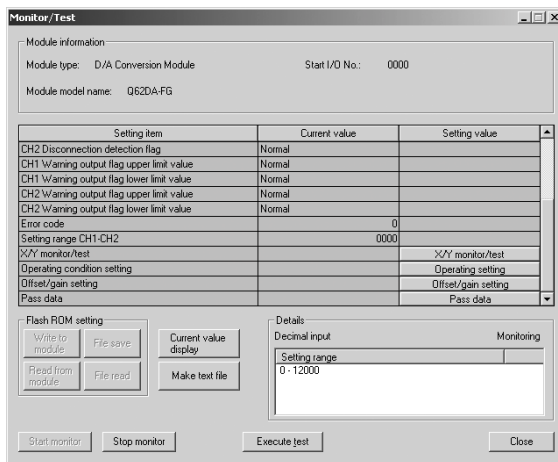
Monitor/test module selection screen → "Start I/O No.*" → "Module type" → "Module model name" → **Monitor/test**

* Enter the start I/O numbers in hexadecimal.

The screen can also be started from the GX Developer Version 6 or later system monitor.

See GX Developer's operating manual for details.

[Setting screen]



1)

Offset/gain setting

Pass data

Offset/Gain setting

Offset/gain settings is performed.

Target module: Q62DA-FG:0000H Error code: ... Error clear

Offset/Gain setting

Offset setting Gain setting

Channel No.: CH1

Adjustment value: 1 + -

For the adjustment value 1000, the Analog value adjustment of Voltage during output: about 0.33V(User range setting 2), about 0.18V(User range setting 3). Current during output: about 0.65mA is possible.

Channel No.	User range setting	Setting state	
		Offset setting	Gain setting
CH1			
CH2			

Registration Conversion characteristic

Close

Pass data

Module information

Module type: D/A Conversion Module Start I/O No.: 0000

Module model name: Q62DA-FG

Setting item	Current value	Setting value
CH1 Pass data classification setting	User range1	User range1
CH2 Pass data classification setting	User range1	User range1
CH1 Industrial shipment settings offset value (used for D/A)	0000	0000
CH1 Industrial shipment settings gain value (used for D/A)	0000	0000
CH2 Industrial shipment settings offset value (used for D/A)	0000	0000
CH2 Industrial shipment settings gain value (used for D/A)	0000	0000
CH1 Industrial shipment settings offset value	0000	0000

Flash ROM setting

Write to module File save Current value display

Read from module File read Make text file

Start monitor Stop monitor Execute test Close

Details

Select input Monitoring

Setting range

User range1
User range2
User range3

Conversion characteristic

Conversion characteristic

Analog/Range setting

Analog: Voltage

Range setting: User range setting 2

Offset/Gain setting

Offset value(V): 0.00

Gain value(V): 10.00

Range settings

Analog/Digital conversion

Analog->Digital Digital->Analog

Analog value(V): 5.00

Digital value: 6000

Conversion

Close

[Explanation of items]

(1) Contents of screen display

- Setting item : Buffer memory name is displayed.
 Current value : Current value of the buffer memory is monitored.
 Setting value : Select or enter the data to be written into the buffer memory during test operation.

(2) Explanation of the command buttons

- The current value of the selected item is displayed. (This is used to check text that cannot be displayed in the current value field. However, in this utility package, all items can be displayed in the display fields).
- Creates a file consisting of the screen contents in text file format.
- / Selects whether or not the current value fields are monitored.
-
- Performs a test of the selected item. To select more than one item, select multiple items while holding down the key.
- Closes the screen currently displayed and returns to the previously displayed screen.

POINT

- (1) Turning the output enable/disable flag ON/OFF or writing the CH□ digital value during test operation changes the analog output, so perform these after taking ample safety precautions.

REMARK

The selection test operation is explained below using the CH1 digital value writing as an example.

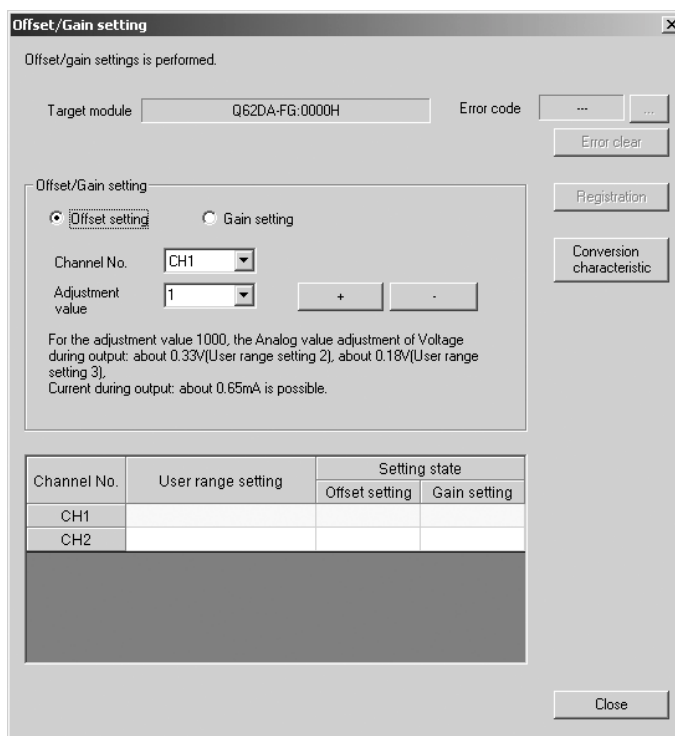
- (1) Change the setting value field for "Y01: CH1 output enable/disable flag" to "ON: enable."
 At this point, the value is not yet written in the Q62DA-FG.
- (2) Click and select the setting value field to be written in the Q62DA-FG.
 To write several data items at one time, perform the selection operation while holding down the key.
- (3) Click the to execute write operation.
 Once writing has been completed, the value that was written will be displayed in the present value field.

5.6.2 Offset/gain setting operation

Perform the offset/gain setting operation in the following sequence.

(1) Switch to the offset/gain setting screen

Perform the operation in Screen 5.6.1 to display the offset/gain setting screen. At this point, a dialog box to confirm the transition of Q62DA-FG's operation mode (normal mode -> offset/gain setting mode) is displayed. Click the **Yes** button to transit to the offset/gain setting mode.



(2) Specify a channel

Specify the target channel of offset setting or gain setting on the channel No. combo box.

(3) Specify offset/gain setting

Specify either offset setting or gain setting on the channel specified on the channel No. combo box using the radio button.

(4) Specify the user range setting

Specify a user range used for the offset/gain setting of each channel on the combo box.

(5) Set up adjustment values

Set up an adjustment value of the offset value or gain value. Select "1," "10," "100," or "1000" on the combo box, however, you can also set up adjustment values by entering a number (1 to 3000).

(6) Fine adjustment of voltage output or current output

By clicking the button or button, the value of voltage output or current output for the prepared adjustment value is finely adjusted.

(7) Write settings into Q62DA-FG

Write the content set up by operations (2) to (6) into Q62DA-FG by clicking the button.

(8) Switch to the normal mode

When the offset/gain setting screen is closed by clicking the button after the setting operation has finished, Q62DA-FG's operation mode transits to the normal mode.

POINT

If an error code is displayed while performing the setting operation, the details and measure of the error can be confirmed by clicking the button to the right of the error code display area. In addition, the error code can be cleared by clicking the button.

5.6.3 Confirmation of Conversion Characteristic

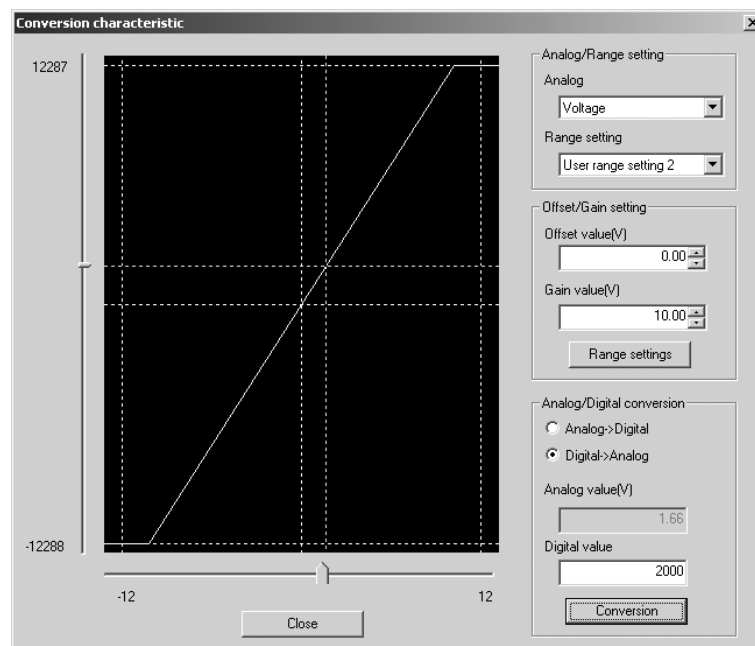
[Purpose of setting]

The converted value of digital-analog conversion can be confirmed according to the tilt of the graph, based on the offset/gain setting.

[Startup procedure]

Monitor/test screen → Offset/gain setting → Conversion characteristic

[Setting screen]



[Explanation of items]

(1) Items displayed on the screen

I/O characteristic diagram: Displays the I/O conversion characteristic to the prepared offset/gain setting.

(2) Setting details

Analog and Range setting

Analog: Select the output (voltage/current) when a digital value is converted to an analog value.

Range setting: Select either "User range setting 2" or "User range setting 3." However, if "Current" is selected for the "Analog" item, only "User range setting 1" can be selected.

Offset/gain setting

Offset value: Enter an offset value to display the I/O characteristic diagram.

Gain value: Enter a gain value to display the I/O characteristic diagram.

Analog/digital conversion: Select a conversion type shown below for confirming the correspondence between an analog value and a digital value caused by the conversion characteristic.

- Digital → analog
- Analog → digital

Analog value: <When converted to a digital value>

Enter an analog value to be converted to a digital value

<When converted to an analog value>

The analog value converted from a digital value is displayed.

Digital value: <When converted to a digital value>

The digital value corresponding to an entered analog value is displayed.

<When converted to an analog value>

Enter a digital value to be converted to an analog value.

POINT

- The offset value is the analog output value (voltage or current) when a digital entry value of 0 is set from the PLC CPU.
- The gain value is the analog value (voltage or current) output when the digital input value set from the PLC CPU is as follows:
12000 (When User range setting 1 to 3 are selected)

(3) Explanation of screen command buttons

Range setting

The entered offset/gain value is determined, and the I/O characteristic diagram is updated.

Conversion

Conversion for the entered value is performed.

5.6.4 Pass data

Perform operation in the following sequence to save/restore the user range.

(1) Switch to the pass data screen

Perform the operation in Section 5.6.1 to display the Pass data screen.

Setting item	Current value	Setting value
CH1 Pass data classification setting	User range1	User range1
CH2 Pass data classification setting	User range1	User range1
CH1 Industrial shipment settings offset value (used for D/A)	0000	0000
CH1 Industrial shipment settings gain value (used for D/A)	0000	0000
CH2 Industrial shipment settings offset value (used for D/A)	0000	0000
CH2 Industrial shipment settings gain value (used for D/A)	0000	0000
CH1 Industrial shipment settings offset value (used for D/A)	0000	0000

(2) User range saving

- (a) Set the user range to be used in the Setting value field of CH□ Pass data classification setting, and click the **Execute test** button.

When the user range setting is completed, the set user range is displayed in the Current value field of CH□ Pass data classification setting.

- (b) Change the Setting value field of Pass data read request to "Request", and click the **Execute test** button.

When read is completed, the values are displayed in the Current value fields of CH□ Industrial shipment settings offset/gain values/CH□ User range settings offset/gain values.

- (c) Compare the values with those in the range reference table, and record them if they are correct.

Refer to Section 7.4 for the range reference table.

(3) User range restoration

- (a) Set the user range to be used in the Setting value field of CH□ Pass data classification setting, and click the button.

When the user range setting is completed, the set user range is displayed in the Current value field of CH□ Pass data classification setting.

- (b) Set the recorded values in the Setting value fields of CH□ Industrial shipment settings offset/gain values/user range settings offset/gain values.

- (c) Select all the Setting value fields of CH□ Industrial shipment settings offset/gain values/user range settings offset/gain values, and click the button.

When write is completed, the set values are displayed in the Current value fields of CH□ Industrial shipment settings offset/gain values/CH□ User range settings offset/gain values.

- (d) Change the Setting value field of Pass data write request to "Request", and click the button.

Make sure that the indication in the Current value field of Pass data write request changes from "Request" to "OFF" on completion of write.

5.7 FB Conversion of Initial Setting/Auto Refresh Setting

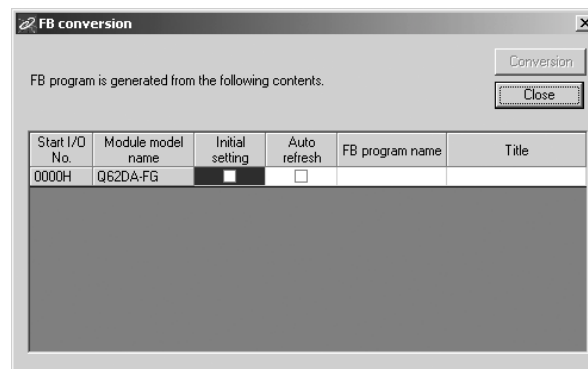
[Purpose of setting]

FB is generated automatically from the intelligent function module parameter (initial setting/auto refresh setting).

[Startup procedure]

Intelligent Function Module Parameter Setting Module Selection Screen →

<<FB Support Parameter>> → **FB conversion**

[Setting screen]**[Explanation of items]****(1) Items displayed on the screen****Start I/O No.:**

The start I/O No. of the information which is set up on the currently open intelligent function module parameter is displayed.

Module model name:

The module model name of the information which is set up on the currently open intelligent function module parameter is displayed.

Initial setting:

Set up whether to apply FB conversion to the parameter or not.

Check if you apply FB conversion to the parameter.

Auto refresh setting:

Set up whether to apply FB conversion to the parameter or not.

Check if you apply FB conversion to the parameter.

FB program name:

Set up the name of the converted FB program.

Up to six single-byte characters can be set up as an FB program name. However, the characters and terms shown below cannot be set up as FB program name.

Character: \, /, :, ;, *, ?, ", <, >, |, ,

Term: COM1 to COM9, LPT1 to LPT9, AUX, PRN, CON, NUL, CLOCK\$

In addition, I- is added for initial setting and A- is added for auto refresh setting respectively to the top of the FB name setting to be registered in GX Developer after FB conversion is performed.

Ex.: If the FB program name is "ABCDE, " the initial setting is "I-ABCDE" and the auto refresh setting is "A-ABCDE. "

Title: Set up a title on a converted FB program. Up to 32 single-byte characters can be set up as a title.

(2) Explanation of screen command buttons

Conversion

FB conversion is performed for the checked columns of initial setting and auto refresh setting.

5.8 Usage of FB

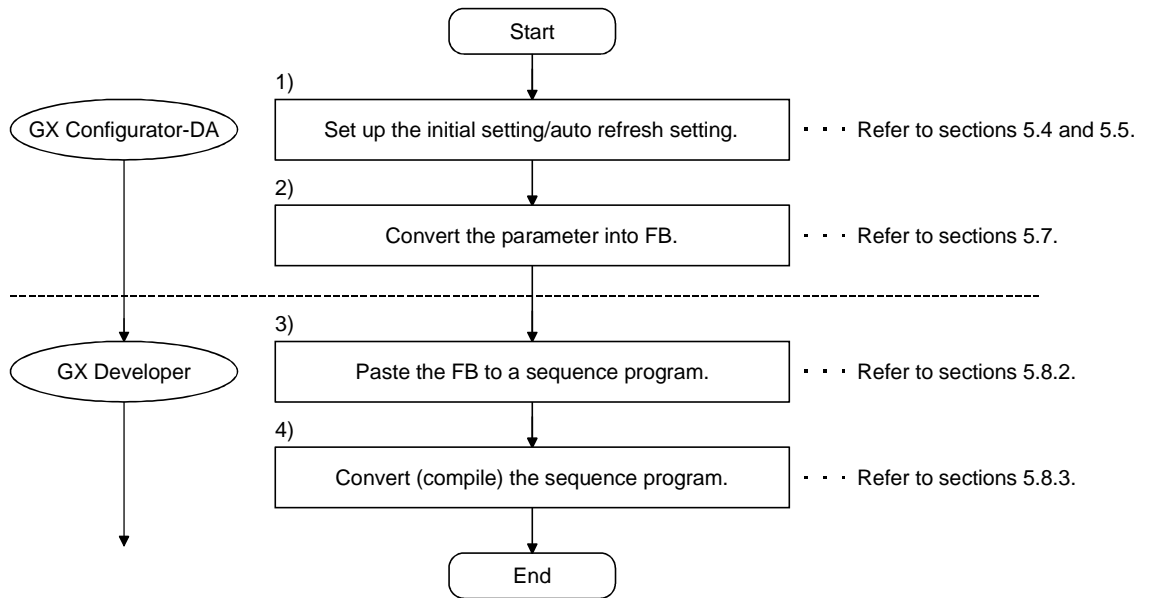
This section describes the procedure for using FB with GX Developer.
 For details, refer to "GX Developer Version 8 Operating Manual (Function Block)."

5.8.1 Outline

The procedure for creating FB is shown below.

- (1) Set up the intelligent function module parameter (initial setting/auto refresh setting).
- (2) Convert the intelligent function module parameter into FB.
- (3) Paste the FB to a sequence program.
- (4) Convert (compile) the sequence program.

Next, a flowchart of procedures (1) to (4) is shown below.



POINT

The initial setting/auto refresh setting of the intelligent function module can be performed by each of the following methods.

- (1) Set intelligent function parameters (Initial setting/Auto refresh setting) and write them to the PLC CPU.
- (2) Create an FB of the intelligent function module parameter (initial setting/auto refresh setting) and paste it to the sequence program.

In accordance with the specification of the system, perform the initial setting/auto refresh setting of the intelligent function module by one of the methods above. *¹

*1: The following explains the case in which both of (1) and (2) are performed.

(a) Initial setting

FB setting given in (2) is valid.

(b) Auto refresh setting

- Both (1) and (2) are valid.
- At the time of FB execution and in the END processing of the sequence program, automatic refresh is performed.

Therefore, an analog value corresponding to the specified digital value is output at each auto refresh time.

5.8.2 Paste an FB to a Sequence Program

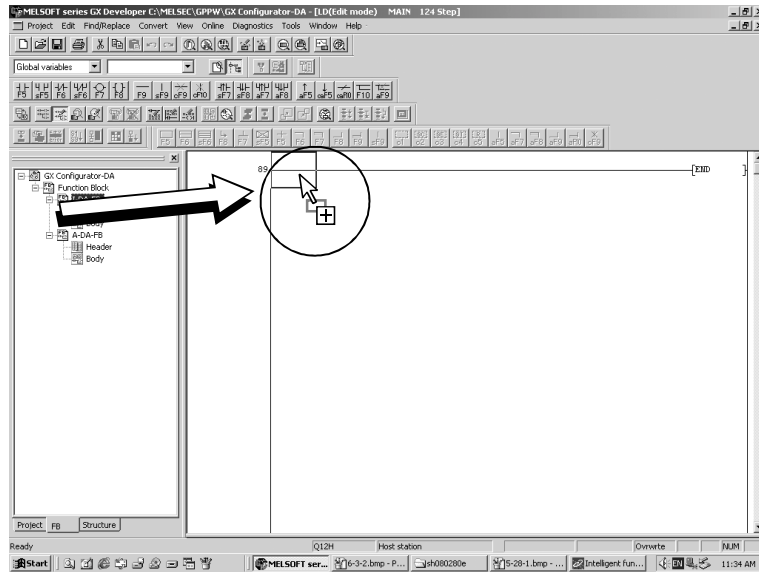
[Purpose of operation]

Paste an FB in order to use it with a sequence program.

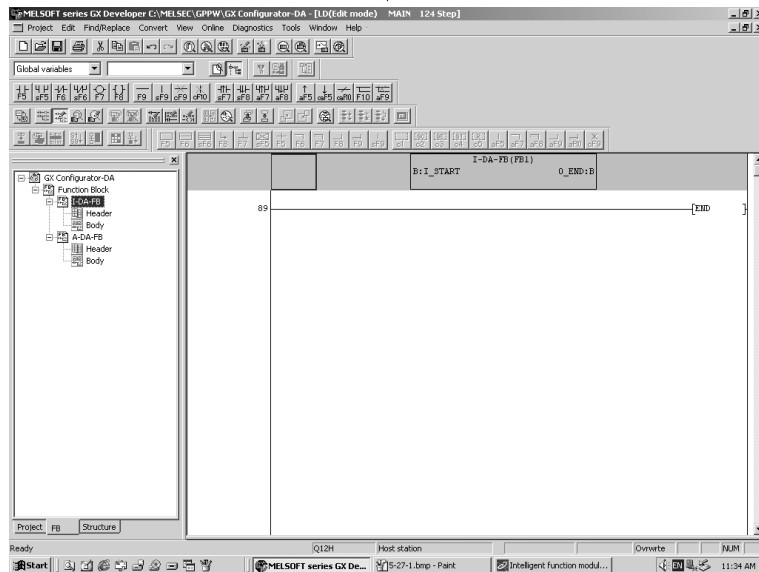
[Operation procedure]

Switch the <<Project>> tab into the <<FB>> tab on GX Developer, and drag & drop the FB to be used onto the sequence program.

Before pasting



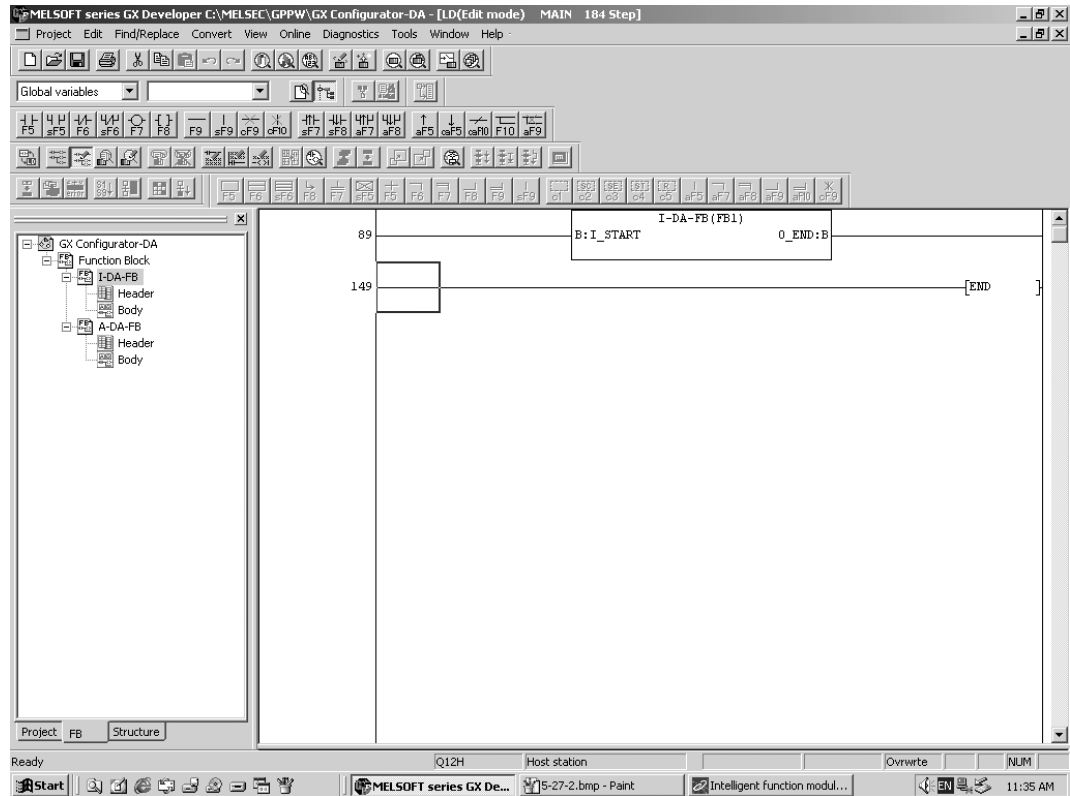
After pasting



5.8.3 Convert (Compile) a Sequence Program

[Purpose of operation]

Convert (compile) the sequence program to which an FB was pasted so that it can be executed.



[Operation procedure]

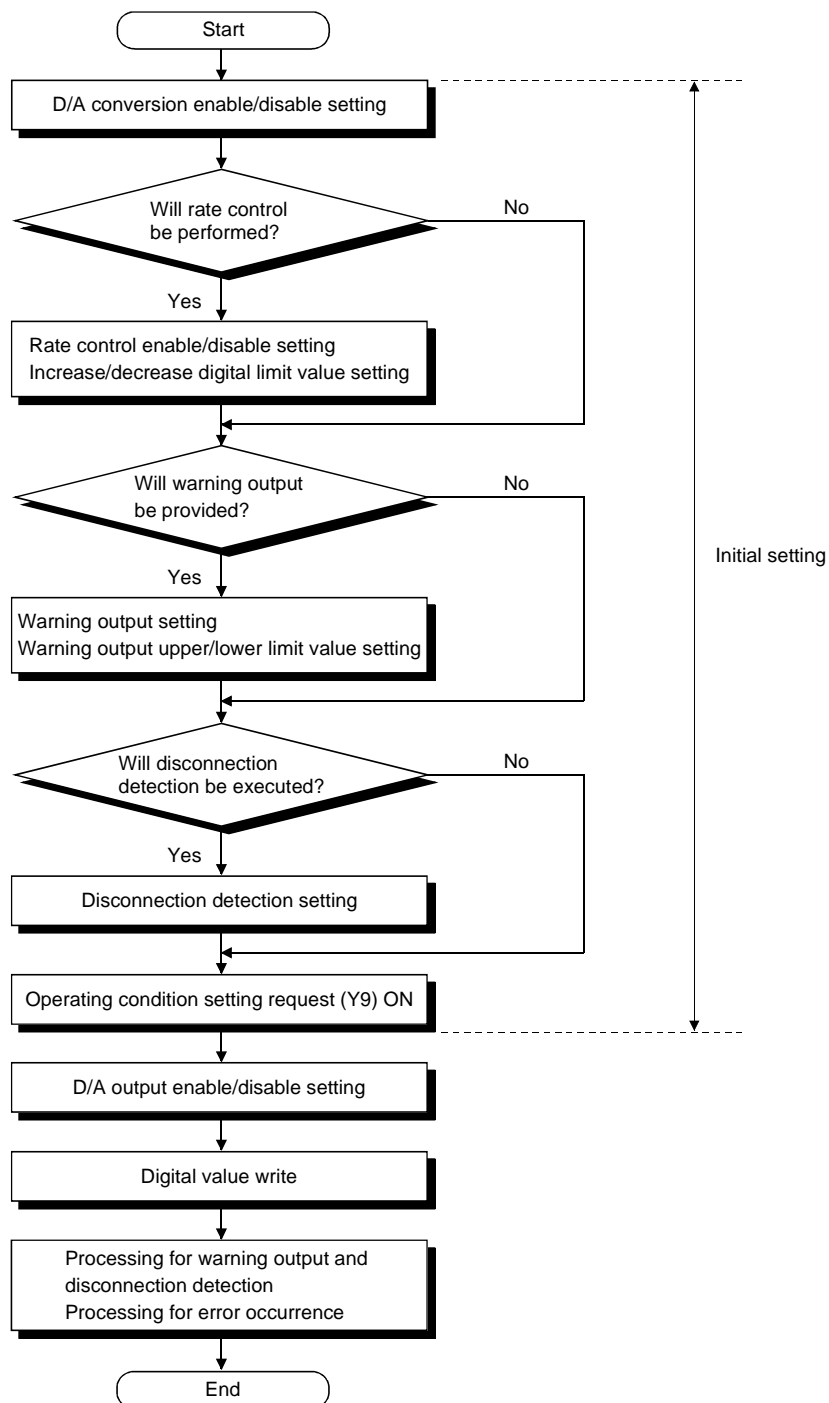
Click the [Convert] menu → [Convert/Compile] menu of GX Developer.

6 PROGRAMMING

This chapter describes the programs of the Q62DA-FG.
 When diverting any of the program examples introduced in this manual to the actual system, fully verify that there are no controllability problems in the target system.

6.1 Programming Procedure

Create the program that will execute the digital-analog conversion of the Q62DA-FG in the following procedure.



6.2 For Use in Normal System Configuration

System configuration used in the program explanation

(1) System configuration

Power supply module	Q n C P U	Q 6 2 D A I F G	Q X 1 0	Q Y 1 0		
---------------------	-----------	-----------------	---------	---------	--	--

X/Y0 X/Y10 X/Y20
to to to
X/YF X/Y1F X/Y2F

Perform the following intelligent function module switch settings in advance.

- Switch 1 0030H (CH1: 4 to 20mA, CH2: 0 to 5V)
- Switch 2 Empty
- Switch 3 0000H (CH1, CH2: Clear)
- Switch 4 0000H (Normal mode (D/A conversion processing))
- Switch 5 0000H (0: Fixed)

(2) Program conditions

The digital values of CH1 and CH2 are written and their output monitor values are read.

If a digital value write error occurs, the corresponding error code is displayed in BCD.

(a) Initial settings

- Analog output enabled channel.....CH1, CH2
- Rate control enabled channel.....CH1 (increase digital limit value: 100, decrease digital limit value: 30)
- Disconnection detection enabled channel ...CH1
- Warning output enabled channel.....CH2 (warning output upper limit value: 10000, warning output lower limit value: 3000)

(b) Devices used by user

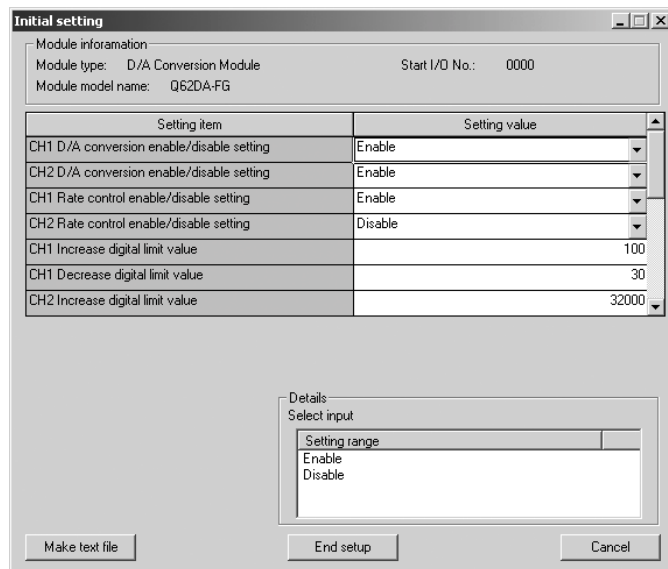
- Output enable.....X11
- Digital value write signalX12
- Disconnection detection reset signal.....X13
- Warning output reset signalX14
- Error code reset signal.....X15
- Error code display (BCD 3 digits)Y20 to Y2B
- CH1 digital valueD11
- CH2 digital valueD12
- CH1 output monitor valueD13
- CH2 output monitor valueD14
- Disconnection detection flag.....D15
- Warning output flag.....D16
- Error code.....D17
- Disconnection detection channel flag.....M10
- Warning output channel flag.....M22, M23

6.2.1 Program example using the utility package

(1) Operation of utility package

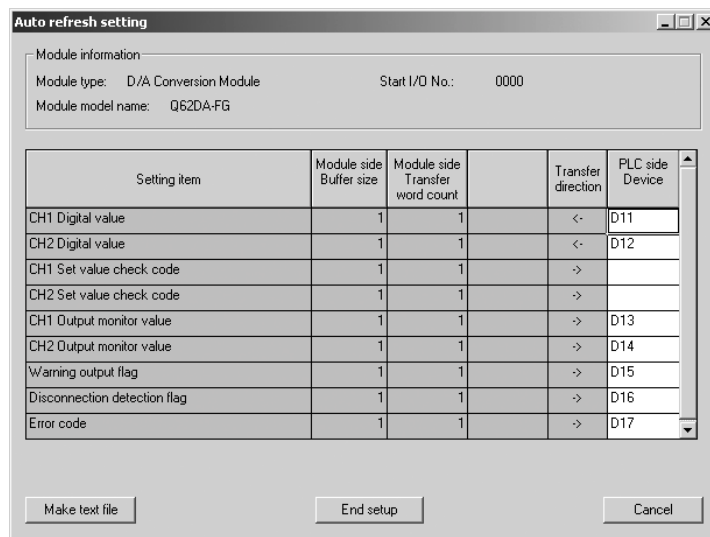
(a) Initial settings (Refer to Section 5.4)

- CH1, CH2 D/A conversion enable/disable setting "Enable"
- CH1 rate control enable/disable setting..... "Enable"
- CH1 increase digital limit value..... "100"
- CH1 decrease digital limit value "30"
- CH1 disconnection detection setting "Enable"
- CH2 warning output setting..... "Enable"
- CH2 warning output upper limit value..... "10000"
- CH2 warning output lower limit value "3000"



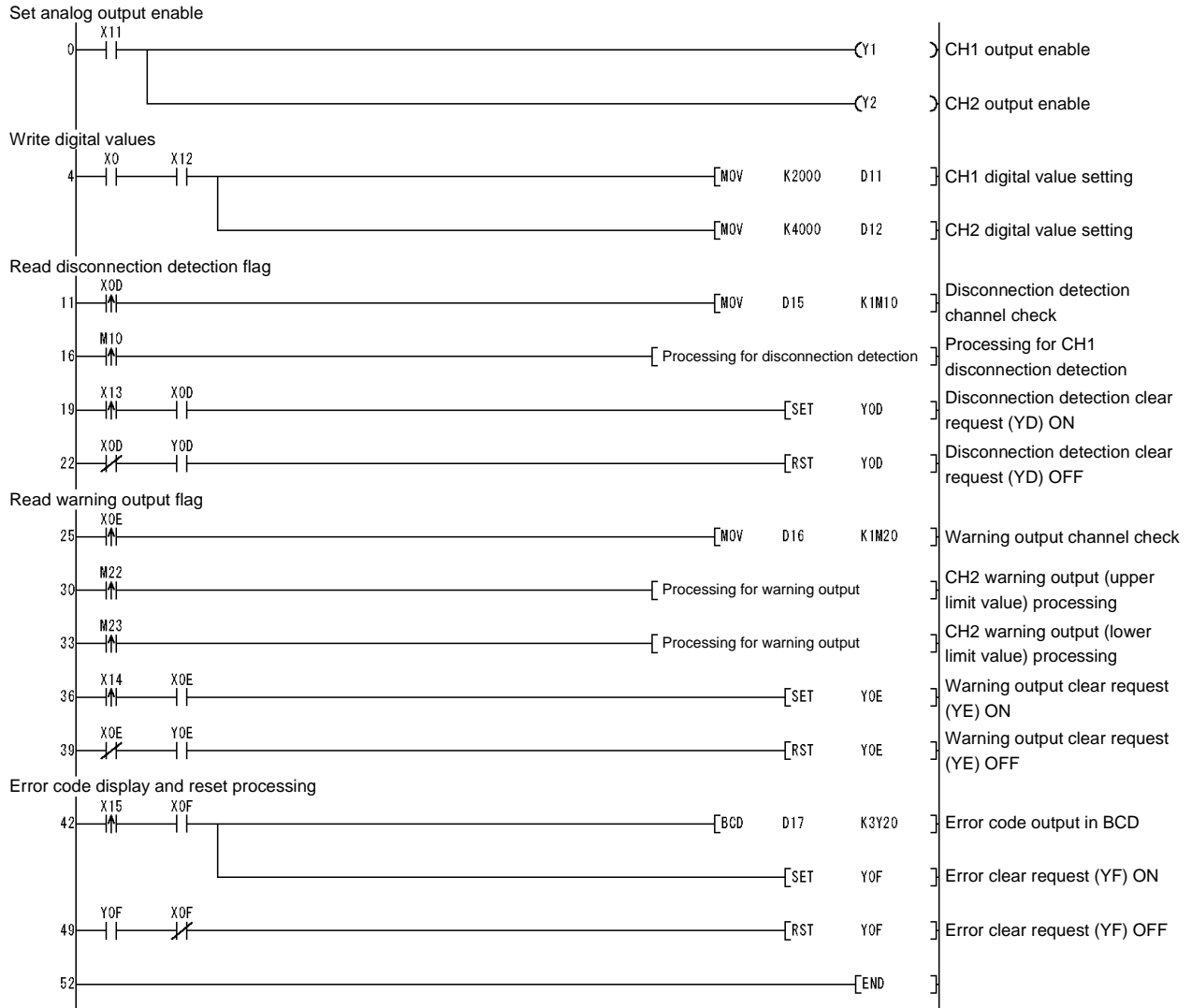
(b) Automatic refresh setting (Refer to Section 5.5)

- CH1, CH2 digital values D11, D12
- CH1, CH2 output monitor values D13, D14
- Disconnection detection D15
- Warning output D16
- Error code D17

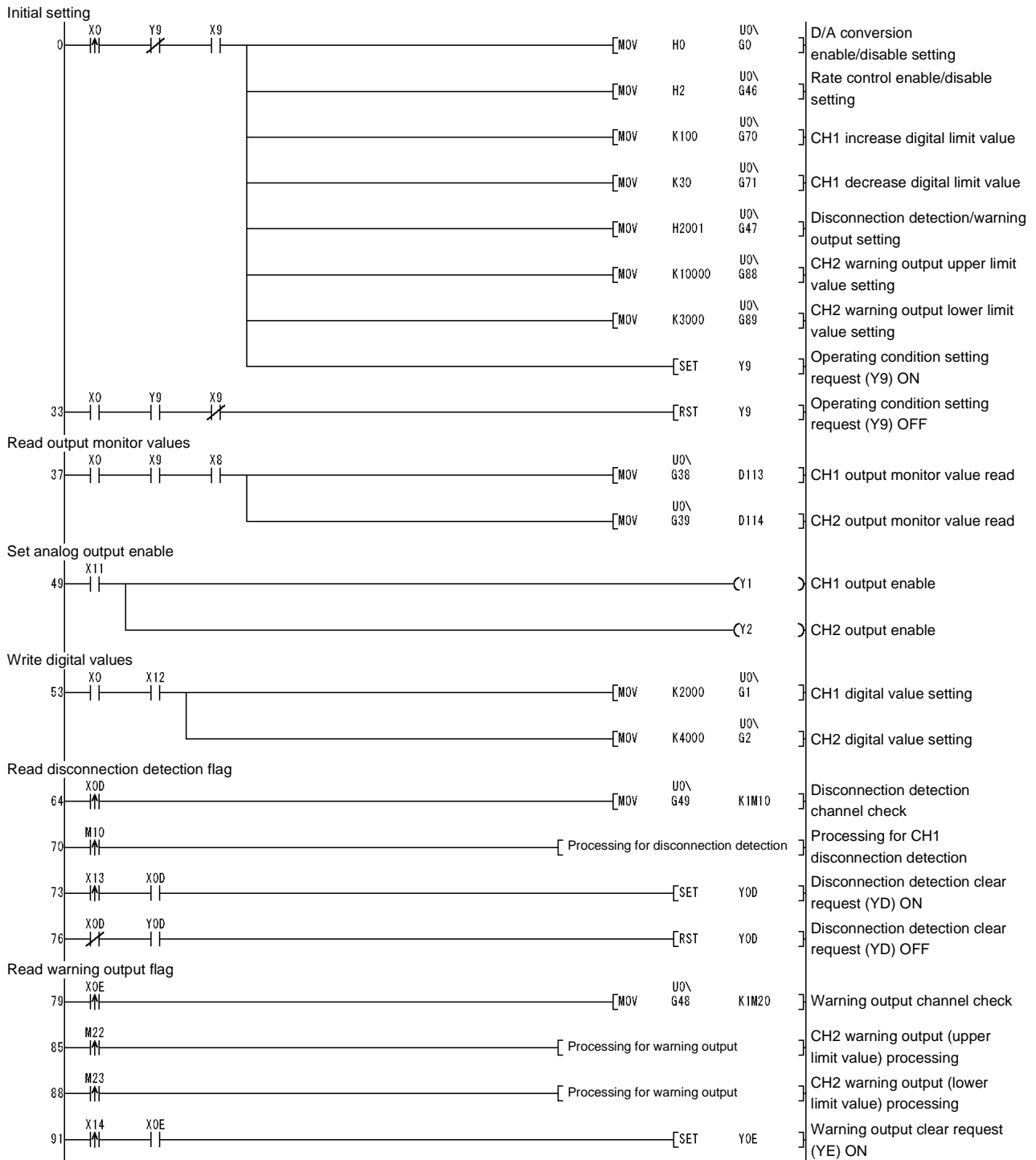


- (c) Write of intelligent function module parameters (Refer to Section 5.3.3)
 Write the intelligent function module parameters to the CPU module.
 Perform this operation on the parameter setting module selection screen.

(2) Program example



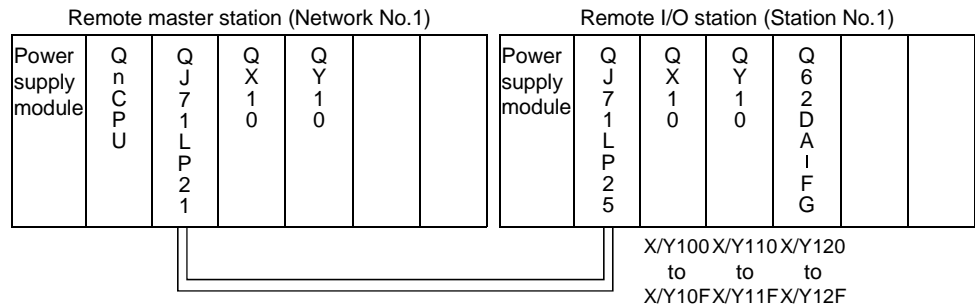
6.2.2 Programming example without using the utility package



6.3 For Use on Remote I/O Network

System configuration used in the program explanation

(1) System configuration



Perform the following intelligent function module switch settings in advance.

- Switch 1 0030H (CH1: 4 to 20mA, CH2: 0 to 5V)
- Switch 2 Empty
- Switch 3 0000H (CH1, CH2: Clear)
- Switch 4 0000H (Normal mode (D/A conversion processing))
- Switch 5 0000H (0: Fixed)

(2) Program conditions

The digital values of CH1 and CH2 of the Q62DA-FG are written and their output monitor values are read to the PLC CPU of the remote master station. If a digital value write error occurs, the corresponding error code is displayed in BCD.

(a) Initial settings

- Analog output enabled channel.....CH1, CH2
- Rate control enabled channel.....CH1 (increase digital limit value: 100, decrease digital limit value: 30)
- Disconnection detection enabled channel ...CH1
- Warning output enabled channel.....CH2 (warning output upper limit value: 10000, warning output lower limit value: 3000)

(b) Devices used by user

- Initial setting request signalX20
- Output enable.....X21
- Digital value write signalX22
- Disconnection detection reset signal.....X23
- Warning output reset signalX24
- Error code reset signal.....X25
- Error code display (BCD 3 digits)Y30 to Y3B
- CH1 digital valueW11
- CH2 digital valueW12
- CH1 output monitor valueW113
- CH2 output monitor valueW114
- Disconnection detection flag.....W115
- Warning output flag.....W116
- Error code.....W117
- Disconnection detection channel flag.....M10
- Warning output channel flagM22, M23

6.3.1 Program example using the utility package

(1) Operating GX Developer

(a) Network parameter setting

- Network type : MNET/H (remote master)
- Head I/O No. : 0000H
- Network No. : 1
- Total number of (slave) stations : 1
- Mode : Online
- Network range assignment :

StationNo.	M station -> R station						M station <- R station					
	Y			Y			X			X		
	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End
1	256	0100	01FF	256	0000	00FF	256	0100	01FF	256	0000	00FF

StationNo.	M station -> R station			M station <- R station			M station -> R station			M station <- R station		
	B			B			W			W		
	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End
1							256	0000	00FF	256	0100	01FF

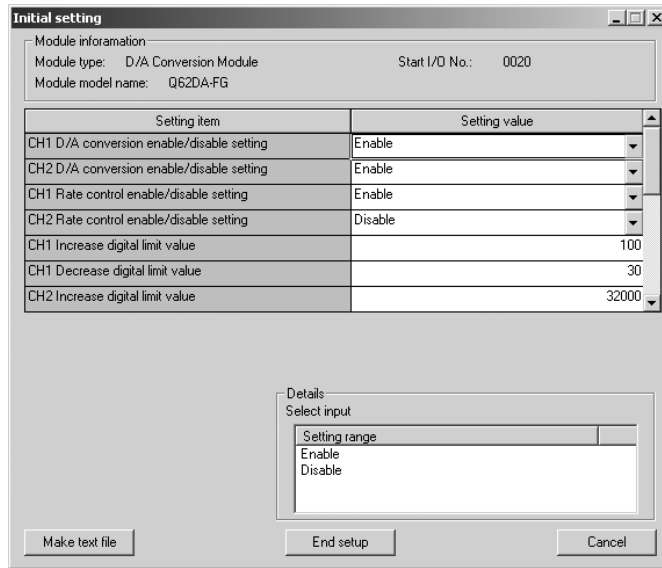
- Refresh parameters :

	Link side						PLC side				
	Dev. name	Points	Start	End	Points		Start	End			
Transfer SB	SB	512	0000	01FF	↔	SB	512	0000	01FF		
Transfer SW	SW	512	0000	01FF	↔	SW	512	0000	01FF		
Random cyclic	LB				↔						
Random cyclic	LW				↔						
Transfer1	LB	8192	0000	1FFF	↔	B	8192	0000	1FFF		
Transfer2	LW	8192	0000	1FFF	↔	w	8192	0000	1FFF		
Transfer3	LX	512	0000	01FF	↔	X	512	0000	01FF		
Transfer4	LY	512	0000	01FF	↔	Y	512	0000	01FF		
Transfer5					↔						
Transfer6					↔						

(2) Operating the utility package

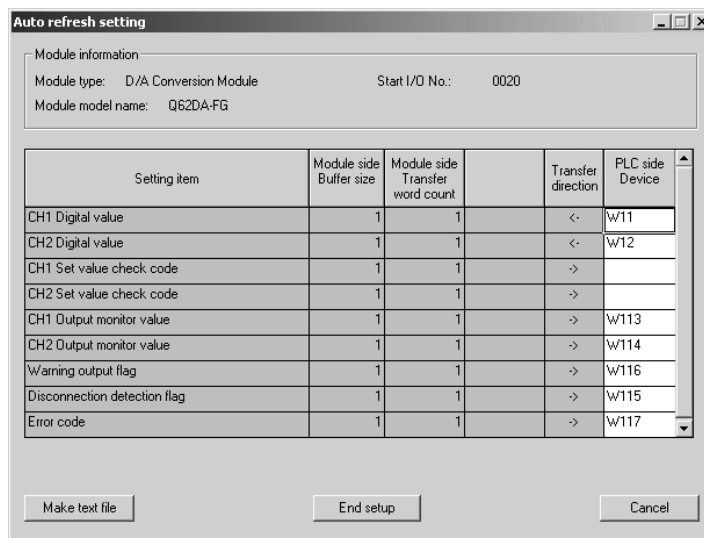
(a) Initial setting (see Section 5.4)

- CH1, CH2 D/A conversion enable/disable setting "Enable"
- CH1 rate control enable/disable setting..... "Enable"
- CH1 increase digital limit value..... "100"
- CH1 decrease digital limit value "30"
- CH1 disconnection detection setting "Enable"
- CH2 warning output setting..... "Enable"
- CH2 warning output upper limit value..... "10000"
- CH2 warning output lower limit value "3000"



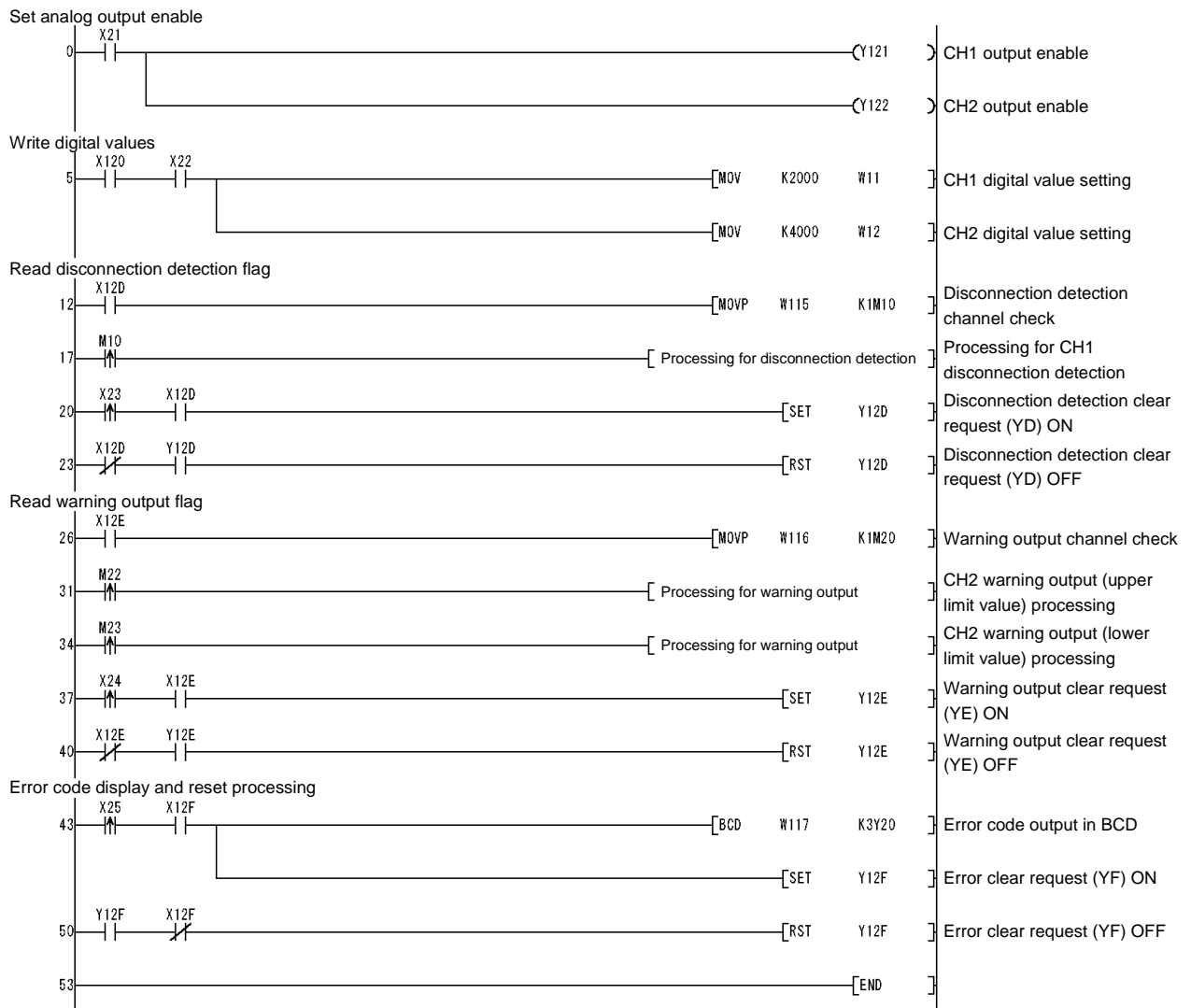
(b) Auto refresh setting (see Section 5.5)

- CH1, CH2 digital values W11, W12
- CH1, CH2 output monitor values W113, W114
- Disconnection detection W115
- Warning output W116
- Error code W117



- (c) Write of intelligent function module parameters (Refer to Section 5.3.3)
 Write the intelligent function module parameters to the CPU module.
 Perform this operation on the parameter setting module selection screen.

(3) Programming example



6.3.2 Program example without using the utility package

(1) Operation of GX Developer (Network parameter setting)

- Network type : MNET/H (remote master)
- Head I/O No. : 0000H
- Network No. : 1
- Total number of (slave) stations : 1
- Mode : Online
- Network range assignment :

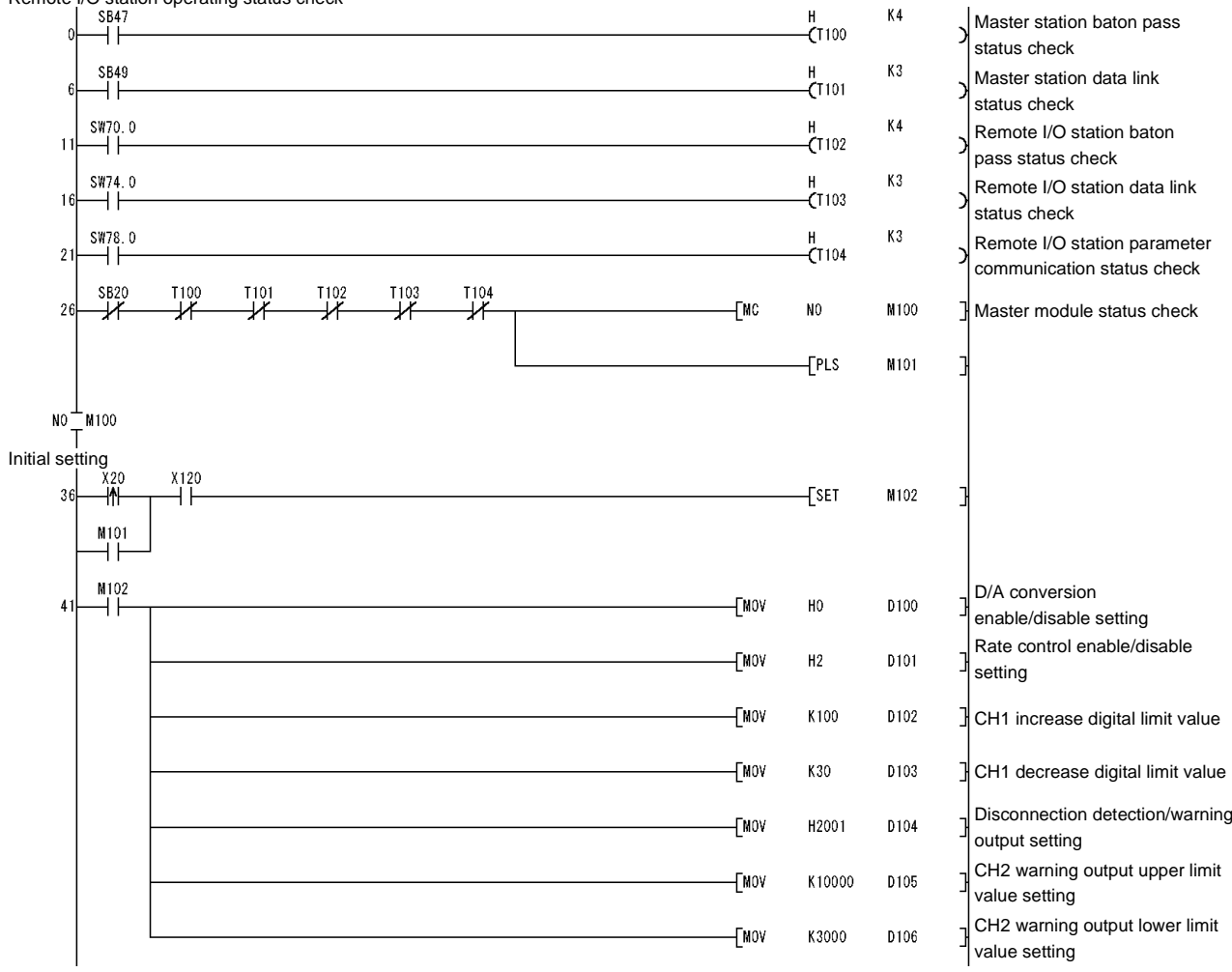
StationNo.	M station -> R station						M station <- R station					
	Y			Y			X			X		
	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End
1	256	0100	01FF	256	0000	00FF	256	0100	01FF	256	0000	00FF

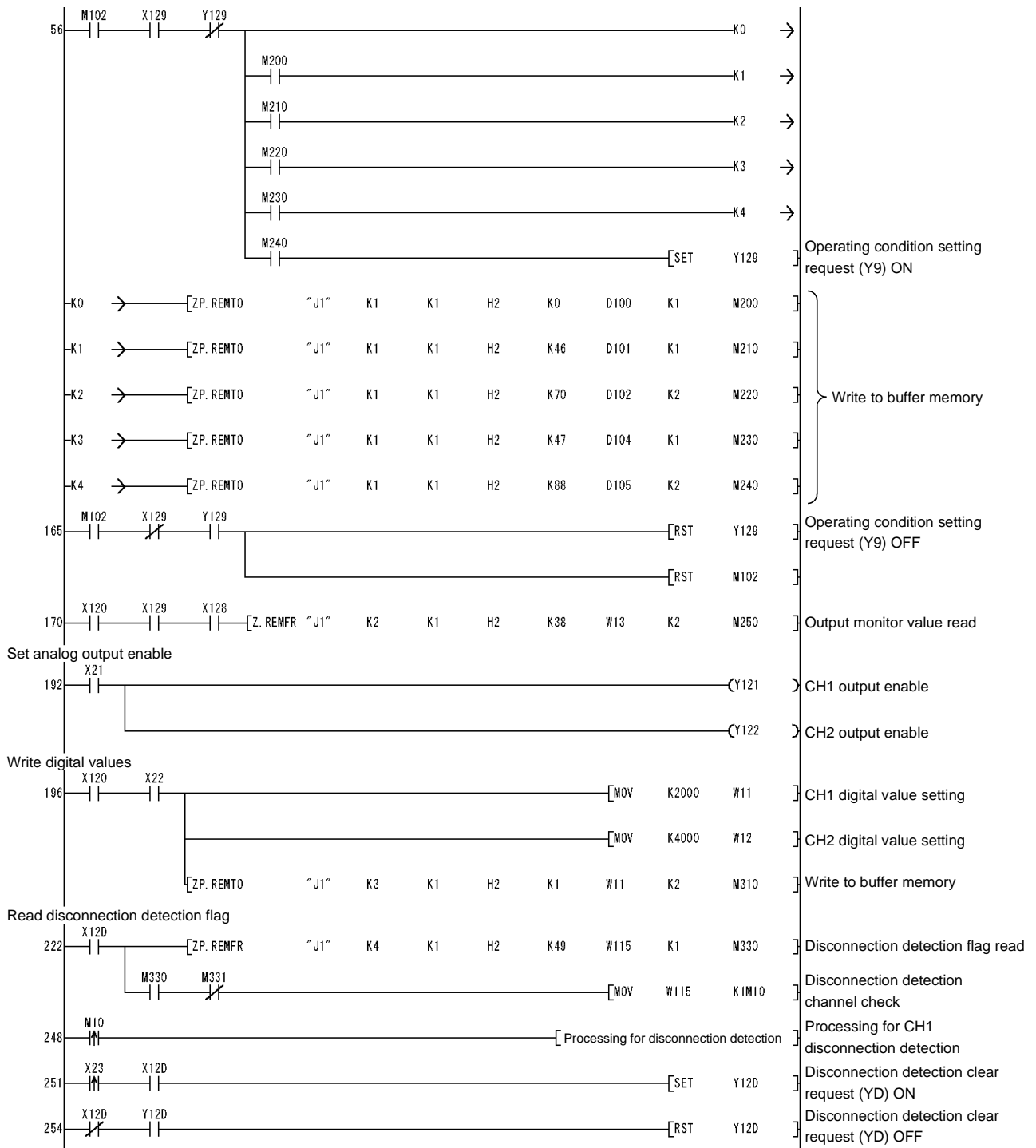
- Refresh parameters :

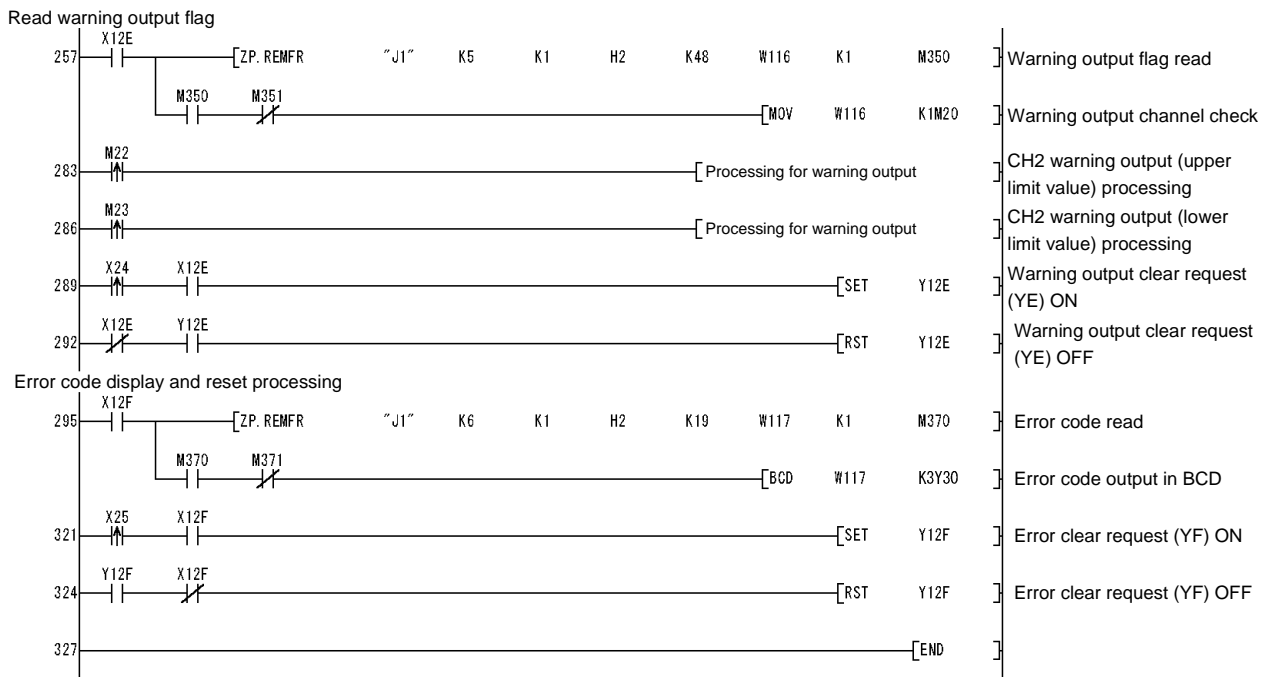
	Link side					PLC side			
	Dev. name	Points	Start	End		Dev. name	Points	Start	End
Transfer SB	SB	512	0000	01FF	↔	SB	512	0000	01FF
Transfer SW	SW	512	0000	01FF	↔	SW	512	0000	01FF
Random cyclic	LB				↔	▼			
Random cyclic	LW				↔	▼			
Transfer1	LB	8192	0000	1FFF	↔	B	8192	0000	1FFF
Transfer2	LW	8192	0000	1FFF	↔	W	8192	0000	1FFF
Transfer3	LX	512	0000	01FF	↔	X	512	0000	01FF
Transfer4	LY	512	0000	01FF	↔	Y	512	0000	01FF
Transfer5	▼				↔	▼			
Transfer6	▼				↔	▼			

(2) Programming example

Remote I/O station operating status check







7 ONLINE MODULE CHANGE

This chapter describes the specifications of an online module change.

- (1) Perform an online module change by operating GX Developer.
- (2) To ensure ease of offset/gain re-setting, there is a user range save/restoration function that is performed by executing the dedicated instruction or read/write from/to buffer memory.

POINT
<ol style="list-style-type: none"> (1) Perform an online module change after making sure that the system outside the PLC will not malfunction. (2) To prevent an electric shock and malfunction of operating modules, provide means such as switches for powering off each of the external power supply and external devices connected to the module to be replaced online. (3) After the module has failed, data may not be saved properly. Referring to Section 3.4.18, therefore, prerecord the data to be saved (offset/gain values of the industrial shipment settings and user range settings in the buffer memory). (4) It is recommended to perform an online module change in the actual system in advance to ensure that it would not affect the other modules by checking the following: <ul style="list-style-type: none"> • Means of cutting off the connection to external devices and its configuration are correct. • Switching ON/OFF does not bring any undesirable effect. (5) Do not mount/remove the module onto/from base unit more than 50 times (IEC 61131-2-compliant), after the first use of the product. Failure to do so may cause the module to malfunction due to poor contact of connector.

(Note)

The dedicated instruction cannot be executed during an online module change. When using the dedicated instruction to execute save/restoration, therefore, execute save/restoration in the other system*.

If the other system is unavailable, execute restoration by performing write to the buffer memory.

* : If the module is mounted on the remote I/O station, execute save/restoration in the other system mounted on the main base unit. (Save/restoration cannot be executed in the other system mounted on the remote I/O station.)

7.1 Online Module Change Conditions

The CPU, MELSECNET/H remote I/O module, Q62DA-FG, GX Developer and base unit given below are needed to perform an online module change.

(1) CPU

The Q12PHCPU or Q25PHCPU is needed.

For precautions for multiple PLC system configuration, refer to the Process CPU User's Manual (Function Explanation/Program Fundamentals).

(2) MELSECNET/H remote I/O module

The module of function version D or later is necessary.

(3) Q62DA-FG

The module of function version C or later is necessary.

(4) GX Developer

GX Developer of Version 7.10L or later is necessary.

GX Developer of Version 8.18U or later is required to perform an online module change on the remote I/O station.

(5) Base unit

1) When the slim type main base unit (Q3□SB) is used, an online module change cannot be performed.

2) When the power supply module unnecessary type extension base unit (Q5□B) is used, online module change cannot be performed for the modules on all the base units connected.

7.2 Online Module Change Operations

The following gives the operations performed for an online module change.

CPU operation ○: Executed ×: Not executed						(User operation)	(Intelligent function module operation)
X/Y refresh	FROM/TO instruction * 1	Dedicated instruction	Device test	GX Configurator			
				Initial setting parameter	Monitor/test		
○	○	○	○	×	○	<p>(1) Conversion disable</p> <p>Turn OFF all Y signals that were turned ON by a sequence program. *2</p> <p>(2) Dismounting of module</p> <p>Operate GX Developer to start an online module change.</p> <p>Click the [Execution] button of GX Developer to make the module dismountable.</p> <p>Dismount the corresponding module.</p> <p>(3) Mounting of new module</p> <p>Mount a new module.</p> <p>After mounting the module, click the [Execution] button of GX Developer.</p> <p>Operation check before control start</p> <p>(4) Operation check</p> <p>Click the [Cancel] button of GX Developer to leave the online mode.</p> <p>Conduct an operation test on the new module using "Device test" of GX Developer or "Monitor/test" of GX Configurator.</p> <p>Perform user range restoration processing by write to buffer memory at this point.</p> <p>Operation check completed</p> <p>(5) Resumption of control</p> <p>Operate GX Developer to resume the online module change mode, and click the [Execution] button to resume control.</p>	<p>Module is operating as usual.</p> <p>Module stops operating.</p> <ul style="list-style-type: none"> • RUN LED turns off. • Conversion disabled. • Analog output is 0V/0mA. <p>*3</p> <p>X/Y refresh resumes and the module starts.</p> <ul style="list-style-type: none"> • RUN LED turns on. • Default operation (X0 remains OFF) <p>(When there are initial setting parameters, operation is performed according to the initial setting parameters at this point.)</p> <p>Module operates according to test operation *4</p> <p>X0 (Module Ready) turns ON.</p> <p>Start is made when X0 turns from OFF to ON. Operation is performed according to the initial setting sequence.*4</p>
×	×	×	×	×	×		
○	×	×	×	○	×		
○	×	×	○	×	○		
○	○	○	○	×	○		

* 1: Access to the intelligent function module device (U□G□) is included.

* 2: Operating the intelligent function module switches (* 3) starts the module and resumes X/Y refresh. When there are initial setting parameters, operation is performed according to the initial setting parameters.

Hence, if the Y signals are not turned OFF, analog outputs will be provided at this point. Therefore, always turn OFF the Y signals that were turned ON by the sequence program.

* 4: In the absence of the operation marked * 4, the operation of the intelligent function module is the operation performed prior to that.

7.3 Online Module Change Procedure

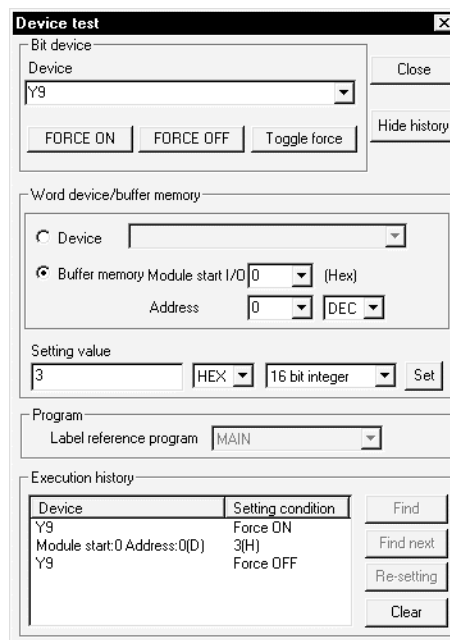
There are the following online module change procedures depending on whether the user range setting has been made or not, whether the initial setting of GX Configurator-DA has been made or not, and whether the other system exists or not.

Range setting	Initial setting	Other system	Reference section
Industrial shipment setting	GX Configurator-DA	—	Section 7.3.1
Industrial shipment setting	Sequence program	—	Section 7.3.2
User range setting	GX Configurator-DA	Present	Section 7.3.3
User range setting	GX Configurator-DA	Absent	Section 7.3.4
User range setting	Sequence program	Present	Section 7.3.5
User range setting	Sequence program	Absent	Section 7.3.6

7.3.1 When industrial shipment setting is used and initial setting was made with GX Configurator-DA

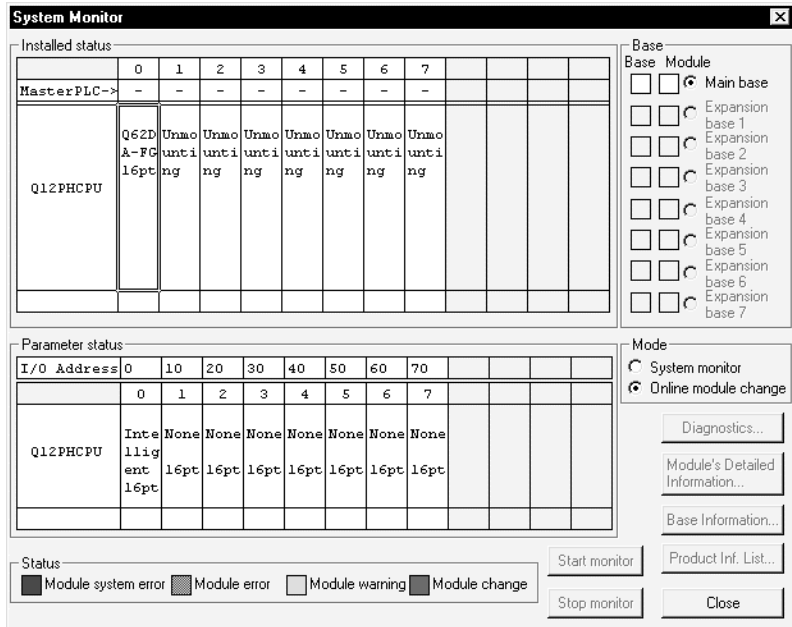
(1) Conversion disable

- (a) Set D/A Conversion enable/disable setting (buffer memory address 0: Un\G0) for all channel conversion disable and turn Operating condition setting request (Y9) from OFF to ON to stop conversion. After confirming that conversion has stopped with the actual analog output value, turn OFF Operating condition setting request (Y9).

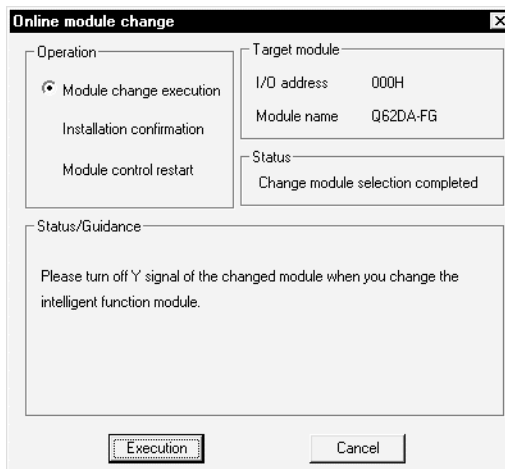


(2) Dismounting of module

- (a) After choosing [Diagnosis] - [Online module change] on GX Developer to enter the "Online module change" mode, double-click the module to be changed online to display the "Online module change" screen.



- (b) Click the "Execution" button to enable a module change.



If the following error screen appears, click the [OK] button, dismount the module as-is, and mount a new module.



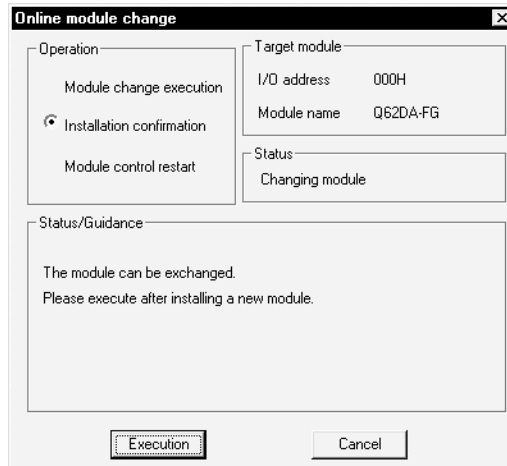
- (c) After confirming that the "RUN" LED of the module has turned off, remove the terminal block and dismount the module.

POINT

Always dismount the module. If mounting confirmation is made without the module being dismounted, the module will not start properly and the "RUN" LED will not be lit.

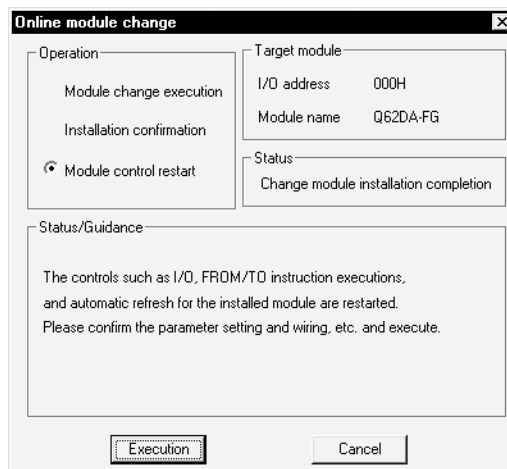
(3) Mounting of new module

- (a) Mount a new module to the same slot and install the terminal block.
- (b) After mounting the module, click the [Execution] button and make sure that the "RUN" LED is lit. Module Ready (X0) remains OFF.



(4) Operation check

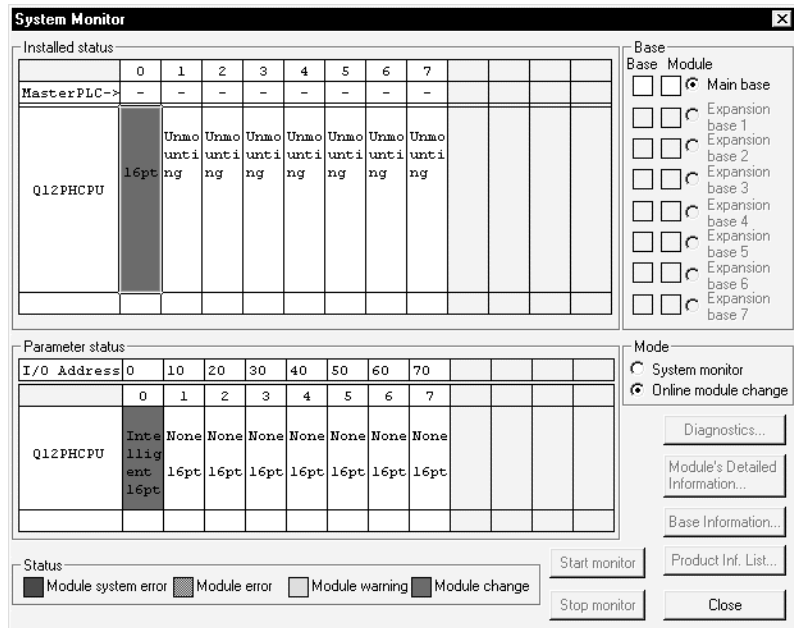
- (a) To make an operation check, click the [Cancel] button to cancel control resumption.



- (b) Click the [OK] button to leave the "Online module change" mode.



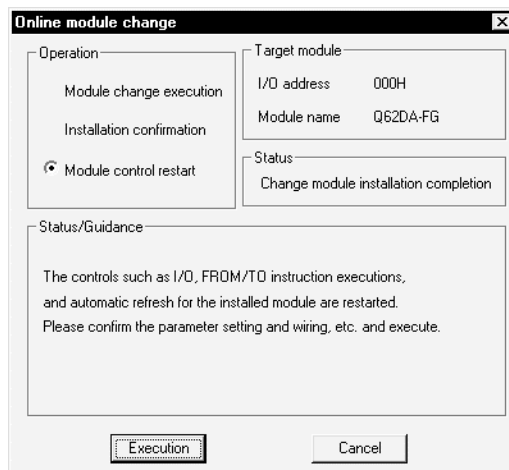
- (c) Click the [Close] button to close the System monitor screen.



- (d) Set digital values to the digital values (buffer memory addresses 1, 2: Un\G1, 2) and turn Operating condition setting request (Y9) from OFF to ON. Turn ON the output enable/disable flag (Y1, Y2) of the used channel to check whether proper conversion has been made or not. (Be careful since analog outputs are provided actually.)

(5) Resumption of control

- (a) After choosing [Diagnosis] - [Online module change] on GX Developer to redisplay the "Online module change" screen, click the [Execution] button to resume control. The FROM/TO instruction for the module resumes.



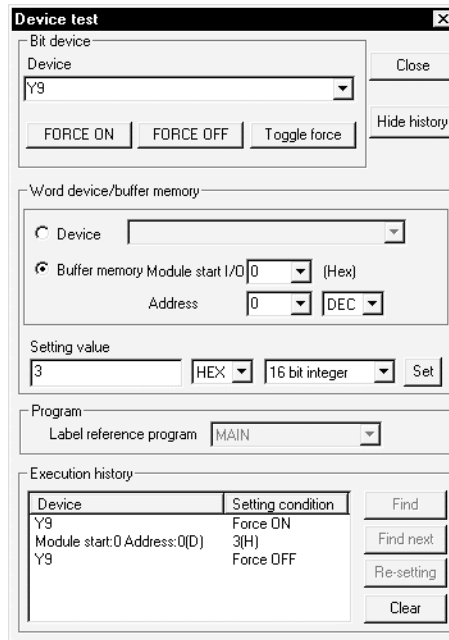
- (b) The "Online module change completed" screen appears.



7.3.2 When industrial shipment setting is used and initial setting was made with sequence program

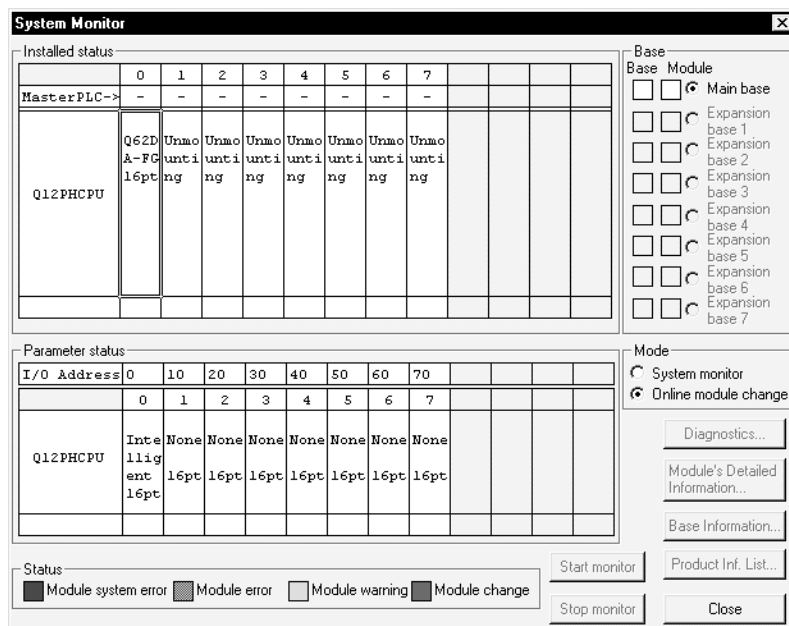
(1) Conversion disable

- (a) Set D/A Conversion enable/disable setting (buffer memory address 0: Un\G0) for all channel conversion disable and turn Operating condition setting request (Y9) from OFF to ON to stop conversion. After confirming that conversion has stopped with the actual analog output value, turn OFF Operating condition setting request (Y9).

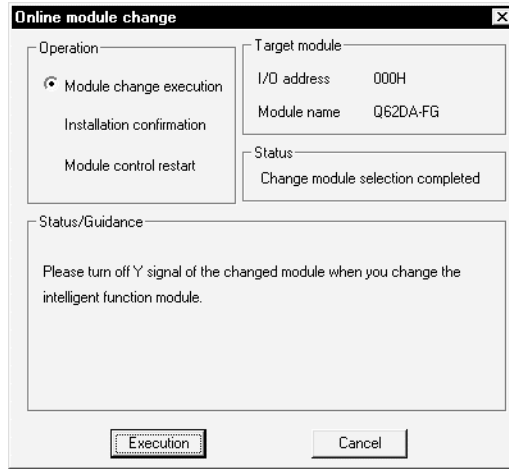


(2) Dismounting of module

- (a) After choosing [Diagnosis] - [Online module change] on GX Developer to enter the "Online module change" mode, double-click the module to be changed online to display the "Online module change" screen.



- (b) Click the "Execution" button to enable a module change.



If the following error screen appears, click the [OK] button, dismount the module as-is, and mount a new module.



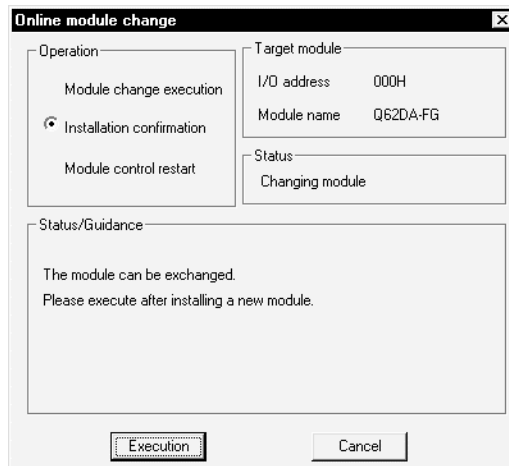
- (c) After confirming that the "RUN" LED of the module has turned off, remove the terminal block and dismount the module.

POINT

Always dismount the module. If mounting confirmation is made without the module being dismounted, the module will not start properly and the "RUN" LED will not be lit.

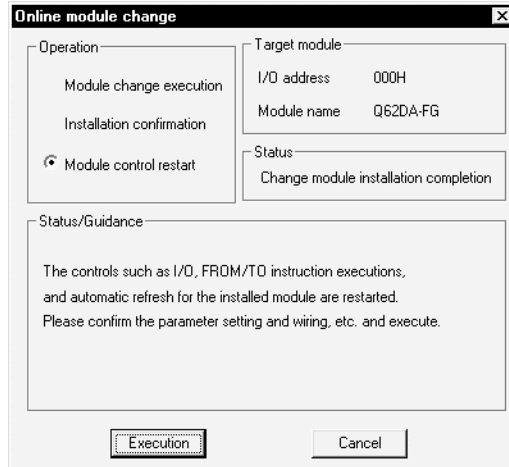
(3) Mounting of new module

- (a) Mount a new module to the same slot and install the terminal block.
- (b) After mounting the module, click the [Execution] button and make sure that the "RUN" LED is lit. Module Ready (X0) remains OFF.

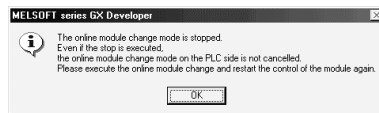


(4) Operation check

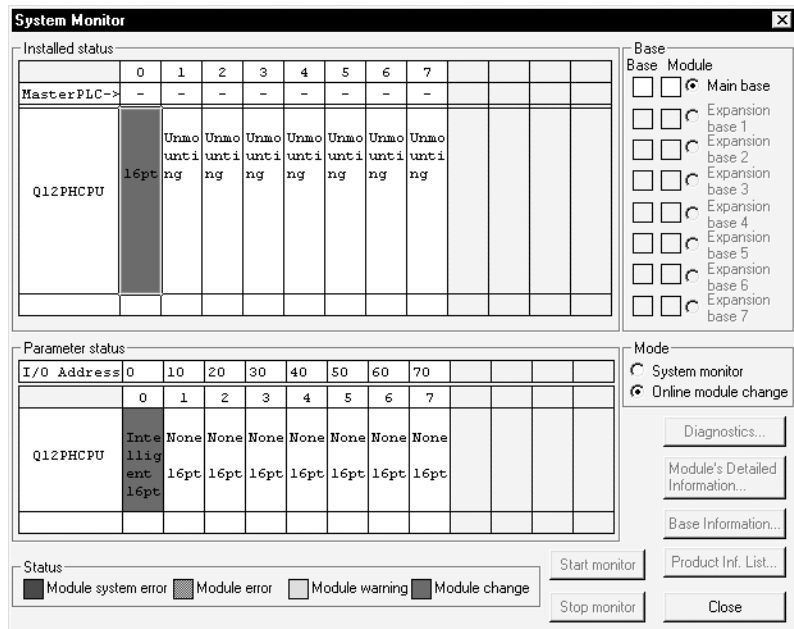
- (a) To make an operation check, click the [Cancel] button to cancel control resumption.



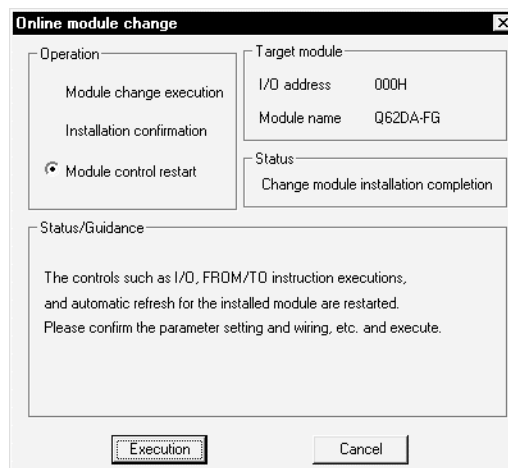
- (b) Click the [OK] button to leave the "Online module change" mode.



- (c) Click the [Close] button to close the System monitor screen.



- (d) Referring to (1), enable the conversion of the channels to be used, set digital values to the digital values (buffer memory addresses 1, 2: Un\G1, 2), and turn Operating condition setting request (Y9) from OFF to ON. Turn ON the output enable/disable flag (Y1, Y2) of the used channel to check whether proper conversion has been made or not.
(Be careful since analog outputs are provided actually.)
- (e) Since the new module is in a default status, it must be initialized by a sequence program after control resumption.
Before performing initialization, check whether the contents of the initialization program are correct or not.
- 1) Normal system configuration
The sequence program should perform initialization on the leading edge of Module READY (X9) of the Q62DA-FG.
When control resumption is executed, Module READY (X0) turns ON and initialization is performed. (If the sequence program performs initialization only one scan after RUN, initialization is not performed.)
 - 2) When used on remote I/O network
Insert a user device that will execute initialization at any timing (initialization request signal) into the sequence program. After control resumption, turn ON the initialization request signal to perform initialization. (If the sequence program performs initialization only one scan after a data link start of the remote I/O network, initialization is not performed.)
- (5) Resumption of control
- (a) After choosing [Diagnosis] - [Online module change] on GX Developer to redisplay the "Online module change" screen, click the [Execution] button to resume control. The FROM/TO instruction for the module resumes.



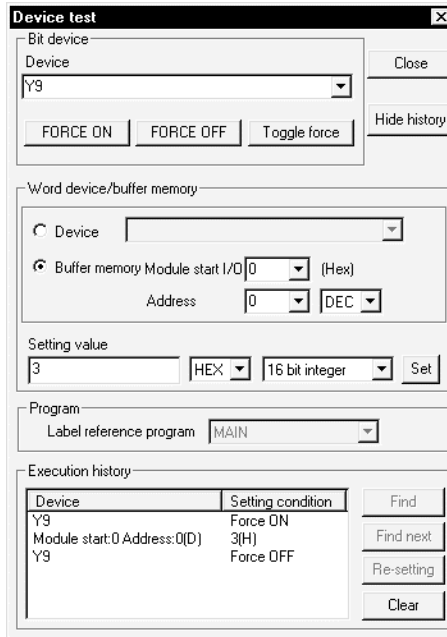
- (b) The "Online module change completed" screen appears.



7.3.3 When user range setting is used and initial setting was made with GX Configurator-DA (other system is available)

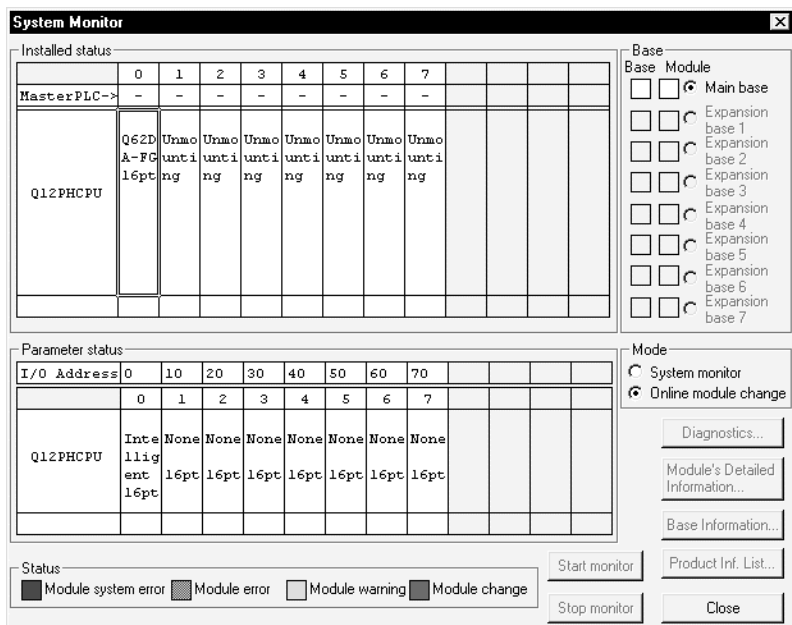
(1) Conversion disable

- (a) Set D/A Conversion enable/disable setting (buffer memory address 0: Un\G0) for all channel conversion disable and turn Operating condition setting request (Y9) from OFF to ON to stop conversion. After confirming that conversion has stopped with the actual analog output value, turn OFF Operating condition setting request (Y9).

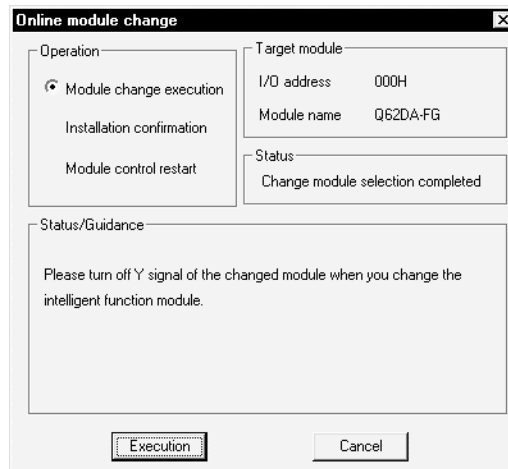


(2) Dismounting of module

- (a) After choosing [Diagnosis] - [Online module change] on GX Developer to enter the "Online module change" mode, double-click the module to be changed online to display the "Online module change" screen.



- (b) Click the "Execution" button to enable a module change.



If the following error screen appears, the user range cannot be saved. Click the [OK] button, and perform the operation in Section 7.3.4 (2)(c) and later.



- (c) After confirming that the "RUN" LED of the module has turned off, remove the terminal block and dismount the module.

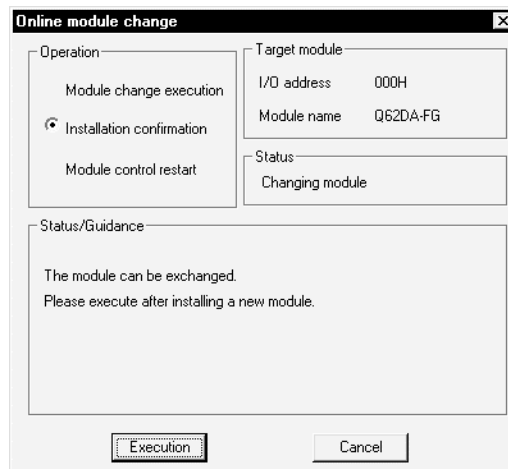
POINT

Always dismount the module. If mounting confirmation is made without the module being dismounted, the module will not start properly and the "RUN" LED will not be lit.

(3) Mounting of new module

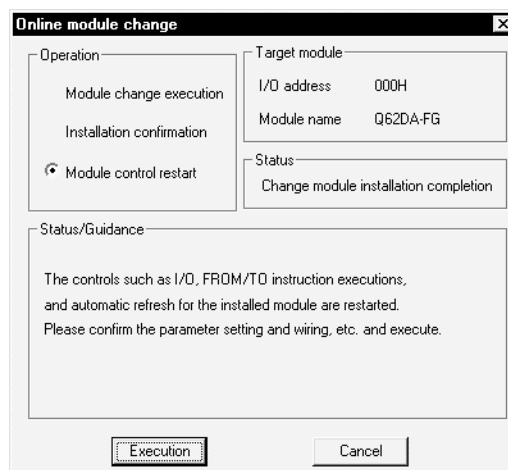
- (a) Mount the dismounted module and new module to the other system.
- (b) Using the G.OGLOAD instruction, save the user set values to the CPU device. Refer to Appendix 1.2 for the G.OGLOAD instruction.
- (c) Using the G.OGSTOR instruction, restore the user set values to the module. Refer to Appendix 1.3 for the G.OGSTOR instruction.
- (d) Dismount the new module from the other system, mount it to the slot from where the old module was dismounted in the original system, and install the terminal block.

- (e) After mounting the module, click the [Execution] button and make sure that the "RUN" LED is lit. Module Ready (X0) remains OFF.

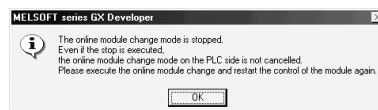


(4) Operation check

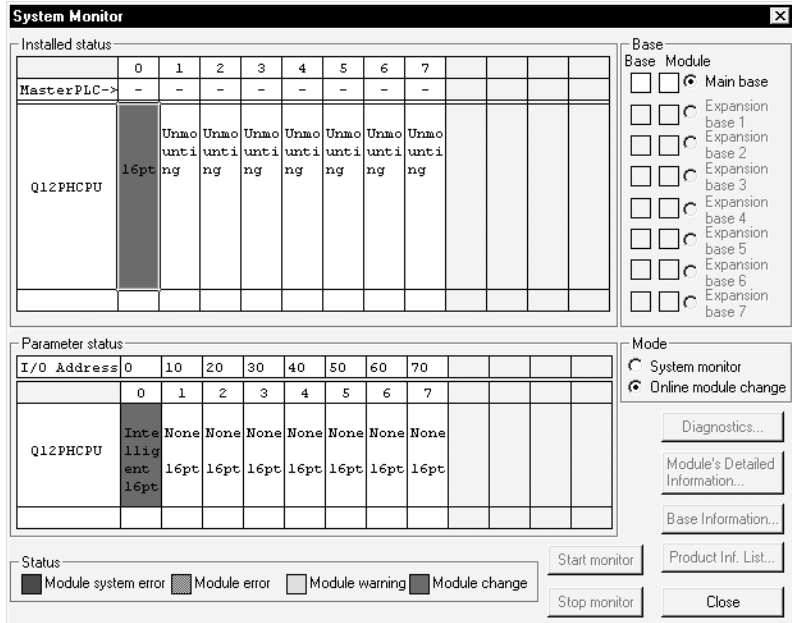
- (a) To make an operation check, click the [Cancel] button to cancel control resumption.



- (b) Click the [OK] button to leave the "Online module change" mode.



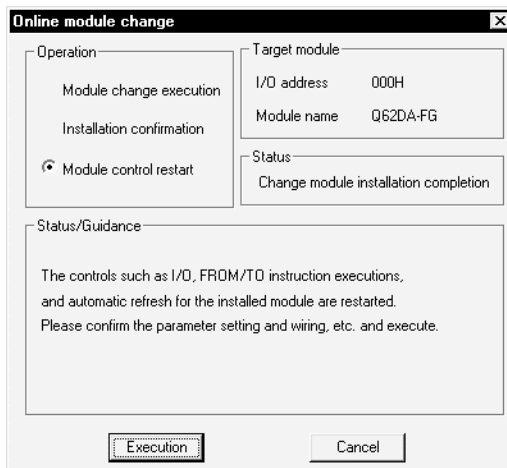
- (c) Click the [Close] button to close the System monitor screen.



- (d) Set digital values to the digital values (buffer memory addresses 1, 2: Un/G1, 2) and turn Operating condition setting request (Y9) from OFF to ON. Turn ON the output enable/disable flag (Y1, Y2) of the used channel to check whether proper conversion has been made or not. (Be careful since analog outputs are provided actually.)

(5) Resumption of control

- (a) After choosing [Diagnosis] - [Online module change] on GX Developer to redisplay the "Online module change" screen, click the [Execution] button to resume control. The FROM/TO instruction for the module resumes.



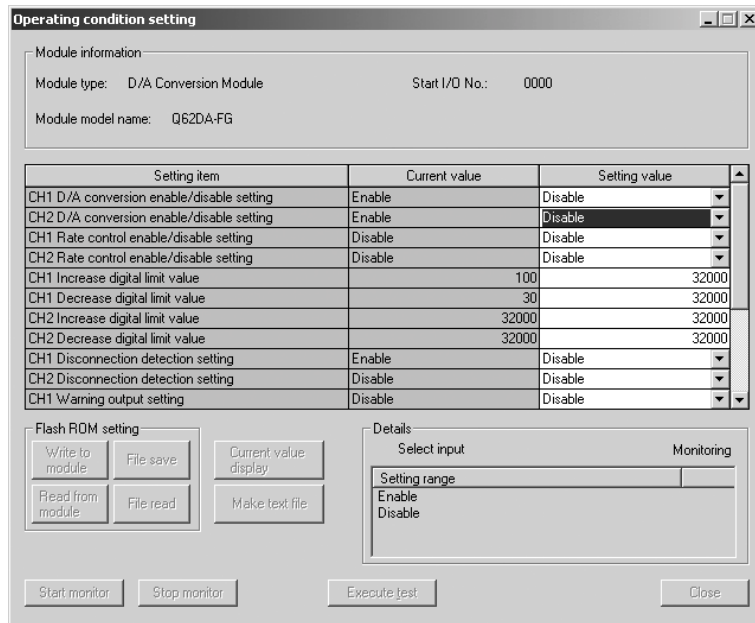
- (b) The "Online module change completed" screen appears.



7.3.4 When user range setting is used and initial setting was made with GX Configurator-DA (other system is unavailable)

(1) Conversion disable

- (a) On the Operating condition setting screen of GX Configurator-DA, set "Disable" in the Setting value field of CH□ D/A conversion enable/disable setting, and click the [Execute test] button.



- (b) After making sure that the indication in the Current value field of CH□ D/A conversion enable/disable setting is "Disable", change the Setting value field of Operating condition setting request to "Setting request", and click the [Execute test] button to stop conversion. Confirm that conversion has stopped with the actual analog output value.



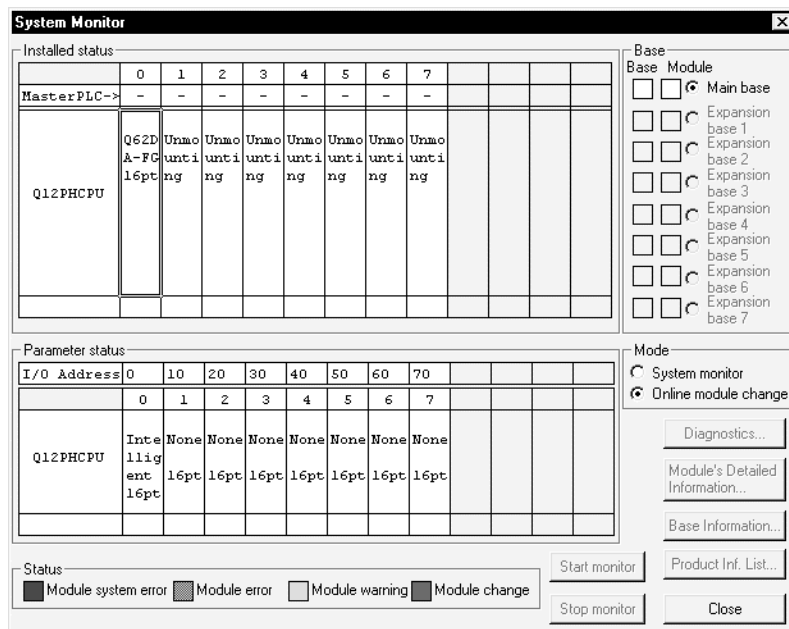
- (c) If the saved buffer memory contents are not yet prerecorded, record them in the following procedure.
 - 1) Display the pass data screen of GX Configurator-DA.
 - 2) Select the user range used for pass data classification setting, and make a pass data read request. (Refer to Section 5.6.3.)
 - 3) Compare the current values of the industrial shipment settings and user range settings offset/gain values with those of the range reference table. Refer to Section 7.4 for the range reference table.
 - 4) If the values are proper, record the offset/gain values of the pass data classification setting, industrial shipment settings and user range settings.

POINT

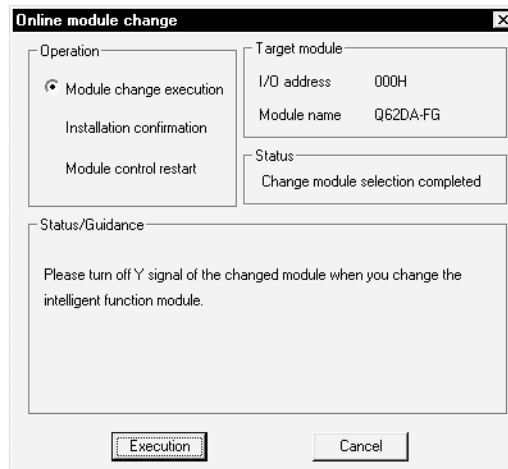
If the buffer memory values compared with the reference table are not proper, save and restoration of the user range cannot be executed.
 Before executing module control resumption, make offset/gain setting in the GX Configurator-DA. (see Section 5.6.2)
 Note that if module control is resumed without offset/gain setting being made, operation will be performed with the default values.

(2) Dismounting of module

- (a) After choosing [Diagnosis] - [Online module change] on GX Developer to enter the "Online module change" mode, double-click the module to be changed online to display the "Online module change" screen.



- (b) Click the "Execution" button to enable a module change.



If the following error screen appears, the user range cannot be saved. Click the [OK] button, and perform the operation in Section (2)(c) and later.



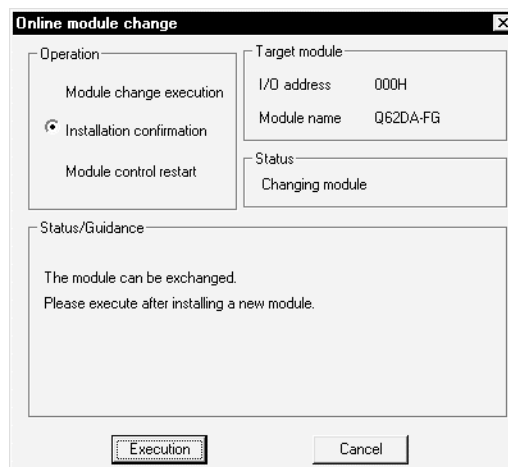
- (c) After confirming that the "RUN" LED of the module has turned off, remove the terminal block and dismount the module.

POINT

Always dismount the module. If mounting confirmation is made without the module being dismounted, the module will not start properly and the "RUN" LED will not be lit.

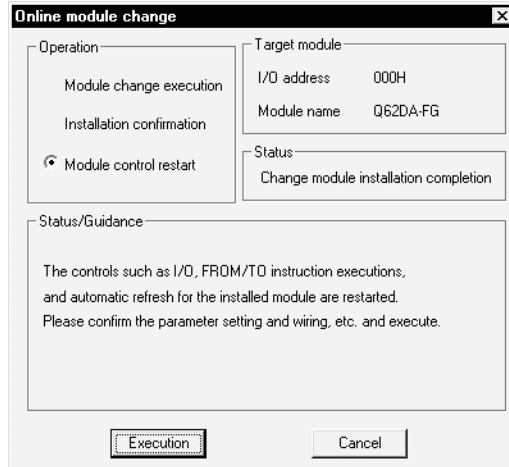
(3) Mounting of new module

- (a) Mount a new module to the same slot and install the terminal block.
- (b) After mounting the module, click the [Execution] button and make sure that the "RUN" LED is lit. Module Ready (X0) remains OFF.

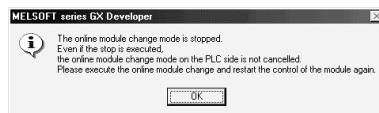


(4) Operation check

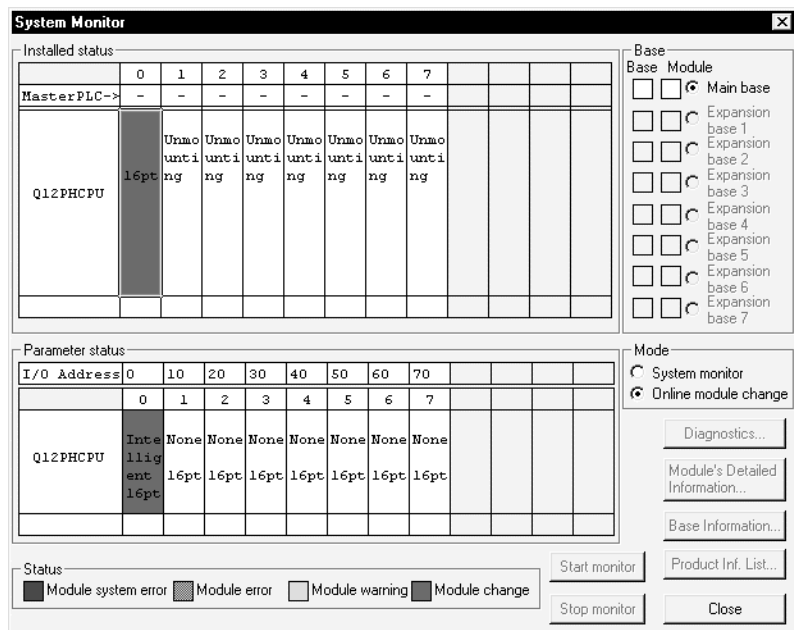
- (a) To make an operation check, click the [Cancel] button to cancel control resumption.



- (b) Click the [OK] button to leave the "Online module change" mode.

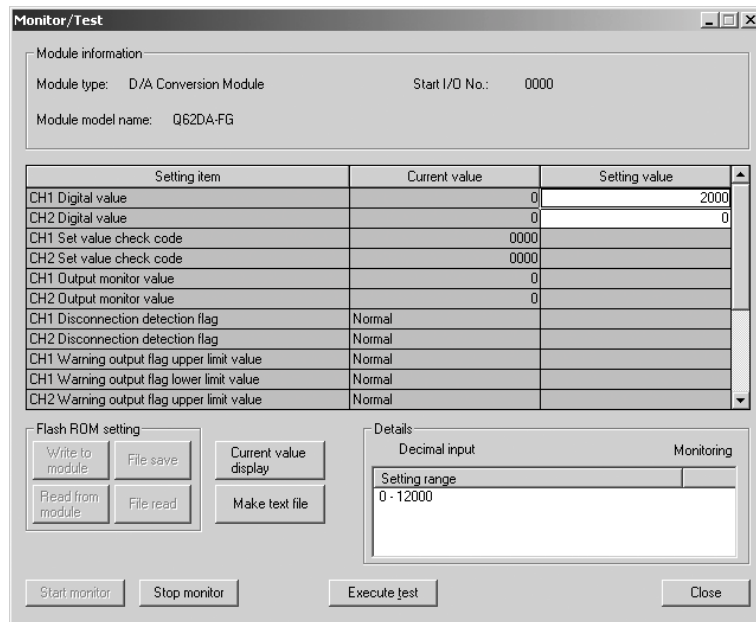


- (c) Click the [Close] button to close the System monitor screen.

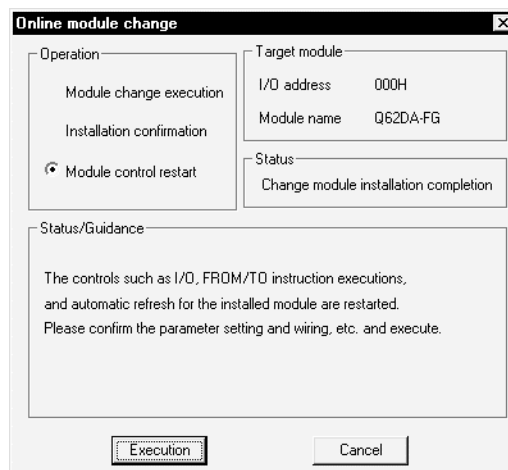


- (d) On the pass data screen of GX Configurator-DA, set the prerecorded values and make a pass data write request. (Refer to Section 5.6.3.)
- (e) Referring to (1), change the D/A conversion enable/disable setting of the used channel to conversion enable.

- (f) On the monitor/test screen of GX Configurator-DA, set a value in the Setting value field of CH□ digital value of the used channel, and click the [Execute test] button.



- (g) Turn ON the output enable/disable flag (Y1, Y2) of the used channel and check whether proper conversion has been made or not. (Be careful since analog outputs are provided actually)
- (5) Resumption of control
- (a) After choosing [Diagnosis] - [Online module change] on GX Developer to redisplay the "Online module change" screen, click the [Execution] button to resume control. The FROM/TO instruction for the module resumes.



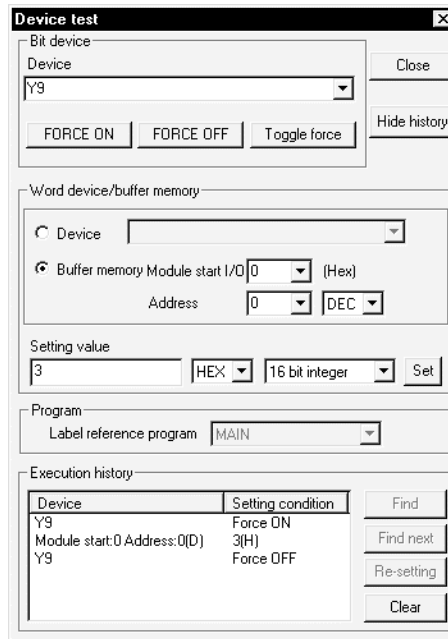
- (b) The "Online module change completed" screen appears.



7.3.5 When user range setting is used and initial setting was made with sequence program (other system is available)

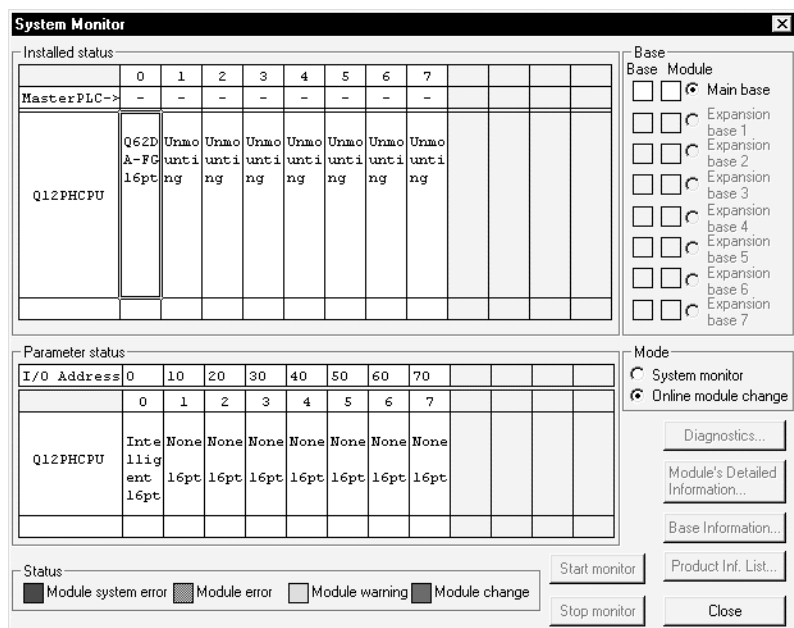
(1) Conversion disable

- (a) Set D/A Conversion enable/disable setting (buffer memory address 0: Un\G0) for all channel conversion disable and turn Operating condition setting request (Y9) from OFF to ON to stop conversion. After confirming that conversion has stopped with the actual analog output value, turn OFF Operating condition setting request (Y9).

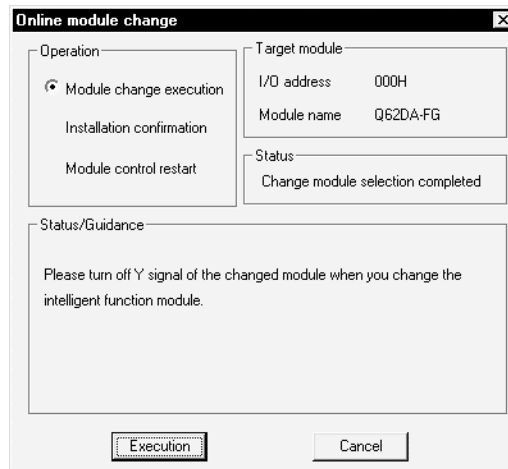


(2) Dismounting of module

- (a) After choosing [Diagnosis] - [Online module change] on GX Developer to enter the "Online module change" mode, double-click the module to be changed online to display the "Online module change" screen.



- (b) Click the "Execution" button to enable a module change.



If the following error screen appears, the user range cannot be saved. Click the [OK] button, and perform the operation in Section 7.3.6 (2)(c) and later.



- (c) After confirming that the "RUN" LED of the module has turned off, remove the terminal block and dismount the module.

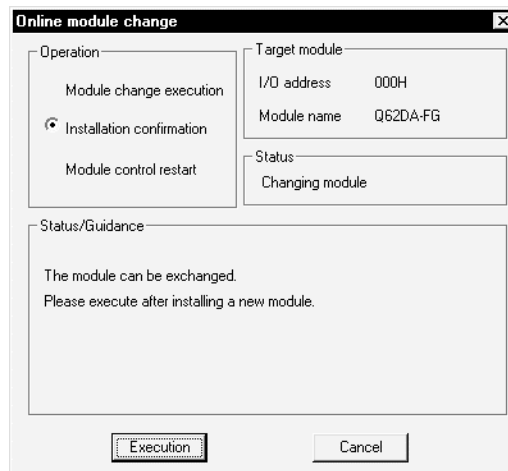
POINT

Always dismount the module. If mounting confirmation is made without the module being dismounted, the module will not start properly and the "RUN" LED will not be lit.

(3) Mounting of new module

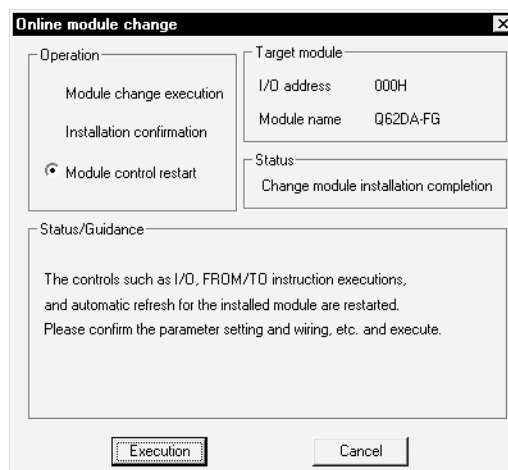
- (a) Mount the dismounted module and new module to the other system.
- (b) Using the G.OGLOAD instruction, save the user set values to the CPU device. Refer to Appendix 1.2 for the G.OGLOAD instruction.
- (c) Using the G.OGSTOR instruction, restore the user set values to the module. Refer to Appendix 1.3 for the G.OGSTOR instruction.
- (d) Dismount the new module from the other system, mount it to the slot from where the old module was dismounted in the original system, and install the terminal block.

- (e) After mounting the module, click the [Execution] button and make sure that the "RUN" LED is lit. Module Ready (X0) remains OFF.



(4) Operation check

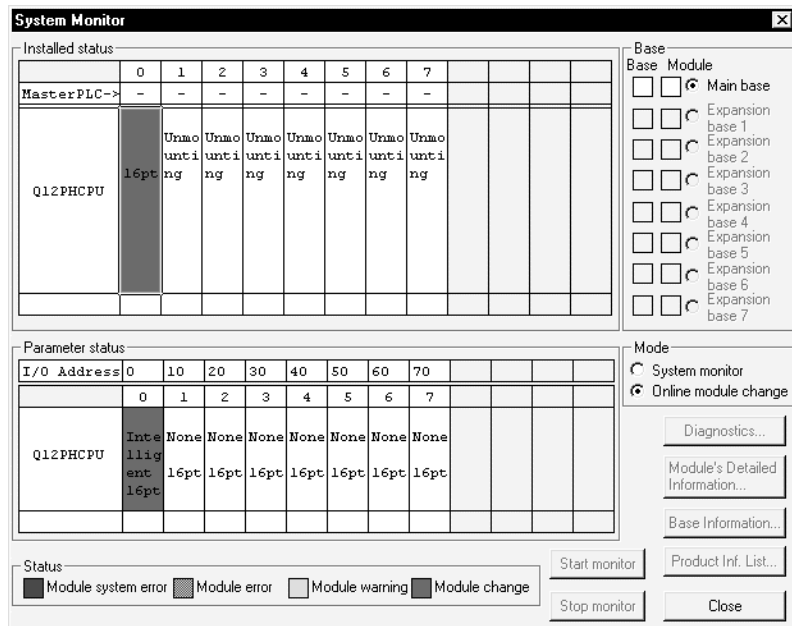
- (a) To make an operation check, click the [Cancel] button to cancel control resumption.



- (b) Click the [OK] button to leave the "Online module change" mode.



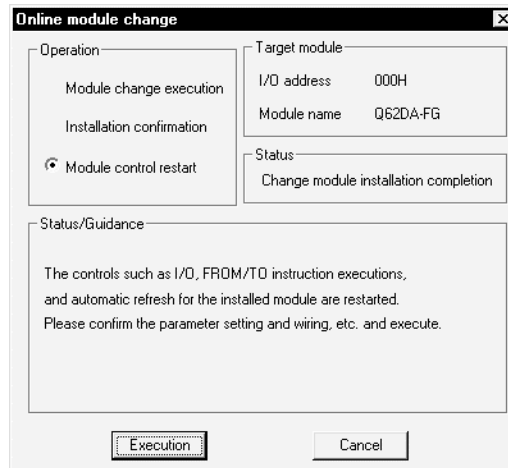
- (c) Click the [Close] button to close the System monitor screen.



- (d) Referring to (1), enable the conversion of the channels to be used, set digital values to the digital values (buffer memory addresses 1, 2: Un\G1, 2), and turn Operating condition setting request (Y9) from OFF to ON. Turn ON the output enable/disable flag (Y1, Y2) of the used channel to check whether proper conversion has been made or not. (Be careful since analog outputs are provided actually.)
- (e) Since the new module is in a default status, it must be initialized by a sequence program after control resumption. Before performing initialization, check whether the contents of the initialization program are correct or not.
- 1) Normal system configuration
The sequence program should perform initialization on the leading edge of Module READY (X9) of the Q62DA-FG. When control resumption is executed, Module READY (X0) turns ON and initialization is performed. (If the sequence program performs initialization only one scan after RUN, initialization is not performed.)
 - 2) When used on remote I/O network
Insert a user device that will execute initialization at any timing (initialization request signal) into the sequence program. After control resumption, turn ON the initialization request signal to perform initialization. (If the sequence program performs initialization only one scan after a data link start of the remote I/O network, initialization is not performed.)

(5) Resumption of control

- (a) After choosing [Diagnosis] - [Online module change] on GX Developer to redisplay the "Online module change" screen, click the [Execution] button to resume control. The FROM/TO instruction for the module resumes.



- (b) The "Online module change completed" screen appears.

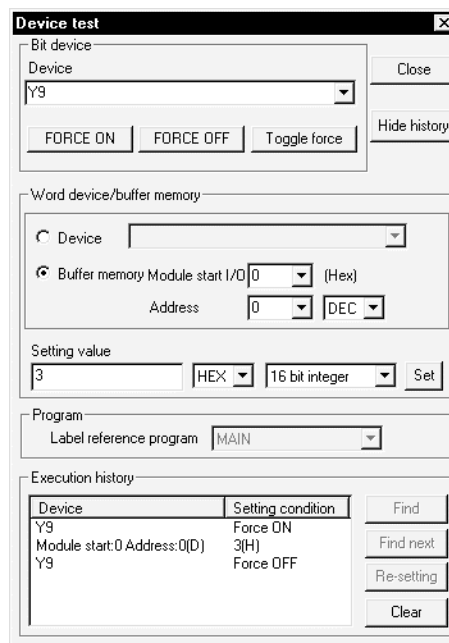


7.3.6 When user range setting is used and initial setting was made with sequence program (other system is unavailable)

(1) Conversion disable

(a) Set D/A Conversion enable/disable setting (buffer memory address 0: Un\G0) for all channel conversion disable and turn Operating condition setting request (Y9) from OFF to ON to stop conversion.

After confirming that conversion has stopped with the actual analog output value, turn OFF Operating condition setting request (Y9).



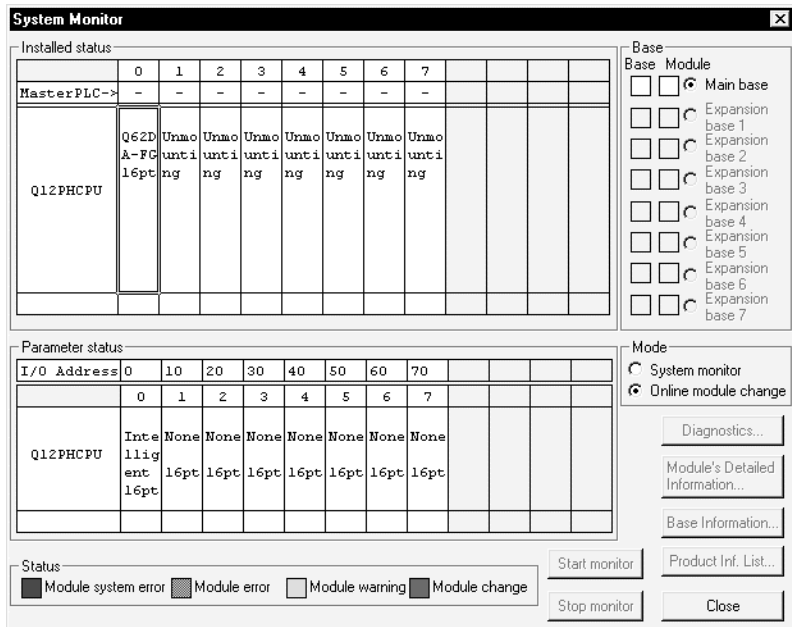
- (b) If the saved buffer memory contents are not yet prerecorded, record them in the following procedure.
- 1) Make the pass data classification setting (buffer memory address 200: Un\G200).
 - 2) Turn Operation Condition Setting Request (Y9) from OFF to ON.
 - 3) Compare the offset/gain values of the industrial shipment settings and user range settings (buffer memory addresses 202 to 217: Un\G202 to Un\G217) with the range reference table. Refer to Section 7.4 for the range reference table.
 - 4) If the values are proper, record the offset/gain values of the pass data classification setting, industrial shipment settings and user range settings.

POINT

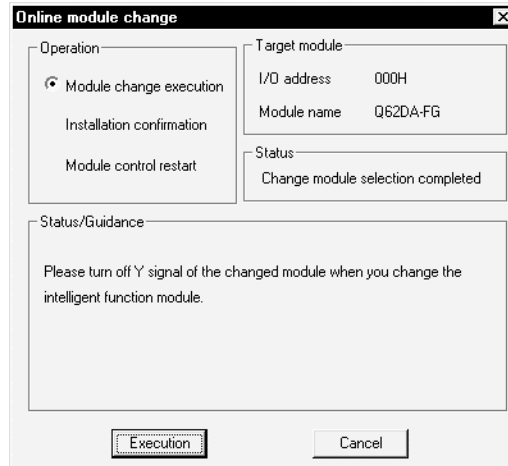
If the buffer memory values compared with the reference table are not proper, save and restoration of the user range cannot be executed.
 Before executing module control resumption, follow the flowchart in Section 4.6 and make offset/gain setting in the device test of GX Developer.
 Perform mode switching by making the setting of the mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159) and turning Operation Condition Setting Request (Y9) from OFF to ON.
 Note that if module control is resumed without offset/gain setting being made, operation will be performed with the default values.

(2) Dismounting of module

- (a) After choosing [Diagnosis] - [Online module change] on GX Developer to enter the "Online module change" mode, double-click the module to be changed online to display the "Online module change" screen.



- (b) Click the "Execution" button to enable a module change.



If the following error screen appears, the user range cannot be saved. Click the [OK] button, and perform the operation in Section (2)(c) and later.



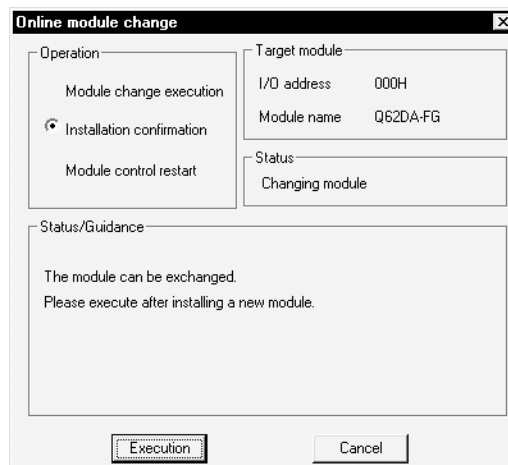
- (c) After confirming that the "RUN" LED of the module has turned off, remove the terminal block and dismount the module.

POINT

Always dismount the module. If mounting confirmation is made without the module being dismounted, the module will not start properly and the "RUN" LED will not be lit.

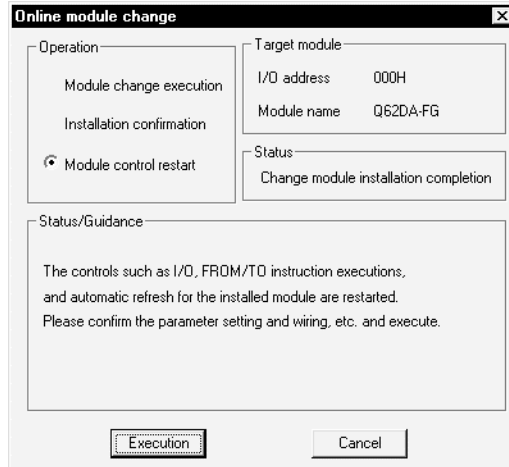
(3) Mounting of new module

- (a) Mount a new module to the same slot and install the terminal block.
 (b) After mounting the module, click the [Execution] button and make sure that the "RUN" LED is lit. Module Ready (X0) remains OFF.



(4) Operation check

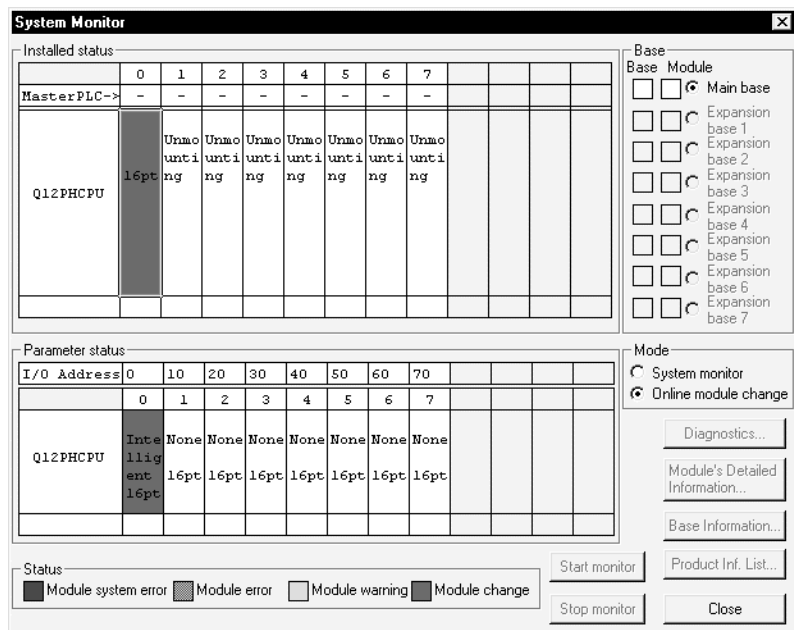
- (a) To make an operation check, click the [Cancel] button to cancel control resumption.



- (b) Click the [OK] button to leave the "Online module change" mode.

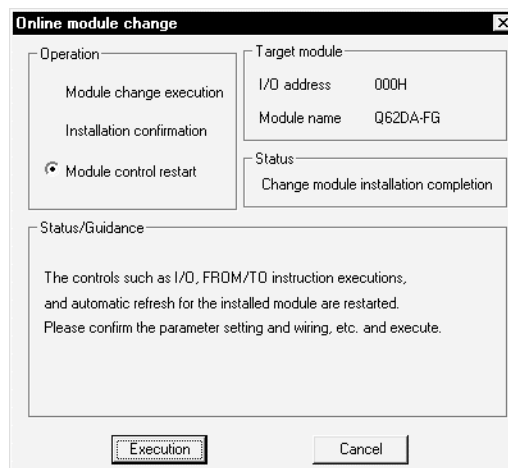


- (c) Click the [Close] button to close the System monitor screen.



- (d) Choose [Online] - [Debug] - [Device test] on GX Developer and set the values prerecorded in Section (2) to the buffer memory.
- (e) Turn the user range write request (YA) from OFF to ON to restore the user set values to the module. After confirming that the offset/gain setting mode status flag (XA) is ON, turn OFF the user range write request (YA).

- (f) Referring to (1), enable the conversion of the channels to be used, set digital values to the digital values (buffer memory addresses 1, 2: Un\G1, 2), and turn Operating condition setting request (Y9) from OFF to ON. Turn ON the output enable/disable flag (Y1, Y2) of the used channel to check whether proper conversion has been made or not.
(Be careful since analog outputs are provided actually.)
- (g) Since the new module is in a default status, it must be initialized by a sequence program after control resumption.
Before performing initialization, check whether the contents of the initialization program are correct or not.
- 1) Normal system configuration
The sequence program should perform initialization on the leading edge of Module READY (X9) of the Q62DA-FG.
When control resumption is executed, Module READY (X0) turns ON and initialization is performed. (If the sequence program performs initialization only one scan after RUN, initialization is not performed.)
 - 2) When used on remote I/O network
Insert a user device that will execute initialization at any timing (initialization request signal) into the sequence program. After control resumption, turn ON the initialization request signal to perform initialization. (If the sequence program performs initialization only one scan after a data link start of the remote I/O network, initialization is not performed.)
- (5) Resumption of control
- (a) After choosing [Diagnosis] - [Online module change] on GX Developer to redisplay the "Online module change" screen, click the [Execution] button to resume control. The FROM/TO instruction for the module resumes.



- (b) The "Online module change completed" screen appears.



7.4 Range Reference Table

The range reference tables are given below.

(1) Reference table for offset/gain values of industrial shipment settings (buffer memory addresses 202 to 209: Un\G202 to 209)

The reference values change depending on the setting of the pass data classification setting (buffer memory address 200: Un\G200).

Address (Decimal)		Description	Pass data classification setting	Reference value (Hexadecimal)
CH1	CH2			
202	204	Industrial shipment settings offset value (used for D/A)	User range setting 1	Approx. 7FC0H
			User range setting 2	Approx. 7FC0H
			User range setting 3	Approx. 14EAH
203	205	Industrial shipment settings gain value (used for D/A)	User range setting 1	Approx. F310H
			User range setting 2	Approx. E830H
			User range setting 3	Approx. 6895H
206	208	Industrial shipment settings offset value (used for monitor output)	User range setting 1	Approx. 0005H
			User range setting 2	Approx. 0920H
			User range setting 3	Approx. 1060H
207	209	Industrial shipment settings gain value (used for monitor output)	User range setting 1	Approx. 6665H
			User range setting 2	Approx. 519BH
			User range setting 3	Approx. 2D50H

(2) Reference table for user range settings offset/gain values (buffer memory addresses 210 to 217: Un\G210 to 217)

Example: When the offset value of channel 1 is 4mA and its gain value is 18mA in user range settings 1, the user range settings offset/gain values are as indicated below.

- CH1 user range settings offset value (for D/A conversion) : Approx. 96D0H
(Buffer memory address 210: Un\G210)
- CH1 user range settings gain value (for D/A conversion) : Approx. E788H
(Buffer memory address 211: Un\G211)
- CH1 user range settings offset value (for monitor output) : Approx. 147EH
(Buffer memory address 214: Un\G214)
- CH1 user range settings gain value (for monitor output) : Approx. 5C29H
(Buffer memory address 215: Un\G215)

Offset/gain value		Reference value for D/A conversion (Hexadecimal)	Reference value for monitor output (Hexadecimal)
User range setting 1	0mA	Approx. 7FC0H	Approx. 0005H
	4mA	Approx. 96D0H	Approx. 147EH
	20mA	Approx. F310H	Approx. 6665H
User range setting 2	-10V	Approx. 6870H	Approx. C0A5H
	0V	Approx. 7FC0H	Approx. 0920H
	10V	Approx. E830H	Approx. 519BH
User range setting 3	1V	Approx. 14EAH	Approx. 01060H
	5V	Approx. 6895H	Approx. 2D50H

7.5 Precautions for Online Module Change

The following are the precautions for online module change.

- (1) Always perform an online module change in the correct procedure. A failure to do so can cause a malfunction or failure.
- (2) If an online module change is made with the user range setting, the accuracy after that will fall to about less than three times of the accuracy before that. Re-set the offset/gain values as necessary.

8 TROUBLESHOOTING

This chapter explains the types of errors that may occur when the Q62DA-FG is used, and how to troubleshoot such errors.

8.1 Error Code List

If an error occurs in Q62DA-FG while writing to or reading data from the PLC CPU, the applicable error code is written to buffer memory address 19 (Un\G19).

Table 8.1 Error code list (1/2)

Error code (decimal)	Error description	Processing
10□	The setting is outside the output range setting that can be made by the intelligent function module switch of the GX Developer. □ indicates the incorrectly specified channel number.	Reset to the correct parameter with GX Developer parameter setting. (See Section 4.5.)
111	Module error at startup.	Turn the power ON and OFF again. If the error occurs again, the module may be malfunctioning. Contact the nearest distributor or branch office with a description of the problem.
112	The value set to the intelligent function switch 5 is other than 0.	Re-set the correct parameter value in the parameter setting of GX Developer. (Refer to Section 4.5.)
161 *1	The G.OGSTOR instruction was executed in the offset/gain setting mode.	Do not execute the G.OGSTOR instruction in the offset/gain setting mode.
162 *1	<ul style="list-style-type: none"> The G.OGSTOR instruction was executed consecutively. At the time of offset/gain setting, a set value was written to the E²PROM 26 or more times. 	<ul style="list-style-type: none"> Execute the G.OGSTOR instruction only once for one module. At the time of offset/gain setting, write a set value only once at one time.
163 *1	The G.OGSTOR instruction was executed for the model that differs from the model for which the G.OGLOAD instruction had been executed.	Execute the G.OGLOAD and G.OGSTOR instructions for the same model.
164	The value set to the G.OGLOAD instruction, G.OGSTOR instruction or pass data classification setting (buffer memory address 200: Un\G200) is outside the range.	Set the value within the range.
40□ *1	The offset value is equal to or larger than the gain value. □ indicates the channel number causing the error.	Reset so that the offset value becomes smaller than the gain value.
500 *1	More than one channel was set at the same time during offset/gain settings.	Set the correct value in buffer memory addresses 22 and 23 (Un\G22 and Un\G23).
60□ *2	The specified digital value is outside the valid range. □ indicates the channel number where the error occurred.	Set a value that is within the valid range.
61□ *1	The warning output upper/lower limit value setting is outside the range -16384 to 16383. □ indicates the channel number incorrectly set.	Correct the contents of the buffer memory addresses 86 to 89 (Un\G86 to 89) to within the range -16384 to 16383.

Table 8.1 Error code list (2/2)

Error code (decimal)	Error description	Processing
62□*1	The warning output lower limit value is equal to or greater than the warning output upper limit value. □ indicates the channel number incorrectly set.	Make setting so that the warning output upper limit value is greater than the warning output lower limit value.
700*1	The analog adjustment output in the offset/gain setting mode is outside the specified value range.	Change the contents of buffer memory address 24 (Un\G24) so that it is within the range from -3000 to 3000.
71□*1	The offset/gain range setting is outside the range D _H to F _H .	Correct the contents of the buffer memory address 25 (Un\G25) to within the range D _H to F _H .
80□*1	The increase/decrease digital limit value setting is outside the range 0 to 32000. □ indicates the channel number incorrectly set.	Correct the contents of the buffer memory addresses 70 to 73 (Un\G70 to 73) to within the range 0 to 32000.

POINT

- (1) When two or more errors occur, the latest error code is stored.
- (2) The error described with *1 can be cleared by setting the error clear request (YF) to ON.
- (3) If the error marked *2 occurs continuously, it is added to the error history of GX Developer in each conversion cycle.

8.2 Troubleshooting

8.2.1 When the "RUN" LED is flashing or turned off

(1) When flashing

Check item	Corrective action
Is the mode set to the offset/gain setting mode?	Reset switch 4 of the intelligent function module switch setting for GX Developer to the normal mode (see Section 4.5).

(2) When off

Check item	Corrective action
Is power being supplied?	Confirm that the supply voltage for the power supply module is within the rated range.
Is the capacity of the power supply module adequate?	Calculate the current consumption of the CPU module, I/O module and intelligent function module mounted on the base unit to see if the power supply capacity is adequate.
Has a watchdog timer error occurred?	Reset the PLC CPU and verify that it is lit. If the RUN LED does not light even after doing this, the module may be malfunctioning. Contact the nearest distributor or branch office with a description of the problem.
Is the module correctly mounted on the base unit?	Check the mounting condition of the module.
Is a module change enabled during an online module change?	Refer to Chapter 7 and take corrective action.

8.2.2 When the "ERR." LED is on or flashing

(1) When on

Check item	Corrective action
Is an error being generated?	Confirm the error code and take corrective action described in Section 8.1.

(2) When flashing

Check item	Corrective action
Is intelligent function module setting switch 5 set to "other than 0"?	Using GX Developer parameter setting, set intelligent function module setting switch 5 to "0" (see Section 4.5).

8.2.3 When the "ALM" LED is turned on or flashing

(1) When on

Check item	Corrective action
Has the warning output occurred?	Check the warning output flag (buffer memory address 48, Un\G48).

(2) When flashing

Check item	Corrective action
Has disconnection occurred?	Check the disconnection detection flag (buffer memory address 49, Un\G49).

8.2.4 When an analog output value is not output

Check item	Action to be taken
Is 24VDC external power supply being supplied?	Verify that 24VDC voltage is being supplied to the external power supply terminals (terminal numbers 16, 17).
Is there any fault with the analog signal lines such as broken or disconnected line?	Check for any abnormality on the signal lines by doing a visual check and performing a continuity check.
Is the CPU module in the STOP status?	Set the CPU module to the RUN status.
Are the offset/gain settings correct?	Verify that the offset/gain settings are correct (see sections 4.6 and 5.6.2). If the user range setting is being used, switch to a different default input range and check if D/A conversion is correctly performed. If it is correctly performed, redo the offset/gain settings.
Is the output setting range correct?	Verify buffer memory address 20 (Un\G20) in GX Developer monitor. If the output range setting is incorrect, redo GX Developer intelligent function module switch settings (see Section 4.5).
Is the D/A conversion enable/disable setting for the channel to be output set to Disable?	Check the D/A conversion enable/disable setting using buffer memory 0 (Un\G0) in GX Developer monitor and set it to Enable using the sequence program or utility package (see Section 3.4).
Is the D/A output enable/disable setting for the channel to be output set to Disable?	Verify ON/OFF for the output enable/disable flags (Y1, 2) in GX Developer monitor. If the output enable/disable flags are OFF, review the initial setting for the sequence program or utility package (see Section 3.3).
Is the digital value being written to the channel to be output?	Verify buffer memory addresses 1, 2 (Un\G1, Un\G2) in GX Developer monitor (see Section 3.4).
Has the operating condition setting request (Y9) been executed?	Set the operating condition setting request (Y9) from ON to OFF from GX Developer and check to see if the analog output is normal. If normal analog output is obtained, review the initial setting for the sequence program or utility package (see Section 3.3).

POINT

If the analog output value is not output after the proper corrective action is taken in accordance with the above check item, the possible cause is a module failure. Consult the nearest sales representative or branch.

8.2.5 Checking the Q62DA-FG status using GX Developer system monitor

When the Q62DA-FG detail information is selected in GX Developer system monitor, function version, error code, LED ON status and status of the intelligent function module switch setting can be checked.

(1) Operating the GX Developer

[Diagnostics] → [System monitor] → "Select Q62DA-FG" →

Module's Detailed Information

(2) Module Detailed Information

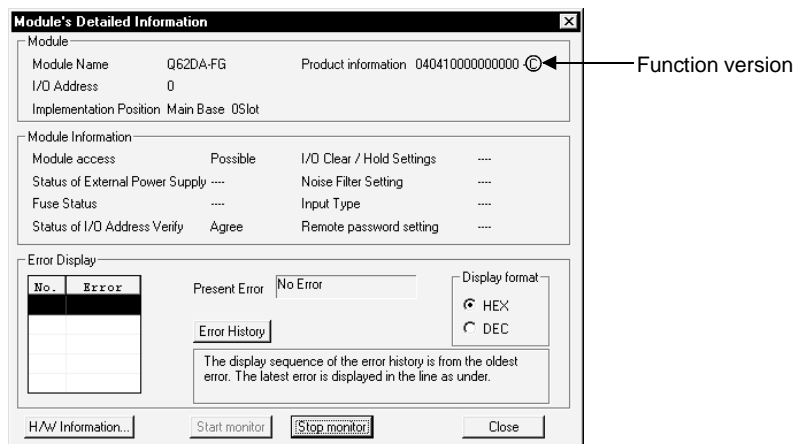
(a) Checking the function version

The function version of the Q62DA-FG is displayed in the product information field.

(b) Checking the error code

The error code stored in buffer memory address 19 (Un\G19) of the Q62DA-FG is displayed in the Present Error field.

(When the **Error History** button is pressed, the contents displayed in the Present Error field are displayed in the No.1 field.)



(3) H/W information

(a) H/W LED information

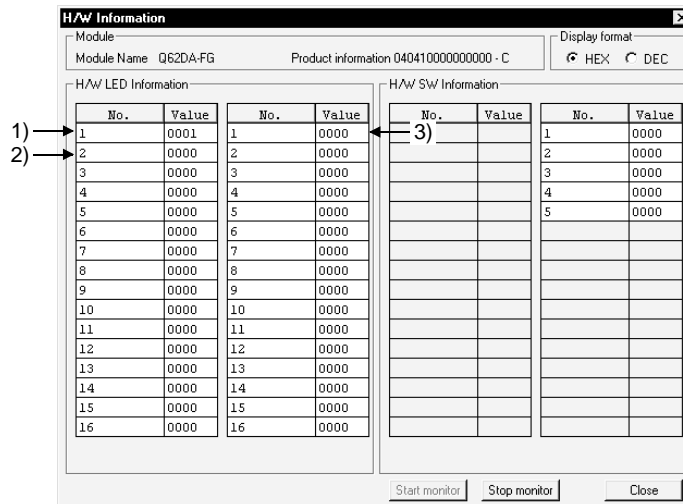
The LED status is displayed.

No.	LED name	Status
1)	RUN LED	0000H : Indicates that LED is unlit. 0001H : Indicates that LED is lit
2)	ERR. LED	
3)	ALM LED	

(b) H/W SW information

The status of the intelligent function module switch setting is displayed.

No.	Switch setting for intelligent function module
1	Switch 1
2	Switch 2
3	Switch 3
4	Switch 4
5	Switch 5



(In the case of GX Developer Version 7.13P)

APPENDIX

Appendix 1 Dedicated Instruction List

The following table lists the dedicated instructions that can be used with the Q62DA-FG.

Instruction	Description	Reference section
G.OFFGAN	Switches to the offset/gain setting mode. Switches to the normal mode.	Appendix 1.1
G.OGLOAD	Reads the offset/gain values of the user range setting to the CPU.	Appendix 1.2
G.OGSTOR	Restores the offset/gain values of the user range setting stored in the CPU to the Q62DA-FG.	Appendix 1.3

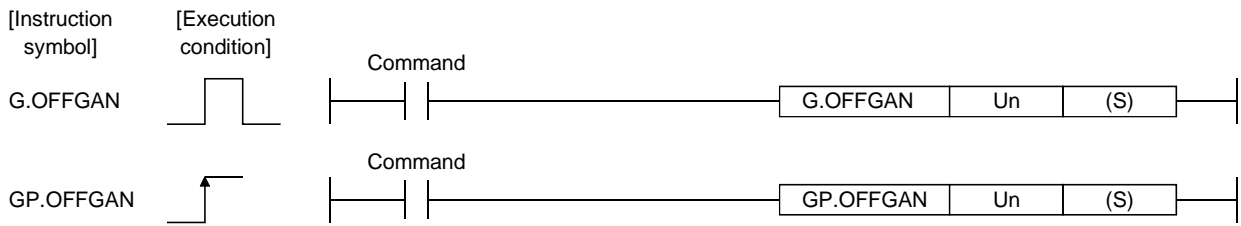
POINT

When the module is mounted to a MELSECNET/H remote station, the dedicated instructions cannot be used.

Appendix 1.1 OFFGAN

Switches the mode of the Q62DA-FG. (Normal mode to offset/gain setting mode, offset/gain setting mode to normal mode)

Set data	Usable devices									
	Internal device (System, user)		File register	MELSECNET/H Direct J□□		Special function module U□\G□	Index register Z□	Constant		Other
	Bit	Word		Bit	Word			K, H	S	
(S)	—	○	—		—	—	—	—	—	



Set data

Device	Description	Setting range	Data type
Un	Start I/O number of the module	0 to FEH	Binary 16 bits
(S)	Mode switching 0: Switching to normal mode 1: Switching to offset/gain setting mode The setting of any other value results in "switching to offset/gain setting mode".	0, 1	Binary 16 bits

(1) Function

Switches the mode of the Q62DA-FG.

- Normal mode to offset/gain setting mode (the offset/gain setting mode status flag (XA) turns ON)
- Offset/gain setting mode to normal mode (the offset/gain setting mode status flag (XA) turns OFF)

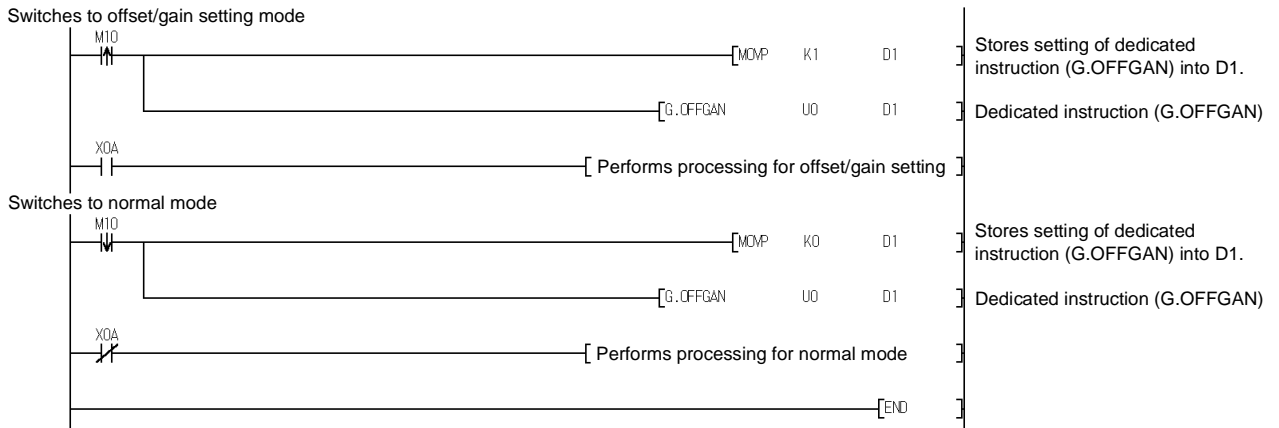
POINT
<p>(1) When the offset/gain setting mode is switched to the normal mode, Module Ready (X0) turns from OFF to ON. Note that initial setting processing will be executed if there is a sequence program that makes initial setting when Module Ready (X0) turns ON.</p> <p>(2) D/A conversion is discontinued if the mode is switched (from the normal mode to the offset/gain setting mode or from the offset/gain setting mode to the normal mode). To resume D/A conversion, switch to the normal mode and then turn ON Operating condition setting request (Y9).</p>

(2) Operation error

No errors.

(3) Program example

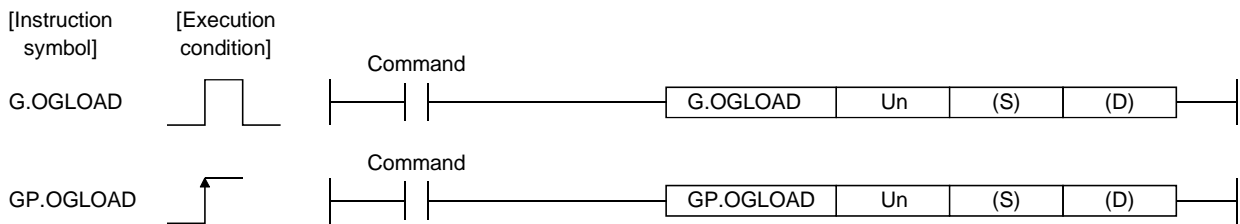
The following program is designed to switch the Q62DA-FG mounted in the position of I/O number X/Y0 to X/YF to the offset/gain setting mode when M10 is turned ON, and to return it to the normal mode when M10 is turned OFF.



Appendix 1.2 OGLOAD

Reads the offset/gain values of the user range setting of the Q62DA-FG to the CPU.

Set data	Usable devices									
	Internal device (System, user)		File register	MELSECNET/H Direct J□\□		Special function module U□\G□	Index register Z□	Constant		Other
	Bit	Word		Bit	Word			K, H	S	
(S)	—	○			—			—	—	—
(D)		○			—			—	—	—



Set data

Device	Description	Setting range	Data type
Un	Start I/O number of the module	0 to FEH	Binary 16 bits
(S)	Start number of the device in which control data is stored.	Within the range of the specified device	Device name
(D)	Device that is turned ON 1 scan on completion of dedicated instruction processing. (D) + 1 also turns ON at an abnormal completion.	Within the range of the specified device	Bit

Control data *1 (1/2)

Device	Item	Set data	Setting range	Set by								
(S)	System area	—	—	—								
(S) + 1	Completion status	Stores the status when the instruction is complete. 0 : Normal completion Other than 0: Abnormal completion	—	System								
(S) + 2	Pass data classification setting	Specify the user range setting where offset/gain values will be read. 0H: Use range setting 1 specified 1H: Use range setting 2 specified 2H: Use range setting 3 specified <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>b15 to b12</td> <td>b11 to b8</td> <td>b7 to b4</td> <td>b3 to b0</td> </tr> <tr> <td>0H</td> <td>0H</td> <td>CH2</td> <td>CH1</td> </tr> </table>	b15 to b12	b11 to b8	b7 to b4	b3 to b0	0H	0H	CH2	CH1	—	User
b15 to b12	b11 to b8	b7 to b4	b3 to b0									
0H	0H	CH2	CH1									
(S) + 3	System area	—	—	—								
(S) + 4	CH1 Industrial shipment settings offset value (used for D/A)	—	—	System								
(S) + 5	CH1 Industrial shipment settings gain value (used for D/A)	—	—	System								
(S) + 6	CH2 Industrial shipment settings offset value (used for D/A)	—	—	System								
(S) + 7	CH2 Industrial shipment settings gain value (used for D/A)	—	—	System								
(S) + 8	CH1 Industrial shipment settings offset value (used for monitor output)	—	—	System								
(S) + 9	CH1 Industrial shipment settings gain value (used for monitor output)	—	—	System								

*1 Set only the pass data classification setting (S)+2. If data is written to the area set by the system, the offset/gain values will not be read properly.

Control data *1 (2/2)

Device	Item	Set data	Setting range	Set by
(S) + 10	CH2 Industrial shipment settings offset value (used for monitor output)	—	—	System
(S) + 11	CH2 Industrial shipment settings gain value (used for monitor output)	—	—	System
(S) + 12	CH1 User range settings offset value (used for D/A)	—	—	System
(S) + 13	CH1 User range settings gain value (used for D/A)	—	—	System
(S) + 14	CH2 User range settings offset value (used for D/A)	—	—	System
(S) + 15	CH2 User range settings gain value (used for D/A)	—	—	System
(S) + 16	CH1 User range settings offset value (used for monitor output)	—	—	System
(S) + 17	CH1 User range settings gain value (used for monitor output)	—	—	System
(S) + 18	CH2 User range settings offset value (used for monitor output)	—	—	System
(S) + 19	CH2 User range settings gain value (used for monitor output)	—	—	System

*1 Set only the pass data classification setting (S)+2. If data is written to the area set by the system, the offset/gain values will not be read properly.

(1) Functions

(a) Reads the offset/gain values of the user range setting of the Q62DA-FG to the CPU.

(b) There are two types of interlock signals for the G.OGLOAD instruction: the completion device (D) and the status display device at completion (D) + 1.

1) Completion device

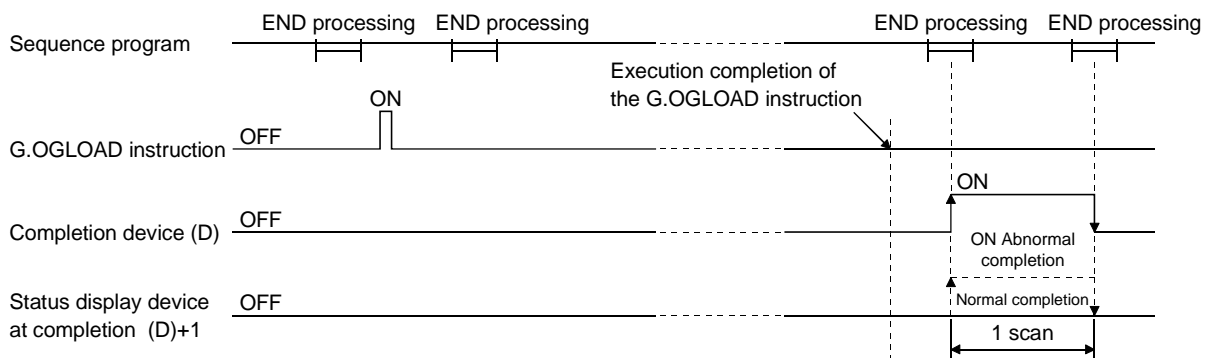
Turns ON in the END processing of the scan where the G.OGLOAD instruction is completed, and turns OFF in the next END processing.

2) Status display device at completion

Turns ON and OFF depending on the completion status of the G.OGLOAD instruction.

Normal completion : Stays OFF and does not change.

Abnormal completion: Turns ON in the END processing of the scan where the G.OGLOAD instruction is completed, and turns OFF in the next END processing.



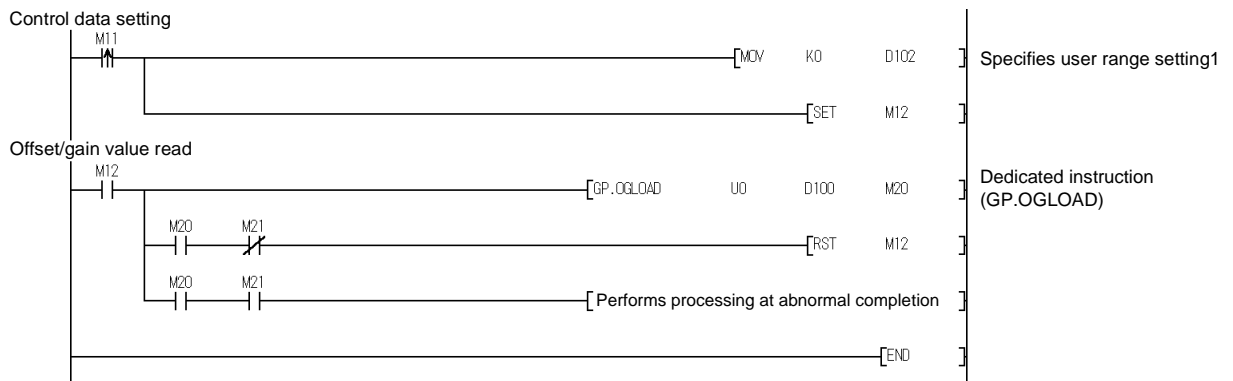
(2) Operation error

In the following case, an error occurs and the corresponding error code is stored into the completion status area (S)+1.

Error code	Case resulting in operation error
164	The value set to the pass data classification setting (S)+2 is outside the range.

(3) Program example

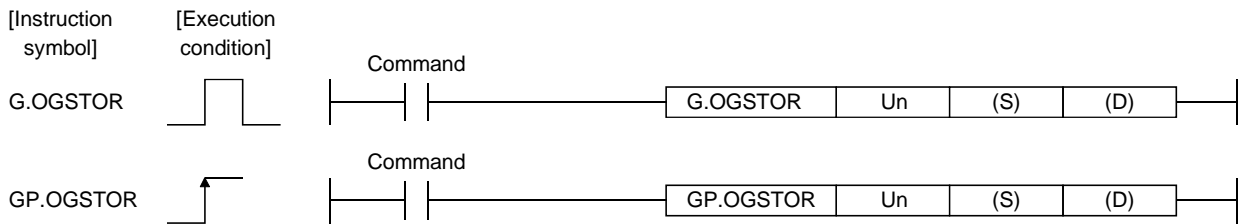
The following program is designed to read the offset/gain values of the Q62DA-FG mounted in the position of I/O number X/Y0 to X/YF when M11 is turned ON.



Appendix 1.3 OGSTOR

Restores the offset/gain values of the user range setting stored in the CPU to the Q62DA-FG.

Set data	Usable devices									
	Internal device (System, user)		File register	MELSECNET/H Direct J□□		Special function module U□\G□	Index register Z□	Constant		Other
	Bit	Word		Bit	Word			K, H	S	
(S)	—	○			—			—	—	—
(D)		○			—			—	—	—



Set data

Device	Description	Setting range	Data type
Un	Start I/O number of the module	0 to FEH	Binary 16 bits
(S) * 1	Start number of the device in which control data is stored.	Within the range of the specified device	Device name
(D)	Device that is turned ON 1 scan on completion of dedicated instruction processing. (D) + 1 also turns ON at an abnormal completion.	Within the range of the specified device	Bit

*1 When executing the G.OGLOAD instruction, specify the device designated in (S).
Do not change the data read with the G.OGLOAD instruction.
If it is changed, normal operation cannot be guaranteed.

Control data *1 (1/2)

Device	Item	Set data	Setting range	Set by								
(S)	System area	—	—	—								
(S) + 1	Completion status	Stores the status when the instruction is complete. 0 : Normal completion Other than 0: Abnormal completion (error code)	—	System								
(S) + 2	Pass data classification setting	The value set to pass data classification setting (S)+2 using the G.OGLOAD instruction is stored. 0H: Use range setting 1 specified 1H: Use range setting 2 specified 2H: Use range setting 3 specified <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>b15 to b12</td> <td>b11 to b8</td> <td>b7 to b4</td> <td>b3 to b0</td> </tr> <tr> <td>0H</td> <td>0H</td> <td>CH2</td> <td>CH1</td> </tr> </table>	b15 to b12	b11 to b8	b7 to b4	b3 to b0	0H	0H	CH2	CH1	—	User
b15 to b12	b11 to b8	b7 to b4	b3 to b0									
0H	0H	CH2	CH1									
(S) + 3	System area	—	—	—								
(S) + 4	CH1 Industrial shipment settings offset value (used for D/A)	—	—	System								
(S) + 5	CH1 Industrial shipment settings gain value (used for D/A)	—	—	System								
(S) + 6	CH2 Industrial shipment settings offset value (used for D/A)	—	—	System								
(S) + 7	CH2 Industrial shipment settings gain value (used for D/A)	—	—	System								

Control data *1 (2/2)

Device	Item	Set data	Setting range	Set by
(S) + 8	CH1 Industrial shipment settings offset value (used for monitor output)	—	—	System
(S) + 9	CH1 Industrial shipment settings gain value (used for monitor output)	—	—	System
(S) + 10	CH2 Industrial shipment settings offset value (used for monitor output)	—	—	System
(S) + 11	CH2 Industrial shipment settings gain value (used for monitor output)	—	—	System
(S) + 12	CH1 User range settings offset value (used for D/A)	—	—	System
(S) + 13	CH1 User range settings gain value (used for D/A)	—	—	System
(S) + 14	CH2 User range settings offset value (used for D/A)	—	—	System
(S) + 15	CH2 User range settings gain value (used for D/A)	—	—	System
(S) + 16	CH1 User range settings offset value (used for monitor output)	—	—	System
(S) + 17	CH1 User range settings gain value (used for monitor output)	—	—	System
(S) + 18	CH2 User range settings offset value (used for monitor output)	—	—	System
(S) + 19	CH2 User range settings gain value (used for monitor output)	—	—	System

(1) Functions

(a) Restores the offset/gain values of the user range setting stored in the CPU to the Q62DA-FG.

(b) There are two types of interlock signals for the G.OGSTOR instruction: the completion device (D) and the status display device at completion (D) + 1.

1) Completion device

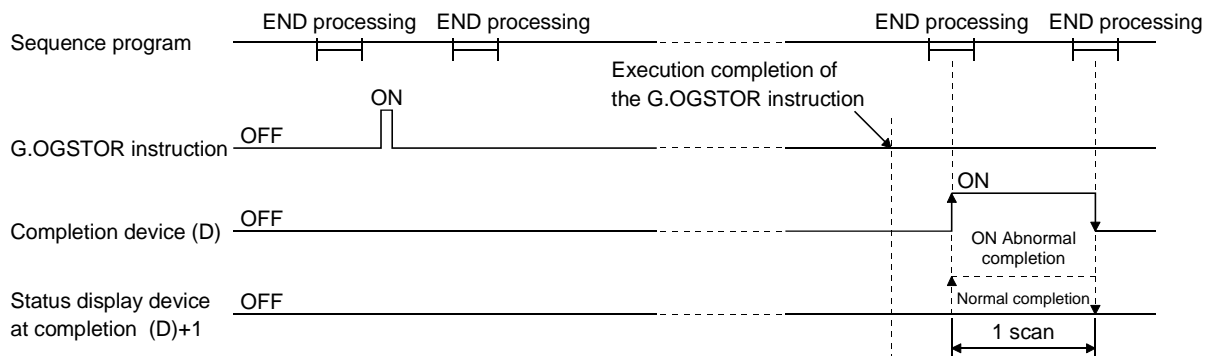
Turns ON in the END processing of the scan where the G.OGSTOR instruction is completed, and turns OFF in the next END processing.

2) Status display device at completion

Turns ON and OFF depending on the completion status of the G.OGSTOR instruction.

Normal completion : Stays OFF and does not change.

Abnormal completion: Turns ON in the END processing of the scan where the G.OGSTOR instruction is completed, and turns OFF in the next END processing.



(c) When the offset/gain values are restored, the reference accuracy falls to about less than three times of the accuracy before that.

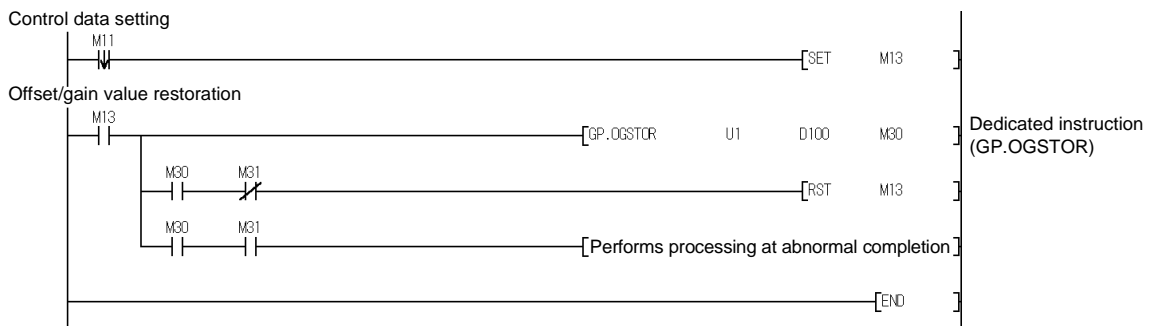
(2) Operation error

In any of the following cases, an error occurs and the corresponding error code is stored into the completion status area (S)+1.

Error code	Case resulting in operation error
161	The G.OGSTOR instruction was executed in the offset/gain setting mode.
162	The G.OGSTOR instruction was executed consecutively.
163	The G.OGSTOR instruction was executed for the model that differs from the model for which the G.OGLOAD instruction had been executed.
164	The value set to the pass data classification setting (S)+2 is outside the range.

(3) Program example

The following program is designed to read the offset/gain values of the Q62DA-FG mounted in the position of I/O number X/Y0 to X/YF when M11 is turned ON.



Appendix 2 Performance Comparison between Q62DA-FG and Q62DA

The following table indicates performance comparison between the Q62DA-FG and Q62DA.

Table Appendix. 1 Performance Comparison Table

Item	Type	Q62DA-FG	Q62DA			
Number of analog outputs		2 points (2 channels)				
Digital input		16-bit signed binary (-12288 to 12287, -16384 to 16383)	16-bit signed binary (normal resolution mode: -4096 to 4095, high resolution mode: -12288 to 12287, -16384 to 16383)			
Analog output	Voltage	-12 to 12VDC (External load resistance: 1k to 1M Ω)	-10 to 10 V DC (External load resistance value: 1 k Ω to 1M Ω)			
	Current	0 to 20mADC (External load resistance: 0 to 600 Ω) 0 to 22mADC	0 to 20 mA DC (External load resistance value: 0 Ω to 600 Ω)			
I/O characteristics maximum resolution	Voltage	Analog output range		Analog output range		
		0 to 5V	0 to 12000	0 to 4000 (0 to 12000)	1.25mV (0.416mV)	
					1 to 5V	1.0mV (0.333mV)
					-10 to 10V	0.625mV
		User range setting 2		-4000 to 4000 (-12000 to 12000)	0.366mV	
		User range setting 3			0.183mV	
	Current	0 to 20mA	0 to 12000	5 μA (1.66 μA)		
				4 to 20mA	4 μA (1.33 μA)	
				User range setting 1	1.66 μA	
	User range setting 1		-4000 to 4000 (-12000 to 12000)	1.5 μA (0.83 μA)		
	User range setting 2			0.671 μA		
	Accuracy (Accuracy relative to maximum analog output value)		Reference accuracy: Within ± 0.1% (Voltage: ± 10mV, Current: ± 20 μA) Temperature coefficient: ± 80ppm/ °C (0.008%/ °C)	Ambient temperature 25 ± 5 °C: Within ± 0.1 % (Voltage: ± 10 mV, Current: ± 20 μA) Ambient temperature 0 to 55 °C: Within ± 0.3 % (Voltage: ± 30 mV, Current: ± 60 μA)		
Conversion speed		10ms/2 channels	80 μs/channel			
Absolute maximum output	Voltage	± 13V	± 12 V			
	Current	23mA	21 mA			
Output monitor	Resolution	12bit	—			
	Reference accuracy	± 0.2%				
	Temperature coefficient	± 160ppm/ °C (0.016%/ °C)				
Maximum number of writes for E ² PROM		Max. 100 thousand times				
Output short-circuit protection		Available				
Isolation specifications	Specific isolated area		Specific isolated area			
	Between the I/O terminal and PLC power supply	Photocoupler isolation	Between the I/O terminal and PLC power supply	Photocoupler isolation		
	Between analog output channels	Transformer isolation	Between analog output channels	No insulation		
	Between external supply power and analog output channel	Transformer isolation	Between external supply power and analog output channel	No insulation		
		1780VAC rms/3 cycles (elevation 2000m)	500VDC 10M Ω or more	500VAC for 1 minute	500VDC 20M Ω or more	
Number of I/O occupied points		16 points				
Connected terminal		18 points terminal block				
Applicable wire size		0.3 to 0.75mm ²				
Applicable solderless terminals		R 1.25-3 (Solderless terminals with sleeves are not applicable)				
External supply power	24VDC, +20%, -15%		24VDC, +20%, -15%			
	Ripple, spike within 500 mV p-p		Ripple, spike within 500 mV p-p			
	Inrush current: 5.2A, within 300 μs	0.3A	Inrush current: 1.9A, within 300 μs	0.12A		
Internal current consumption (5 VDC)		0.37A	0.33A			
Weight		0.20kg	0.19kg			

*: The values in parentheses are those in the high resolution mode.

Appendix 3 External Dimension Diagram



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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.

6. Product application

- (1) In using the Mitsubishi MELSEC programmable logic controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable logic controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.
- (2) The Mitsubishi programmable logic controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for Railway companies or Public service purposes shall be excluded from the programmable logic controller applications.

In addition, applications in which human life or property that could be greatly affected, such as in aircraft, medical applications, incineration and fuel devices, manned transportation, equipment for recreation and amusement, and safety devices, shall also be excluded from the programmable logic controller range of applications.

However, in certain cases, some applications may be possible, providing the user consults their local Mitsubishi representative outlining the special requirements of the project, and providing that all parties concerned agree to the special circumstances, solely at the users discretion.

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