Channel Isolated Digital-Analog Converter Module

User's Manual

MITSUBISHI

Mitsubishi
Programmable Controller

MELSEC-Q

Q66DA-G
GX Configurator-DA
(SW2D5C-QDAU-E)

● 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 programmable controller system, please read the user's manual for 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 store this manual in a safe place and make it accessible when required. 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 programmable controller CPU.
Writing data into the "system area" or outputting a signal for "prohibited to use" may cause a malfunction of the programmable controller system.

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.

● At power ON/OFF, voltage or current may instantaneously be output from the output terminal of this module. In such case, wait until the analog output becomes stable to start controlling the external device.

[INSTALLATION PRECAUTIONS]

⚠ CAUTION

- Use the programmable controller in an environment that meets the general specifications contained in the user's manual of the CPU module to use.
  Using this programmable controller in an environment outside the range of the general specifications may cause electric shock, fire, malfunction, and damage to or deterioration of the product.

- While pressing the installation lever located at the bottom of module, insert the module fixing tab into the fixing hole in the base unit until it stops.
  Improper installation may result in malfunction, breakdown or the module coming loose and dropping.
  Securely hold the module with module fixing bracket.

- 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.

- Be sure to shut off all phases of the external power supply used by the system before 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 programmable controller. There is a risk of electric shock or malfunction. ● 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.

[WIRING PRECAUTIONS]

⚠ CAUTION

● 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.

● Be sure to shut off all phases of the external power supply used by the system before 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 install/remove the module to/from the base unit more than 50 times after the first use of the product. (IEC 61131-2 compliant)
Failure to do so may cause malfunctions.

● Do not touch the connector while the power is on. Doing so may cause malfunction.

● Switch off all phases of the externally supplied power used in the system when cleaning the module or retightening the terminal or module fixing 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.

Print Date	*Manual Number	Revision
Oct., 2006	SH (NA)-080648ENG-A	First printing
Jan.,2007	SH (NA)-080648ENG-B	Correction Section3.2.1, Section4.6
Jan.,2008	SH (NA)-080648ENG-C	Correction SAFETY PRECAUTIONS, About the Generic Terms and Abbreviations, Section 1.1, Section 2.1, Section 2.3, Section 4.1, Section 4.6, Section 5.2.1, Section 5.2.2, Section 7.3.3, Section 7.3.5, Section 8.1, Appendix 1, Appendix 1.1, Appendix 1.2, Appendix 1.3 Addition Section 2.2
May,2008	SH (NA)-080648ENG-D	Correction SAFETY PRECAUTIONS, Compliance with the EMC and Low Voltage Directives, About the Generic Terms and Abbreviations, Section 2.1, 2.3, 4.1, 4.3, 5.1, 5.2.1, 5.2.2, 5.3.1, 5.3.3, Chapter 7, Section 7.1

Japanese Manual Version SH-080646-E

INTRODUCTION

Thank you for purchasing the MELSEC-Q series programmable controller.
Before using the equipment, please read this manual carefully to develop full familiarity with the functions and performance of the Q series programmable controller you have purchased, so as to ensure correct use.
Please forward a copy of this manual to the end user.

CONTENTS

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).

COMPLIANCE WITH THE EMC AND LOW VOLTAGE DIRECTIVES

(1) For programmable controller system

To configure a system meeting the requirements of the EMC and Low Voltage Directives when incorporating the Mitsubishi programmable controller (EMC and Low Voltage Directives compliant) into other machinery or equipment, refer to Chapter 9 "EMC AND LOW VOLTAGE DIRECTIVES" of the QCPU User's Manual (Hardware Design, Maintenance and Inspection).
The CE mark, indicating compliance with the EMC and Low Voltage Directives, is printed on the rating plate of the programmable controller.

(2) For the product

No additional measures are necessary for the compliance of this product with the EMC and Low Voltage Directives.

ABOUT THE GENERIC TERMS AND ABBREVIATIONS

Unless otherwise specified, this manual uses the following general 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 for the SWnD5C-GPPW-E, SWnD5C-GPPW-EA, SWnD5C-GPPW-EV and SWnD5C-GPPW-EVA. ("n" is 4 or greater.) "-A" and "-V" denote volume license product and upgraded product respectively.
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, Q02PHCPU, Q06PHCPU, Q12PHCPU, Q25PHCPU, Q12PRHCPU, Q25PRHCPU, Q02UCPU, Q03UDCPU, Q04UDHCPU, Q06UDHCPU, Q13UDHCPU, Q26UDHCPU, Q03UDECPU, Q04UDEHCPU, Q06UDEHCPU, Q13UDEHCPU and Q26UDEHCPU.
Process CPU	Generic term for Q02PHCPU, Q06PHCPU, 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.
Windows Vista®	Generic term for the following: Microsoft® Windows Vista® Home Basic Operating System, Microsoft® Windows Vista® Home Premium Operating System, Microsoft® Windows Vista® Business Operating System, Microsoft® Windows Vista® Ultimate Operating System, Microsoft® Windows Vista® Enterprise Operating System
Windows® XP	Generic term for the following: Microsoft® Windows® XP Professional Operating System, Microsoft® Windows® XP Home Edition Operating System

PRODUCT STRUCTURE

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

Model code	Product name	Quantity
Q66DA-G	Q66DA-G 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 Q66DA-G type channel isolated digital-analog converter module (hereinafter referred to as the Q66DA-G) which are used in conjunction with MELSEC-Q series CPU module (hereinafter referred to as the programmable controller CPU).

1.1 Features

(1) Multi-channel analog input is available.

By using a single Q66DA-G, analog voltage or current outputs of 6 points (6 channels) are available.

(2) Channel isolated

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

(3) High accuracy

The reference accuracy*1 is as high as +0.1% and the temperature coefficient*2 is as high as -80ppm/°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%/°C (temperature coefficient) × 5°C (temperature variation difference) = 0.14%

(4) 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. (Refer to Section 4.5)

(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. (Refer to Section 3.2.1)

(5) Output monitor function

The analog output value output by D/A conversion is reconverted into a digital value within the Q66DA-G and the result is stored into the buffer memory as an output monitor value.

(6) Changing the resolution mode

The resolution mode can be changed according to the application, and digital value resolution settings of 1/4000, 1/12000 or 1/16000 can be selected. (Refer to Section 4.5)

(7) Warning output function

A warning is output if a digital input value falls outside the setting range. (Refer to Section 3.2.4.)

(8) Rate control function

The increase and decrease in analog output values per 6ms *1 can be limited, preventing rapid change of the values. (Refer to Section 3.2.4.)

*1 6ms is the conversion cycle per channel.

(9) Scaling function

The digital input value range can be changed to any given range between –32000 and 32000, and digital values within the range are converted to analog values. (Refer to Section 3.2.5.)

(10) Online module change

The module can be changed without the system being stopped.
Further, the dedicated instruction (G(P). OGLOAD, G(P). OGSTOR), write to the buffer memory, or turning ON the Y signal enables "inheritance of offset/gain settings to the new Q66DA-G replacing the old one changed online" and "transfer of offset/gain settings to the other Q66DA-G mounted on the other slot". (These apply to the modules of the same model.) (Refer to Chapter 7.)

(11) Offset/gain setting

GX Configurator-DA, dedicated instruction (G(P). OFFGAN) or mode switching setting allows a shift to the offset/gain setting mode easily. (Refer to Section 4.6.)

(12) 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. (Refer to Chapter 5.)

*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

This chapter explains the system configuration of the Q66DA-G.

2.1 Applicable Systems

This section describes the applicable systems.

(1) Applicable modules and base units, and No. of modules

(a) When mounted with a CPU module
The table below shows the CPU modules and base units applicable to the Q66DA-G and quantities for each CPU model.
Depending on the combination with other modules or the number of mounted modules, power supply capacity may be insufficient.
Pay attention to the power supply capacity before mounting modules, and if the power supply capacity is insufficient, change the combination of the modules.

Applicable CPU module			No. of modules *1	Base unit *2	
CPU type		CPU model		Main base unit	Extension base unit
Programmable controller CPU	Basic model QCPU	Q00JCPU	Up to 16	○	○
		Q00CPU	Up to 24		
		Q01CPU			
	High Performance model QCPU	Q02CPU	Up to 64	○	○
		Q02HCPU			
		Q06HCPU			
		Q12HCPU			
		Q25HCPU			
	Process CPU	Q02PHCPU	Up to 64	○	○
		Q06PHCPU			
		Q12PHCPU			
		Q25PHCPU			
	Redundant CPU	Q12PRHCPU	Up to 53	×	○
		Q25PRHCPU			
	Universal model QCPU	Q02UCPU	Up to 36	○	○
		Q03UDCPU	Up to 64		
		Q04UDHCPU			
		Q06UDHCPU			
		Q13UDHCPU			
		Q26UDHCPU			
		Q03UDECPU			
		Q04UDEHCPU			
		Q06UDEHCPU			
		Q13UDEHCPU			
		Q26UDEHCPU			
	Safety CPU	QS001CPU	N/A	×	×
C Controller module		Q06CCPU-V	Up to 64	○	○
		Q06CCPU-V-B			

○: Applicable, ×: N/A

*1 Limited within the range of I/O points for the CPU module.
*2 Can be installed to any I/O slot of a base unit.

(b) Mounting to a MELSECNET/H remote I/O station

The table below shows the network modules and base units applicable to the Q66DA-G and quantities for each network module model.

Depending on the combination with other modules or the number of mounted modules, power supply capacity may be insufficient.

Pay attention to the power supply capacity before mounting modules, and if the power supply capacity is insufficient, change the combination of the modules.

Applicable network module	No. of modules *1	Base unit *2	
		Main base unit of remote I/O station	Extension base unit of remote I/O station
QJ72LP25-25	Up to 64	○	○
QJ72LP25G			
QJ72LP25GE			
QJ72BR15			

○: Applicable, × : N/A

*1 Limited within the range of I/O points for the network module.

*2 Can be installed to any I/O slot of a base unit.

Remark

The Basic model QCPU or C Controller module cannot create the MELSECNET/H remote I/O network.

(2) Support of the multiple CPU system

When using the Q66DA-G in a multiple CPU system, refer to the following manual first.

- QCPU User's Manual (Multiple CPU System)

(a) Intelligent function module parameters

Write intelligent function module parameters to only the control CPU of the Q66DA-G.

(3) Compatibility with online module change

The Q66DA-G supports online module change (hot swapping).

For procedures of the online module change, refer to Chapter7.

(4) Supported software packages

Relation between the system containing the Q66DA-G and software package is shown in the following table.

GX Developer is necessary when using the Q66DA-G.

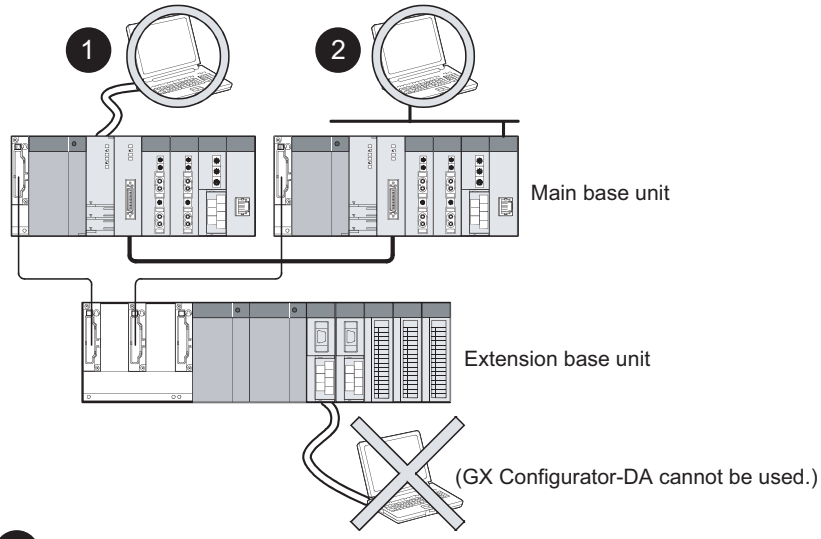
		Software Version	
		GX Developer	GX Configurator-DA
Q00J/Q00/Q01CPU	Single CPU system	Version 7 or later	Version 2.06G or later
	Multiple CPU system	Version 8 or later	
Q02/Q02H/Q06H/ Q12H/Q25HCPU	Single CPU system	Version 4 or later	
	Multiple CPU system	Version 6 or later	
Q02PH/Q06PHCPU	Single CPU system	Version 8.68W or later	
	Multiple CPU system		
Q12PH/Q25PHCPU	Single CPU system	Version 7.10L or later	
	Multiple CPU system		
Q12PRH/ Q25PRHCPU	Redundant CPU system	Version 8.45X or later	
Q02U/Q03UD/ Q04UDH/ Q06UDHCPU	Single CPU system	Version 8.48A or later	
	Multiple CPU system		
Q13UDH/ Q26UDHCPU	Single CPU system	Version 8.62Q or later	
	Multiple CPU system		
Q03UDE/ Q04UDEH/ Q06UDEH/ Q13UDEH/ Q26UDEHCPU	Single CPU system	Version 8.68W or later	
	Multiple CPU system		
If installed in a MELSECNET/H remote I/O station		Version 6 or later	

2.2 Precautions on System Configuration

(1) For Use with Q12PRH/Q25PRHCPU

(a) Dedicated instruction
The dedicated instruction cannnot be used.

(b) GX Configurator-DA connection
GX Configurator-DA cannot be used when accessing the Q12PRH/Q25PRHCPU via an intelligent function module on an extension base unit from GX Developer. Connect a personal computer with a communication path indicated below.



1 Direct connection to use the CPU

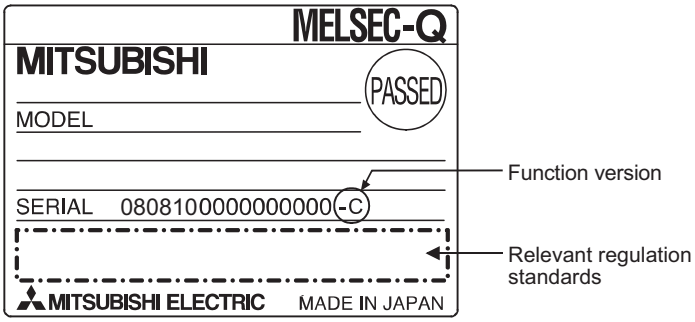
2 Direct connection to the CPU

2.3 How to Check the Function Version and Software Version

This section describes how to check the function version of the Q66DA-G and the GX Configuration-DA software version.

(1) Checking the function version of the Q66DA-G

(a) Checking at "the SERIAL field of the rating plate" located on the side of the module



(b) To check the version using the GX Developer
Refer to Section 8.2.7 of this manual.

Point

The serial No. on the rating plate may be different from the serial No. displayed on the product information screen of GX Developer.

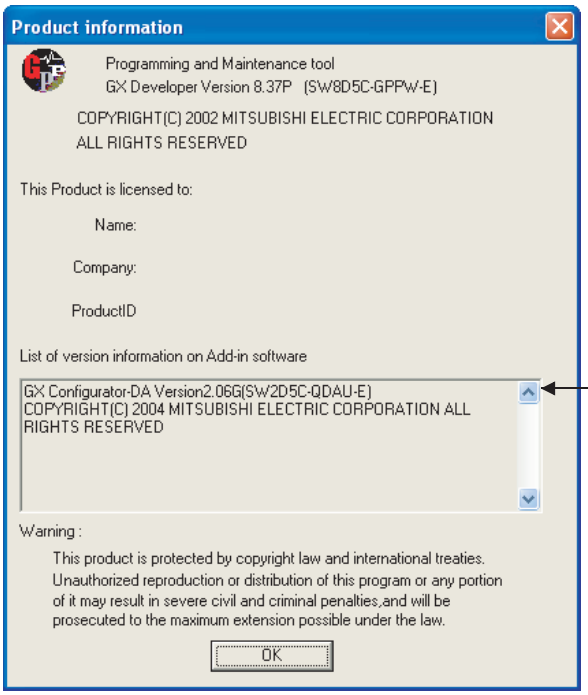
- The serial No. on the rating plate indicates the management information of the product.
- The serial No. displayed on the product information screen of GX Developer indicates the function information of the product.
  The function information of the product is updated when a new function is added.

(2) Checking the software version of GX Configuration-DA

The software version of GX Configurator-DA can be checked in GX Developer's "Productinformation" screen.

[Operating procedure]

GX Developer → [Help] → [Product information]



(In the case of GX Developer Version 8)

3 SPECIFICATIONS

3.1 Performance Specifications

3.1.1 Performance specifications list

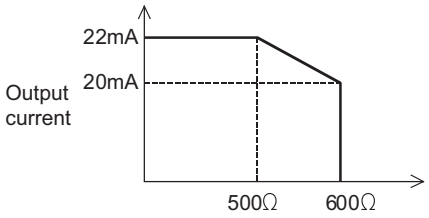
Table3.1 Performance specifications list

Item		Specifications
Number of analog outputs		6 points (6 channels)
Digital input		16-bit signed binary (normal resolution mode:-4096 to 4095 high resolution mode: -12288 to 12287, -16384 to 16383)
Using scaling function		16-bit signed binary (-32768 to 32767)
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 (External load resistance: Please refer to Note 3)
I/O characteristics maximum resolution		See the table below
Accuracy (Accuracy relative to maximum analog output value)	Reference accuracy *1	± 0.1% (Voltage: ±10mV, Current: ±20μA)
	Temperature coefficient *2	±80ppm/ ℃ (0.008%/ ℃)
Conversion speed		6ms/ channels
Absolute maximum output	Voltage	±13V
	Current	23mA
Maximum number of writes to flash memory		Up to 50,000 times
Output short-circuit protection		Available
Isolation specifications		See the table below
Number of I/O occupied points		16 points (I/O assignment: Intelligent 16 points)
External wiring connection system		40-pin connector
Applicable wire size		0.3 mm^2 (AWG #22)
External device connection connector		A6CON4 (Sold separately)
External supply power		24VDC, +20%, -15%
		Ripple, spike within 500 mV p-p
		Inrush current: 4.8A, within 400μs
		0.22A
Internal current consumption (5 VDC)		0.62A
Weight		0.22kg

Analog output range		Normal resolution mode		High resolution mode	
		Digital input value	Maximum resolution	Digital input value	Maximum resolution
Voltage	0 to 5V	0 to 4000	1.25mV	0 to 12000	0.416mV
	1 to 5V		1.0mV		0.333mV
	-10 to 10V	-4000 to 4000	2.5mV	-16000 to 16000	0.625mV
	User range setting 2		0.75mV	-12000 to 12000	0.400mV
	User range setting 3		0.375mV		0.210mV
Current	0 to 20mA	0 to 4000	5μA	0 to 12000	1.66μA
	4 to 20mA		4μA		1.33μA
	User range setting 1	-4000 to 4000	1.5μA	-12000 to 12000	0.95μA

Specific isolated area	Isolation method	Dielectric withstand oltage	Insulation resistance
Between the output terminal and programmable controller power supply	Transformer isolation	500VAC rms, 1min	500VDC 10MΩ or more
Between analog output channels		1000VAC rms, 1min	
Between external supply power and analog output cannel		500VAC rms, 1min	

*1: Accuracy of offset/gain setting at ambient temperature
Q66DA-G 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% (Reference accuracy) + 0.008%/ °C (temperature coefficient) × 5 °C (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 Q66DA-G.

3.1.2 I/O conversion characteristics

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

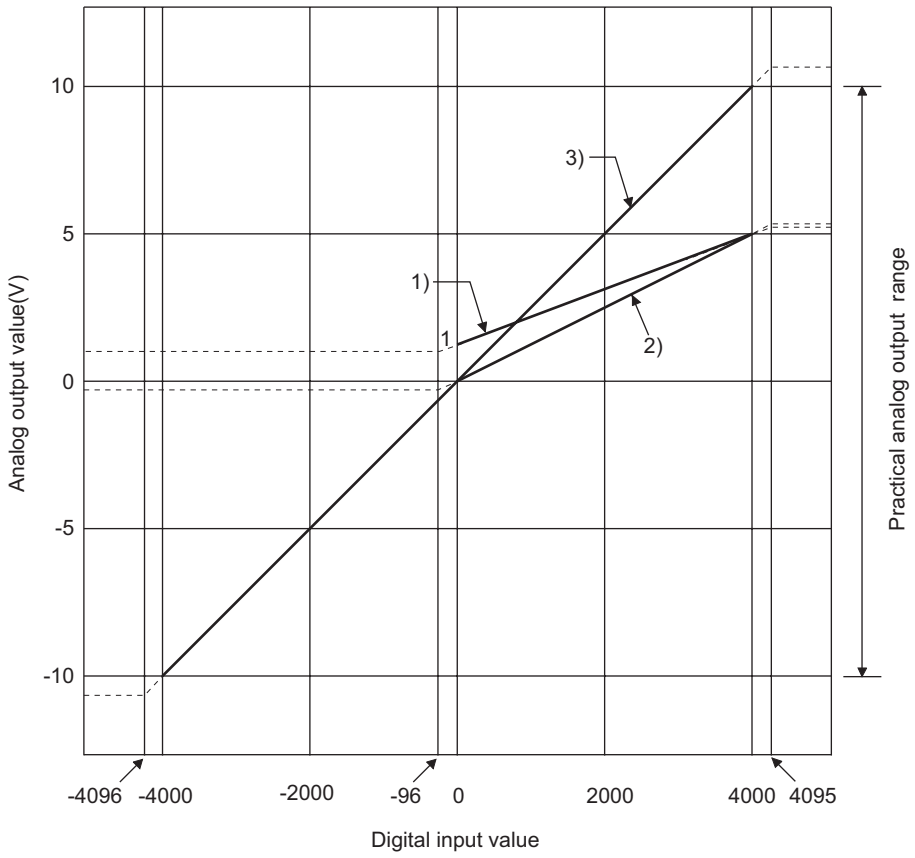
Offset value
The offset value is the analog output value (voltage or current) when the digital input value set from the programmable controller CPU is 0.

Gain value
The gain value is the analog output value (voltage or current) when the digital input value set from the programmable controller CPU is
4000 (in normal resolution mode)
12000 (when 1 to 5V, 0 to 5V, 4 to 20 mA, 0 to 20 mA or the user range setting1 to 3 is selected in high resolution mode),
16000 (when -10 to 10V is selected in high resolution mode).

(1) Voltage output characteristic

(a) Voltage output characteristic in normal resolution mode

Fig.3.1 shows a graph of the voltage output characteristic in normal resolution mode.

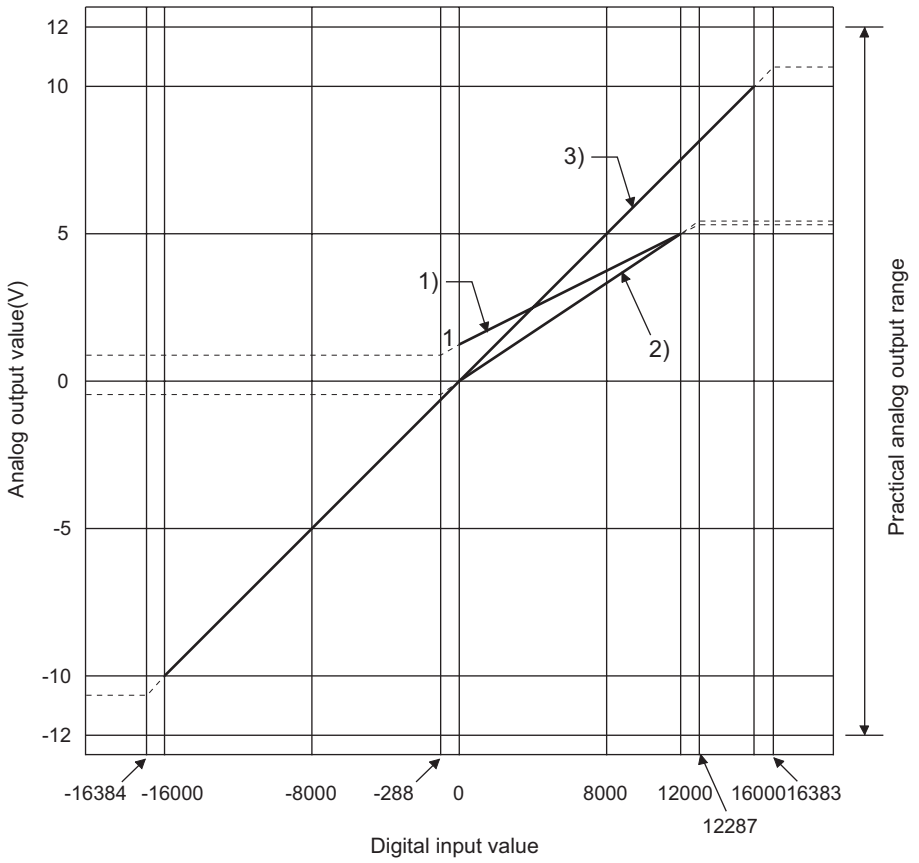


Number	Output range setting	Offset value	Gain value	Digital input value	Maximum resolution
1)	1 to 5 V	1 V	5 V	0 to 4000	1.0 mV
2)	0 to 5 V	0 V	5 V		1.25 mV
3)	-10 to 10 V	0 V	10 V	-4000 to 4000	2.5 mV
-	User range setting 2	*1	*1		0.75 mV
-	User range setting 3	*2	*2		0.375 mV

Fig.3.1 Voltage output characteristic in normal resolution mode

(b) Voltage output characteristic in high resolution mode

Fig.3.2 shows a graph of the voltage output characteristic in high resolution mode.



Number	Output range setting	Offset value	Gain value	Digital input value	Maximum resolution
1)	1 to 5 V	1 V	5 V	0 to 12000	0.333 mV
2)	0 to 5 V	0 V	5 V		0.416 mV
3)	–10 to 10 V	0 V	10 V	-16000 to 16000	0.625 mV
-	User range setting2	*1	*1	-12000 to 12000	0.400 mV
-	User range setting3	*2	*2		0.210 mV

Fig.3.2 Voltage output characteristic in high resolution mode

Point

(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 and 3.2.)

(2) In user range setting 2, the maximum and minimum output values are 6V and -6V respectively. Obtain these values as follows using the gain and offset values.
Maximum analog output value = Gain value
Minimum analog output value = (Offset value - (Gain value - Offset value))
If a maximum or minimum value exceeds the output range, use user range setting 3.

(3) Set the offset/gain values for the user range setting 2 *1 within a range in which the following conditions are satisfied.
(a) Setting range is from -12 to 12 V.
(b) { (Gain value) - (Offset value) } > A
<Value of A>

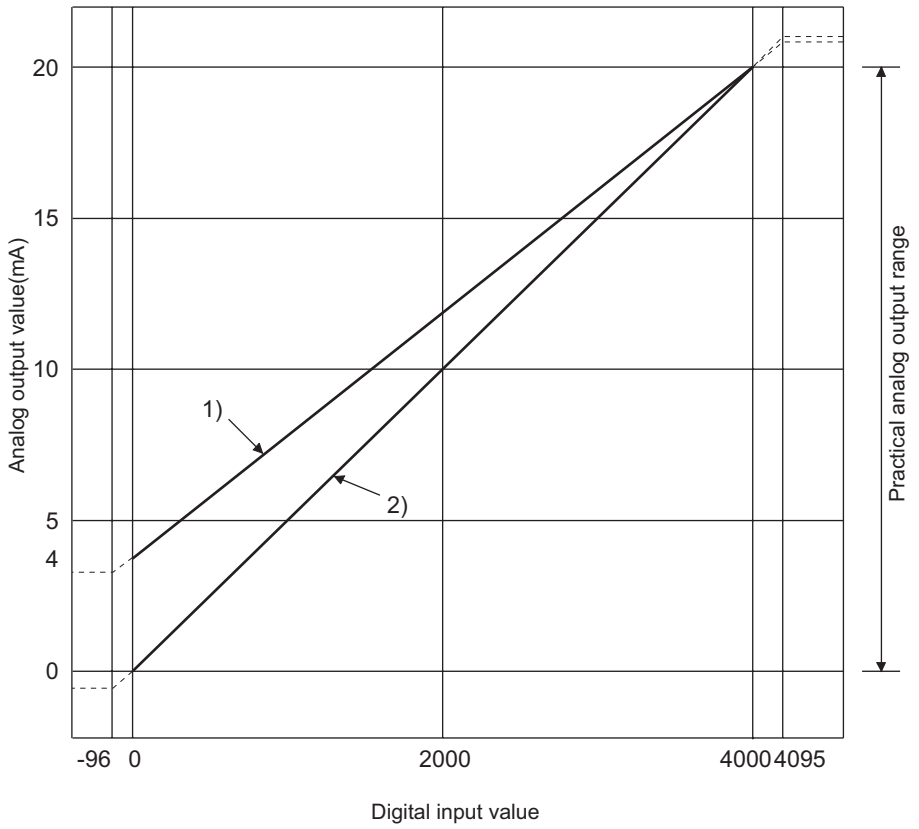
Normal resolution mode	High resolution mode
3.0V	5.0V

(4) Set the offset/gain values for the user range setting 3 *2 within a range in which the following conditions are satisfied.
(a) Setting range is from -0.5 to 6 V.
(b) { (Gain value) - (Offset value) } > A
<Value of A>

Normal resolution mode	High resolution mode
1.5V	2.6V

(2) Current output characteristic

(a) Current output characteristic in normal resolution mode
Fig.3.3 shows a graph of the current output characteristic in normal resolution mode.

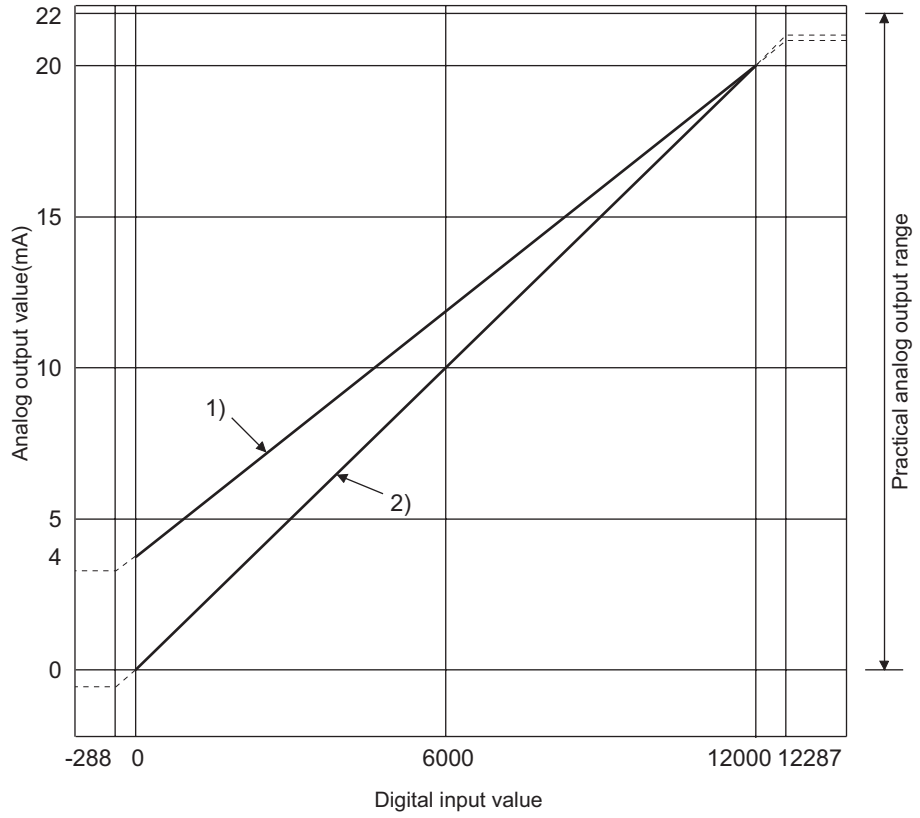


Number	Output range setting	Offset value	Gain value	Digital input value	Maximum resolution
1)	4 to 20 mA	4 mA	20 mA	0 to 4000	4μA
2)	0 to 20 mA	0 mA	20 mA		5μA
-	User range setting1	*1	*1	–4000 to 4000	1.5μA

Fig.3.3 Current output characteristic in normal resolution mode

(b) Current output characteristic in high resolution mode

Fig.3.4 shows a graph of the current output characteristic in high resolution mode.



Number	Output range setting	Offset value	Gain value	Digital input value	Maximum resolution
1)	4 to 20 mA	4 mA	20 mA	0 to 12000	1.33 μ A
2)	0 to 20 mA	0 mA	20 mA		1.66 μ A
-	User range setting1	*1	*1	–12000 to 12000	0.95 μ A

Fig.3.4 Current output characteristic in high resolution mode

Point

(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 3.3 and 3.4.)

(2) Set the offset/gain values for the user range setting 1 *1 within a range in which the following conditions are satisfied.
(a) Setting range is from 0 to 22 mA
(b) { (Gain value) - (Offset value) } > A
<Value of A>

Normal resolution mode	High resolution mode
6.0mA	11.5mA

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℃ .
The reference accuracy is the accuracy relative to the maximum value of the analog output value.
Even if the offset/gain setting or analog output range is changed to change the output characteristic, the reference accuracy and temperature coefficient do not vary and are kept within the ranges given in the performance specifications.

Example) Accuracy when the temperature varies from 25℃ to 30℃

0.1% (reference accuracy) + 0.008%/℃ (temperature coefficient) × 5℃ (difference in temperature variation) = 0.14%

3.1.4 Conversion speed

The conversion speed for the Q66DA-G is "6ms × the number of conversion enabled channels".
By setting the unused channels to D/A conversion disabled (Refer to Section 3.4.2), the conversion speed can be increased.

3.2 Function List

Table 3.2 shows the function of the Q66DA-G.

Table3.2 Function list

Item	Function	Reference section
D/A conversion enable/ disable function	• Specifies whether to enable or disable the D/A conversion for each channel. • Disabling D/A conversion of unused channels can increase the conversion speed.	Section 3.4.2
D/A output enable/disable function	• Specifies whether to output the D/A converted value or output the offset value for each channel. • Regardless of the output enable/disable setting, the conversion speed is “6ms x number of conversion-enabled channels”.	Section 3.3.1
Analog output HOLD/ CLEAR function	• The output analog value can be retained when the programmable controller CPU is placed in the STOP status or when an error occurs.	Section 3.2.1
Analog output test during programmable controller CPU STOP	• When the CH□ output enable/disable flag is forced ON during programmable controller CPU STOP, the D/A converted analog value is output.	Section 3.2.2
Warning output function	• A warning is output if a digital input value falls outside the setting range.	Section 3.2.3
Rate control function	• The increase and decrease in analog output values per conversion cycle of one station (6ms) can be limited. • Using this function prevents rapid change of analog output values.	Section 3.2.4
Resolution mode	• The resolution mode can be changed according to the application, and a resolution setting can be selected from 1/4000, 1/12000 and 1/16000. • The resolution mode setting is applicable to all channels in block. • Refer to Section 3.1.1 for the digital input values and maximum resolution in normal resolution mode and high resolution mode.	Section 3.1.1 Section 4.5
Scaling function	• The input range of digital values can be changed to any given range between -32000 and 32000.	Section 3.2.5
Online module change	• The module can be changed without the system being stopped.	Chapter 7

3.2.1 Analog output HOLD/CLEAR function

(1) For the case where the programmable controller CPU is placed in STOP or in a stop error status, whether to hold (HOLD) or clear (CLEAR) the analog output value can be set.

(2) Make the setting in the HOLD/CLEAR setting (Refer to Section4.5 (1).) of the intelligent function module switch.

(3) Depending on combinations of the HOLD/CLEAR setting, D/A conversion enable/disable setting (Un\G0), and CH□ output enable/disable flag (Y1 to Y6), the analog output status varies as shown in Table 3.3.

Table3.3 Analog output status combination list

Setting combination / Execution status	D/A conversion enable/disable setting (Un\G0)	Enable			Disable
	CH□ output enable/ disable flags (Y1 to Y6)	Enable		Disable	Enable or disable
	HOLD/CLEAR setting	HOLD	CLEAR	HOLD or CLEAR	HOLD or CLEAR
Analog output status when programmable controller CPU is RUN		Outputs analog values converted from digital values.*2		Offset	0 V/0 mA
Analog output status when programmable controller CPU is STOP		Hold	Offset	Offset	0 V/0 mA
Analog output status when a programmable controller CPU stop error occurs		Hold	Offset	Offset	0 V/0 mA
Analog output status when a watchdog timer error*1 occurs in Q66DA-G		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 Q66DA-G. When a watchdog timer error occurs, module READY (X0) turns OFF and the Q66DA-G RUN LED turns off.

*2 The rate control function and the scaling function are operable.

Point

The following conditions should be satisfied when the analog output HOLD/CLEAR function is used on a MELSECNET/H remote I/O station.

- The master module of function version D or later and the remote I/O module of function version D or later are required.
- Validate the station unit block guarantee of the send side cyclic data.
- The setting for holding the Q66DA-G output in the case of a link error must be made in the "Error time output mode in the I/O assignment setting". (Refer to Section 4.5 (2).) The HOLD/CLEAR setting by the intelligent function module switch is invalid. This setting is validated on a per-module basis, and is not made on a per-channel basis. Therefore, to make the output status at a stop error or STOP of the programmable controller CPU matched with the output status at a link error, set the same .HOLD/CLEAR setting to all channels. (Refer to the table below.)

	Error time output mode	HOLD/CLEAR setting (Same setting to all channels)
Hold analog output	Hold	HOLD
Clear analog output (Output offset value)	Clear	CLEAR

For the station unit block guarantee of the cyclic data, refer to the Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O Network).

3.2.2 Analog output test during programmable controller CPU STOP

(1) While the programmable controller CPU is in STOP, an analog output test as shown in Table 3.4 can be performed.

(2) To conduct an analog output test, perform the following on Device test of GX Developer or on the relevant test screens of Configurator-DA (Refer to Section 5.6.1.).

(a) Set D/A conversion enable/disable setting (Un\G0) of the channel to be tested to enable.

(b) Switch the operating condition setting request (Y9) from OFF to ON to OFF.

(c) Sets the output enable/disable flag (Y1 to Y6) for the channel to be tested to enable (OFF → ON).

(d) Write digital values equivalent to analog values that are to be output to the CH□ digital value (Un\G1 to Un\G6).

Table3.4 List of analog output test

Setting combination	D/A conversion enable/disable setting (Un\G0)	Enable		Disable	
	CH□ output enable/disable flags (Y1 to Y6)	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 (Un\G0) to enable.

Point

When the digital input value is set to be written to the CH□ digital value (Un\G1 to Un\G6) from the CPU device at the automatic refresh setting of GX Configurator-DA, write digital input value to the CPU device where the setting is performed. The automatic refresh can be performed while the programmable controller CPU is in STOP.

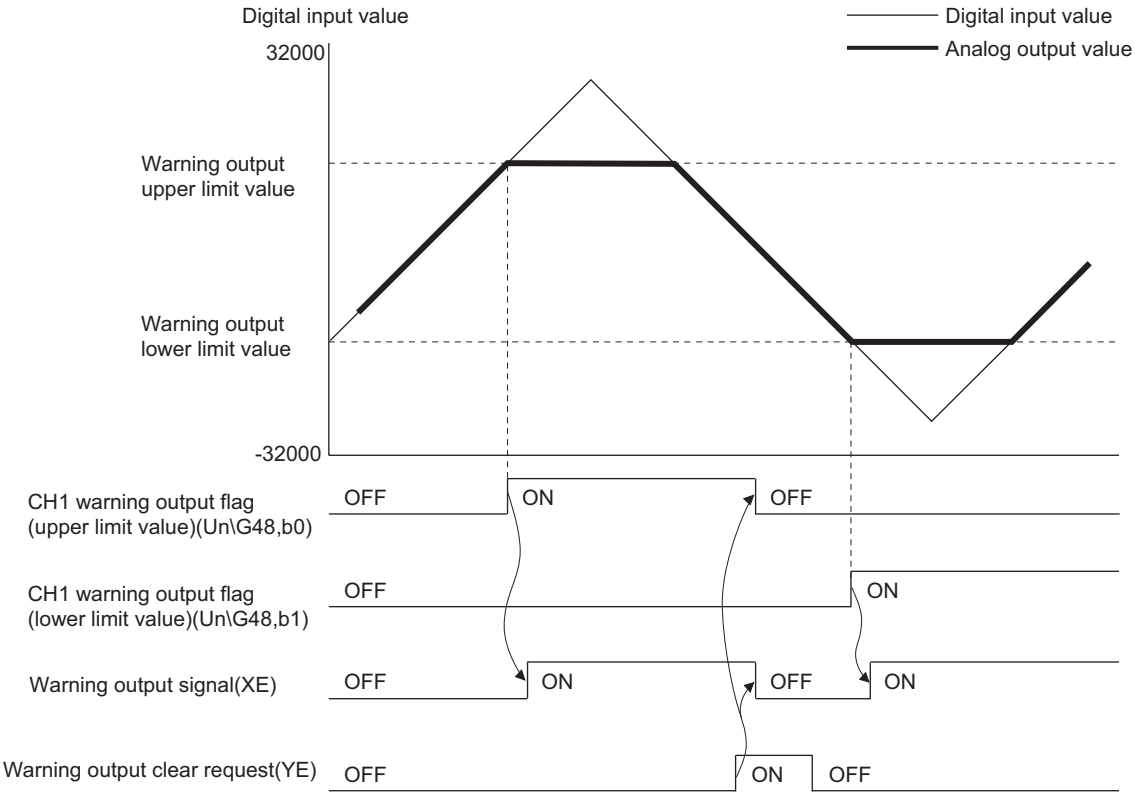
3.2.3 Warning output function

(1) If the digitat input value is equal to or greater than the warning output upper limit value or equal to or less than the warning output lower limit value, the warning output flag (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) The analog output value of waring occurrence is the value converted from the digital value at the warning output upper limit value or warning output lower limit value.

(3) The warning output flag (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) To use this function, the following settings are required for each setting.
- Enable the warning output function: Warning output setting (Un\G47)
- Set the warning output upper and lower limit values: CH□ warning output upper/ lower limit values (Un\G86 to Un\G97)



(5) When the scaling function is used, input values converted within the scaling range are checked for warning output.

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.

3.2.4 Rate control function

(1) The increase and decrease in analog output values per 6ms *1 can be limited, which can prevent rapid change of the values.

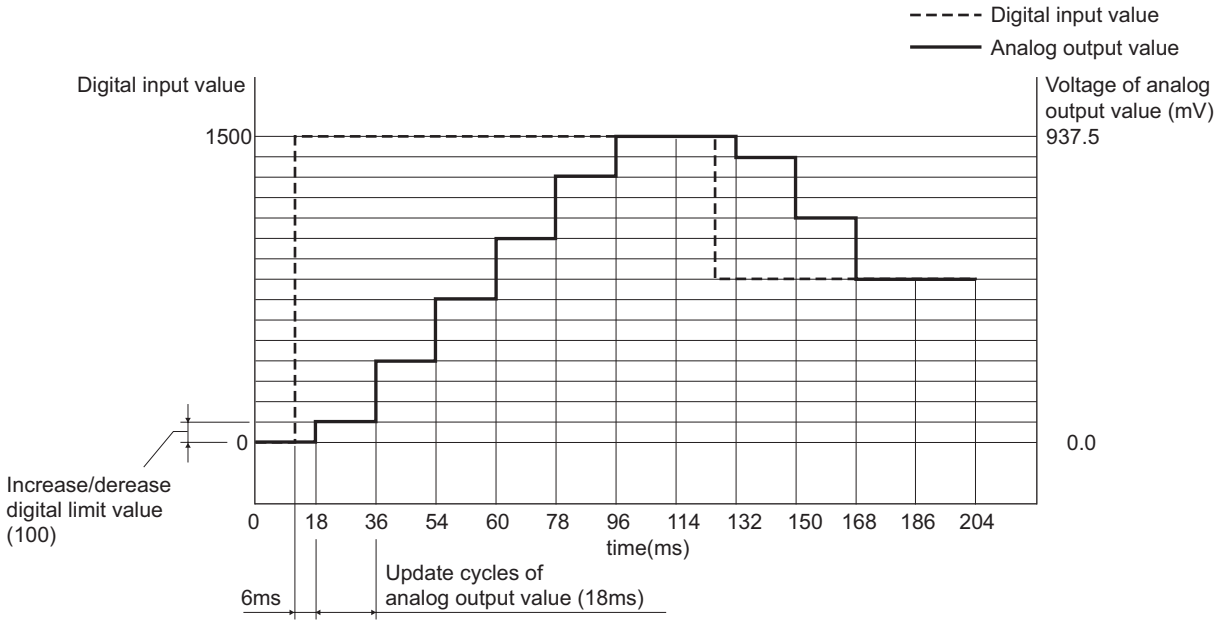
*1 6ms is the D/A conversion cycle per channel.

(2) To use this function, the following settings are required for each setting.

- Enable the rate control function: rate control enable/disable setting (Un\G46)
- Set the increase/decrease of analog output value per 6ms: CH□ increase/decrease digital limit value (Un\G70 to Un\G81)

(3) Although values on a per-6ms basis are set in CH□ increase/decrease digital limit value (Un\G70 to Un\G81), the actual cycle in which the Q66DA-G updates analog values is (6ms x number of conversion-enabled channels).
Therefore, the maximum increase/decrease in analog output values under the rate control is a D/A converted value of (Increase/decrease digital limit value x No. of conversion-enabled channels).
[Example Control of channel 3 when No. of conversion-enabled channels is 1 to 3]

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

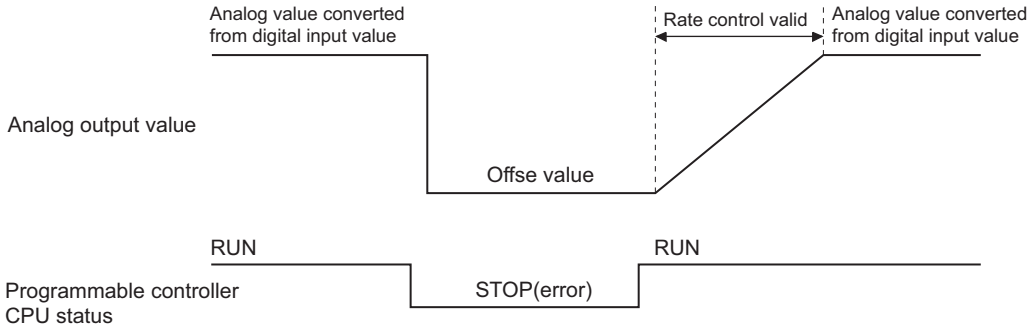


When the digital input value changes, the analog output value increases or decreases in update cycles as follows:

1st time: D/A converted value of the upper/lower digital limit value

2nd time or later: D/A converted value of (Increase/decrease digital limit value x No. of conversion-enabled channels)

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



(5) When the scaling function is used, digital input values converted within the scaling range are limited.

3.2.5 Scaling function

The digital input value range can be changed to any given range between -32000 and 32000.

To use this function, the following settings are required for each channel.

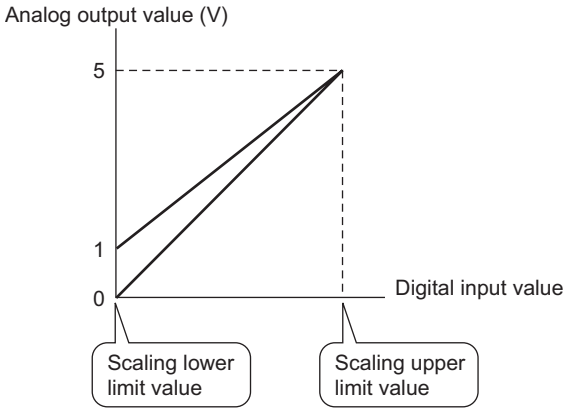
- Enable the scaling function: Scaling enable/disable setting (Un\G53)
- Set the scaling upper and lower limit values: Scaling upper/lower limit value (Un\G54 to Un\G65)

The CH□ scaling upper/lower limit value settings vary depending on the output range. (Refer to (1) and (2) below.)

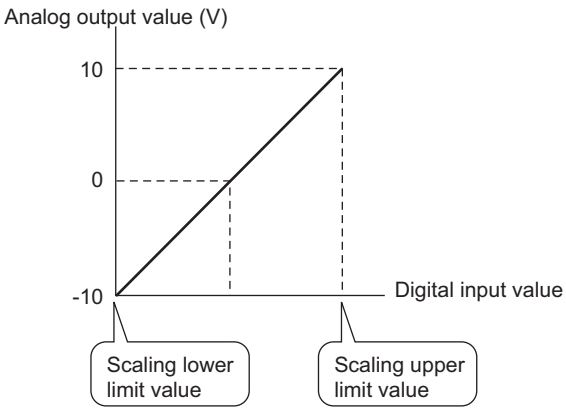
(1) When using the factory default setting for the output range

(a) As the scaling upper and lower limit values, set digital values equivalent to the upper and lower limit values of analog output respectively.

[Example] When the output range is “0 to 5V” or “1 to 5V”



[Example] When the output range is “-10 to 10V”



(b) The D/A conversion uses values calculated from the following formula.

$$\text{Digital values actually used for D/A conversion} = \frac{D_{Max}-D_{Min}}{S_H-S_L} \times (D_X-S_L)+D_{Min}$$

D_X : Digital input value

D_{Max} : Maximum digital input value of the output range used

D_{Min} : Minimum digital input value of the output range used

S_H : Scaling upper limit value

S_L : Scaling lower limit value

[Example]

When a digital input value of 7000 is input under the following setting:
Output range: -10 to 10V, High resolution mode,
Scaling upper limit value: 14000, Scaling lower limit value: 2000

Digital values actually used for D/A conversion

$$= \frac{16000-(-16000)}{14000-2000} \times (7000-2000) + (-16000)$$

$$= -2666.66 \cdot \cdot \cdot \cdot \cdot$$

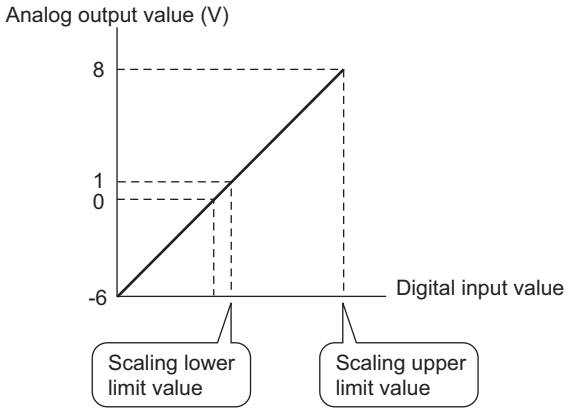
$$= -2666$$

Fractional part is rounded down.

(2) When using the user range setting for the output range

(a) Set a digital value, which is equivalent to the analog gain value to be output, as the scaling upper limit value. Also, set a digital value, which is equivalent to the analog offset value to be output, as the scaling lower limit value.

[Example] User range setting 2, Offset value: 1V, Gain value: 8V



(b) The D/A conversion uses values calculated from the following formula.

$$\text{Digital values actually used for D/A conversion} = \frac{D_{Max}}{S_H - S_L} \times (D_X - S_L)$$

D_X : Digital input value

D_{Max}: Maximum digital input value of the output range used

S_H : Scaling upper limit value

S_L : Scaling lower limit value

[Example]
When a digital input value of 4000 is input under the following setting:
Output range: User range setting 2, High resolution mode,
Scaling upper limit value: 13000, Scaling lower limit value: 2000

Digital values actually used for D/A conversion

$$= \frac{12000}{13000-2000} \times (4000-2000)$$
$$= 2181.81 \cdot \cdot \cdot \cdot \cdot$$
$$= 2181$$

Fractional part is rounded down.

Point

(1) Even if the digital value input range is enlarged, the resolution will not be more than the one applied when the scaling function is not used. As the digital value input range is narrowed, the resolution is lowered.

(2) When a digital value input range not including zero (0), such as “1000 to 6000”, is specified, turn ON the output enable/disable flag after setting values within the input range in the CH☐ digital values (Un\G1 to Un\G6).
If the output enable/disable flag is turned ON with the default value (0) set in the CH☐ digital value, an error will occur and an error code will be stored in the Error code (Un\G19).

(3) The check of the settable range is performed for “digital values actually used for D/A conversion”.

(4) Depending on whether to use the scaling function or not, the analog output value varies on the boundary between the inside and outside of the digital input value setting range.
[Example 1]
Output range: 4 to 20mA, Normal resolution mode, and not using the scaling function
By the conditions of the output range and resolution mode, the available digital input value setting range is –96 to 4095.
When a digital value is the upper limit of the settable range, 4095 or higher, an analog value equivalent to 4095 is output, which means the same analog value is output for the digital values within and outside the setting range.
[Example 2]
Output range: 4 to 20mA, Normal resolution mode (same as Example 1), and using the scaling function with:
Scaling upper limit value: 3000, Scaling lower limit value: 1000
When a digital value is the upper limit of the settable range, 3047 (4094 after calculation), an analog value equivalent to 4094 is output.
On the other hand, if it is out of the settable range, which is 3048 or higher (calculated value is 4096 or higher), an analog value equivalent to 4095 is output.
As a result, the analog output value converted from the upper limit digital value of the settable range is different from the one converted from the value outside the settable range by 1 digit.

3.3 I/O Signals for the Programmable Controller CPU

3.3.1 List of I/O signals

Table 3.5 shows a list of the I/O signals for the Q66DA-G.

Table3.5 List of I/O signal

Signal direction	Q66DA-G → CPU module	Signal direction	CPU module → Q66DA-G
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	CH3 Output enable/disable flag
X4		Y4	CH4 Output enable/disable flag
X5		Y5	CH5 Output enable/disable flag
X6		Y6	CH6 Output enable/disable flag
X7	External power supply READY	Y7	Use prohibited *1
X8	High resolution mode status 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	Use prohibited *1	YD	Use prohibited *1
XE	Warning output signal	YE	Warning output clear request
XF	Error flag	YF	Error clear request

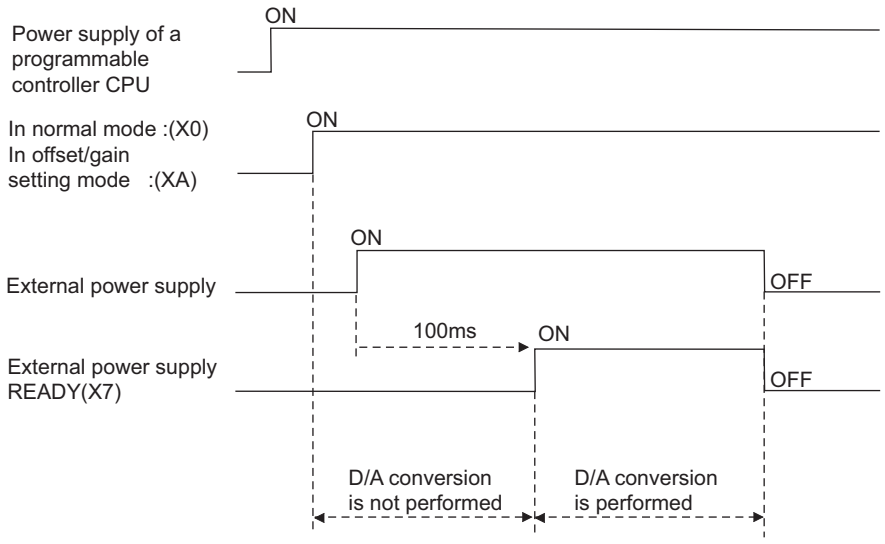
Point

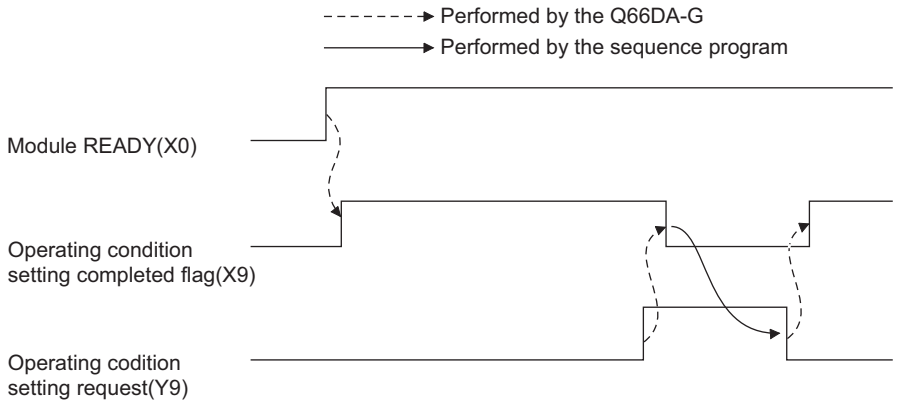
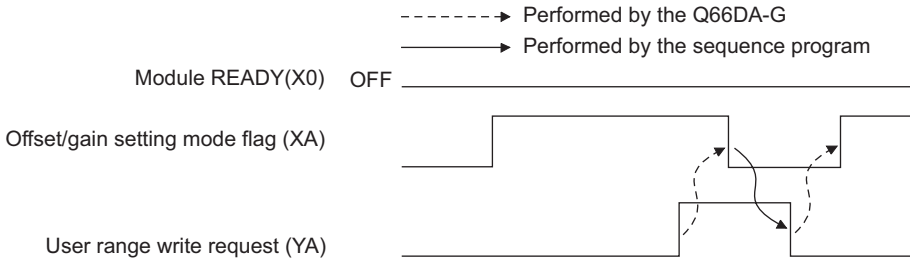
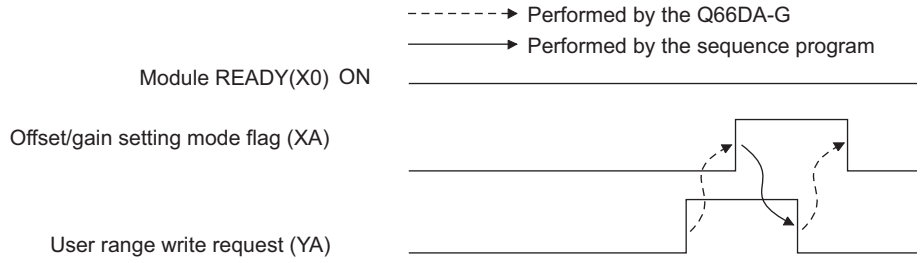
*1 These signals cannot be used by the user since they are used by the system. If these are turned ON/OFF by the sequence program, the function of the Q66DA-G cannot be guaranteed.

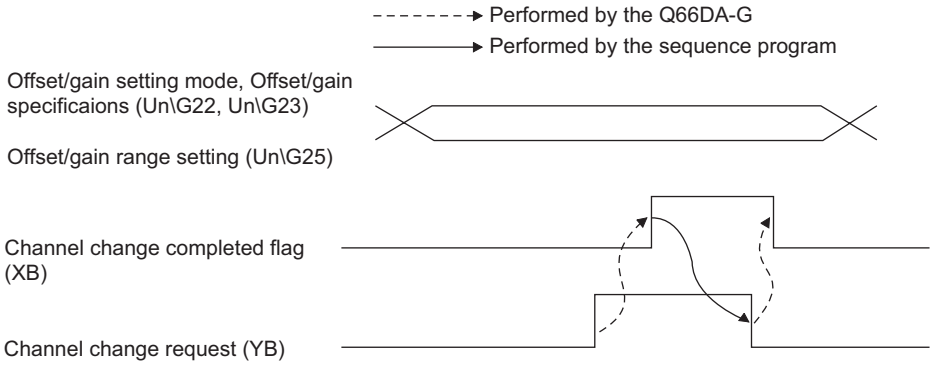
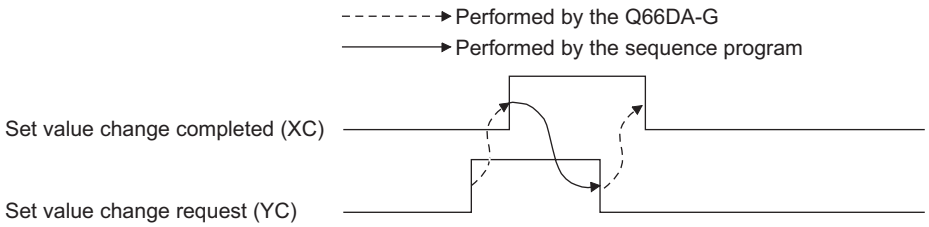
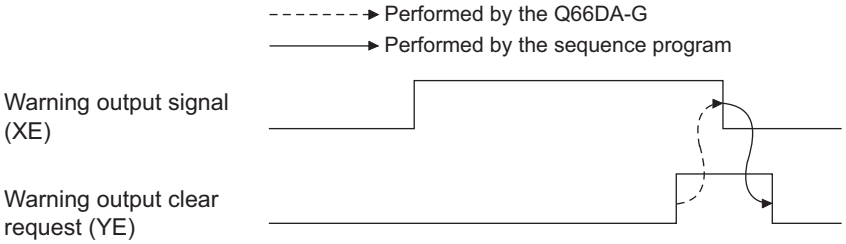
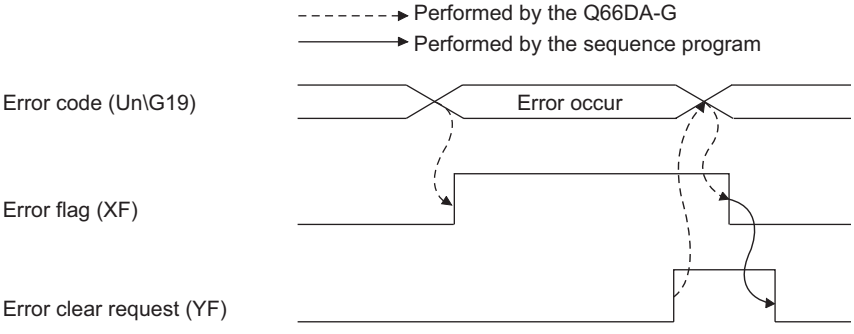
3.3.2 Details of I/O signals

I/O signals for the Q66DA-G are explained in detail below.

(1) Input signals

Device No.	Signal name	Description
X0	Module READY	(1) When the programmable controller CPU is powered on or reset, this signal turns ON when the initial processings in the Q66DA-G are all completed. (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: ▪ During offset/gain setting mode ▪ When the Q66DA-G has a watchdog timer error
X7	External power supply READY	(1) This signal turns on 100ms after turning on the external power supply. (2) In normal mode, when Module READY (X0) is OFF, this signal does not turn ON even if 100ms have elapsed after turning on the external power supply. In this case, as soon as Module READY (X0) turns ON, this signal (X7) turns ON. (3) In Offset/gain setting mode, when Offset/gain setting mode flag (XA) is OFF, this signal does not turn on even if 100ms have elapsed after turning ON the external power supply. In this case, as soon as Offset/gain setting mode flag (XA) turns on, this signal (X7) turns on. (4) D/A conversion is performed after the external power supply READY (X7) turns ON. (5) When the external power is not supplied or has been supplied for less than 100ms, X7 is OFF and no D/A conversion is performed. At this time, the analog output value is "0mA/0V" regardless of other settings, and no invalid digital value error detection or no warning output is performed. (6) X7 might not turn ON when the external power supply does not meet the requirements shown in the performance specifications (Refer to Table 3.1.). (7) The following time chart shows that the external power supply is turned ON after power-on of a programmable controller CPU.  (8) When performing D/A output, X0 and X7 must be ON as shown below. 
X8	High resolution mode status flag	(1) This turns ON when in high resolution mode.

Device No.	Signal name	Description
X9	Operating condition setting completed flag	(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. ・D/A conversion enable/disable setting (Un\G0) ・Rate control enable/disable setting (Un\G46) ・Warning output setting (Un\G47) ・Scaling enable/disable setting (Un\G53) ・Scaling upper/lower limit value (Un\G54 to Un\G65) ・Increase/decrease digital limit value (Un\G70 to Un\G81) ・Warning output upper/lower limit value (Un\G86 to Un\G97) (2) Under the following conditions, the operating condition setting completed flag (X9) turns OFF. ・When operating condition setting request (Y9) is ON 
XA	Offset/gain setting mode flag	[In offset/gain setting mode] (1) This is used as an interlock condition for turning ON/OFF the user range write request (YA) when registering the value after adjustment of the offset/gain settings have been completed. (2) Refer to Section 4.6 regarding the offset/gain settings.  [In normal mode] (1) This is used as an interlock condition to turn ON/OFF the User range write request (YA) when the user range is restored. (2) Refer to Chapter 7 regarding the user range restoration. 

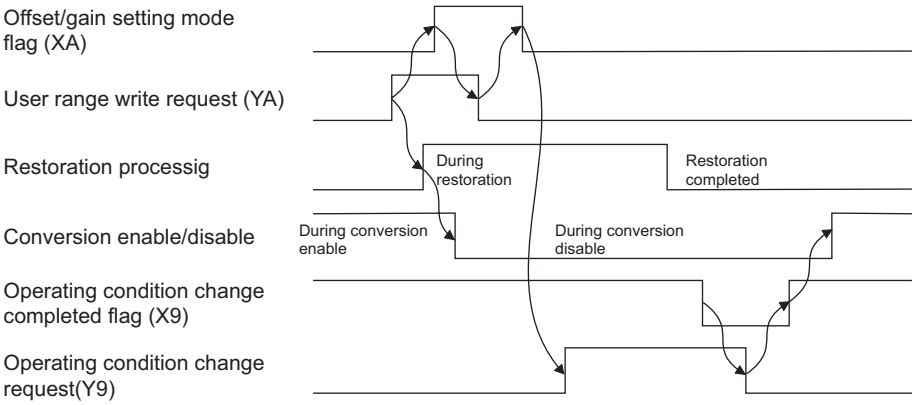
Device No.	Signal name	Description
XB	Channel change completed flag	(1) This is used as an interlock condition for turning ON/OFF the channel change request (YB) when specifying the user range and channel to perform offset/gain settings. (2) Refer to Section 4.6 regarding the offset/gain settings. 
XC	Set value change completed flag	(1) This is used as an interlock condition for turning ON/OFF the set value change request (YC) when adjusting the offset/gain settings. (2) Refer to Section 4.6 regarding the offset and gain settings. 
XE	Warning output signal	(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. (2) Turning ON the warning output clear request (YE) or operating condition setting request (Y9) turns OFF the warning output signal (XE). 
XF	Error flag	(1) The error flag (XF) turns ON when a write error occurs. (2) To turn the error flag (XF) OFF, remove the cause of the error and turn ON the error clear request (YF). The error code (Un\G19) changes to 0 and the ERR. LED turns off. 

(2) Output signals

Device No.	Signal name	Description
Y1 to Y6	CH□ output enable/ disable flag	(1) Specify whether to output the D/A converted value or output the offset value for each channel. ON: D/A converted value OFF: Offset value (2) The D/A conversion speed is 6ms X the number conversion-enabled channels regardless of whether the output enable/disable flag is ON or OFF.
Y9	Operating condition setting request	(1) Turn ON this signal when changing any of the following settings and making the setting valid. • D/A conversion enable/disable setting (Un\G0) • Rate control enable/disable setting (Un\G46) • Warning output setting (Un\G47) • Scaling enable/disable setting (Un\G53) • Scaling upper/lower limit value (Un\G54 to Un\G65) • Increase/decrease digital limit value (Un\G70 to Un\G81) • Warning output upper/lower limit value (Un\G86 to Un\G97) (2) Refer to the X9 column for the ON/OFF timing.
YA	User range write request	[In offset/gain setting mode] (1) Turn ON this signal when the values for the adjusted offset/gain settings are registered in the Q66DA-G. (2) Refer to the XA column for ON/OFF timing. Refer to Section 4.6 for offset/gain settings.
		[In normal mode] (1) Turn ON this signal when restoring the user range. (2) Refer to the XA column for the ON/OFF timing. Refer to Chapter 7 for the user range restoration.
YB	Channel change request	(1) Turn ON this signal when specifying the user range and channel to perform offset/gain settings. (2) Refer to the XB column for the ON/OFF timing.
YC	Set value change request	(1) Turn ON/OFF this signal when increasing or decreasing the analog output value during adjustment of the offset/gain settings. (2) The analog output is incremented or decremented depending on the value set to the offset/gain adjustment value specification (Un\G24).
YE	Warning output clear request	(1) Turn ON this signal when clearing the warning output. (2) Refer to the XE column for the ON/OFF timing.
YF	Error clear request	(1) Turn ON this signal when clearing a write error. (2) Refer to the XF column for ON/OFF timing.

Point

When the user range write request (YA) is turned ON with D/A conversion enabled in the normal mode, the Q66DA-G restores the user range.



During restoration : D/A conversion disable
After restoration : D/A conversion processing can be executed in the restored user range

3.4 Buffer Memory

3.4.1 Buffer memory assignment

Table 3.6 indicates the buffer memory assignment of the Q66DA-G.

Point

Do not write data from system area or sequence program to the buffer memory area where writing is disabled.
Doing so may cause malfunction.

Table3.6 Buffer memory assignment (1/3)

Address		Description	Default *1	Read/write *2
Hexadecimal	Decimal			
0H	0	D/A conversion enable/disable setting	003FH	R/W
1H	1	CH1 Digital value	0	R/W
2H	2	CH2 Digital value	0	R/W
3H	3	CH3 Digital value	0	R/W
4H	4	CH4 Digital value	0	R/W
5H	5	CH5 Digital value	0	R/W
6H	6	CH6 Digital value	0	R/W
7H to AH	7 to 10	System area	-	-
BH	11	CH1 Set value check code	0	R
CH	12	CH2 Set value check code	0	R
DH	13	CH3 Set value check code	0	R
EH	14	CH4 Set value check code	0	R
FH	15	CH5 Set value check code	0	R
10H	16	CH6 Set value check code	0	R
11H	17	System area	-	-
12H	18			
13H	19	Error code	0	R
14H	20	Setting range (CH1 to CH4)	0	R
15H	21	Setting range (CH5, CH6)	0	R
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 2DH	26 to 45	System area	-	-
2EH	46	Rate control enable/disable setting	003FH	R/W
2FH	47	Warning output setting	003FH	R/W
30H	48	Warning output flag	0	R
31H To 34H	49 to 52	System area	-	-

*1 This is the initial value set after the power is turned on or the programmable controller CPU is reset.
*2 Indicates whether reading from and writing to a sequence program are enabled.
R : Reading enabled W : Writing enabled

Table 3.6 Buffer memory assignment (2/3)

Address		Description	Default *1	Read/write *2
Hexadecimal	Decimal			
35H	53	Scaling enable/disable setting	003FH	R/W
36H	54	CH1 Scaling lower limit value	0	R/W
37H	55	CH1 Scaling upper limit value	0	R/W
38H	56	CH2 Scaling lower limit value	0	R/W
39H	57	CH2 Scaling upper limit value	0	R/W
3AH	58	CH3 Scaling lower limit value	0	R/W
3BH	59	CH3 Scaling upper limit value	0	R/W
3CH	60	CH4 Scaling lower limit value	0	R/W
3DH	61	CH4 Scaling upper limit value	0	R/W
3EH	62	CH5 Scaling lower limit value	0	R/W
3FH	63	CH5 Scaling upper limit value	0	R/W
40H	64	CH6 Scaling lower limit value	0	R/W
41H	65	CH6 Scaling upper limit value	0	R/W
42H to 45H	66 to 69	System area	-	-
46H	70	CH1 Increase digital limit value	64000	R/W
47H	71	CH1 Decrease digital limit value	64000	R/W
48H	72	CH2 Increase digital limit value	64000	R/W
49H	73	CH2 Decrease digital limit value	64000	R/W
4AH	74	CH3 Increase digital limit value	64000	R/W
4BH	75	CH3 Decrease digital limit value	64000	R/W
4CH	76	CH4 Increase digital limit value	64000	R/W
4DH	77	CH4 Decrease digital limit value	64000	R/W
4EH	78	CH5 Increase digital limit value	64000	R/W
4FH	79	CH5 Decrease digital limit value	64000	R/W
50H	80	CH6 Increase digital limit value	64000	R/W
51H	81	CH6 Decrease digital limit value	64000	R/W
52H to 55H	82 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	90	CH3 Warning output upper limit value	0	R/W
5BH	91	CH3 Warning output lower limit value	0	R/W
5CH	92	CH4 Warning output upper limit value	0	R/W
5DH	93	CH4 Warning output lower limit value	0	R/W
5EH	94	CH5 Warning output upper limit value	0	R/W
5FH	95	CH5 Warning output lower limit value	0	R/W
60H	96	CH6 Warning output upper limit value	0	R/W
61H	97	CH6 Warning output lower limit value	0	R/W

*1 This is the initial value set after the power is turned on or the programmable controller CPU is reset.
*2 Indicates whether reading from and writing to a sequence program are enabled.
R : Reading enabled W : Writing enabled

Table 3.6 Buffer memory assignment (3/3)

Address		Description	Default *1	Read/write *2
Hexadecimal	Decimal			
62H to 9DH	98 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	Save data classification setting*3	0	R/W
C9H	201	System area	-	-
CAH	202	CH1 Factory default setting offset value*3	0	R/W
CBH	203	CH1 Factory default setting gain value*3	0	R/W
CCH	204	CH2 Factory default setting offset value*3	0	R/W
CDH	205	CH2 Factory default setting gain value*3	0	R/W
CEH	206	CH3 Factory default setting offset value*3	0	R/W
CFH	207	CH3 Factory default setting gain value*3	0	R/W
D0H	208	CH4 Factory default setting offset value*3	0	R/W
D1H	209	CH4 Factory default setting gain value*3	0	R/W
D2H	210	CH5 Factory default setting offset value*3	0	R/W
D3H	211	CH5 Factory default setting gain value*3	0	R/W
D4H	212	CH6 Factory default setting offset value*3	0	R/W
D5H	213	CH6 Factory default setting gain value*3	0	R/W
D6H	214	CH1 User range settings offset value*3	0	R/W
D7H	215	CH1 User range settings gain value*3	0	R/W
D8H	216	CH2 User range settings offset value*3	0	R/W
D9H	217	CH2 User range settings gain value *3	0	R/W
DAH	218	CH3 User range settings offset value*3	0	R/W
DBH	219	CH3 User range settings gain value*3	0	R/W
DCH	220	CH4 User range settings offset value*3	0	R/W
DDH	221	CH4 User range settings gain value *3	0	R/W
DEH	222	CH5 User range settings offset value*3	0	R/W
DFH	223	CH5 User range settings gain value*3	0	R/W
E0H	224	CH6 User range settings offset value*3	0	R/W
E1H	225	CH6 User range settings gain value *3	0	R/W

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

*2 Indicates whether reading from and writing to 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 (Un\G0)

(1) Set whether D/A conversion is enabled or disabled for each channel.

(2) To validate the settings, ON/OFF of the Operating condition setting request (Y9) is required. (Refer to Section 3.3.2.)

(3) By default, all channels are set to D/A conversion disabled.

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Un\G0	0	0	0	0	0	0	0	0	0	0	CH 6	CH 5	CH 4	CH 3	CH 2	CH 1

b6 to b15 information is fixed at 0.

1: D/A connversion disabled
0: D/A conversion enabled

Point

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

3.4.3 CH□ digital values (Un\G1 to Un\G6)

(1) This area is used to write digital values from the programmable controller CPU as 16-bit signed binary code.

(2) If a value outside the settable range is written, the upper or lower limit value of the range is used for D/A conversion. (Refer to Table 3.7.)
Also, if this happens, a check code and an error code will be stored in the Set value check code (Un\G11 to Un\G16) and Error code (Un\G19) respectively.

Table3.7 Output range settings and settable range

Output range setting	Normal resolution mode		High resolution mode	
	Settable range (practical range)	Digital value that is set when a value outside the settable range is written	Settable range (practical range)	Digital value that is set when a value outside the settable range is written
0: 4 to 20 mA	-96 to 4095 (Practical range: 0 to 4000)	4096 or larger: 4095 -97 or smaller: -96	-288 to 12287 (Practical range: 0 to 12000)	12288 or larger: 12287 -289 or smaller: -288
1: 0 to 20 mA				
2: 1 to 5 V				
3: 0 to 5 V				
4: –10 to 10 V	-4096 to 4095 (Practical range: -4000 to 4000)	4096 or larger: 4095 -4097 or smaller: -4096	-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 (Un\G11 to Un\G16)

(1) Digital values set in CH□ Digital value (Un\G1 to Un\G6) are checked and if any of them is outside the settable range, the check result is stored in this area.

(2) When a digital value outside the settable range (Refer to Section 3.4.3 and Table 3.7) is written, one of the check codes listed in Table 3.8 is stored.

Table3.8 Check code list

Check code	Description
000FH	A digital value exceeding the settable range is written.
00F0H	A digital value that falls short of the settable range is written.
00FFH	A digital value that either falls short or exceeds the settable range was written. For example, the 00FFH check code is stored if a digital value exceeding the valid range is written, and then, without the check code being reset, a digital value that falls short of the settable range is written.

(3) Once a check code is stored, it will not be reset even if the digital value is within the settable 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 settable range.

(5) When the scaling function is used, digital values converted from the digital values set in CH□ Digital values (Un\G1 to Un\G6) are checked. (Refer to Section 3.2.5.)

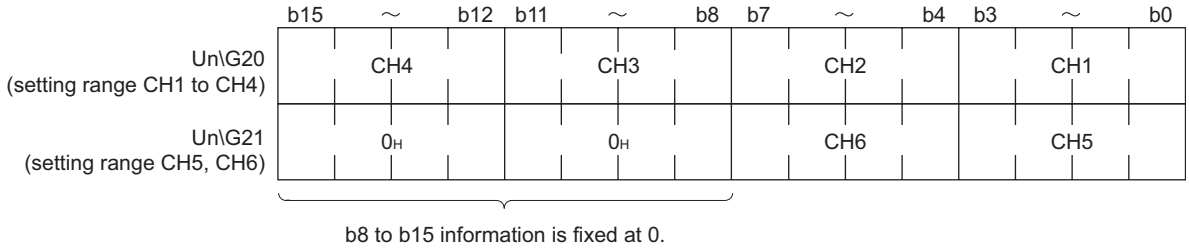
3.4.5 Error codes (Un\G19)

(1) This area stores the error codes detected by the Q66DA-G.

(2) Refer to Section 8.1 for more details of the error codes.

3.4.6 Setting range (Un\G20, Un\G21)

(1) This area is used to confirm the setting range of the Q66DA-G.



Output range	Storing value
4 to 20 (mA)	0_H
0 to 20 (mA)	1_H
1 to 5 (V)	2_H
0 to 5 (V)	3_H
–10 to 10 (V)	4_H
User range setting 3	D_H
User range setting 2	E_H
User range setting 1	F_H

3.4.7 Offset/gain setting mode and offset/gain specification (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. (Refer to Section 3.3.2.)

(3) Specification can be made for 1 channel only.
If more than one channel is set at the same time, an error occurs and an error code is stored in the Error code (Un\G19).

(4) Refer to Section 4.6 for the details of the offset/gain settings.

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Un\G22 (Offset specification)	0	0	0	0	0	0	0	0	0	0	CH6	CH5	CH4	CH3	CH2	CH1
Un\G23 (gain specification)	0	0	0	0	0	0	0	0	0	0	CH6	CH5	CH4	CH3	CH2	CH1

b6 to b15 information is fixed at 0.

1: Channel to be set
0: Invalid

3.4.8 Offset/gain adjustment value specification (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 settable input range is from -3000 to 3000.
When the set value is 1000, the analog output values can be adjusted by following value.

Output range	Adjustment when set value is 1000
User range setting1	Approx. 0.86mA
User range setting2	Approx. 0.38V
User range setting3	Approx. 0.19V

(4) Refer to Section 4.6 for details of offset/gain setting.

3.4.9 Offset/gain range setting (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 (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 Rate control enable/disable setting (Un\G46)

(1) Set whether to enable or disable the rate control on each channel.

(2) To validate the settings, ON/OFF of the operating condition setting request (Y9) is required. (Refer to Section 3.3.2.)

(3) The default setting is all-channel rate control disable.

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Un\G46	0	0	0	0	0	0	0	0	0	0	CH 6	CH 5	CH 4	CH 3	CH 2	CH 1

b6 to b15 information is fixed at 0

1: Rate control disable
0: Rate control enable

(4) Refer to Section 3.2.4 for details of rate control function.

3.4.11 Warning output setting (Un\G47)

(1) Set whether to enable or disable the warning output on each channel.

(2) To validate the settings, ON/OFF of the operating condition setting request (Y9) is required. (Refer to Section 3.3.2.)

(3) The default setting is all-channel warning output disable.

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Un\G47	0	0	0	0	0	0	0	0	0	0	CH 6	CH 5	CH 4	CH 3	CH 2	CH 1

b6 to b15 information is fixed at 0

1: Warning output disable
0: Warning output enable

(4) Refer to Section 3.2.3 for details of warning output function.

3.4.12 Warning output flag (Un\G48)

(1) When the digital input value falls outside the CH□ warning output upper limit value/ lower limit value (Un\G86 to Un\G97) range, the bit corresponding to each channel turns to "1".

(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) turns ON.

(4) Turning ON the operating condition setting request (Y9) or warning output clear request (YE) clears the warning output flag.

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Un\G48	0	0	0	0	CH6 lower limit value	CH6 upper limit value	CH5 lower limit value	CH5 upper limit value	CH4 lower limit value	CH4 upper limit value	CH3 lower limit value	CH3 upper limit value	CH2 lower limit value	CH2 upper limit value	CH1 lower limit value	CH1 upper limit value

b12 to b15 information is fixed at 0

1: Warning output
0: Normal

(5) Refer to Section 3.2.3 for details of warning output function.

3.4.13 Scaling enable/disable setting (Un\G53)

(1) Set whether to enable or disable the scaling on each channel.

(2) To validate the settings, ON/OFF of the Operating condition setting request (Y9) is required. (Refer to Section 3.3.2.)

(3) The default setting is all-channel scaling disable.

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Un\G53	0	0	0	0	0	0	0	0	0	0	CH 6	CH 5	CH 4	CH 3	CH 2	CH 1

b6 to b15 information is fixed at 0

1: Scaling disable
0: Scaling enable

(4) Refer to Section 3.2.5 for details of warning output function.

3.4.14 Scaling upper/lower limit value (Un\G54 to Un\G65)

(1) When the scaling function is used, set a digital value input range. (Refer to Section 3.2.5.)

(2) The setting range is -32000 to 32000.
Set them so that the scaling upper limit value is greater than the scaling lower limit value.
If any value outside the setting range is set, an error occurs and the corresponding error code (Un\G19) is stored.

(3) To validate the settings, ON/OFF of the operating condition setting request (Y9) is required. (Refer to Section 3.3.2.)

3.4.15 CH□ increase/decrease digital limit values (Un\G70 to Un\G81)

(1) For rate control, set the range where the digital value can be incremented and decremented in a conversion cycle per channel (6ms). (Refer to Section 3.2.4.)

(2) The setting range is 0 to 64000 (0 to $FA00_H$).
If any value outside the setting range is set, an error occurs and the corresponding error code is stored in error code (Un\G19).

(3) The operating condition setting request (Y9) must be turned ON/OFF to validate the settings. (Refer to Section 3.3.2.)

Point

When setting CH□ increase/decrease digital limit values (Un\G70 to Un\G81) from the sequence program, values from 0 to 32767 can be set as decimal numbers without change. Note that this is not applicable to 32768 to 65535. These values must be converted to hexadecimal numbers before setting.

3.4.16 CH□ warning output upper limit value/lower limit value (Un\G86 to Un\G97)

(1) Set the upper and lower limit values of the digital input value for providing the warning output. (Refer to Section 3.2.3.)

(2) The setting range is -32000 to 32000.
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 (Un\G19) is stored.

(3) The operating condition setting request (Y9) must be turned ON/OFF to validate the settings. (Refer to Section 3.3.2.)

3.4.17 Mode switching setting (Un\G158, Un\G159)

(1) Set the values of the mode to switch.

(2) After setting the values, turning the operation condition setting request (Y9) from OFF to ON enables mode switching.

(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 operating 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

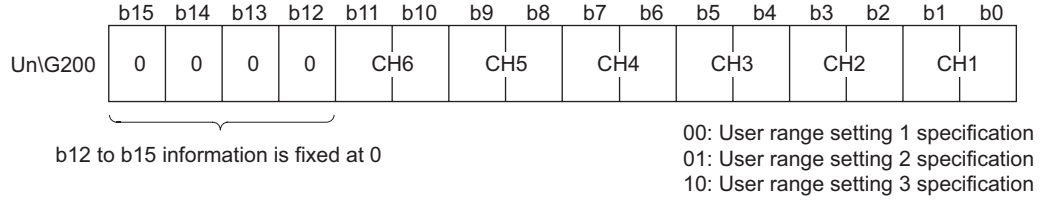
Point

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

3.4.18 Save data classification setting (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 Factory default setting and user range settings offset/gain values (Un\G202 to Un\G225)

(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*);
- The offset/gain values are written in the offset/gain setting mode (YA turns from OFF to ON).

*: The data are not saved when the set values have been written to the mode switch setting (Un\G158, Un\G159).

(3) When restoring the offset/gain values of the user range setting, set the data saved in this area similarly into the corresponding area of the module where the data will be restored.

(4) Buffer memory saving record procedure for online module change
1) Set the save data classification setting (Un\G200).
2) Turn the operating condition setting request (Y9) from OFF to ON.
3) Compare the offset/gain values of the factory default setting and user range settings (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 save data classification setting, factory default setting 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 failure.

(3) Be careful not to let foreign materials 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 materials such as wire chips from entering the module during wiring.
Do not remove this film until the wiring is completed. Before operating the system, be sure to remove the film to provide adequate heat radiation.

(5) Tighten the screws such as module fixing screws within the following ranges.
Loose screws may cause short circuits, failures or malfunctions.

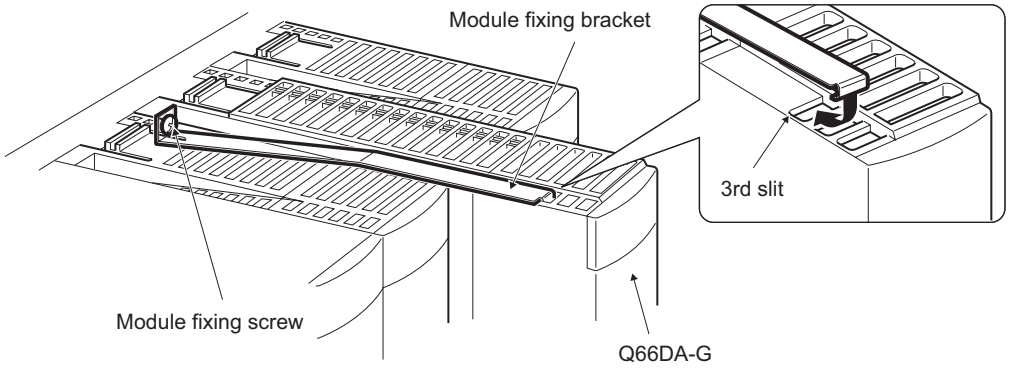
Screw location	Tightening torque range
Module fixing screw (M3 screw)	0.36 to 0.48 N・m
Connector screw (M2.6 screw)	0.20 to 0.29 N・m
FG Terminal screw (M3 screw)	0.42 to 0.58 N・m

(6) To mount the module on the base unit, fully insert the module fixing latch into the fixing hole in the base unit, using the module fixing hole as a fulcrum.
Improper installation may result in a module malfunction or failure, or may cause the module to fall off.

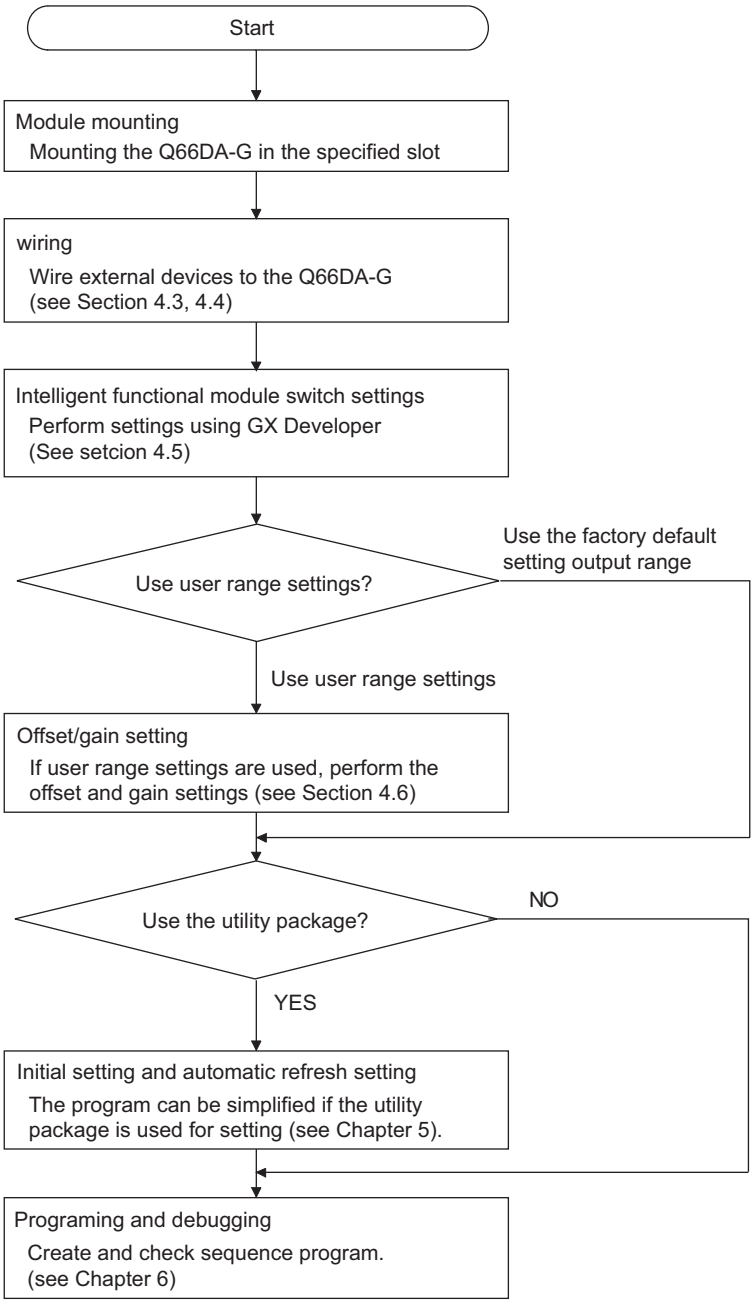
(7) Fix the Q66DA-G with module fixing bracket after the Q66DA-G is mounted to the base unit.

Point

Make sure that the hook at the tip of the module fixing bracket is hooked on the 3rd slit viewed from the front of Q66DA-G.
Tighten the module fixing screw by the specified torque.

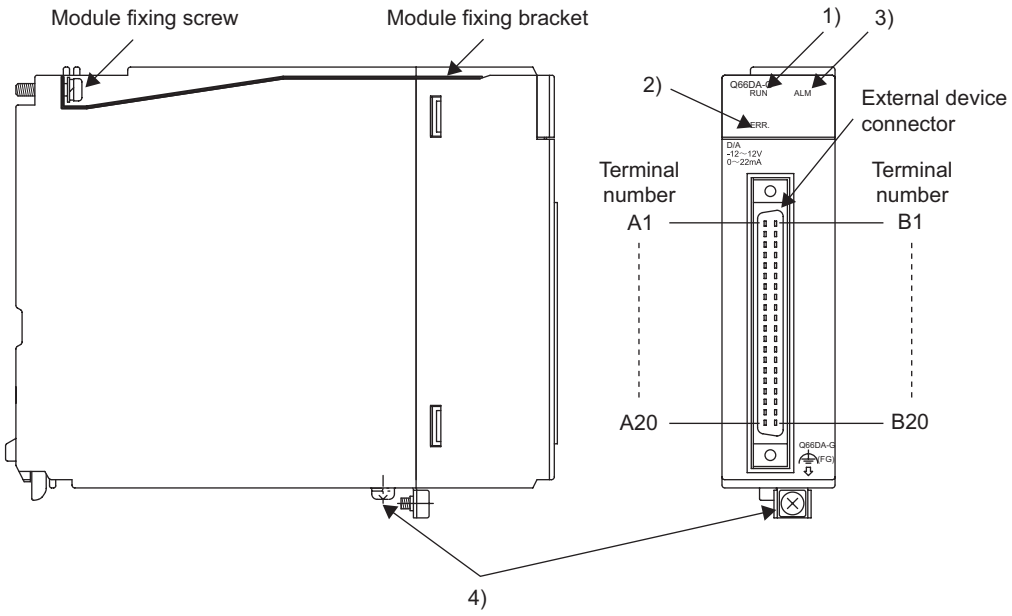


4.2 Setup and Procedures before Operation



4.3 Part Names

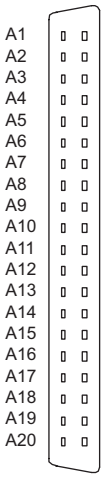
The name of each part in the Q66DA-G is listed below.



Number	Name	Description
1)	RUN LED	Displays the operating status of the Q66DA-G. On : Normal operation Flashing : During offset/gain setting mode Off : 5V power switched off, watchdog timer error occurred, or online module change enabled.
2)	ERR. LED	Displays the error status of the Q66DA-G. On : Error (Refer to Section 8.1) 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 Q66DA-G. On : During warning output occurrence (Refer to Section 3.2.3) Off : Normal operation
4)	FG terminal L-Shaped metal fitting	Metal fitting to wire for FG of the Q66DA-G

Point

When two or more errors have occurred, the latest error found by the Q66DA-G is displayed on the LED.



Seen from the front of the module

Terminal number	Signal name	Terminal number	Signal name
A1	CH1 V +	B1	CH1 COM1
A2	CH1 I +	B2	-
A3	-	B3	-
A4	CH2 V +	B4	CH1 COM2
A5	CH2 I +	B5	-
A6	-	B6	-
A7	CH3 V +	B7	CH1 COM3
A8	CH3 I +	B8	-
A9	-	B9	-
A10	CH4 V +	B10	CH1 COM4
A11	CH4 I +	B11	-
A12	-	B12	-
A13	CH5 V +	B13	CH1 COM5
A14	CH5 I +	B14	-
A15	-	B15	-
A16	CH6 V +	B16	CH1 COM6
A17	CH6 I +	B17	-
A18	-	B18	-
A19	24VDC	B19	24VDC
A20	24GDC	B20	24GDC

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 Q66DA-G and ensure system reliability, external wiring that is protected from noise is required.
The following shows the 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 Q66DA-G in order to avoid AC surges and induction effects.

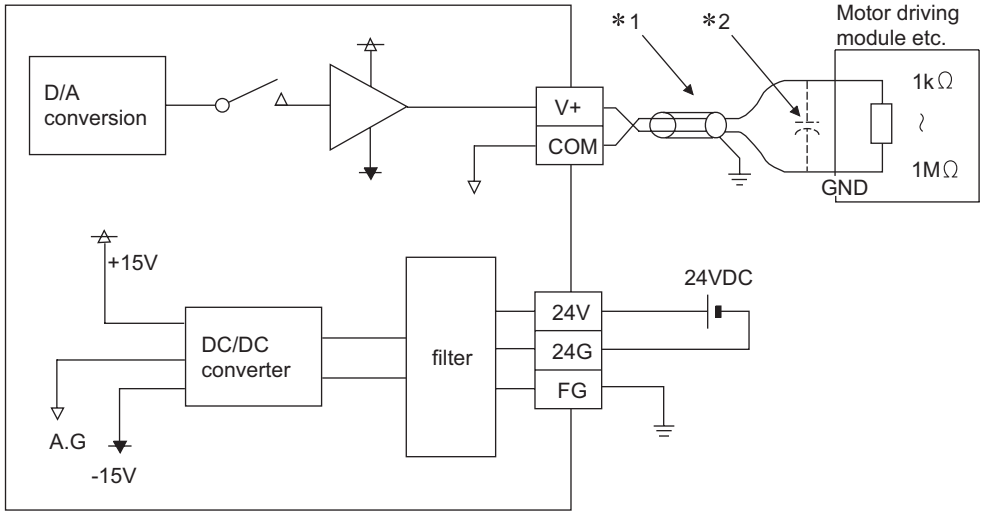
(2) Do not mount the cables close to or bundle them with the main circuit line, a high-voltage cable or a load cable from other than the programmable controller. This may increase the effects of noise, surges and induction.

(3) Perform a one-point grounding for shielded lines and the shields of shielded cables.

(4) When the wiring of the module mounted right to the Q66DA-G is difficult, perform wiring after removing the Q66DA-G.

4.4.2 External wiring

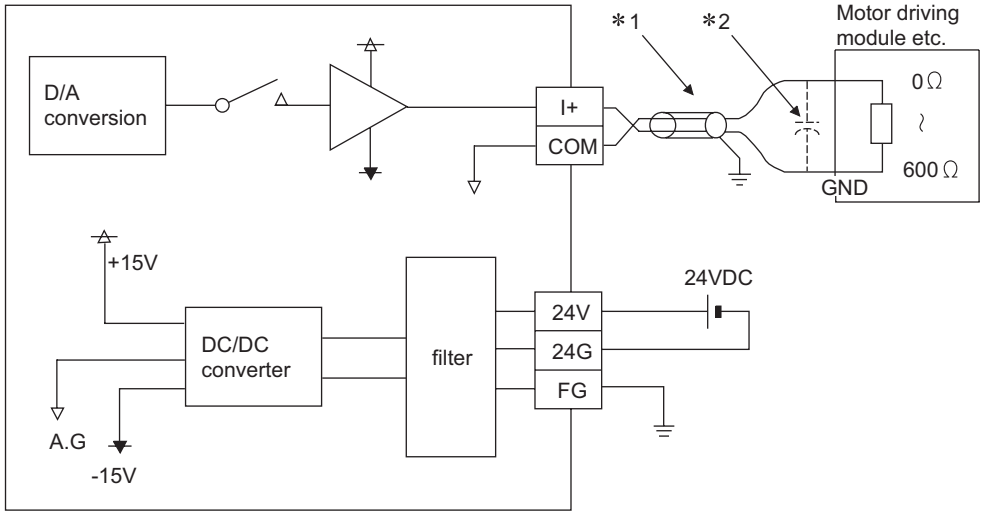
(1) For voltage output



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

*2 If there is noise or ripples in the external wiring, connect a 0.1 to 0.47μF25V capacitor between the V+ terminal and COM terminal.

(2) For current output



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

*2 If there is noise or ripples in the external wiring, connect a 0.1 to 0.47μF25V capacitor between the I+ terminal and COM terminal.

Point

Q66DA-G needs to be powered on 30 minutes prior to operation for compliance to the specification (accuracy).
Similarly, power on 30 minutes prior to offset/gain setting or after online module replacement.

4.5 Intelligent Function Module Switch Setting

The intelligent function module switch settings 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.

Table4.1 Switch setting item for intelligent function module

<table>
<tr><th></th><th colspan="2">Setting item</th></tr>
<tr><td>Switch 1</td><td>Output range setting(CH1to CH4)
□ □ □ □ H
CH4 CH3 CH2 CH1</td><td rowspan="2"><table><tr><th>Analog output range</th><th>Output range setting value</th></tr><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></table></td></tr>
<tr><td>Switch 2</td><td>Output range setting (CH5, CH6)
□ □ □ □ H
CH6 CH5
00H: Fixed</td></tr>
<tr><td>Switch 3</td><td>b15 b6 b5 b4 b3 b2 b1 b0
□ ~ □ □ □ □ □ □ □
CH6 CH5 CH4 CH3 CH2 CH1
0:Fixed</td><td>HOLD/CLEAR function setting
0: CLEAR
1: HOLD</td></tr>
<tr><td>Switch 4</td><td colspan="2">□ □ □ □ H
00H:Fixed
0H: Normal resolution mode
1 to FH(numeric value other than 0H)*: Higih resolution mode
0H: Normal mode (D/A conversion processing)
1 to FH(numeric value other than 0H)*: Offset/gain setting mode</td></tr>
<tr><td>Switch 5</td><td colspan="2">0 : Fixed</td></tr>
</table>

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

Point

(1) The switch 3 is set in binary.
Setting will be easy if the input format is changed to binary number.
[Example For setting CH3, CH5 and CH6 to HOLD.]

Input format	Binary	Hexadecimal
Setting value	00110100	34H

(2) If the offset/gain setting mode is set using intelligent function module switch 4, resolution mode will be ignored.

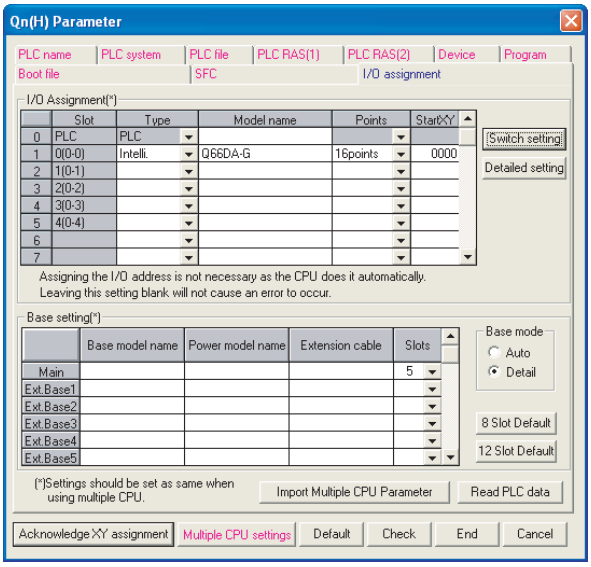
(3) Perform the offset/gain settings after checking the RUN LED flashes in offset/gain setting mode. If the RUN LED does not flash, check to see if the switch 4 setting is correct.

(4) Since the analog output value differs considerably depending on the resolution mode setting, thoroughly check the settings for the intelligent function module switches before performing the analog output processing.
[Example Analog output value when the setting range is -10 to 10V and the digital input value is set to 4000.]

	High resolution mode	Normal resolution mode
Analog output value	About 2.5 V	About 10.0 V

(2) Operating procedure

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



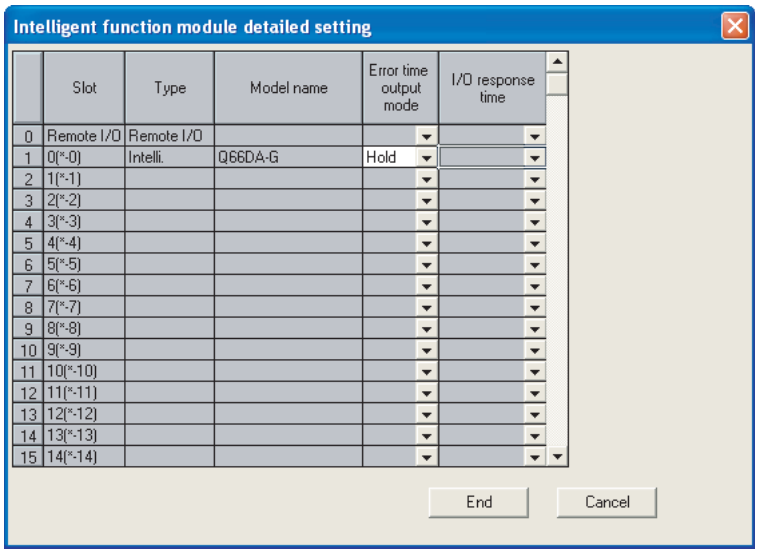
(a) I/O assignment setting screen

Set the following for the slot in which the Q66DA-G 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 signal for the Q66DA-G.
Detailed setting :

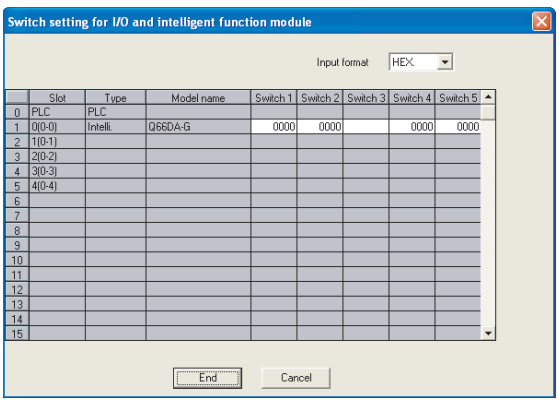
1) When using in the standard system configuration (on the main or extension base), specify the control CPU of the Q66DA-G.
It is unnecessary to set the "Error time output mode" or "H/W error time PLC operation mode" since these settings are invalid for the Q66DA-G.

2) When using on a remote I/O station, if the analog output is to be held in the case of a link error, "Error time output mode" must be set to "Hold".



3) Switch setting for intelligent function module screen

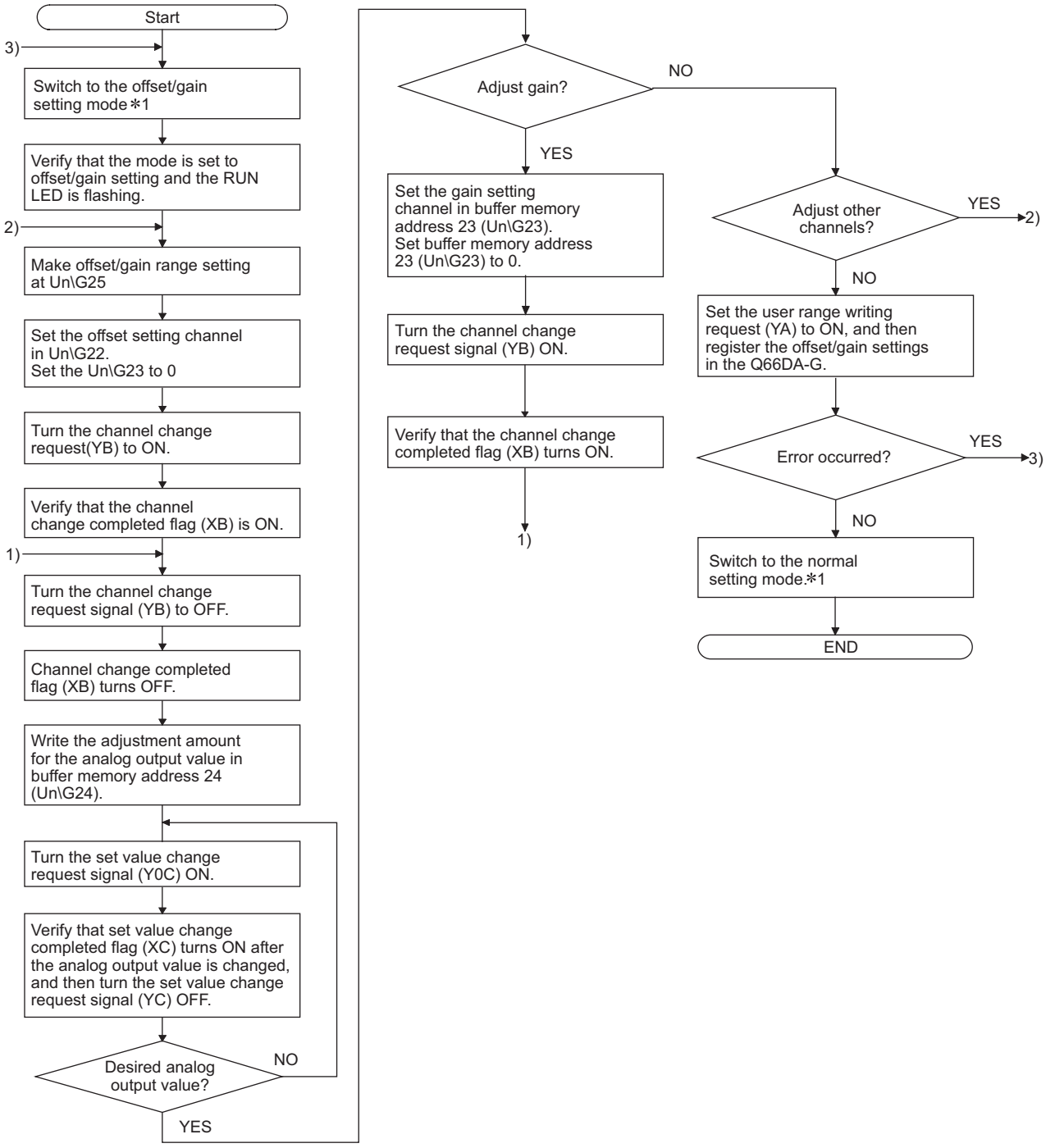
Click on [Switch setting] on the I/O assignment setting screen to display the screen shown at the under, then set switches 1 to 5.
The switches can easily be set if values are entered in hexadecimal. Change the entry format to hexadecimal and then enter the values.



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(P).OFFGAN).....Refer to Section 4.6 (2), (a)
- Setting made to mode switching setting (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 programmable controller CPU or switch power OFF, then ON.)

Point

(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.

(2) Perform the offset/gain settings separately for each channel. If channels are set in Un\G22 and Un\G23 at the same time, an error will occur and the ERR. LED will be lit.

(3) After the offset and gain settings are completed, verify that the offset and gain values have been set correctly under actual usage conditions.

(4) The offset and gain values are stored into the Flash memory and are not erased at power-off.

(5) At the time of offset/gain setting, turn ON the user range write request (YA) to write the values to the Flash memory.
Data can be written to the Flash memory up to 100 thousand times.
To prevent accidental write to the Flash memory, an error will occur and the error code (Un\G19) will be stored if write is performed 26 consecutive times.

(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 Q66DA-G. (*1: indicates the corresponding channel number.)

(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(P).OFFGAN) or the setting of the mode switching setting (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.

(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 (G(P).OFFGAN) or the setting of the mode switching setting (Un\G158, Un\G159).

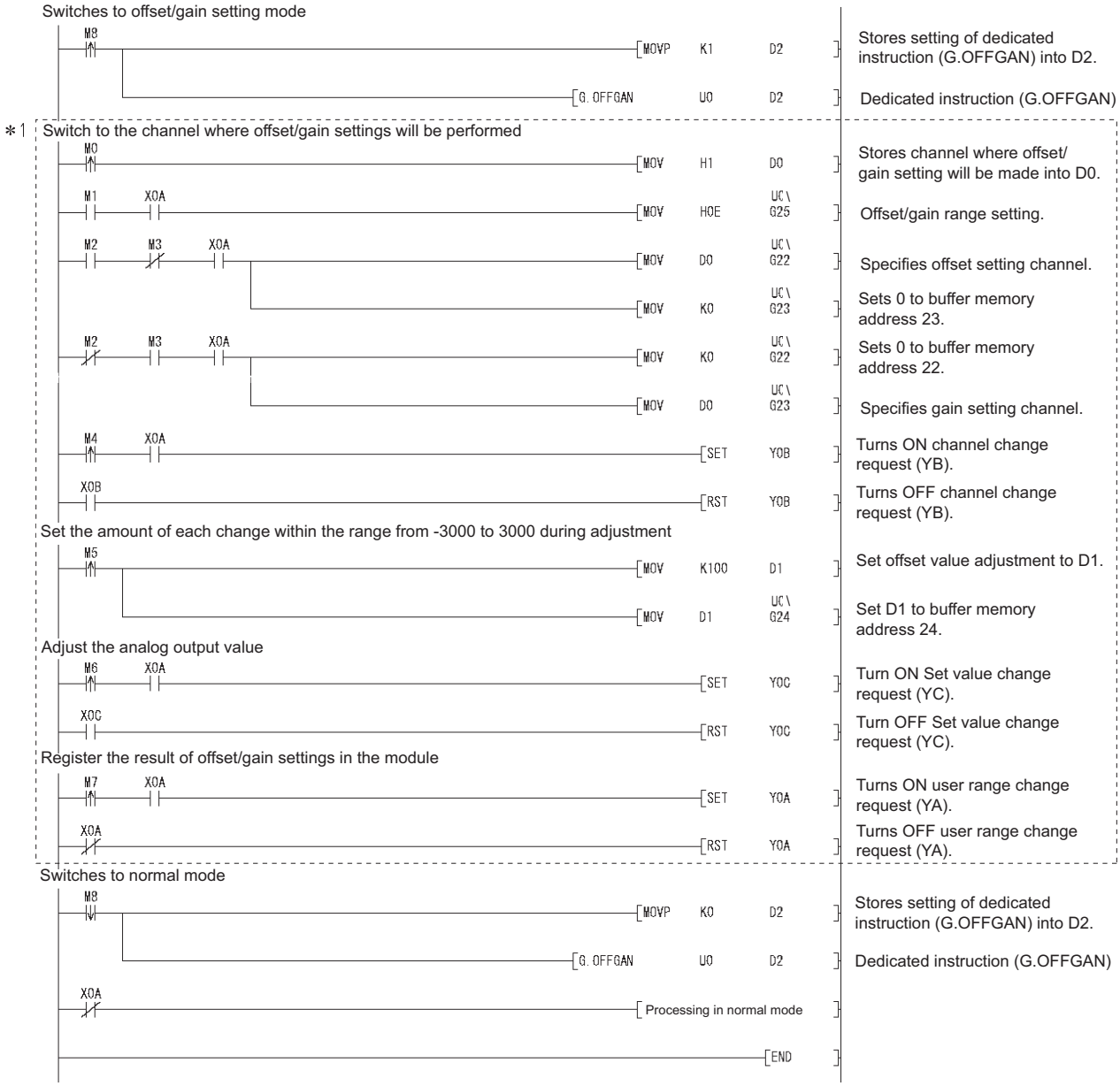
(9) Un\G200, Un\G202 to Un\G217 are the areas used to restore the user range settings offset/gain values when online module change is made.
Refer to Chapter 7 for details of online module change.

(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 Q66DA-G are X/Y0 to X/YF.

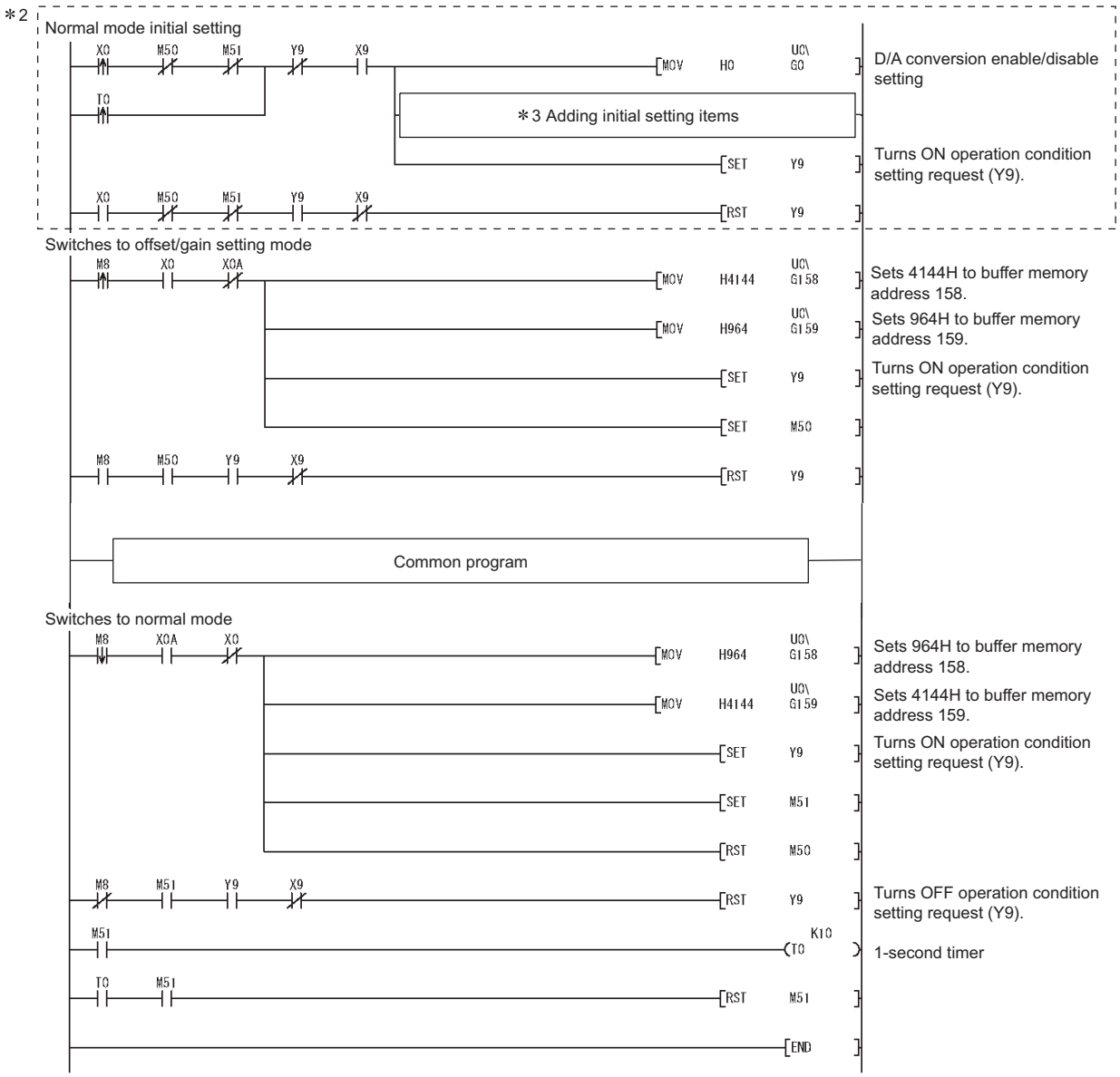
- Channel selection..... M0
- Offset/gain range setting..... M1
- Offset setting M2
- Gain setting M3
- Channel change command M4
- Writing the adjustment amount M5
- Analog output value adjust command M6
- Offset/gain setting value write command to the module M7
- Mode switching..... M8
- Normal mode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

(a) When switching the mode using the dedicated instruction (G(P).OFFGAN)
The following sample program switches to the offset/gain setting mode with the dedicated instruction (G(P).OFFGAN), changes the channel where offset/gain setting will be made, adjusts the offset/gain values, and writes the offset/gain values to the Q66DA-G.



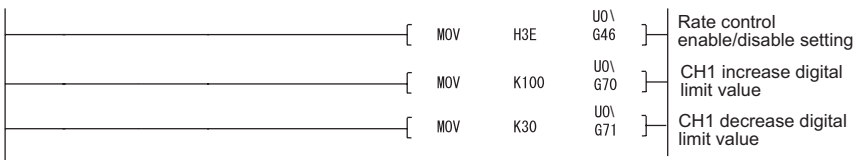
*1 The program in the dotted area is a common program.

(b) When switching the mode using the setting of the mode switching setting (Un\G158, Un\G159) and operation condition setting request (Y9)



Point

When running this program together with the normal-mode D/A conversion program(shown in Section 6.2.3), use *2 of this program as the initial setting program.
Note)When adding this program to the normal-mode D/A conversion program (shown inSection 6.2.3), replace the existing initial setting program with the programmarked *2
*3 Example of adding initial setting items (Rate control funcion)



(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.

Table5.1 Utility package (GX Configurator-DA) function list

Item	Reference section	Description
Initial setting*1	(1) Set the following items that require initial setting. • D/A conversion enable/disable setting • Scaling enable/disable setting • Scaling upper limit value/lower limit value • Rate control enable/disable setting • Increase/decrease digital limit values • Disconnection detection setting • Warning output setting • Warning output upper limit value/lower limit value (2) The data for which initial setting has been completed is registered in the parameters for the programmable controller CPU, and automatically written to the Q66DA-G when the programmable controller CPU changes to RUN status.	Section 5.4
Automatic refresh setting*1	(1) Sets automatic refresh for the Q66DA-G buffer memory. (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 programmable controller CPU is executed.	Section 5.5
Monitor/Test	(1) Monitor/Test The buffer memory and I/O signals for the Q66DA-G are monitored and tested. (2) Operating condition setting Changes the D/A conversion enable/disable during operation. (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. (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.	Section 5.6
FB conversion	Generates FB automatically from the intelligent function module parameter (initial setting/auto refresh setting).	Section 5.7

5.2 Installing and Uninstalling the Utility Package

For how to install or uninstall the utility package, refer to "Method of installing the MELSOFT Series" included in the utility package.

5.2.1 Handling precautions

The following explains the precautions on using the GX Configurator-DA:

(1) For safety

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

(2) About installation

GX Configurator-DA is add-in software for GX Developer Version 4 or later. Therefore, GX Configurator-DA must be installed on the personal computer that has already GX Developer Version 4 or later installed.

(3) Screen error of Intelligent function module utility

Insufficient system resource may cause the screen to be displayed inappropriately while using the Intelligent function module utility. If this occurs, close the Intelligent function module utility, GX Developer (program, comments, etc.) and other applications, and then start GX Developer and Intelligent function module utility again.

(4) To start the Intelligent function module utility

(a) In GX Developer, select "QCPU (Q mode)" for PLC series and specify a project. If any PLC series other than "QCPU (Q mode)" is selected, or if no project is specified, the Intelligent function module utility will not start.

(b) Multiple Intelligent function module utilities can be started.
However, [Open parameters] and [Save parameters] operations under [Intelligent function module parameter] are allowed for one Intelligent function module utility only. Only the [Monitor/test] operation is allowed for the other utilities.

(5) Switching between two or more Intelligent function module utilities

When two or more Intelligent function module utility screens cannot be displayed side by side, select a screen to be displayed on the top of others using the task bar.

(6) Number of parameters that can be set in GX Configurator-DA

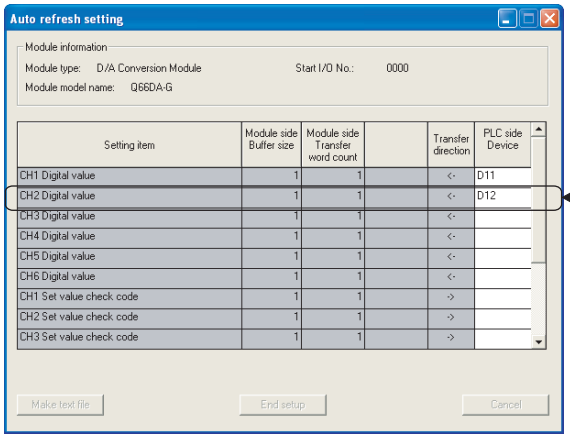
When multiple intelligent function modules are mounted, the number of parameter settings must not exceed the following limit.

When intelligent function modules are installed to:	Maximum number of parameter settings	
	Initial setting	Auto refresh setting
Q00J/Q00/Q01CPU	512	256
Q02/Q02H/Q06H/Q12H/Q25HCPU	512	256
Q02PH/Q06PH/Q12PH/Q25PHCPU	512	256
Q12PRH/Q25PRHCPU	512	256
Q02UCPU	2048	1024
Q03UD/Q04UDH/Q06UDH/Q13UDH/Q26UDH/ Q03UDE/Q04UDEH/Q06UDEH/Q13UDEH/ Q26UDEHCPU	4096	2048
MELSECNET/H remote I/O station	512	256

For example, if multiple intelligent function modules are installed to the MELSECNET/H remote I/O station, configure the settings in GX Configurator so that the number of parameter settings for all the intelligent function modules does not exceed the limit of the MELSECNET/H remote I/O station.
Calculate the total number of parameter settings separately for the initial setting and for the auto refresh setting.
The number of parameters that can be set for one module in GX Configurator-DA is as shown below.

Target module	Initial setting	Auto refresh setting
Q66DA-G	5 (Fixed)	14 (Max.)

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



This one row is counted as one setting.
Blank rows are not counted.
Count up all the setting items on this screen, and add the total to the number of settings for other intelligent function modules to get a grand total.

5.2.2 Operating environment

This section explains the operating environment of the personal computer that runs GX Configurator-DA.

Item		Description
Installation (Add-in) target*1		Add-in to GX Developer Version 4 (English version) or later*2
Computer		Windows® -based personal computer
	CPU	Refer to the next page "Operating system and performance required for personal computer".
	Required memory	
Hard disk space*3	For installation	65 MB or more
	For operation	20 MB or more
Display		800 × 600 dots or more resolution*4
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)
		Microsoft® Windows Vista® Home Basic Operating System (English version)
		Microsoft® Windows Vista® Home Premium Operating System (English version)
		Microsoft® Windows Vista® Business Operating System (English version)
		Microsoft® Windows Vista® Ultimate Operating System (English version)
		Microsoft® Windows Vista® Enterprise 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 combination.

*2: GX Configurator-DA is not applicable to GX Developer Version 3 or earlier. In addition, GX Developer Version 8 or later is necessary to use the FB conversion function.

*3: At least 15GB is required for Windows Vista®.

*4: Resolution of 1024 X 768 dots or more is recommended for Windows Vista®.

Operating system and performance required for personal computer

Operating system	Performance required for personal computer	
	CPU	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 (Service Pack 1 or more)	Pentium® 300MHz or more	128MB or more
Windows® XP Home Edition (Service Pack 1 or more)	Pentium® 300MHz or more	128MB or more
Windows Vista® Home Basic	Pentium® 1GHz or more	1GB or more
Windows Vista® Home Premium	Pentium® 1GHz or more	1GB or more
Windows Vista® Business	Pentium® 1GHz or more	1GB or more
Windows Vista® Ultimate	Pentium® 1GHz or more	1GB or more
Windows Vista® Enterprise	Pentium® 1GHz or more	1GB or more

Point

(1) The functions shown below are not available for Windows® XP and Windows Vista®.
If any of the following functions is attempted, this product may not operate normally.
- Start of application in Windows® compatible mode
- Fast user switching
- Remote desktop
- Large fonts (Details setting of Display Properties)

Also, 64-bit version Windows® XP and Windows Vista® are not supported.

(2) Use a USER authorization or higher in Windows Vista®.

5.3 Utility Package Operation

5.3.1 Common utility package operations

(1) Control keys

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

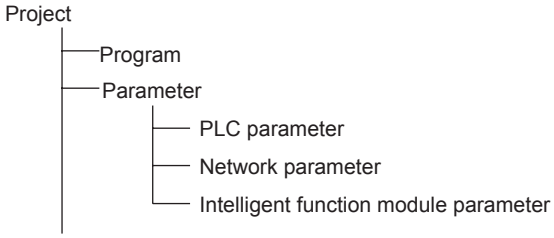
Key	Application
Esc	Cancels the current entry in a cell. Closes the window.
Tab	Moves between controls in the window.
Ctrl	Used in combination with the mouse operation to select multiple cells for test execution.
Delete	Deletes the character where the cursor is positioned. When a cell is selected, clears all of the setting contents in the cell.
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	Completes the entry in the cell.

(2) Data created with the utility package

The following data or files that are created with the utility package can be also handled in GX Developer. Figure 5.1 shows respective data or files are handled in which operation.

<Intelligent function module parameter>

(a) This represents the data created in Auto refresh setting, and they are stored in an intelligent function module parameter file in a project created by GX Developer.



(b) Steps 1) to 3) shown in Figure 5.1 are performed as follows:

1) From GX Developer, select:
[Project] → [Open project] / [Save]/ [Save as]

2) On the intelligent function module selection screen of the utility, select:
[Intelligent function module parameter] → [Open parameters] / [Save parameters]

3) From GX Developer, select:
[Online] → [Read from PLC] / [Write to PLC] "Intelligent function module parameters"
Alternatively, from the intelligent function module selection screen of the utility, select:
[Online] → [Read from PLC] / [Write to PLC]

<Text files>

(a) A text file can be created by clicking the Make text file button on the initial setting, Auto refresh setting, or Monitor/Test screen. The text files can be utilized to create user documents.

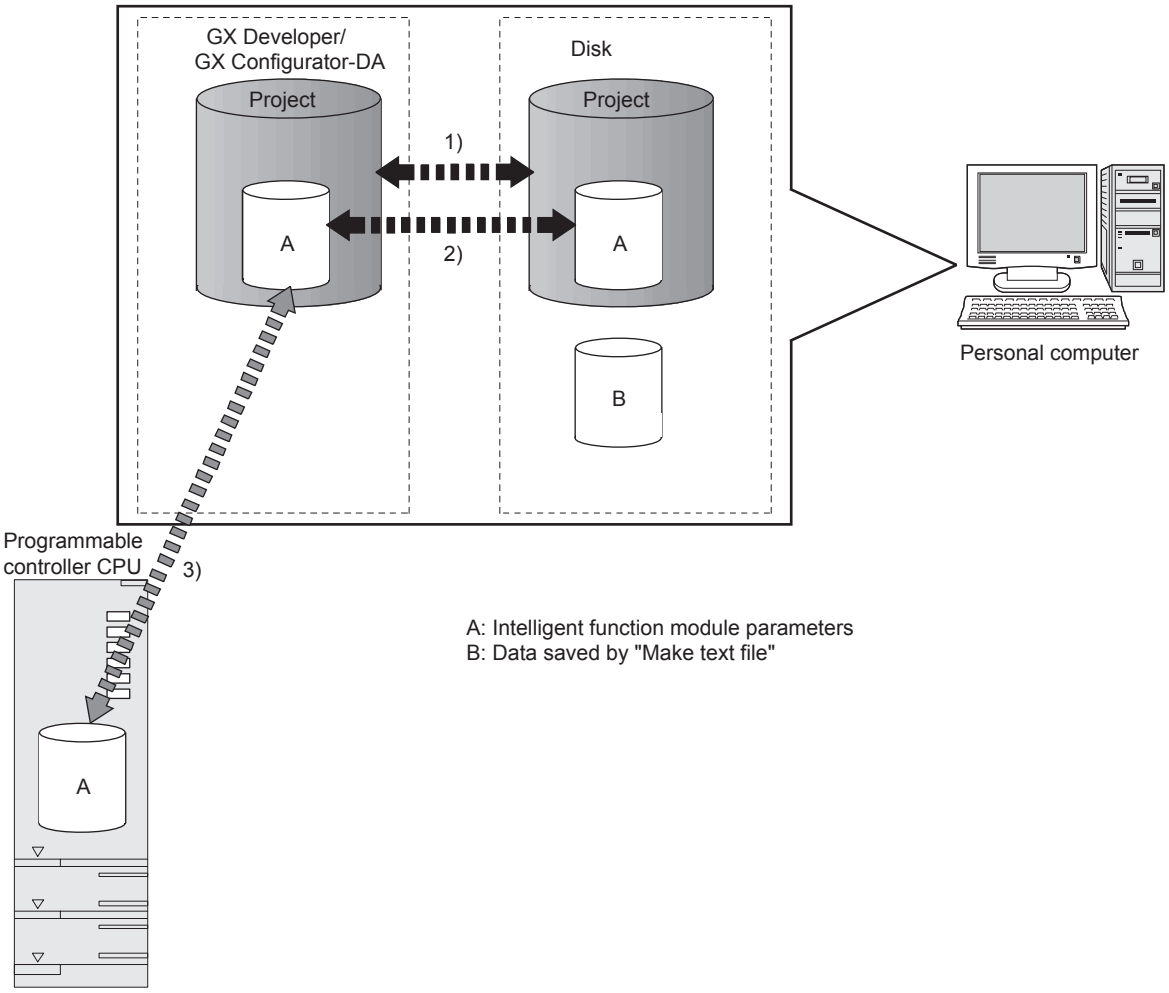
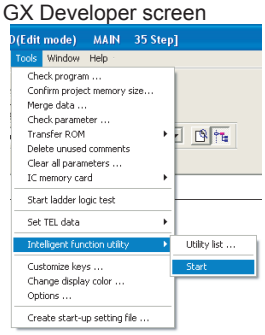


Fig5.1 Correlation chart for data created with the utility package

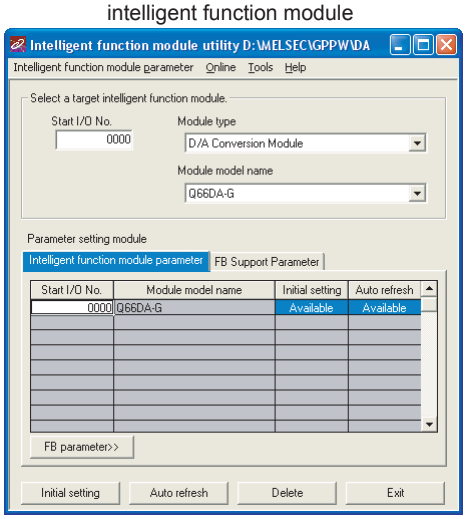
5.3.2 Operation overview

GX Developer screen



[Tools] - [Intelligent function utility] - [Start]

Screen for selecting a target intelligent function module

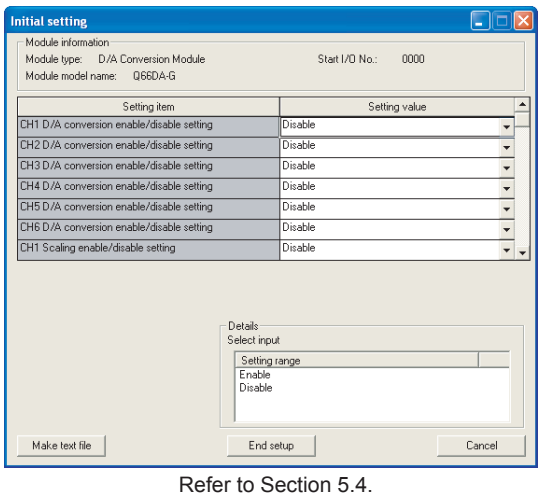


Enter "Start I/O No.", and select "Module type" and "Module model name".

1)

Initial setting

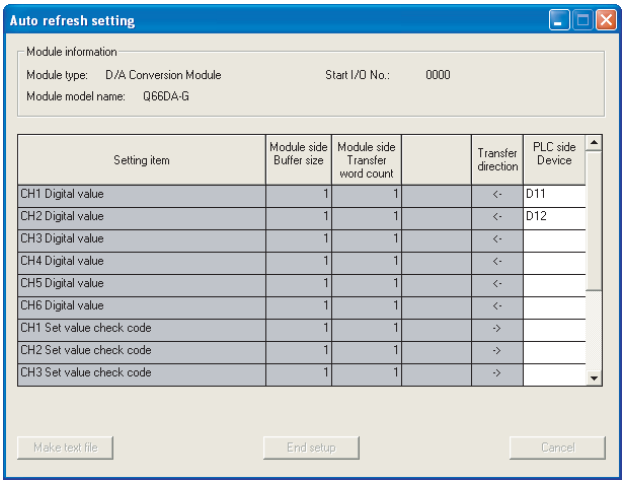
Initial setting screen



Refer to Section 5.4.

Auto refresh

Auto refresh setting screen

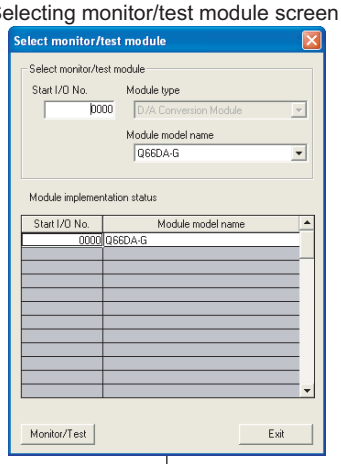


Refer to Section 5.5.

1)

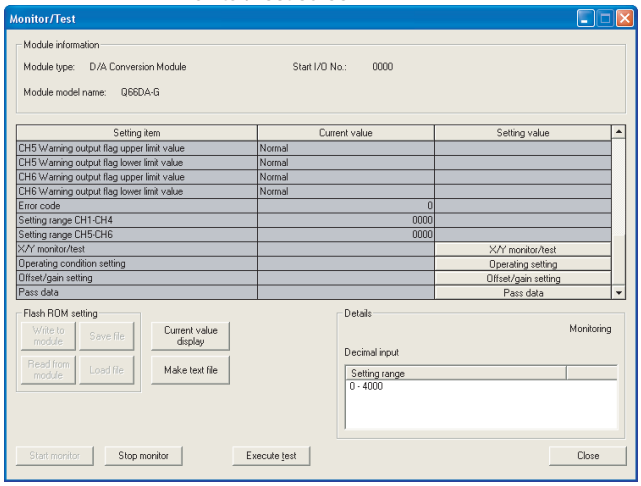
[Online] - [Monitor/Test]

Selecting monitor/test module screen



Select a module to be monitored/tested.

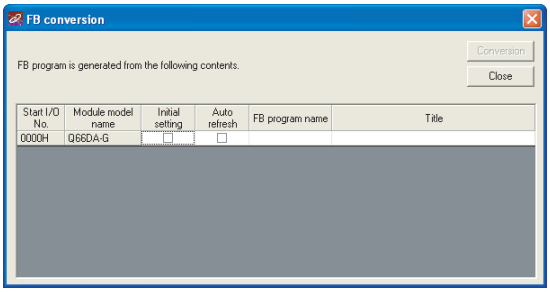
Monitor/Test screen



Refer to Section 5.6.

<<FB support parameter>> tab
- FB conversion

FB conversion screen



Refer to Section 5.7.

5.3.3 Starting the Intelligent function module utility

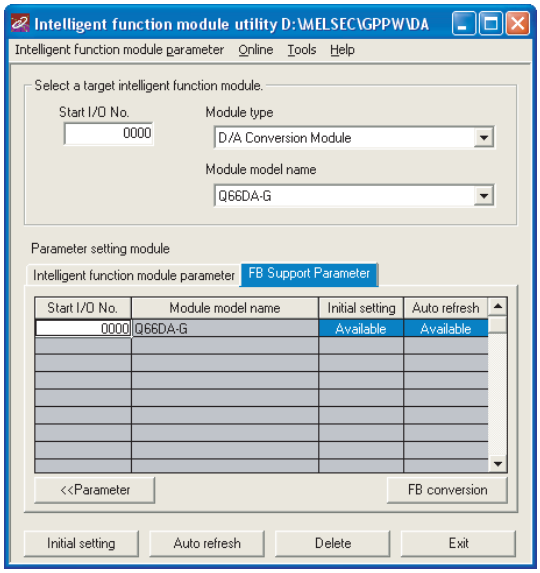
[Operating procedure]

Intelligent function module utility is started from GX Developer.

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

[Setting screen]

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



[Explanation of items]

(1) Activation of other screens

Following screens can be displayed from the intelligent function module utility screen.
Common operations to the <<Intelligent function module parameter>> tab and <<FB support parameter>> tab

(a) Initial setting screen

"Start I/O No.*1" → "Module type" → "Module model name" → Initial setting

(b) Auto refresh setting screen

"Start I/O No.*1" → "Module type" → "Module model name" → Auto refresh

(c) Select monitor/test module screen

[Online] → [Monitor/Test]

*1 Enter the start I/O No. in hexadecimal.

On the <<FB support parameter>> tab

(a) FB conversion screen

<<FB support parameter>> tab → FB conversion

For details, refer to Section 5.7.

Point

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

(2) Command buttons

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

Delete	Deletes the initial setting and auto refresh setting of 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	Closes this screen.

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

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

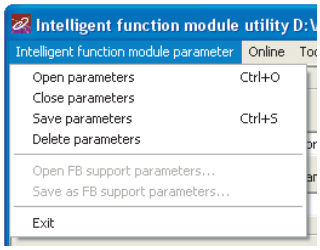
When the <<Intelligent function module parameter>> tab is selected

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

(3) Menu bar

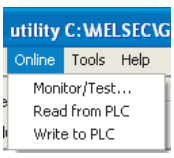
(a) File menu

Intelligent function module parameters of the project opened by GX Developer are handled.



[Open parameters]:	Reads a parameter file.
[Close parameters]:	Closes the parameter file. If any data are modified, a dialog asking for file saving will appear.
[Save parameters]:	Saves the parameter file.
[Delete parameters]:	Deletes the parameter file.
[Open FB support parameters]:	Opens the FB support parameter file.
[Save as FB support parameters]:	Saves the FB support parameter file.
[Exit]:	Closes this screen.

(b) Online menu



[Monitor/Test]:	Activates the Select monitor/test module screen.
[Read from PLC]:	Reads intelligent function module parameters from the CPU module.
[Write to PLC]:	Writes intelligent function module parameters to the CPU module.

Point

(1) Saving intelligent function module parameters in a file
Since intelligent function module parameters cannot be saved in a file by the project saving operation of GX Developer, save them on the shown module selection screen for intelligent function module parameter setting.

(2) Reading/writing intelligent function module parameters from/to a programmable controller CPU using GX Developer
(a) Intelligent function module parameters can be read from and written into a programmable controller after having been saved in a file.
(b) Set a target programmable controller CPU in GX Developer: [Online] → [Transfer setup].
(c) When the Q66DA-G is installed to the remote I/O station, use "Read from PLC" and "Write to PLC".

(3) Checking the required utility
While the start I/O is displayed on the Intelligent function module utility setting screen, "* " may be displayed for the model name.
This means that the required utility has not been installed or the utility cannot be started from GX Developer.
Check the required utility, selecting [Tools] - [Intelligent function utility] - [Utility list...] in GX Developer.

5.4 Initial Setting

[Purpose]

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

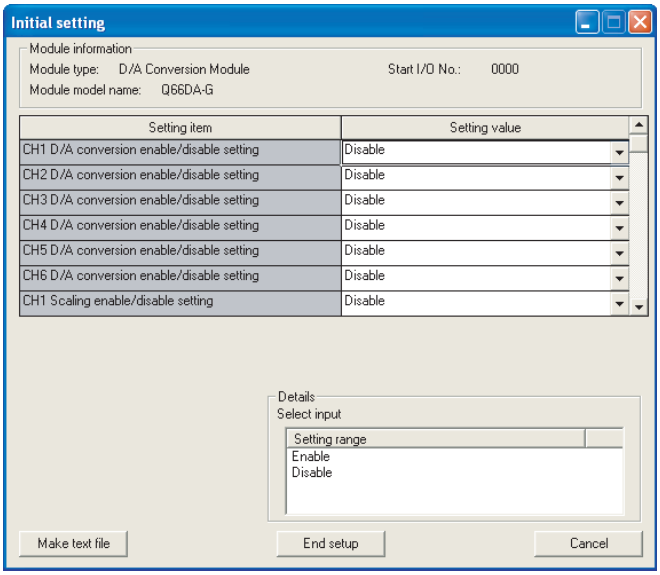
This initial setting makes sequence program setting unnecessary.

[Operating procedure]

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

* Enter the start I/O No. in hexadecimal.

[Setting screen]



[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) Command button

Make text file	Creates a file containing the screen data in text file format.
End setup	Saves the set data and ends the operation.
Cancel	Cancels the setting and ends the operation.

Point

Initial settings are stored in an intelligent function module parameter file. 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 sequence 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 Auto Refresh Setting

[Purpose]

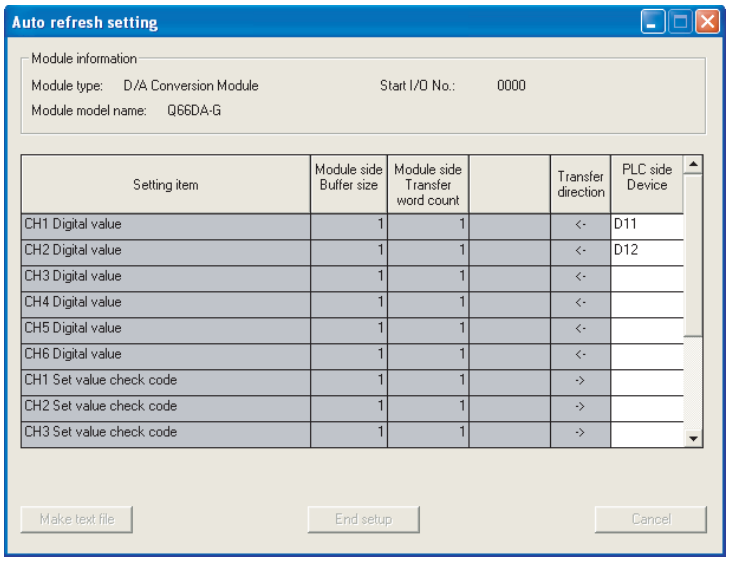
Configure the Q66DA-G's buffer memory for automatic refresh.

[Operating procedure]

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

* Enter the start I/O No. in hexadecimal.

[Setting screen]



[Explanation of items]

(1) Items

Module side Buffer size	:	Displays the buffer memory size of the setting item (fixed at one word).
Module 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	:	"←" indicates that data are written from the device to the buffer memory. "→" indicates that data are loaded from the buffer memory to the device.
PLC side Device	:	Enter a CPU module side device that is to be automatically refreshed. Applicable devices are X, Y, M, L, B, T, C, ST, D, W, R, and 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, etc.) Also, buffer memory data are stored in a 16-point area, starting from the specified device number. For example, if X10 is entered, data are stored in X10 to X1F.

(2) Command buttons

Make text file	Creates a file containing the screen data in text file format.
End setup	Saves the set data and ends the operation.
Cancel	Cancels the setting and ends the operation.

Point

The auto refresh settings are stored in an intelligent function module parameter file.

The auto refresh settings become effective by performing STOP→ RUN→ STOP→ RUN operations for the CPU module, turning the power OFF and then ON or resetting the CPU module after writing the intelligent function module parameters to the CPU module.

The auto refresh settings cannot be changed from sequence programs. However, processing equivalent to auto refresh can be added using the FROM/TO instruction in the sequence program.

5.6 Monitoring/Test

5.6.1 Monitor/test screen

[Purpose]

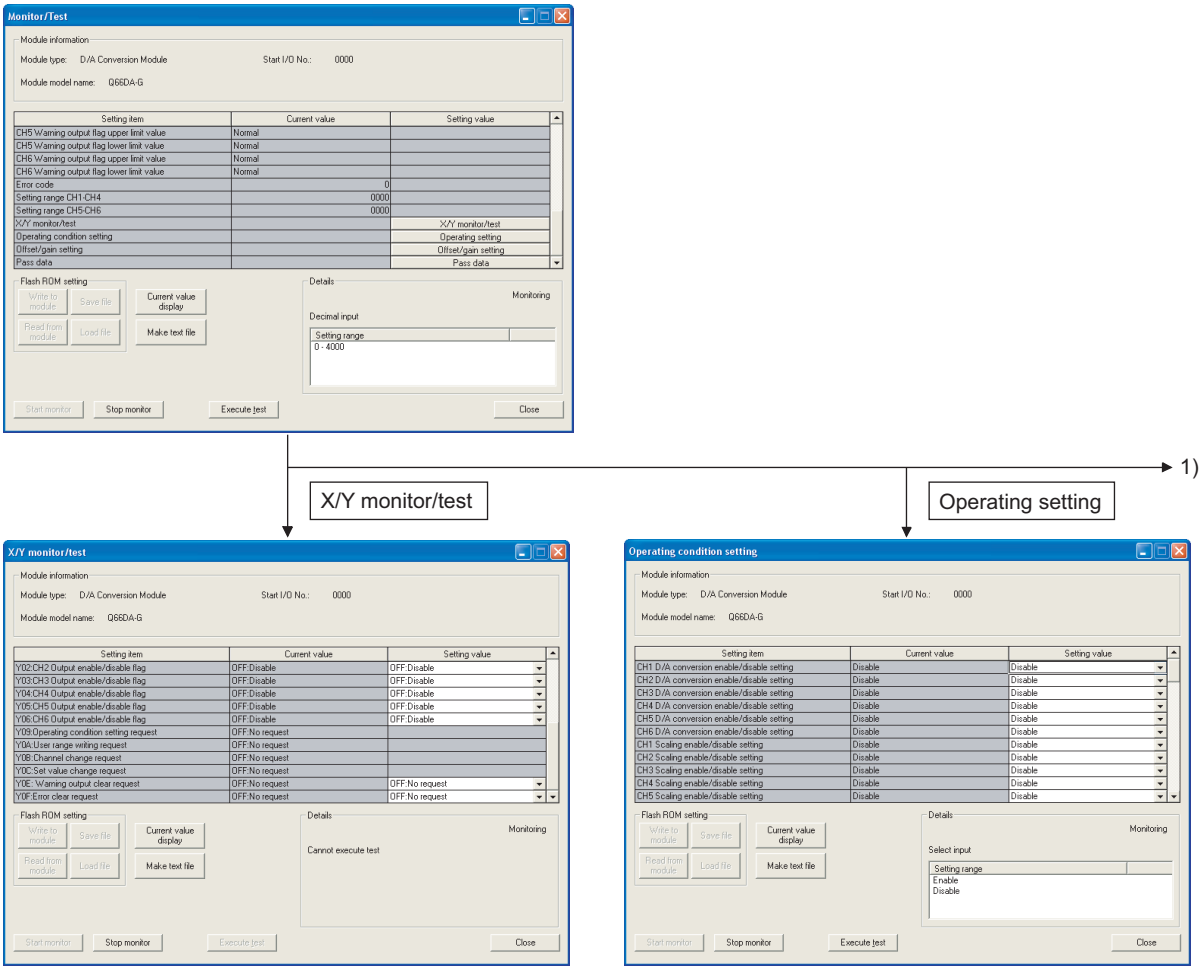
Start buffer memory monitoring/testing, I/O signal monitoring/testing, operating condition setting, offset/gain settings (refer to Section 5.6.2) and pass data (refer to Section 5.6.3) from this screen.

[Operating procedure]

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

* Enter the start I/O No. in hexadecimal.
The screen can also be started from System monitor of GX Developer Version 6 or later.
Refer to the GX Developer Operating Manual for details.

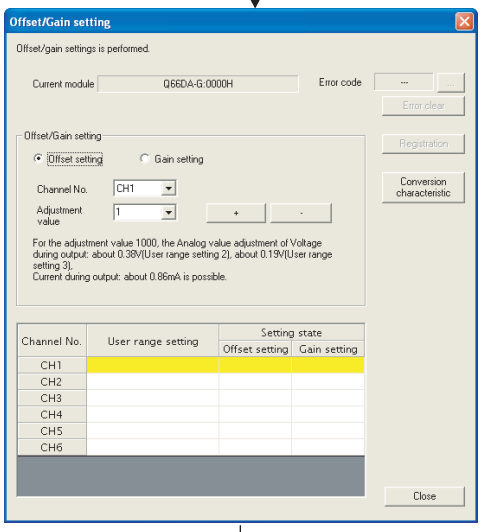
[Setting screen]

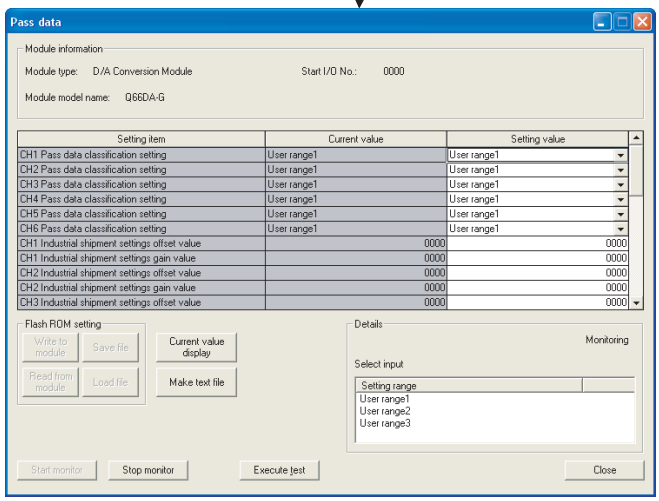


1)

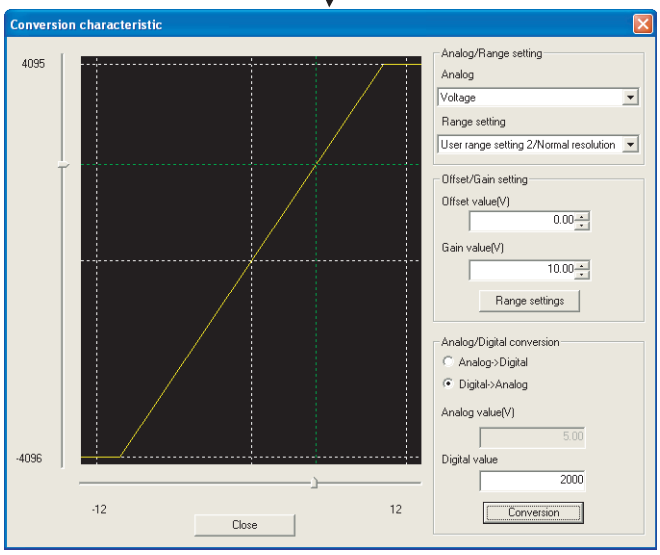
Offset/gain setting

Pass data





Conversion characteristic



[Explanation of items]

(1) Items

Setting item	:	Displays buffer memory names.
Current value	:	Monitors the present buffer memory values.
Setting value	:	Enter or select values to be written into the buffer memory for test operation.

(2) Command buttons

Currect Value	Displays the current value of the item selected. (This is used to check the text that cannot be displayed in the current value field. However, in this utility package, all items can be displayed in the display fields.)
Make text file	Creates a file containing the screen data in text file format.
Start monitor / Stop monitor	Selects whether or not to monitor current values.
Execute test	Performs a test on the selected items. To select more than one item, select them while holding down the Ctrl key.
Close	Closes the currently open screen and returns to the previous 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."
Nothing is written to the Q66DA-G at this point.

(2) Click and select the setting value field to be written in the Q66DA-G.
To write more than one setting item at the same time, select the items while holding down the Ctrl key.

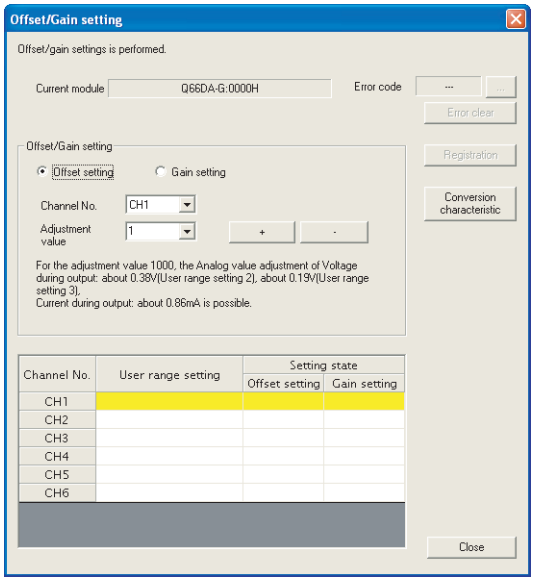
(3) Click the Execute test to execute the write operation.
Once writing has been completed, the value that was written will be displayed in the present value field.

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 Q66DA-G'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 Q66DA-G

Write the content set up by operations (2) to (6) into Q66DA-G by clicking the [Registration] button.

(8) Switch to the normal mode

When the offset/gain setting screen is closed by clicking the [Close] button after the setting operation has finished, Q66DA-G'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 [Error clear] button.

5.6.3 Confirmation of Conversion Characteristic

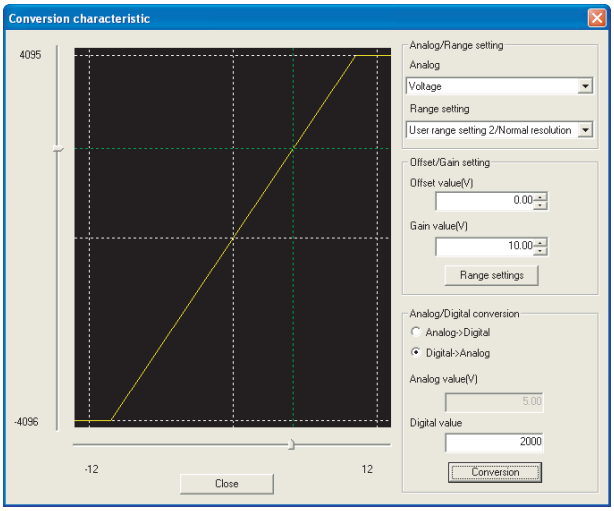
[Purpose]

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

[Operating procedure]

Monitor/Test screen → offset/gain setting → Conversion characteristic

[Setting screen]



[Explanation of items]

(1) Items

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 programmable controller CPU.
- The gain value is the analog value (voltage or current) output when the digital input value set from the programmable controller CPU is as follows:

Normal resolution mode	4000 (User range setting 1 to 3)
High resolution mode	12000 (User range setting 1 to 3)

(3) Command button

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

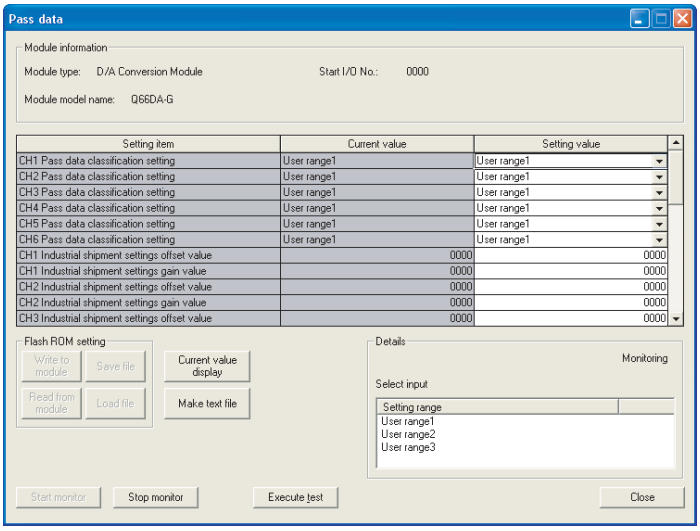
Conversion — Conversion for the entered value is performed.

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.



(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 [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 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) 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 Execute test 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 Execute test 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]

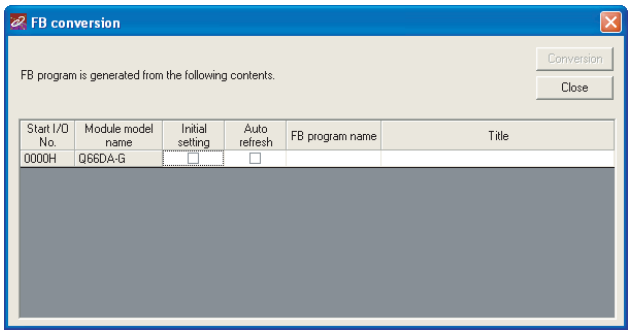
FB is generated automatically from the intelligent function module parameter (initial setting/auto refresh setting).

[Operating procedure]

Intelligent Function Module Parameter Setting Module Selection Screen

<<FB Support Parameter>> → FB conversion

[Setting screen]



[Explanation of items]

(1) Items

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 : 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) Command buttons

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

5.8 Usage of FB

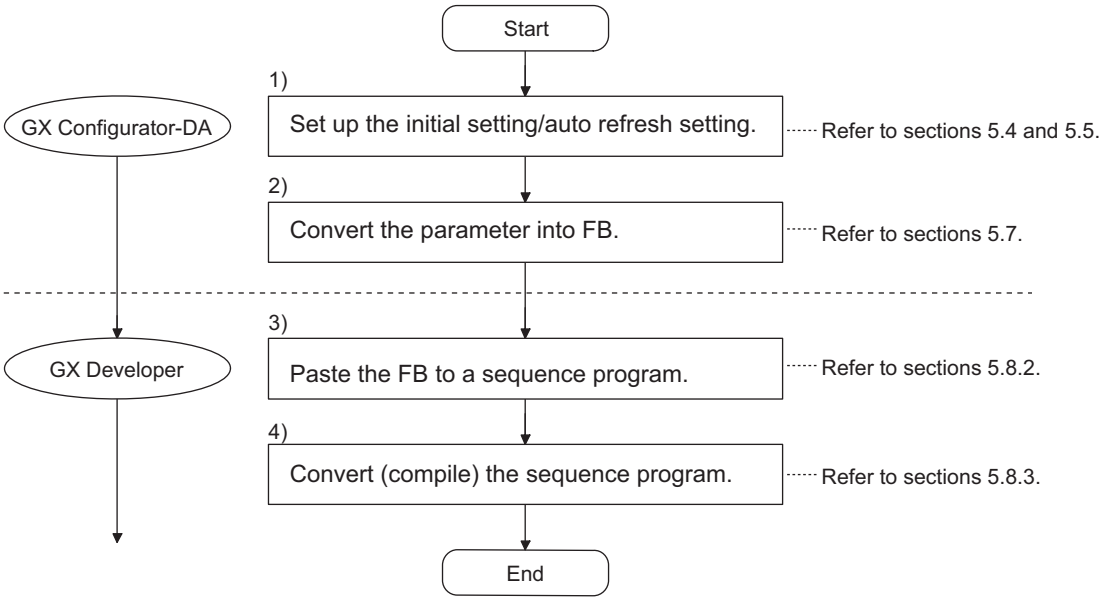
This section describes the procedure for using FB with GX Developer.
Refer to the "GX Developer Version 8 Operating Manual (Function Block)" for details.

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 programmable controller 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

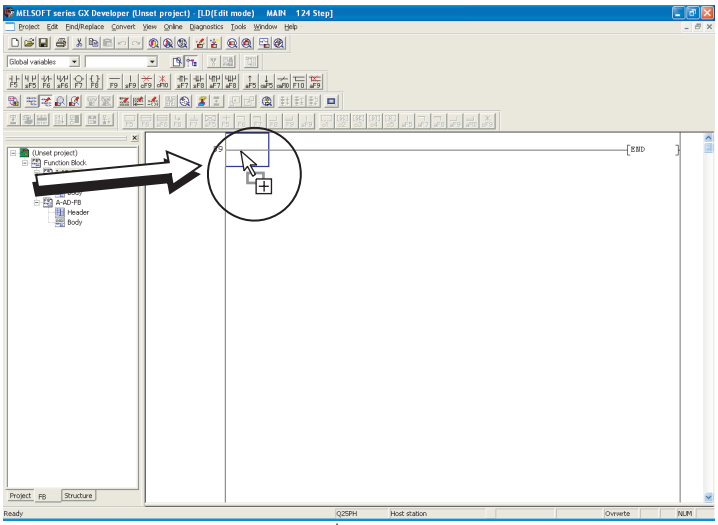
[Purpose of operation]

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

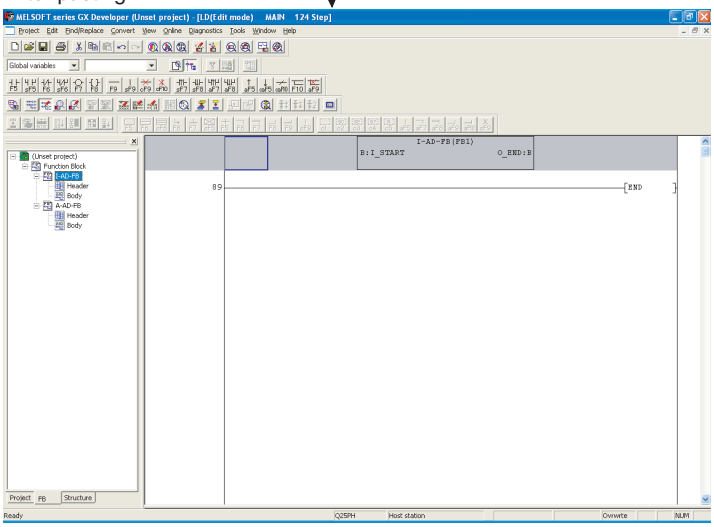
[Operation procedure]

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



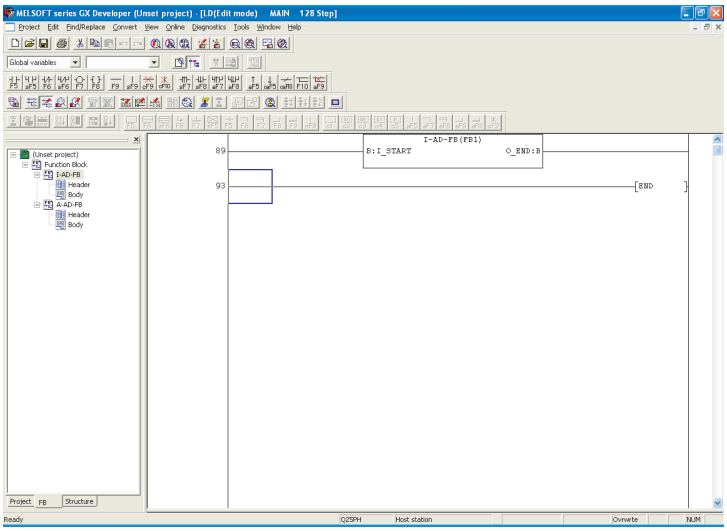
After pasting



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]

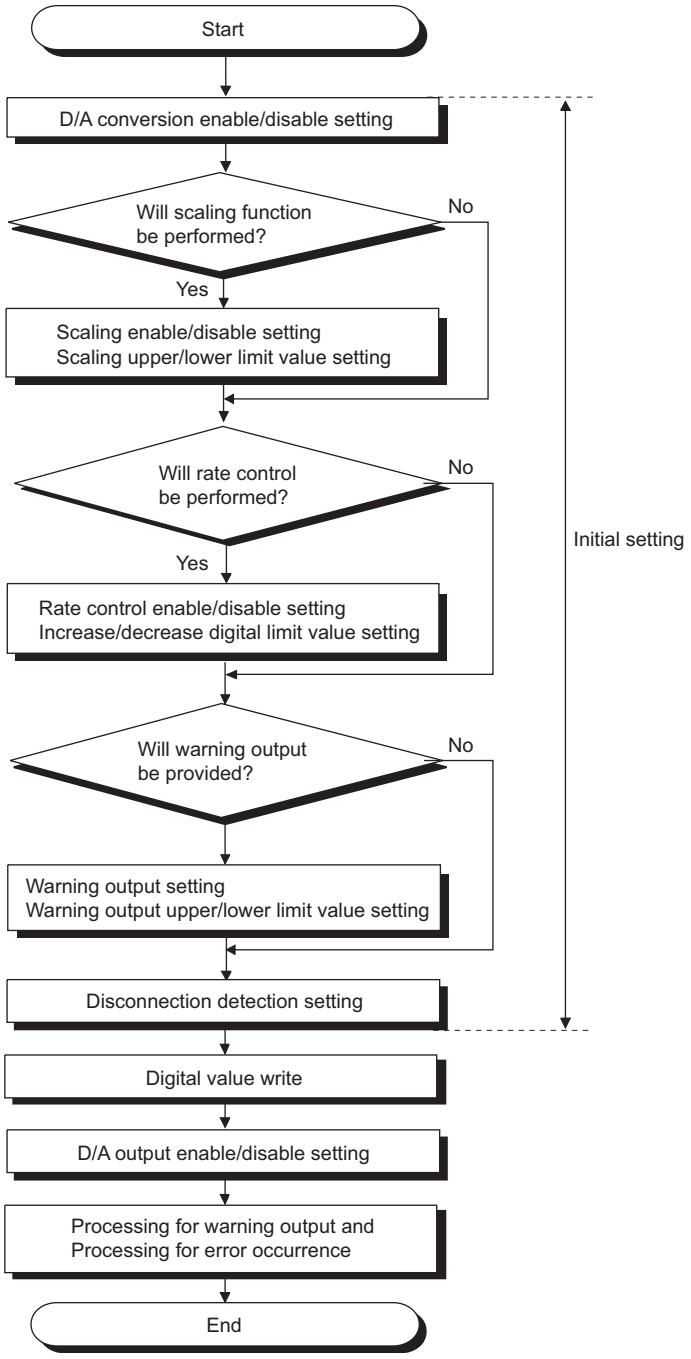
Click the [Convert] menu → [Convert/Compile] menu of GX Developer.

6 PROGRAMMING

This chapter describes the programs of the Q66DA-G.
When applying any of the program examples introduced in this chapter to the actual system, verify the applicability and confirm that no problems will occur in the system control.

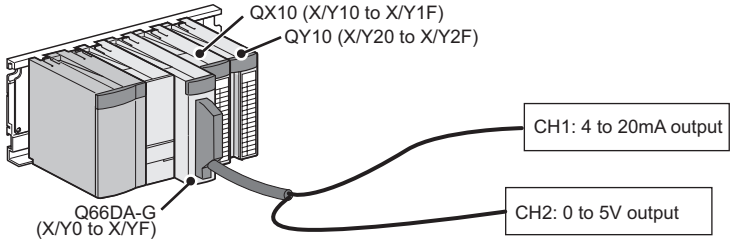
6.1 Programming Procedure

Create the program that will execute the digital-analog conversion of the Q66DA-G in the following procedure.



6.2 For Use in Normal System Configuration

(1) System configuration



(2) Conditions for the intelligent function module switch setting

	Input range setting	HOLD/CLEAR function setting	Normal resolution mode/ High resolution mode
CH1	4 to 20mA	CLEAR	High resolution mode
CH2	0 to 5V		
CH3 to CH6	not used	-	-

(3) Program conditions

(a) CH1 uses the rate control function (Refer to Section 3.2.4.)
- CH1 increase digital limit value: 100
- CH1 decrease digital limit value: 30

(b) CH2 uses the warning output function (Refer to Section 3.2.4.)
- CH2 warning output upper limit value: 10000
- CH2 warning output lower limit value: 3000

If a warning is output, the warning output flag status is read and processing for the warning output is performed.

(c) If an error occurs in writing a digital value, an error code is displayed in binary coded decimal (BCD) form.
The error code shall be reset after removal of the cause.

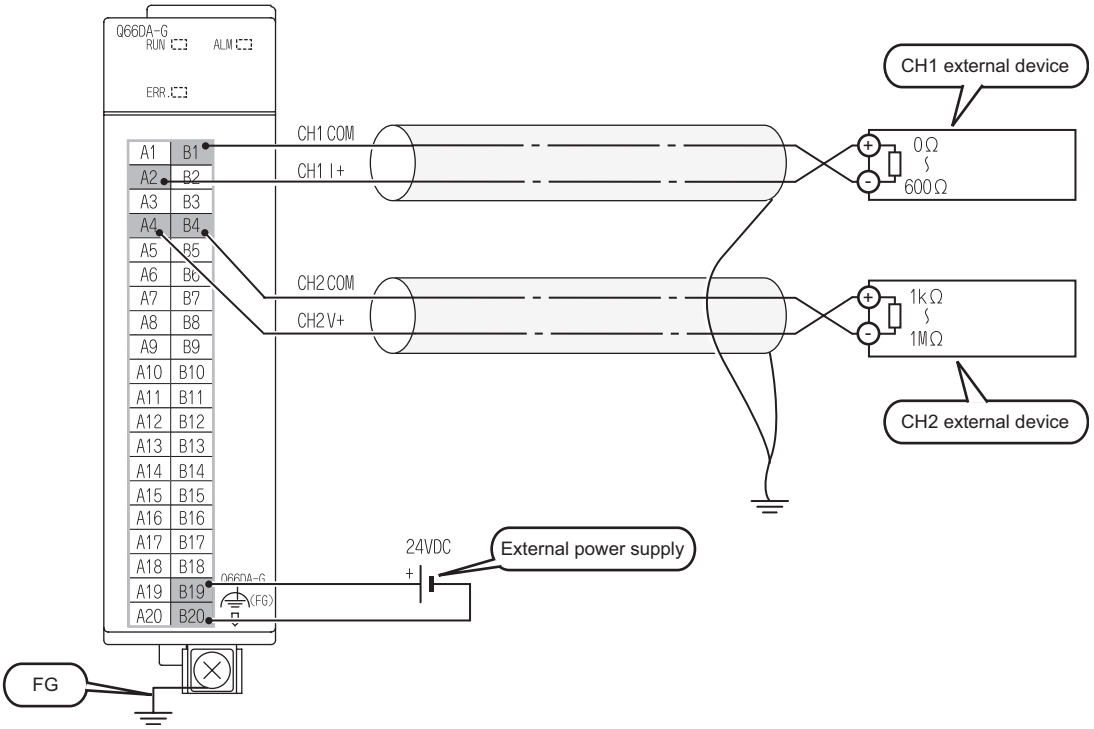
6.2.1 Before creating a program

Perform the following steps before creating a program.

(1) Wiring of external devices

Mount the Q66DA-G on the base unit and connect the external devices.

- CH1: run the cables for current output. (For details, refer to “4.4.2 (2) .)
- CH2: run the cables for voltage output. (For details, refer to “4.4.2 (1) .)

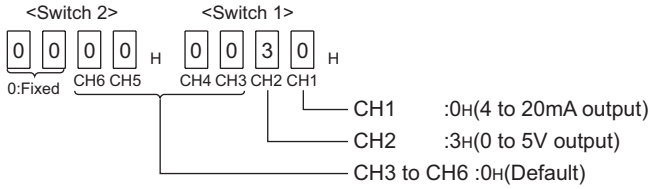


(2) Intelligent function module switch setting

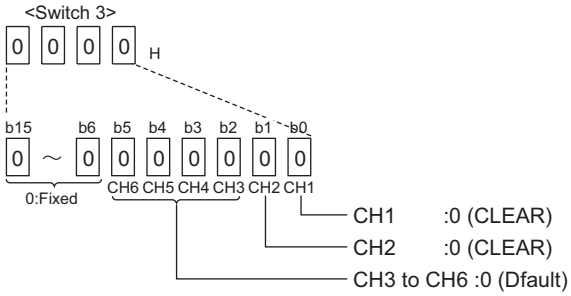
Based on the setting conditions given in Section6.2 (2), make the intelligent function module switch settings.

(a) Each switch setting

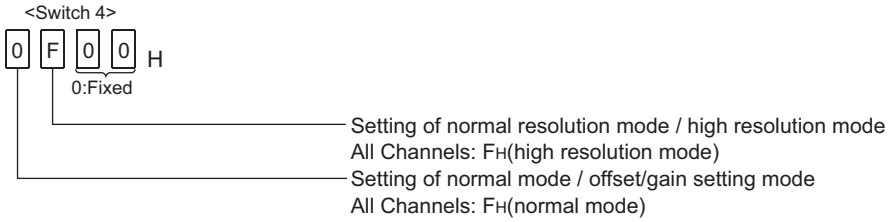
1) Switch1,Switch2: output range setting



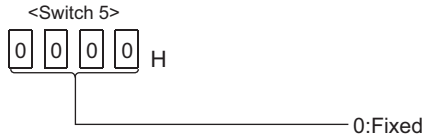
2) Switch3: HOLD/CLEAR setting function



3) Switch4: Mode setting



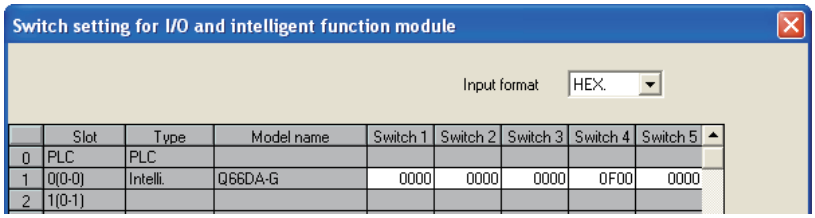
4) Switch5: Use prohibited (0:fixed)



* If any other than 0 is set to Switch 5, an error occurs.

(b) Write the settings in (a) to the Q66DA-G.

On GX Developer's "Parameter setting" screen, select the "I/O assignment" tab, click "Switch setting", and make settings of Switch 1 to 5 on the screen shown below.



6.2.2 Program example using the utility package

(1) List of devices

Device	Function	
D11*1	CH1 Digital value	
D12*1	CH2 Digital value	
D16*1	Warning output flag	
D17*1	Error code	
M20,M21	CH1 Warning output flag*2	
M22,M23	CH2 Warning output flag	
X0	Module ready	Q66DA-G (X/Y0 to X/YF)
X7	External power supply ready	
XE	Warning output signal	
XF	Error flag	
YE	Warning output clear request	
YF	Error clear request	
X11	Output enable	QX10 (X10 to X1F)
X12	Digital value write signal	
X14	Warning output reset signal	
X15	Error code reset signal	
Y20 to Y2B	Error code display (BCD 3 digits)	QY10 (Y20 to Y2F)

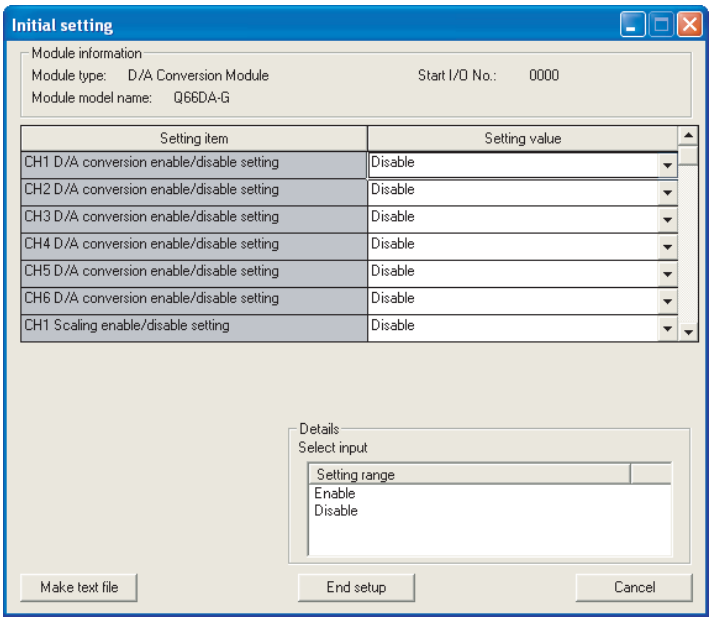
*1: Devices used for the automatic refresh function of GX Configurator-DA.

*2: Although channel 1 does not use warning output, these devices are assigned to read out warning output flag data of both channel 1 and 2 at a time.

(2) Operation of utility package

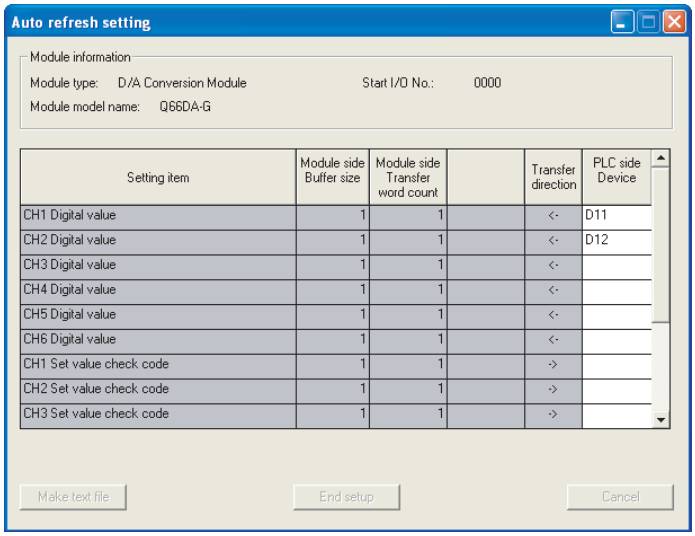
(a) Initial settings (Refer to Section 5.4)

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"
CH2 warning output setting "Enable"
CH2 warning output upper limit value "10000"
CH2 warning output lower limit value "3000"



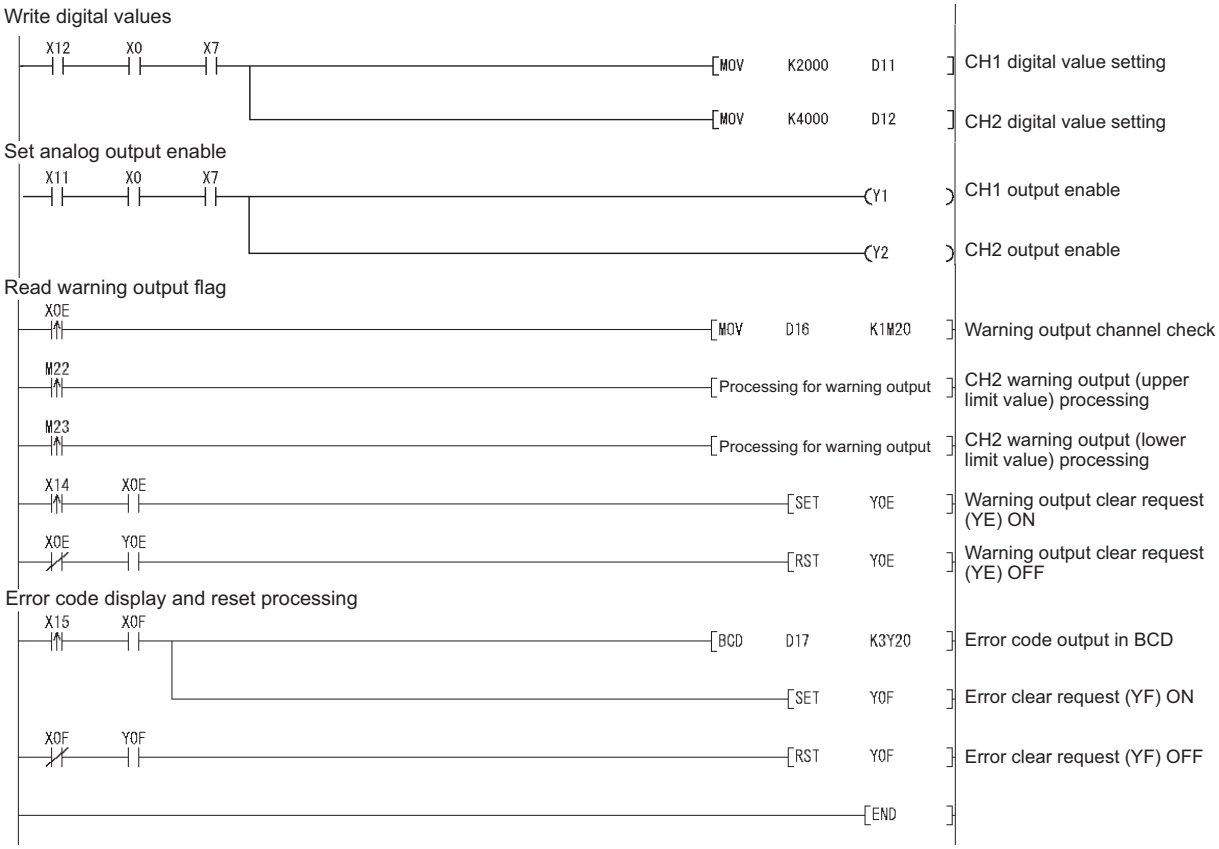
(b) Automatic refresh setting (Refer to Section 5.5)

CH1, CH2 digital values D11, D12
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.

(3) Program example



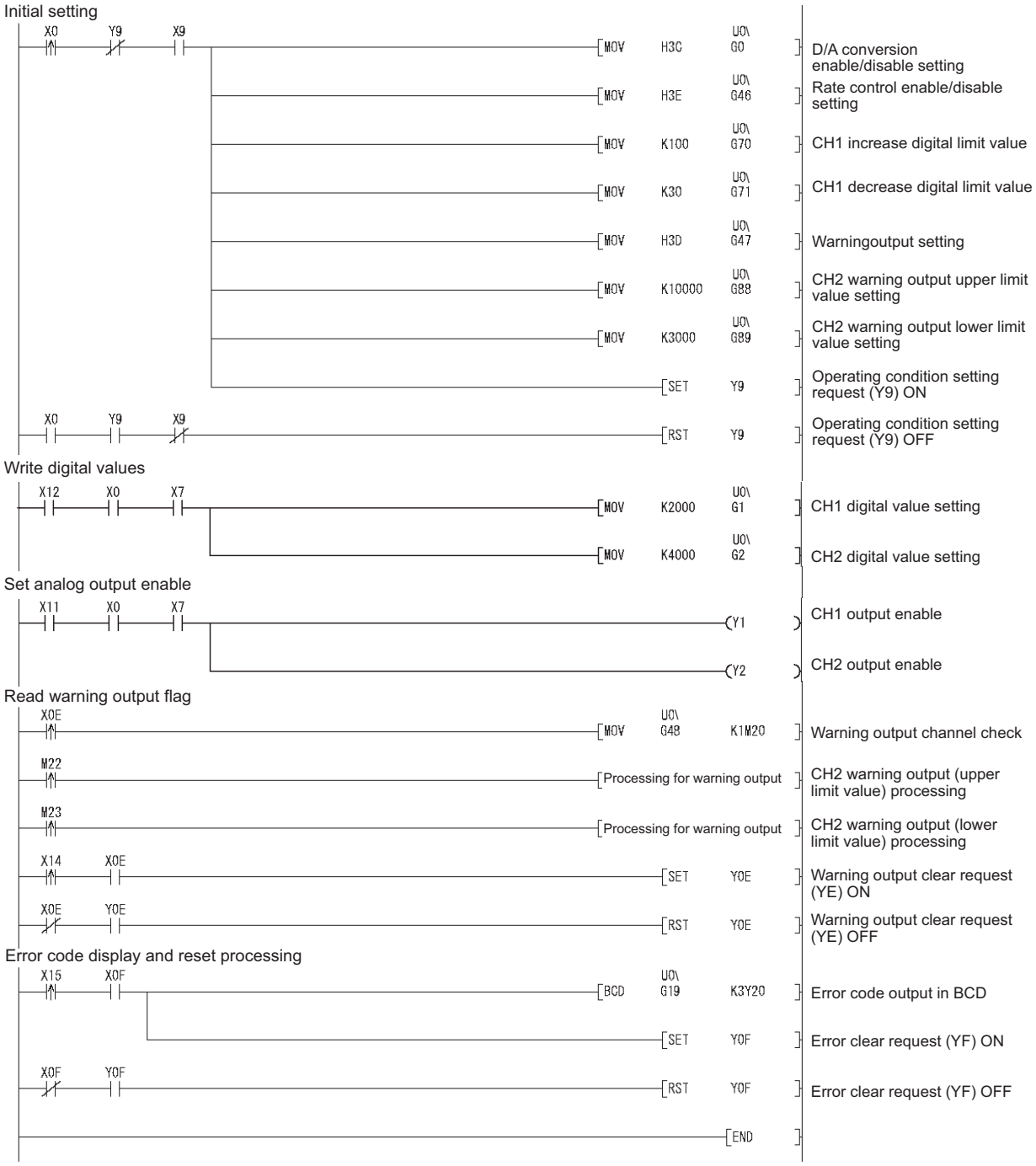
6.2.3 Programming example without using the utility package

(1) List of devices

Device	Function	
M20,M21	CH1 Warning output flag*1	
M22,M23	CH2 Warning output flag	
X0	Module ready	Q66DA-G (X/Y0 to X/YF)
X7	External power supply ready	
X9	Operating condition setting completed flag	
XE	Warning output signal	
XF	Error flag	
Y9	Operating condition setting request	
YE	Warning output clear request	
YF	Error clear request	
X11	Output enable	QX10 (X10 to X1F)
X12	Digital value write signal	
X14	Warning output reset signal	
X15	Error code reset signal	
Y20 to Y2B	Error code display (BCD 3 digits)	QY10 (Y20 to Y2F)

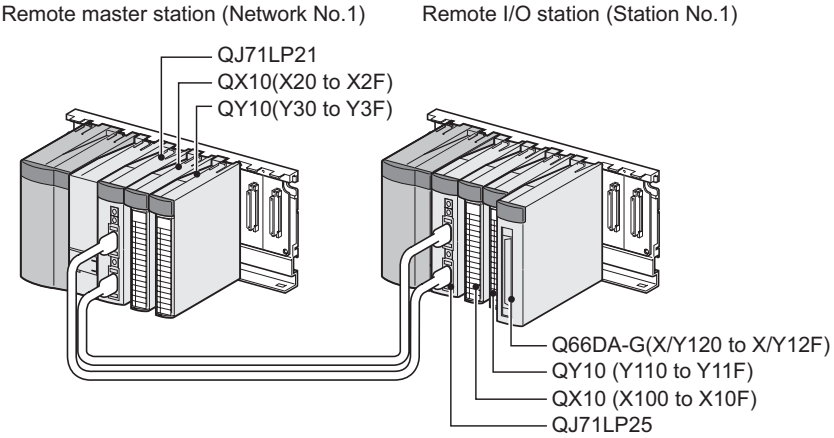
*1: Although channel 1 does not use warning output, these devices are assigned to read out warning output flag data of both channel 1 and 2 at a time.

(2) Program example



6.3 For Use on Remote I/O Network

(1) System configuration



(2) Conditions for the intelligent function module switch setting

	Input range setting	HOLD/CLEAR function setting	Normal resolution mode/ High resolution mode
CH1	4 to 20mA	CLEAR	High resolution mode
CH2	0 to 5V		
CH3 to CH6	not used	-	-

Based on the setting conditions given in the above, make the intelligent function module switch settings.
Select the [I/O assignment] tab on the [Intelligent function module switch settings] screen, and click [Switch setting] to set the following values.

Switch No.	Setting value	
Switch 1	0030H	(CH1: 4 to 20mA, CH2: 0 to 5V, CH3 to CH6: Default)
Switch 2	0000H	
Switch 3	0000H (CH1,CH2: CLEAR)	
Switch 4	0F00H (High resolution mode)	
Switch 5	0000H (0: Fixed)	

(3) Program conditions

(a) CH1 uses the rate control function (Refer to Section 3.2.4.)
- CH1 increase digital limit value: 100
- CH1 decrease digital limit value: 30

(b) CH2 uses the warning output function (Refer to Section 3.2.3.)
- CH2 warning output upper limit value: 10000
- CH2 warning output lower limit value: 3000

If a warning is output, the warning output flag status is read and processing for the warning output is performed.

(c) If an error occurs in writing a digital value, an error code is displayed in binary coded decimal (BCD) form.
The error code shall be reset after removal of the cause.

(4) List of devices

Device	Function	
D11*1	CH1 Digital value	
D12*1	CH2 Digital value	
D16*1	Warning output flag	
D17*1	Error code	
M20,M21	CH1 Warning output flag*2	
M22,M23	CH2 Warning output flag	
X20	Initial setting request signal*3	QX10 (X20 to X2F)
X21	Output enable	
X22	Digital value write signal	
X24	Warning output reset signal	
X25	Error code reset signal	
Y30 to Y3B	Error code display (BCD 3 digits)	QY10 (Y30 to Y3F)
X120	Module ready	Q66DA-G (X/Y120 to X/Y12F)
X127	External power supply ready	
X129	Operating condition setting completed flag	
X12E	Warning output signal	
X12F	Error flag	
Y129	Operating condition setting request	
Y12E	Warning output clear request	
Y12F	Error clear request	

*1: Devices used for the automatic refresh function of GX Configurator-DA.
*2: Although channel 1 does not use warning output, these devices are assigned to read out warning output flag data of both channel 1 and 2 at a time.
*3: When the initial setting is made by GX Configurator-DA, X20 is not used.

Point

For details on the MELSECNET/H remote I/O network, refer to the Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O Network).

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

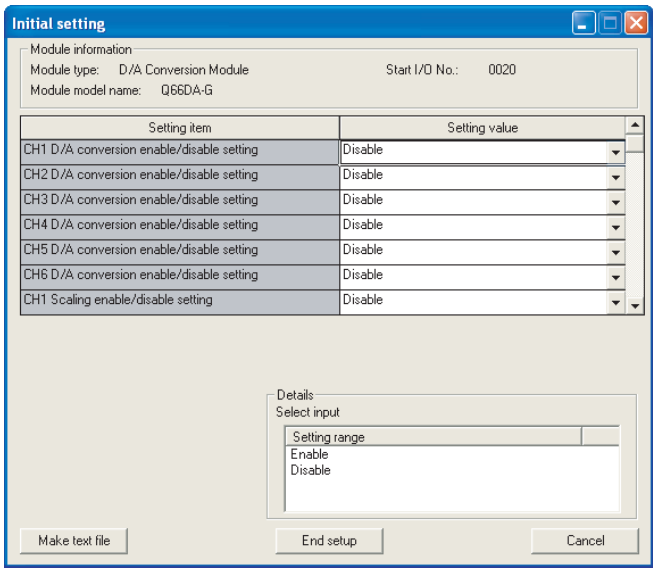
- Refresh parameters:

	Link side					PLC side			
	Dev. name	Points	Start	End		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) Operating the utility package

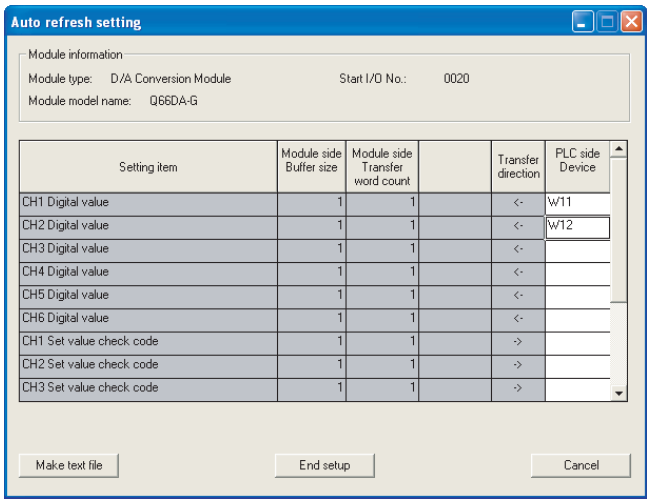
(a) Initial setting (Refer to Section 5.4)

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"
CH2 warning output setting ..... "Enable"
CH2 warning output upper limit value ..... "10000"
CH2 warning output lower limit value ..... "3000"



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

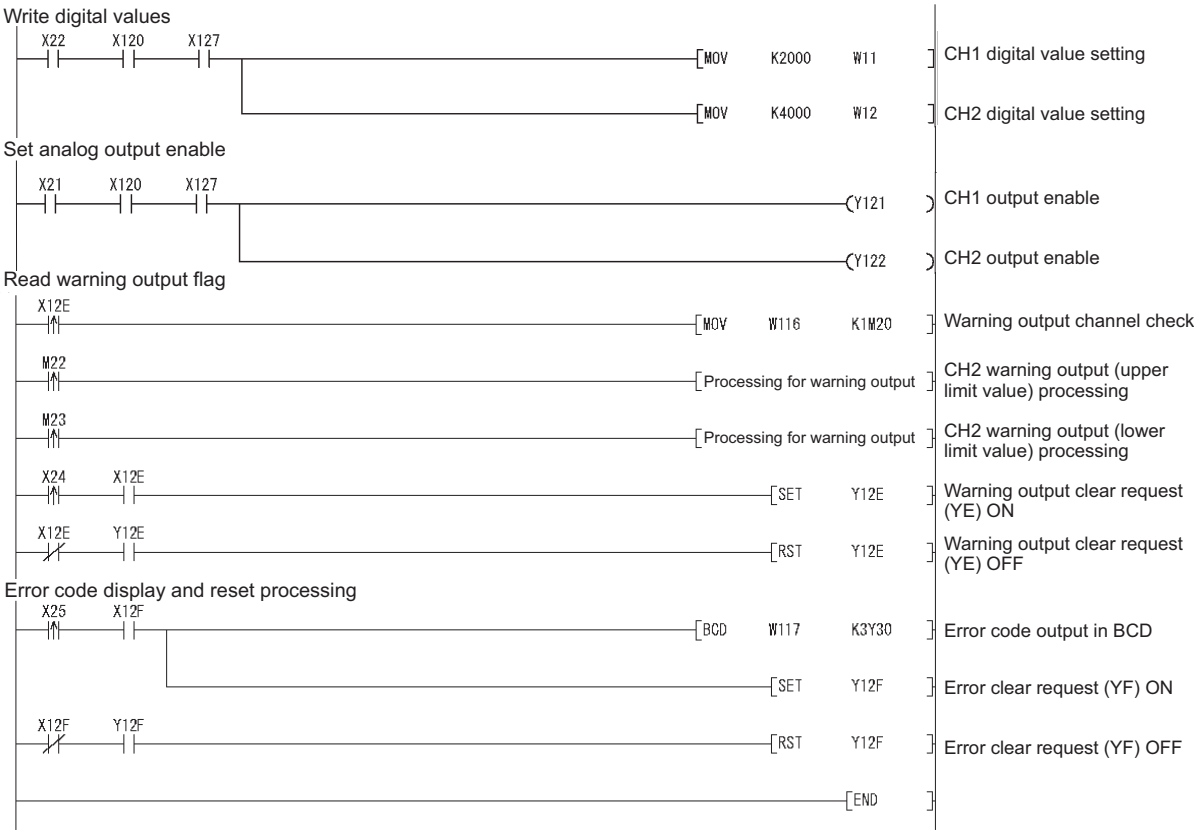
CH1, CH2 digital values W11, W12
Warning output W116
Error code W117



(c) Write of intelligent function module parameters (Refer to Section 5.3.3)

The intelligent function module parameters are written to the remote I/O station.
Perform this operation on the parameter setting module selection screen.

(3) Programming example



Point

To write the intelligent function module parameters, set the target remote I/O station from [Online] - [Transfer setup] on GX Developer.
They can be written by:

- Directly connecting GX Developer to the remote I/O station.
- Connecting GX Developer to another device such as a CPU module and passing through the network.

6.3.2 Program example without using the utility package

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

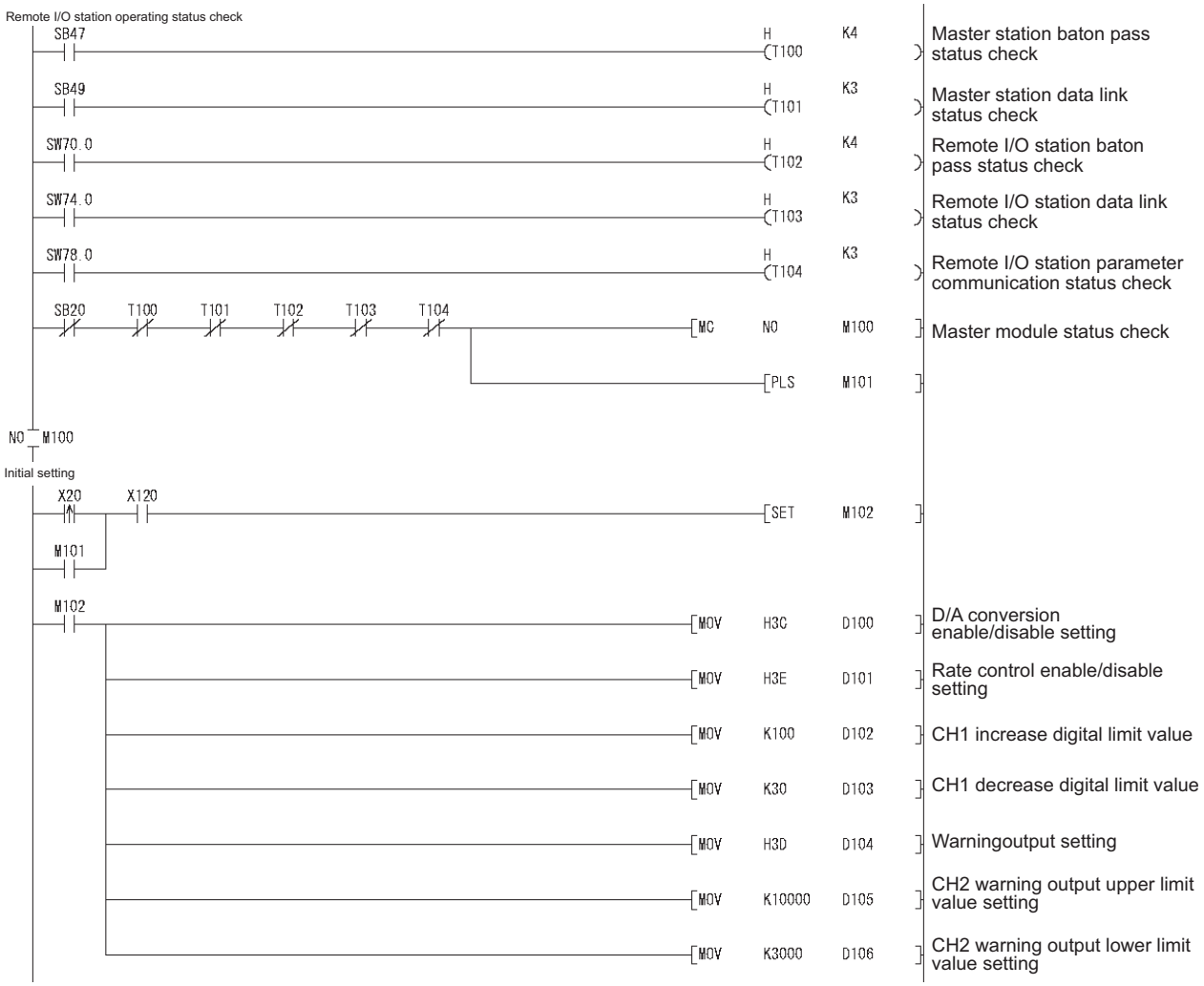
- Network type : MNET/H (remote master)
- Head I/O No. : 0000H
- Network No. : 1
- Total number of (slave) stations : 1
- Mode : Online
- Network range assignment :

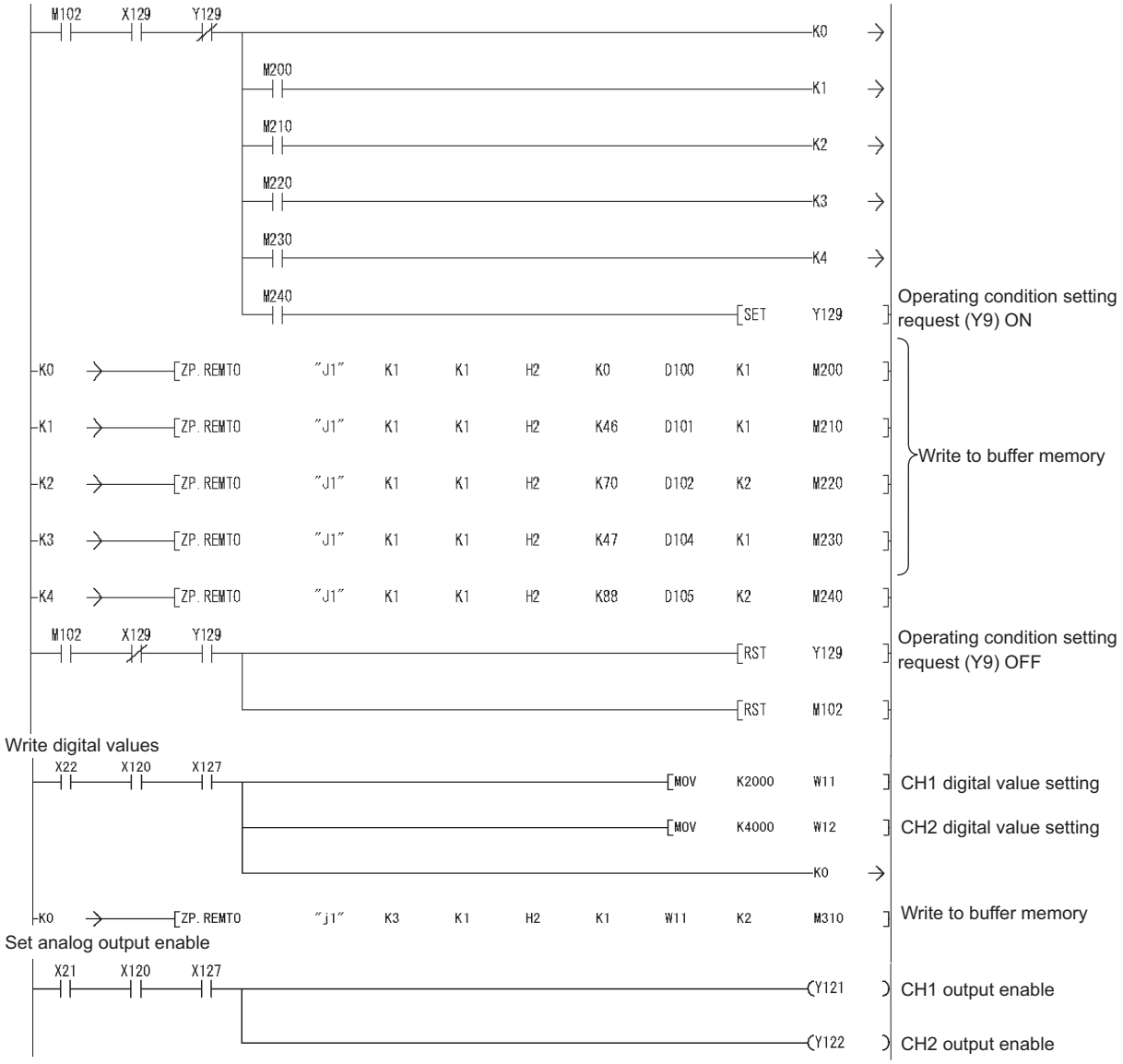
StationNo.	M station -> R station						M station <- R station					
	Y			Y			X			X		
	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End
1	256	0100	01FF	256	0000	00FF	256	0100	01FF	256	0000	00FF

- Refresh parameters :

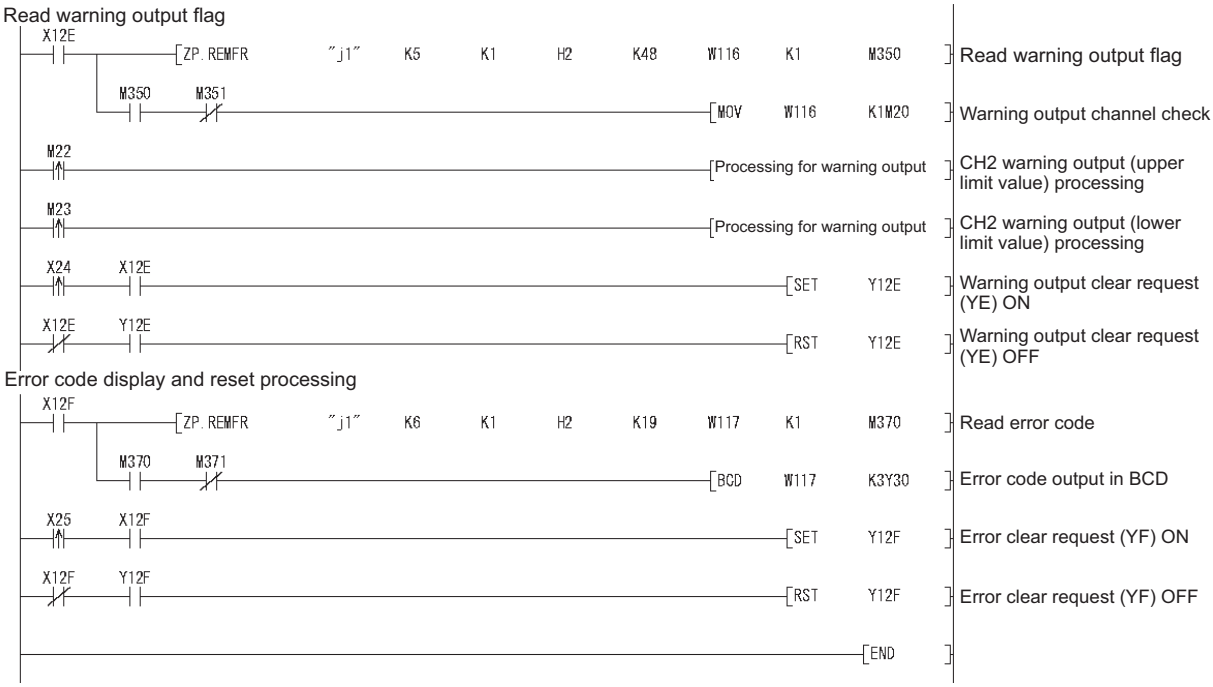
	Link side					PLC side			
	Dev. name	Points	Start	End		Dev. name	Points	Start	End
Transfer SB	SB	512	0000	01FF	↔	SB	512	0000	01FF
Transfer SW	SW	512	0000	01FF	↔	SW	512	0000	01FF
Random cyclic	LB				↔				
Random cyclic	LW				↔				
Transfer1	LB	8192	0000	1FFF	↔	B	8192	0000	1FFF
Transfer2	LW	8192	0000	1FFF	↔	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 exaple




M102 X129 Y129
K0
M200
K1
M210
K2
M220
K3
M230
K4
M240
SET Y129
Operating condition setting request (Y9) ON
K0 ZP.REMTO "J1" K1 K1 H2 K0 D100 K1 M200
K1 ZP.REMTO "J1" K1 K1 H2 K46 D101 K1 M210
K2 ZP.REMTO "J1" K1 K1 H2 K70 D102 K2 M220
K3 ZP.REMTO "J1" K1 K1 H2 K47 D104 K1 M230
K4 ZP.REMTO "J1" K1 K1 H2 K88 D105 K2 M240
Write to buffer memory
M102 X129 Y129
RST Y129
Operating condition setting request (Y9) OFF
RST M102
Write digital values
X22 X120 X127
MOV K2000 W11
CH1 digital value setting
MOV K4000 W12
CH2 digital value setting
K0
K0 ZP.REMTO "j1" K3 K1 H2 K1 W11 K2 M310
Write to buffer memory
Set analog output enable
X21 X120 X127
Y121
CH1 output enable
Y122
CH2 output enable

Read warning output flag



Error code display and reset processing

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

(1) Perform an online module change after making sure that the system outside the programmable controller 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:

- 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 install/remove the module to/from the base unit more than 50 times after the first use of the product. (IEC 61131-2 compliant)
Failure to do so may cause malfunction.

(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, Q66DA-G, GX Developer and base unit given below are needed to perform an online module change.

(1) CPU

The Process CPU is required.
For precautions for multiple CPU system configuration, refer to the QCPU User's Manual (Multiple CPU System).

(2) MELSECNET/H remote I/O module

The module of function version D or later is necessary.

(3) 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.

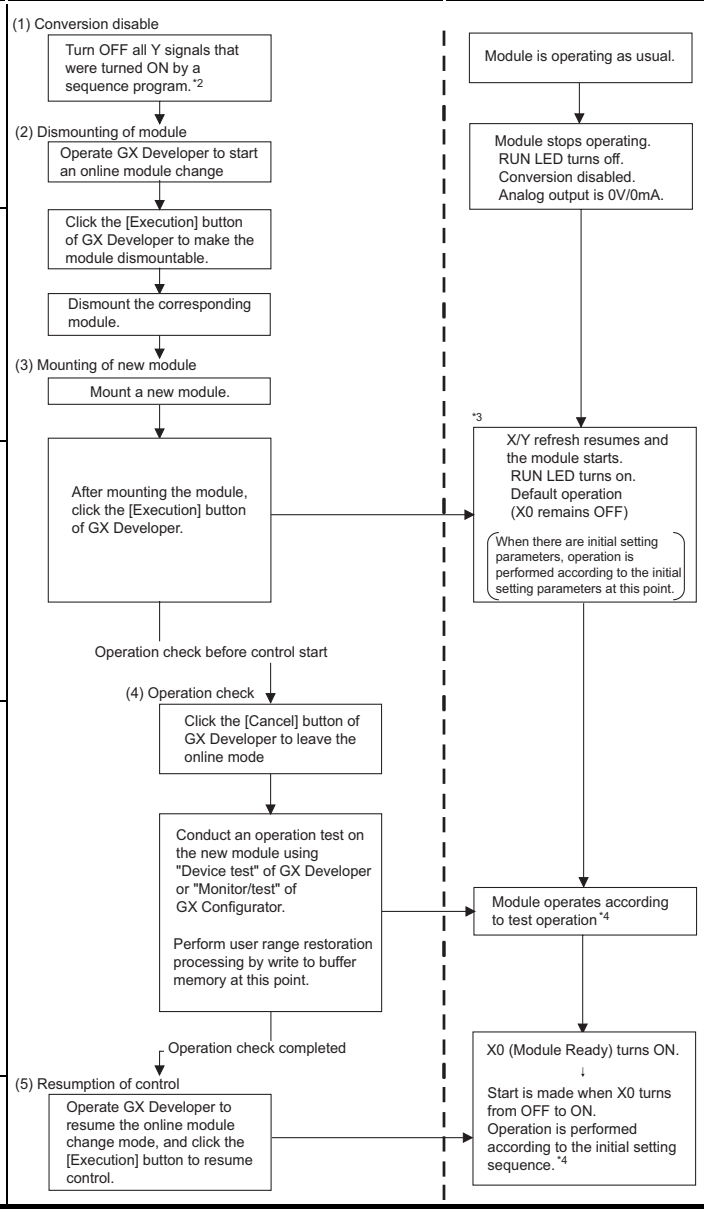
(4) Base unit

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	GX Configurator: Monitor/test		
○	○	○	○	×	×		
×	×	×	×	×	×		
○	×	×	×	○	×		
○	×	×	○	×	○		
○	○	○	○	×	○		



*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

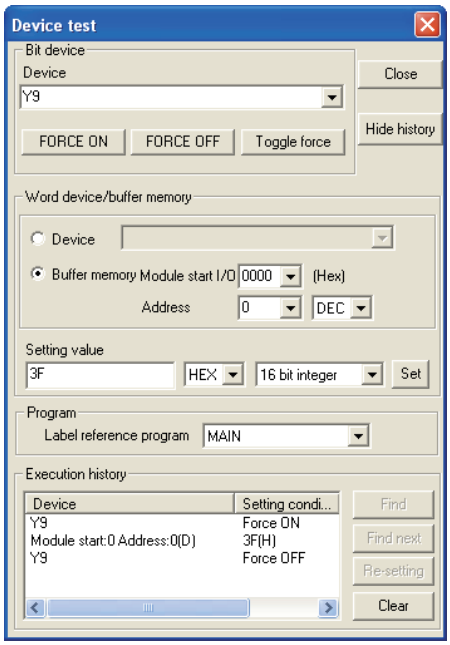
There are the following online module change procedures depending on whether the user range setting has been made or not, whether the initial setting of GX Configurator-DA has been made or not, and whether the other system exists or not.

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

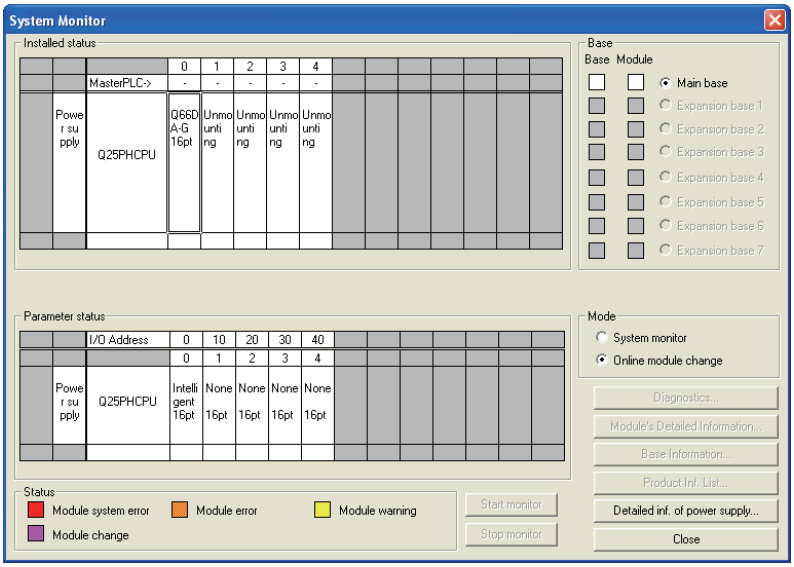
(1) Conversion disable

(a) Set D/A Conversion enable/disable setting (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).

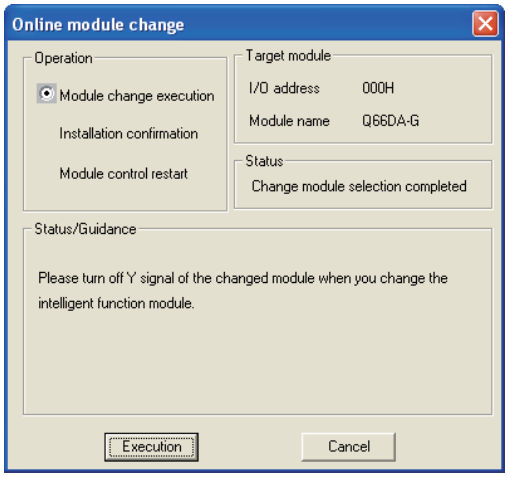


(2) Dismounting of module

(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 connector and dismount the module.

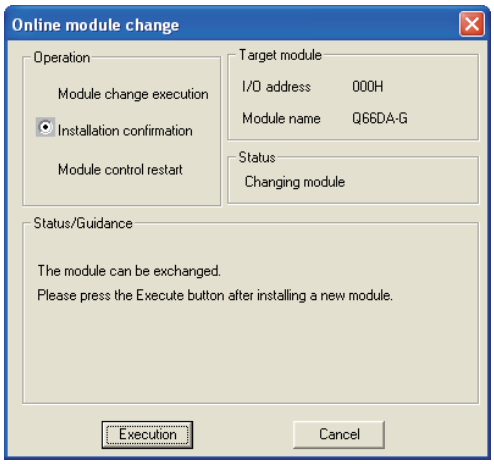
Point

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

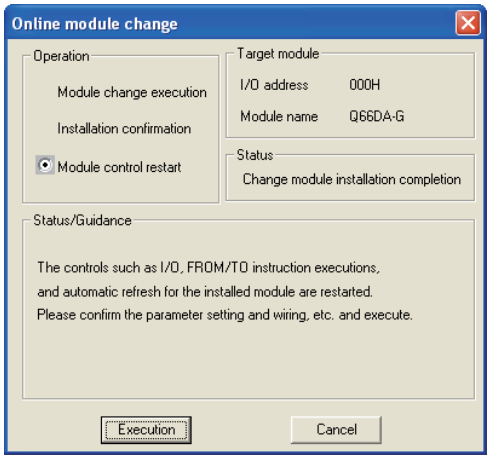
(a) Mount a new module to the same slot and install the connector.

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

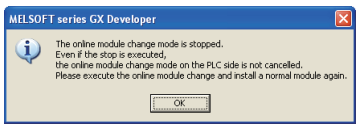


(4) Operation check

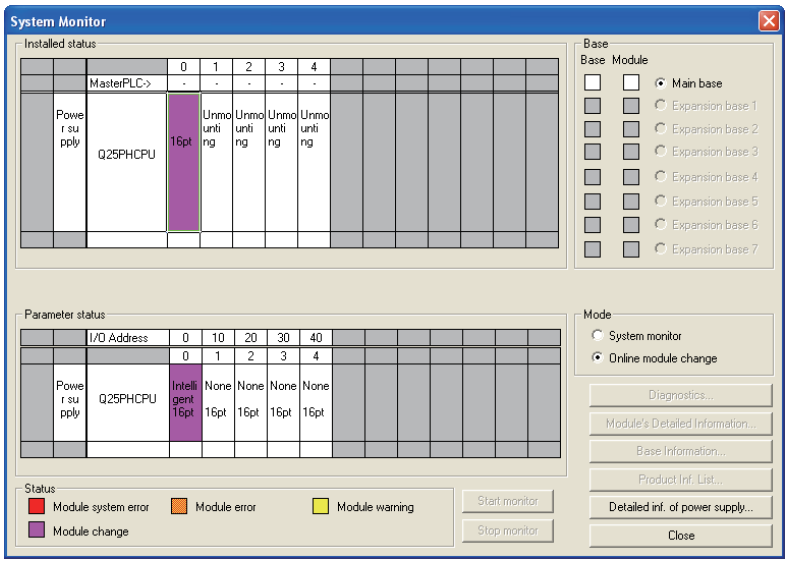
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



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



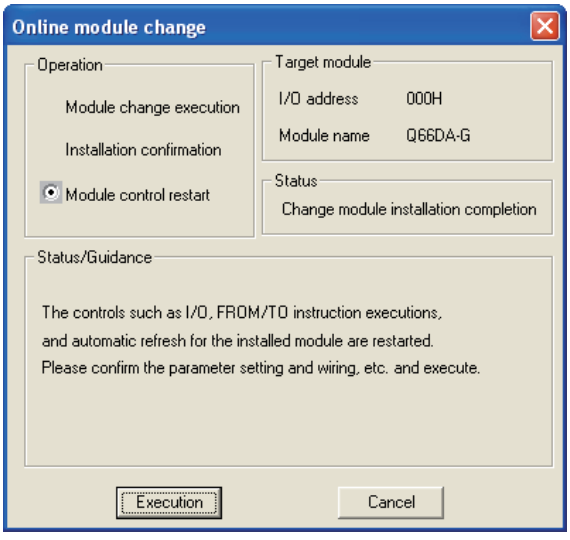
(c) lick the [Close] button to close the System monitor screen.



(d) Set digital values to the digital values (Un\G1 to Un\G6) and turn Operating condition setting request (Y9) from OFF to ON. Turn ON the output enable/disable flag (Y1 to Y6) 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.

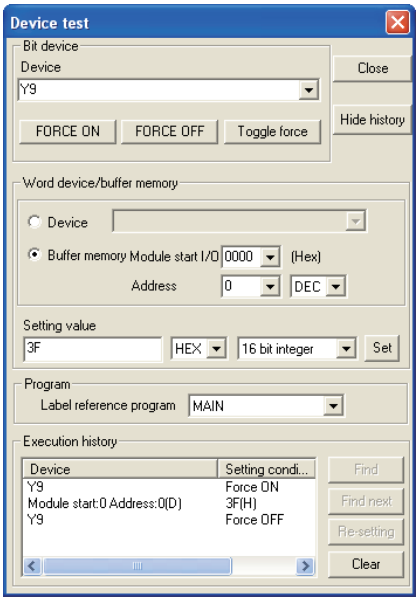


(b) The "Online module change completed" screen appears.

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

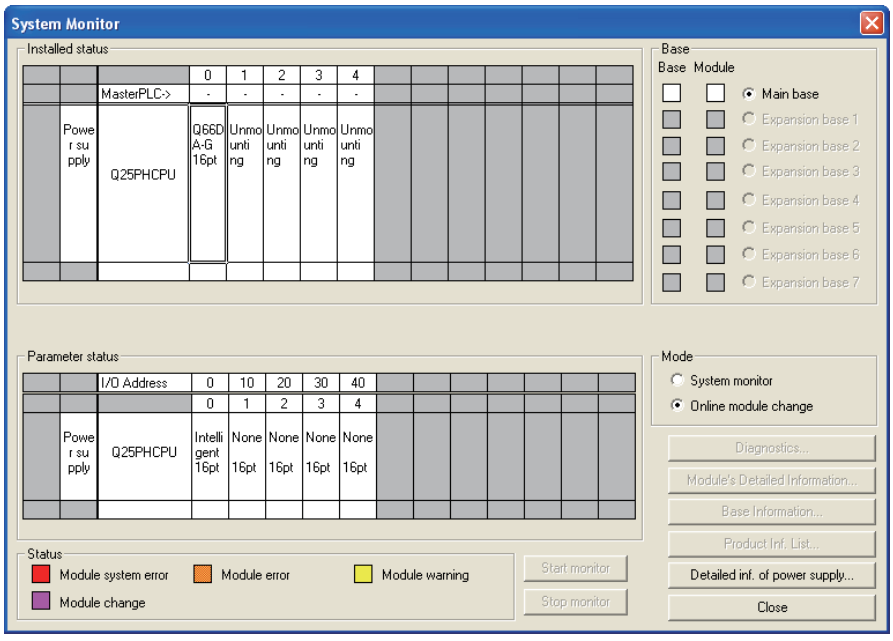
(1) Conversion disable

(a) Set D/A Conversion enable/disable setting (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)

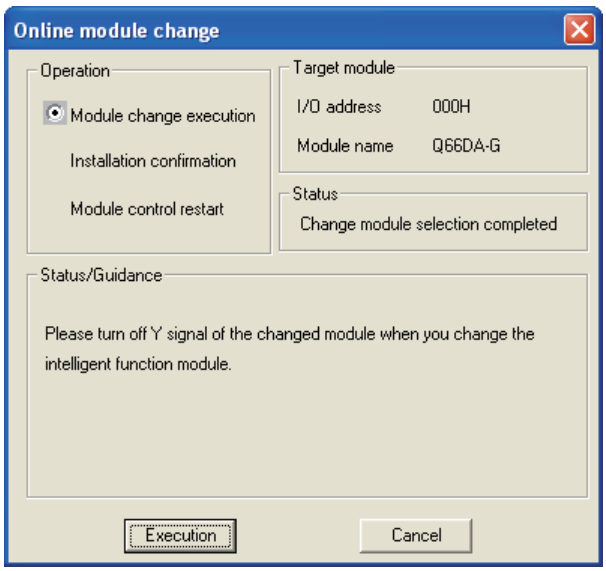


(2) Dismounting of module

(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 connector and dismount the module.

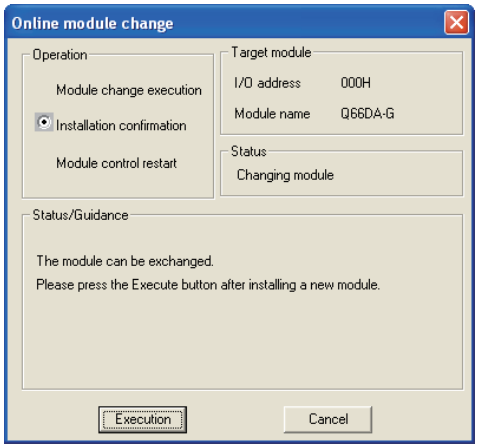
Point

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

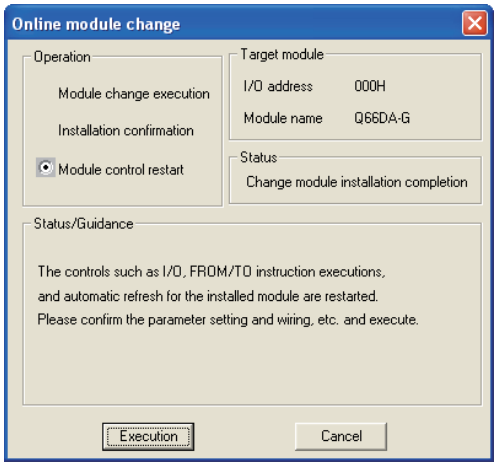
(a) Mount a new module to the same slot and install the connector.

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

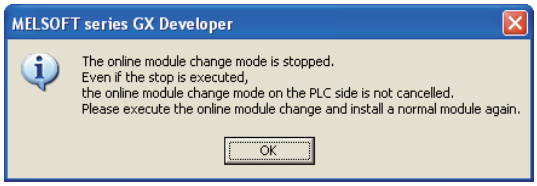


(4) Operation check

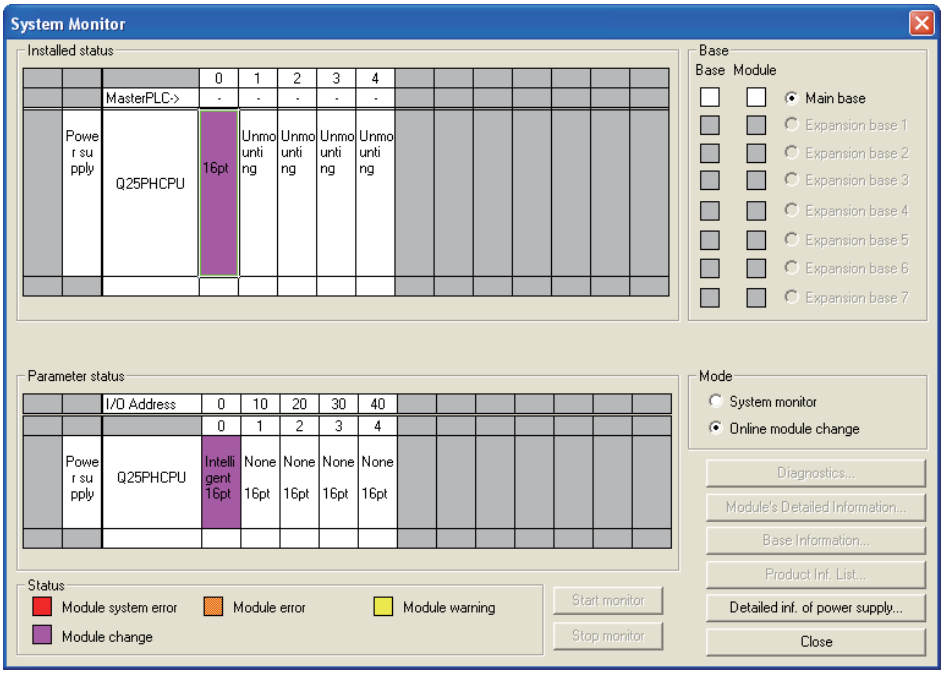
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



(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 (Un\G1 to Un\G6), and turn Operating condition setting request (Y9) from OFF to ON. Turn ON the output enable/disable flag (Y1 to Y6) 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

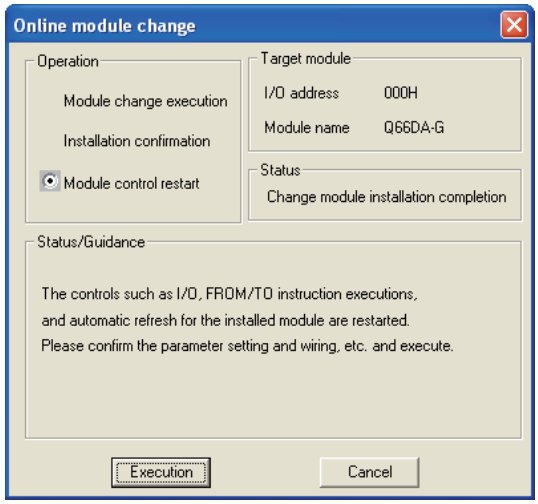
The sequence program should perform initialization on the leading edge of Module READY (X9) of the Q66DA-G.
When control resumption is executed, Module READY (X0) turns ON and initialization is performed. (If the sequence program performs initialization only one scan after RUN, initialization is not 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.

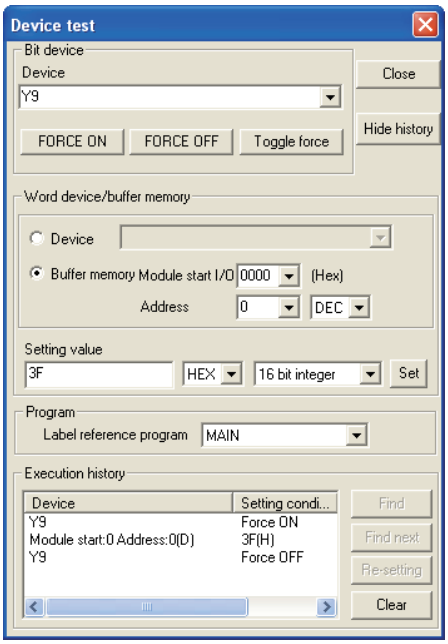


(b) The "Online module change completed" screen appears.

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

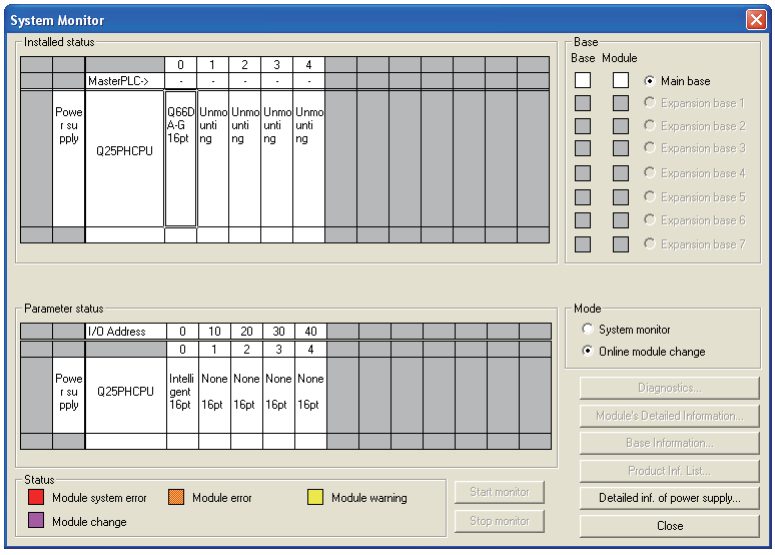
(1) Conversion disable

(a) Set D/A Conversion enable/disable setting (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).

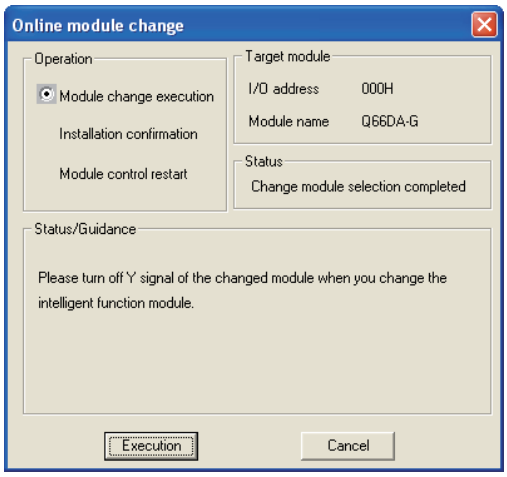


(2) Dismounting of module

(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 connector 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

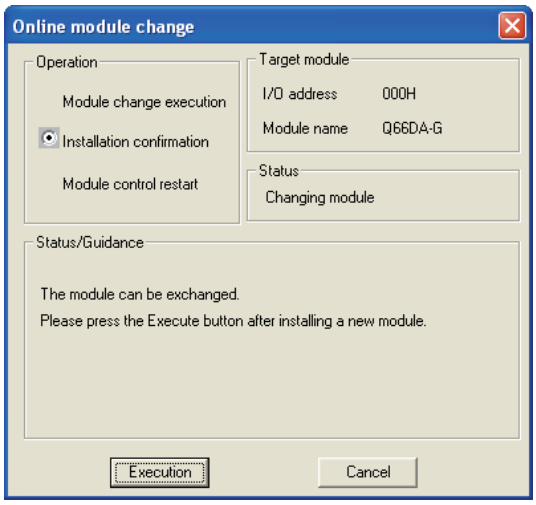
(a) Mount the dismounted module and new module to the other system.

(b) Using the G(P).OGLOAD instruction, save the user set values to the CPU device. Refer to Appendix 1.2 for the G(P).OGLOAD instruction.

(c) Using the G(P).OGSTOR instruction, restore the user set values to the module. Refer to Appendix 1.3 for the G(P).OGSTOR instruction.

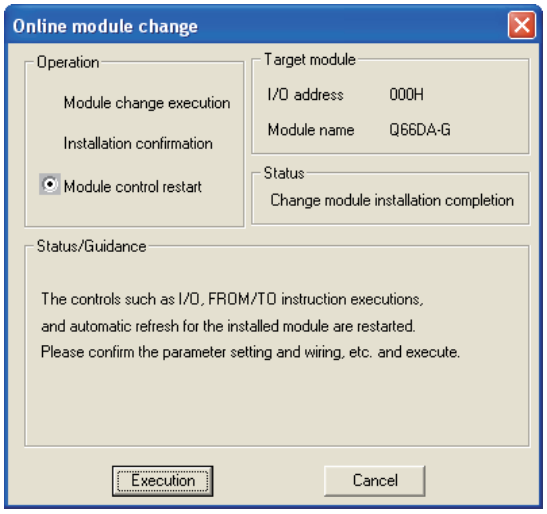
(d) Dismount the new module from the other system, mount it to the slot from where the old module was dismounted in the original system, and install the connector.

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

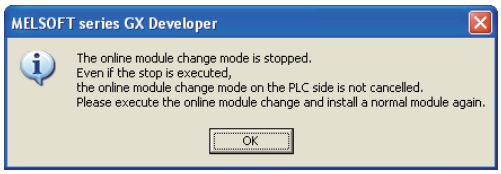


(4) Operation check

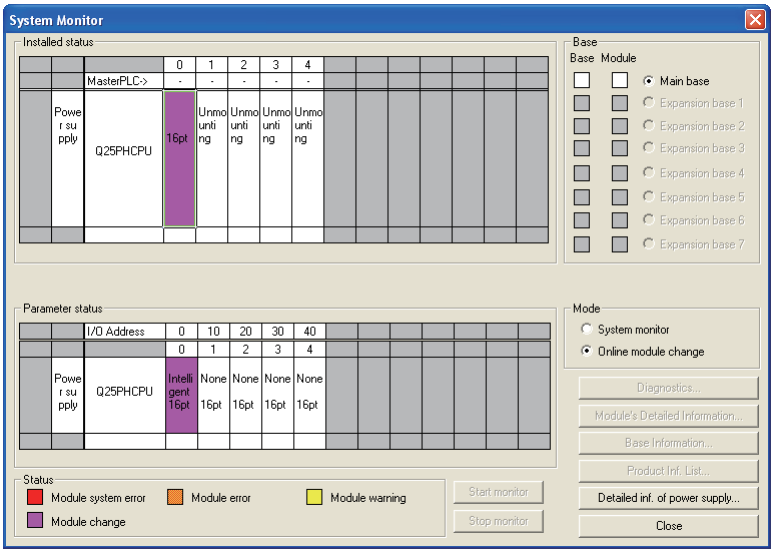
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



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



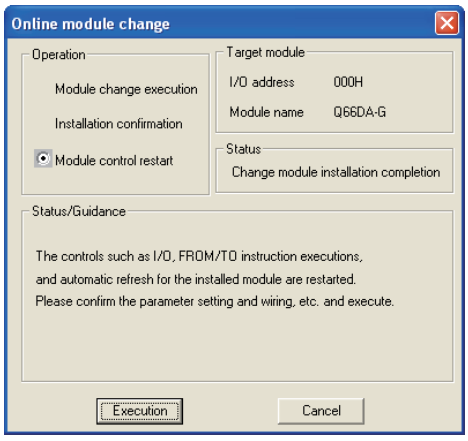
(c) Click the [Close] button to close the System monitor screen.



(d) Set digital values to the digital values (Un\G1 to Un\G6) and turn Operating condition setting request (Y9) from OFF to ON. Turn ON the output enable/disable flag (Y1 to Y6) 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.

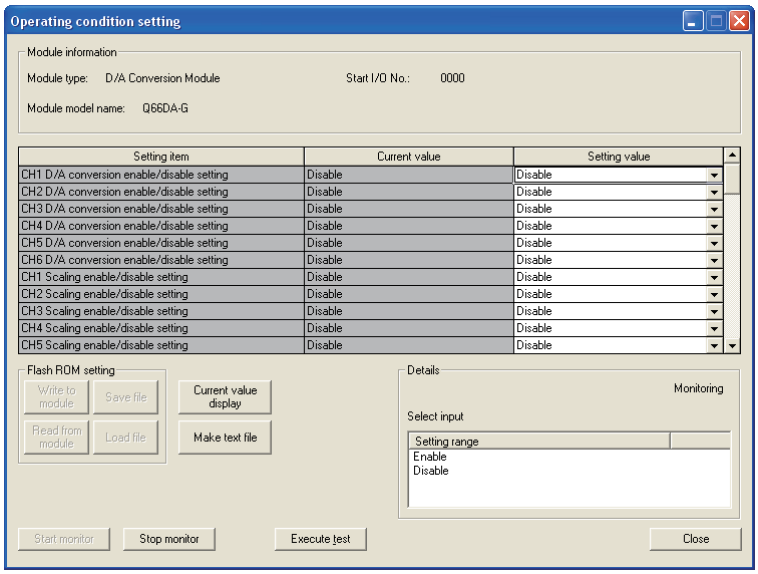


(b) The "Online module change completed" screen appears.

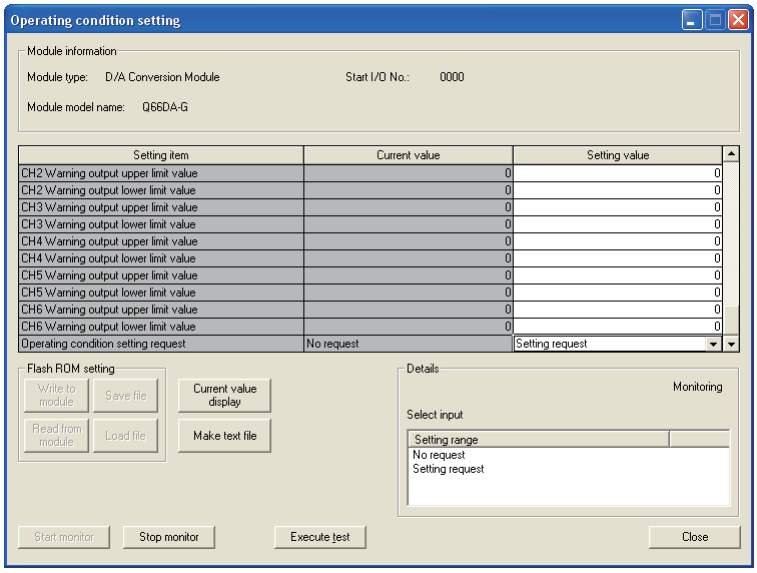
7.3.4 When user range setting is used and initial setting was made with GX Configurator-DA (other system is unavailable)

(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 7.3.6 for the range reference table.

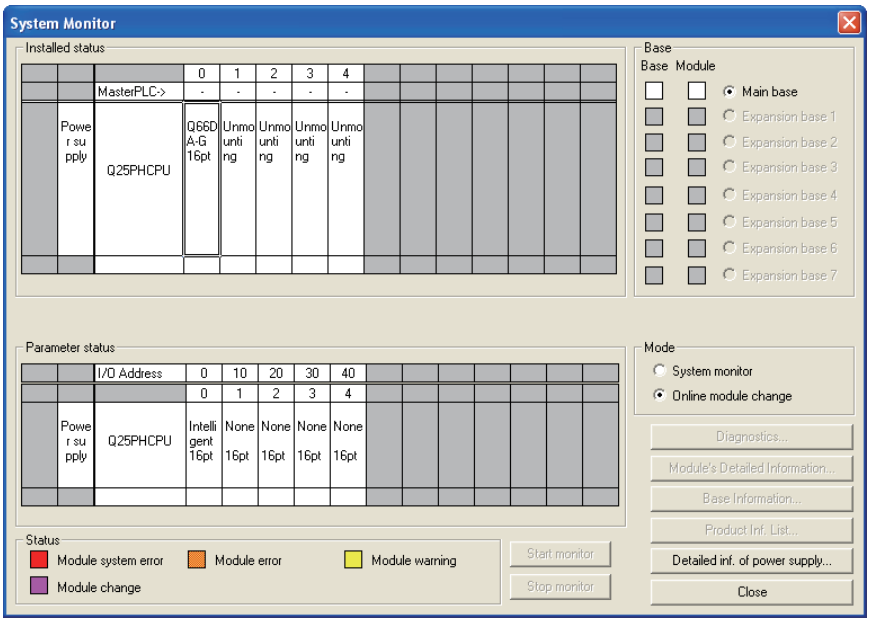
4) If the values are proper, record the offset/gain values of the pass data classification setting, industrial shipment settings and user range settings.

Point

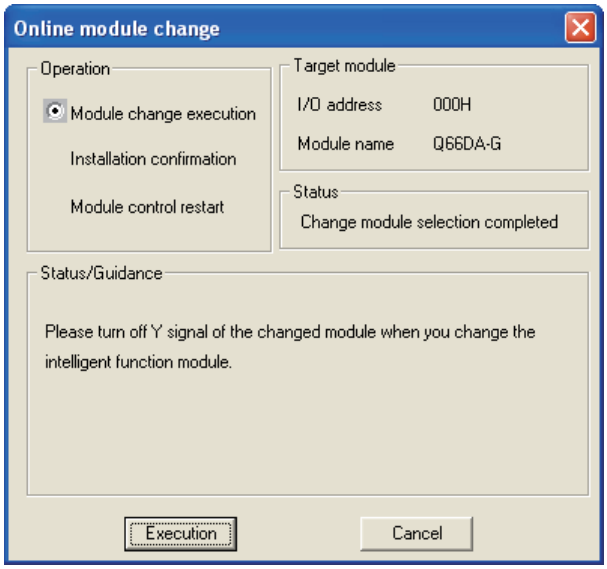
If the buffer memory values compared with the reference table are not proper, save and restoration of the user range cannot be executed.
Before executing module control resumption, make offset/gain setting in the GX Configurator-DA. (Refer to Section 5.6.2)
Note that if module control is resumed without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

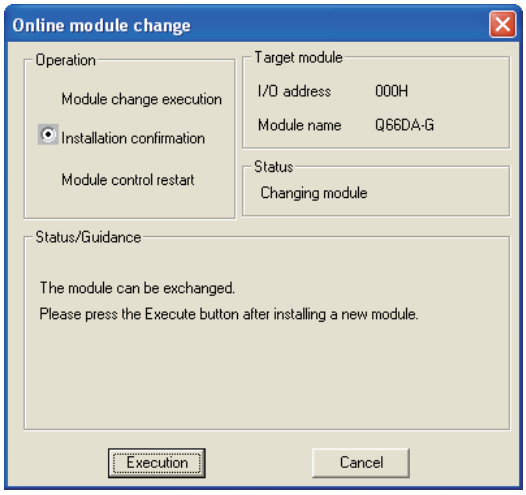
Point

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

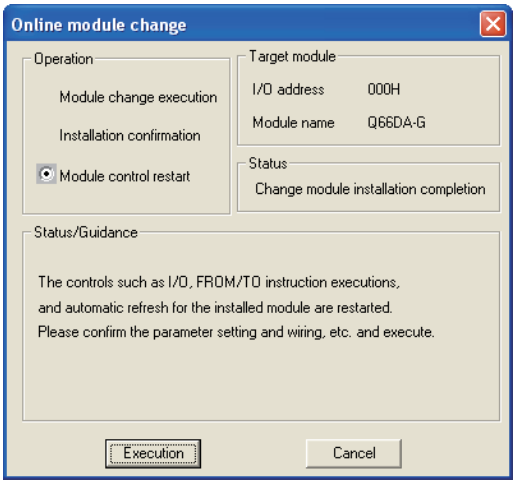
(a) Mount a new module to the same slot and install the connector.

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

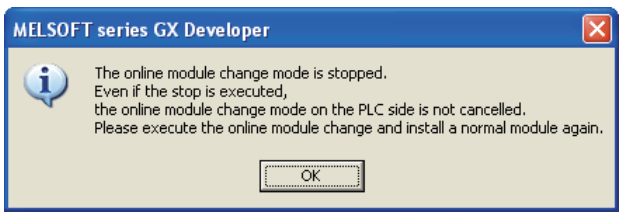


(4) Operation check

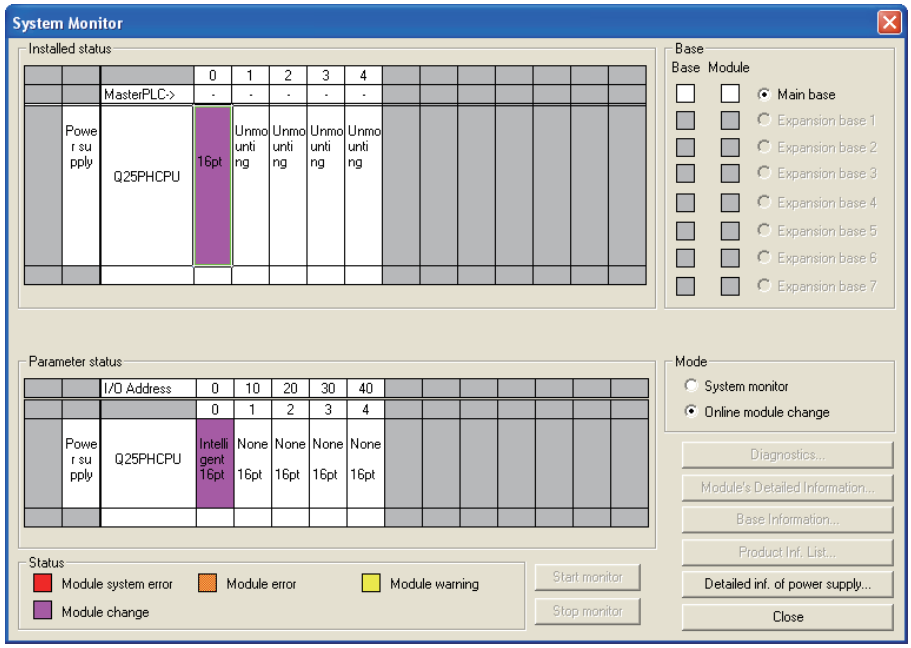
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



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



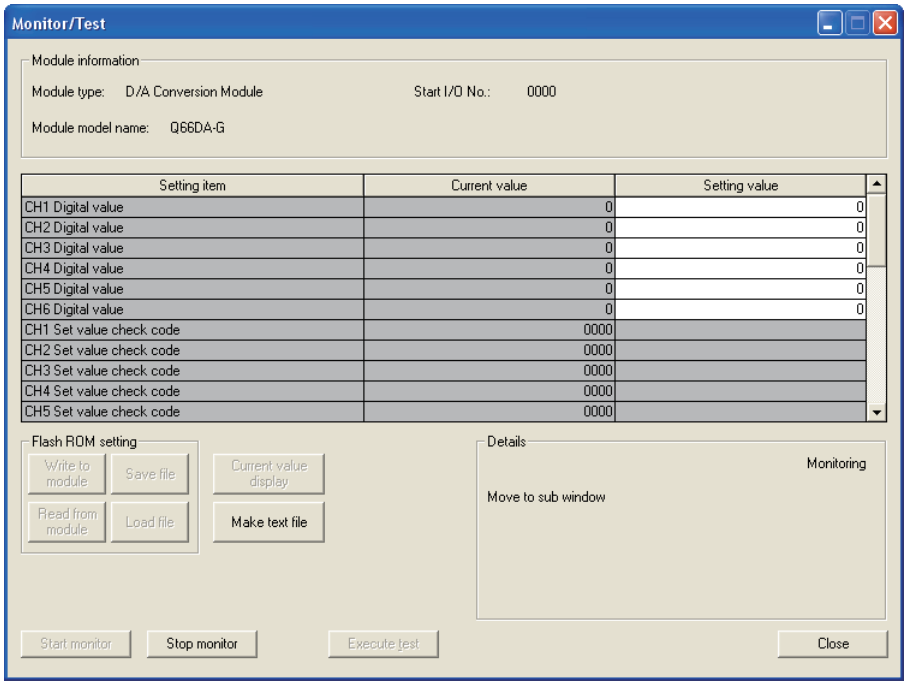
(c) Click the [Close] button to close the System monitor screen.



(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.

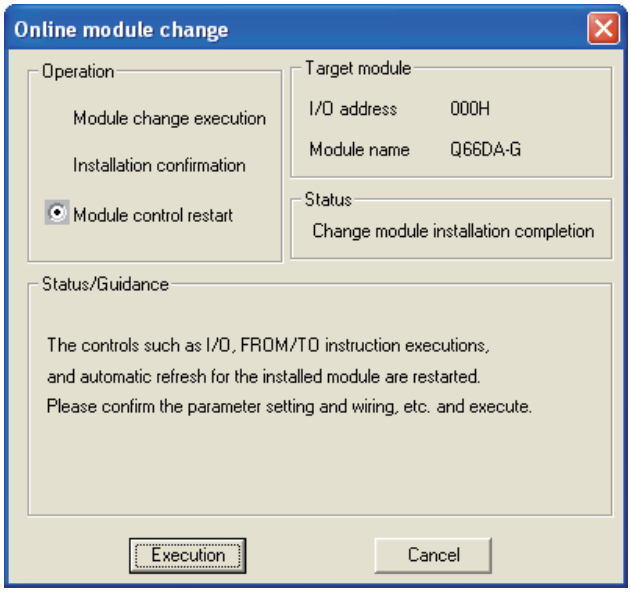
(f) On the monitor/test screen of GX Configurator-DA, set a value in the Setting value field of CH☐ digital value of the used channel, and click the [Execute test] button.



(g) Turn ON the output enable/disable flag (Y1 to Y6) 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.

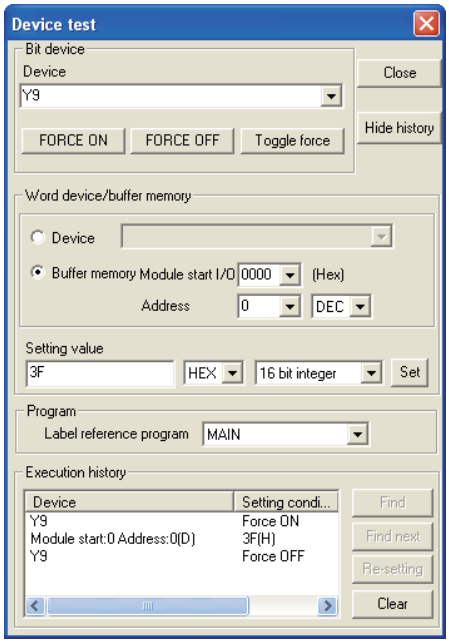


(b) The "Online module change completed" screen appears.

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

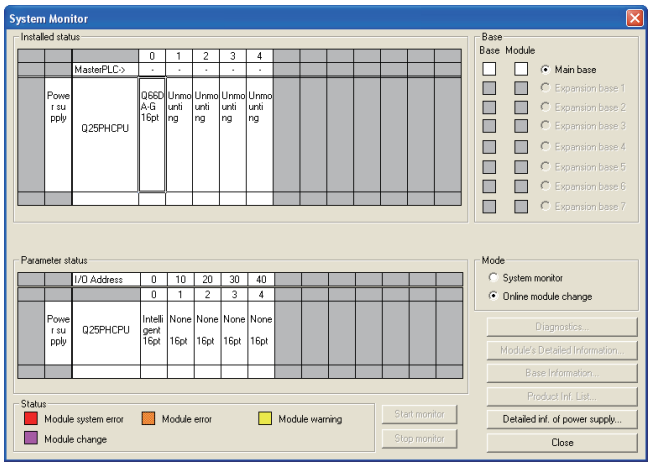
(1) Conversion disable

(a) Set D/A Conversion enable/disable setting (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).

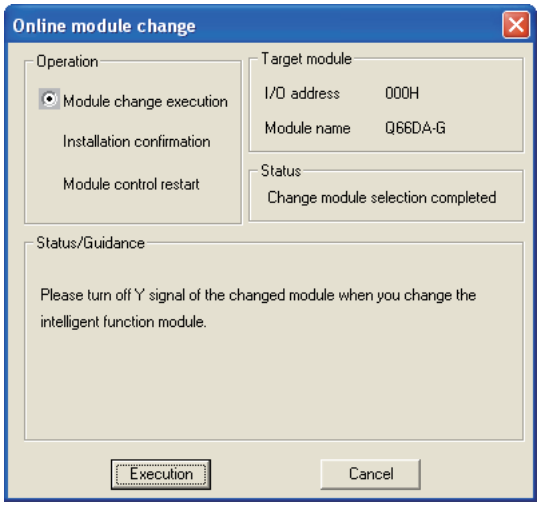


(2) Dismounting of module

(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 connector 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

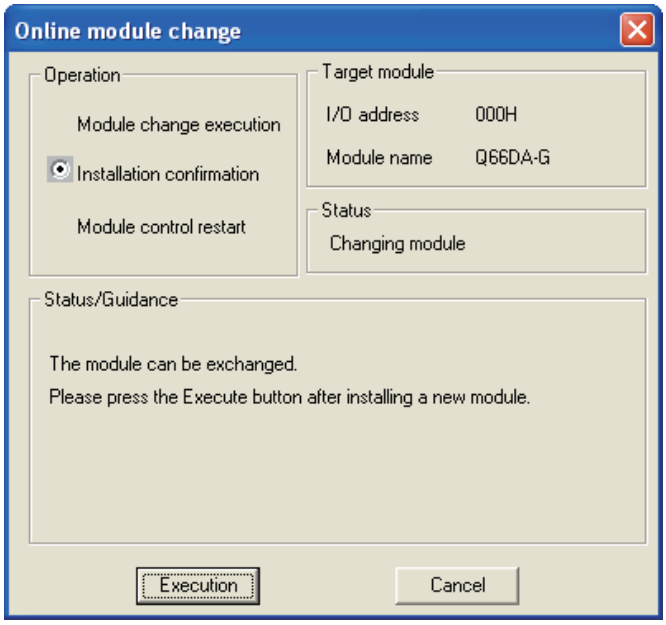
(a) Mount the dismounted module and new module to the other system.

(b) Using the G(P).OGLOAD instruction, save the user set values to the CPU device. Refer to Appendix 1.2 for the G(P).OGLOAD instruction.

(c) Using the G(P).OGSTOR instruction, restore the user set values to the module. Refer to Appendix 1.3 for the G(P).OGSTOR instruction.

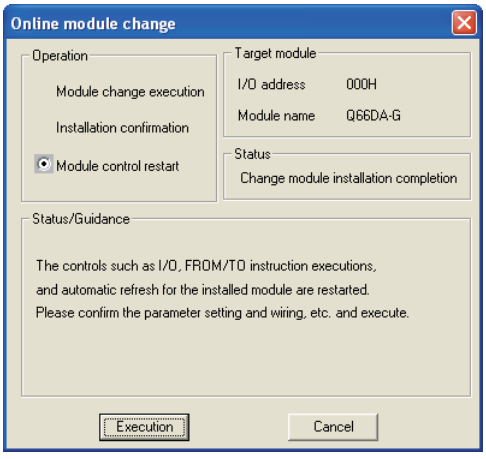
(d) Dismount the new module from the other system, mount it to the slot from where the old module was dismounted in the original system, and install the connector.

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

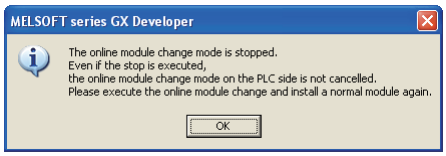


(4) Operation check

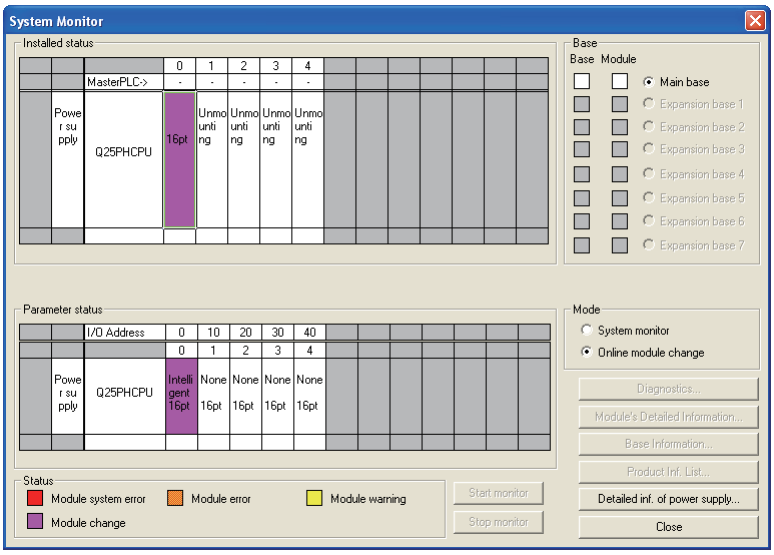
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



(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 (Un\G1 to Un\G6), and turn Operating condition setting request (Y9) from OFF to ON. Turn ON the output enable/disable flag (Y1 to Y6) 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

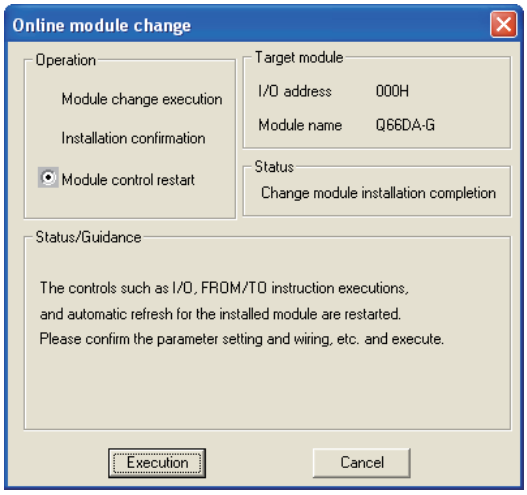
The sequence program should perform initialization on the leading edge of Module READY (X9) of the Q66DA-G.
When control resumption is executed, Module READY (X0) turns ON and initialization is performed. (If the sequence program performs initialization only one scan after RUN, initialization is not 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.

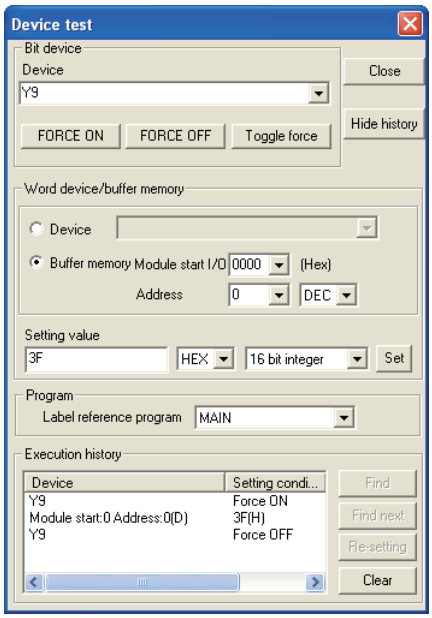


(b) The "Online module change completed" screen appears.

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 (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.

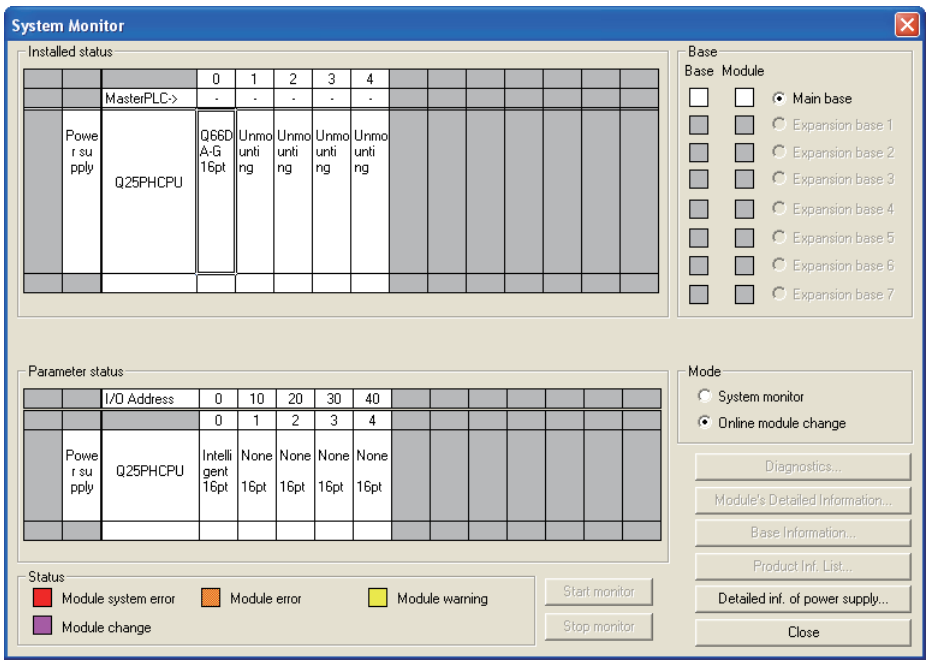
1) Make the pass data classification setting (Un\G200).
2) Turn Operation Condition Setting Request (Y9) from OFF to ON.
3) Compare the offset/gain values of the industrial shipment settings and user range settings (Un\G214 to Un\G225) with the range reference table. Refer to Section 7.4 for the range 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

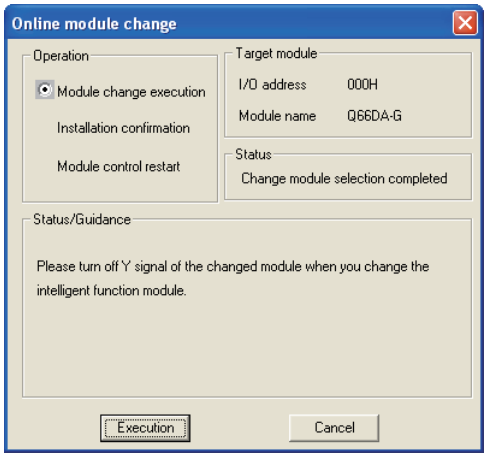
If the buffer memory values compared with the reference table are not proper, save and restoration of the user range cannot be executed.
Before executing module control resumption, follow the flowchart in Section 4.6 and make offset/gain setting in the device test of GX Developer.
Perform mode switching by making the setting of the mode switching setting (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 connector and dismount the module.

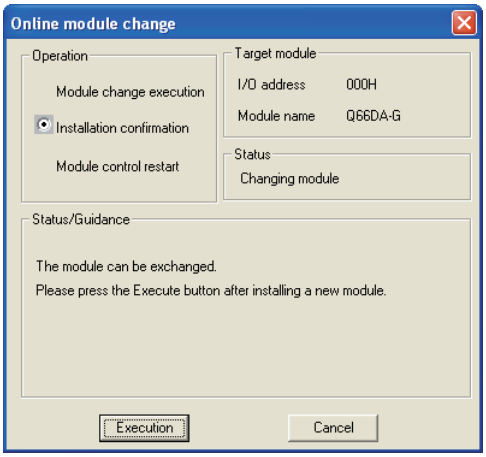
Point

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

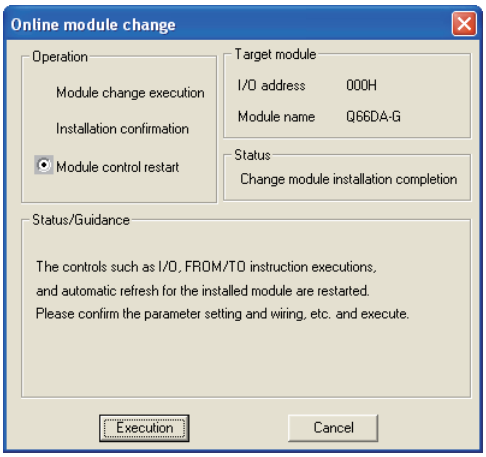
(a) Mount a new module to the same slot and install the connector.

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

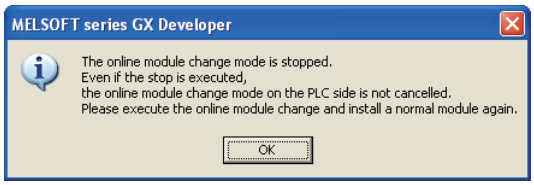


(4) Operation check

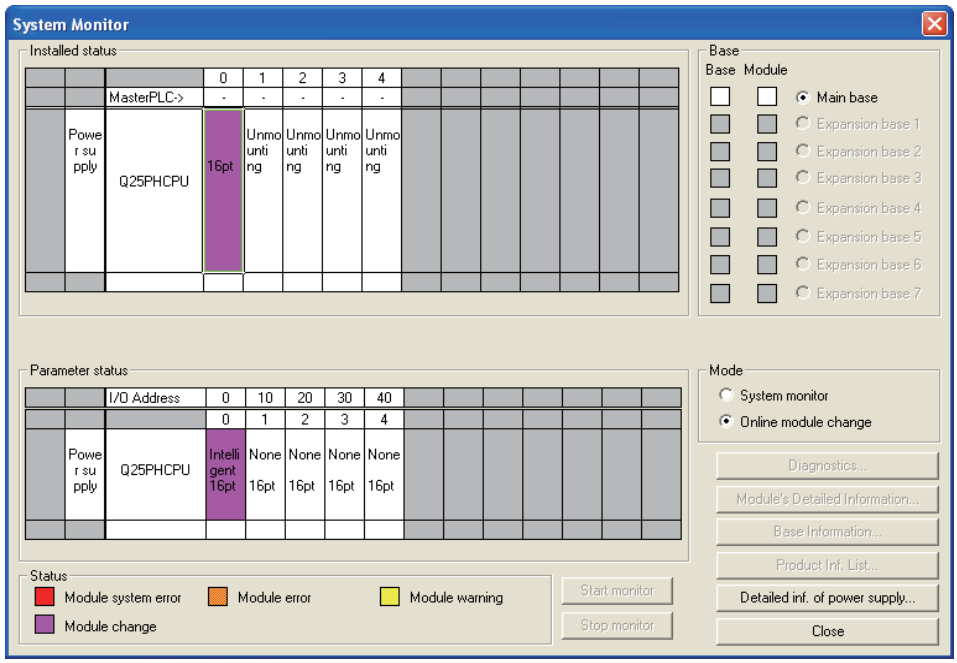
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



(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 (Un\G1 to Un\G6), and turn Operating condition setting request (Y9) from OFF to ON. Turn ON the output enable/disable flag (Y1 to Y6) 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

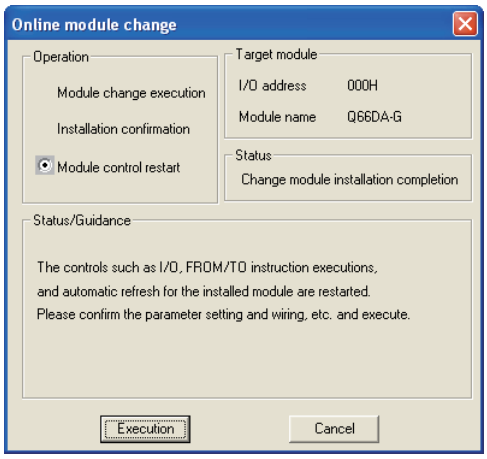
The sequence program should perform initialization on the leading edge of Module READY (X9) of the Q66DA-G.
When control resumption is executed, Module READY (X0) turns ON and initialization is performed. (If the sequence program performs initialization only one scan after RUN, initialization is not 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 (Un\G202 to 213)

The reference values change depending on the setting of the pass data classification setting (Un\G200).

Address (Decimal)						Description	Pass data classification setting		Reference value (Hexadecimal)
CH1	CH2	CH3	CH4	CH5	CH6				
202	204	206	208	210	212	Industrial shipment settings offset value	User range setting 1	0mA	Approx. 7FFF$_H$
							User range setting 2	0V	Approx. 7FFF$_H$
							User range setting 3	0V	Approx. 7FFF$_H$
203	205	207	209	211	213	Industrial shipment settings gain value	User range setting 1	20mA	Approx. 24A0$_H$
							User range setting 2	10V	Approx. E4C8$_H$
							User range setting 3	5V	Approx. E4C8$_H$

(2) Reference table for user range settings offset/gain values (Un\G214 to 225)

Offset/gain value		Reference value
User range setting 1	0mA	Approx. 7FFF$_H$
	4mA	Approx. 6DB9$_H$
	20mA	Approx. 24A0$_H$
User range setting 2	-10V	Approx. 1B36$_H$
	0V	Approx. 7FFF$_H$
	10V	Approx. E4C8$_H$
User range setting 3	0V	Approx. 7FFF$_H$
	1V	Approx. 9427$_H$
	5V	Approx. E4C8$_H$

[Example]

When using User range setting 3 in channel 1 and setting 1V to the offset value and 5V to the gain value, the following values are stored in the User range setting offset/gain value areas.

- CH1 user range settings offset value (Un\G214): Approx. 9427$_H$
- CH1 user range settings gain value (Un\G215): Approx. E4C8$_H$

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 Q66DA-G is used, and how to troubleshoot such errors.

8.1 Error Code List

If an error occurs in Q66DA-G while reading/writing data from/to the programmable controller CPU, the applicable error code is written to error code (Un\G19).

Table8.1 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. (Refer to Section 4.5.)
111	Hardware error of the module.	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.)
120*3	An invalid value is set in the offset/gain setting. The number of the error channel cannot be identified.	Perform the offset/gain setting again for all of the channels that use the user range settings. If the error occurs again, the module may be malfunctioning. Please consult your local Mitsubishi represeutative, explaining a detailed descriptopm of the problem.
12□*3	An invalid value is set in the offset/gain setting. □ indicates the channel number set incorrectly.	Perform the offset/gain setting again for the error channel. If the error occurs again, the module may be malfunctioning. Please consult your local Mitsubishi represeutative, explaining a detailed descriptopm of the problem.
161*4	The G(P).OGSTOR instruction was executed in the offset/gain setting mode.	Do not execute the G(P).OGSTOR instruction in the offset/gain setting mode.
162*1	• The G(P).OGSTOR instruction was executed consecutively. • At the time of offset/gain setting, a set value was written to the flash memory 26 or more times consecutively.	• Execute the G(P).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(P).OGSTOR instruction was executed for the model that differs from the model for which the G(P).OGLOAD instruction had been executed.	Execute the G(P).OGLOAD and G(P).OGSTOR instructions for the same model.
164*1	The value set to the G(P).OGLOAD instruction, G(P).OGSTOR instruction or save data classification setting (Un\G200) is outside the range.	Set the value within the range.

Table8.2 Error code list (2/2)

Error code (decimal)	Error description	Processing
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 is 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 offset/ gain setting mode(Un\G22, Un\G23).
60□*2	The specified digital value is outside the range. □ indicates the channel number where the error occurred.	Set a value that is within the range.
61□*1	The warning output upper/lower limit value setting is outside the range -32000 to 32000. □ indicates the channel number incorrectly set.	Correct the contents of the warning output upper limit value/lower limit value (Un\G86 to 97) to within the range -32000 to 32000.
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 offset/gain adjustment value specification (Un\G24) so that it is within the range from –3000 to 3000.
80□*1	The increase/decrease digital limit value setting is outside the range 0 to 64000. □ indicates the channel number incorrectly set.	Correct the contents of the increase/decrease digital limit values (Un\G70 to Un\G81) to within the range 0 to 64000.
90□*1	The scaling upper/lower limit value is set outside the range of –32000 to 32000. □ indicates the channel number set incorrectly.	Correct the scaling upper/lower limit value (Un\G54 to Un\G65) within the range of –32000 to 32000.
91□*1	The scaling lower limit value is equal to or greater than the scaling upper limit value. □ indicates the channel number set incorrectly.	Set CH□ scaling upper/lower limit value (Un\G54 to Un\G65) so that the scaling upper limit value is greater than the scaling lower limit value.

Point

(1) When two or more errors occur, the latest error code is stored.

(2) The error described with ∗1 can be cleared by turning ON the error clear request (YF).

(3) If the error marked ∗2 occurs continuously, it is added to the error history of GX Developer in each conversion cycle.

(4) If an error marked ∗3 occurs, D/A conversions on all channels will stop. Therefore, after correcting the offset/gain setting, make the initial setting again.

(5) Error code 161 marked ∗4 is not stored in the Error code (Un\G19). It is written to the Completion status area, (S) + 1, of the G(P).OGSTOR instruction.

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 (Refer to 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 programmable controller CPU and verify that it is lit. If the RUN LED does not light even after doing this, the module may be malfunctioning. Please consult your local Mitsubishi representative, explaining a detailed description.
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" (Refer to Section 4.5).

8.2.3 When the "ALM" LED is turned on

Check item	Corrective action
Has the warning output occurred?	Check the warning output flag (Un\G48).

8.2.4 When an analog output value is not output

Check item	Action to be taken
Is 24VDC being supplied from the external power supply? (If not, "External power supply (X7)" is OFF.)	Verify that 24VDC voltage is being supplied to the external power supply terminals (between terminals No. A19 and A20 or B19 and B20).
Is there any fault with the analog signal lines such as broken or disconnected line?	Check for any abnormality on the signal lines by a visual check and 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 (Refer to 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 setting range (Un\G20, Un\G21) in GX Developer monitor. If the output range setting is incorrect, redo GX Developer intelligent function module switch settings (Refer to Section 4.5).
Is the resolution mode setting correct?	Check the ON/OFF status of the high resolution mode status flag (X8) in GX Developer system monitor. If the resolution mode setting is incorrect, redo the GX Developer intelligent function module switch setting. (Refer to 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 (Un\G0) in GX Developer monitor and set it to Enable using the sequence program or utility package (Refer to 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 C output enable/disable flags (Y1 to Y6) in GX Developer monitor. If the output enable/disable flags are OFF, review the initial setting for the sequence program or utility package (Refer to Section 3.3).
Is the digital value being written to the channel to be output?	Verify CH□ digital value (Un\G1 to Un\G6) in GX Developer monitor (Refer to 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 Refer to if the analog output is normal. If normal analog output is obtained, review the initial setting for the sequence program or utility package (Refer to 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. Please consult your local Mitsubishi representative, explaining a detailed description of the problem.

8.2.5 When the analog value is not within the reference accuracy of the theoretical value

Check item	Action to be taken
When using voltage output, is a small load resistance of the connected external device and a long wiring distance observed?	If observed, because a voltage drop due to the wiring impedance and load current is large and the voltage applied to the external device is low, the factory default range setting may not satisfy the reference accuracy. In this case, use User range setting and adjust the offset and gain values after wiring.

8.2.6 When analog output value is not “HOLD”

Check item	Action to be taken
Is the HOLD/CLEAR setting correct?	Check the Switch 3 setting of the intelligent function module switch setting on GX Developer.
Is the Q66DA-G used on a MELSECNET/H remote I/O station?	Take action, referring to POINT (2) in Section 3.2.1.

8.2.7 Checking the Q66DA-G status using GX Developer system monitor

When the Q66DA-G 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 Q66DA-G" →

Module's Detailed Information

(2) Module Detailed Information

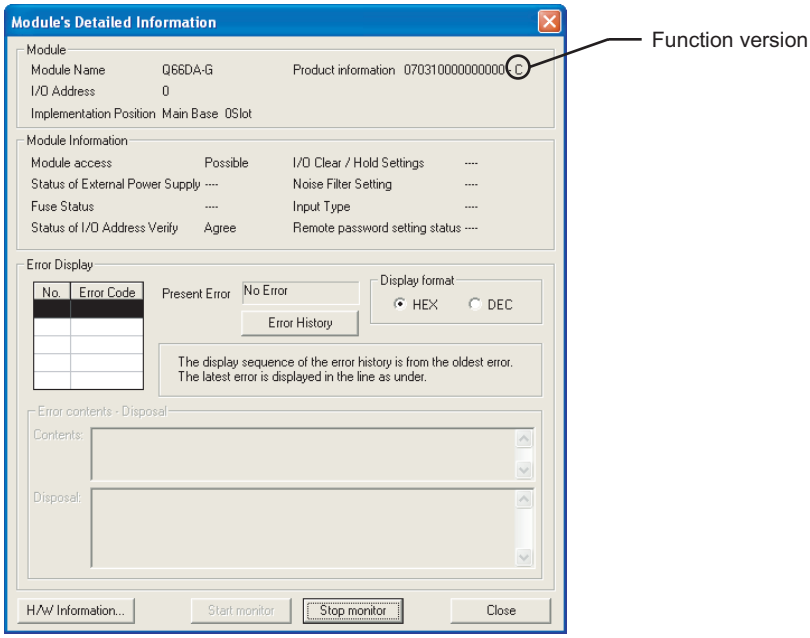
(a) Checking the function version

The function version of the Q66DA-G 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 Q66DA-G is displayed in the Present Error field.

(When the button Error History 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

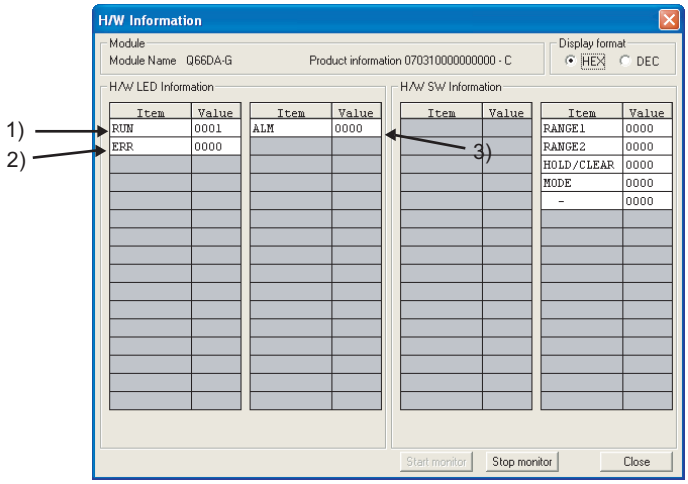
The LED status is displayed.

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 8)

APPENDIX

Appendix 1 Dedicated Instruction List and Available Devices

(1) Dedicated instruction list

The following table lists the dedicated instructions that can be used with the Q66DA-G.

Instruction	Description	Reference section
G(P).OFFGAN	Switches to the offset/gain setting mode. Switches to the normal mode.	Appendix 1.1
G(P).OGLOAD	Reads the offset/gain values of the user range setting to the CPU.	Appendix 1.2
G(P).OGSTOR	Restores the offset/gain values of the user range setting stored in the CPU to the Q66DA-G.	Appendix 1.3

Point

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

(2) Available devices

The following devices are available for the dedicated instructions:

Internal devices		File register	Constant*2
Bit *1	Word		
X, Y, M, L, F, V, B	T, ST, C, D, W	R, ZR	K, H

*1Word device bit designation can be used as bit data.

Word device bit designation is done by designating Word device . Bit No. .
(Designation of bit numbers is done in hexadecimal.)

For example, bit 10 of D0 is designated as DO.A.

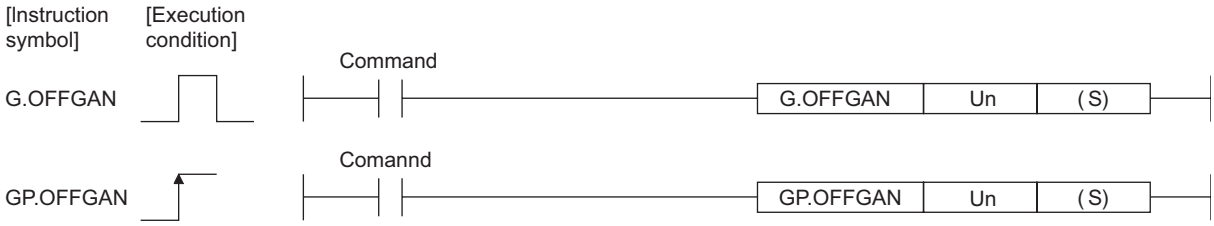
However, there can be no bit designation for timers (T), retentive timers (ST) and counters (C).

*2Available devices are given in each of the Constant field.

Appendix 1.1 G(P).OFFGAN

Switches the mode of the Q66DA-G. (Normal mode to offset/gain setting mode, offset/gain setting mode to normal mode)

Set data	Usable devices									
	Internal device (System, user)		File register	Link direct device J□\□		Intelligent function module device 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 Q66DA-G.

- 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

(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.

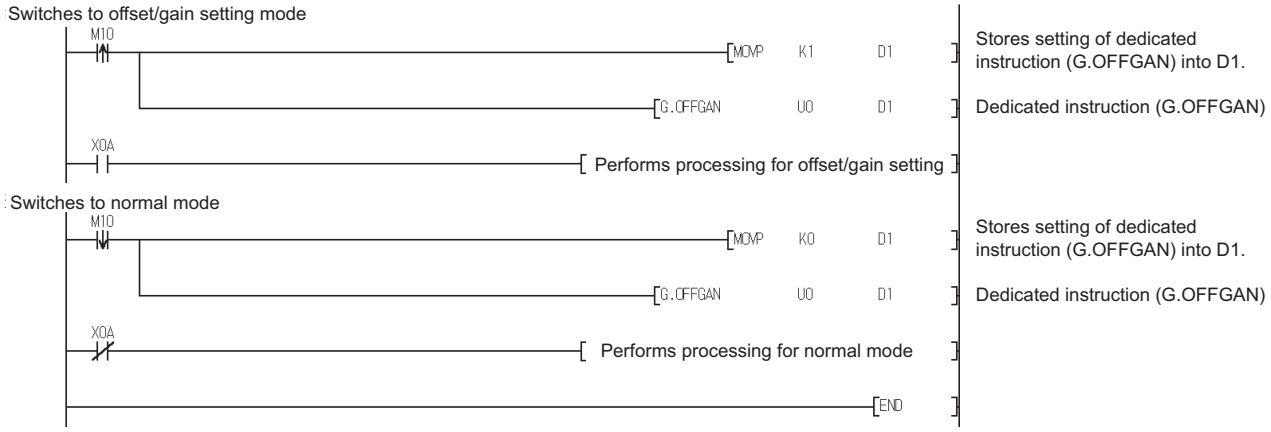
(2) D/A conversion is discontinued if the mode is switched (from the normal mode to the offset/gain setting mode or from the offset/gain setting mode to the normal mode).
To resume D/A conversion, switch to the normal mode and then turn ON Operating condition setting request (Y9).

(2) Operation error

No errors.

(3) Program example

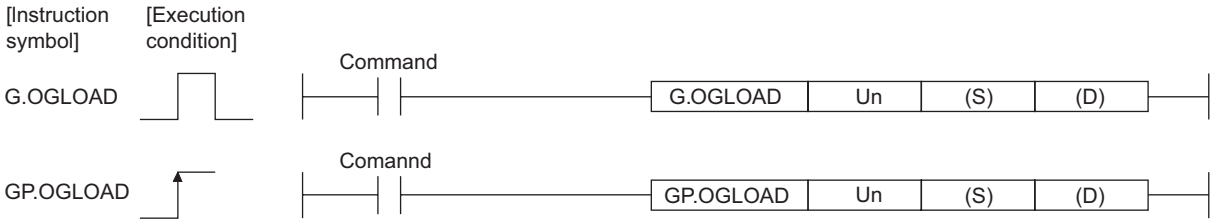
The following program is designed to switch the Q66DA-G mounted in the position of I/O number X/Y0 to X/YF to the offset/gain setting mode when M10 is turned ON, and to return it to the normal mode when M10 is turned OFF.



Appendix 1.2 G(P).OGLOAD

Reads the offset/gain values of the user range setting of the Q66DA-G to the CPU.

Set data	Usable devices									
	Internal device (System, user)		File register	Link direct device J□\□		Intelligent function module device 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 (1/2) *1

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. 00H: Use range setting 1 specified 01H: Use range setting 2 specified 10H: Use range setting 3 specified b15 ~ b12 b11 b10 b9 b8 b7 b6 b5 b4 b3 b2 b1 b0 0:Fixed CH6 CH5 CH4 CH3 CH2 CH1	0000H to 0AAAH	User
(S) + 3	System area	-	-	-
(S) + 4	CH1 Industrial shipment settings offset value	-	-	System
(S) + 5	CH1 Industrial shipment settings gain value	-	-	System
(S) + 6	CH2 Industrial shipment settings offset value	-	-	System
(S) + 7	CH2 Industrial shipment settings gain value	-	-	System

Control data (2/2) *1

Device	Item	Set data	Setting range	Set by
(S) + 7	CH2 Industrial shipment settings gain value	-	-	System
(S) + 8	CH3 Industrial shipment settings offset value	-	-	System
(S) + 9	CH3 Industrial shipment settings gain value	-	-	System
(S) + 10	CH4 Industrial shipment settings offset value	-	-	System
(S) + 11	CH4 Industrial shipment settings gain value	-	-	System
(S) + 12	CH5 Industrial shipment settings offset value	-	-	System
(S) + 13	CH5 Industrial shipment settings gain value	-	-	System
(S) + 14	CH6 Industrial shipment settings offset value	-	-	System
(S) + 15	CH6 Industrial shipment settings gain value	-	-	System
(S) + 16	CH1 User range settings offset value	-	-	System
(S) + 17	CH1 User range settings gain value	-	-	System
(S) + 18	CH2 User range settings offset value	-	-	System
(S) + 19	CH2 User range settings gain value	-	-	System
(S) + 20	CH3 User range settings offset value	-	-	System
(S) + 21	CH3 User range settings gain value	-	-	System
(S) + 22	CH4 User range settings offset value	-	-	System
(S) + 23	CH4 User range settings gain value	-	-	System
(S) + 24	CH5 User range settings offset value	-	-	System
(S) + 25	CH5 User range settings gain value	-	-	System
(S) + 26	CH6 User range settings offset value	-	-	System
(S) + 27	CH6 User range settings gain value	-	-	System
(S) + 28 to (S) + 35	System area	-	-	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.

*2 The set value of the Pass data classification setting, (S) + 2, varies depending on the module. Attention must be paid.

*3 An area of 36 words is required for (S).

(1) Functions

(a) Reads the offset/gain values of the user range setting of the Q66DA-G to the CPU.

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

1) Completion device

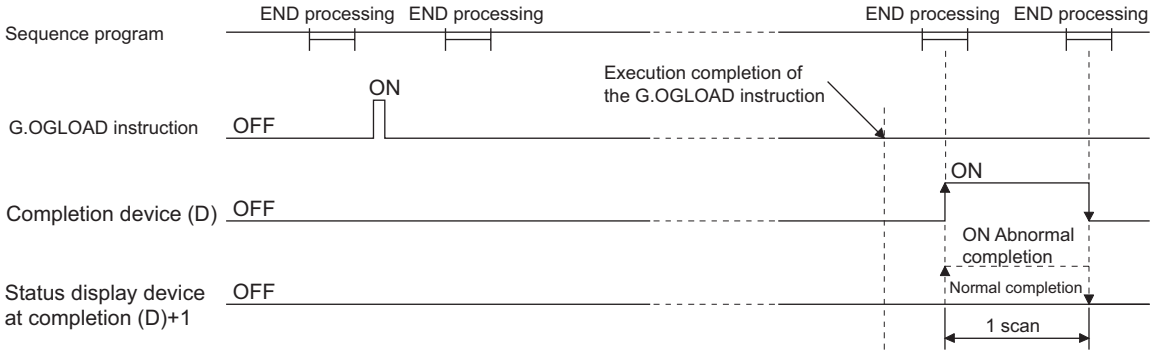
Turns ON in the END processing of the scan where the G(P).OGLOAD instruction is completed, and turns OFF in the next END processing.

2) Status display device at completion

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

Normal completion : Stays OFF and does not change.

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



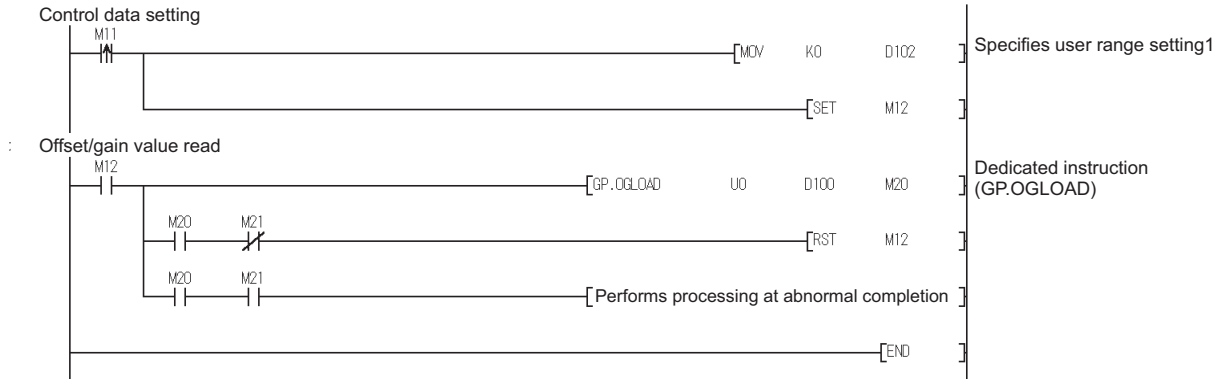
(2) Operation error

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

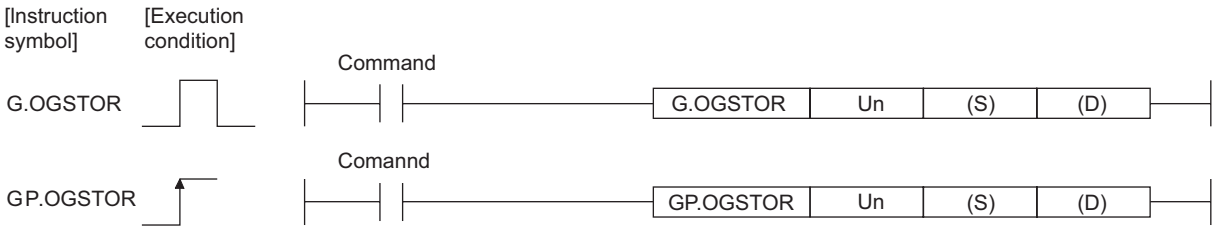
The following program is designed to read the offset/gain values of the Q66DA-G mounted in the position of I/O number X/Y0 to X/YF when M11 is turned ON.



Appendix 1.3 G(P).OGSTOR

Restores the offset/gain values of the user range setting stored in the CPU to the Q66DA-G.

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

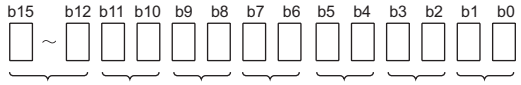


Set data

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

Control data *1

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(P).OGLOAD instruction is stored. 00H: Use range setting 1 specified 01H: Use range setting 2 specified 10H: Use range setting 3 specified  	-	User
(S) + 3	System area	-	-	-
(S) + 4	CH1 Industrial shipment settings offset value	-	-	System
(S) + 5	CH1 Industrial shipment settings gain value	-	-	System
(S) + 6	CH2 Industrial shipment settings offset value	-	-	System
(S) + 7	CH2 Industrial shipment settings gain value	-	-	System
(S) + 8	CH3 Industrial shipment settings offset value	-	-	System
(S) + 9	CH3 Industrial shipment settings gain value	-	-	System
(S) + 10	CH4 Industrial shipment settings offset value	-	-	System
(S) + 11	CH4 Industrial shipment settings gain value	-	-	System
(S) + 12	CH5 Industrial shipment settings offset value	-	-	System
(S) + 13	CH5 Industrial shipment settings gain value	-	-	System
(S) + 14	CH6 Industrial shipment settings offset value	-	-	System
(S) + 15	CH6 Industrial shipment settings gain value	-	-	System
(S) + 16	CH1 User range settings offset value	-	-	System
(S) + 17	CH1 User range settings gain value	-	-	System
(S) + 18	CH2 User range settings offset value	-	-	System
(S) + 19	CH2 User range settings gain value	-	-	System
(S) + 20	CH3 User range settings offset value	-	-	System
(S) + 21	CH3 User range settings gain value	-	-	System
(S) + 22	CH4 User range settings offset value	-	-	System
(S) + 23	CH4 User range settings gain value	-	-	System
(S) + 24	CH5 User range settings offset value	-	-	System
(S) + 25	CH5 User range settings gain value	-	-	System
(S) + 26	CH6 User range settings offset value	-	-	System
(S) + 27	CH6 User range settings gain value	-	-	System
(S) + 28 to (S) + 35	System area	-	-	System

*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.

*2 The set value of the Pass data classification setting, (S) + 2, varies depending on the module.
Attention must be paid.

*3 An area of 36 words is required for (S).

(1) Functions

(a) Restores the offset/gain values of the user range setting stored in the CPU to the Q66DA-G.

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

1) Completion device

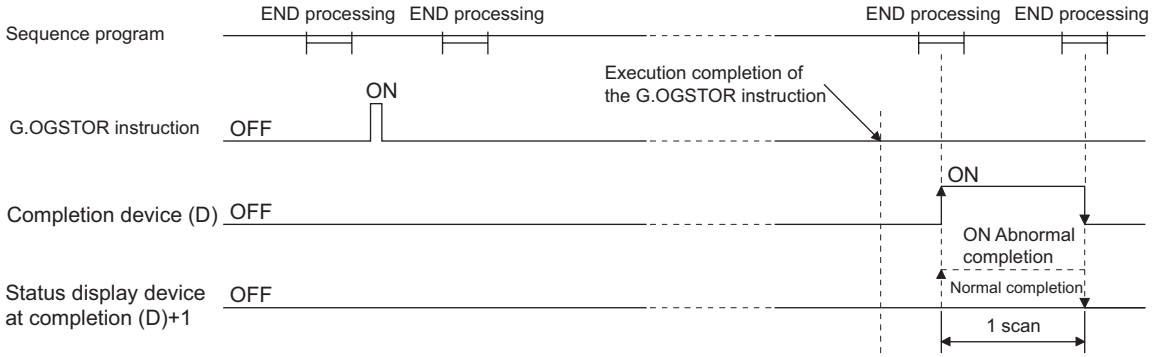
Turns ON in the END processing of the scan where the G(P).OGSTOR instruction is completed, and turns OFF in the next END processing.

2) Status display device at completion

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

Normal completion : Stays OFF and does not change.

Abnormal completion : Turns ON in the END processing of the scan where the G(P).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.

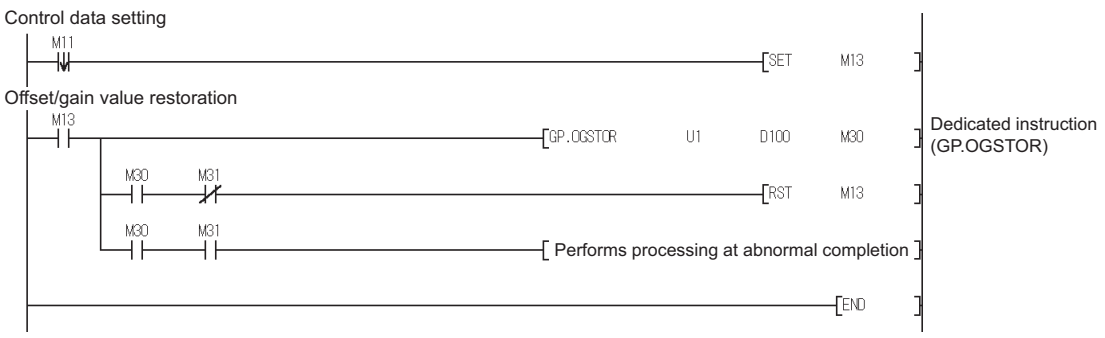
(2) Operation error

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

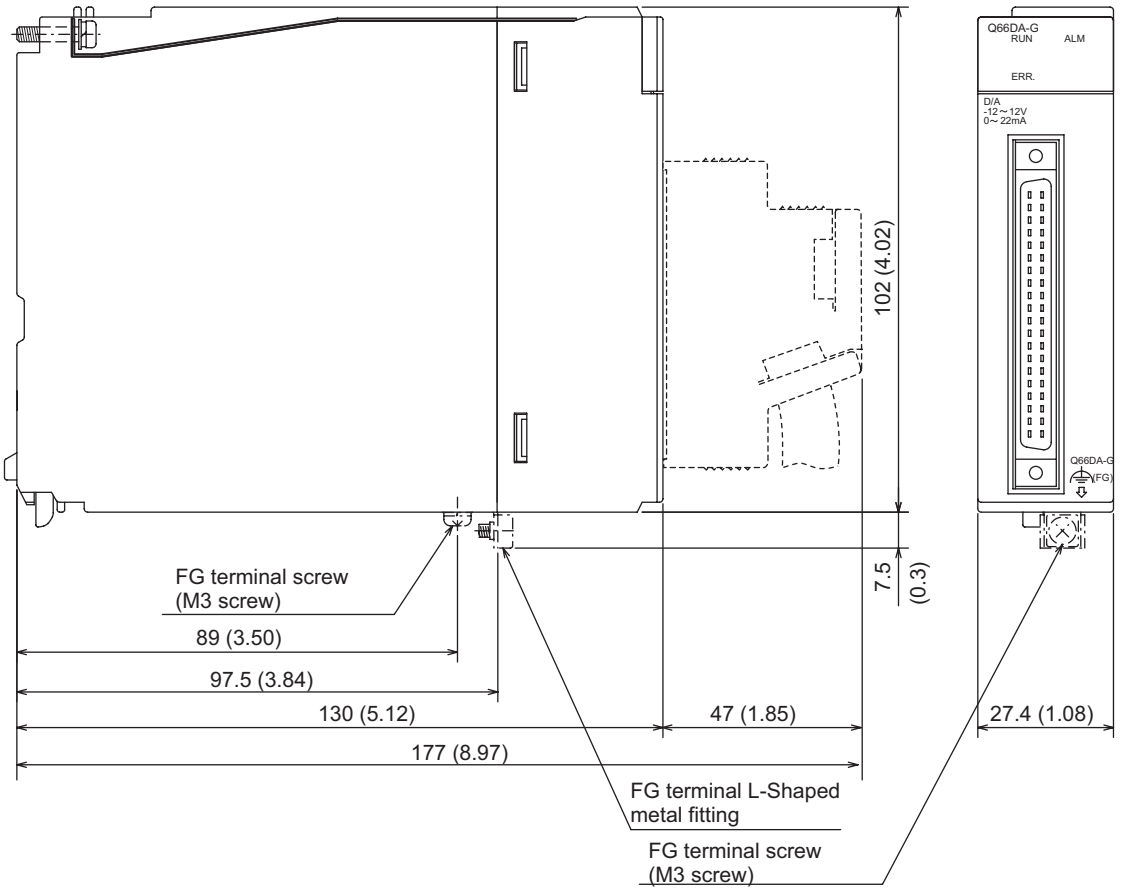
Error code	Case resulting in operation error
161	The G(P).OGSTOR instruction was executed in the offset/gain setting mode.
162	The G(P).OGSTOR instruction was executed consecutively.
163	The G(P).OGSTOR instruction was executed for the model that differs from the model for which the G(P).OGLOAD instruction 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 Q66DA-G mounted in the position of I/O number X/Y0 to X/YF when M11 is turned ON.



Appendix 2 External Dimension Diagram



(Unit: mm (inch))

INDEX

[W]

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 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 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 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 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 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.

SH (NA)-080648ENG-D

Channel Isolated Digital-Analog Converter Module

User's Manual

MODEL	Q-D/A-G-U-SY-E
MODEL CODE	13JR97
SH(NA)-080648ENG-D(0805)MEE	

MITSUBISHI ELECTRIC CORPORATION

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