RTD Input Module
Channel Isolated RTD Input Module

User's Manual

MITSUBISHI

Mitsubishi
Programmable Controller

MELSEC-Q

Q64RD
Q64RD-G
GX Configurator-TI
(SW1D5C-QTIU-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 minor or moderate injuries and/or property 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 CPU.
  Writing data into the "system area" or outputting a signal for "prohibited to use" may cause a programmable controller system malfunction.

⚠ CAUTION

- Do not bunch the control wires or communication cables with the main circuit or power wires, or install them close to each other.
  They should be installed 100mm(3.94inch) or more from each other.
  Not doing so could result in noise that may cause malfunction.

[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. Then, securely mount the module with the fixing hole as a supporting point.
  Improper installation may result in malfunction, breakdown or the module coming loose and dropping.
  Securely fix the module with screws if it is subject to vibration during use.
- Tighten the screws within the range of specified torque.
  If the screws are loose, it may cause the module to fallout, short circuits, or malfunction.
  If the screws are tightened too much, it may cause damage to the screw and/or the module, resulting in fallout, short circuits or malfunction.
- 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.
- When turning on the power and operating the module after wiring is completed, always attach the terminal cover that comes with the product.
  There is a risk of electric shock if the terminal cover is not attached.
- Tighten the terminal screws within the range of specified torque.
  If the terminal screws are loose, it may result in short circuits or malfunction.
  If the terminal screws are tightened too much, it may cause damage to the screw and/or the module, resulting in short circuits or malfunction.
- Be careful not to let foreign matter such as sawdust or wire chips get inside the module.
  They may cause fires, failure or malfunction.
- Use applicable solderless terminals and tighten them with the specified torque.
  If any solderless spade terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
- 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, or the terminal block to/from the module more than 50 times after the first use of the product. (IEC 61131-2 compliant)
  Failure to do so may cause malfunction.
- 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.

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REVISIONS

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

Print Date	* Manual Number	Revision
Nov., 2000	SH (NA)-080142-A	First printing
Jun., 2001	SH (NA)-080142-B	Addition Section 2.1, 2.2 Correction Conformation to the EMC Directive and Low Voltage Instruction, About the Generic Terms and Abbreviations, Product Structure, Section 5.2, 5.2.1, 5.2.2, 5.3.3
Feb., 2002	SH (NA)-080142-C	Addition Section 1.2, Section 3.4.18, 3.4.19, Chapter 7, App 2,3 Partial addition SAFETY PRECAUTIONS, About the Generic Terms and Abbreviations, Section 2.1, Section 3.1, 3.2, 3.4.1, Section 4.3, 4.6, Section 5.2.1, 5.2.2, Section 8.1, 8.2.1 Correction Section 3.3.2, 3.4.10, 3.4.17, Section 4.2, 4.4.1, Section 5.3.2, 5.5, 5.6.1 Section 6.1.1, 6.2.2, Section 8.2.4,
Feb., 2003	SH (NA)-080142-D	Addition Section 5.6.3, 5.6.4 Correction SAFETY PRECAUTIONS, Section 1.2, Section 2.1, Section 3.1.1, 3.2, 3.3.1, 3.3.2, 3.4.1, 3.4.3, 3.4.4, 3.4.6, 3.4.7, 3.4.10 to 3.4.19, Section 4.5, 4.6, Section 5.1, 5.2.1, 5.2.2, 5.3.2, 5.4, 5.5, 5.6.1, 5.6.2, Section 6.1, 6.1.1, 6.1.2, 6.2, 6.2.1, 6.2.2, Section 7.3.1, 7.3.3 to 7.3.6, 7.4, Section 8.1, 8.2, 8.2.5, Appendix 2.1, Appendix 3.1 to 3.3
Sep., 2003	SH(NA)-080142-E	Description for new model, Q64RD-G is added. Addition Section 3.1.2, 3.4.2, 3.4.5, 3.4.7, 3.4.12, 3.4.13, 3.4.23, 7.4.2, 8.2.5, 8.2.6, Appendix 1.3 Correction About the Generic Terms and Abbreviations, Product Lineup, Chapter 1, Section 1.1, 2.1, 2.2, 3.1.1, 3.1.3, 3.2, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.4, 3.4.15 to 3.4.17, 3.4.21, 3.4.25, 4.3, 4.4.2, 4.5, 4.6, 5.1, 5.2.1, 5.6.1, 5.6.2, 5.6.4, 6.1, Chapter 7, Section 7.3.4, 7.3.6, 7.4.1, 8.1, 8.2.10, Appendix 1.1, 1.2, 3.2, 3.3, 4
May, 2004	SH(NA)-080142-F	Correction Section 2.2, 3.4.16, 7.1, 7.3.1 to 7.3.6
Oct., 2004	SH (NA)-080142-G	Correction SAFETY PRECAUTIONS, Section 2.1, Section 3.1.1, 3.3, 3.4.1, 3.4.1, Section 4.1, Section 6.2, 6.2.1

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Print Date	* Manual Number	Revision
Sep., 2005	SH (NA)-080142-H	Addition Section 3.4.22, 3.4.23, Appendix 2.2, Appendix 2.2.1, Appendix 2.2.2 Correction Conformation to the EMC Directive and Low Voltage Instruction, Section 1.2, Section 2.1, 2.2, Section 3.1.1, 3.1.2, 3.2, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.5, 3.4.6, 3.4.7, 3.4.10, 3.4.14, 3.4.20, 3.4.21, Section 5.1, 5.2.2, 5.6.1, 6.1.1, 6.2.1, Section 7.3.1, 7.3.3, 7.3.4, 8.1, 8.2.10, Appendix 2.1
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Oct., 2006	SH(NA)-080142-J	Correction Section 4.5
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May, 2008	SH(NA)-080142-M	Correction SAFETY PRECAUTIONS, Compliance with the EMC and Low Voltage Directives, About the Generic Terms and Abbreviations, Section 2.1, Section 2.3, Section 3.4.19, Section 4.1, Section 5.2.1, Section 5.2.2, Section 5.3.1 to 5.3.3, Section 7.1

Japanese Manual Version SH-080133-M

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

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
Q64RD	Q64RD platinum RTD input module
Q64RD-G	Q64RD-G channel isolated RTD input module
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-TI	Generic term for temperature input module setting and monitor tool GX Configurator-TI (SW1D5C-QTIU-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.
RTD	Abbreviation for Resistance Temperature Detector. Platinum or nickel temperature-measuring resistor.
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 Lineup

The lineup for this product is given in the table below.

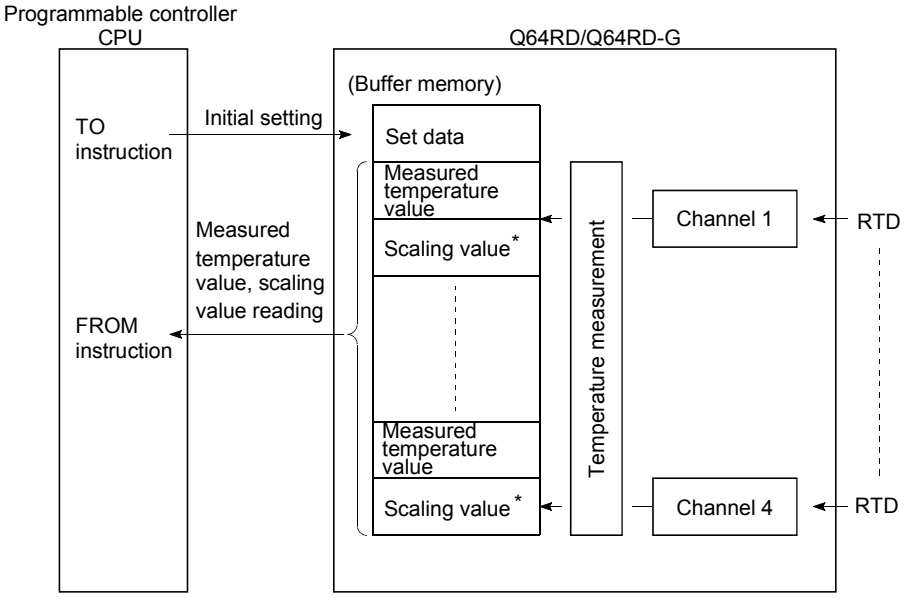
Model code	Product		Quantity
Q64RD	Q64RD platinum RTD input module		1
Q64RD-G	Q64RD-G channel isolated RTD input module		1
SW1D5C-QTIU-E	GX Configurator-TI Version 1 (Single license product)	(CD-ROM)	1
SW1D5C-QTIU-EA	GX Configurator-TI Version 1 (Volume license product)	(CD-ROM)	1

1 OVERVIEW

This user's manual provides the specifications, handling instructions, programming procedures and other information of the Q64RD platinum RTD (Resistance Temperature Detector) input module and the Q64RD-G channel isolated RTD input module (hereinafter referred to as the Q64RD and Q64RD-G), which are designed to use together with the MELSEC-Q series CPU module (hereinafter referred to as the CPU).

The Q64RD is a module for connection of 3-wire or 4-wire type platinum RTDs (2-wire application is available if terminals are short-circuited.) and converts temperature data [℃] input from Pt100 or JPt100 platinum RTD (hereinafter referred to as PT100 or JPt100) to:
• 16-bit signed binary data (stored as a value rounded off to 1 decimal place × 10)
• 32-bit signed binary data (stored as a value rounded off to 3 decimal places × 1000)
and scaling values (ratios (%)).

The Q64RD-G is a module for connection of 3-wire or 4-wire type RTDs (2-wire application is available if terminals are short-circuited.) and converts temperature data [℃] input from Pt100, JPt100 or nickel RTD Ni100Ω (hereinafter referred to as Ni100Ω) to:
• 16-bit signed binary data (stored as a value rounded off to 1 decimal place × 10)
• 32-bit signed binary data (stored as a value rounded off to 3 decimal places × 1000)
and scaling values (ratios (%)).



*: Refer to Section 3.4.15 for details of the scaling values.

1.1 Features

(1) Channel isolation (Q64RD-G)

The Q64RD-G is a channel-isolated module.

(2) Four-channel temperature measurement by one module

The Q64RD and Q64RD-G are capable of measuring temperatures of 4 channels per module. Detected temperature values can be converted into scaling values (ratios (%)).

(3) Conversion enable/disable setting

You can make a conversion enable/disable setting for each channel. Disabling unused channels for conversion reduces sampling time.
It also prevents unnecessary disconnection detection on unused channels.

(4) Standard-compliant RTD is usable

(a) Platinum RTD compliant with JIS (Japanese Industrial Standards) is usable (Q64RD)
Two types of JIS-compliant platinum RTDs (Pt100 and JPt100) can be used.
The types can be selected for each channel on GX Developer.

(b) Platinum RTD compliant with JIS or Nickel RTD compliant with DIN is usable (Q64RD-G)
In addition to the above 2 types of JIS-compliant platinum RTDs, DIN-compliant nickel RTDs can be used.
The types of RTD can be selected for each channel on GX Developer.

(5) Connection of 3-wire or 4-wire RTD is available for each channel

For each channel, 3-wire or 4-wire RTD can be connected. By making the terminals short-circuited, 2-wire RTD can be used.

(6) Disconnection detection

The disconnection of a platinum RTD or cable can be detected on each channel.

(7) Optimal processing selection is available

Selectable options of Sampling processing, Time averaging processing and Count averaging processing, Moving average and Primary delay filter
A desired conversion method can be selected for each channel.

(8) Optimal range selection is available

(a) Ranges of -20 to 120℃, -180 to 600℃ and -200 to 850℃ can be selected (Q64RD)
When Pt100 or JPt100 is used, a desired range can be selected for each channel.

(b) Ranges of 0 to 200℃, -20 to 120℃, -180 to 600℃, -200 to 850℃, -60 to 180℃ can be selected (Q64RD-G)
When a platinum RTD, Pt100 or JPt100 is used, a range of 0 to 200℃, -20 to 120℃, -180 to 600℃ or -200 to 850℃ can be selected for each channel.
When a nickel RTD, Ni100Ω is used, a range of -60 to 180℃ can be selected for each channel.

(9) Error compensation by offset/gain value setting

Error compensation can be made by setting offset and gain values on each channel.

As the offset and gain values, you can make selection from user settings and factory settings.

(10) Warning output

If the temperature detected is outside the preset measurement range, an warning can be output on each channel.

(11) Online Module Change

The module can be changed without the system being stopped.

Also, by using the dedicated instructions (G(P).OGLOAD, G(P). OGSTOR) or writing to the buffer and turning on the corresponding Y signal, the offset/gain values can be re-set to the Q64RD/Q64RD-G replaced online and they can be transferred to the other Q64RD/Q64RD-G mounted in another slot. (Between the same models only)

(12) Easy setting by utility package

The utility package, GX Configurator-TI is available separately.

This utility package is not necessarily to be used. However, using this makes the initial setting and auto refresh setting easy on screen, reduces sequence programs and enables easy setting and operation check.

1.2 Added/Changed Functions

Functions added or changed for the Q64RD/Q64RD-G are shown below.

(1) Q64RD

Functions added or changed for the Q64RD are shown below.

Item	Applicable module	Function overview	Reference section
Online module change	Function version C or later	You can change the module without stopping the system. The CPU of function version C or later is required.	Chapter 7
Mode switching that does not require CPU to be reset	Function version C or later	Using the mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159) and operating condition setting request (Y9), the module is switched between the normal mode and offset/gain setting mode without the CPU being reset.	Section 3.4.24
		Using the dedicated instruction (G(P).OFFGAN), the module is switched between the normal mode and offset/gain setting mode without the CPU being reset.	Appendix 3.2
		Using GX Configurator-TI, the module is switched between the normal mode and offset/gain setting mode without the CPU being reset.	Section 5.6.2
Conversion setting for disconnection detection function	First 5 digits of product information are 07072 or later	For values to be stored in the CH□ measured temperature value (buffer memory addresses 11 to 14, 54 to 61: Un\G11 to 14, Un\G54 to 61) in the case of disconnection detection, any of "Value immediately before disconnection", "Up scale (maximum value of measured temperature range + 5% of measured temperature range)", "Down scale (minimum value of measured temperature range – 5% of measured temperature range)" or "Given value" can be selected.	Section 3.2.2
Moving average	First 5 digits of product information are 07072 or later	Digital output values sampled at specified number of times are averaged.	Section 3.2.1
Primary delay filter	First 5 digits of product information are 07072 or later	By a preset time constant, digital output values are smoothed.	Section 3.2.1

(2) Q64RD-G

The following is a function added for the Q64RD-G.

Item	Applicable version	Function overview	Reference section
Conversion setting for disconnection detection function	First 5 digits of product information are 07072 or later	For values to be stored in the CH□ measured temperature value (buffer memory addresses 11 to 14, 54 to 61: Un\G11 to 14, Un\G54 to 61) in the case of disconnection detection, any of "Value immediately before disconnection", "Up scale (maximum value of measured temperature range + 5% of measured temperature range)", "Down scale (minimum value of measured temperature range – 5% of measured temperature range)" or "Given value" can be selected.	Section 3.2.2

POINT

(1) Refer to Appendix 2.1 for the function comparison between function versions.
(2) For differences between the Q64RD/Q64RD-G whose first 5 digits of product information are 07071 or earlier and those of 07072 or later, refer to Appendix 2.2.
(3) Refer to Section 2.2 for how to check the function version and product information.

2 SYSTEM CONFIGURATION

This chapter explains the system configuration of the Q64RD/Q64RD-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 Q64RD/Q64RD-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 ＊3	×	○
		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.
＊3 Use the Q64RD/Q64RD-G whose serial No. (first five digits) is 09012 or later.

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

The table below shows the network modules and base units applicable to the Q64RD/Q64RD-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 Q64RD/Q64RD-G in a multiple CPU system, refer to the following manual first.

• QCPU User's Manual (Multiple CPU System)

(a) Compatible Q64RD/Q64RD-G

Use a Q64RD/Q64RD-G of function version B or higher if using the module in a multiple CPU system.

(b) Intelligent function module parameters

Write intelligent function module parameters to only the control CPU of the Q64RD/Q64RD-G.

(3) In the case of online module change

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

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(4) Software packages for Q64RD

Relation between the system containing the Q64RD and software package is shown in the following table.

GX Developer is necessary when using the Q64RD.

		Software Version	
		GX Developer	GX Configurator-TI ＊1 ＊2
Q00J/Q00/Q01CPU	Single CPU system	Version 7 or later	Version 1.10L or later
	Multiple CPU system	Version 8 or later	
Q02/Q02H/Q06H/ Q12H/Q25HCPU	Single CPU system	Version 4 or later	Version 1.00A or later
	Multiple CPU system	Version 6 or later	
Q02PH/Q06PHCPU	Single CPU system	Version 8.68W or later	Version 1.13P 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	Version 1.14Q or later
Q02U/Q03UD/ Q04UDH/Q06UDHCPU	Single CPU system	Version 8.48A or later	Version 1.24AA 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	Version 1.00A or later

＊1 The product of Version 1.14Q or earlier is not compatible with "normal mode - offset/gain setting mode switching" and "OMC refresh data". Use the product of Version 1.15R or later.

＊2 The product of Version 1.20W or earlier is not compatible with "Moving average", "Primary delay filter" and "Conversion setting for disconnection detection function". Use the product of Version 1.21X or later.

(5) Software packages for Q64RD-G

Relation between the system containing the Q64RD-G and software package is shown in the following table.

GX Developer is necessary when using the Q64RD-G.

		Software Version	
		GX Developer	GX Configurator-TI ＊1
Q00J/Q00/Q01CPU	Single CPU system	Version 7 or later	Version 1.17T 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	Version 1.14Q or later
Q02U/Q03UD/ Q04UDH/Q06UDHCPU	Single CPU system	Version 8.48A or later	Version 1.24AA 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	Version 1.17T or later

＊1 The product of Version 1.20W or earlier is not compatible with "Conversion setting for disconnection detection function". Use the product of Version 1.21X or later.

POINT

(1) The Q64RD of function version A is not available.
The Q64RD-G of function version A and B is not available.
The products of function version C include the functions of version A and B.

(2) Depending on the version of GX Configurator-TI, applicable system, CPU module and functions of Q64RD/Q64RD-G varies.

2.2 About Use of the Q64RD/Q64RD-G with the Q12PRH/Q25PRHCPU

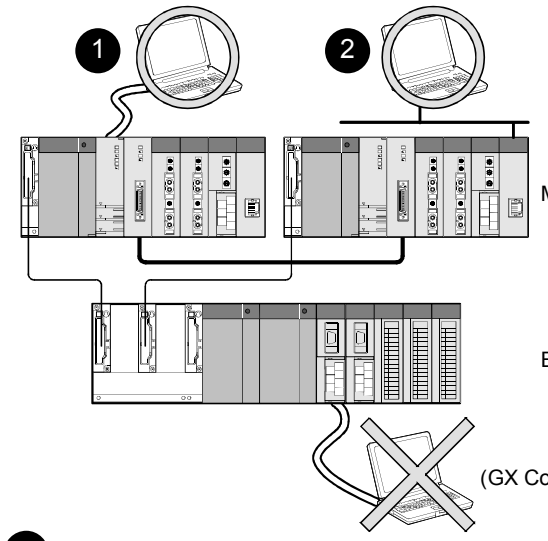
Here, use of the Q64RD/Q64RD-G with the Q12PRH/Q25PRHCPU is explained

(1) Dedicated instruction

The dedicated instruction cannot be used.

(2) GX Configurator-TI

When using GX Developer to access the Q12PRH/Q25PRHCPU through the intelligent function module on the extension base unit, GX Configurator-TI cannot be used.
Connect a personal computer to the Q12PRH/Q25PRHCPU with a communication path indicated below.



1 Direct connection to the CPU

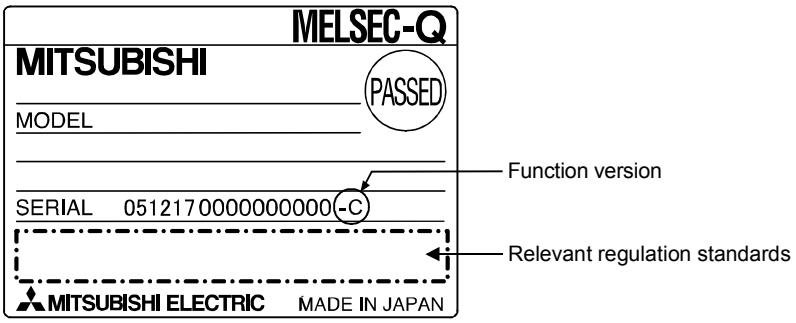
2 Connection through an intelligent function module on the main base unit
(Through Ethernet module, MELSECNET/H module, or CC-Link module)

2.3 How to Check the Function Version, Product Information and Software Version

This section describes how to check the function version and product information of the Q64RD/Q64RD-G and the GX Configuration-TI software version.

(1) Checking the function version and product information of the Q64RD/Q64RD-G

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



(b) To check the function version and product information using the GX Developer
See Section 8.2.10 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.

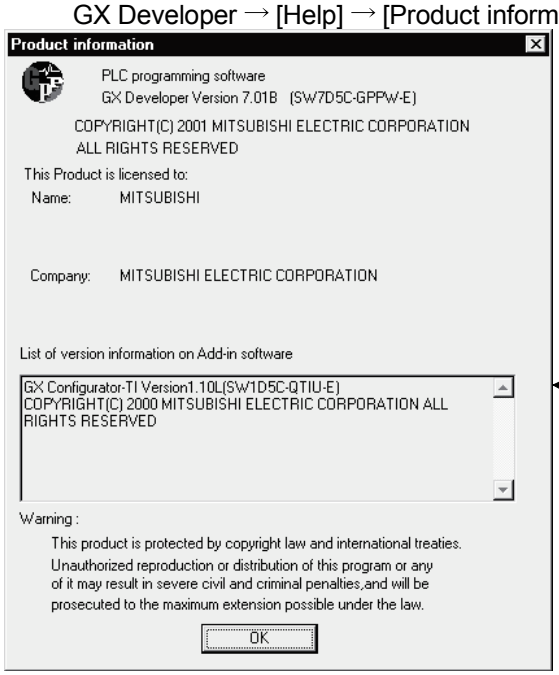
- The serial No. on the rating plate indicates the management information of the product.
- The serial No. displayed on the product information screen of GX Developer indicates the function information of the product.
  The function information of the product is updated when a new function is added.

(2) Checking the software version of GX Configurator- TI

The software version of GX Configurator- TI can be checked in GX Developer's "Product information" screen.

[Operating procedure]

GX Developer → [Help] → [Product information]



(In the case of GX Developer Version 7)

3 SPECIFICATIONS

3.1 Performance Specifications

The following are the performance specifications of the Q64RD/Q64RD-G.

3.1.1 Specifications of Q64RD

Item		Specifications
Number of channels		4 channels
Output	Temperature conversion value	16-bit, signed binary data (-2000 to 8500: Value to the first decimal place × 10) 32-bit, signed binary data (-200000 to 850000: Value to the third decimal place × 1000)
	Scaling value	16-bit, signed binary
Usable platinum RTD		Pt100(JIS C1604-1997,IEC 751 1983), JPt100(JIS C1604-1981)
Measured temperature range	Pt100	-200 to 850℃
	JPt100	-180 to 600℃
Range changing	Pt100	-20 to 120℃ / -200 to 850℃
	JPt100	-20 to 120℃ / -180 to 600℃
Accuracy ＊1	Ambient temperature 0 to 55℃	± 0.25% (Accuracy relative to maximum value)
	Ambient temperature 25±5℃	± 0.08% (Accuracy relative to maximum value)
Resolution		0.025℃
Conversion speed		40ms/channel ＊2
Number of analog input points		4 channels/module
Temperature detecting output current		1mA
E^2PROM write count		Max. 100,000 times
Isolation		Specific isolated area: Between platinum temperature-measuring resistor input and programmable controller power supply; Isolation method: Photocoupler isolation; Dielectric withstand voltage: 1780VrmsAC/ 3 cycles (Altitude 2000m); Isolation resistance: 10MΩ or more using 500VDC isolation resistance tester Specific isolated area: Between platinum temperature-measuring resistor input channels; Isolation method: No isolation; Dielectric withstand voltage: -; Isolation resistance: 10MΩ or more using 500VDC isolation resistance tester
Wire break detection		Yes (Each channel independent) ＊3
Number of occupied I/O points		16 points (I/O assignment: Intelligent 16 points)
Connection terminals		18-point terminal block
Applicable wire size		0.3 to 0.75mm^2
Applicable crimping terminals		1.25-3 R1.25-3 (Sleeved crimping terminals are unusable)
Cables between Q64RD and platinum RTD		Refer to Section 3.1.3.
Internal current consumption (5VDC)		0.60A
Weight		0.17kg
Outline dimensions		98(H) × 27.4(W) × 90(D)mm

＊1: The selection ranges and accuracies have the following relationships.

Selection Range / Ambient Temperature	Pt100 and JPt100 : -20 to 120℃	Pt100 : -200 to 850℃	JPt100 : -180 to 600℃
0 to 55℃	±0.3℃	±2.125℃	±1.5℃
25±5℃	±0.096℃	±0.68℃	±0.48℃

＊2: The conversion speed is a period from when a temperature is input and converted into a corresponding digital value until the value is stored into the buffer memory.
When two or more channels are used, the conversion speed is "40ms × number of conversion enabled channels".

＊3: For output in the case of disconnection detection, select any of "Value immediately before disconnection", "Up scale (maximum value of measured temperature range + 5% of measured temperature range)", "Down scale (minimum value of measured temperature range – 5% of measured temperature range)" or "Given value". (Refer to Section 3.2.2.)

3.1.2 Specifications of Q64RD-G

<table>
<tr><th colspan="3">Item</th><th>Specifications</th></tr>
<tr><td colspan="3">Number of channels</td><td>4 channels</td></tr>
<tr><td rowspan="2">Output</td><td colspan="2">Measured temperature value</td><td>16-bit, signed binary data
(-2000 to 8500: Value to the first decimal place × 10)
32-bit, signed binary data
(-200000 to 850000: Value to the third decimal place × 1000)</td></tr>
<tr><td colspan="2">Scaling value</td><td>16-bit, signed binary data</td></tr>
<tr><td colspan="3">Usable RTD</td><td>Pt100 (JIS C1604-1997,IEC 751 1983), JPt100(JIS C1604-1981),
Ni100Ω (DIN43760 1987)</td></tr>
<tr><td rowspan="3">Measured temperature range</td><td colspan="2">Pt100</td><td>-200 to 850℃</td></tr>
<tr><td colspan="2">JPt100</td><td>-180 to 600℃</td></tr>
<tr><td colspan="2">Ni100Ω</td><td>-60 to 180℃</td></tr>
<tr><td rowspan="3">Range changing</td><td colspan="2">Pt100</td><td>-20 to 120℃ /0 to -200℃ / -200 to 850℃</td></tr>
<tr><td colspan="2">JPt100</td><td>-20 to 120℃ /0 to -200℃ / -180 to 600℃</td></tr>
<tr><td colspan="2">Ni100Ω</td><td>-</td></tr>
<tr><td rowspan="5">Accuracy ＊1 (Accuracy relative to maximum value of selection range)</td><td colspan="2">Reference accuracy ＊2</td><td>Within ±0.04%</td></tr>
<tr><td rowspan="4">Temperature coefficient ＊3</td><td>Pt100/JPt100 (-20 to 120℃)</td><td>±70ppm/℃ (±0.0070%/℃)</td></tr>
<tr><td>Pt100/JPt100 (0 to 200℃)</td><td>±65ppm/℃ (±0.0065%/℃)</td></tr>
<tr><td>Pt100/JPt100 (-200 to 850℃)</td><td>±50ppm/℃ (±0.0050%/℃)</td></tr>
<tr><td>Pt100/JPt100 (-60 to 180℃)</td><td>±70ppm/℃ (±0.0070%/℃)</td></tr>
<tr><td colspan="3">Resolution</td><td>0.025℃</td></tr>
<tr><td colspan="3">Conversion speed</td><td>40ms/channel ＊4</td></tr>
<tr><td colspan="3">Number of analog input points</td><td>4 channels/module</td></tr>
<tr><td colspan="3">Temperature detecting output current</td><td>1mA</td></tr>
<tr><td colspan="3">E²PROM write count</td><td>Max. 100,000 times</td></tr>
<tr><td colspan="3">Isolation</td><td>
<table>
<tr><th>Specific isolated area</th><th>Isolation method</th><th>Dielectric withstand voltage</th><th>Isolation resistance</th></tr>
<tr><td>Between temperature-measuring resistor input and programmable controller power supply</td><td>Photocoupler isolation</td><td rowspan="2">1780VrmsAC/ 3 cycles (Altitude 2000m)</td><td rowspan="2">10MΩ or more using 500VDC isolation resistance tester</td></tr>
<tr><td>Between temperature-measuring resistor input channels</td><td>Transformer isolation</td></tr>
</table>
</td></tr>
<tr><td colspan="3">Wire break detection</td><td>Yes (Each channel independent) ＊5</td></tr>
<tr><td colspan="3">Number of occupied I/O points</td><td>16 points (I/O assignment: Intelligent 16 points)</td></tr>
<tr><td colspan="3">Connection terminals</td><td>18-point terminal block</td></tr>
<tr><td colspan="3">Applicable wire size</td><td>0.3 to 0.75mm²</td></tr>
<tr><td colspan="3">Applicable crimping terminals</td><td>1.25-3 R1.25-3 (Sleeved crimping terminals are not usable.)</td></tr>
<tr><td colspan="3">Cables between Q64RD-G and RTD</td><td>Refer to Section 3.1.3.</td></tr>
<tr><td colspan="3">Internal current consumption (5VDC)</td><td>0.62A</td></tr>
<tr><td colspan="3">Weight</td><td>0.20kg</td></tr>
<tr><td colspan="3">Outline dimensions</td><td>98(H) × 27.4(W) × 112(D)mm</td></tr>
</table>

∗1 The selection ranges and accuracies have the following relationships.

Selection Range / Ambient Temperature	Pt100 and JPt100: -20 to 120℃	Pt100: -200 to 850℃	JPt100: -180 to 600℃
0 to 55℃	±0.300℃	±1.615℃	±1.140℃
25±5℃	±0.090℃	±0.553℃	±0.390℃

Selection Range / Ambient Temperature	Pt100 and JPt100: 0 to 200℃	Pt100: -60 to 180℃
0 to 55℃	±0.470℃	±0.450℃
25±5℃	±0.145℃	±0.135℃

∗2 Accuracy in ambient temperature and wire resistance when the offset/gain setting is set.

∗3 Accuracy per 1-degree temperature change

Example) Accuracy for the case of changing from 25 to 30℃

0.04% (Reference accuracy) + 0.0070%/℃ (Temperature coefficient) × 5℃ (Temperature difference) = 0.075%

∗4 The conversion speed is a period from when a temperature is input and converted into a corresponding digital value until the value is stored into the buffer memory.

When two or more channels are used, the conversion speed is "40ms × number of conversion enabled channels".

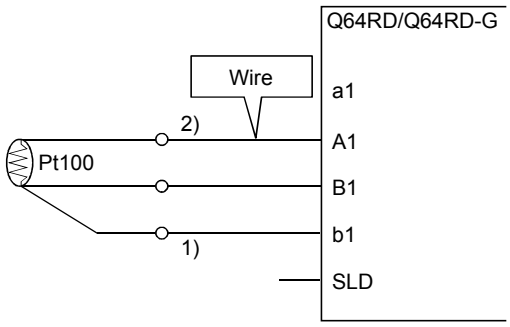
∗5 For output in the case of disconnection detection, select any of "Value immediately before disconnection", "Up scale (maximum value of measured temperature range + 5% of measured temperature range)", "Down scale (minimum value of measured temperature range – 5% of measured temperature range)" or "Given value". (Refer to Section 3.2.2.)

3.1.3 Specifications for RTD connection

This section explains the specifications for connection of the Q64RD/Q64RD-G and platinum temperature-measuring resistors.

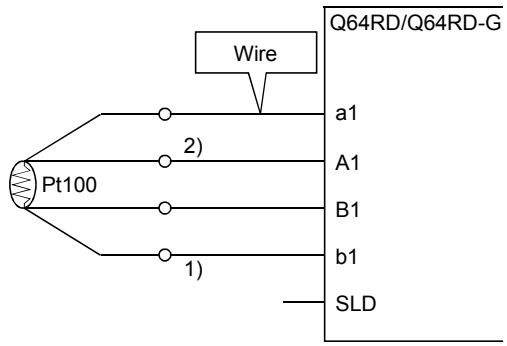
(1) For 3-wire type

The wire resistance value should satisfy the condition of 1) + 2) ≦ 2Ω max.
In addition, the difference of the wire resistance value between 1) and 2) should be 10Ω max.



(2) For 4-wire type

The wire resistance value should satisfy the condition of 1) + 2) ≦ 2Ω max.



POINT

Wire resistance values may be an error factor in the temperature measurement.
The error arisen between the Q64RD/Q64RD-G and the temperature-measuring resistor (between the wire resistance value 1) + 2) and measured temperature value) is Max. 0.007℃/2Ω (Q64RD) or Max. 0.003℃/2Ω (Q64RD-G).
This error can be corrected by the offset/gain setting.
When making offset/gain adjustment, set the wire resistance value actually used.

3.2 Function List

The following table lists the Q64RD/Q64RD-G functions.

Item	Description	Refer To
Temperature conversion function	This function allows temperature data to be imported by connecting a temperature-measuring resistor. Temperature data are 16-bit signed binary (-2000 to 8500), 32-bit signed binary (-200000 to 850000) and stored into buffer memory.	Section 3.4.7, 3.4.16
Temperature conversion system	(1) Sampling processing Values input by each channel are successively converted into temperature values and output as measured temperature value. (2) Averaging processing (a) Time averaging Temperature conversion is averaged by time on each channel and an averaged value is stored. (b) Count averaging Temperature conversion is averaged by count on each channel and an averaged value is stored. (c) Moving average Measured temperature values, which are taken at every sampling interval for the specified number of times, are averaged. (3) Primary delay filter By a preset time constant, digital output values are smoothed.	Section 3.2.1
Conversion enable/disable function	This function specifies whether temperature conversion is enabled or disabled on each channel. Setting temperature conversion enable/disable reduces the processing time of	Section 3.4.3
Range changing function	This function changes the measured temperature range.	Section 4.5
Temperature-measuring resistor selection function	This function sets the type of the temperature-measuring resistor per channel.	Section 4.5
Disconnection detection function	This function detects the disconnection of the connected temperature-measuring resistor on each channel.	Section 3.4.14
Conversion setting for disconnection detection function	For values to be stored in the CH□ measured temperature value (buffer memory addresses 11 to 14, 54 to 61: Un\G11 to 14, Un\G54 to 61) in the case of disconnection detection, any of "Value immediately before disconnection", "Up scale (maximum value of measured temperature range + 5% of measured temperature range)", "Down scale (minimum value of measured temperature range – 5% of measured temperature range)" or "Given value" can be selected.	Section 3.2.2
Warning output function	This function outputs a warning if a temperature falls outside the user-set temperature range.	Section 3.4.12, 3.4.13
Scaling function	This function can convert a temperature conversion value into a preset range ratio (%) and import it into buffer memory.	Section 3.4.15, 3.4.17, 3.4.18
Offset/gain setting function	This function compensates for an error of a temperature conversion value.	Section 3.4.20, 4.6
Online module change	A module change is made without the system being stopped.	Chapter 7

3.2.1 Temperature conversion system

(1) Sampling processing

A temperature input value is converted into a temperature one by one and its measured temperature value is stored into buffer memory.
Sampling processing time varies with the number of used channels (number of channels set to enable temperature conversion).

(Processing time) = (number of used channels) × (40ms)

[Example]
Sampling time is 120ms when three channels, channels 1, 2 and 4, are enabled for conversion.

3 channels × 40ms = 120ms

(2) Averaging processing

(a) Time-specified averaging processing

When this option is specified for a channel, values input from the channel are converted into temperature values consecutively for the preset length of time. Then, the total amount of values after eliminating the maximum and minimum values is averaged to be stored into the buffer memory.
Averaging processing requires at least 2 times of conversion processing excluding the maximum and the minimum values.
The processing count within the preset time varies with the number of used channels (number of channels set to enable temperature conversion).

$$\text{(Processing count)} = \frac{\text{(preset time)}}{\text{(number of used channels)} \times \text{(40ms)}}$$

Setting range of preset time is 160 to 5000ms.
When setting a value out of the setting range, an error (error code 20□) occurs.
[Example]
The sampling count is 4.75 when four channels, channels 1, 2, 3 and 4, are enabled for conversion and the preset time is 760ms.

760ms ÷ (4 channels × 40ms) = 4.75

Since the fractional portion of an indivisible value is dropped, the sampling count is 4 times.

(b) Count-specified averaging processing

The time taken to store a count-averaged value into buffer memory varies with the number of used channels (number of channels set to enable temperature conversion).

(Processing time) = (preset count) × (number of used channels) × (40ms)

Setting range of preset count is 4 to 62500times.
When setting a value out of the setting range, an error (error code 30□) occurs.

[Example]
An average value is output ever 320ms when two channels, channels 3 and 4, are enabled for conversion and the preset count is 4.

4 times × (2 channels × 40ms) = 320ms

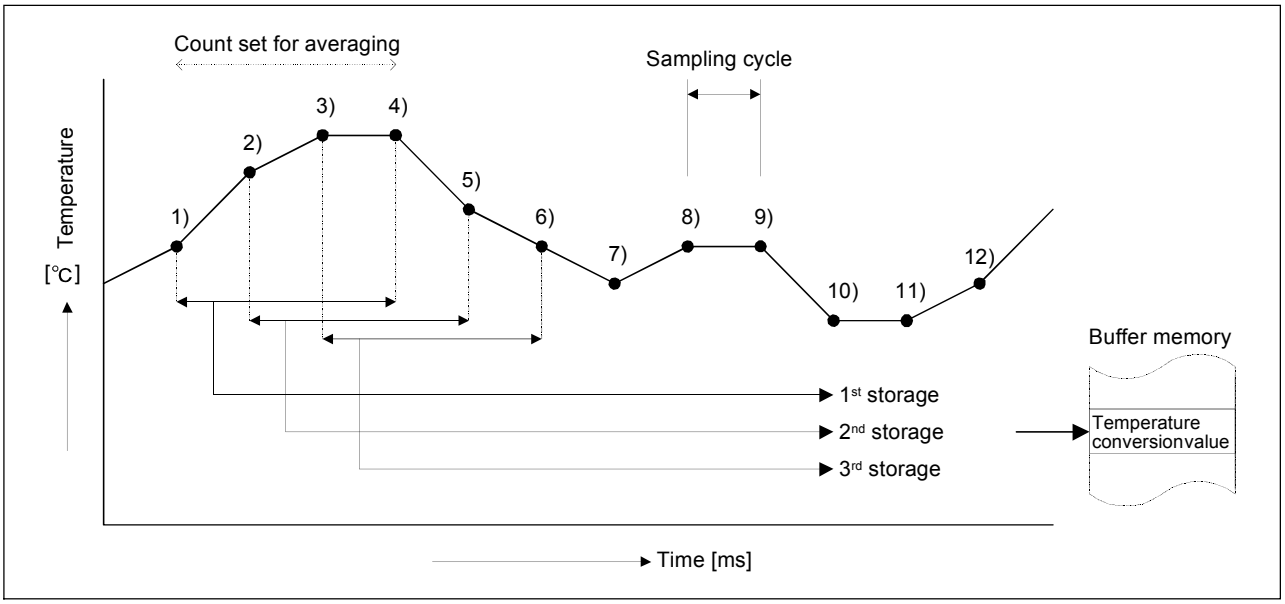
(c) Processing using moving average

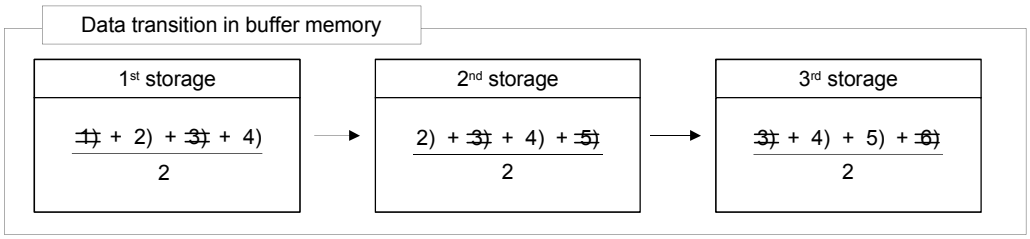
Since the calculation is done for each sampling period, the latest digital output value can be obtained.

Setting range of moving average is 4 to 60times.

When setting a value out of the setting range, an error (error code 31□) occurs.

Moving average processing in the case of 4-time setting





3 - 7

(3) Primary delay filter

By setting a time constant, excessive noise is eliminated and smoothed temperature value can be output. Depending the time constant, the degree of smoothness is changed.

The relational expression between the time constant and measured temperature value is shown below.

[In the case of n=1]

$Yn=1$

[In the case of n=2]

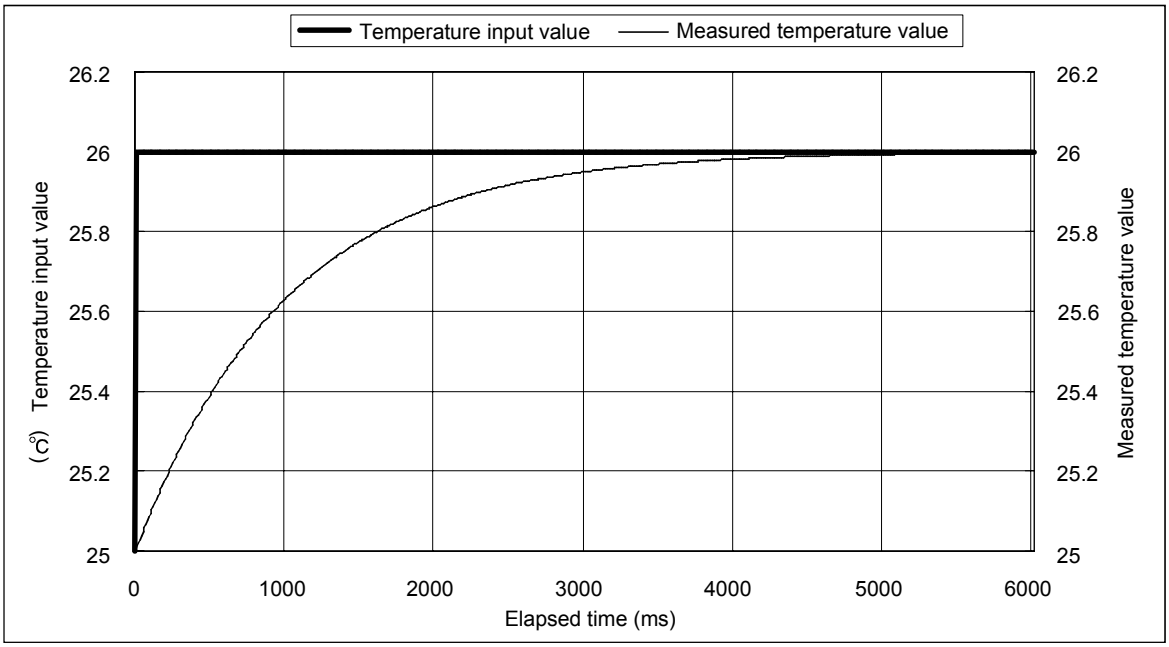
$$Yn = Xn-1 + \frac{\Delta t}{\Delta t + TA}(Xn - Xn-1)$$

[In the case of n ≧ 3]

$$Yn = Yn-1 + \frac{\Delta t}{\Delta t + TA}(Xn - Yn-1)$$

Yn: Current measured temperature value Δt: A/D conversion time (0.04ms)
N : Sampling count TA: Time constant (s)
Yn-1: Preceding measured temperature value
Xn: measured temperature value before smoothing
* Conversion completion flag (buffer memory address10: Un\G10) turns on at n ≧ 2.

[Example] When the temperature input value is changed from 25.000 to 26.000℃
In the time constant setting of 1000ms (1s) measured temperature value is changed as shown below.
At 1000ms (1s) after the temperature input value is changed to 26.000℃, the measured temperature value reaches 63.2% of the value output in the case of selecting the sampling processing.



3.2.2 Conversion setting for disconnection detection function

(1) For values to be stored in the CH□ measured temperature value (buffer memory addresses 11 to 14, 54 to 61: Un\G11 to 14, Un\G54 to 61) in the case of disconnection detection, any of "Value immediately before disconnection", "Up scale (maximum value of measured temperature range + 5% of measured temperature range)", "Down scale (minimum value of measured temperature range – 5% of measured temperature range)" or "Given value" can be selected. Setting is available for each channel.

(2) This function can be utilized only for channels where temperature conversion is enabled.

(3) When Up scale (1H) or Down scale (2H) is set, an Up scale value (maximum value of measured temperature range + 5% of measured temperature range) or a Down scale value (minimum value of measured temperature range – 5% of measured temperature range) of the individual range is stored respectively.

Measurement mode	Set value	Measurement range	Up scale	Down scale
New JIS	0	-200 to 850 ℃	902.5℃	-252.5℃
	1	-20 to 120 ℃	127.0℃	-27.0℃
	4	0 to 200 ℃	210.0℃	-10.0℃
Old JIS	2	-180 to 600 ℃	639.0℃	-219.0℃
	3	-20 to 120 ℃	127.0℃	-27.0℃
	5	0 to 200 ℃	210.0℃	-10.0℃
Ni100Ω	8	-60 to 180 ℃	192.0℃	-72.0℃

(4) When Given value (3H) is selected, specify a value to CH□ conversion setting value for disconnection detection (buffer memory addresses 150 to 157: Un\G150 to 157). When Given value(3H) is selected, set a value for the CH□ conversion setting for disconnection detection (buffer memory addresses 150 to 153: Un\G150 to 157) in units of 0.1℃.
The value set in the area is stored in CH□ measured temperature value when disconnection is detected.

3.3 I/O Signals Transferred to/from CPU

This section describes the I/O signal assignment and signal functions.

3.3.1 I/O signal list

The following are the I/O signals of the Q64RD/Q64RD-G.
The I/O numbers (X/Y) given in this chapter and later assume that the first I/O number of the Q64RD/Q64RD-G is set to 0.

Input Signal (Signal Direction: Programmable controller CPU ← Q64RD/Q64RD-G)		Output Signal (Signal Direction: Programmable controller CPU → Q64RD/Q64RD-G)	
Device No.	Signal name	Device No.	Signal name
X0	Module ready	Y0	Reserved *
X1	CH1 Offset/Gain Setting Status Signal	Y1	CH1 Offset Setting Request
X2	CH2 Offset/Gain Setting Status Signal	Y2	CH1 Gain Setting Request
X3	CH3 Offset/Gain Setting Status Signal	Y3	CH2 Offset Setting Request
X4	CH4 Offset/Gain Setting Status Signal	Y4	CH2 Gain Setting Request
X5	Reserved *	Y5	CH3 Offset Setting Request
X6		Y6	CH3 Gain Setting Request
X7		Y7	CH4 Offset Setting Request
X8		Y8	CH4 Gain Setting Request
X9	Operating Condition Setting Completion Signal	Y9	Operating Condition Setting Request
XA	Offset/Gain Setting Mode Status Flag	YA	User Range Write Request
XB	Reserved *	YB	Reserved *
XC	Disconnection Detection Signal	YC	
XD	Warning Output Signal	YD	
XE	Conversion Completion Flag	YE	
XF	Error Flag	YF	Error Clear Request

POINT

The reserved signals marked * are used by the system and are unavailable for the user. Should they be turned on/off in a sequence program, we cannot guarantee the functions of the Q64RD/Q64RD-G.

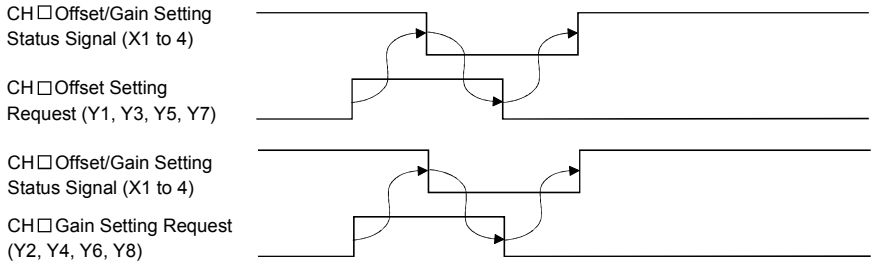
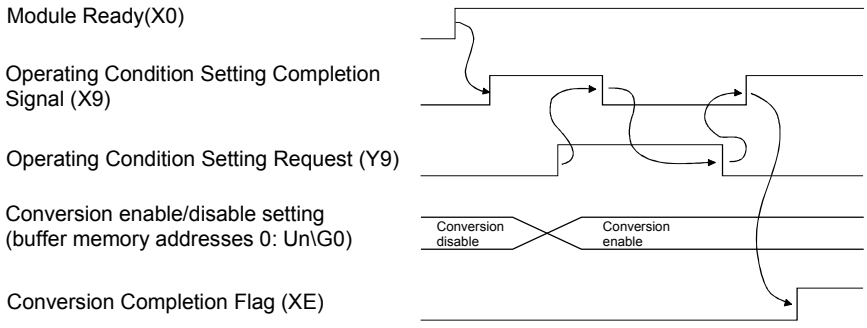
REMARK

Between the Q64RD/Q64RD-G whose first 5 digits of product information are 07071 or earlier and those of 07072 or later, the Conversion Completion Flag (XE) operation is different.
For details, refer to Appendix 2.2 and 2.3.

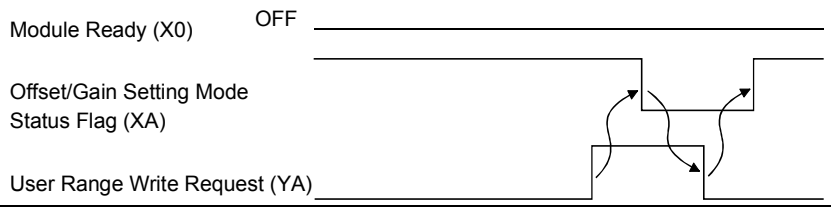
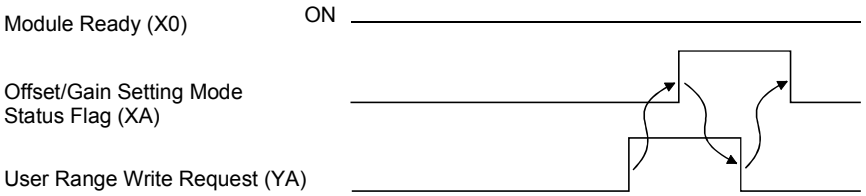
3.3.2 I/O signal details

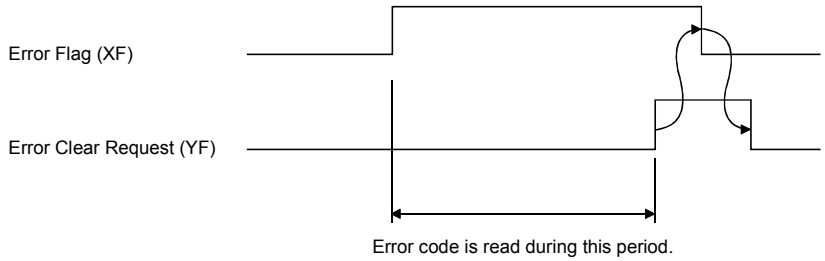
The following are details of the Q64RD/Q64RD-G I/O signals.

(1) Input signals

Device No.	Signal Name	Description
X0	Module Ready	(1) If the module is in the normal mode at power-on or resetting of the programmable controller CPU, this signal turns on to start temperature conversion as soon as it gets ready. (2) When this signal (X0) is off in the normal mode, temperature conversion is not performed. In the offset/gain setting mode, temperature conversion is performed even if this signal (X0) is off. (3) This signal (X0) turns off when: • The module is in the offset/gain setting mode; • The Q64RD/Q64RD-G is in a watchdog timer error ∗1
X1 X2 X3 X4	CH□ Offset/Gain Setting Status Signal	(1) This signal is used as an interlock condition to turn on/off the CH□ Offset Setting Request (Y1, Y3, Y5, Y7)/CH□ Gain Setting Request (Y2, Y4, Y6, Y8) when offset/gain setting is made. (2) When the CH□ Offset Setting Request (Y1, Y3, Y5, Y7) or CH□ Gain Setting Request (Y2, Y4, Y6, Y8) is turned from ON to OFF in the offset/gain setting mode, this signal (X1 to 4) corresponding to the user-set, conversion-enabled channel turns on. 
X9	Operating Condition Setting Completion Signal	(1) This signal is used as an interlock condition to turn on/off the Operating Condition Setting Request (Y9) when the "Conversion enable/disable setting", "CH□ time/count/moving average/time constant setting (Q64RD-G)", "averaging processing specification" , "Extended averaging processing specification", "Warning output enable/disable setting", "CH□ scaling range upper/lower limit value", "CH□ scaling width upper/lower limit value", "CH□ warning output upper/lower limit value", "Conversion setting for disconnection detection" or "CH□Conversion setting value for disconnection detection" is changed. (2) Conversion processing is not performed when this signal (X9) is off. (3) This signal (X9) turns off when: • The Module Ready (X0) is off in the normal mode; or • The Operating Condition Setting Request (Y9) is on.  (4) The Q64RD-G clears measured temperature values immediately after Operating Condition Setting Request (Y9) turned ON. Therefore, before reading measured temperature values, confirm that Conversion Completion Flag (XE) has turned ON. The Q64RD holds measured temperature values immediately after Operating Condition Setting Request (Y9) turned ON.

∗1 Occurs if program operation is not completed within the intended time due to a hardware fault of the Q64RD/Q64RD-G. The RUN LED of the Q64RD/Q64RD-G goes off when a watchdog timer error occurs.

<table>
<tr><th>Device No.</th><th>Signal Name</th><th>Description</th></tr>
<tr><td rowspan="2">XA</td><td rowspan="2">Offset/Gain Setting Mode Status Flag</td><td>[In offset/gain setting mode]
(1) This signal is used as an interlock condition to turn on/off the User Range Write Request (YA) when the value at adjusted according to the offset/gain setting is stored.
(2) See Section 4.6 for the offset/gain settings.
 
</td></tr>
<tr><td>[In normal mode]
(1) This signal 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 for the user range restoration.
 
</td></tr>
<tr><td>XC</td><td>Disconnection Detection Signal</td><td>(1) The input circuit for the platinum RTD of the conversion-enabled channel turns ON the Disconnection Detection Signal (XC) when any input signal line including the platinum RTD is disconnected.
For the channel where disconnection is detected, a value based on the Conversion setting for disconnection detection (buffer memory address 148: Un\G148) is stored in the CH□ measured temperature value (buffer memory addresses 11 to 14, 54 to 61: Un\G11 to 14, Un\G54 to 61).
Conversion of the channels not disconnected is continued.
(2) For temperature conversion values to be stored when the Disconnection Detection Signal (XC) turns ON, any of "Value immediately before disconnection", "Up scale (maximum value of measured temperature range + 5% of measured temperature range)", "Down scale (minimum value of measured temperature range – 5% of measured temperature range)" or "Given value" can be selected. (Refer to Section 3.2.2.)
(3) Removing the cause of disconnection and turning ON the Error Clear Request (YF) turns OFF the Disconnection Detection Signal (XC).
(4) When the line connection is recovered, the temperature conversion value update is restarted independently of the Disconnection Detection Signal (XC) reset.</td></tr>
<tr><td>XD</td><td>Warning Output Signal</td><td>(1) This signal turns on when the measured temperature value has fallen out of the temperature range set in the warning output upper/lower limit values (buffer memory addresses 86 to 117: Un\G86 to 117) on any of the conversion-enabled channels.
(2) This signal turns off automatically as soon as the measured temperature values returned to within the ranges on conversion-enabled all channel.</td></tr>
</table>

Device No.	Signal Name	Description
XE	Conversion Completion Flag	(1) This signal (XE) turns on when the temperature conversion values of all conversion-enabled channels are stored into buffer memory after power-on or hardware reset. (2) When averaging processing is performed, this signal also turns on when the temperature conversion values are stored into buffer memory after completion of averaging processing. (3) This signal (XE) varies as described below depending on whether the Operating Condition Setting Completion Signal (X9) has turned on or off. • When the Operating Condition Setting Completion Signal (X9) has turned on (stop → conversion) 1) Temperature conversions of the enabled channels are started. 2) After the temperature conversion values are stored into buffer memory, the conversion completion flags (buffer memory address 10: Un\G10) are turned on. 3) This signal (XE) is turned on after the temperature conversion values of all conversion-enabled channels enabled for conversion are stored into buffer memory. • When the Operating Condition Setting Completion Signal (X9) has turned off (conversion → stop) 1) The conversion completion flags (buffer memory address 10: Un\G10) of all channels are turned off. 2) This signal (XE) is turned off. Note that if conversion is stopped, the temperature conversion values stored in buffer memory are held at the data immediately before the stop. (4) This signal (XE) does not turn on when all channels are disabled for conversion.
XF	Error Flag	(1) This signal (XF) turns on when an error occurs. (2) To clear the error code, turn on the Error Clear Request (YF). 

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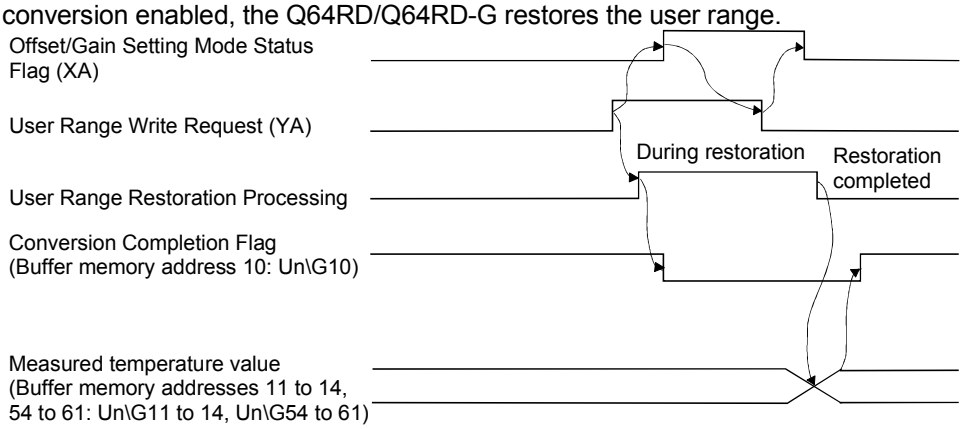
(2) Output signals

Device No.	Signal name	Description
Y1 Y3 Y5 Y7	CH□ Offset Setting Request	(1) This signal is made valid in the offset/gain setting mode. (2) This signal corrects the temperature conversion value to be an offset temperature set value when it is on. (3) When this signal turns on while the Gain Setting Request on the same channel is on or they turn on simultaneously, an error will occur and the operation in (2) not performed. (4) For the on/off timing, refer to the field of the CH□ Offset/Gain Setting Status Signal (X1 to 4).
Y2 Y4 Y6 Y8	CH□ Gain Setting Request	(1) This signal is made valid in the offset/gain setting mode. (2) This signal corrects the temperature conversion value to be a gain temperature set value when it is on. (3) When this signal turns on while the Offset Setting Request on the same channel is on or they turn on simultaneously, an error will occur and the operation in (2) not performed. (4) For the on/off timing, refer to the field of the CH□ Offset/Gain Setting Status Signal (X1 to 4).
Y9	Operating condition setting request	(1) This signal is turned on when the "Conversion enable/disable setting", "CH□ time/count/moving average/time constant setting", "Averaging processing selection", "Warning output enable/disable setting", "CH□ scaling range upper/lower limit value", "CH□ scaling width upper/lower limit value", "CH□ warning output upper/lower limit value", "Conversion setting for disconnection detection" or "CH□Conversion setting value for disconnection detection" is made valid. (2) When this signal turns on, the Disconnection Detection Signal (XC) and Warning Output Signal (XD) turn off. (3) For the on/off timing, refer to the field of the Operating Condition Setting Completion Signal (X9).
YA	User Range Write Request	[In offset/gain setting mode] (1) This turns on when the value adjusted based on the offset/gain settings is stored in the E^2PROM. (2) See the XA column for ON/OFF timing. See Section 4.6 for offset/gain settings. [In normal mode] (1) This signal turns on when the user range is restored. (2) Refer to the field of XA for the ON/OFF timing. Refer to Chapter 7 for user range restoration.
YF	Error Clear Request	(1) This signal is turned on when the Error Flag (XF) and Disconnection Detection Signal (XC) are cleared. However, the set value error of the intelligent function module switch setting cannot be cleared. Correct the set value. (2) For the on/off timing, refer to the field of the Error Flag (XF).

POINT

When the User Range Write Request (YA) is turned on in the normal mode with conversion enabled, the Q64RD/Q64RD-G restores the user range.



During user range restoration: Conversion stopped, conversion completion flag (buffer memory addresses 10: Un\G10) OFF, proceding temperature value held

After user range restoration: Conversion resumed (when user range setting is used, conversion is resumed at the restored offset/gain setting value.)

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3.4 Buffer Memory

3.4.1 Buffer memory assignment (Q64RD)

This section describes the assignment of the Q64RD buffer memory.

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.

Addresses		Description	R/W *1	Addresses		Description	R/W *1
Hex.	Dec.			Hex.	Dec.		
00H	0	Conversion enable/disable setting	R/W *2	3EH	62	CH1 scaling range lower limit (L)	R/W *2
01H	1	CH1 time/count/moving average/time constant setting	R/W *2	3FH	63	value (H)	
02H	2	CH2 time/count/moving average/time constant setting	R/W *2	40H	64	CH1 scaling range upper limit (L)	R/W *2
03H	3	CH3 time/count/moving average/time constant setting	R/W *2	41H	65	value (H)	
04H	4	CH4 time/count /moving average/time constant setting	R/W *2	42H	66	CH2 scaling range lower limit (L)	R/W *2
05H	5	System area	—	43H	67	value (H)	
to	to			44H	68	CH2 scaling range upper limit (L)	R/W *2
08H	8			45H	69	value (H)	
09H	9	Averaging processing setting	R/W *2	46H	70	CH3 scaling range lower limit (L)	R/W *2
0AH	10	Conversion completion flag	R	47H	71	value (H)	
0BH	11	CH1 measured temperature value (16bit)	R	48H	72	CH3 scaling range upper limit (L)	R/W *2
0CH	12	CH2 measured temperature value (16bit)	R	49H	73	value (H)	
0DH	13	CH3 measured temperature value (16bit)	R	4AH	74	CH4 scaling range lower limit (L)	R/W *2
0EH	14	CH4 measured temperature value (16bit)	R	4BH	75	value (H)	
0FH	15	System area	—	4CH	76	CH4 scaling range upper limit (L)	R/W *2
to	to			4DH	77	value (H)	
12H	18			4EH	78	CH1 scaling width lower limit value	R/W *2
13H	19	Error code	R	4FH	79	CH1 scaling width upper limit value	R/W *2
14H	20	Setting range	R	50H	80	CH2 scaling width lower limit value	R/W *2
15H	21	System area	—	51H	81	CH2 scaling width upper limit value	R/W *2
to	to			52H	82	CH3 scaling width lower limit value	R/W *2
2EH	46			53H	83	CH3 scaling width upper limit value	R/W *2
2FH	47	Warning output enable/disable setting	R/W *2	54H	84	CH4 scaling width lower limit value	R/W *2
30H	48	Warning output flag	R	55H	85	CH4 scaling width upper limit value	R/W *2
31H	49	Disconnection detection flag	R	56H	86	CH1 warning output lower lower (L)	R/W *2
32H	50	CH1 scaling value	R	57H	87	limit value (H)	
33H	51	CH2 scaling value	R	58H	88	CH1 warning output lower upper (L)	R/W *2
34H	52	CH3 scaling value	R	59H	89	limit value (H)	
35H	53	CH4 scaling value	R	5AH	90	CH1 warning output upper lower (L)	R/W *2
36H	54	CH1 measured temperature value (32bit)	R	5BH	91	limit value (H)	
37H	55			5CH	92	CH1 warning output upper upper (L)	R/W *2
38H	56	CH2 measured temperature value (32bit)	R	5DH	93	limit value (H)	
39H	57			5EH	94	CH2 warning output lower lower (L)	R/W *2
3AH	58	CH3 measured temperature value (32bit)	R	5FH	95	limit value (H)	
3BH	59			60H	96	CH2 warning output lower upper (L)	R/W *2
3CH	60	CH4 measured temperature value (32bit)	R	61H	97	limit value (H)	
3DH	61						

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Addresses		Description	R/W *1
Hex.	Dec.		
62H	98	CH2 warning output upper lower limit value (L)	R/W *2
63H	99	(H)	
64H	100	CH2 warning output upper upper limit value (L)	R/W *2
65H	101	(H)	
66H	102	CH3 warning output lower lower limit value (L)	R/W *2
67H	103	(H)	
68H	104	CH3 warning output lower upper limit value (L)	R/W *2
69H	105	(H)	
6AH	106	CH3 warning output upper lower limit value (L)	R/W *2
6BH	107	(H)	
6CH	108	CH3 warning output upper upper limit value (L)	R/W *2
6DH	109	(H)	
6EH	110	CH4 warning output lower lower limit value (L)	R/W *2
6FH	111	(H)	
70H	112	CH4 warning output lower upper limit value (L)	R/W *2
71H	113	(H)	
72H	114	CH4 warning output upper lower limit value (L)	R/W *2
73H	115	(H)	
74H	116	CH4 warning output upper upper limit value (L)	R/W *2
75H	117	(H)	
76H	118	CH1 offset temperature set value (L)	R/W *2
77H	119	(H)	
78H	120	CH1 gain temperature set value (L)	R/W *2
79H	121	(H)	
7AH	122	CH2 offset temperature set value (L)	R/W *2
7BH	123	(H)	
7CH	124	CH2 gain temperature set value (L)	R/W *2
7DH	125	(H)	
7EH	126	CH3 offset temperature set value (L)	R/W *2
7FH	127	(H)	
80H	128	CH3 gain temperature set value (L)	R/W *2
81H	129	(H)	
82H	130	CH4 offset temperature set value (L)	R/W *2
83H	131	(H)	
84H	132	CH4 gain temperature set value (L)	R/W *2
85H	133	(H)	
86H	134	Extended averaging processing specification	R/W *2
87H	135	System area	—
to	to		
93H	147		
94H	148	Conversion setting for disconnection detection	R/W *2
95H	149	System area	—
96H	150	CH1 Conversion setting value for (L)	R/W *2
97H	151	disconnection detection (H)	

Addresses		Description	R/W
Hex.	Dec.		
98H	152	CH2 Conversion setting value for (L)	R/W *2
99H	153	disconnection detection (H)	
9AH	154	CH3 Conversion setting value for (L)	R/W *2
9BH	155	disconnection detection (H)	
9CH	156	CH4 Conversion setting value for (L)	R/W *2
9DH	157	disconnection detection (H)	
9EH	158	Mode switching setting	R/W
9FH	159		
A0H	160	3-wire type CH1 Factory default offset value	R/W *3
A1H	161	3-wire type CH1 Factory default offset value	R/W *3
A2H	162	3-wire type CH1 Factory default gain value	R/W *3
A3H	163	3-wire type CH1 Factory default gain value	R/W *3
A4H	164	3-wire type CH1 User range setting offset value	R/W *3
A5H	165	3-wire type CH1 User range setting offset value	R/W *3
A6H	166	3-wire type CH1 User range settings gain value	R/W *3
A7H	167	3-wire type CH1 User range settings gain value	R/W *3
A8H	168	3-wire type CH1 User range settings offset (L)	R/W *3
A9H	169	resistance value (H)	
AAH	170	3-wire type CH1 User range settings gain (L)	R/W *3
ABH	171	resistance value (H)	
ACH	172	4-wire type CH1 Factory default offset value	R/W *3
ADH	173	4-wire type CH1 Factory default offset value	R/W *3
AEH	174	4-wire type CH1 Factory default gain value	R/W *3
AFH	175	4-wire type CH1 Factory default gain value	R/W *3
B0H	176	4-wire type CH1 User range setting offset value	R/W *3
B1H	177	4-wire type CH1 User range setting offset value	R/W *3
B2H	178	4-wire type CH1 User range settings gain value	R/W *3
B3H	179	4-wire type CH1 User range settings gain value	R/W *3
B4H	180	4-wire type CH1 User range settings offset (L)	R/W *3
B5H	181	resistance value (H)	
B6H	182	4-wire type CH1 User range settings gain (L)	R/W *3
B7H	183	resistance value (H)	
B8H	184	3-wire type CH2 Factory default offset value	R/W *3
B9H	185	3-wire type CH2 Factory default offset value	R/W *3
BAH	186	3-wire type CH2 Factory default gain value	R/W *3
BBH	187	3-wire type CH2 Factory default gain value	R/W *3
BCH	188	3-wire type CH2 User range setting offset value	R/W *3
BDH	189	3-wire type CH2 User range setting offset value	R/W *3
BEH	190	3-wire type CH2 User range settings gain value	R/W *3
BFH	191	3-wire type CH2 User range settings gain value	R/W *3
C0H	192	3-wire type CH2 User range settings gain (L)	R/W *3
C1H	193	resistance value (H)	
C2H	194	3-wire type CH2 User range settings gain (L)	R/W *3
C3H	195	resistance value (H)	

Addresses		Description	R/W *1	Addresses		Description	R/W *1
Hex.	Dec.			Hex.	Dec.		
C4H	196	4-wire type CH2 Factory default offset value	R/W	E2H	226	4-wire type CH3 User range settings gain value	R/W *3
C5H	197	4-wire type CH2 Factory default offset value	R/W	E3H	227	4-wire type CH3 User range settings gain value	R/W *3
C6H	198	4-wire type CH2 Factory default gain value	R/W	E4H	228	4-wire type CH3 User range settings offset (L)	R/W *3
C7H	199	4-wire type CH2 Factory default gain value	R/W	E5H	229	resistance value (H)	
C8H	200	4-wire type CH2 User range setting offset value	R/W	E6H	230	4-wire type CH3 User range settings gain (L)	R/W *3
C9H	201	4-wire type CH2 User range setting offset value	R/W	E7H	231	resistance value (H)	
CAH	202	4-wire type CH2 User range settings gain value	R/W	E8H	232	3-wire type CH4 Factory default offset value	R/W *3
CBH	203	4-wire type CH2 User range settings gain value	R/W	E9H	233	3-wire type CH4 Factory default offset value	R/W *3
CCH	204	4-wire type CH2 User range settings offset (L)	R/W	EAH	234	3-wire type CH4 Factory default gain value	R/W *3
CDH	205	disconnection detection (H)		EBH	235	3-wire type CH4 Factory default gain value	R/W *3
CEH	206	4-wire type CH2 User range settings gain (L)	R/W	ECH	236	3-wire type CH4 User range setting offset value	R/W *3
CFH	207	disconnection detection (H)		EDH	237	3-wire type CH4 User range setting offset value	R/W *3
D0H	208	3-wire type CH3 Factory default offset value	R/W	EEH	238	3-wire type CH4 User range settings gain value	R/W *3
D1H	209	3-wire type CH3 Factory default offset value	R/W	EFH	239	3-wire type CH4 User range settings gain value	R/W *3
D2H	210	3-wire type CH3 Factory default gain value	R/W	F0H	240	3-wire type CH4 User range settings offset (L)	R/W *3
D3H	211	3-wire type CH3 Factory default gain value	R/W	F1H	241	resistance value (H)	
D4H	212	3-wire type CH3 User range settings offset value	R/W	F2H	242	3-wire type CH4 User range settings gain (L)	R/W *3
D5H	213	3-wire type CH3 User range settings offset value	R/W	F3H	243	resistance value (H)	
D6H	214	3-wire type CH3 User range settings gain value	R/W	F4H	244	4-wire type CH4 Factory default offset value	R/W *3
D7H	215	3-wire type CH3 User range settings gain value	R/W	F5H	245	4-wire type CH4 Factory default offset value	R/W *3
D8H	216	3-wire type CH3 User range settings offset (L)	R/W	F6H	246	4-wire type CH4 Factory default gain value	R/W *3
D9H	217	disconnection detection (H)		F7H	247	4-wire type CH4 Factory default gain value	R/W *3
DAH	218	3-wire type CH3 User range settings gain (L)	R/W	F8H	248	4-wire type CH4 User range setting offset value	R/W *3
DBH	219	disconnection detection (H)		F9H	249	4-wire type CH4 User range setting offset value	R/W *3
DCH	220	4-wire type CH3 Factory default offset value	R/W	FAH	250	4-wire type CH4 User range settings gain value	R/W *3
DDH	221	4-wire type CH3 Factory default offset value	R/W	FBH	251	4-wire type CH4 User range settings gain value	R/W *3
DEH	222	4-wire type CH3 Factory default gain value	R/W	FCH	252	4-wire type CH4 User range settings offset (L)	R/W *3
DFH	223	4-wire type CH3 Factory default gain value	R/W	FDH	253	disconnection detection (H)	
E0H	224	4-wire type CH3 User range setting offset value	R/W	FEH	254	4-wire type CH4 User range settings gain (L)	R/W *3
E1H	225	4-wire type CH3 User range setting offset value	R/W	FFH	255	disconnection detection (H)	

✻1 Indicates whether reading from and writing to a sequence program are enabled.
R : Read enabled W : Write enabled

✻2 Data must be written to buffer memory under the interlock conditions (buffer memory write conditions) of the following I/O signals.

• Operating condition setting

• Offset setting

• Gain setting

✻3 This area is related with the user range save/restore function and allows users to re-set the offset/gain values easily in the case of online module change.

3.4.2 Buffer memory assignment (Q64RD-G)

This section describes the assignment of the Q64RD-G buffer memory.

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.

Addresses		Description	R/W *1	Addresses		Description	R/W *1
Hex.	Dec.			Hex.	Dec.		
00H	0	Conversion enable/disable setting	R/W *2	3EH	62	CH1 scaling range lower limit value (L)	R/W *2
01H	1	CH1 Time/count/moving average/time constant setting	R/W *2	3FH	63	(H)	
02H	2	CH2 Time/count/moving average/time constant setting	R/W *2	40H	64	CH1 scaling range upper limit value (L)	R/W *2
03H	3	CH3 Time/count/moving average/time constant setting	R/W *2	41H	65	(H)	
04H	4	CH4 Time/count/moving average/time constant setting	R/W *2	42H	66	CH2 scaling range lower limit value (L)	R/W *2
05H	5	System area	—	43H	67	(H)	
to	to			44H	68	CH2 scaling range upper limit value (L)	R/W *2
08H	8			45H	69	(H)	
09H	9	Averaging processing specification	R/W *2	46H	70	CH3 scaling range lower limit value (L)	R/W *2
0AH	10	Conversion completion flag	R	47H	71	(H)	
0BH	11	CH1 Measured temperature value (16bit)	R	48H	72	CH3 scaling range upper limit value (L)	R/W *2
0CH	12	CH2 Measured temperature value (16bit)	R	49H	73	(H)	
0DH	13	CH3 Measured temperature value (16bit)	R	4AH	74	CH4 scaling range lower limit value (L)	R/W *2
0EH	14	CH4 Measured temperature value (16bit)	R	4BH	75	(H)	
0FH	15	System area	—	4CH	76	CH4 scaling range upper limit value (L)	R/W *2
to	to			4DH	77	(H)	
12H	18			4EH	78	CH1 scaling width lower limit value	R/W *2
13H	19	Error code	R	4FH	79	CH1 scaling width upper limit value	
14H	20	Setting range 1	R	50H	80	CH2 scaling width lower limit value	R/W *2
15H	21	Setting range 2	R	51H	81	CH2 scaling width upper limit value	R/W *2
16H	22	System area	—	52H	82	CH3 scaling width lower limit value	R/W *2
to	to			53H	83	CH3 scaling width upper limit value	R/W *2
2EH	46			54H	84	CH4 scaling width lower limit value	R/W *2
2FH	47	Warning output enable/disable setting	R/W *2	55H	85	CH4 scaling width upper limit value	R/W *2
30H	48	Warning output flag	R	56H	86	CH1 warning output lower lower (L)	R/W *2
31H	49	Disconnection detection flag	R	57H	87	limit value (H)	
32H	50	CH1 scaling value	R	58H	88	CH1 warning output lower upper (L)	R/W *2
33H	51	CH2 scaling value	R	59H	89	limit value (H)	
34H	52	CH3 scaling value	R	5AH	90	CH1 warning output upper lower (L)	R/W *2
35H	53	CH4 scaling value	R	5BH	91	limit value (H)	
36H	54	CH1 Measured temperature value (32bit) (L)	R	5CH	92	CH1 warning output upper upper (L)	R/W *2
37H	55	(H)		5DH	93	limit value (H)	
38H	56	CH2 Measured temperature value (32bit) (L)	R	5EH	94	CH2 warning output lower lower (L)	R/W *2
39H	57	(H)		5FH	95	limit value (H)	
3AH	58	CH3 Measured temperature value (32bit) (L)	R	60H	96	CH2 warning output lower upper (L)	R/W *2
3BH	59	(H)		61H	97	limit value (H)	
3CH	60	CH4 Measured temperature value (32bit) (L)	R				
3DH	61	(H)					

Addresses		Description	R/W *1	Addresses		Description	R/W *1
Hex.	Dec.			Hex.	Dec.		
62H	98	CH2 warning output upper lower (L)	R/W *2	98H	152	CH2 Conversion setting value for (L)	R/W *2
63H	99	limit value (H)		99H	153	disconnection detection (H)	
64H	100	CH2 warning output upper upper (L)	R/W *2	9AH	154	CH3 Conversion setting value for (L)	R/W *2
65H	101	limit value (H)		9BH	155	disconnection detection (H)	
66H	102	CH3 warning output lower lower (L)	R/W *2	9CH	156	CH4 Conversion setting value for (L)	R/W *2
67H	103	limit value (H)		9DH	157	disconnection detection (H)	
68H	104	CH3 warning output lower upper (L)	R/W *2	9EH	158	Mode switching setting	R/W
69H	105	limit value (H)		9FH	159		
6AH	106	CH3 warning output upper lower limit value (L)	R/W *2	A0H	160	3-wire type CH1 Factory default offset (L) *3	R/W
6BH	107	(H)		A1H	161	value (H)	
6CH	108	CH3 warning output upper upper limit value (L)	R/W *2	A2H	162	3-wire type CH1 Factory default (L) *3	R/W
6DH	109	(H)		A3H	163	gain value (H)	
6EH	110	CH4 warning output lower lower limit value (L)	R/W *2	A4H	164	3-wire type CH1 User range settings (L) *3	R/W
6FH	111	(H)		A5H	165	offset value (H)	
70H	112	CH4 warning output lower upper limit value (L)	R/W *2	A6H	166	3-wire type CH1 User range settings (L) *3	R/W
71H	113	(H)		A7H	167	gain value (H)	
72H	114	CH4 warning output upper lower limit value (L)	R/W *2	A8H	168	3-wire type CH1 User range settings (L) *3	R/W
73H	115	(H)		A9H	169	offset resistance value (H)	
74H	116	CH4 warning output upper upper limit value (L)	R/W *2	AAH	170	3-wire type CH1 User range settings (L) *3	R/W
75H	117	(H)		ABH	171	gain resistance value (H)	
76H	118	CH1 offset temperature set value (L)	R/W *2	ACH	172	4-wire type CH1 Factory default (L) *3	R/W
77H	119	(H)		ADH	173	offset value (H)	
78H	120	CH1 gain temperature set value (L)	R/W *2	AEH	174	4-wire type CH1 Factory default (L) *3	R/W
79H	121	(H)		AFH	175	gain value (H)	
7AH	122	CH2 offset temperature set value (L)	R/W *2	B0H	176	4-wire type CH1 User range settings (L) *3	R/W
7BH	123	(H)		B1H	177	offset value (H)	
7CH	124	CH2 gain temperature set value (L)	R/W *2	B2H	178	4-wire type CH1 User range settings (L) *3	R/W
7DH	125	(H)		B3H	179	gain value (H)	
7EH	126	CH3 offset temperature set value (L)	R/W *2	B4H	180	4-wire type CH1 User range settings (L) *3	R/W
7FH	127	(H)		B5H	181	offset resistance value (H)	
80H	128	CH3 gain temperature set value (L)	R/W *2	B6H	182	4-wire type CH1 User range settings (L) *3	R/W
81H	129	(H)		B7H	183	gain resistance value (H)	
82H	130	CH4 offset temperature set value (L)	R/W *2	B8H	184	3-wire type CH2 Factory default (L) *3	R/W
83H	131	(H)		B9H	185	offset value (H)	
84H	132	CH4 gain temperature set value (L)	R/W *2	BAH	186	3-wire type CH2 Factory default (L) *3	R/W
85H	133	(H)		BBH	187	gain value (H)	
86H	134	Extended averaging processing specification	R/W *2	BCH	188	3-wire type CH2 User range settings (L) *3	R/W
87H	135	System area	—	BDH	189	offset value (H)	
to	to			BEH	190	3-wire type CH2 User range settings (L) *3	R/W
93H	147			BFH	191	gain value (H)	
94H	148	Conversion setting for disconnection detection	R/W *2	C0H	192	3-wire type CH2 User range settings (L) *3	R/W
95H	149	System area	—	C1H	193	offset resistance value (H)	
96H	150	CH1 Conversion setting value for (L)	R/W *2	C2H	194	3-wire type CH2 User range settings (L) *3	R/W
97H	151	disconnection detection (H)		C3H	195	gain resistance value (H)	

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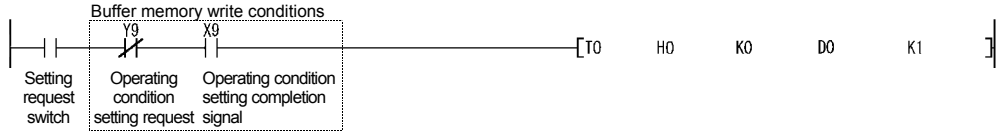
Addresses		Description	R/W *1	Addresses		Description	R/W *1
Hex.	Dec.			Hex.	Dec.		
C4H	196	4-wire type CH2 Factory default (L) *3	R/W	E2H	226	4-wire type CH3 User range settings (L) *3	R/W
C5H	197	offset value (H)		E3H	227	gain value (H)	
C6H	198	4-wire type CH2 Factory default (L) *3	R/W	E4H	228	4-wire type CH3 User range settings (L) *3	R/W
C7H	199	gain value (H)		E5H	229	offset resistance value (H)	
C8H	200	4-wire type CH2 User range settings (L) *3	R/W	E6H	230	4-wire type CH3 User range settings (L) *3	R/W
C9H	201	offset value (H)		E7H	231	gain resistance value (H)	
CAH	202	4-wire type CH2 User range settings (L) *3	R/W	E8H	232	3-wire type CH4 Factory default offset (L) *3	R/W
CBH	203	gain value (H)		E9H	233	value (H)	
CCH	204	4-wire type CH2 User range settings (L) *3	R/W	EAH	234	3-wire type CH4 Factory default gain (L) *3	R/W
CDH	205	offset resistance value (H)		EBH	235	value (H)	
CEH	206	4-wire type CH2 User range settings (L) *3	R/W	ECH	236	3-wire type CH4 User range settings (L) *3	R/W
CFH	207	gain resistance value (H)		EDH	237	offset value (H)	
D0H	208	3-wire type CH3 Factory default offset (L) *3	R/W	EEH	238	3-wire type CH4 User range settings (L) *3	R/W
D1H	209	value (H)		EFH	239	gain value (H)	
D2H	210	3-wire type CH3 Factory default gain (L) *3	R/W	F0H	240	3-wire type CH4 User range settings (L) *3	R/W
D3H	211	value (H)		F1H	241	offset resistance value (H)	
D4H	212	3-wire type CH3 User range settings (L) *3	R/W	F2H	242	3-wire type CH4 User range settings (L) *3	R/W
D5H	213	offset value (H)		F3H	243	gain resistance value (H)	
D6H	214	3-wire type CH3 User range settings (L) *3	R/W	F4H	244	4-wire type CH4 Factory default offset (L) *3	R/W
D7H	215	gain value (H)		F5H	245	value (H)	
D8H	216	3-wire type CH3 User range settings (L) *3	R/W	F6H	246	4-wire type CH4 Factory default gain (L) *3	R/W
D9H	217	offset resistance value (H)		F7H	247	value (H)	
DAH	218	3-wire type CH3 User range settings (L) *3	R/W	F8H	248	4-wire type CH4 User range settings (L) *3	R/W
DBH	219	gain resistance value (H)		F9H	249	offset value (H)	
DCH	220	4-wire type CH3 Factory default offset (L) *3	R/W	FAH	250	4-wire type CH4 User range settings (L) *3	R/W
DDH	221	value (H)		FBH	251	gain value (H)	
DEH	222	4-wire type CH3 Factory default gain (L) *3	R/W	FCH	252	4-wire type CH4 User range settings (L) *3	R/W
DFH	223	value (H)		FDH	253	offset resistance value (H)	
E0H	224	4-wire type CH3 User range settings (L) *3	R/W	FEH	254	4-wire type CH4 User range settings (L) *3	R/W
E1H	225	offset value (H)		FFH	255	gain resistance value (H)	

*1 Indicates whether reading from and writing to a sequence program are enabled.
R : Read enabled W : Write enabled

*2 Data must be written to buffer memory under the interlock conditions (buffer memory write conditions) of the following I/O signals.

• Operating condition setting



• Offset setting

• Gain setting

*3 This area is related with the user range save/restore function and allows users to re-set the offset/gain values easily in the case of online module change.

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3.4.3 Conversion enable/disable setting (Un\G0)

(1) You can make setting to enable/disable temperature conversion on each channel.

(2) Specifying unused channels as "conversion disabled" prevents unnecessary disconnection detection and also reduces sampling time.

(3) At power-on or reset, the conversion enable/disable setting is set to 000FH (all channels disabled).

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

0: Conversion enabled
1: Conversion disabled

[Example]

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

Channels 1 and 2 are conversion enabled.

(4) The Operating condition setting request (Y9) must be turned on/off to make the conversion enable/disable setting valid.

3.4.4 CH□ time/count/moving average/time constant setting (Un\G1 to 4)

(1) For each channel for which Averaging processing specification (buffer memory address 9: Un\G9) and Extended averaging processing specification (buffer memory address 134: Un\G134) is made, set the averaging time, averaging count, the number for moving average or time constant for primary delay filter.

(2) Allowable setting range is as follows:

Processing method	Set value
Time averaging	160 to 5000 (ms)
Count averaging	4 to 62500 (times)
Moving average	4 to 60 (times)
Primary delay filter	40 to 5000 (ms)

Setting any value outside the above range will result in an error and the operation will be performed under the previous setting.

(3) This setting will be invalid if sampling is specified for Averaging processing specification (buffer memory address 9: Un\G9) or Extended averaging processing specification (buffer memory address 134: Un\G134).

(4) At power-on or reset, this is preset to 0000H. Change the setting according to the processing method.

(5) The Operating Condition Setting Request (Y9) must be turned on/off to make this setting valid.

(6) Refer to Section 3.4.5 and 3.4.21 for further details.

3.4.5 Averaging processing specification (Un\G9)

(1) To select sampling or averaging processing, write values to the buffer memory address 9 (Un\G9).

(2) When you selected averaging processing, choose time averaging or count averaging.

(3) This setting defaults to all-channel sampling processing.

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

Designation of averaging-processed channels
1: Averaging processing
0: Sampling processing

Designation of time/count
1: Time averaging
0: Count averaging

(4) The Operating condition setting request (Y9) must be turned on/off to make this setting valid.

Example

To specify count averaging for channels 1 time averaging for channels 2 and sampling processing for other channels, store 0302H (770) into the buffer memory address 9 (Un\G9).

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	
0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0302_H (770)
				CH4	CH3	CH2	CH1					CH4	CH3	CH2	CH1	
0				3				0				2				

POINT

(1) When replacing the Q64RD whose first 5 digits of product information are 07071 or earlier with the one of 07072 or later, there is compatibility within the setting range of the Averaging processing specification (buffer memory address 9: (Un\G9). Existing programs can be utilized without change.
However, when setting the moving average or primary delay filter, make setting in the Extended averaging processing specification area (buffer memory address 134: Un\G134).

(2) Use the Extended averaging processing specification (buffer memory address 134: (Un\G134)) to set the averaging processing.
In this case, it is not required to use the Averaging processing specification (buffer memory address 9: (Un\G9)). (Any value written to the area is ignored.)

(3) The relation between Averaging processing specification (buffer memory address 9: Un\G9) and Extended averaging processing specification (buffer memory address 134: Un\G134) is as follows:
- When 1H to 4H (other than 0) is written into Extended averaging processing specification, the value of this area becomes valid.
  (The setting of Extended averaging processing specification acts on Averaging processing specification.)
- It becomes valid at the ON/OFF timing of the Operating Condition Setting Request (Yn9).

(4) Refer to Section 3.4.21 for Extended averaging processing specification (buffer memory address 134: Un\G134).

(5) When setting the Q64RD-G with the utility package, the initial setting using the averaging processing specification does not exist. Make the initial setting using Extended averaging processing specification.

3.4.6 Conversion completion flag (Un\G10)

(1) You can check whether the channels specified for conversion enable succeeded in normal temperature conversion.

(2) You can make check on each channel using the conversion completion flag.

(3) The conversion completion flag is cleared when the Operating Condition Setting Request (Y9) is turned from ON to OFF.

(4) The Conversion Completion Flag (XE) turns on when conversions of all channels set for conversion enable are completed.

- When Conversion enable/disable setting is turned from 1 (disable) to 0 (enable)
  After the temperature conversion value is stored into buffer memory, the conversion completion flag of the corresponding channel is turned to 1.
- When Conversion enable/disable setting is turned from 0 (enable) to 1 (disable)
  The conversion completion flag of the corresponding channel is turned to 0.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	0	0	0	0	0	0	CH.4	CH.3	CH.2	CH.1

1: Conversion completed
0: Under conversion or unused

REMARK

Between the Q64RD/Q64RD-G whose first 5 digits of product information are 07071 or earlier and those of 07072 or later, the Conversion Completion Flag (Un\G10) operation is different.
For details, refer to Appendix 2.2 and 2.3.

3.4.7 CH□ measured temperature value (16bit) (Un\G11 to 14)

(1) The "RTD value" input from the platinum temperature-measuring resistor is converted into a "temperature value" to detect a temperature.

(2) The value of the measured temperature to the first decimal place is multiplied by 10 and the result is stored into buffer memory in 16-bit signed binary. (All digits to the right of the second decimal place is rounded down.)

(3) A negative measured temperature value is displayed as two's complement.

(4) At power-on or reset, all channels are set to 0.

[Example 1] At the measured temperature value of 123.025℃ ..... 1230 is stored.

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

[Example 2] At the measured temperature value of -123.025℃ ..... -1230 is stored.

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

3.4.8 Error code (Un\G19)

(1) When the Q64RD/Q64RD-G has detected an error of a set value or operation procedure, the corresponding error code is stored.

(2) The error code is stored as a 16-bit binary value.

(3) When an error occurs, the "ERROR/ERR. LED" of the Q64RD/Q64RD-G is lit.

(4) The following are chief checks made.

Timing	Description
At start	• Check on the intelligent function module switch settings of GX Developer
When Operating condition setting request (Y9) has turned from ON to OFF	• Check on extended averaging processing selection • Check on averaging time and averaging count • Check on warning output upper/upper limit values
When Offset Setting Request (Y1, Y3, Y5, Y7) or Gain Setting Request (Y2, Y4, Y6, Y8) is turned on	• Check on offset/gain setting • Check on CH□ offset temperature set value/CH□ gain temperature set value • Check whether Offset Setting Request (Y1, Y3, Y5, Y7) and Gain Setting Request (Y2, Y4, Y6, Y8) are not turned on at the same time.
When User Range Write Request (YA) has turned from ON to OFF *	• Check whether the same data was written consecutively or not. • Check whether the OMC refresh data has been set or not.
When G(P).OGSTOR instruction is executed in sequence program *	• Check whether the same data was written consecutively or not. • Check whether a different model has been mounted or not by an online module change.

* Supported by the module of function version C or later.

(5) When two or more errors occurred, the error code of the error found first is stored and latter errors are not stored. However, you can confirm the latter errors in the error history of the detailed module information of GX Developer.

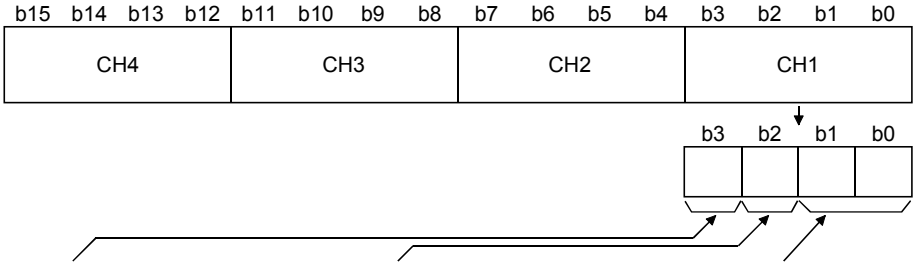
(6) Giving the Error Clear Request (YF) clears the error code and turns off the lit " ERROR/ERR. LED ".

(7) Clearing the error stores 0.

3.4.9 Setting range(Q64RD) (Un\G20)

(1) The settings of "Measurement range setting", "Offset/gain setting" and "Wiring type setting" are stored.

(2) Use the intelligent function module switches of GX Developer to make settings of the "Measurement range setting", "Offset/gain setting" and "Wiring type setting". Refer to Section 4.5 for details of the setting method.



Set value of offset/gain setting

Offset/Gain Setting	Set Value
Factory default	0
User setting	1

Set value of wiring type setting

Wiring Type Setting	Set Value
3-wire type	0
4-wire type	1

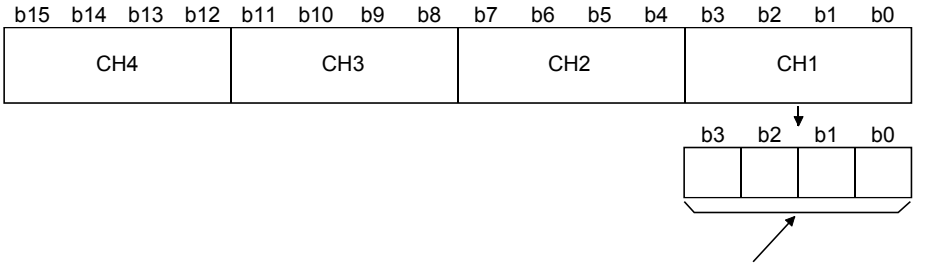
Set value of measurement range setting

Measurement Mode	Measurement Range	Set Value
New JIS (Pt100)	-200～850℃	0
	-20～120℃	1
Old JIS (JPt100)	-200～600℃	2
	-20～120℃	3

3.4.10 Setting range 1 (Q64RD-G) (Un\G20)

(1) The setting of "Measurement range setting" is stored.

(2) Use the intelligent function module switches of GX Developer to make setting of "Measurement range setting".
Refer to Section 4.5 for details of the setting method.

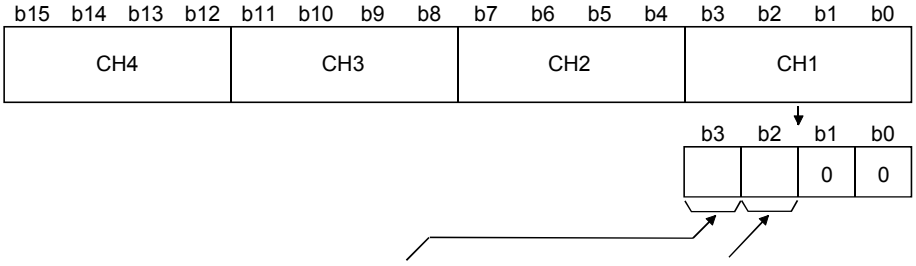


Measurement Mode	Measurement Range	Set Value
New JIS (Pt100)	-200 to 850℃	0
	-20 to 120℃	1
	0 to 200℃	4
Old JIS (JPt100)	-180 to 600℃	2
	-20 to 120℃	3
	0 to 200℃	5
Ni100Ω	-60 to 180℃	8

3.4.11 Setting range 2 (Q64RD-G) (Un\G21)

(1) The settings of "Offset/gain setting" and "Wiring type setting" are stored.

(2) Use the intelligent function module switches of GX Developer to make setting of "Offset/gain setting" and "Wiring type setting".
Refer to Section 4.5 for details of the setting method.



Offset/Gain Setting	Set Value
Factory default	0
User setting	1

Wiring Type Setting	Set Value
3-wire type	0
4-wire type	1

3.4.12 Warning output enable/disable setting (Un\G47)

(1) This area is used to set whether a warning will be output or not per channel.

(2) At power-on or reset, this is set to 000F$_H$ (all channels disabled).

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	0	0	0	0	0	0	CH.4	CH.3	CH.2	CH.1

0: Warning output enable
1: Warning output disable

[Example]

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

Channels 1 and 2 are warning output enabled.

(3) The Operating Condition Setting Request (Y9) must be turned on/off to make the warning output enable/disable setting valid.

3.4.13 Warning output flag (Un\G48)

(1) When a temperature detected is outside the temperature range set for the CH□ warning output upper/lower limit value (buffer memory addresses 86 to 117: Un\G86 to 117), the warning output flag of the corresponding channel turns to 1.

(2) You can check whether the warning given is the upper or lower limit value warning on each channel.

(3) When the temperature conversion value returned to within the measurement range, the flag is automatically reset.

(4) If a warning is detected on any of the channels enabled for conversion, the Warning Output Signal (XD) turns on.

(5) The warning output flag is cleared when the Operating Condition Setting Request (Y9) is turned on.
Also, only for the Q64RD-G, "ALM LED" turns OFF from ON.

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

0: Normal
1: Out-of-range

POINT
Refer to Section 3.4.19 for details of the warning output.

3.4.14 Disconnection detection flag (Un\G49)

(1) The disconnection detection flag of the corresponding channel turns to 1 when the disconnection of the RTD or wire break is detected.

(2) Disconnection detection availabe for conversion-enabled channels only.

(3) Disconnection is detected on each channel.

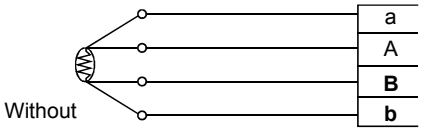
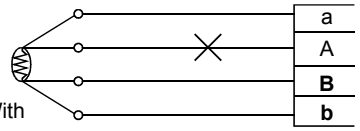
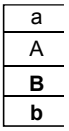
(4) The disconnection detection Signal is cleared when the Operating Condition Setting Request (Y9) is turned on.

(5) If disconnection is detected on any of conversion-enabled channels, the Disconnection Detection Signal (XC) also turns on.
For a channel where disconnection is detected, a value based on the Conversion setting for disconnection detection (buffer memory address 148: Un\G148) is stored in the CH□ measured temperature value (buffer memory addresses 11 to 14, 54 to 61: Un\G11 to 14, Un\G54 to 61).
Conversion of the channels not disconnected is continued.
For the Q64RD-G, "ALM LED" flashes.

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

0: Normal
1: Disconnection

(6) The relationships between disconnection detection and conversion enable/disable are indicated below.

Connection Status	Conversion Enable/ Disable Setting	Disconnection Detection Flag
 Without disconnection	Conversion enable	OFF
	Conversion disable	
 With disconnection	Conversion enable	ON
	Conversion disable	OFF
 Without disconnection	Conversion enable	ON
	Conversion disable	OFF

POINT

- Any channel where no RTD is connected must be specified as "conversion disable".
  Not doing so will turn on the disconnection detection flag.
- For temperature conversion values to be stored when the Disconnection Detection Signal (XC) turns ON, any of "Value immediately before disconnection", "UP scale (maximum value of measured temperature range + 5% of measured temperature range)", "Down scale (minimum value of measured temperature range – 5% of measured temperature range)" or "Given value" can be selected. (Refer to Section 3.2.2.)
- Refer to Section 4.4 for the RTD wiring.
- Refer to Section 8.2.7 for the troubleshooting of disconnection detection.

3.4.15 CH□ scaling value (Un\G50 to 53)

(1) The measured temperature value within the scaling range set for the CH□ scaling range upper/lower limit values (buffer memory address 62 to 77: Un\G62 to 77) is scaled to the scaling width set for the CH□ scaling width upper/lower limit values (buffer memory address 78 to 85: Un\G78 to 85) and the result is stored.

(2) The following is how to calculate the scaling value.

$$\text{Scaling value} = (\text{Scaling width upper limit value} - \text{Scaling width lower limit value}) \times \frac{\text{Measured Temperature value} - \text{Scaling range lower limit value}}{\text{Scaling range upper limit value} - \text{Scaling range lower limit value}} + \text{Scaling width lower limit value}$$

[Example]
To scale a temperature to a percent
When the CH1 measured temperature value of 360℃ measured temperature value = 360000 (32bit)) is scaled at the following settings:
Scaling range: -100 to 500℃ (lower limit value = -100000, upper limit value = 500000)
Scaling width: 0 to 100% (lower limit value = 0, upper limit value = 100)

$$\text{Scaling value} = (100-0) \times \frac{360000-(-100000)}{500000-(-100000)} + 0 = 76.666666\cdots$$ Fractional portion is rounded off.

$$= 77[\%]$$ Stored into buffer memory address 50.

POINT

(1) If the upper limit value is less than the lower limit value in the settings of the CH□ scaling range upper/lower limit values (buffer memory address 62 to 77: Un\G62 to 77) or CH□ scaling width upper/lower limit values (buffer memory address 78 to 85: Un\G78 to 85), it will not result in an error and the scaling value will be output using the above calculation expression to make calculation.
(2) If the temperature measured is outside the range set by the upper and lower limit values of the scaling range, the value set as the upper or lower limit value of the scaling width is stored into the buffer memory.

3.4.16 CH□ measured temperature value (32 bit) (Un\G54 to 61)

(1) The "temperature-measuring resistance value" input from the RTD is converted into a "temperature value" to detect a temperature.

(2) The value of the measured temperature to the third decimal place is multiplied by 1000 and the result is stored into buffer memory in 32-bit signed binary. (All digits to the right of the fourth decimal place are rounded down.)

(3) A negative measured temperature value is displayed as two's complement.

(4) At power-on or reset, all channels are set to 0.

[Example 1] At the measured temperature value of 123.025 ..... 123025 is stored.

b31															b24	b23												b16	b15												b8	b7												b0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	1	0	0	1	0	0	0	1																

[Example 2] At the measured temperature value of -123.025 ..... -123025 is stored.

b31															b24	b23												b16	b15												b8	b7												b0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	0	1	1	0	1	1	1	1																

3.4.17 CH□ scaling range upper/lower limit values (Un\G62 to 77)

(1) Set the scaling range (0.001℃ increments) of the measured temperature on each channel.

(2) 0 is set at power-on or reset.

(3) Allowable scaling range is -2147483648 to 2147483647.

(4) Scaling will not be made if the upper limit value and lower limit value are equal.

(5) The Operating Condition Setting Request (Y9) must be turned on/off to make the setting valid.

3.4.18 CH□ scaling width upper/lower limit values (Un\G78 to 85)

(1) Set the scaling with on each channel.

(2) 0 is set at power-on or reset.

(3) Allowable scaling range is -32768 to 32767.

(4) Set the upper and lower limit values to 0 when scaling will not be made.

(5) The Operating Condition Setting Request (Y9) must be turned on/off to make the setting valid.

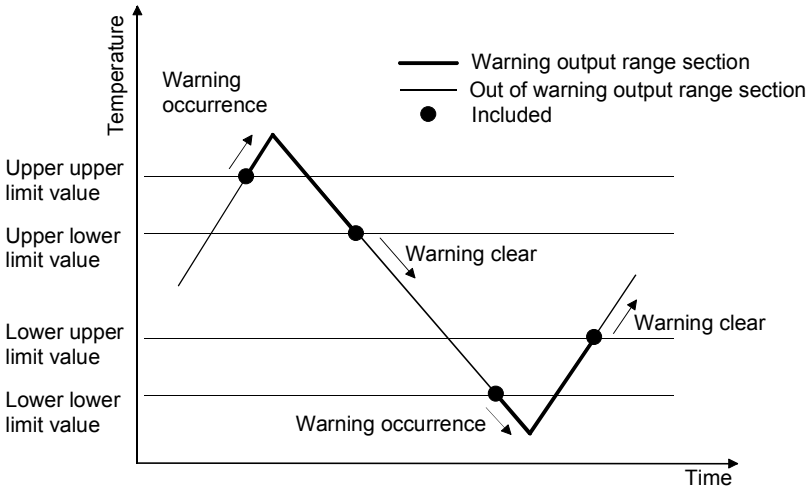
3.4.19 CH□ warning output upper/lower limit values (Un\G86 to 101)

(1) Set the range (0.1℃ increments) on each channel.

(2) The warning output range region can be set in four levels of the warning output upper upper value, upper lower value, lower upper value and lower lower value.

(3) When the detected measured temperature value is higher than or equal to the warning output upper upper limit value, or lower than or equal to the warning output lower lower limit value (when the value enters the warning output range), a warning occurs.
When a warning occurs, "1" is stored to the bit of the corresponding channel in the warning output flag (buffer memory address 48: Un\G48), and the warning output signal (XD) turns ON.

(4) After a warning occurrence, when the temperature value falls lower than the warning output upper lower limit value or rises higher than the warning output lower upper limit value and returns to within the setting range, the warning is cleared.
When the warning is cleared, "0" is stored in the bit position corresponding to the channel of the warning output flag (buffer memory address 48: Un\G48).
The warning output signal (XD) turns OFF only when all channels return to within the setting range.



(5) At power-on or reset, the minimum and maximum values of the measured temperature range of the setting range set as the measurement range (set using GX Developer) are stored.
The upper upper limit value is set to be equal to the upper lower limit value, and the lower upper limit value equal to the lower lower limit value.

Setting		Settings at Power-On or Reset				Allowable Temperature Range
Setting mode	Setting range	Lower lower limit value	Lower Upper limit value	Upper upper limit value	Upper lower limit value	
Pt 100 (New JIS)	0	-200000		850000		-200000 to 850000
	1	-20000		120000		-20000 to 120000
	4	0		200000		0 to 200000
JPt.100 (Old JIS)	2	-180000		600000		-180000 to 600000
	3	-20000		120000		-20000 to 120000
	5	0		200000		0 to 200000
Ni100Ω	8	-60000		180000		-60000 to 180000

* Setting range 0 to 3 can be used for the Q64RD/Q64RD-G. Setting range 4, 5 and 8 is allowed for the Q64RD-G only.

(6) When the settings below are applied, an error (error code 6△□) occurs. Then the error flag (XF) turns ON and the operation is carried out with the setting before the error occurrence.
   (a) Setting a value out of the above settable range.
   (b) Setting a value that does not satisfy the following condition:
      Warning output lower lower limit value ≤ lower upper limit value ≤ upper lower limit value ≤ upper upper limit value
(7) If the lower upper limit value is equal to the upper lower limit value, no error will occur and the warning output is made invalid.
(8) The Operating Condition Setting Request (Y9) must be turned on/off to make the setting valid.

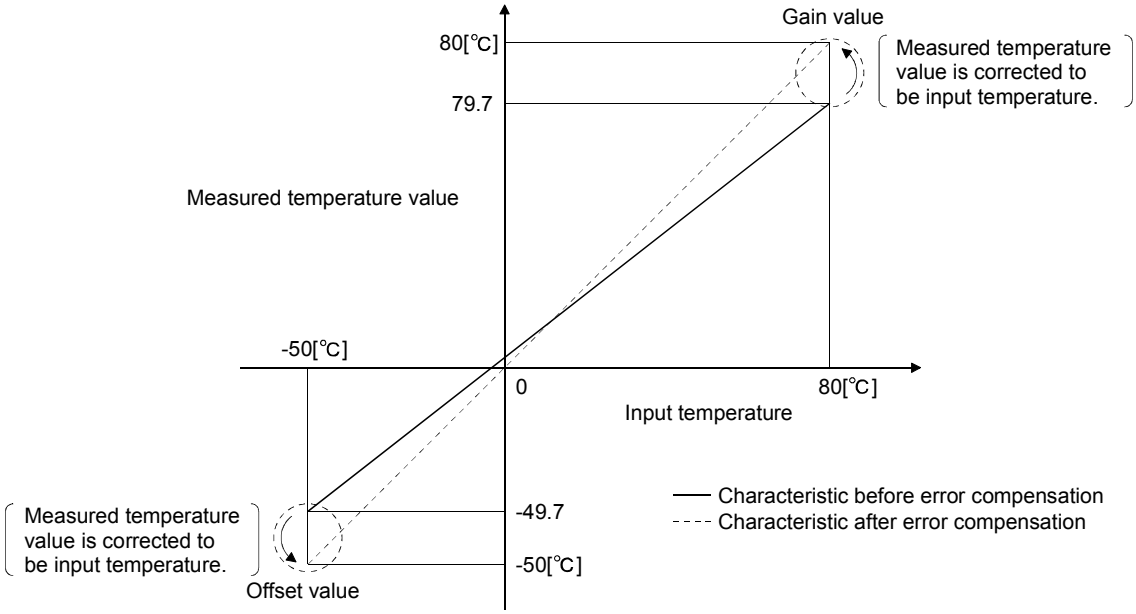
3.4.20 CH□ offset/gain temperature set value (Un\G118 to 133)

(1) Offset/gain setting (error compensation) is a function designed to compensate for the value at any two points (offset value/gain value) within the operating range when the proper temperature conversion value is not available at a system start or when the measurement range type is changed.

(2) When the Offset Setting Request/Gain Setting Request (Y1 to 8) is turned on in the offset/gain setting mode, the measured temperature value is corrrected using the set value written to this area. (Setting in 0.001℃ increments.)
[Example] To set to 80℃ ..... Store 80000.

(3) Error compensation is made by reading the measured temperature values of the buffer memory using a sequence program and monitoring the values on the peripheral device.

(4) The following are the relationships between the measured temperature value and the offset value/gain value relative to the input temperature.



POINT

- High accuracy is ensured for the offset and gain values when the minimum and maximum temperatures within the operating range are used to make error compensation.
- Make offset/gain value setting while simultaneously reading the measured temperature value.
- Always set the offset and gain values so that they will satisfy the following conditions. An error will occur if the conditions are not satisfied.
  Condition 1: Within temperature input range
  Condition 2: Gain value - offset value > 0.1[℃]
- By giving the user range write request, the offset and gain values are stored into the E^2PROM of the Q64RD/Q64RD-G and will not be erased at power-off.
- Error compensation may also be made using general resistor or the like instead of inputting a temperature directly to the temperature-measuring resistor.

Value of general resistor	=	Temperature-measuring resistance value of platinum RTD

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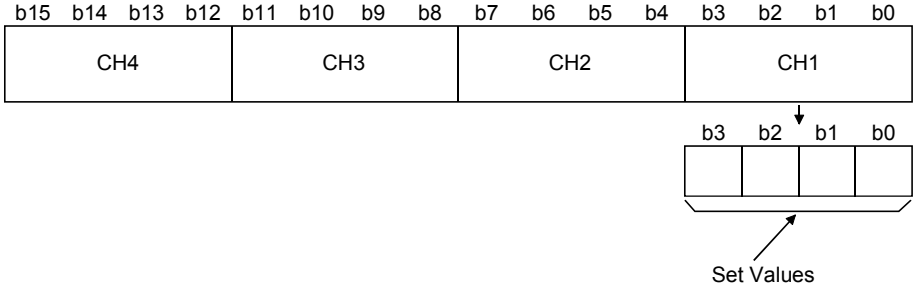
3.4.21 Extended averaging processing specification (Un\G134)

(1) When selecting sampling processing, averaging processing (time/count/moving average) or primary delay filter, write the setting values to the buffer memory address 134 (Un\134).

(2) Sampling processing is set to all channels as a default.

(3) When an out-of-range value is set, sampling processing is performed.



Processing	Set Value
Sampling processing	0
Time averaging	1
Count averaging	2
Moving average	3
Primary delay filter	4

(4) The Operating Condition Setting Request (Y9) must be turn on/off to make this setting valid.

POINT

(1) Use the Extended averaging processing specification (buffer memory address 134: (Un\G134)) to set the averaging processing. In this case, it is not required to use Averaging processing specification (buffer memory address 9: Un\G9). (Any value written to the area is ignored.)

(2) When replacing the Q64RD whose first 5 digits of product information are 07071 or earlier with the one of 07072 or later, there is compatibility within the setting range of the Averaging processing specification (buffer memory address 9: (Un\G9). Existing programs can be utilized without change.
However, when setting the moving average or primary delay filter, make setting in the Extended averaging processing specification area (buffer memory address 134: Un\G134).

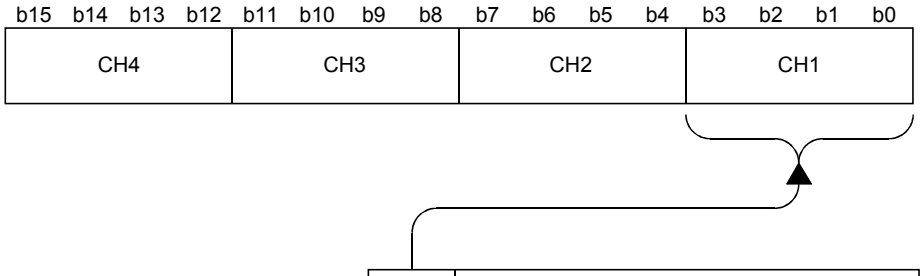
(3) The relation between Averaging processing specification (buffer memory address 9: Un\G9) and Extended averaging processing specification (buffer memory address 134: Un\G134) is as follows:
- When 1H to 4H (other than 0) is written into Extended averaging processing specification, the value of this area becomes valid.
  (The setting of Extended averaging processing specification acts on Averaging processing specification.)
- It becomes valid at the ON/OFF timing of the Operating Condition Setting Request (Yn9).

(4) Refer to Section 3.4.5 for Averaging processing specification (buffer memory address 9: Un\G9).

(5) When setting the Q64RD-G with the utility package, the initial setting using the averaging processing specification does not exist. Make the initial setting using Extended averaging processing specification.

3.4.22 Conversion setting for disconnection detection (Un\G148)

(1) Select the value to be stored in the CH☐ measured temperature value (buffer memory address 11 to 14, 54 to 61: Un\G11 to 14, Un\G54 to 61) in the case of disconnection detection.



Setting value	Value to be stored in the CH☐ measured temperature value in the case of disconnection detection.
0H	Value immediately before disconnection
1H	Up scale (maximum value of measured temperature range + 5% of measured temperature range)
2H	Down scale (minimum value of measured temperature range - 5% of measured temperature range)
3H	Given value (set a value for the CH☐ conversion setting for disconnection state value)(refer to Section 3.4.21)

(2) This is set to 0H (Value immediately before disconnection) when the module is powered up or reset.

(3) The Operating Condition Setting Request (Y9) must be turned on/off to make the setting valid.

(4) Do not set any value outside the setting range.
If it is set, the module operation cannot be guaranteed.

3.4.23 CH☐ Conversion setting value for disconnection detection (Un\G150 to 157)

(1) If Given value (3H) is set in the Conversion setting for disconnection detection (buffer memory address 148: Un\G148), when disconnection is detected, the value set in this area is stored in the CH☐ measured temperature value (buffer memory addresses 11 to 14, 54 to 61: Un\G11 to 14, Un\G54 to 61).
If any of 0H to 2H is set in the Conversion setting for disconnection detection, setting of this area is ignored.

(2) The setting range is from –2147483648 to 2147483647 (0000H to FFFFFFFFH). (Setting in 0.001℃ increments.)
[Example] To set to 0.3℃ ..... Store 300.

(3) This is set to 0 when the module is powered up or reset.

(4) The Operating Condition Setting Request (Y9) must be turned on/off to make the setting valid.

3.4.24 Mode switching setting (Un\G158 to 159)

(1) Set the values of the mode to which you want to switch.

(2) After setting the values, turning the operating condition setting request (Y9) from OFF to ON switches the mode.

(3) When mode switching is performed, this area is cleared to zero and the operating condition setting completion signal (X9) turns OFF.
After confirming that the this signal (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.

3.4.25 Factory default offset/gain value/user range settings offset/gain value/user range settings offset/gain resistance value (Un\G160 to 255)

(1) This area is related with the user range save/restore function and allows users to re-set the offset/gain values easily in the case 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 is written by the utility;
- The operating condition is set (Y9 turns from OFF to ON*1); or
- The offset/gain values are written in the offset/gain setting mode (YA turns from OFF to ON).

*1: The data are not saved when set values have been written to the mode switching setting area (buffer memory addresses 158, 159: Un\G158, Un\G159).

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

(4) In the Q64RD, two areas are provided for each of the factory default offset/gain value/User range settings offset/gain value. (For example, the buffer memory addresses for the 3-wire type CH1 Factory default offset value are 160 and 161.)
When saving the offset/gain values for Online Module Change, the same value is stored into these two areas.
When restoring the offset/gain values, be sure to set the same value to both of them.
In the Q64RD-G, one data value for each of the factory default offset/gain value/User range settings offset/gain value is split into two (the first and second halves) and stored separately. (For example, the buffer memory addresses for the 3-wire type CH1 Factory default offset value are 160 and 161.)
When saving the offset/gain values for Online Module Change, the first and second halves of one data value are stored into two areas.
When restoring the offset/gain values, be sure to set the first and second halves of one data value to each of the areas.

(5) Buffer memory saving recording procedure for online module change

1) Turn the Operating condition setting request (Y9) from OFF to ON.

2) Compare the factory default offset/gain value/user range settings offset/gain value/user range settings offset/gain resistance value (buffer memory addresses 160 to 255: Un\G160 to Un\G255) with the values in the range reference table. Refer to Section 7.4 for the range reference table.

3) If the values are proper, record the factory default offset/gain value/user range settings offset/gain input value/user range settings offset/gain resistance value.

(6) Refer to Chapter 7 for details of online module change.

POINT
This area is not used for the offset/gain setting. For the offset/gain setting, refer to Section 4.6.

MEMO

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4 SETUP AND PROCEDURES BEFORE OPERATION

4.1 Handling Precautions

(1) Do not drop the module or subject it to heavy impact.

(2) Do not remove the PCB of the module from its case. Doing so may cause the module to fail.

(3) Be careful not to let foreign particles such as swarf or wire chips enter the module. They may cause a fire, mechanical failure or malfunction.

(4) The top surface of the module is covered with a protective film to prevent foreign objects such as wire burrs from entering the module during wiring. Do not remove this film until the wiring is complete. Before operating the system, be sure to remove the film to provide adequate ventilation.

(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) *1	0.36 to 0.48 N·m
Terminal block screw (M3 screw)	0.42 to 0.58 N·m
Terminal block mounting screw (M3.5 screw)	0.66 to 0.89 N·m

*1: The module can be easily fixed onto the base unit using the hook at the top of the module.
However, it is recommended to secure the module with the module fixing screw if the module is subject to significant vibration.

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

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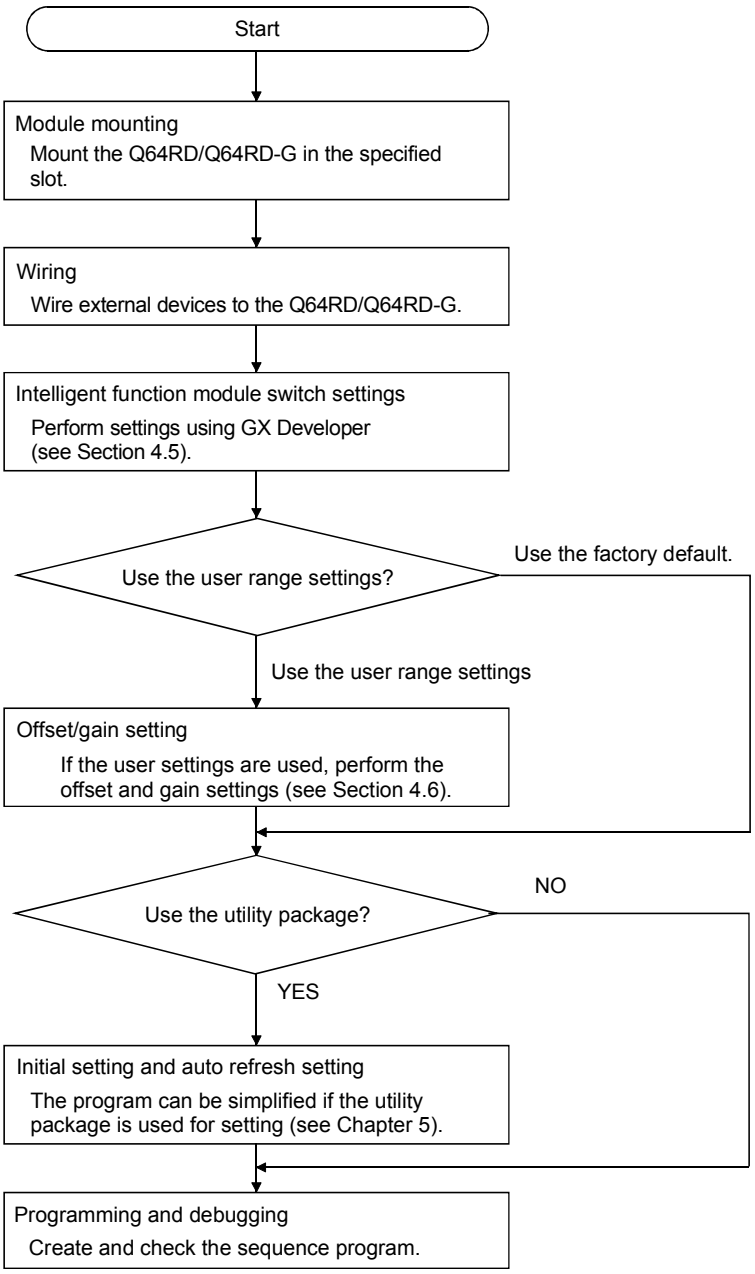
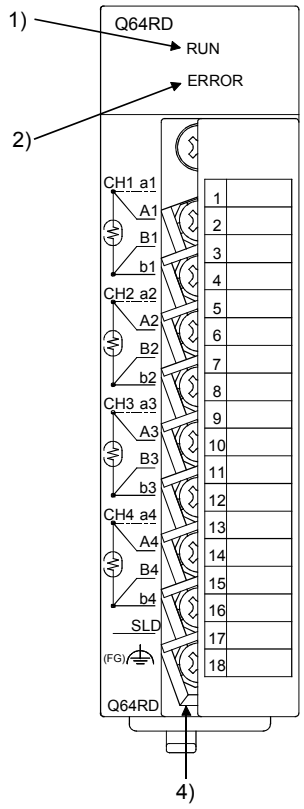
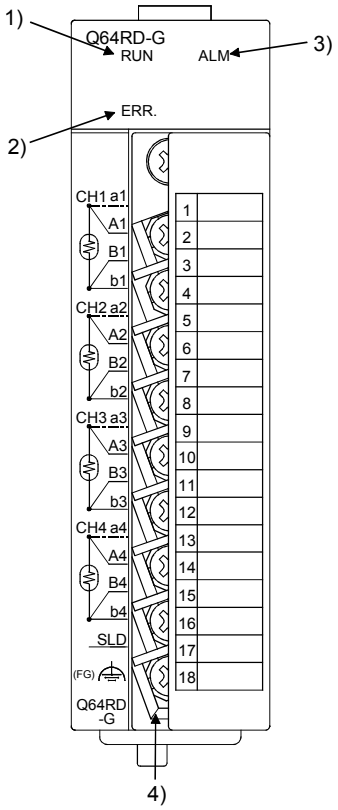
4.2 Setup and Procedures before Operation



4.3 Part Names and Settings

This section explains the names of the Q64RD/Q64RD-G parts.





Terminal Block Layout		
Terminal number	Signal name	
1	CH1	a1
2		A1
3		B1
4		b1
5	CH2	a2
6		A2
7		B2
8		b2
9	CH3	a3
10		A3
11		B3
12		b3
13	CH4	a4
14		A4
15		B4
16		b4
17	SLD	
18	FG	

Number	Name and Appearance	Description
1)	RUN LED	Indicates the Q64RD/Q64RD-G operation status. ON : Normally operating Flicker : Offset/gain setting mode OFF : 5V power-off, watchdog timer error occurrence or status available for module replacement during online module replacement
2)	ERROR LED ERR. LED	Indicates the Q64RD/Q64RD-G error status. ON : Error occurrence Flicker : Switch setting error In intelligent function module switch setting of GX Developer, other than 0 was set to Switch 5. OFF : Normally operating
3)	ALM LED (Q64RD-G only)	Indicates the Q64RD/Q64RD-G alarm status. ON : Alarm occurrence Flicker : Input signal fault occurrence OFF : Normally operating
4)	Terminal block	Used for wiring of the temperature-measuring resistor, etc.

∗ Check the error code for details.

4.4 Wiring

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

4.4.1 Wiring Instructions

In order to optimize the functions of the Q64RD/Q64RD-G and ensure system reliability, external wiring that is protected from noise is required.
Please observe the following precautions for external wiring:

(1) Use separate cables for the AC control circuit and the external input signals of the Q64RD/Q64RD-G to avoid the influence of the AC side surges and inductions.

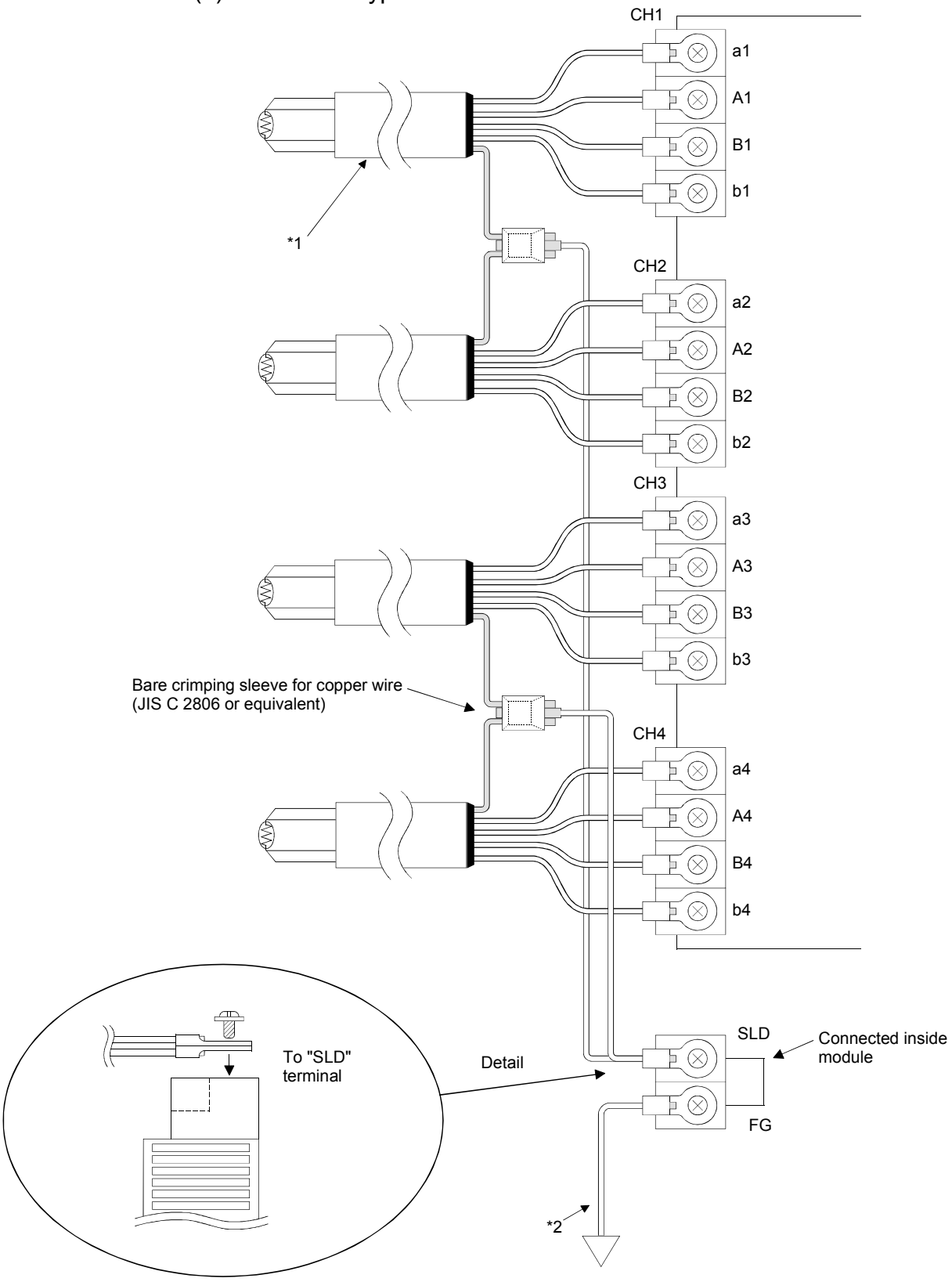
(2) Do not run the module cables near, or bundle them with, the main circuit and high-voltage cables and the load cables from other than the programmable controller. Not doing so will make the module more susceptible to noises, surges and inductions.

(3) Earth the shielded of the shielded cable to FG of the programmable controller. However, depending on the external noise conditions, external earthing on the RTD side may be recommended.

(4) Insulation-sleeved crimping terminals cannot be used with the terminal block. It is recommended to fit mark tubes or insulation tubes to the wire connection parts of the crimping terminals.

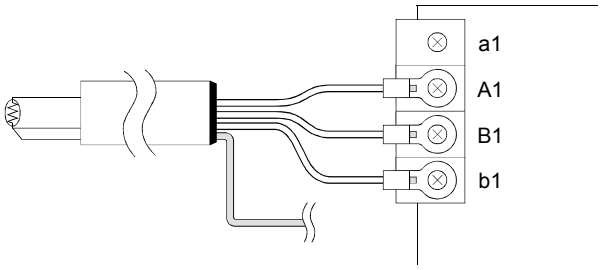
4.4.2 External Wiring

(1) For 4-wire type



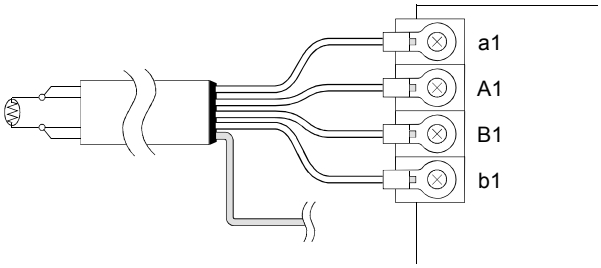
*1 Use the conducting cable with shield and make the wiring length as short as possible.
*2 Ground it to the ground terminal on the control panel.

(2) For 3-wire type

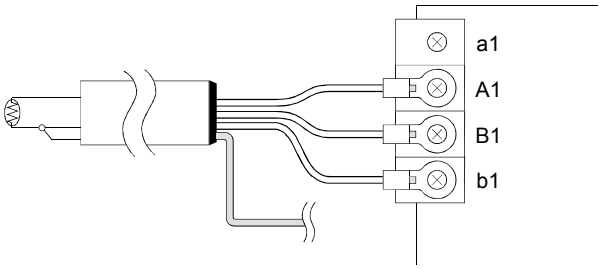


(3) For 2-wire type

When 4-wire type is selected in switch 3
of intelligent function module switch setting



When 3-wire type is selected in switch 3
of intelligent function module switch setting



4.5 Switch Setting for Intelligent Function Module

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

(1) Setting item

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

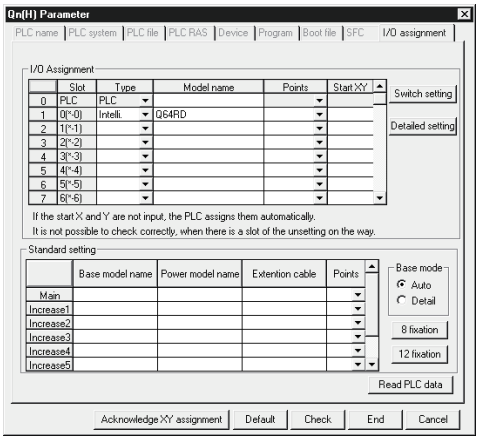
<table>
<tr><th></th><th colspan="2">Setting Item</th></tr>
<tr><td>Switch 1</td><td>Measurement range setting
CH4 CH3 CH2 CH1 H</td><td>
<table>
<tr><th>Measurement mode</th><th>Measurement range</th><th>Set value∗1</th></tr>
<tr><td rowspan="3">New JIS
(Pt 100)</td><td>-200 to 850℃</td><td>0</td></tr>
<tr><td>-20 to 120℃</td><td>1</td></tr>
<tr><td>0 to 200℃</td><td>4</td></tr>
<tr><td rowspan="3">Old JIS
(JPt100)</td><td>-180 to 600℃</td><td>2</td></tr>
<tr><td>-20 to 120℃</td><td>3</td></tr>
<tr><td>0 to 200℃</td><td>5</td></tr>
<tr><td>Ni100Ω</td><td>-60 to 180℃</td><td>8</td></tr>
</table>
</td></tr>
<tr><td>Switch 2</td><td>Offset/gain setting
CH4 CH3 CH2 CH1 H</td><td>
<table>
<tr><th>Offset/gain setting</th><th>Set value</th></tr>
<tr><td>Factory default</td><td>0</td></tr>
<tr><td>User range setting</td><td>1</td></tr>
</table>
</td></tr>
<tr><td>Switch 3</td><td>Wiring type setting
CH4 CH3 CH2 CH1 H</td><td>
<table>
<tr><th>Wiring type setting</th><th>Set value</th></tr>
<tr><td>3-wire type</td><td>0</td></tr>
<tr><td>4-wire type</td><td>1</td></tr>
</table>
</td></tr>
<tr><td>Switch 4</td><td colspan="2">H
0H : Normal mode (temperature conversion processing)
1 to FH *2: Offset/gain setting mode</td></tr>
<tr><td>Switch 5</td><td colspan="2">0: Fixed</td></tr>
</table>

∗1 The setting range 0 to 3 is available for the Q64RD/Q64RD-G. Setting of 4, 5 and 8 is available for the Q64RD-G only. Setting other than these setting values will output an error. For details, check the error code.

∗2 The same operation is activated with any value within the setting range. For the range of 1 to FH, for example, set 1.

(2) Operating procedure

Start the settings with GX Developer assignment setting screen.



(a) I/O assignment setting screen

Set the following for the slot in which the Q64RD is mounted.

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

Type : Select "intelli."

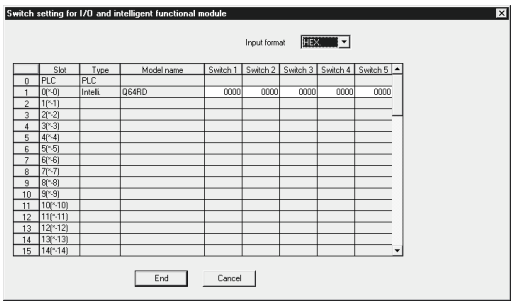
Model name : Enter the module model name.

Points : Select 16 points.

Start XY : Enter the start I/O number for the Q64RD/Q64RD-G.

Detail setting: Specify the control PLC for the Q64RD/Q64RD-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 Q64RD/Q64RD-G.



(b) Switch setting for intelligent function module screen

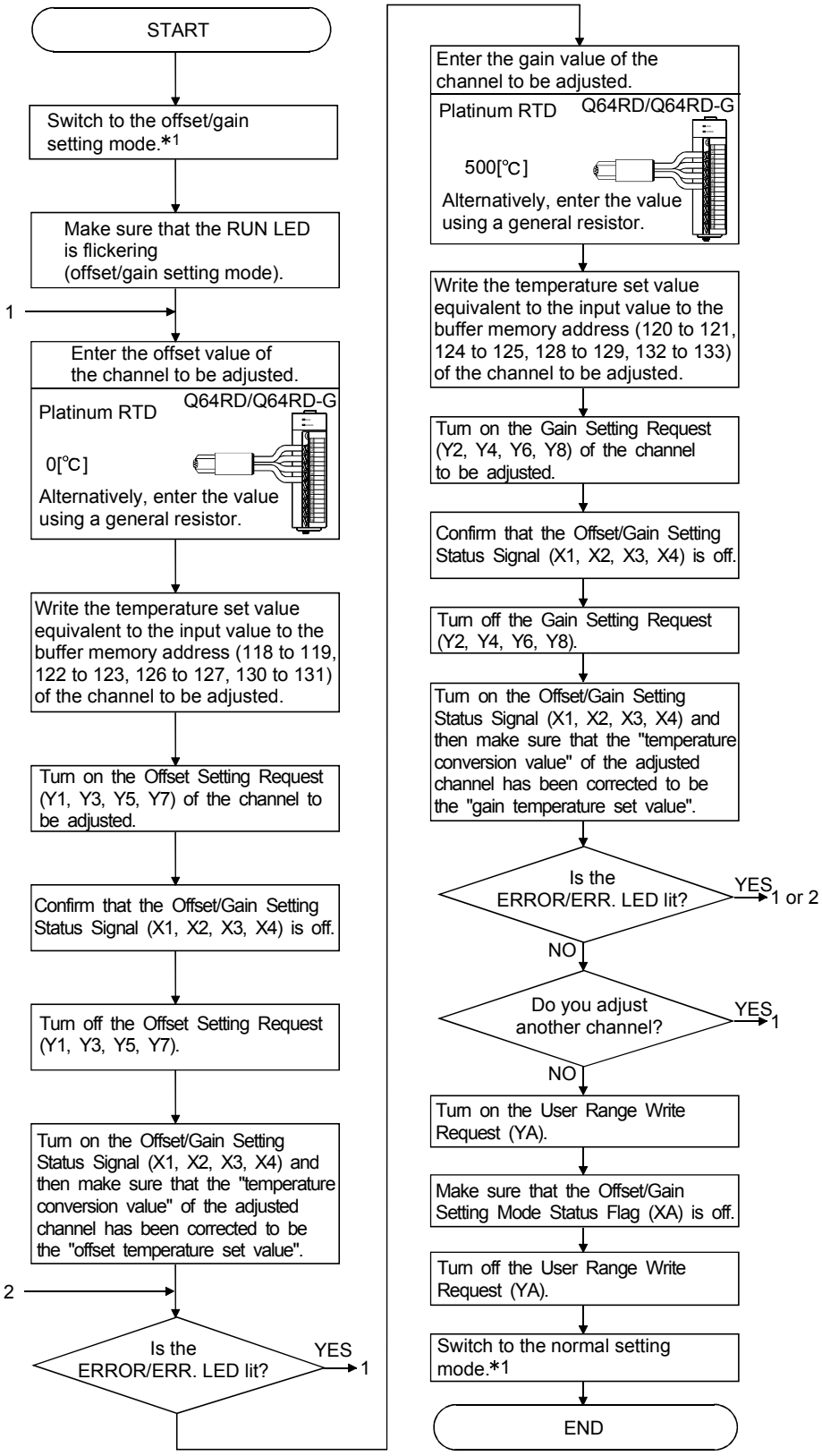
Click on [Switch setting] on the I/O assignment setting screen to display the screen shown at left, then set switches 1 to 5.

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

4.6 Offset/Gain Setting

Perform offset/gain settings in the procedure given in Section 4.6 (1).
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 or Section 5.6.3

(1) Offset/gain setting



∗1 The mode switching (normal mode to offset/gain setting mode to normal mode) method is given below.
- Dedicated instruction (G.OFFGAN) Refer to Section 4.6 (2), (a)
- Setting made to mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159) and turning the Operating 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

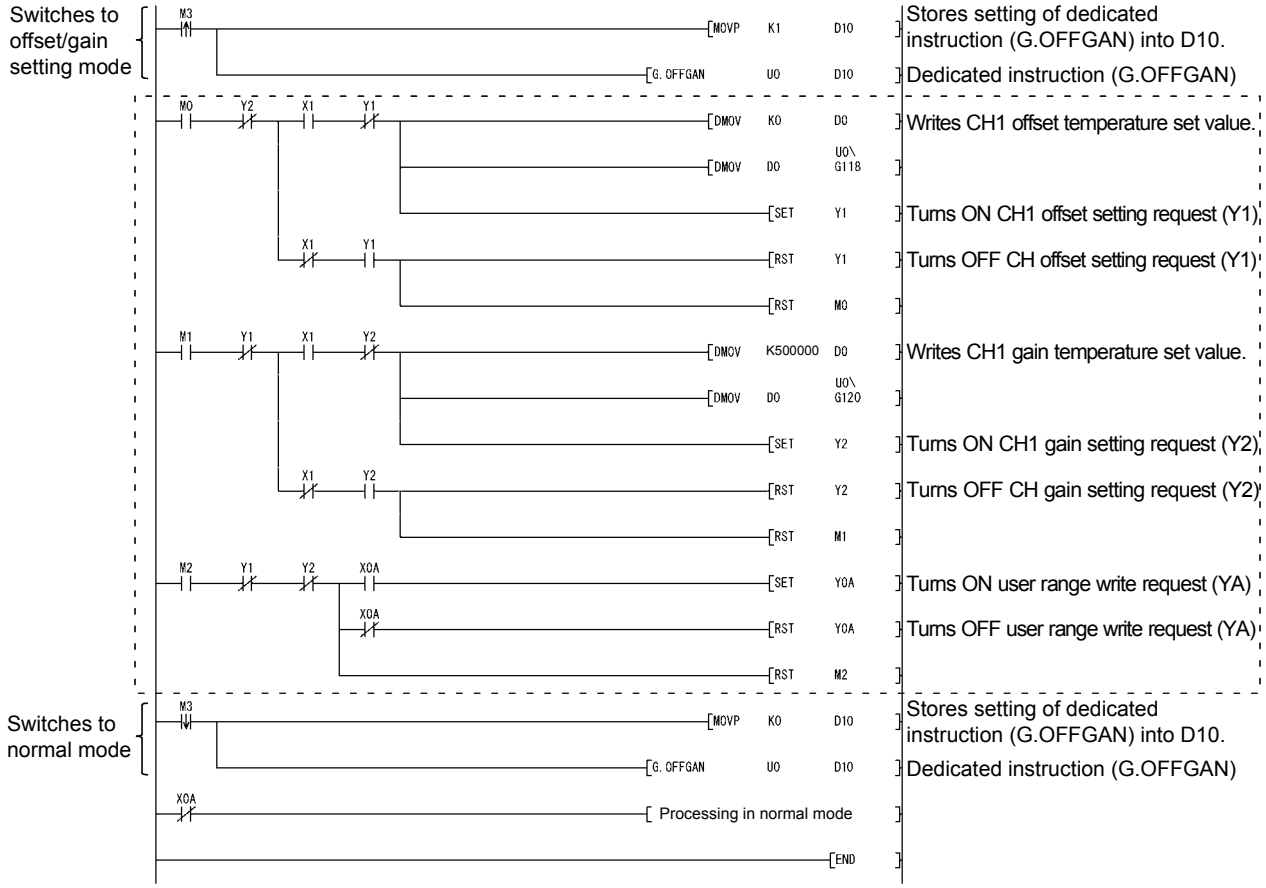
- Check the offset and gain values in the actual operating status.
- By turning ON the user range write request (YA), the offset and gain values are stored into the E^2PROM and will not be erased at power-off.
- Make offset/gain setting within the measured temperature range.
  If setting is made outside the measured temperature range, the resolution and accuracy may not fall within the ranges of the performance specifications.
- Offset/gain setting may be made for two or more channels simultaneously.
- Do not set the offset and gain values simultaneously.
  Specifying them at the same time will cause an error, lighting up the ERROR/ERR. LED.
- If an error occurs during offset/gain setting, setting can be continued on another channel or the like.
  However, since the error remains occurring, turn on the Error Clear Request (YF) when you want to clear the error.
- At the time of offset/gain setting, turn ON the user range write request (YA) to write the values to the E^2PROM.
  Data can be written to the E^2PROM up to 100 thousand times.
  To prevent accidental write to the E^2PROM, an error will occur and the error code (buffer memory address 19: Un\G19) will be stored if write is performed 26 consecutive times.
- 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 Q64RD. (∗1: □indicates the corresponding channel number.)
- Module Ready (X0) turns from OFF to ON when the offset/gain setting mode switches to the normal mode by the dedicated instruction (G.OFFGAN) or the setting of the mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159).
  Note that initial setting processing will be executed if there is a sequence program that makes initial setting when Module ready (X0) turns ON.
  Also, the error is cleared when the mode is switched.
- The areas of Factory default offset/gain value/User range settings offset/gain value/User range settings offset/gain resistance value (buffer memory address 160 to 255: Un\G160 to 255) are related with the user range save/restore function and allows users to re-set the offset/gain values easily in the case of online module change.
  These area are not used for the offset/gain setting.

(2) Program examples

The program in the dotted area of (a) is common to (a), (b) and (c).
In this example, the I/O numbers of the Q64RD/Q64RD-G are X/Y0 to X/YF.

- Offset request M0
- Gain request M1
- Write request M2
- Mode switching M3
- Offset/gain temperature set value D0, D1
- Dedicated instruction (G.OFFGAN) setting storage device D10

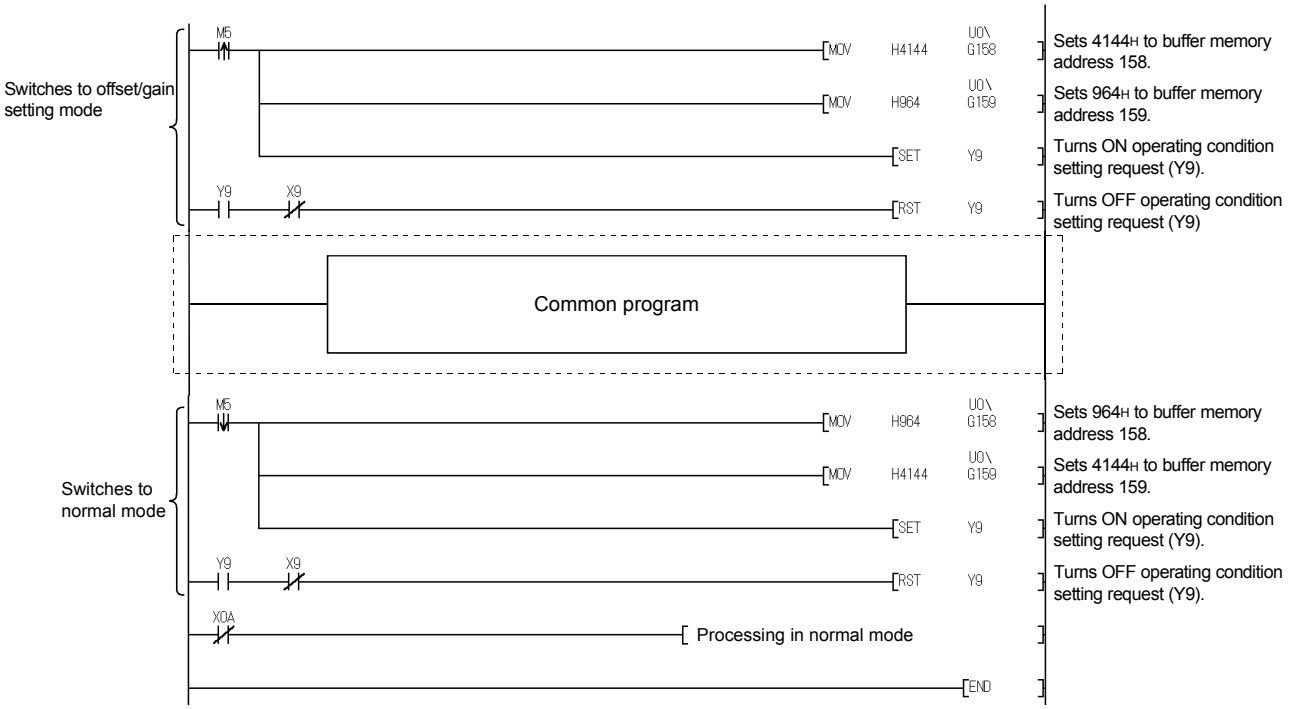
(a) When switching the mode using the dedicated instruction (G.OFFGAN)
The following program example switches to the offset/gain setting mode with the dedicated instruction (G.OFFGAN) and writes the offset/gain values of CH. 1 to the Q64RD/Q64RD-G.



∗ The program in the dotted area is a common program.

4 - 12

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



(c) When switching the mode by making intelligent function module switch setting, other than the common program is not required.

5 UTILITY PACKAGE (GX Configurator-TI)

5.1 Utility Package Functions

Table 5.1 shows a list of the utility package functions.

Table 5.1 Utility Package (GX Configurator-TI) Function List

Function	Description	Reference section
Initial setting ＊1	(1) Make the initial setting for the following items on each channel. • Conversion Enable/Disable Setting • Sampling/Averaging Processing Selection (Q64RD) • Extended Averaging Processing Selection • Time/Count Averaging Selection (Q64RD) • Time/Count/Moving Average/Time Constant Setting ＊2 • Warning Output Enable/Disable Setting • Setting Range (Q64RD) • Setting Range 1 (Q64RD-G) • Warning Output Lower Lower Limit Value • Warning Output Lower Upper Limit Value • Warning Output Upper Lower Limit Value • Warning Output Upper Upper Limit Value • Scaling Range Lower Limit Value • Scaling Range Upper Limit Value • Scaling Width Lower Limit Value • Scaling Width Upper Limit Value • Conversion setting for disconnection detection • Conversion setting value for disconnection detection (2) The data set in the initial setting are stored as parameters in the programmable controller CPU, and automatically written into the Q64RD/Q64RD-G when the programmable controller CPU is changed into the RUN status.	Section 5.4
Auto refresh ＊1	(1) Make the refresh setting for the following items on each channel. • Conversion Completion Flag • CH□ Measured Temperature Value (16bit) • Error Code • Setting Range (Q64RD) • Setting Range 1 (Q64RD-G) • Setting Range 2 (Q64RD-G) • Warning Output Flag • Disconnection Detection Flag • CH□ Scaling Value • CH□ Measured Temperature Value (32bit) (2) The data in the Q64RD/Q64RD-G buffer memory set in the auto refresh setting are read or written to set devices automatically when the END instruction of the programmable controller CPU is executed.	Section 5.5
Monitor/test	Monitors and tests the buffer memory and I/O signals for the Q64RD/Q64RD-G. • Module Ready • Operating Condition Setting Completion Signal • Operating Condition Setting Request • Offset/gain Setting Mode Status Flag • Disconnection Detection Signal • Warning Output Signal • Conversion Completion Flag • Error Flag • Error Clear Request • Averaging Processing Selecion • Extended Averaging Processing Selection (1) CH□ Monitor/Test • Conversion Enable/Disable Setting • Sampling/Averaging Processing Selection (Q64RD) • Extended Averaging Processing Selection • Time/Count Averaging Selection (Q64RD) • Time/Count/Moving Average/Time Constant Setting • Conversion Completion Flag • Measured Temperature Value (16bit) • Measured Temperature Value (32bit) • Error Code • Setting Range (Q64RD) • Setting Range - Wire Connection (Q64RD) • Setting Range 1 (Q64RD-G) • Setting Range 2 - Wire Connection (Q64RD-G) • Warning Output Enable/Disable Setting • Warning Output Flag Lower Limit Value • Warning Output Flag Upper Limit Value • Warning Output Lower Lower Limit Value • Warning Output Lower Upper Limit Value • Warning Output Upper Lower Limit Value • Warning Output Upper Upper Limit Value • Disconnection Detection Flag • Scaling Value • Scaling Range Lower Limit Value • Scaling Range Upper Limit Value • Scaling Width Lower Limit Value • Scaling Width Upper Limit Value • Conversion setting for disconnection detection ＊3 • Conversion setting value for disconnection detection ＊3	Section 5.6

Function	Description	Reference section
Monitor/test	(2) Offset/Gain Setting • Mode Switching Setting • Mode Switching Setting Status • CH□ Setting Range • CH□ Offset Temperature Setting Value • CH□ Offset Setting Request • CH□ Gain Temperature Setting Value • CH□ Gain Setting Request • CH□ Measured Temperature Value (16bit) • CH□ Measured Temperature Value (32bit) • User Range Write Request • Offset/gain Setting Mode Status Flag (3) X/Y Monitor/Test • Xn0: Module Ready • Xn1: CH1 Offset/Gain Setting Status Signal • Xn2: CH2 Offset/Gain Setting Status Signal • Xn3: CH3 Offset/Gain Setting Status Signal • Xn4: CH4 Offset/Gain Setting Status Signal • Xn9: Operating Condition Setting Completion Signal • XnA: Offset/gain Setting Mode Status Flag • XnC: Disconnection Detection Signal • XnD: Warning Output Signal • XnE: Conversion Completion Flag • XnF: Error Flag • Yn1: CH1 Offset Setting Request • Yn2: CH1 Gain Setting Request • Yn3: CH2 Offset Setting Request • Yn4: CH2 Gain Setting Request • Yn5: CH3 Offset Setting Request • Yn6: CH3 Gain Setting Request • Yn7: CH4 Offset Setting Request • Yn8: CH4 Gain Setting Request • Yn9: Operating Condition Setting Request • YnA: User Range Write Request • YnF: Error Clear Request (4) OMC Refresh Data • 3/4-wire type CH□ Factory default offset/gain input value • 3/4-wire type CH□ User range settings offset/gain value • 3/4-wire type CH□ User range settings offset/gain resistance value • OMC refresh data read request • OMC refresh data write request	Section 5.6

5

POINT

*1 For the initial setting and auto refresh setting, memory capacity of Max. 76 bytes per module is required for the Intelligent function module parameters.

*2 Verify the input range displayed on the utility package screen and then enter values.
If a value outside the input range is set, an error will not be identified on the utility package but detected during module operation.
In such a case, check the error code and set an appropriate value.

*3 Monitoring only is available. The tests are not executable.

5 - 2

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-TI:

(1) For safety

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

(2) About installation

The GX Configurator-TI is add-in software for GX Developer Version 4 or later. Therefore, GX Configurator-TI 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-TI

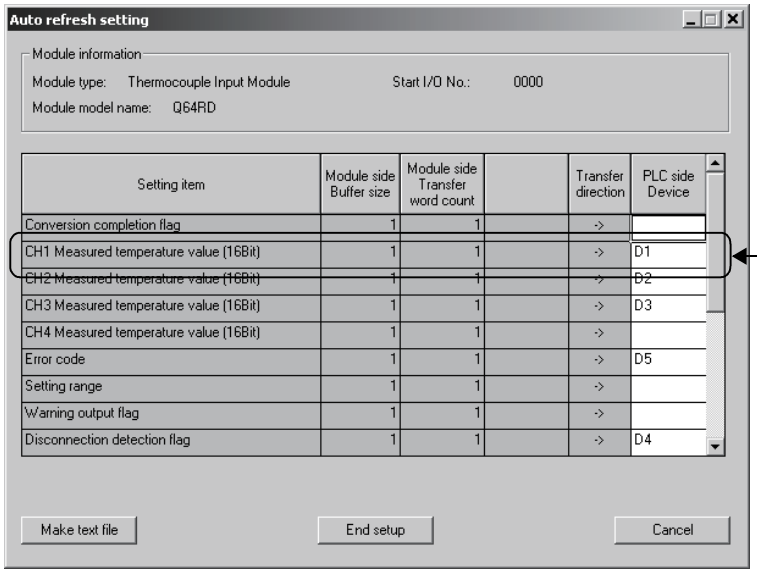
When multiple intelligent function modules are mounted, the number of parameter settings must not exceed the following limit.

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-TI is as shown below.

Target module	Initial setting	Auto refresh setting
Q64RD	5 (Fixed)	17 (Max.)
Q64RD-G	4 (Fixed)	18 (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-TI.

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 following table "Operating system and performance required for personal computer".
	Required memory	
Hard disk space ＊3	For installation	65 MB or more
	For operation	10 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 GX Configurator-TI in GX Developer Version 4 or higher in the same language.
GX Developer (English version) and GX Configurator-TI (Japanese version) cannot be used in combination, and GX Developer (Japanese version) and GX Configurator-TI (English version) cannot be used in combination.

＊2: GX Configurator-TI is not applicable to GX Developer Version 3 or earlier.

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

＊4: Resolution of 1024 × 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 Pack1 or more)	Pentium® 300MHz or more	128MB or more
Windows® XP Home Edition (Service Pack1 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

- 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.
- 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.

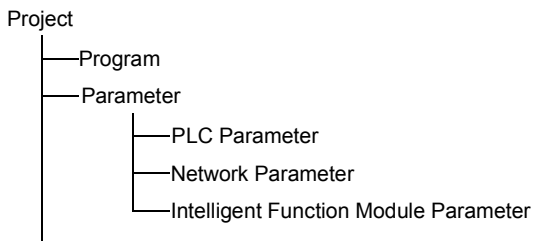
Key	Application
Esc	Cancels the current entry in a cell. Closes the window.
Tab	Moves between controls in the window.
Ctrl	Used in combination with the mouse operation to select multiple cells for test execution.
Delete	Deletes the character where the cursor is positioned. When a cell is selected, clears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

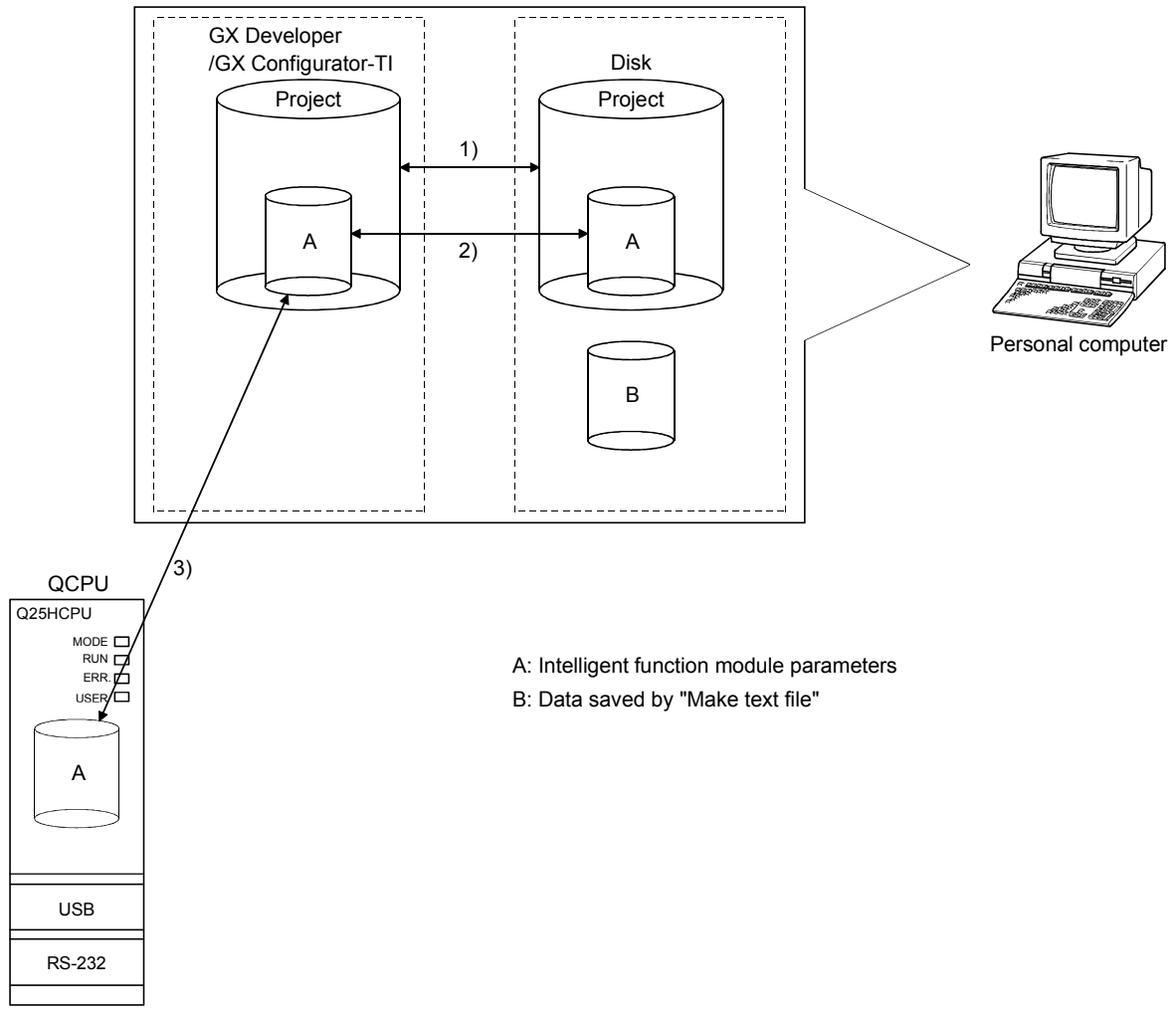
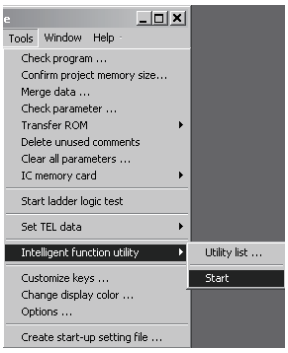


Figure 5.1 Correlation chart for data created with the utility package

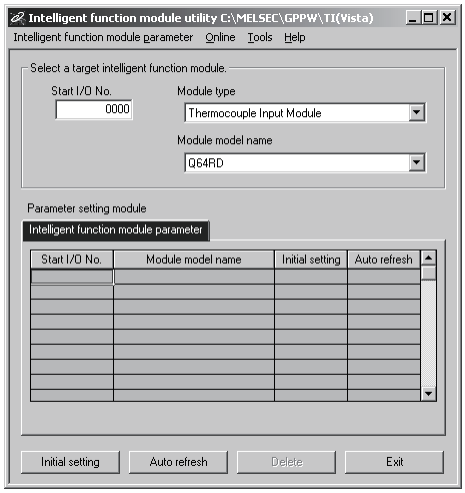
5.3.2 Operation overview

GX Developer screen



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

Screen for selecting a target intelligent function module



Refer to Section 5.3.3.

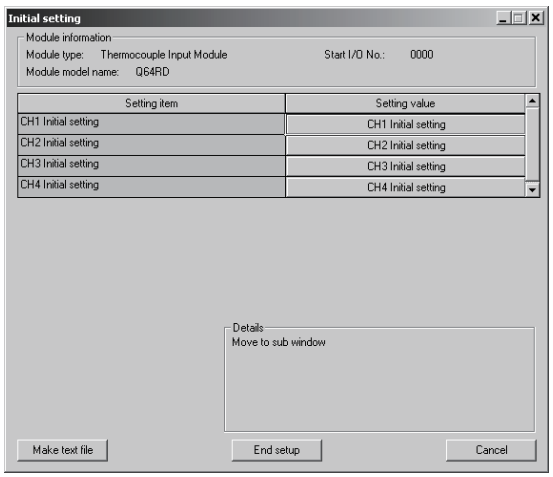
Enter "Start I/O No.", and select "Module type" and "Module model name".

1)

Initial setting

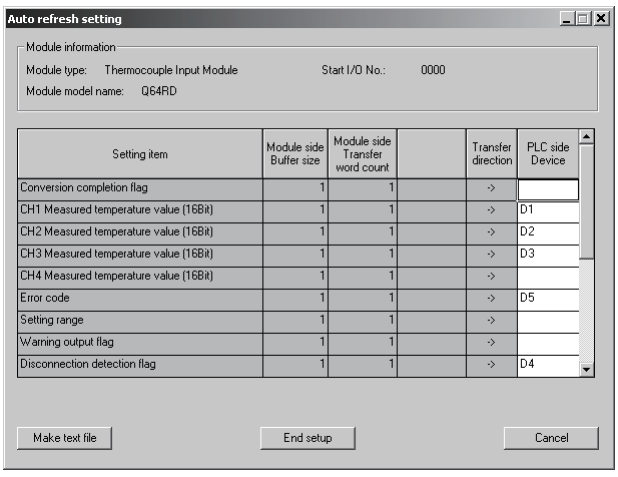
Auto refresh

Initial setting screen



Refer to Section 5.4.

Auto refresh setting screen

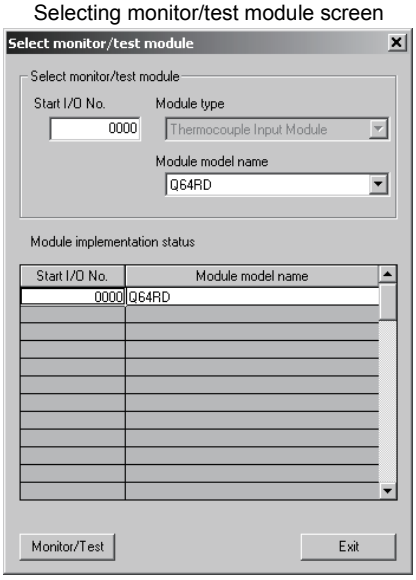


Refer to Section 5.5.

1)

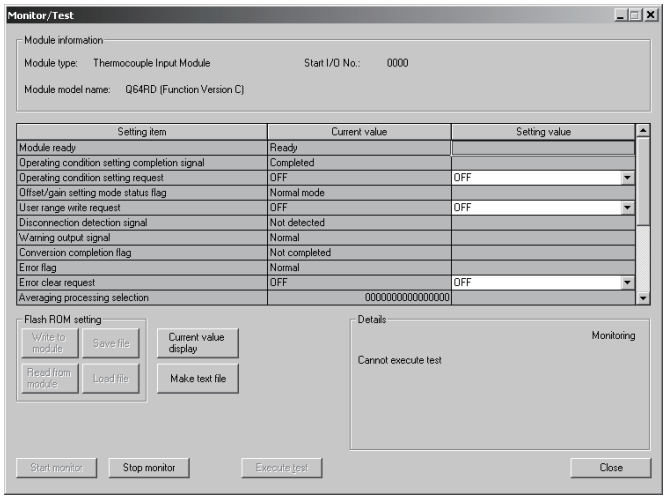
[Online] – [Monitor/Test]

Selecting monitor/test module screen



Select a module to be monitored/tested.

Monitor/Test screen



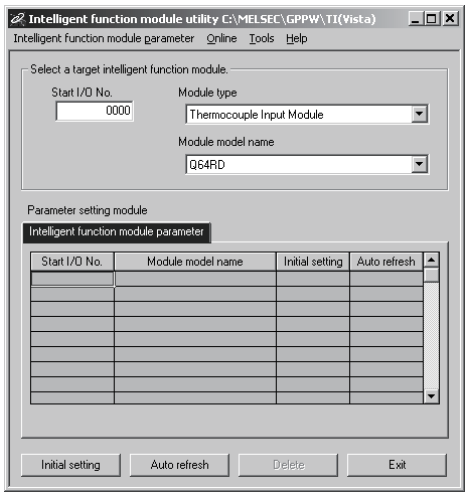
Refer to Section 5.6.

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]



[Explanation of items]

(1) Activation of other screens

Following screens can be displayed from the intelligent function module utility screen.

(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]

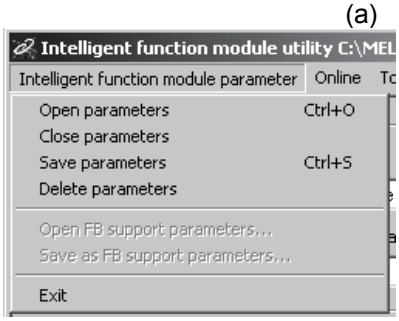
*1 Enter the start I/O No. in hexadecimal.

(2) Command buttons

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

(3) Menu bar

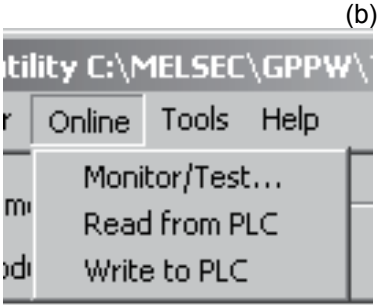
(a) File menu



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.
[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 the programmable controller CPU after having been saved in a file.

(b) Set the target programmable controller CPU in GX Developer: [Online] → [Transfer setup].

(c) When the Q64RD/Q64RD-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]

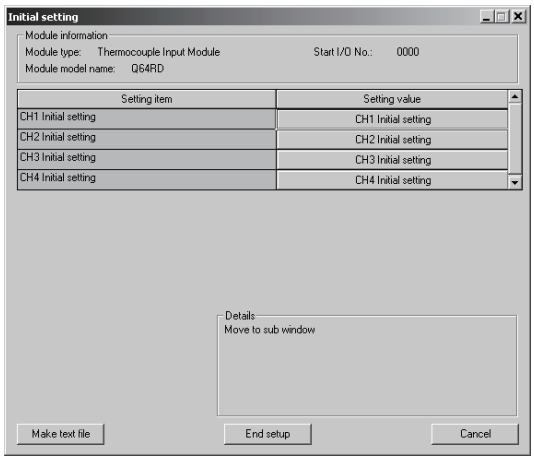
Make initial setting for operating the Q64RD/Q64RD-G on each channel.
Refer to Section 5.1 for the initial setting parameter types.
This initial setting makes sequence program setting unnecessary.

[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 whether temperature conversion is enabled or disabled and the temperature conversion method 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 the intelligent function module parameters. After being written to the CPU module, the initial setting is made effective by either (1) or (2).

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

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

When using a 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 Settings

[Purpose]

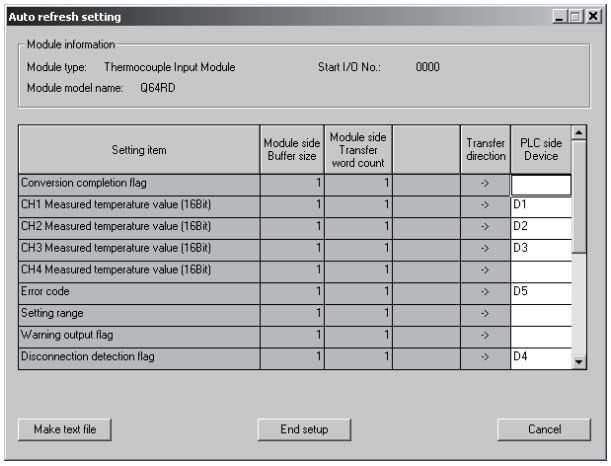
Configure the Q64RD/Q64RD-G buffer memory for auto refresh.

[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 that can be transferred (fixed at one word).
Module side Transfer word count	:	Displays the number of words to transfer the CPU device from the head device (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.

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]

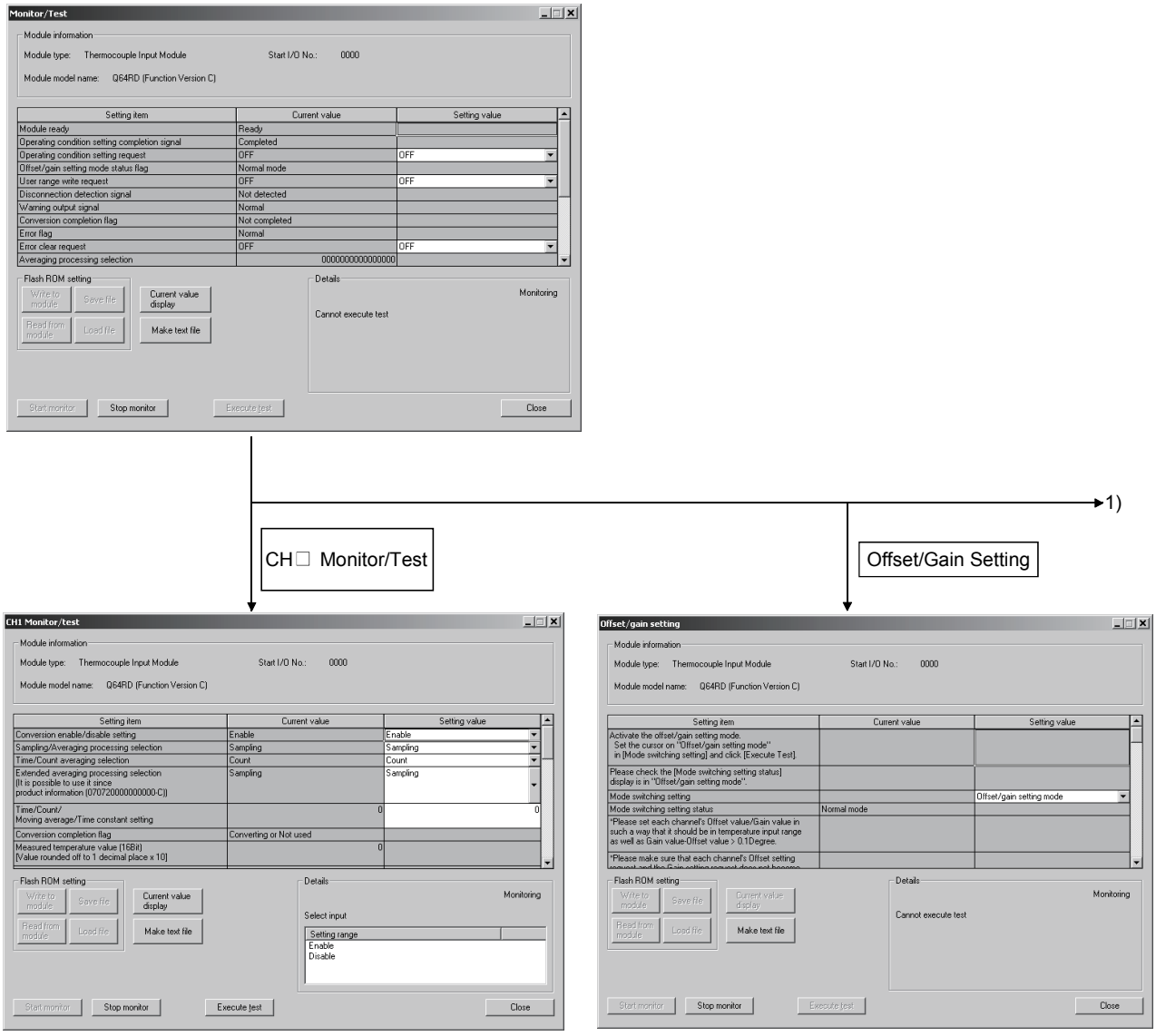
Start buffer memory monitoring/testing, I/O signal monitoring/testing, offset/gain settings (refer to Section 5.6.2, 5.6.3) and pass data (refer to Section 5.6.4) from this screen.

[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.

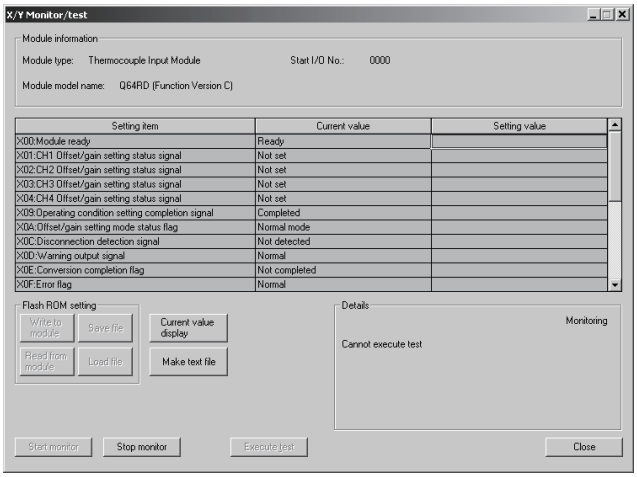
[Setting screen]

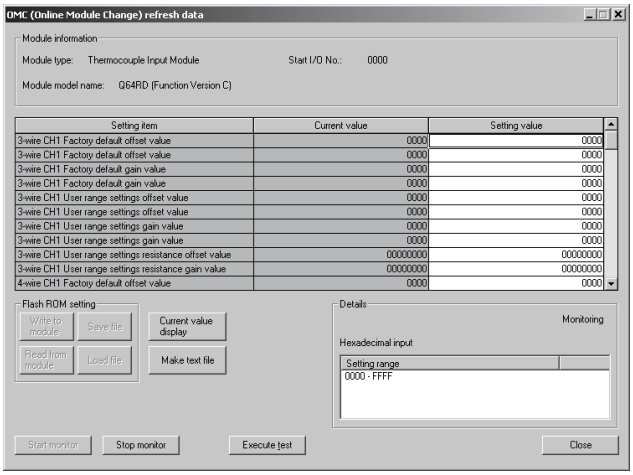


1)

X/Y Monitor/Test

OMC refresh





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[Explanation of items]

(1) Items

Setting item : Displays I/O signals and buffer memory names.
Current value : Monitors the I/O signal states and present buffer memory values.
Setting value : Enter or select the data to be written into the buffer memory for test operation.

(2) Command buttons

Current value display	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.

REMARK

The following describes an example where sampling processing for the selection test operation is changed to a 10-time averaging processing setting when the Q64RD id used.

(1) Set averaging processing in the setting value field for Sampling/Averaging processing selection.
(2) Set number of times in the setting value field for Time/count selection.
(3) Click the setting value field for Time/count/move average/time constant setting to select.
(4) After entering the count, press the Enter key.

At this point, nothing has been written to the Q64RD.

(5) Select the setting value fields that were specified in steps 1 to 4 while holding down the Ctrl key.
(6) Click Execute test to execute write operation.

Once writing has been completed, the value that was written will be displayed in the present value field.

5.6.2 Offset/gain setting operation (Function version C or later)

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

(1) Switch to the offset/gain setting screen

Display the offset/gain setting screen using the operation described in Section 5.6.1.

(2) Switch to the offset/gain setting mode

Set " Offset/gain setting mode" in the Setting (value) field of Mode switching setting and click the Execute test button to perform write.

On completion of write, the indication in the Current value field of Mode switching setting status changes to " Offset/gain setting mode ".

(3) Adjustment of the offset and gain values

(a) Set the offset value
Enter the desired value into the Setting (value) field for CH□ Offset Temperature Setting Value, and click the Execute test button.

(b) Determine the offset value
Select "Request" from the Setting (value) field for CH□ Offset Setting Request, and click the [Execute test] button. After making sure that the offset/gain setting status signal (X1, X2, X3, X4) has turned off, select "OFF" from the Setting (value) field for CH□ Offset Setting Request, and click the Execute test button.

(c) Set the gain value
Enter the desired value into the Setting (value) field for CH□ Gain Temperature Setting Value, and click the Execute test button.

(d) Determine the gain value
Select "Request" from the Setting (value) field for CH□ Gain Setting Request, and click the [Execute test] button. After making sure that the offset/gain setting status signal (X1, X2, X3, X4) has turned off, select "OFF" from the Setting (value) field for CH□ Gain Setting Request, and click the Execute test button.

(e) To set the offset/gain for more than one channel, repeat steps (a) to (d).

(4) Write the offset/gain setting values to the module

Write the offset/gain settings to the module after completing the settings for all channels using the user range setting. Note that if settings are written while offset/gain settings are incomplete, the status at that point will be written to the module.

(a) Write to the Q64RD/Q64RD-G
Select "Request" from the Setting (value) field for User Range Write Request, and click the Execute test button.

(b) Confirm execution of write and exit
After confirming that the indication of the Current value field for Offset/gain Setting Mode Status Flag changes from "Completed" to " Writing", select "OFF" from the Setting (value) field for User Range Write Request, and click the Execute test button.

(c) Error handling
Confirm that the ERR. LED for the Q64RD is off. If the ERR. LED is lit, click on Close, check the error code on the monitor screen, and then perform the offset/gain settings again.

(5) Switch to the normal mode

Set "Normal mode" in the Setting (value) field of Mode switching setting and click the Execute test button to perform write.

On completion of write, the indication in the Current value field of Mode switching setting status changes to " Normal mode".

5.6.3 Offset/gain setting operation (Function version B)

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

(1) Switch to the offset/gain setting mode

Change switch 4 for intelligent function module switch setting to the offset/gain setting mode and switch 2 to the user setting. (Refer to Section 4.5)

(2) Switch to the offset/gain setting screen

Display the offset/gain setting screen using the operation described in Section 5.6.1.

(3) Adjustment of the offset and gain values

(a) Set the offset value

Enter the desired value into the Setting (value) field for CH□ Offset Temperature Setting Value, and click the Execute test button.

(b) Determine the offset value

Select "Request" from the Setting (value) field for CH□ Offset Setting Request, and click the [Execute test] button. After making sure that the offset/gain setting status signal (X1, X2, X3, X4) has turned off, select "OFF" from the Setting (value) field for CH□ Offset Setting Request, and click the Execute test button.

(c) Set the gain value

Enter the desired value into the Setting (value) field for CH□ Gain Temperature Setting Value, and click the Execute test button.

(d) Determine the gain value

Select "Request" from the Setting (value) field for CH□ Gain Setting Request, and click the [Execute test] button. After making sure that the offset/gain setting status signal (X1, X2, X3, X4) has turned off, select "OFF" from the Setting (value) field for CH□ Gain Setting Request, and click the Execute test button.

(e) To set the offset/gain for more than one channel, repeat steps (a) to (d).

(4) Write the offset/gain setting values to the module

Write the offset/gain settings to the module after completing the settings for all channels using the user range setting. Note that if settings are written while offset/gain settings are incomplete, the status at that point will be written to the module.

(a) Write to the Q64RD

Select "Request" from the Setting (value) field for User Range Write Request, and click the Execute test button.

(b) Confirm execution of write and exit

After confirming that the indication of the Current value field for Offset/gain Setting Mode Status Flag changes from "Completed" to " Writing ", select "OFF" from the Setting (value) field for User Range Write Request, and click the Execute test button.

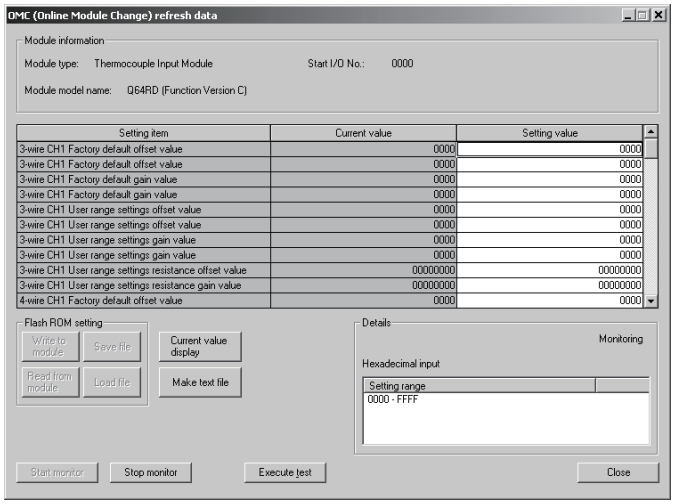
(c) Error handling
Confirm that the ERR. LED for the Q64RD is off. If the ERR. LED is lit, click on [Close], check the error code on the monitor screen, and then perform the offset/gain settings again.

5.6.4 OMC (Online Module Change) refresh data

Perform the following steps to save/restore the user range.

(1) Switch to the OMC refresh data screen

Perform the operation in Section 5.6.1 to display the OMC refresh data screen.



(2) User range saving

(a) Change the Setting value field of OMC refresh 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 3/4-wire type CH□ Factory default offset/gain value/3/4-wire type CH□ User range settings offset/gain value/3/4-wire type CH□ User range settings offset/gain resistance value.

(b) 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 recorded values in the Setting value fields of 3/4-wire type CH□ Factory default offset/gain value/3/4-wire type CH□ User range settings offset/gain value/3/4-wire type CH□ User range settings offset/gain resistance value.

(b) Select all the Setting value fields of 3/4-wire type CH□ Factory default offset/gain value/3/4-wire type CH□ User range settings offset/gain value/3/4-wire type CH□ User range settings offset/gain resistance value, and click the Execute test button.

When write is completed, the set values are displayed in the Current value fields of 3/4-wire type CH□ Factory default offset/gain value/3/4-wire type CH□ User range settings offset/gain value/3/4-wire type CH□ User range settings offset/gain resistance value.

(c) Change the Setting value field of OMC refresh data write request to "Request", and click the Execute test button.

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

MEMO

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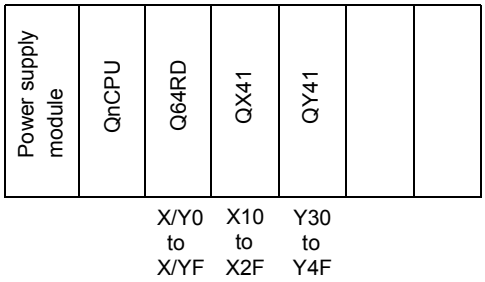
6 PROGRAMMING

This chapter describes Q64RD/Q64RD-G programs.
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 Programs Used in Normal System Configuration

System configuration used to describe programs

(1) System configuration



(2) Program conditions

This program reads the digital values of temperature conversions made on CH1 to CH3 of the Q64RD.
Sampling processing is performed on CH1, and Averaging processing is executed every 500 counts on CH2 and in a cycle of 1000ms on CH3. If a write error occurs, the corresponding error is displayed in BCD.

(a) Initial settings
- Temperature conversion enabled channel ····· CH1 to CH3
- Sampling channel ····· CH1
- Count-specified averaging channel ····· CH2
- Time-specified averaging channel ····· CH3

(b) Devices used by user
- Measured temperature value read command signal (Turned on when user wants to read measured temperature value) ····· X10
- Disconnection detection reset signal ····· X11
- Error reset signal (Turned on when user wants to make error reset) ····· X12
- Error code display(3-digits BCD) ····· Y40 to Y4B
- Conversion flag ····· M0 to M2
- Measured temperature value (16-bit) ····· D1 to D3 (D11 to D13)
- Disconnection detection flag ····· D4, M10
- Error code storage ····· D5

POINT

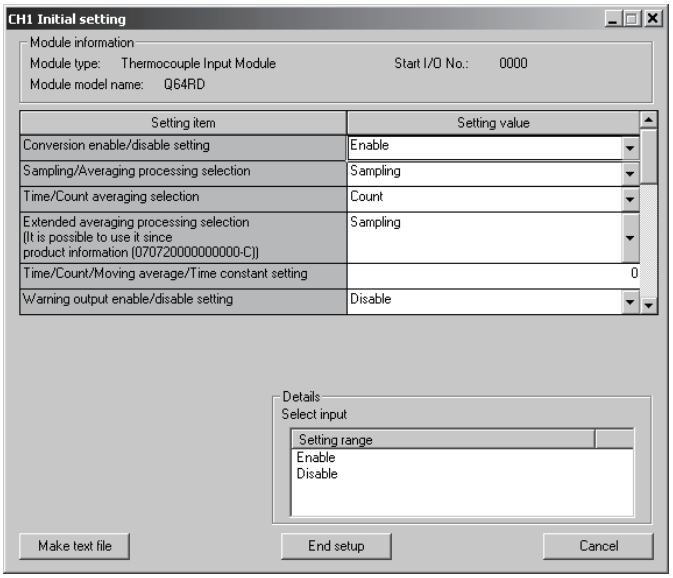
Refer to Section 3.3 for the I/O signals (X0 to XF, Y0 to YF).

6.1.1 Program example used when utility package is used

(1) Operation of utility package

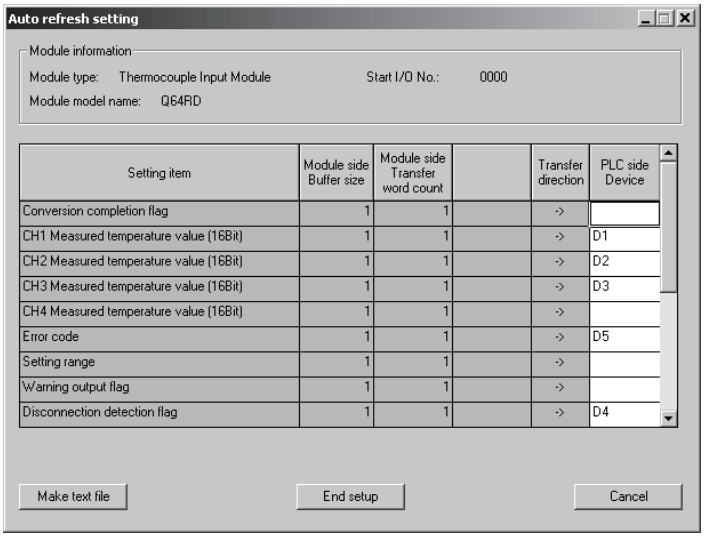
(a) Initial setting (refer to Section 5.4)

Set Sampling processing for CH1, averaging processing of every 500 counts for CH2 and averaging processing in a cycle of 1000ms for CH3.



(b) Auto refresh settings (refer to Section 5.5)

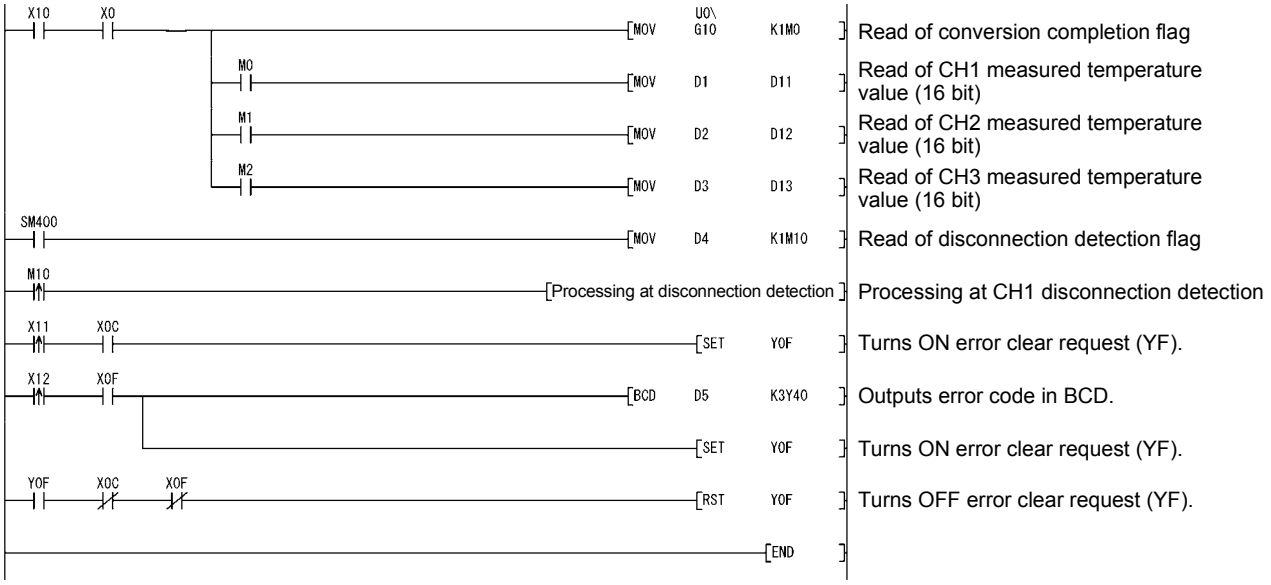
Set the CH1 to CH3 measured temperature values and error codes.



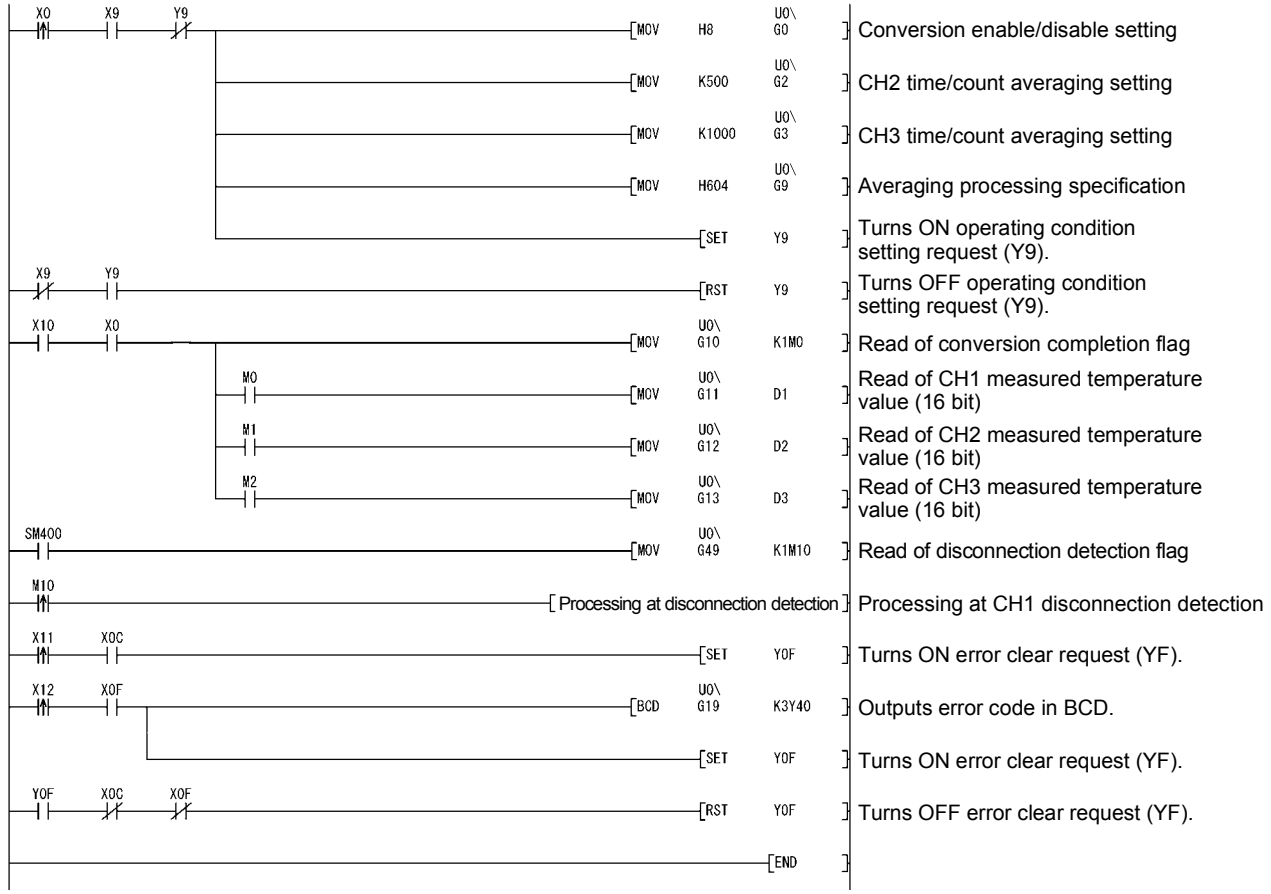
(c) Write of intelligent function module parameters (refer to Section 5.3.3)

Write the intelligent function module parameters to the CPU module. Perform this operation on the parameter setting unit selection screen.

(2) Program example



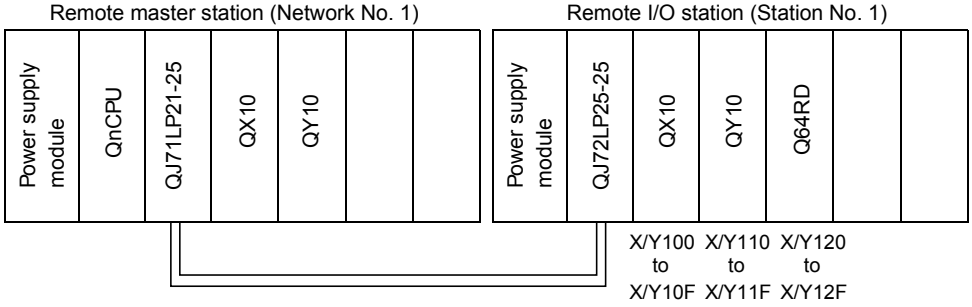
6.1.2 Program example used when utility package is not used



6.2 Programs Used on Remote I/O Network

System configuration used to describe programs

(1) System configuration



(2) Program conditions

This program is written for the CPU on the remote master station to read the digital values of temperature conversions made on CH1 to CH3 of the Q64RD. Sampling processing is performed on CH1, and Averaging processing is executed every 500 counts on CH2 and in a cycle of 1000ms on CH3. If a write error occurs, the corresponding error is displayed in BCD.

(3) Initial settings

- Temperature conversion enabled channel ····· CH1 to CH3
- Sampling channel ····· CH1
- Count-specified averaging channel ····· CH2
- Time-specified averaging channel ····· CH3
- CH2 averaging count ····· 500 times
- CH3 averaging time ····· 1000ms (1s)

(4) Devices used by user

- Initial setting request signal ····· X20
- Measured temperature value read command signal (Turned on when user wants to read measured value) ····· X21
- Disconnection detection reset signal ····· X22
- Error reset signal (Turned on when user wants to make error reset) ····· X23
- Error code display (3-digits BCD) ····· Y30 to Y3B
- Conversion completion flag ····· D10
- CH1 to 3 temperature value (16-bit) ····· D1 to D3 (W1 to W3)
- Disconnection detection flag ····· W4, M20
- Error code storage ····· W5

POINT

(1) Refer to Section 3.3 for the I/O signals (X120 to X12F, Y120 to Y12F).
(2) 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).

6.2.1 Program example used when utility package is used

(1) Operation of GX Developer

(a) Setting of CPU parameters

- Network type :MNET/H (remote master)
- First 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							160	0100	019F	160	0000	009F

- Refresh parameters:

Assignment method: (•) Start/End ( ) Points/Start

Transient transmission error history status: (•) Overwrite ( ) Hold

	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) Operation of utility package

Perform operation on the remote I/O station side.

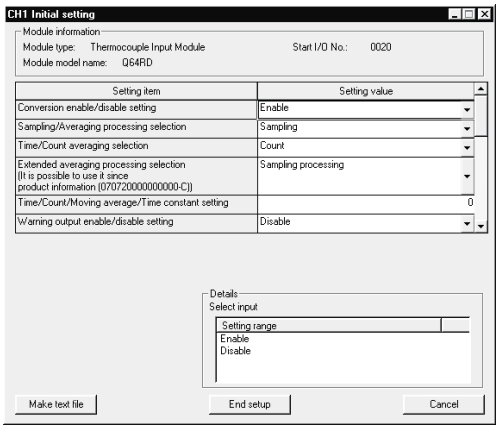
Operate the utility package on the remote I/O station side.

Set the following in the Intelligent function module parameter setting module select area.

- Start I/O No. : 20
- Module type : Thermocouple Input Module
- Module model name: Q64RD / Q64RD-G

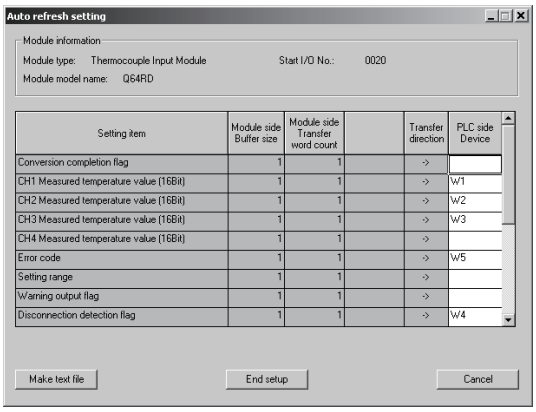
(a) Initial setting (refer to Section 5.4)

Set Sampling processing for CH1, averaging processing of every 500 counts for CH2 and averaging processing in a cycle of 1000ms for CH3.



(b) Auto refresh settings (refer to Section 5.5)

Set the CH1 to CH3 measured temperature values and error codes.

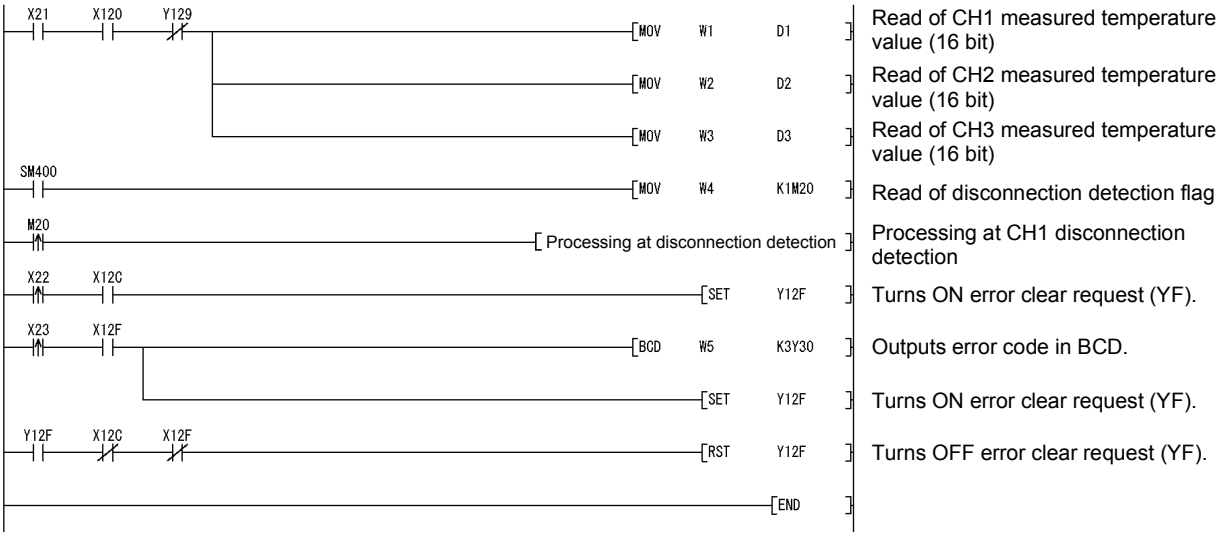


(c) Write of intelligent function module parameters (refer to Section 5.3.3)

The intelligent function module parameters are written to the remote I/O station.

Perform this operation on the parameter setting unit selection screen.

(3) Program 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.

6.2.2 Program example used when utility package is not used

POINT

The dedicated instructions used for reading/writing the buffer memory of the intelligent function module on a remote I/O station (REMTO and REMFR) are the execution type for which several scans are needed. Therefore, transmissions of the execution results are not synchronized with the I/O signal operations. When reading a measured temperature value on an Q64RD after changing the operating condition during operation, be sure to read the Conversion completed flag (buffer memory address 10) at the same time.
Also, for the case of changing the operating condition, insert an interlock top revent the execution of the REMFR instruction.

(1) Operation of GX Developer (Setting of CPU parameters)

- Network type : MNET/H (remote master)
- First 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

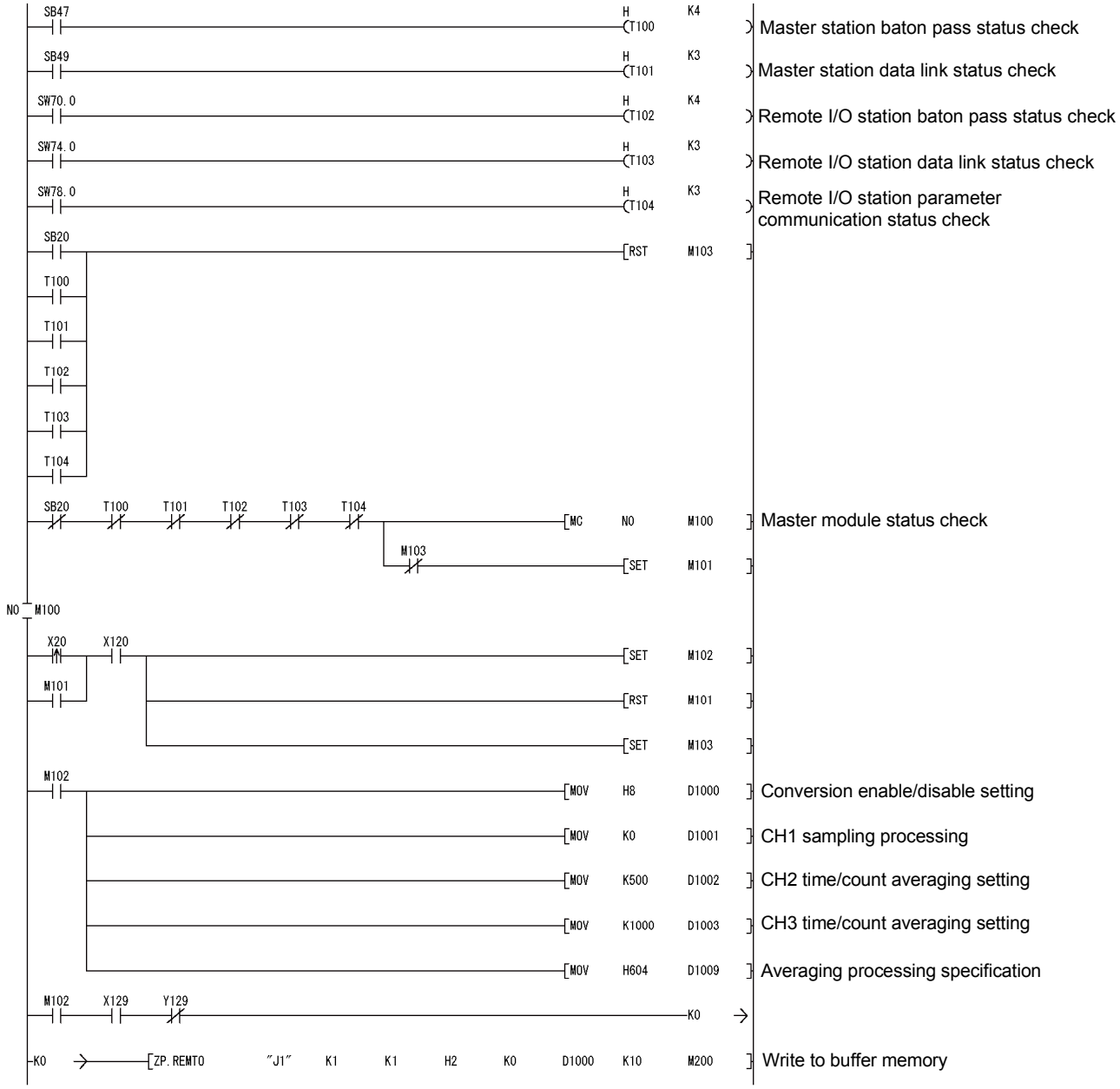
- Refresh parameters:

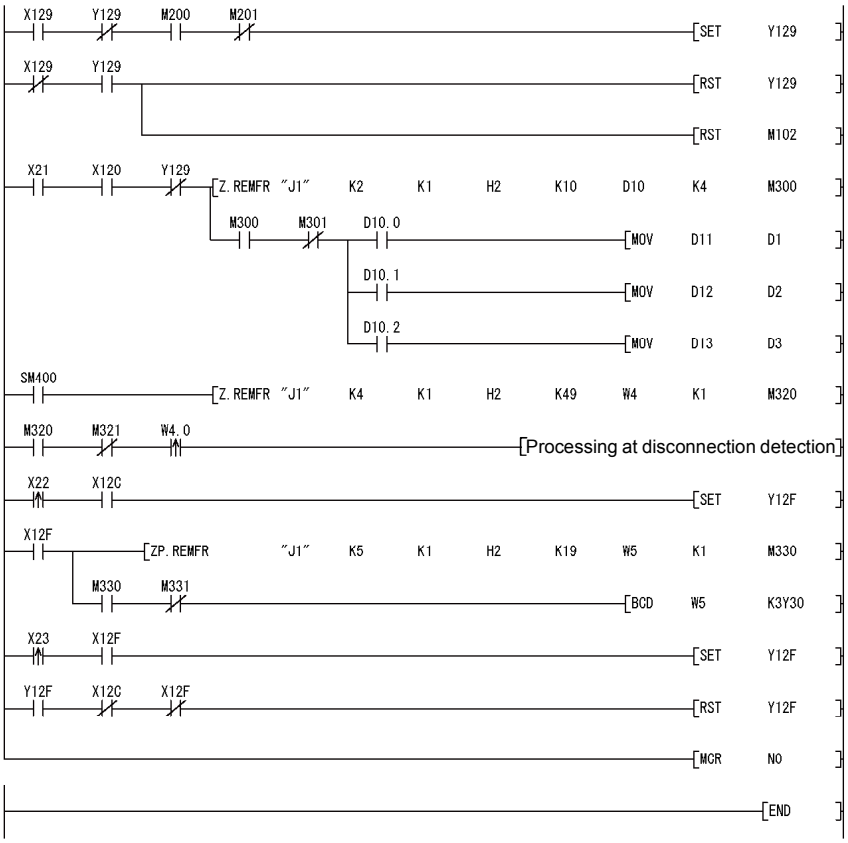
Assignment method: ○ Points/Start ◉ Start/End

Transient transmission error history status: ◉ Overwrite ○ Hold

	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) Program example





Turns ON operating condition setting request (Y9).

Turns OFF operating condition setting request (Y9).

Concurrently reads the Conversion completed flag and CH1-to-CH3 measured temperature value.

Read of CH1 measured temperature value (16 bit)

Read of CH2 measured temperature value (16 bit)

Read of CH3 measured temperature value (16 bit)

Read of disconnection detection flag

Processing at CH1 disconnection detection

Turns ON error clear request (YF).

Read of error code

Outputs error code in BCD.

Turns ON error clear request (YF).

Turns OFF error clear request (YF).

7 ONLINE MODULE CHANGE

When changing a module online, carefully read the QCPU User's Manual (Hardware Design, Maintenance and Inspection), section 12.4.1 "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 simplify the offset/gain re-setting, there is a user range save/restore function for which dedicated instructions or read/write from/to buffer memory can be used.

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 3.4.25, prerecord the data to be saved (offset/gain values of the factory default offset/gain value/user range settings offset/gain value/user range settings offset/gain resistance value 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, or the terminal block to/from the module 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, Q64RD, 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) Q64RD

The module of function version C or later is necessary.

(4) GX Developer

GX Developer of Version 7.10L or later is necessary.
GX Developer of Version 8.18U or later is required to perform an online module change on the remote I/O station.

(5) Base unit

1) When the slim type main base unit (Q3□SB) is used, an online module change cannot be performed.
2) When the power supply module unnecessary type extension base unit (Q5□B) is used, online module change cannot be performed for the modules on all the base units connected.

7.2 Online Module Change Operations

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

CPU operation ○: Executed ×: Not executed						(User operation)	(Intelligent function module operation)
X/Y refresh	FROM/TO instruction *1	Dedicated instruction	Device test	GX Configurator: Initial setting parameter	GX Configurator: Monitor/ test		
○	○	○	○	×	○	(1) Conversion disable Turn OFF all Y signals that were turned ON by a sequence program.	Module is operating as usual.
×	×	×	×	×	×	(2) Dismounting of module Operate GX Developer to start an online module change. Click the [Execution] button of GX Developer to make the module dismountable. Dismount the corresponding module.	Module stops operating. • RUN LED turns off. • Conversion disabled.
○	×	×	×	○	×	(3) Mounting of new module Mount a new module. After mounting the module, click the [Execution] button of GX Developer.	X/Y refresh resumes and the module starts. • RUN LED turns on. • Default operation (X0 remains OFF) When there are initial setting parameters, operation is performed according to the initial setting parameters at this point.
○	×	×	○	×	○	Operation check before control start (4) Operation check Click the [Cancel] button of GX Developer to leave the online mode. Conduct an operation test on the new module using "Device test" of GX Developer or "Monitor/test" of GX Configurator. Perform user range restoration processing by write to buffer memory at this point. Operation check completed	Module operates according to test operation *2
○	○	○	○	×	○	(5) Resumption of control Operate GX Developer to resume the online module change mode, and click the [Execution] button to resume control.	X0 (Module Ready) turns ON. ↓ Start is made when X0 turns from OFF to ON. Operation is performed according to the initial setting sequence.*2

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

*2: In the absence of the operation marked *2, the operation of the intelligent function module is the operation performed prior to that.

7.3 Online Module Change Procedure

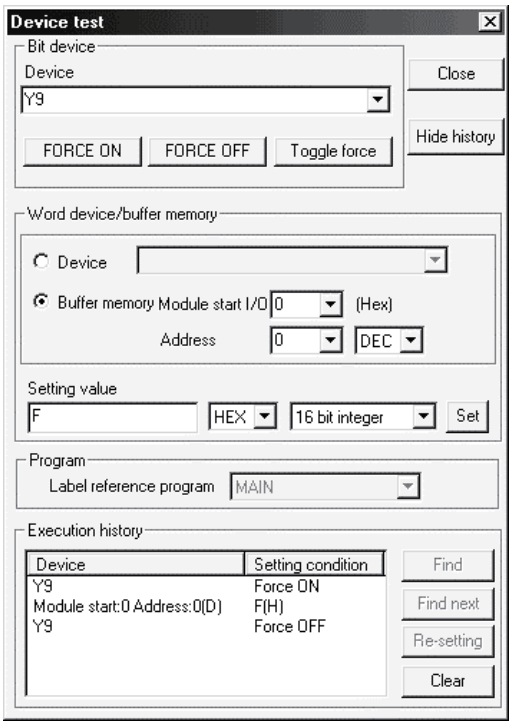
There are the following online module change procedures depending on whether the user range setting has been made or not, whether the initial setting of GX Configurator-AD has been made or not, and whether the other system exists or not.

Range setting	Initial setting	Other system	Reference section
Factory default	GX Configurator-TI	—	Section 7.3.1
Factory default	Sequence program	—	Section 7.3.2
User range setting	GX Configurator-TI	Present	Section 7.3.3
User range setting	GX Configurator-TI	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 factory default is used and initial setting was made with GX Configurator-TI

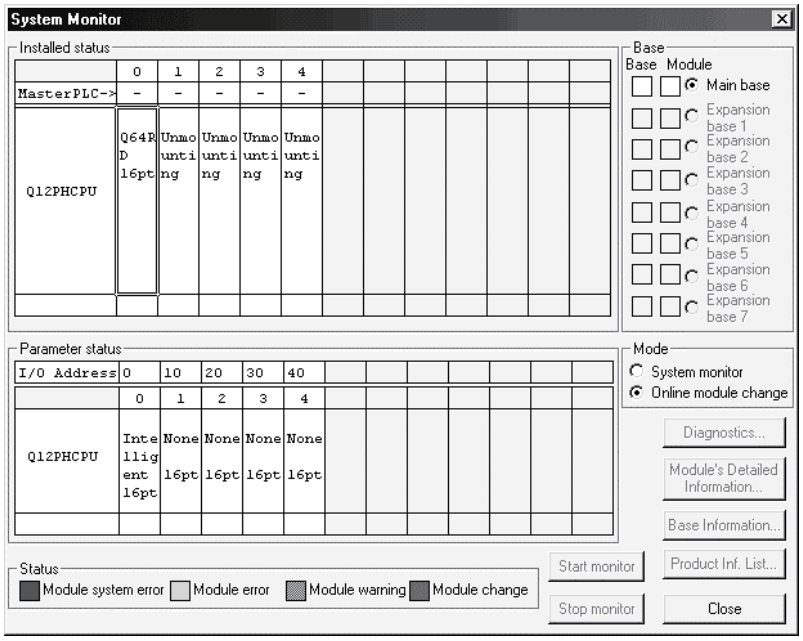
(1) Conversion disable

(a) Set Conversion enable/disable setting (buffer memory address 0: Un\G0) for all channel conversion disable and turn the operating condition setting request (Y9) from OFF to ON to stop conversion.
After confirming that conversion has stopped with the Conversion Completion Flag (buffer memory address 10: Un\G10), turn off Operating Condition Setting Request (Y9).

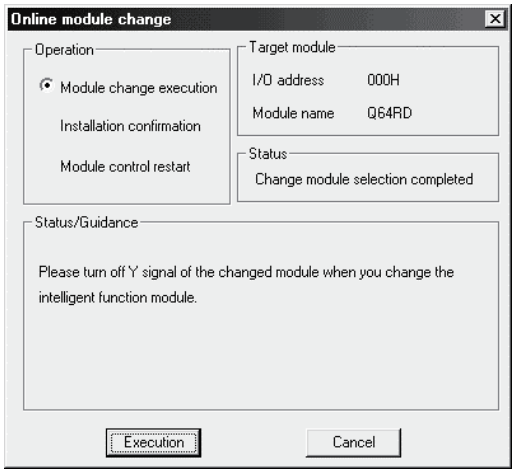


(2) Dismounting of module

(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.

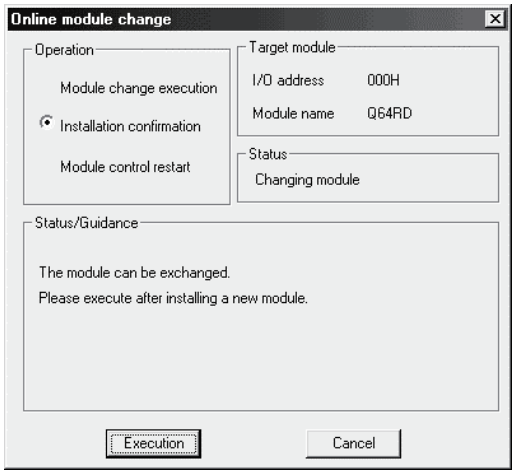
(c) After confirming that the "RUN" LED of the module has turned off, disconnect the external wiring and dismount the module.

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

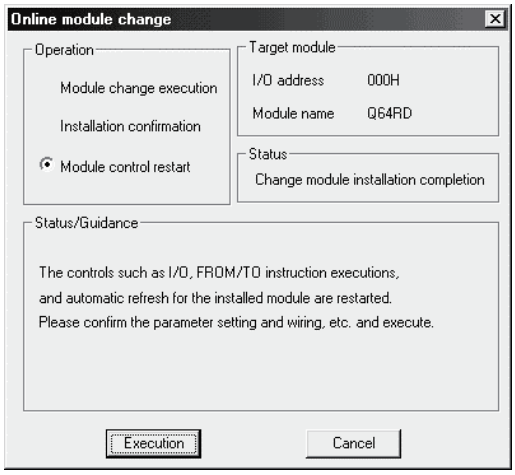
(a) Mount a new module to the same slot and connect the external wiring.

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

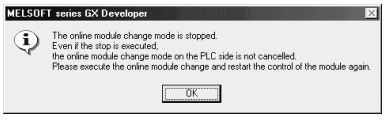


(4) Operation check

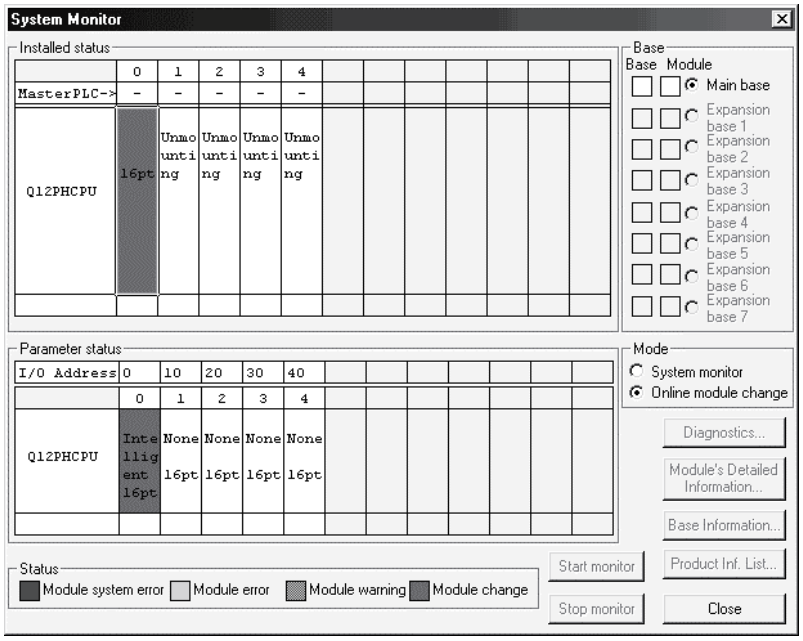
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



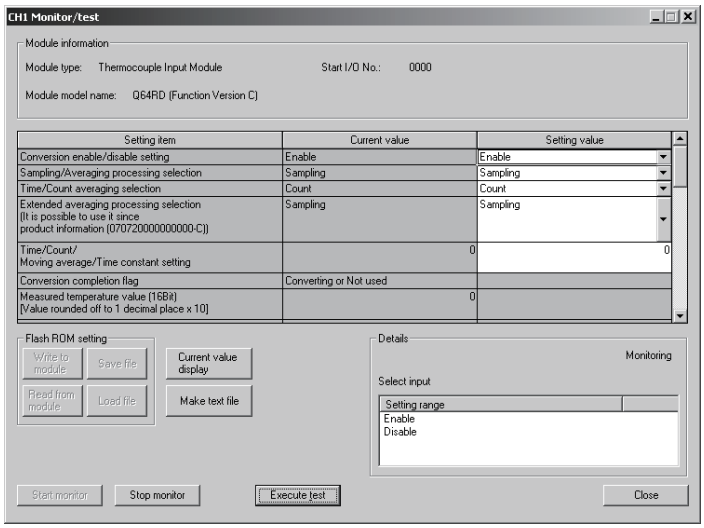
(b) Click the [OK] button to leave the "Online module change" mode.



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

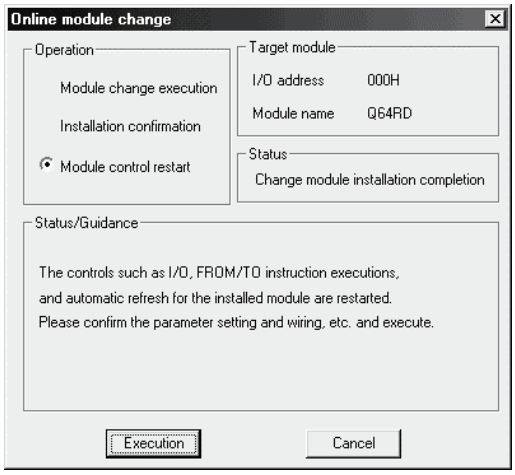


(d) Monitor the measured temperature values (16 bits) (buffer memory addresses 11 to 14: Un\G11 to 14) or measured temperature values (32 bits) (buffer memory addresses 54 to 61: Un\G54 to 61) to check that proper conversion has been made.



(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.

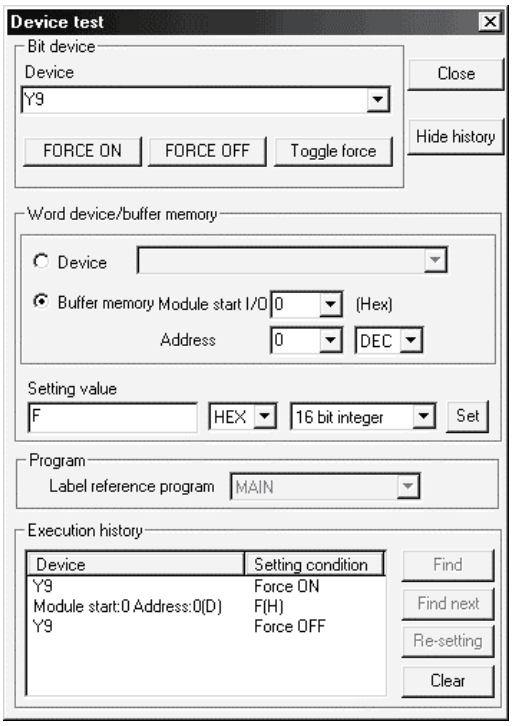


(b) The "Online module change completed" screen appears.

7.3.2 When factory default is used and initial setting was made with sequence program

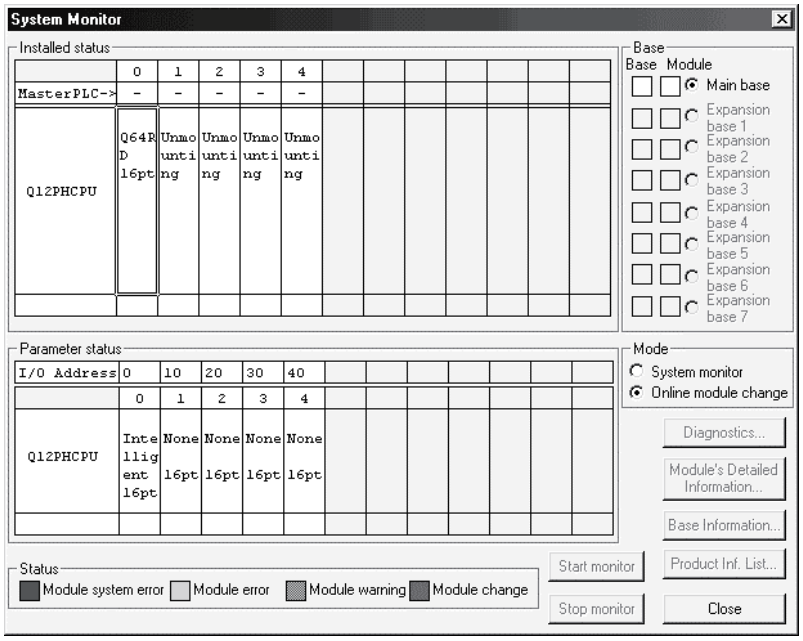
(1) Conversion disable

(a) Set the Conversion enable/disable setting (buffer memory address 0: Un\G0) for all channel conversion disable and turn Operating Condition Setting Request (Y9) from OFF to ON to stop conversion.
After confirming that conversion has stopped with the Conversion Completion Flag (buffer memory address 10: Un\G10), turn off Operating Condition Setting Request (Y9).

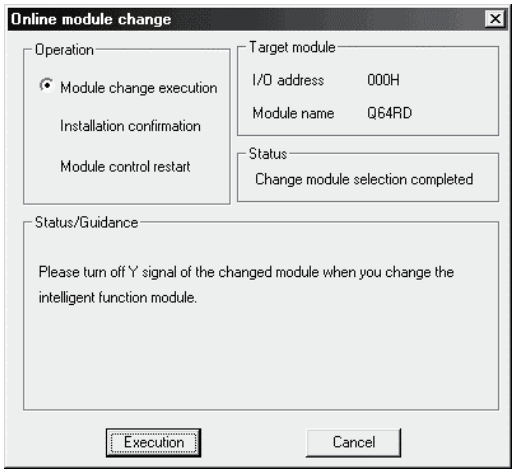


(2) Dismounting of module

(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.

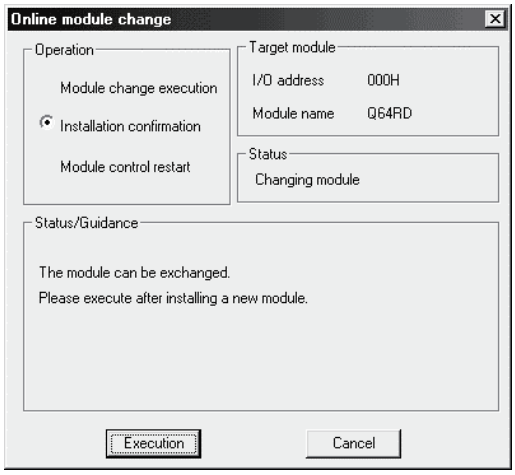
(c) After confirming that the "RUN" LED of the module has turned off, disconnect the external wiring and dismount the module.

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

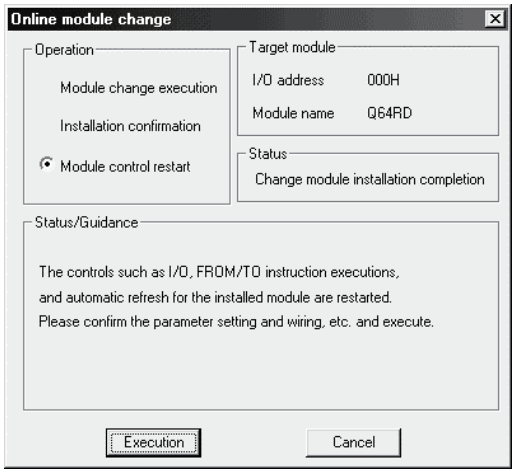
(a) Mount a new module to the same slot and connect the external wiring.

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

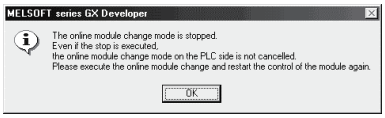


(4) Operation check

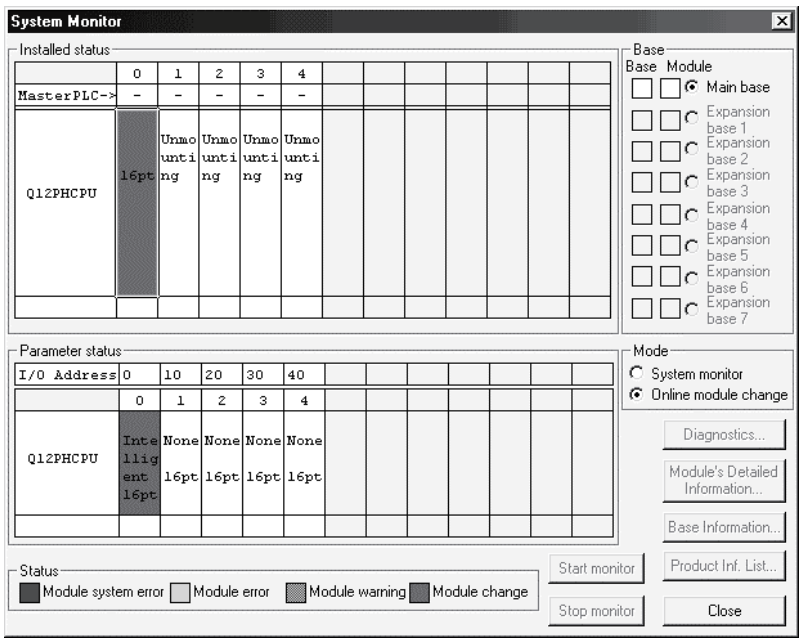
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



(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, and monitor the measured temperature values (16 bits) (buffer memory addresses 11 to 14: Un\G11 to 14) or measured temperature values (32 bits) (buffer memory addresses 54 to 61: Un\G54 to 61) to check that proper conversion has been made.

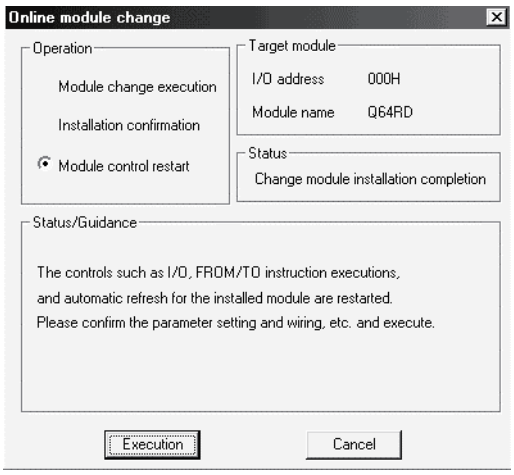
(e) Since the new module is in a default status, it must be initialized by a sequence program after control resumption.
Before performing initialization, check whether the contents of the initialization program are correct or not.

1) Normal system configuration
The sequence program should perform initialization on the leading edge of Module READY (X9) of the Q64RD/Q64RD-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.

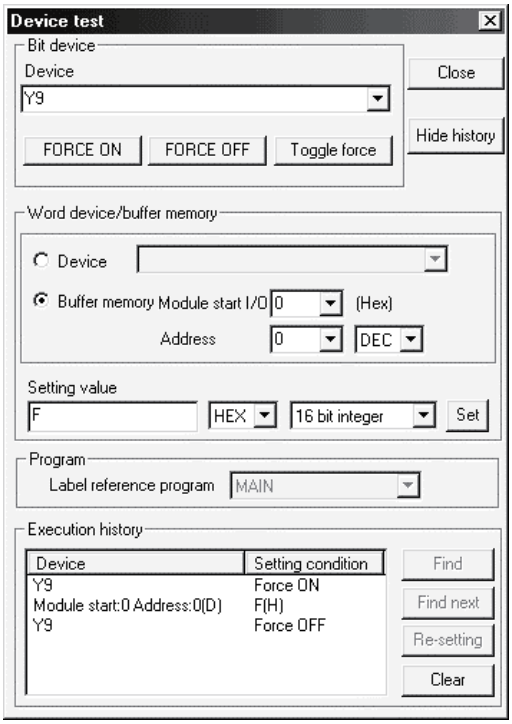


(b) The "Online module change completed" screen appears.

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

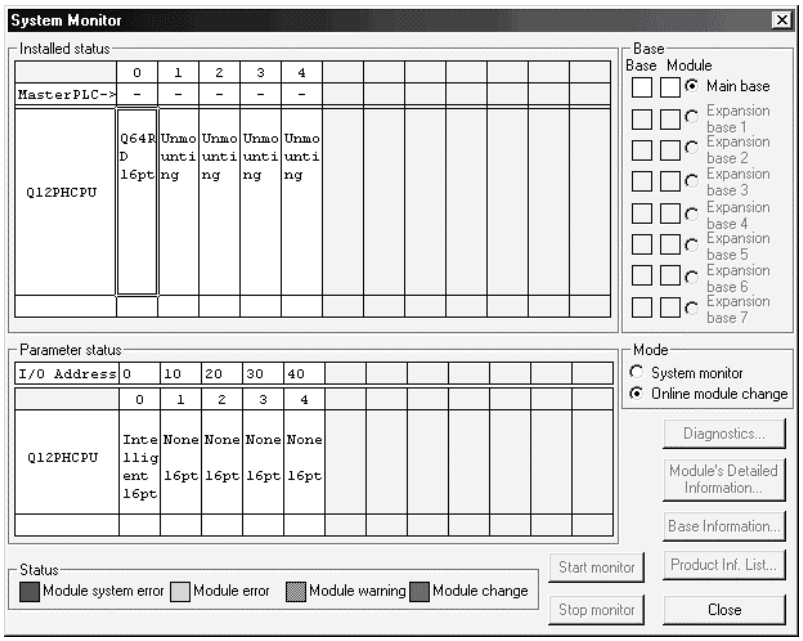
(1) Conversion disable

(a) Set the Conversion enable/disable setting (buffer memory address 0: Un\G0) for all channel conversion disable and turn Operating Condition Setting Request (Y9) from OFF to ON to stop conversion.
After confirming that conversion has stopped with the Conversion Completion Flag (buffer memory address 10: Un\G10), turn off Operating Condition Setting Request (Y9).

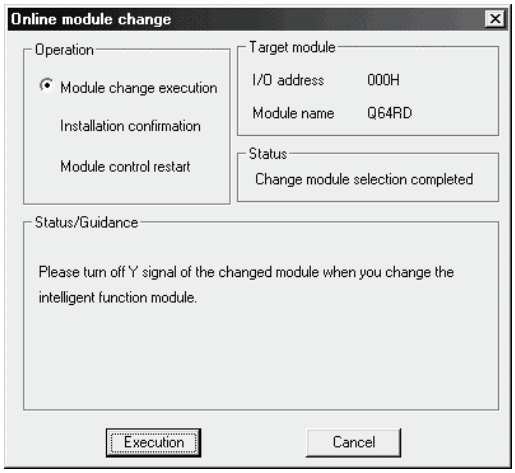


(2) Dismounting of module

(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, dismount the module as-is, 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, disconnect the external wiring and dismount the module.

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

(3) Mounting of new module

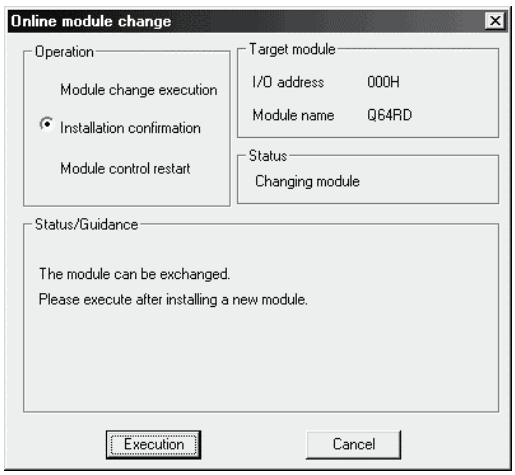
(a) Mount the dismounted module and new module to the other system.

(b) Using the G.OGLOAD instruction, save the user range set values to the CPU device. Refer to Appendix 3.3 for the G.OGLOAD instruction.

(c) Using the G.OGSTOR instruction, restore the user range set values to the module. Refer to Appendix 3.4 for the G.OGSTOR instruction.

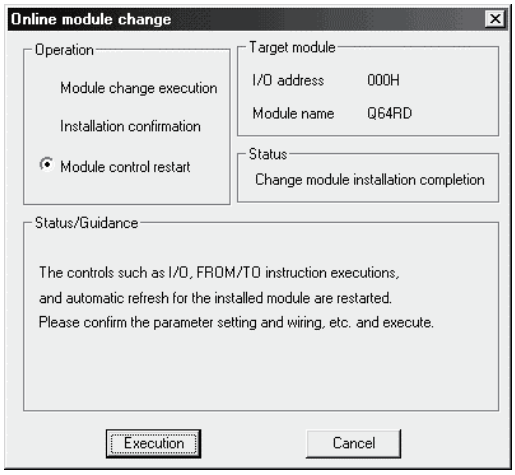
(d) Dismount the new module from the other system, mount it to the slot from where the old module was dismounted in the original system, and connect the external wiring.

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

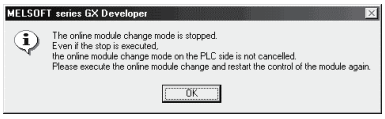


(4) Operation check

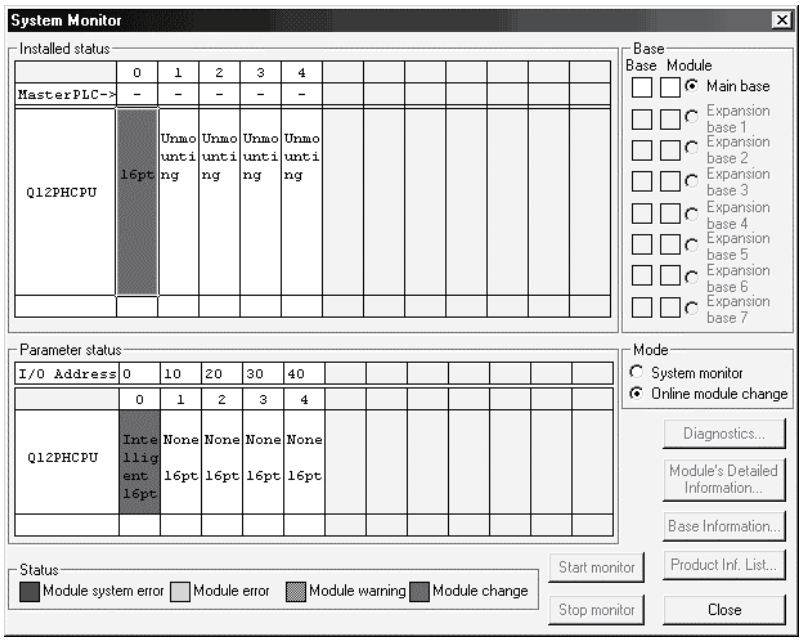
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



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

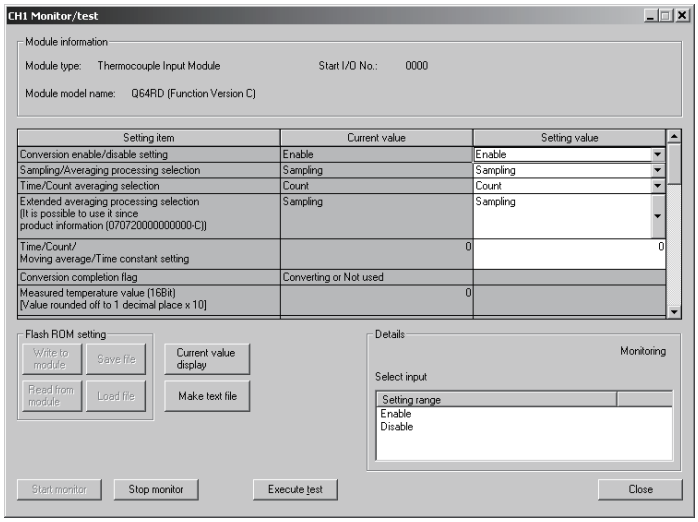


(c) Click the [Close] button to close the System monitor screen.



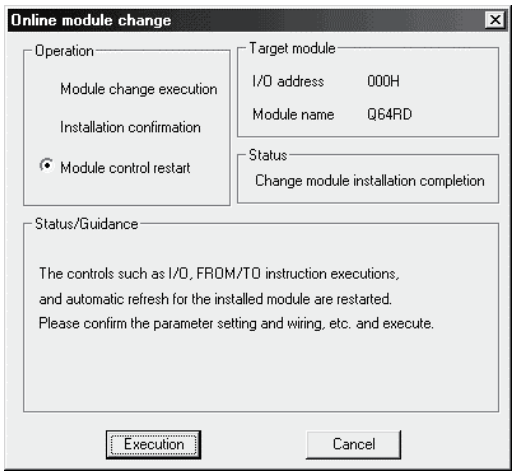
7 - 17

(d) Monitor the measured temperature values (16 bits) (buffer memory addresses 11 to 14: Un\G11 to 14) or measured temperature values (32 bits) (buffer memory addresses 54 to 61: Un\G54 to 61) to check that proper conversion has been made.



(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.

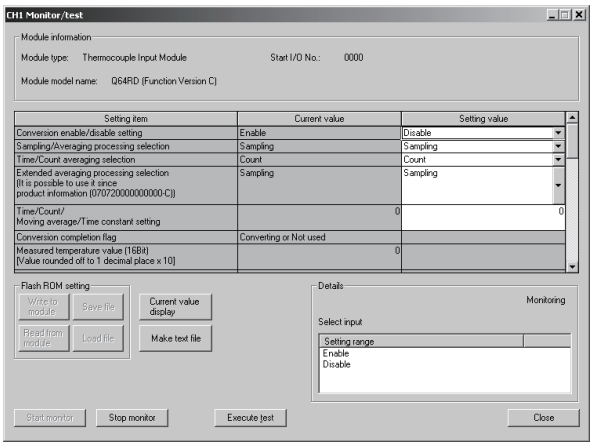


(b) The "Online module change completed" screen appears.

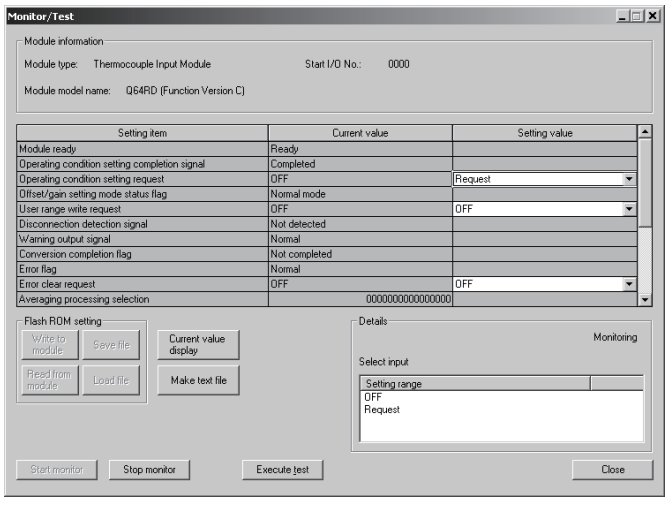
7.3.4 When user range setting is used and initial setting was made with GX Configurator-TI (other system is unavailable)

(1) Conversion disable

(a) Set "Disable" in the Setting value field of Conversion Enable/Disable Setting on the CH□ Monitor/Test screen of GX Configurator-TI, and click the Execute test button.



(b) After making sure that "Disable" is displayed in the Current value field of Conversion Enable/Disable Setting, set "Request" in the Setting value field of Operating Condition Setting Request on the Monitor screen, and click the [Execute test] button to stop conversion.
Monitor the Conversion Completion Flag (buffer memory address 10: Un\G10) and confirm that conversion has stopped.



(c) If the saved buffer memory contents are not yet prerecorded, record them in the following procedure.

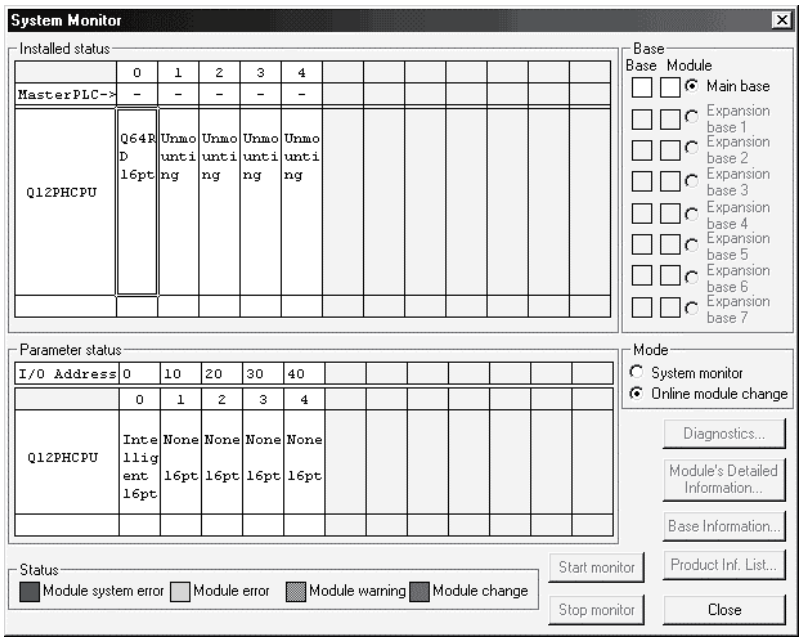
1) Display the OMC refresh data screen of GX Configurator-TI.
2) Make a OMC refresh data read request. (Refer to Section 5.6.4)
3) Compare the current values of the factory default offset/gain value/user range settings offset/gain value/user range settings offset/gain resistance value with those of the range reference table. Refer to Section 7.4 for the range reference table.
4) If the values are proper, record the factory default offset/gain value/user range settings offset/gain value/user range settings offset/gain resistance value.

POINT

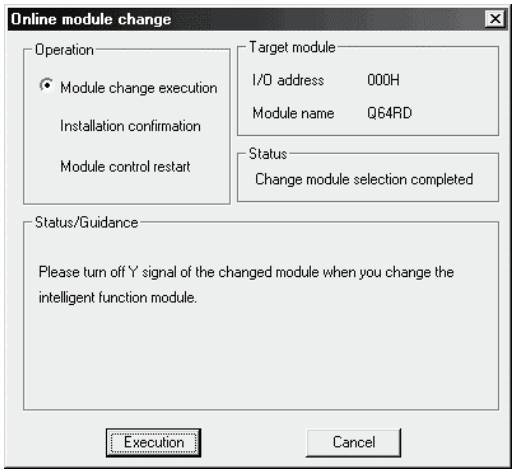
If the buffer memory values compared with the reference table are not proper, save and restoration of the user range cannot be executed.
Before executing module control resumption, make offset/gain setting in the GX Configurator-TI. (Refer to Section 5.6.2.)
Note that if module control is resumed without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

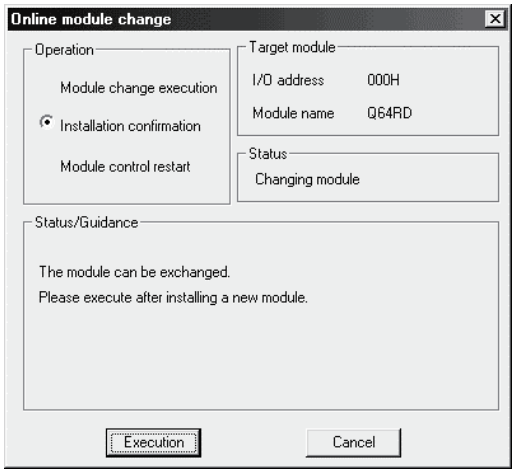
(c) After confirming that the "RUN" LED of the module has turned off, disconnect the external wiring and dismount the module.

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

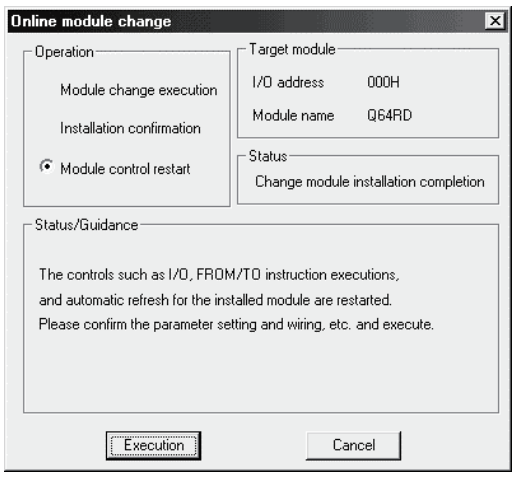
(a) Mount a new module to the same slot and connect the external wiring.

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

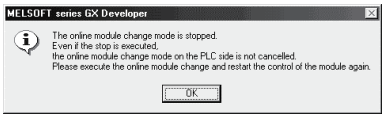


(4) Operation check

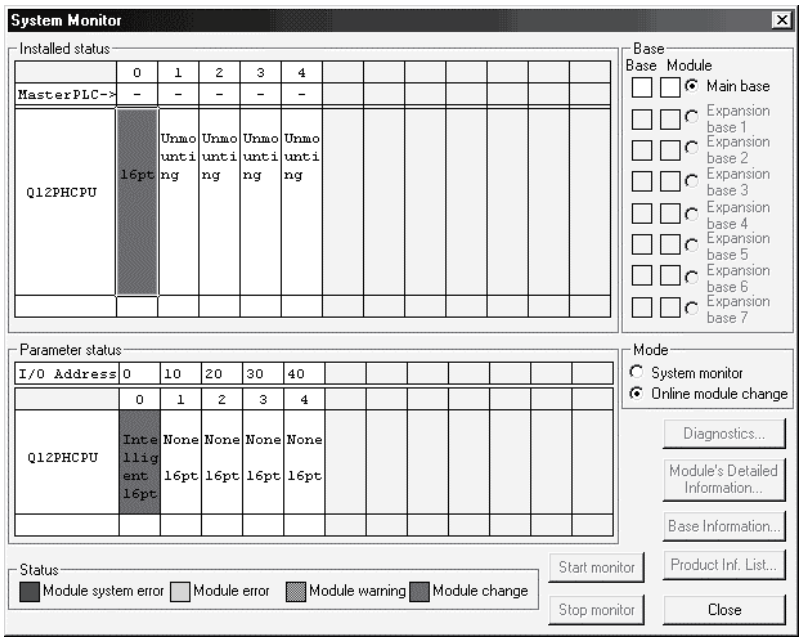
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



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

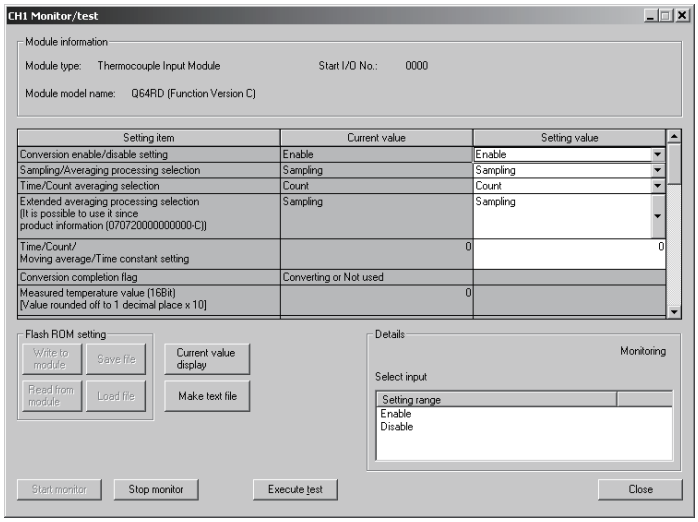


(c) Click the [Close] button to close the System monitor screen.



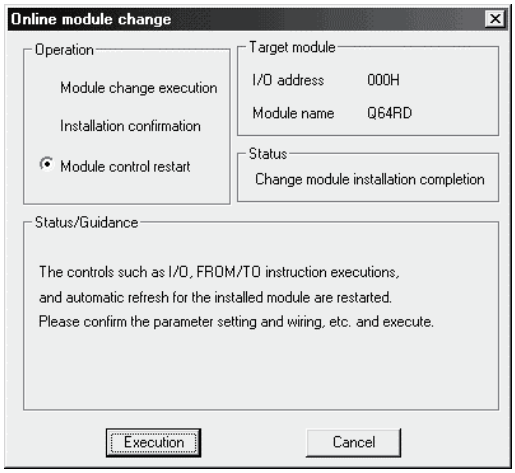
(d) On the OMC refresh data screen of GX Configurator-TI, set the prerecorded values and make a user range write request. (Refer to Section 5.6.4.)

(e) Monitor the measured temperature values (16 bits) (buffer memory addresses 11 to 14: Un\G11 to 14) or measured temperature values (32 bits) (buffer memory addresses 54 to 61: Un\G54 to 61) to check that proper conversion has been made.



(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.



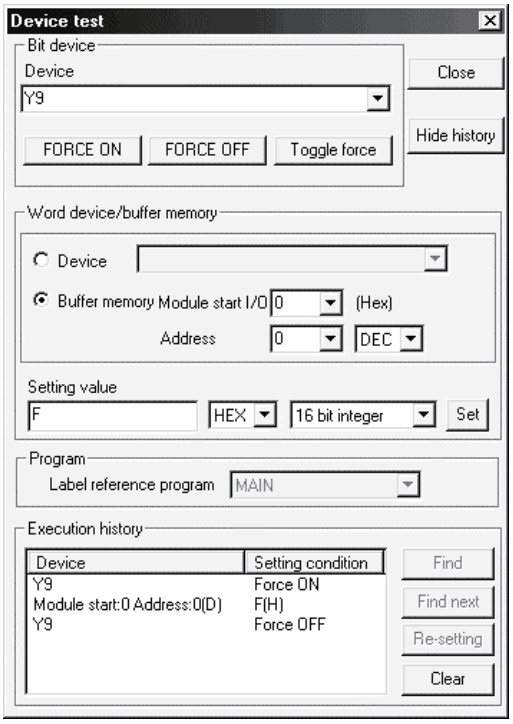
(b) The "Online module change completed" screen appears.

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

(1) Conversion disable

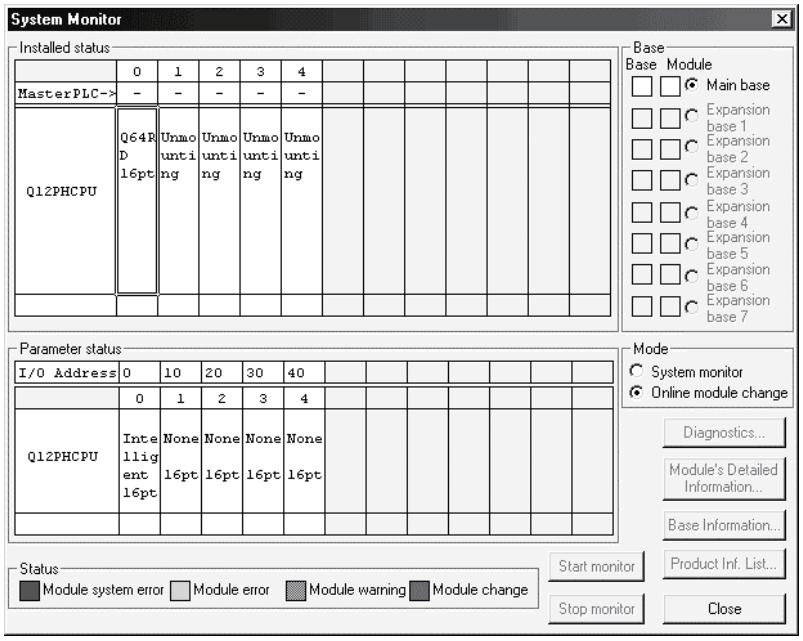
(a) Set Conversion enable/disable setting (buffer memory address 0: Un\G0) for all channel conversion disable and turn the operating condition setting request (Y9) from OFF to ON to stop conversion.

After confirming that conversion has stopped with the Conversion Completion Flag (buffer memory address 10: Un\G10), turn off Operating Condition Setting Request (Y9).

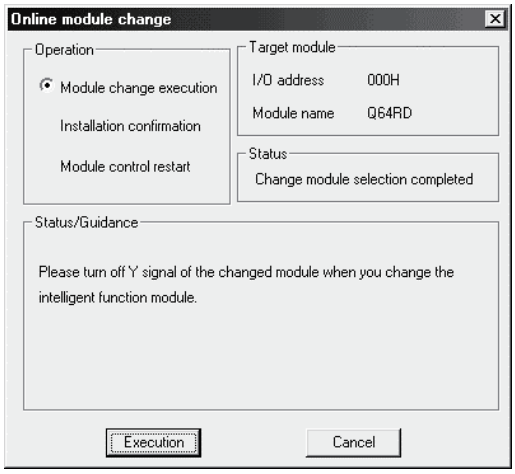


(2) Dismounting of module

(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, disconnect the external wiring 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

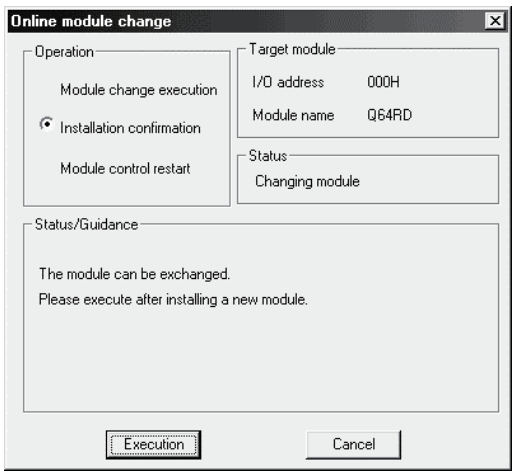
(a) Mount the dismounted module and new module to the other system.

(b) Using the G(P).OGLOAD instruction, save the user range set values to the CPU device. Refer to Appendix 3.3 for the G(P).OGLOAD instruction.

(c) Using the G(P).OGSTOR instruction, restore the user range set values to the module. Refer to Appendix 3.4 for the G(P).OGSTOR instruction.

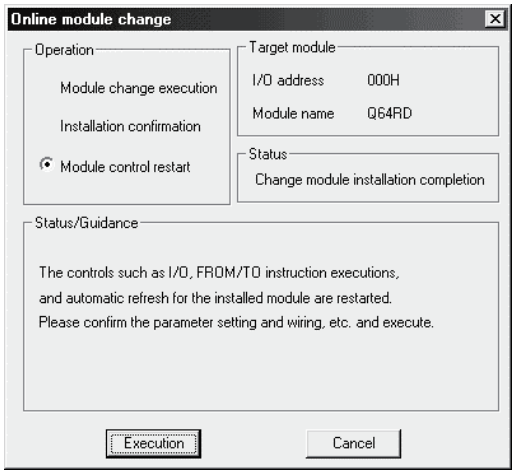
(d) Dismount the new module from the other system, mount it to the slot from where the old module was dismounted in the original system, and connect the external wiring.

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

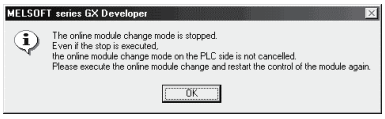


(4) Operation check

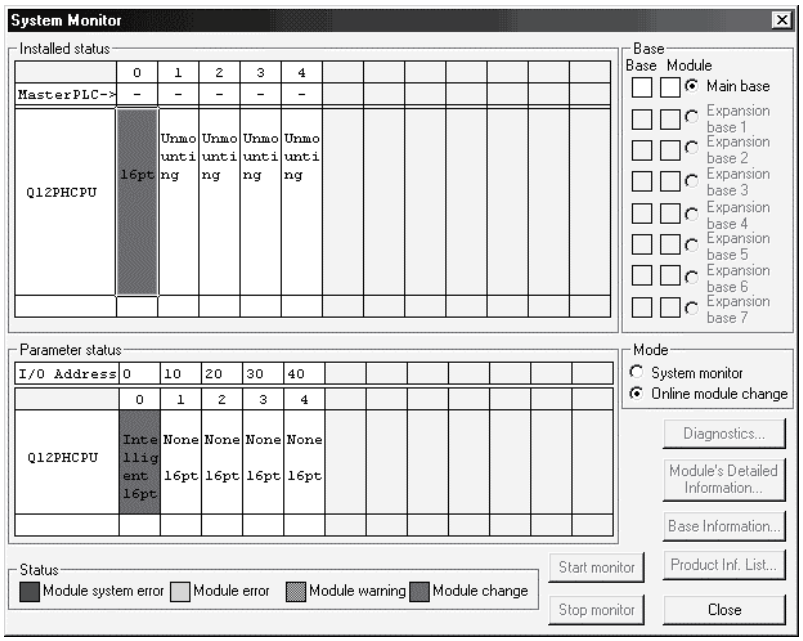
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



(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, and monitor the Measured temperature values (16 bits) (buffer memory addresses 11 to 14: Un\G11 to 14) or Measured temperature values (32 bits) (buffer memory addresses 54 to 61: Un\G54 to 61) to check that proper conversion has been made.

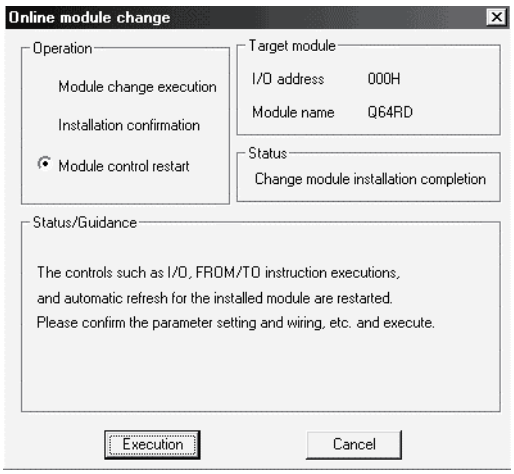
(e) Since the new module is in a default status, it must be initialized by a sequence program after control resumption.
Before performing initialization, check whether the contents of the initialization program are correct or not.

1) Normal system configuration
The sequence program should perform initialization on the leading edge of Module READY (X9) of the Q64RD/Q64RD-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.

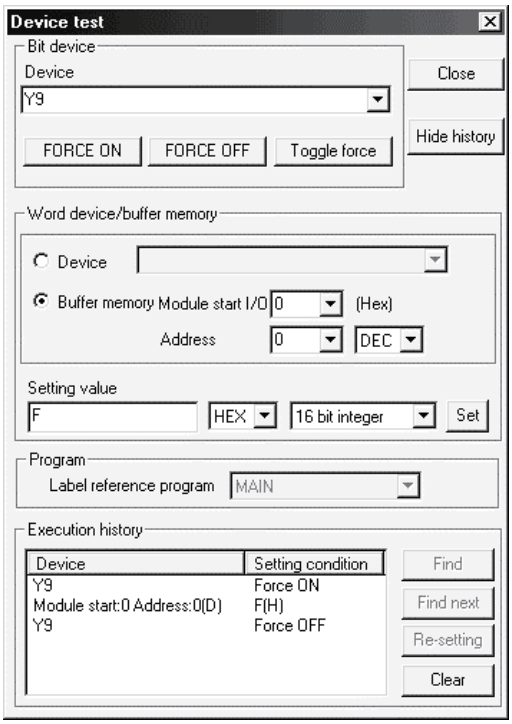


(b) The "Online module change completed" screen appears.

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 Conversion enable/disable setting (buffer memory address 0: Un\G0) for all channel conversion disable and turn the operating condition setting request (Y9) from OFF to ON to stop conversion.
After confirming that conversion has stopped with the Conversion Completion Flag (buffer memory address 10: Un\G10), turn off Operating Condition Setting Request (Y9).



(b) If the saved buffer memory contents are not yet prerecorded, record them in the following procedure.

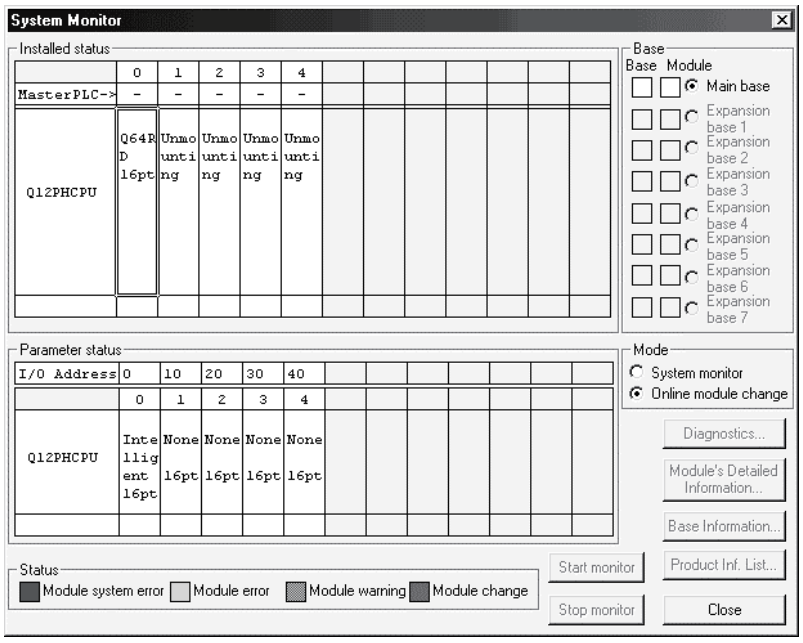
1) Turn Operating Condition Setting Request (Y9) form OFF to ON.
2) Compare the factory default offset/gain value/user range settings offset/gain value/user range settings offset/gain resistance value (buffer memory addresses 160 to 255: Un\G160 to Un\G255)with the range reference table. Refer to Section 7.4 for the range reference table.
3) If the values are proper, record the factory default offset/gain value/user range settings offset/gain value/user range settings offset/gain resistance value.

POINT

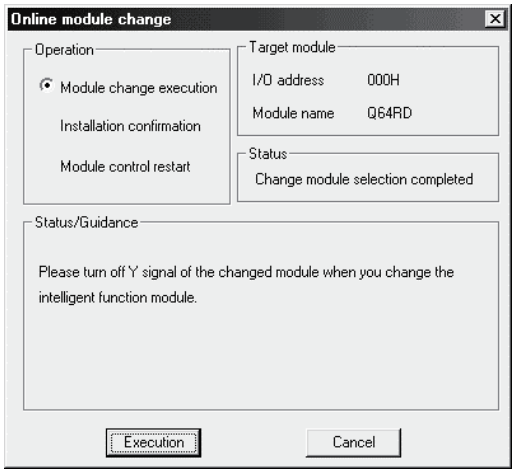
If the buffer memory values compared with the reference table are not proper, saving and restoration of the user range cannot be executed.
Before executing module control resumption, follow the flowchart in Section 4.6 and make offset/gain setting in the device test of GX Developer.
Perform mode switching by making the mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159) and turning Operating 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.

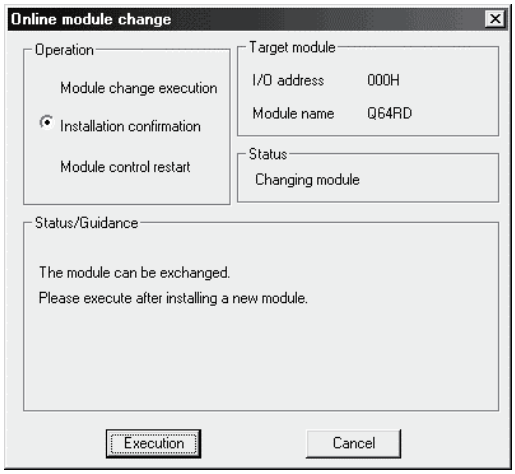
(c) After confirming that the "RUN" LED of the module has turned off, disconnect the external wiring and dismount the module.

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

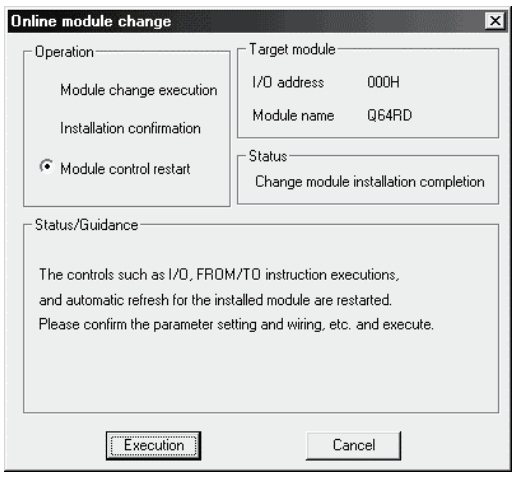
(a) Mount a new module to the same slot and connect the external wiring.

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

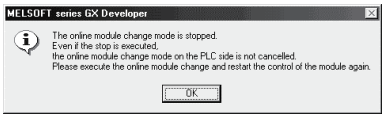


(4) Operation check

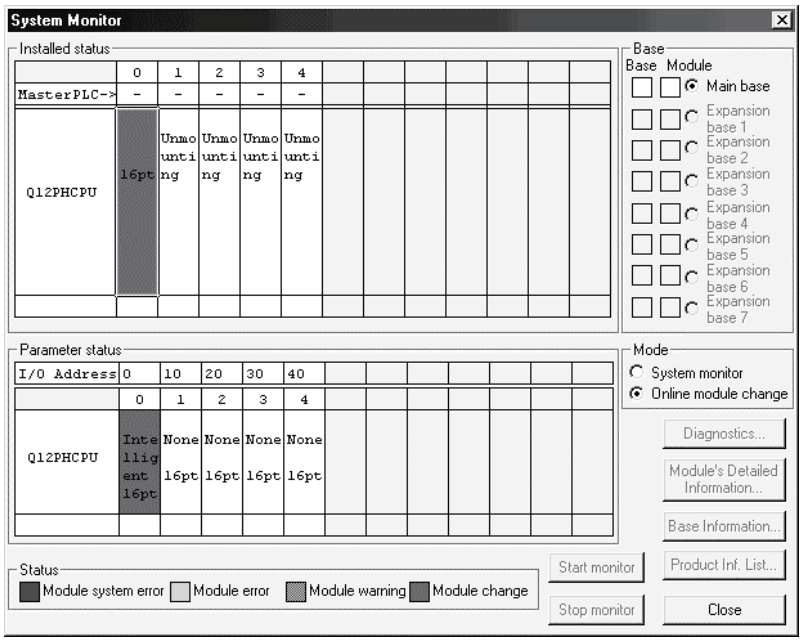
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



(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 range 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, and monitor the measured temperature values (16 bits) (buffer memory addresses 11 to 14: Un\G11 to 14) or measured temperature values (32 bits) (buffer memory addresses 54 to 61: Un\G54 to 61) to check that proper conversion has been made.

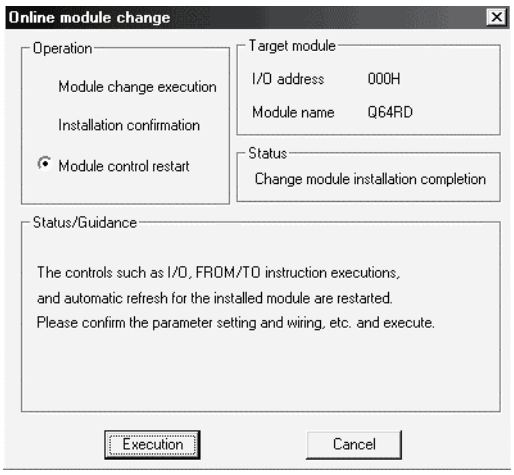
(g) Since the new module is in a default status, it must be initialized by a sequence program after control resumption.
Before performing initialization, check whether the contents of the initialization program are correct or not.

1) Normal system configuration
The sequence program should perform initialization on the leading edge of Module READY (X9) of the Q64RD/Q64RD-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

7.4.1 Range reference table (Q64RD)

The range reference tables for the Q64RD are given below.

Address (Decimal)				Description	Reference value
CH1	CH2	CH3	CH4		
160	184	208	232	3-wire type factory default offset value ＊4	Factory-set offset digital value (theoretical value: 3B1DH)
161	185	209	233	3-wire type factory default offset value ＊4	Factory-set offset digital value (theoretical value: 3B1DH)
162	186	210	234	3-wire type factory default gain value ＊4	Factory-set gain digital value (theoretical value: B158H)
163	187	211	235	3-wire type factory default gain value ＊4	Factory-set gain digital value (theoretical value: B158H)
164	188	212	236	3-wire type User range setting offset value ＊4	Digital value*2 for user-set offset value ＊2
165	189	213	237	3-wire type User range setting offset value ＊4	Digital value*2 for user-set offset value ＊2
166	190	214	238	3-wire type User range settings gain value ＊4	Digital value*3 for user-set gain value ＊3
167	191	215	239	3-wire type User range settings gain value ＊4	Digital value*3 for user-set gain value ＊3
168	192	216	240	3-wire type User range settings offset resistance value (L)	Resistance value for user-set offset set temperature ($\times 10^{-2}\Omega$) ＊1
169	193	217	241	(H)	
170	194	218	242	3-wire type User range settings gain resistance value (L)	Resistance value for user-set gain set temperature ($\times 10^{-2}\Omega$) ＊1
171	195	219	243	(H)	
172	196	220	244	4-wire type factory default offset value ＊4	Factory-set offset digital value (theoretical value: 3B1DH)
173	197	221	245	4-wire type factory default offset value ＊4	Factory-set offset digital value (theoretical value: 3B1DH)
174	198	222	246	4-wire type factory default gain value ＊4	Factory-set gain digital value (theoretical value: B1518H)
175	199	223	247	4-wire type factory default gain value ＊4	Factory-set gain digital value (theoretical value: B1518H)
176	200	224	248	4-wire type User range setting offset value ＊4	Digital value*2 for user-set offset value ＊2
177	201	225	249	4-wire type User range setting offset value ＊4	Digital value*2 for user-set offset value ＊2
178	202	226	250	4-wire type User range settings gain value ＊4	Digital value*3 for user-set gain value ＊3
179	203	227	251	4-wire type User range settings gain value ＊4	Digital value*3 for user-set gain value ＊3
180	204	228	252	4-wire type User range settings offset resistance value (L)	Resistance value for user-set offset set temperature ($\times 10^{-2}\Omega$) ＊1
181	205	229	256	(H)	
182	206	230	254	4-wire type User range settings gain resistance value (L)	Resistance value for user-set gain set temperature ($\times 10^{-2}\Omega$) ＊1
183	207	231	255	(H)	

＊1: Refer to Appendix 1 for the reference resistance values of the platinum temperature-measuring resistors.
＊2: Use the following expression to calculate the theoretical value of the digital value.
Digital value = User range settings offset resistance value × 1.51336
＊3: Use the following expression to calculate the theoretical value of the digital value.
Digital value = User range settings gain resistance value × 1.51336
＊4: There are two identical areas consecutively. (Buffer memory addresses 160, 161 both have the 3-wire type CH. 1 factory default offset values.) Set the same value in each area.

(Example) The following values (theoretical values) are set when user offset/gain adjustment is made at the offset set temperature of -200℃ and the gain set temperature of 850℃ with a Pt100 type platinum temperature-measuring resistor connected.

Value type	Set temperature	Reference resistance value	Set value ($\times 10^{-2}\Omega$)	Input value
Offset value	-200.0°C	18.52Ω	1852	1852 × 1.51336 = 2802 (theoretical value :AF2H)
Gain value	850.0°C	390.48Ω	39048	39048 × 1.51336 = 59093 (theoretical value :F6D5H)

7.4.2 Range reference table (Q64RD-G)

The range reference tables for the Q64RD-G are given below.

Address (Decimal)				Description	Reference value
CH1	CH2	CH3	CH4		
160	184	208	232	3-wire type factory default offset value (L)	Factory-set offset digital value ＊4 (theoretical value: 1E2FEEH)
161	185	209	233	3-wire type factory default offset value (H)	
162	186	210	234	3-wire type factory default gain value (L)	Factory-set gain digital value ＊4 (theoretical value: 5A8FCAH)
163	187	211	235	3-wire type factory default gain value (H)	
164	188	212	236	3-wire type User range setting offset value (L)	Digital value*2 for user-set offset value ＊2
165	189	213	237	3-wire type User range setting offset value (H)	
166	190	214	238	3-wire type User range settings gain value (L)	Digital value*3 for user-set gain value ＊3
167	191	215	239	3-wire type User range settings gain value (H)	
168	192	216	240	3-wire type User range settings offset resistance value (L)	Resistance value for user-set offset set temperature ($\times 10^{-2}\Omega$) ＊1
169	193	217	241	(H)	
170	194	218	242	3-wire type User range settings gain resistance value (L)	Resistance value for user-set gain set temperature ($\times 10^{-2}\Omega$) ＊1
171	195	219	243	(H)	
172	196	220	244	4-wire type factory default offset value (L)	Factory-set offset digital value ＊4 (theoretical value: 1E2FEEH)
173	197	221	245	4-wire type factory default offset value (H)	
174	198	222	246	4-wire type factory default gain value (L)	Factory-set gain digital value ＊4 (theoretical value: 5A8FCAH)
175	199	223	247	4-wire type factory default gain value (H)	
176	200	224	248	4-wire type User range setting offset value (L)	Digital value*2 for user-set offset value ＊2
177	201	225	249	4-wire type User range setting offset value (H)	
178	202	226	250	4-wire type User range settings gain value (L)	Digital value*3 for user-set gain value ＊3
179	203	227	251	4-wire type User range settings gain value (H)	
180	204	228	252	4-wire type User range settings offset resistance value (L)	Resistance value for user-set offset temperature ($\times 10^{-2}\Omega$) ＊1
181	205	229	256	(H)	
182	206	230	254	4-wire type User range settings gain resistance value (L)	Resistance value for user-set gain temperature ($\times 10^{-2}\Omega$) ＊1
183	207	231	255	(H)	

＊1: Refer to Appendix 1 for the reference resistance values of the platinum temperature-measuring resistors.
＊2: Use the following expression to calculate the theoretical value of the digital value.
Digital value = User range settings offset resistance value × 1.51336
＊3: Use the following expression to calculate the theoretical value of the digital value.
Digital value = User range settings gain resistance value × 1.51336
＊4: Refer to the following example.

(Example) The following values (theoretical values) are set when user offset/gain adjustment is made at the offset set temperature of -200℃ and the gain set temperature of 850℃ with a Pt100 type platinum temperature-measuring resistor connected.

Value type	Set temperature	Reference resistance value	Set value ($\times 10^{-2}\Omega$)	Input value
Offset value	-200.0°C	18.52Ω	1852	1852 × 197.835 = 366390 (theoretical value : 59736H)
Gain value	850.0°C	390.48Ω	39048	39048 × 197.835 = 7725061 (theoretical value : 75E005H)

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. Failure to do so can cause a malfunction or failure.

(2) If a module change is changed online with the user range setting, the accuracy after that will be decreased by approx.3 times compared with the one before the restoration.
Re-set the offset/gain values as necessary.

8 TROUBLESHOOTING

This chapter explains the natures of errors which may occur during use of the Q64RD/Q64RD-G and troubleshooting.

8.1 Error Code List

If an error occurs when data are written to or read from the programmable controller CPU, the Q64RD/Q64RD-G writes the corresponding error code to the buffer memory address 19 (Un\G19).

Error Code (Decimal)	Description	Remedy
10☐	The measurement range setting is other than 0 to 5.8 in the intelligent function module switch setting. ☐ indicates the channel number set incorrectly.	Make a correct setting in the intelligent function module switch setting. (Refer to Section 4.5.)
111	A module error at start-up.	Switch power off, then on again. If the error recurs, the module may have failed. Consult your local Mitsubishi service center or representative.
112	Value set in the intelligent function module switch setting 5 is other than 0.	Set a correct value in the intelligent function module switch setting. (Refer to Section 4.5.)
12☐	The offset/gain setting is other than 0 and 1 in the intelligent function module switch setting. ☐ indicates the channel number set incorrectly.	Make a correct setting in the intelligent function module switch setting. (Refer to Section 4.5.)
13☐	The three-/four-wire type setting is other than 0 and 1 in the intelligent function module switch setting. ☐ indicates the channel number set incorrectly.	Make a correct setting in the intelligent function module switch setting. (Refer to Section 4.5.)
161 *1	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	• The G(P).OGSTOR instruction was executed consecutively. • At the time of offset/gain setting, a set value was written to the E^2PROM 26 or more times.	• 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	• 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. • The G(P).OGSTOR instruction had been executed before the G(P).OGLOAD instruction was executed.	Execute the G(P).OGLOAD and G(P).OGSTOR instructions for the same model.
20☐	The time averaging setting is outside the setting range. ☐ indicates the channel number set incorrectly.	Set a correct value at the buffer memory address 1 to 4 (Un\G1 to 4). (Refer to Section 3.4.4).
30☐	The count averaging setting is outside the setting range. ☐ indicates the channel number set incorrectly.	Set a correct value at the buffer memory address 1 to 4 (Un\G1 to 4). (Refer to Section 3.4.4).
31☐	The moving average setting is outside the setting range. ☐ indicates the channel number set incorrectly.	Set a correct value at the buffer memory address 1 to 4 (Un\G1 to 4). (Refer to Section 3.4.5.)
32☐	The time constant setting is outside the setting range. ☐ indicates the channel number set incorrectly.	Set a correct value at the buffer memory address 1 to 4 (Un\G1 to 4). (Refer to Section 3.4.5.)
40☐	In the offset/gain setting, or when the user setting is restored, Gain value - Offset value ≦ 0.1 [C]. ☐ indicates the channel number set incorrectly.	Set a correct value in the buffer memory, or measure and check the resistance of the RTD input terminals.
50☐	When the offset setting request (Y1, Y3, Y5, Y7) or gain setting request (Y2, Y4, Y6, Y8) is turned on in the offset/gain setting mode, the offset/gain setting of the intelligent function module switch setting on that channel is not user-set. ☐ indicates the channel number set incorrectly.	Make a correct setting in the intelligent function module switch setting. (Refer to Section 4.5.)
51☐	When the offset setting request (Y1, Y3, Y5, Y7) or gain setting request (Y2, Y4, Y6, Y8) is turned on in the offset/gain setting mode, the "offset value" or "gain value" of that channel is outside the measurement range. ☐ indicates the channel number set incorrectly.	Check the measurement range and set the offset/gain value within the range. (Refer to Section 3.1.1 (Q64RD) or 3.1.2 (Q64RD-G).)
52☐	The offset setting request and gain setting request were turned on simultaneously in the offset/gain setting mode. ☐ indicates the channel number set incorrectly.	Reexamine the sequence program so that they do not turn on simultaneously.

*1: This error code is written into G(P).OGSTOR instruction's completion status area (S) +1, not into the buffer memory address 19 (Un\G19).

Error Code (Decimal)	Description	Remedy
6△□	The set warning output upper/lower limit value is outside the measurable temperature range specified for the used platinum temperature-measuring resistor. □ indicates the channel number set incorrectly. △ indicates any of the following statuses. 0: The lower lower limit value is lower than the measurement range. 1: The upper upper limit value is higher than the measurement range. 2: Lower lower limit value > lower upper limit value 3: Lower upper limit value > upper lower limit value 4: Upper lower limit value > upper upper limit value	Set a correct value at the buffer memory address 86 to 117 (Un\G86 to 117). (Refer to Section 3.4.19.)

POINT

- If two or more errors have occurred, the code of the error found by the Q64RD/Q64RD-G first is stored. The latter errors are not stored.
- The error can be cleared by turning on the error clear request (YF).
- The error is cleared at the time of mode switching.

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8.2 Troubleshooting

8.2.1 RUN LED is extinguished

Check Item	Remedy
Check that power is supplied.	Confirm that the supply voltage of the power supply module is within the rated range.
Check that the capacity of the power supply module is sufficient.	Calculate the current consumption of the CPU, I/O, intelligent function and other modules loaded on the base unit, and make sure that the power supply capacity is enough.
Check for a watchdog timer error.	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. Consult your local Mitsubishi service center or representative.
Check whether the modules are loaded normally on the base unit.	Check the module loading status.
Is a module change enabled during an online module change?	Refer to Chapter 7 and take corrective action.

8.2.2 RUN LED flickers

Check Item	Remedy
Check whether the module is in the offset/gain setting mode or not.	After making offset/gain setting, return to the normal mode.

8.2.3 ERROR/ERR. LED flickers

Check Item	Remedy
Check whether the switch 5 of the intelligent function module switches is "other than 0".	Set the switch 5 of the intelligent function module switches for 0. (Refer to Section 4.5)

8.2.4 ERROR/ERR. LED is lit

Check Item	Remedy
Check for an error.	Check the error code and take the action given in Section 8.1.

8.2.5 ALM LED flickers

Check Item	Remedy
Check for an input signal fault.	Check the Disconnection detection flag (buffer memory address 49, Un\G49) and take the action given in Section 8.2.7.

8.2.6 ALM LED is lit

Check Item	Remedy
Check for a warning output.	Check the Warning output flag (buffer memory address 48, Un\G48).

8.2.7 Disconnection detection signal (XC) has turned on

Check Item	Remedy
Check whether RTD is connected securely or not.	Connect it securely.
Check for loose terminal screws.	Retighten the terminal screws within the specified torque range.
Check the connected RTD for wire break.	Make continuity check on the RTD, and replace it if its wire is broken.
Check whether the channel where no RTD is connected is specified for conversion enable.	Check the channels which are specified for conversion enable and the channels where RTDs are connected, and make the conversion setting correctly.

8.2.8 Temperature conversion value cannot be read

Check Item	Remedy
Check whether the used channel has been set for conversion disable.	Set it for conversion enable in sequence program.
Check whether the programmable controller CPU is set for STOP.	Set the programmable controller CPU for RUN.

8.2.9 Temperature conversion value is abnormal

Check Item	Remedy
Check whether the RTD differs from the one specified.	Set the RTD connected to the switch 1 in the intelligent function module switch setting.
Check whether the connected RTD is connected reversely.	Connect the RTD correctly.
Check for noise in the RTD input.	Check influence from the ground and adjacent devices, and take action to prevent noise.
Check whether conversion is made with another RTD specified after setting of the offset/gain value.	Make offset/gain setting again for the current RTD.

8.2.10 Checking the Q64RD/Q64RD-G status using GX Developer system monitor

When the Q64RD/Q64RD-G detailed information is selected in GX Developer system monitor, an error code and LED status can be checked.

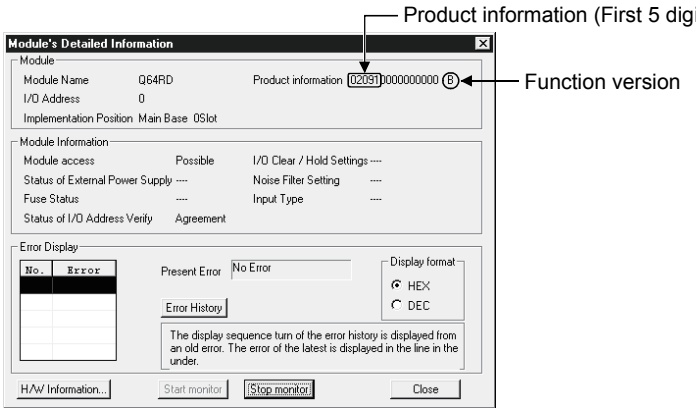
(1) Operating GX Developer

[Diagnostics] → [System monitor] → "Select Q64RD/Q64RD-G " → Module Detailed Information

(2) Module's Detailed Information

(a) Checking the function version and product information
The function version and product information of the Q64RD/Q64RD-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 Q64RD/Q64RD-G is displayed in the Present Error field.
(When the Error History button is pressed, the contents displayed in the Present Error field are displayed in the No. 1 field.)

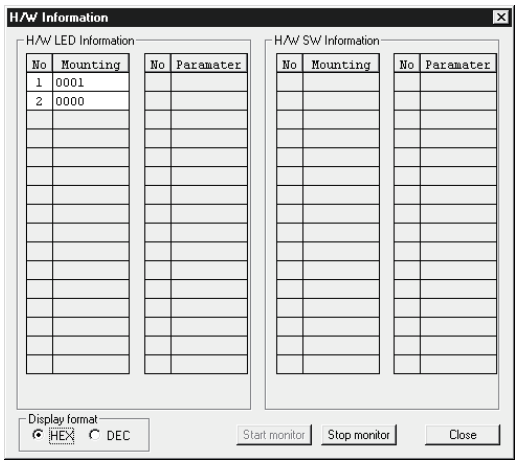


(3) H/W information (Q64RD)

(a) H/W LED information of Q64RD

The LED ON status is displayed.

No.	LED name	Status
1	RUN LED	0000_H : Indicates that LED is unlit.
2	ERROR LED	0001_H : Indicates that LED is lit



(4) H/W information (Q64RD-G)

(a) H/W LED information of Q64RD-G

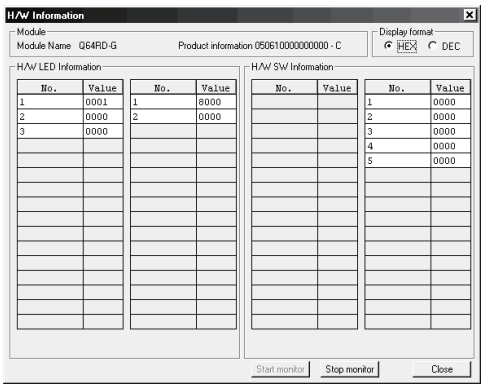
The LED ON status is displayed.

No.	LED name	Status
1	RUN LED	0000H: Indicates that LED is unlit.
2	ERR LED	0001H: Indicates that LED is lit.
3	ALM LED	Alternate display of 0000 and 0001: Indicates that the LED is flickering.

(b) H/W switch information of Q64RD-G

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

No.	Intelligent function module switch
1	Switch 1
2	Switch 2
3	Switch 3
4	Switch 4
5	Switch 5



APPENDIX

Appendix 1 Reference Resistance of RTD

Appendix 1.1 New JIS/IEC type (Pt100)

JIS C1604-1997, IEC 751 1983 Unit: Ω

-200	-100	-0	Temperature[℃]		Temperature[℃]	0	100	200	300	400	500	600	700	800
18.52	60.26	100.00	-0		0	100.00	138.51	175.86	212.05	247.09	280.98	313.71	345.28	375.70
	56.19	96.09	-10		10	103.90	142.29	179.53	215.61	250.53	284.30	316.92	348.38	378.68
	52.11	92.16	-20		20	107.79	146.07	183.19	219.15	253.96	287.62	320.12	351.46	381.65
	48.00	88.22	-30		30	111.67	149.83	186.84	222.68	257.38	290.92	323.30	354.53	384.60
	43.88	84.27	-40		40	115.54	153.58	190.47	226.21	260.78	294.21	326.48	357.59	387.55
	39.72	80.31	-50		50	119.40	157.33	194.10	229.72	264.18	297.49	329.64	360.64	390.48
	35.54	76.33	-60		60	123.24	161.05	197.71	233.21	267.56	300.75	332.79	363.67	
	31.34	72.33	-70		70	127.08	164.77	201.31	236.70	270.93	304.01	335.93	366.70	
	27.10	68.33	-80		80	130.90	168.48	204.90	240.18	274.29	307.25	339.06	369.71	
		64.30	-90		90	134.71	172.17	208.48	243.64	277.64	310.49	342.18	372.71	

Appendix 1.2 Old JIS type (JPt100)

JIS C1604-1981 Unit: Ω

-100	-0	Temperature[℃]		Temperature[℃]	0	100	200	300	400	500	600
59.57	100.00	-0		0	100.00	139.16	177.13	213.93	249.56	284.02	317.28
55.44	96.02	-10		10	103.97	143.01	180.86	217.54	253.06	287.40	
51.29	92.02	-20		20	107.93	146.85	184.58	221.15	256.55	290.77	
47.11	88.01	-30		30	111.88	150.67	188.29	224.74	260.02	294.12	
42.91	83.99	-40		40	115.81	154.49	191.99	228.32	263.49	297.47	
38.68	79.96	-50		50	119.73	158.29	195.67	231.89	266.94	300.80	
34.42	75.91	-60		60	123.64	162.08	199.35	235.45	270.38	304.12	
30.12	71.85	-70		70	127.54	165.86	203.01	238.99	273.80	307.43	
25.80	67.77	-80		80	131.42	169.63	206.66	242.53	277.22	310.72	
	63.68	-90		90	135.30	173.38	210.30	246.05	280.63	314.01	

Appendix 1.3 Ni100Ω type

DIN43760 1987 Unit: Ω

-0	Temperature[℃]		Temperature[℃]	0	100
100.0	-0		0	100.0	161.8
94.6	-10		10	105.6	168.8
89.3	-20		20	111.2	176.0
84.2	-30		30	117.1	183.3
79.1	-40		40	123.0	190.9
74.3	-50		50	129.1	198.7
69.5	-60		60	135.3	206.6
	-70		70	141.7	214.8
	-80		80	148.3	223.2
	-90		90	154.9	

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Appendix 2 Function Upgrade for the Q64RD

The Q64RD of function versions C have more functions than the conventional model (function version B).

Appendix 2.1 A Comparison of Function of the Q64RD

The following table indicates the functions supported by the corresponding function versions.

Function	Function version B	Function version C (First 5 digits of product information are 07071 or earlier)	Function version C (First 5 digits of product information are 07072 or later)
Online module change	×	○	○
Dedicated instruction	×	○	○
Mode switching that does not require programmable controller CPU to be reset	—	—	—
Dedicated instruction (G(P).OFFGAN)	×	○	○
Buffer memory (mode switching setting) and operating condition setting request (Y9)	×	○	○
GX Configurator-TI	×	○	○
Conversion setting for disconnection detection function	×	×	○
Moving average	×	×	○
Primary delay filter	×	×	○

○ : Compatible × : Not compatible

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Appendix 2.2 When the Q64RD has Product Information which First 5 Digits are 07071 or Earlier

The following shows differences between the Q64RD whose first 5 digits of product information are 07071 or earlier and those of 07072 or later.

Item	Q64RD	
	First 5 digits of product information are 07071 or earlier	First 5 digits of product information are 07072 or later
Moving average	No moving average processing	Digital output values sampled at specified number of times are averaged.
Primary delay filter	No primary delay filter	By a preset time constant, digital output values are smoothed.
Conversion setting for disconnection detection function	No conversion setting for disconnection detection function	For values to be stored in the CH□ measured temperature value (buffer memory addresses 11 to 14, 54 to 61: Un\G11 to 14, Un\G54 to 61) in the case of disconnection detection, any of "Value immediately before disconnection", "Up scale (maximum value of measured temperature range + 5% of measured temperature range)", "Down scale (minimum value of measured temperature range – 5% of measured temperature range)" or "Given value" can be selected.
Conversion completion flag (XE)	The Conversion completion flag (XE) turns OFF when disconnection is detected, and a value immediately before the detection is held in the CH□ measured temperature value (Un\G11 to 14, Un\G54 to 61).	When disconnection is detected, the Conversion completion flag (XE) does not turn OFF and a value based on the Conversion setting for disconnection detection (Un\G148) is stored in the CH□ measured temperature value (Un\G11 to 14, Un\G54 to 61).
	The Conversion completion flag (XE) turns OFF when disconnection is detected. Upon recovery of the connection, the temperature conversion value update is restarted independently of the Disconnection detection signal (XC) reset. After the initial update, the Conversion completion flag (XE) turns ON again.	When disconnection is detected, the Conversion completion flag (XE) does not turn OFF. Upon recovery of the connection, the temperature conversion value update is restarted independently of the Disconnection detection signal (XC) reset.
Conversion completion flag (Un\G10)	When disconnection is detected, the Conversion completion flag (Un\G10) for the channel disconnected turns OFF (0).	When disconnection is detected, the Conversion completion flag (Un\G10) for the channel disconnected does not turn OFF (0).
CH□ time/count/moving average/time constant setting (Un\G1 to 4)	Setting options are "Time" and "Count" only. (see Appendix 2.2.1)	There are four setting options: "Time", "Count", Moving average" and "Time constant".
Exteded averaging processing specification (Un\G134)	Since the Extended averaging processing specification (Un\G134) is not provided, use the Averaging processing specification (Un\G9) to specify the averaging processing. (see Appendix 2.2.2)	Use the Extended averaging processing specification (Un\G134) to specify the averaging processing.
Conversion setting for disconnection detection (Un\G148)	The Conversion setting for disconnection detection (Un\G148) is not provided.	For values to be stored in the CH□ measured temperature value (buffer memory addresses 11 to 14, 54 to 61: Un\G11 to 14, Un\G54 to 61) in the case of disconnection detection, any of "Value immediately before disconnection", "Up scale (maximum value of measured temperature range + 5% of measured temperature range)", "Down scale (minimum value of measured temperature range – 5% of measured temperature range)" or "Given value" can be selected. (see Section 3.4.22)
CH□ Conversion setting value for disconnection detection (Un\G150 to 157)	The Conversion setting value for disconnection detection (Un\G150 to 157) is not provided.	If Given value (3H) is set in the Conversion setting for disconnection detection (Un\G148), when disconnection is detected, the value set in this area is stored in the CH□ measured temperature value (Un\G11 to 14, Un\G54 to 61). (see Section 3.4.23)

Appendix 2.2.1 CH□ time/count averaging setting (Un\G1 to 4)

(1) Set the averaging time or averaging count for each channel specified for averaging processing (buffer memory address 9: Un\G9).

(2) Setting can be made within the following ranges.
Time averaging processing: 160 to 5000ms
Count averaging processing: 4 to 62500 times
Setting any value outside the range will result in an error and operation will be performed under the previous setting.

(3) This setting will be invalid if sampling is specified for Averaging processing specification (buffer memory address 9: Un\G9).

(4) At power-on or reset, the CH□ time/count averaging setting is set to 0000H (averaging time 0/averaging count 0).

(5) The Operating Condition Setting Request (Y9) must be turned on/off to make this setting valid.

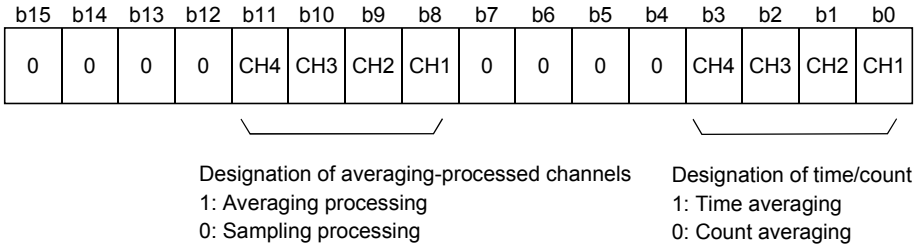
(6) Refer to Appendix 2.2.2 for details of sampling processing/time averaging processing/count averaging processing.

Appendix 2.2.2 Averaging processing specification (Un\G9)

(1) To select sampling or averaging processing, write values to the buffer memory address 9 (Un\G9).

(2) When you selected averaging processing, choose time averaging or count averaging.

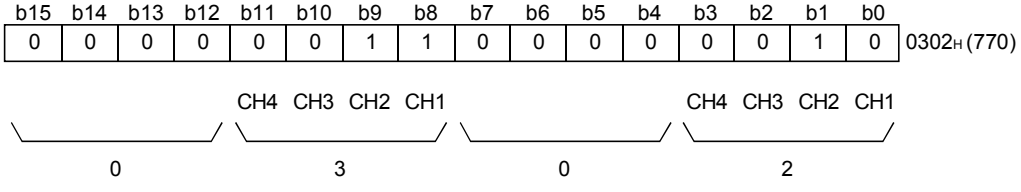
(3) This setting defaults to all-channel sampling processing.



(4) The Operating Condition Setting Request (Y9) must be turned on/off to make this setting valid.

Example

To specify count averaging for channels 1 time averaging for channels 2 and sampling processing for other channels, store 0302H (770) into the buffer memory address 9 (Un\G9).



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Appendix 2.3 When the Q64RD-G has Product Information which First 5 Digits are 07071 or Earlier

The following shows differences between the Q64RD-G whose first 5 digits of product information are 07071 or earlier and those of 07072 or later.

Item	Q64RD-G	
	First 5 digits of product information are 07071 or earlier	First 5 digits of product information are 07072 or later
Conversion setting for disconnection detection function	No moving average processing	For values to be stored in the CH□ measured temperature value (Un\G11 to 14, Un\G54 to 61) in the case of disconnection detection, any of "Value immediately before disconnection", "Up scale (maximum value of measured temperature range + 5% of measured temperature range)", "Down scale (minimum value of measured temperature range – 5% of measured temperature range)" or "Given value" can be selected.
Conversion completion flag (XE)	The Conversion completion flag (XE) turns OFF when disconnection is detected, and a value immediately before the detection is held in the CH□ measured temperature value (Un\G11 to 14, Un\G54 to 61).	When disconnection is detected, the Conversion completion flag (XE) does not turn OFF and a value based on the Conversion setting for disconnection detection (Un\G148) is stored in the CH□ measured temperature value (Un\G11 to 14, Un\G54 to 61).
	The Conversion completion flag (XE) turns OFF when disconnection is detected. Upon recovery of the connection, the temperature conversion value update is restarted independently of the Disconnection detection signal (XC) reset. After the initial update, the Conversion completion flag (XE) turns ON again.	When disconnection is detected, the Conversion completion flag (XE) does not turn OFF. Upon recovery of the connection, the temperature conversion value update is restarted independently of the Disconnection detection signal (XC) reset.
Conversion completion flag (Un\G10)	When disconnection is detected, the Conversion completion flag (Un\G10) for the channel disconnected turns OFF (0).	When disconnection is detected, the Conversion completion flag (Un\G10) for the channel disconnected does not turn OFF (0).
Conversion setting for disconnection detection (Un\G148)	The Conversion setting for disconnection detection (Un\G148) is not provided.	For values to be stored in the CH□ measured temperature value (Un\G11 to 14, Un\G54 to 61) in the case of disconnection detection, any of "Value immediately before disconnection", "Up scale (maximum value of measured temperature range + 5% of measured temperature range)", "Down scale (minimum value of measured temperature range – 5% of measured temperature range)" or "Given value" can be selected. (see Section 3.4.22)
CH□ Conversion setting value for disconnection detection (Un\G150 to 157)	The Conversion setting value for disconnection detection (Un\G150 to 157) is not provided.	If Given value (3H) is set in the Conversion setting for disconnection detection (Un\G148), when disconnection is detected, the value set in this area is stored in the CH□ measured temperature value (Un\G11 to 14, Un\G54 to 61). (see Section 3.4.23)

Appendix 3 Dedicated Instruction

Appendix 3.1 Dedicated Instruction List and Available Device

(1) Dedicated instruction list

The following table lists the dedicated instructions that can be used with the Q64RD/Q64RD-G.

Instruction	Description	Reference section
G(P).OFFGAN	Switches to the offset/gain setting mode. Switches to the normal mode.	Appendix 3.2
G(P).OGLOAD	Reads the offset/gain values of the user range setting to the CPU.	Appendix 3.3
G(P).OGSTOR	Restores the offset/gain values of the user range setting stored in the CPU to the Q64RD/Q64RD-G.	Appendix 3.4

POINT

When the module is mounted to a MELSECNET/H remote I/O station, the dedicated instructions are not available.

(2) Available devices

The following devices are available for the dedicated instructions:

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

*1: Word 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 D0.A.
However, there can be no bit designation for timers (T), retentive timers (ST) and counters (C).

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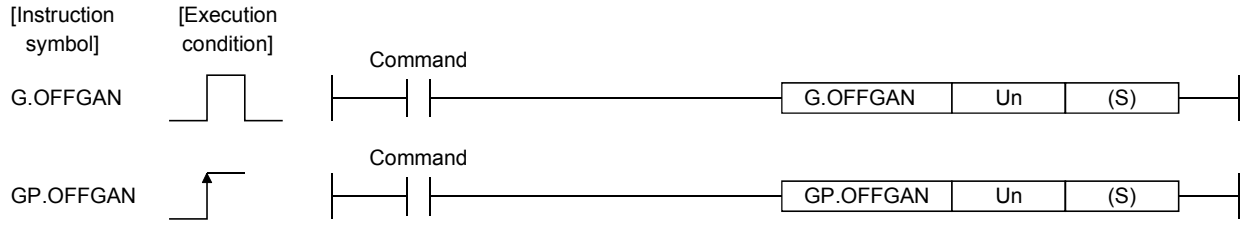
Appendix 3.2 G(P).OFFGAN

Switches the mode of the Q64RD/Q64RD-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 Q64RD/Q64RD-G.

- Normal mode to offset/gain setting mode
- Offset/gain setting mode to normal mode

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) The error is cleared when the mode is switched.

(2) Operation error

No errors.

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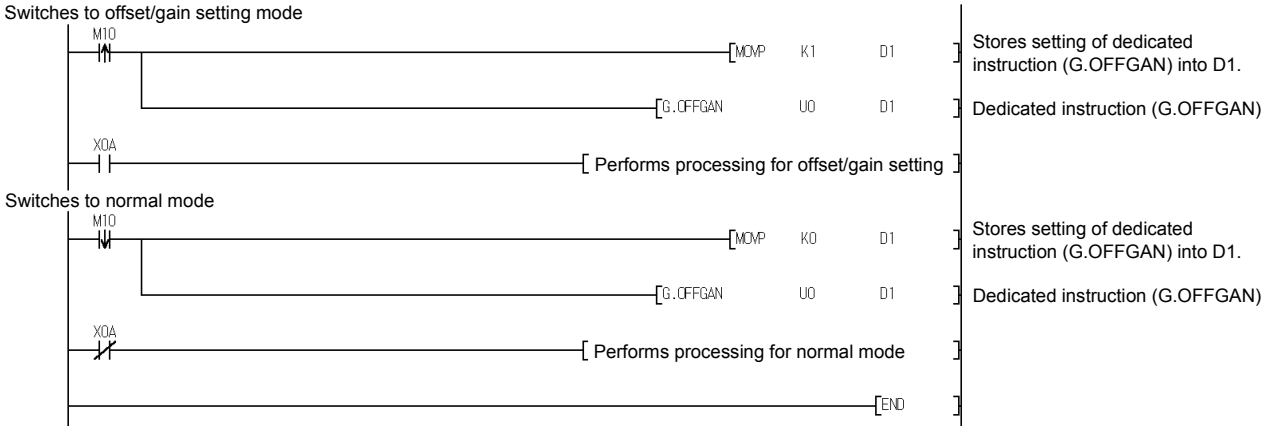
(3) Program example

The following program is designed to switch the Q64RD/Q64RD-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.



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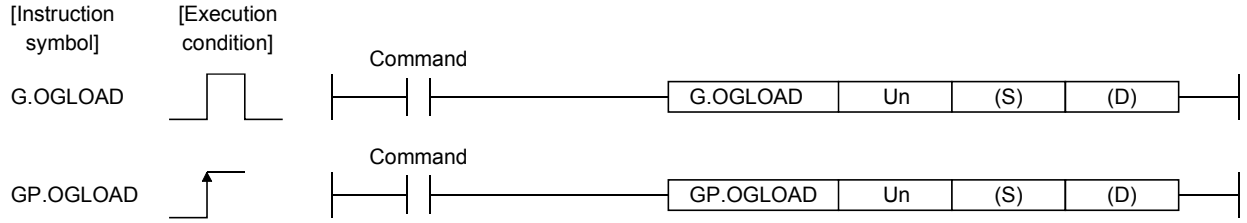
Appendix 3.3 G(P).OGLOAD

Reads the offset/gain values of the user range setting of the Q64RD/Q64RD-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 (1/4)

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		System area	—	—	—
(S) + 3					
Q64RD	(S) + 4	3-wire CH1 Factory default offset value	—	—	System
	(S) + 5	3-wire CH1 Factory default offset value	—	—	System
	(S) + 6	3-wire CH1 Factory default gain value	—	—	System
	(S) + 7	3-wire CH1 Factory default gain value	—	—	System
	(S) + 8	3-wire CH1 User range settings offset value	—	—	System
	(S) + 9	3-wire CH1 User range settings offset value	—	—	System
	(S) + 10	3-wire CH1 User range settings gain value	—	—	System
	(S) + 11	3-wire CH1 User range settings gain value	—	—	System

*1 Setting is not necessary. If setting is made, the offset/gain values will not be read properly.

App. - 9

Control data＊1 (2/4)

Device		Item	Set data	Setting range	Set by
Q64RD-G	(S) + 4	3-wire CH1 Factory default offset value (L)	—	—	System
	(S) + 5	3-wire CH1 Factory default offset value (H)			
	(S) + 6	3-wire CH1 Factory default gain value (L)	—	—	System
	(S) + 7	3-wire CH1 Factory default gain value (H)			
	(S) + 8	3-wire CH1 User range settings offset value (L)	—	—	System
	(S) + 9	3-wire CH1 User range settings offset value (H)			
	(S) + 10	3-wire CH1 User range settings gain value (L)	—	—	System
	(S) + 11	3-wire CH1 User range settings gain value (H)			
(S) + 12		3-wire CH1 User range settings offset resistance value (L)	—	—	System
(S) + 13		3-wire CH1 User range settings offset resistance value (H)			
(S) + 14		3-wire CH1 User range settings gain resistance value (L)	—	—	System
(S) + 15		3-wire CH1 User range settings gain resistance value (H)			
Q64RD	(S) + 16	4-wire CH1 Factory default offset value	—	—	System
	(S) + 17	4-wire CH1 Factory default offset value	—	—	System
	(S) + 18	4-wire CH1 Factory default gain value	—	—	System
	(S) + 19	4-wire CH1 Factory default gain value	—	—	System
	(S) + 20	4-wire CH1 User range settings offset value	—	—	System
	(S) + 21	4-wire CH1 User range settings offset value	—	—	System
	(S) + 22	4-wire CH1 User range settings gain value	—	—	System
	(S) + 23	4-wire CH1 User range settings gain value	—	—	System
Q64RD-G	(S) + 16	4-wire CH1 Factory default offset value (L)	—	—	System
	(S) + 17	4-wire CH1 Factory default offset value (H)			
	(S) + 18	4-wire CH1 Factory default gain value (L)	—	—	System
	(S) + 19	4-wire CH1 Factory default gain value (H)			
	(S) + 20	4-wire CH1 User range settings offset value (L)	—	—	System
	(S) + 21	4-wire CH1 User range settings offset value (H)			
	(S) + 22	4-wire CH1 User range settings gain value (L)	—	—	System
	(S) + 23	4-wire CH1 User range settings gain value (H)			
(S) + 24		4-wire CH1 User range settings offset resistance value (L)	—	—	System
(S) + 25		4-wire CH1 User range settings offset resistance value (H)			
(S) + 26		4-wire CH1 User range settings gain resistance value (L)	—	—	System
(S) + 27		4-wire CH1 User range settings gain resistance value (H)			
Q64RD	(S) + 28	3-wire CH2 Factory default offset value	—	—	System
	(S) + 29	3-wire CH2 Factory default offset value	—	—	System
	(S) + 30	3-wire CH2 Factory default gain value	—	—	System
	(S) + 31	3-wire CH2 Factory default gain value	—	—	System
	(S) + 32	3-wire CH2 User range settings offset value	—	—	System
	(S) + 33	3-wire CH2 User range settings offset value	—	—	System
	(S) + 34	3-wire CH2 User range settings gain value	—	—	System
	(S) + 35	3-wire CH2 User range settings gain value	—	—	System
Q64RD-G	(S) + 28	3-wire CH2 Factory default offset value (L)	—	—	System
	(S) + 29	3-wire CH2 Factory default offset value (H)			
	(S) + 30	3-wire CH2 Factory default gain value (L)	—	—	System
	(S) + 31	3-wire CH2 Factory default gain value (H)			
	(S) + 32	3-wire CH2 User range settings offset value (L)	—	—	System
	(S) + 33	3-wire CH2 User range settings offset value (H)			
	(S) + 34	3-wire CH2 User range settings gain value (L)	—	—	System
	(S) + 35	3-wire CH2 User range settings gain value (H)			
(S) + 36		3-wire CH2 User range settings offset resistance value (L)	—	—	System
(S) + 37		3-wire CH2 User range settings offset resistance value (H)			
(S) + 38		3-wire CH2 User range settings gain resistance value (L)	—	—	System
(S) + 39		3-wire CH2 User range settings gain resistance value (H)			

＊1 Setting is not necessary. If setting is made, the offset/gain values will not be read properly.

App. - 10

Control data＊1 (3/4)

Device		Item	Set data	Setting range	Set by
Q64RD	(S) + 40	4-wire CH2 Factory default offset value	—	—	System
	(S) + 41	4-wire CH2 Factory default offset value	—	—	System
	(S) + 42	4-wire CH2 Factory default gain value	—	—	System
	(S) + 43	4-wire CH2 Factory default gain value	—	—	System
	(S) + 44	4-wire CH2 User range settings offset value	—	—	System
	(S) + 45	4-wire CH2 User range settings offset value	—	—	System
	(S) + 46	4-wire CH2 User range settings gain value	—	—	System
	(S) + 47	4-wire CH2 User range settings gain value	—	—	System
Q64RD -G	(S) + 40	4-wire CH2 Factory default offset value (L)	—	—	System
	(S) + 41	4-wire CH2 Factory default offset value (H)			
	(S) + 42	4-wire CH2 Factory default gain value (L)	—	—	System
	(S) + 43	4-wire CH2 Factory default gain value (H)			
	(S) + 44	4-wire CH2 User range settings offset value (L)	—	—	System
	(S) + 45	4-wire CH2 User range settings offset value (H)			
	(S) + 46	4-wire CH2 User range settings gain value (L)	—	—	System
	(S) + 47	4-wire CH2 User range settings gain value (H)			
(S) + 48		4-wire CH2 User range settings offset resistance value (L)	—	—	System
(S) + 49		4-wire CH2 User range settings offset resistance value (H)			
(S) + 50		4-wire CH2 User range settings gain resistance value (L)	—	—	System
(S) + 51		4-wire CH2 User range settings gain resistance value (H)			
Q64RD	(S) + 52	3-wire CH3 Factory default offset value	—	—	System
	(S) + 53	3-wire CH3 Factory default offset value	—	—	System
	(S) + 54	3-wire CH3 Factory default gain value	—	—	System
	(S) + 55	3-wire CH3 Factory default gain value	—	—	System
	(S) + 56	3-wire CH3 User range settings offset value	—	—	System
	(S) + 57	3-wire CH3 User range settings offset value	—	—	System
	(S) + 58	3-wire CH3 User range settings gain value	—	—	System
	(S) + 59	3-wire CH3 User range settings gain value	—	—	System
Q64RD -G	(S) + 52	3-wire CH3 Factory default offset value (L)	—	—	System
	(S) + 53	3-wire CH3 Factory default offset value (H)			
	(S) + 54	3-wire CH3 Factory default gain value (L)	—	—	System
	(S) + 55	3-wire CH3 Factory default gain value (H)			
	(S) + 56	3-wire CH3 User range settings offset value (L)	—	—	System
	(S) + 57	3-wire CH3 User range settings offset value (H)			
	(S) + 58	3-wire CH3 User range settings gain value (L)	—	—	System
	(S) + 59	3-wire CH3 User range settings gain value (H)			
(S) + 60		3-wire CH3 User range settings offset resistance value (L)	—	—	System
(S) + 61		3-wire CH3 User range settings offset resistance value (H)			
(S) + 62		3-wire CH3 User range settings gain resistance value (L)	—	—	System
(S) + 63		3-wire CH3 User range settings gain resistance value (H)			
Q64RD	(S) + 64	4-wire CH3 Factory default offset value	—	—	System
	(S) + 65	4-wire CH3 Factory default offset value			
	(S) + 66	4-wire CH3 Factory default gain value	—	—	System
	(S) + 67	4-wire CH3 Factory default gain value			
	(S) + 68	4-wire CH3 User range settings offset value	—	—	System
	(S) + 69	4-wire CH3 User range settings offset value			
	(S) + 70	4-wire CH3 User range settings gain value	—	—	System
	(S) + 71	4-wire CH3 User range settings gain value			

＊1 Setting is not necessary. If setting is made, the offset/gain values will not be read properly.

App. - 11

Control data＊1 (4/4)

Device		Item	Set data	Setting range	Set by
Q64RD-G	(S) + 64	4-wire CH3 User range settings offset value (L)	—	—	System
	(S) + 65	4-wire CH3 User range settings offset value (H)			
	(S) + 66	4-wire CH3 User range settings gain value (L)	—	—	System
	(S) + 67	4-wire CH3 User range settings gain value (H)			
	(S) + 68	4-wire CH3 User range settings offset resistance value (L)	—	—	System
	(S) + 69	4-wire CH3 User range settings offset resistance value (H)	—	—	System
	(S) + 70	4-wire CH3 User range settings gain resistance value (L)	—	—	System
	(S) + 71	4-wire CH3 User range settings gain resistance value (H)	—	—	System
(S) + 72		4-wire CH3 User range settings offset resistance value (L)	—	—	System
(S) + 73		4-wire CH3 User range settings offset resistance value (H)			
(S) + 74		4-wire CH3 User range settings gain resistance value (L)	—	—	System
(S) + 75		4-wire CH3 User range settings gain resistance value (H)			
Q64RD	(S) + 76	3-wire CH4 Factory default offset value	—	—	System
	(S) + 77	3-wire CH4 Factory default offset value	—	—	System
	(S) + 78	3-wire CH4 Factory default gain value	—	—	System
	(S) + 79	3-wire CH4 Factory default gain value	—	—	System
	(S) + 80	3-wire CH4 User range settings offset value	—	—	System
	(S) + 81	3-wire CH4 User range settings offset value	—	—	System
	(S) + 82	3-wire CH4 User range settings gain value	—	—	System
	(S) + 83	3-wire CH4 User range settings gain value	—	—	System
Q64RD-G	(S) + 76	3-wire CH4 Factory default offset value (L)	—	—	System
	(S) + 77	3-wire CH4 Factory default offset value (H)			
	(S) + 78	3-wire CH4 Factory default gain value (L)	—	—	System
	(S) + 79	3-wire CH4 Factory default gain value (H)			
	(S) + 80	3-wire CH4 User range settings offset value (L)	—	—	System
	(S) + 81	3-wire CH4 User range settings offset value (H)			
	(S) + 82	3-wire CH4 User range settings gain value (L)	—	—	System
	(S) + 83	3-wire CH4 User range settings gain value (H)			
(S) + 84		3-wire CH4 User range settings offset resistance value (L)	—	—	System
(S) + 85		3-wire CH4 User range settings offset resistance value (H)			
(S) + 86		3-wire CH4 User range settings gain resistance value (L)	—	—	System
(S) + 87		3-wire CH4 User range settings gain resistance value (H)			
Q64RD	(S) + 88	4-wire CH4 Factory default offset value	—	—	System
	(S) + 89	4-wire CH4 Factory default offset value	—	—	System
	(S) + 90	4-wire CH4 Factory default gain value	—	—	System
	(S) + 91	4-wire CH4 Factory default gain value	—	—	System
	(S) + 92	4-wire CH4 User range settings offset value	—	—	System
	(S) + 93	4-wire CH4 User range settings offset value	—	—	System
	(S) + 94	4-wire CH4 User range settings gain value	—	—	System
	(S) + 95	4-wire CH4User range settings gain value	—	—	
Q64RD-G	(S) + 88	4-wire CH4 Factory default offset value (L)	—	—	System
	(S) + 89	4-wire CH4 Factory default offset value (H)			
	(S) + 90	4-wire CH4 Factory default gain value (L)	—	—	System
	(S) + 91	4-wire CH4 Factory default gain value (H)			
	(S) + 92	4-wire CH4 User range settings offset value (L)	—	—	System
	(S) + 93	4-wire CH4 User range settings offset value (H)			
	(S) + 94	4-wire CH4 User range settings gain value (L)	—	—	System
	(S) + 95	4-wire CH4 User range settings gain value (H)			
(S) + 96		4-wire CH4 User range settings offset resistance value (L)	—	—	System
(S) + 97		4-wire CH4 User range settings offset resistance value (H)			
(S) + 98		4-wire CH4 User range settings gain resistance value (L)	—	—	System
(S) + 99		4-wire CH4 User range settings gain resistance value (H)			

＊1 Setting is not necessary. If setting is made, the offset/gain values will not be read properly.

App. - 12

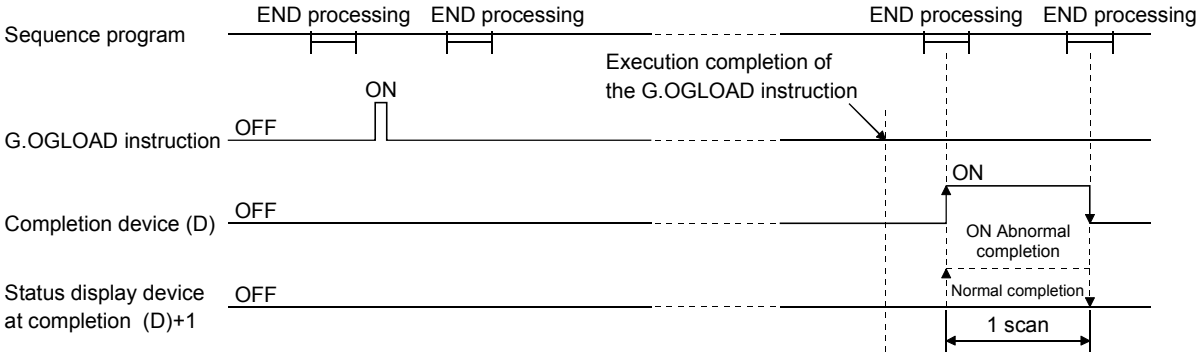
(1) Functions

(a) Reads the offset/gain values of the user range setting of Q64RD/Q64RD-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.

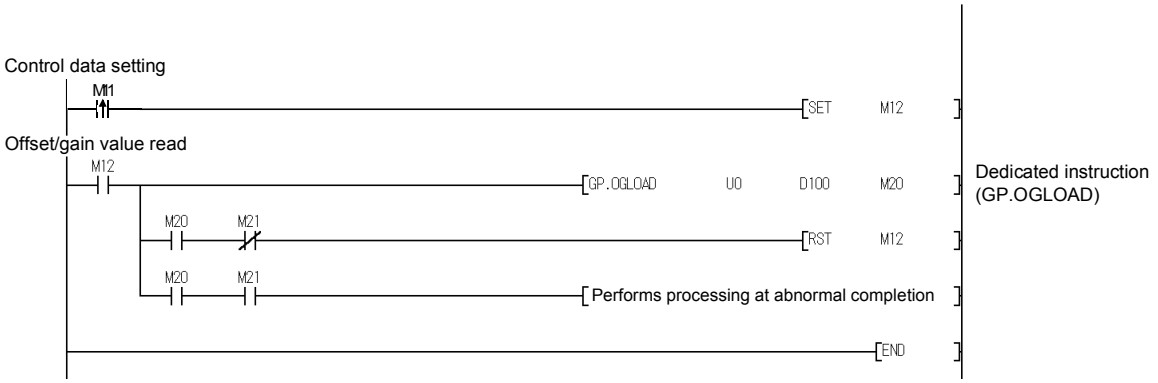


(2) Operation error

No errors.

(3) Program example

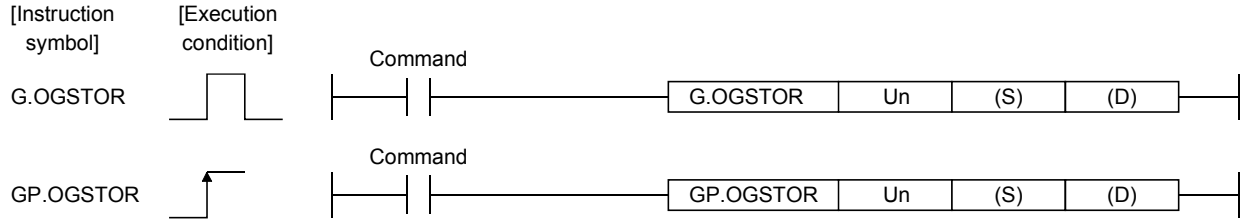
The following program is designed to read the offset/gain values of the Q64RD/Q64RD-G mounted in the position of I/O number X/Y0 to X/YF when M11 is turned ON.



Appendix 3.4 OGSTOR

Restores the offset/gain values of the user range setting stored in the CPU to the Q64RD/Q64RD-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.OGLOAD instruction, specify the device designated in (S).
Do not change the data read with the G.OGLOAD instruction.
If it is changed, normal operation cannot be guaranteed.

Control data ＊1 (1/4)

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 (S) + 3		System area	—	—	—
Q64RD	(S) + 4	3-wire CH1 Factory default offset value	—	—	System
	(S) + 5	3-wire CH1 Factory default offset value	—	—	System
	(S) + 6	3-wire CH1 Factory default gain value	—	—	System
	(S) + 7	3-wire CH1 Factory default gain value	—	—	System
	(S) + 8	3-wire CH1 User range settings offset value	—	—	System
	(S) + 9	3-wire CH1 User range settings offset value	—	—	System
	(S) + 10	3-wire CH1 User range settings gain value	—	—	System
	(S) + 11	3-wire CH1 User range settings gain value	—	—	System

＊1 Setting is not necessary. If setting is made, the offset/gain values will not be read properly.

App. - 14

Control data＊1 (2/4)

Device		Item	Set data	Setting range	Set by
Q64RD-G	(S) + 4	3-wire CH1 Factory default offset value (L)	—	—	System
	(S) + 5	3-wire CH1 Factory default offset value (H)			
	(S) + 6	3-wire CH1 Factory default gain value (L)	—	—	System
	(S) + 7	3-wire CH1 Factory default gain value (H)			
	(S) + 8	3-wire CH1 User range settings offset value (L)	—	—	System
	(S) + 9	3-wire CH1 User range settings offset value (H)			
	(S) + 10	3-wire CH1 User range settings gain value (L)	—	—	System
	(S) + 11	3-wire CH1 User range settings gain value (H)			
(S) + 12		3-wire CH1 User range settings offset resistance value (L)	—	—	System
(S) + 13		3-wire CH1 User range settings offset resistance value (H)			
(S) + 14		3-wire CH1 User range settings gain resistance value (L)	—	—	System
(S) + 15		3-wire CH1 User range settings gain resistance value (H)			
Q64RD	(S) + 16	4-wire CH1 Factory default offset value	—	—	System
	(S) + 17	4-wire CH1 Factory default offset value	—	—	System
	(S) + 18	4-wire CH1 Factory default gain value	—	—	System
	(S) + 19	4-wire CH1 Factory default gain value	—	—	System
	(S) + 20	4-wire CH1 User range settings offset value	—	—	System
	(S) + 21	4-wire CH1 User range settings offset value	—	—	System
	(S) + 22	4-wire CH1 User range settings gain value	—	—	System
	(S) + 23	4-wire CH1 User range settings gain value	—	—	System
Q64RD-G	(S) + 16	4-wire CH1 Factory default offset value (L)	—	—	System
	(S) + 17	4-wire CH1 Factory default offset value (H)			
	(S) + 18	4-wire CH1 Factory default gain value (L)	—	—	System
	(S) + 19	4-wire CH1 Factory default gain value (H)			
	(S) + 20	4-wire CH1 User range settings offset value (L)	—	—	System
	(S) + 21	4-wire CH1 User range settings offset value (H)			
	(S) + 22	4-wire CH1 User range settings gain value (L)	—	—	System
	(S) + 23	4-wire CH1 User range settings gain value (H)			
(S) + 24		4-wire CH1 User range settings offset resistance value (L)	—	—	System
(S) + 25		4-wire CH1 User range settings offset resistance value (H)			
(S) + 26		4-wire CH1 User range settings gain resistance value (L)	—	—	System
(S) + 27		4-wire CH1 User range settings gain resistance value (H)			
Q64RD	(S) + 28	3-wire CH2 Factory default offset value	—	—	System
	(S) + 29	3-wire CH2 Factory default offset value	—	—	System
	(S) + 30	3-wire CH2 Factory default gain value	—	—	System
	(S) + 31	3-wire CH2 Factory default gain value	—	—	System
	(S) + 32	3-wire CH2 User range settings offset value	—	—	System
	(S) + 33	3-wire CH2 User range settings offset value	—	—	System
	(S) + 34	3-wire CH2 User range settings gain value	—	—	System
	(S) + 35	3-wire CH2 User range settings gain value	—	—	System
Q64RD-G	(S) + 28	3-wire CH2 Factory default offset value (L)	—	—	System
	(S) + 29	3-wire CH2 Factory default offset value (H)			
	(S) + 30	3-wire CH2 Factory default gain value (L)	—	—	System
	(S) + 31	3-wire CH2 Factory default gain value (H)			
	(S) + 32	3-wire CH2 User range settings offset value (L)	—	—	System
	(S) + 33	3-wire CH2 User range settings offset value (H)			
	(S) + 34	3-wire CH2 User range settings gain value (L)	—	—	System
	(S) + 35	3-wire CH2 User range settings gain value (H)			
(S) + 36		3-wire CH2 User range settings offset resistance value (L)	—	—	System
(S) + 37		3-wire CH2 User range settings offset resistance value (H)			
(S) + 38		3-wire CH2 User range settings gain resistance value (L)	—	—	System
(S) + 39		3-wire CH2 User range settings gain resistance value (H)			

＊1 Setting is not necessary. If setting is made, the offset/gain values will not be read properly.

App. - 15

Control data＊1 (3/4)

Device		Item	Set data	Setting range	Set by
Q64RD	(S) + 40	4-wire CH2 Factory default offset value	—	—	System
	(S) + 41	4-wire CH2 Factory default offset value	—	—	System
	(S) + 42	4-wire CH2 Factory default gain value	—	—	System
	(S) + 43	4-wire CH2 Factory default gain value	—	—	System
	(S) + 44	4-wire CH2 User range settings offset value	—	—	System
	(S) + 45	4-wire CH2 User range settings offset value	—	—	System
	(S) + 46	4-wire CH2 User range settings gain value	—	—	System
	(S) + 47	4-wire CH2 User range settings gain value	—	—	System
Q64RD -G	(S) + 40	4-wire CH2 Factory default offset value (L)	—	—	System
	(S) + 41	4-wire CH2 Factory default offset value (H)			
	(S) + 42	4-wire CH2 Factory default gain value (L)	—	—	System
	(S) + 43	4-wire CH2 Factory default gain value (H)			
	(S) + 44	4-wire CH2 User range settings offset value (L)	—	—	System
	(S) + 45	4-wire CH2 User range settings offset value (H)			
	(S) + 46	4-wire CH2 User range settings gain value (L)	—	—	System
	(S) + 47	4-wire CH2 User range settings gain value (H)			
(S) + 48		4-wire CH2 User range settings offset resistance value (L)	—	—	System
(S) + 49		4-wire CH2 User range settings offset resistance value (H)			
(S) + 50		4-wire CH2 User range settings gain resistance value (L)	—	—	System
(S) + 51		4-wire CH2 User range settings gain resistance value (H)			
Q64RD	(S) + 52	3-wire CH3 Factory default offset value	—	—	System
	(S) + 53	3-wire CH3 Factory default offset value	—	—	System
	(S) + 54	3-wire CH3 Factory default gain value	—	—	System
	(S) + 55	3-wire CH3 Factory default gain value	—	—	System
	(S) + 56	3-wire CH3 User range settings offset value	—	—	System
	(S) + 57	3-wire CH3 User range settings offset value	—	—	System
	(S) + 58	3-wire CH3 User range settings gain value	—	—	System
	(S) + 59	3-wire CH3 User range settings gain value	—	—	System
Q64RD -G	(S) + 52	3-wire CH3 Factory default offset value (L)	—	—	System
	(S) + 53	3-wire CH3 Factory default offset value (H)			
	(S) + 54	3-wire CH3 Factory default gain value (L)	—	—	System
	(S) + 55	3-wire CH3 Factory default gain value (H)			
	(S) + 56	3-wire CH3 User range settings offset value (L)	—	—	System
	(S) + 57	3-wire CH3 User range settings offset value (H)			
	(S) + 58	3-wire CH3 User range settings gain value (L)	—	—	System
	(S) + 59	3-wire CH3 User range settings gain value (H)			
(S) + 60		3-wire CH3 User range settings offset resistance value (L)	—	—	System
(S) + 61		3-wire CH3 User range settings offset resistance value (H)			
(S) + 62		3-wire CH3 User range settings gain resistance value (L)	—	—	System
(S) + 63		3-wire CH3 User range settings gain resistance value (H)			
Q64RD	(S) + 64	4-wire CH3 Factory default offset value	—	—	System
	(S) + 65	4-wire CH3 Factory default offset value			
	(S) + 66	4-wire CH3 Factory default gain value	—	—	System
	(S) + 67	4-wire CH3 Factory default gain value			
	(S) + 68	4-wire CH3 User range settings offset value	—	—	System
	(S) + 69	4-wire CH3 User range settings offset value			
	(S) + 70	4-wire CH3 User range settings gain value	—	—	System
	(S) + 71	4-wire CH3 User range settings gain value			

＊1 Setting is not necessary. If setting is made, the offset/gain values will not be read properly.

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Control data＊1 (4/4)

Device		Item	Set data	Setting range	Set by
Q64RD-G	(S) + 64	4-wire CH3 User range settings offset value (L)	—	—	System
	(S) + 65	4-wire CH3 User range settings offset value (H)			
	(S) + 66	4-wire CH3 User range settings gain value (L)	—	—	System
	(S) + 67	4-wire CH3 User range settings gain value (H)			
	(S) + 68	4-wire CH3 User range settings offset resistance value (L)	—	—	System
	(S) + 69	4-wire CH3 User range settings offset resistance value (H)	—	—	System
	(S) + 70	4-wire CH3 User range settings gain resistance value (L)	—	—	System
	(S) + 71	4-wire CH3 User range settings gain resistance value (H)	—	—	System
(S) + 72		4-wire CH3 User range settings offset resistance value (L)	—	—	System
(S) + 73		4-wire CH3 User range settings offset resistance value (H)			
(S) + 74		4-wire CH3 User range settings gain resistance value (L)	—	—	System
(S) + 75		4-wire CH3 User range settings gain resistance value (H)			
Q64RD	(S) + 76	3-wire CH4 Factory default offset value	—	—	System
	(S) + 77	3-wire CH4 Factory default offset value	—	—	System
	(S) + 78	3-wire CH4 Factory default gain value	—	—	System
	(S) + 79	3-wire CH4 Factory default gain value	—	—	System
	(S) + 80	3-wire CH4 User range settings offset value	—	—	System
	(S) + 81	3-wire CH4 User range settings offset value	—	—	System
	(S) + 82	3-wire CH4 User range settings gain value	—	—	System
	(S) + 83	3-wire CH4 User range settings gain value	—	—	System
Q64RD-G	(S) + 76	3-wire CH4 Factory default offset value (L)	—	—	System
	(S) + 77	3-wire CH4 Factory default offset value (H)			
	(S) + 78	3-wire CH4 Factory default gain value (L)	—	—	System
	(S) + 79	3-wire CH4 Factory default gain value (H)			
	(S) + 80	3-wire CH4 User range settings offset value (L)	—	—	System
	(S) + 81	3-wire CH4 User range settings offset value (H)			
	(S) + 82	3-wire CH4 User range settings gain value (L)	—	—	System
	(S) + 83	3-wire CH4 User range settings gain value (H)			
(S) + 84		3-wire CH4 User range settings offset resistance value (L)	—	—	System
(S) + 85		3-wire CH4 User range settings offset resistance value (H)			
(S) + 86		3-wire CH4 User range settings gain resistance value (L)	—	—	System
(S) + 87		3-wire CH4 User range settings gain resistance value (H)			
Q64RD	(S) + 88	4-wire CH4 Factory default offset value	—	—	System
	(S) + 89	4-wire CH4 Factory default offset value	—	—	System
	(S) + 90	4-wire CH4 Factory default gain value	—	—	System
	(S) + 91	4-wire CH4 Factory default gain value	—	—	System
	(S) + 92	4-wire CH4 User range settings offset value	—	—	System
	(S) + 93	4-wire CH4 User range settings offset value	—	—	System
	(S) + 94	4-wire CH4 User range settings gain value	—	—	System
	(S) + 95	4-wire CH4User range settings gain value	—	—	
Q64RD-G	(S) + 88	4-wire CH4 Factory default offset value (L)	—	—	System
	(S) + 89	4-wire CH4 Factory default offset value (H)			
	(S) + 90	4-wire CH4 Factory default gain value (L)	—	—	System
	(S) + 91	4-wire CH4 Factory default gain value (H)			
	(S) + 92	4-wire CH4 User range settings offset value (L)	—	—	System
	(S) + 93	4-wire CH4 User range settings offset value (H)			
	(S) + 94	4-wire CH4 User range settings gain value (L)	—	—	System
	(S) + 95	4-wire CH4 User range settings gain value (H)			
(S) + 96		4-wire CH4 User range settings offset resistance value (L)	—	—	System
(S) + 97		4-wire CH4 User range settings offset resistance value (H)			
(S) + 98		4-wire CH4 User range settings gain resistance value (L)	—	—	System
(S) + 99		4-wire CH4 User range settings gain resistance value (H)			

＊1 Setting is not necessary. If setting is made, the offset/gain values will not be read properly.

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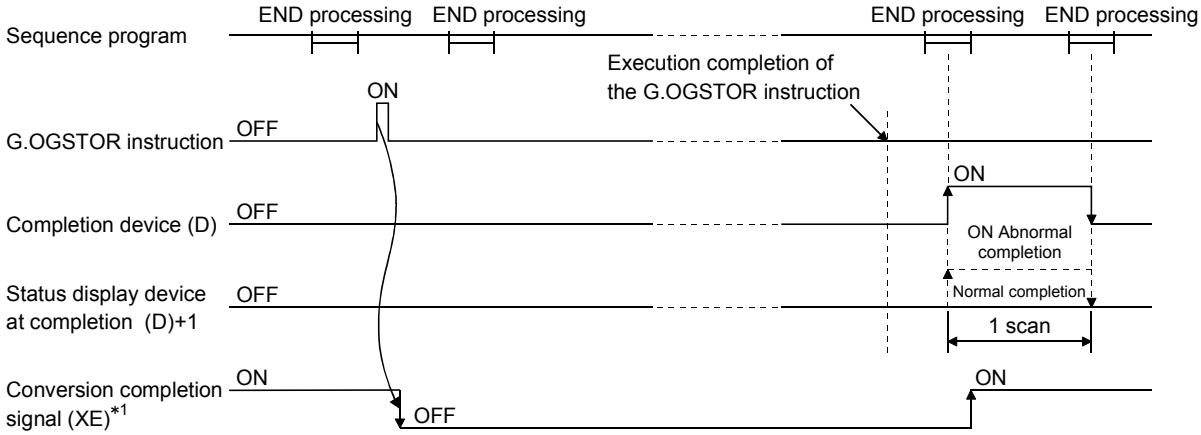
(1) Functions

(a) Restores the offset/gain values of the user range setting stored in the CPU to the Q64RD/Q64RD-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.



*1 When the G(P).OGSTOR instruction is executed, A/D conversion is not performed. After the completion device (D) turns ON, A/D conversion starts, the A/D conversion value is stored into the buffer memory, and the conversion completion signal (XE) then turns ON.

(c) When the offset/gain values are restored, the reference accuracy is decreased by approx. 3 times compared with the one before the restoration.

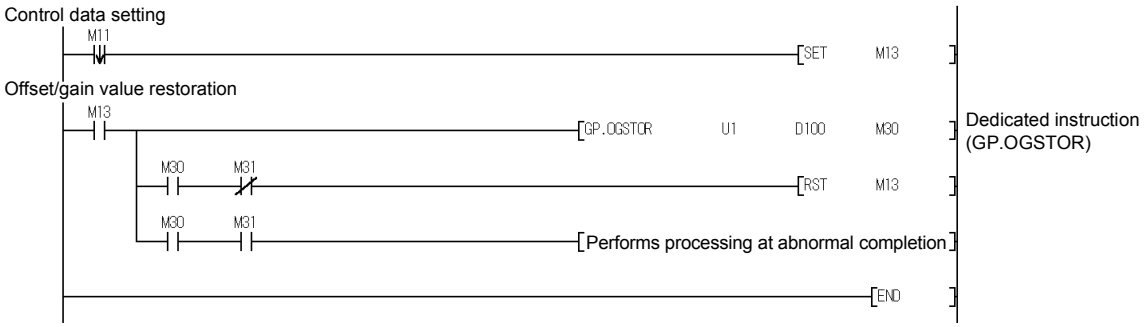
(2) Operation error

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.

(3) Program example

The following program is designed to read the offset/gain values of the Q64RD/Q64RD-G mounted in the position of I/O number X/Y0 to X/YF when M11 is turned ON.



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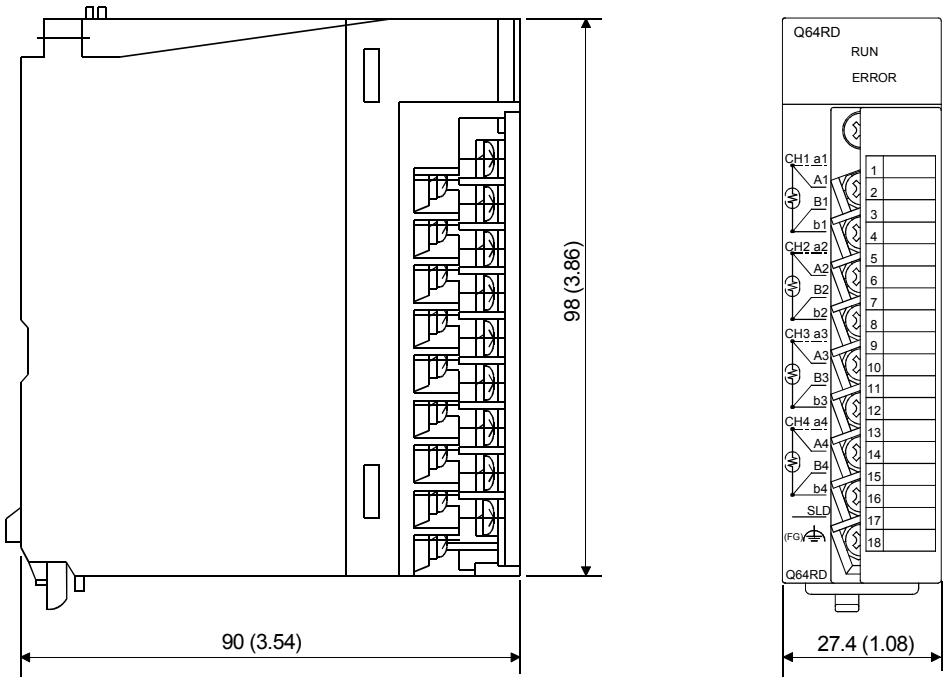
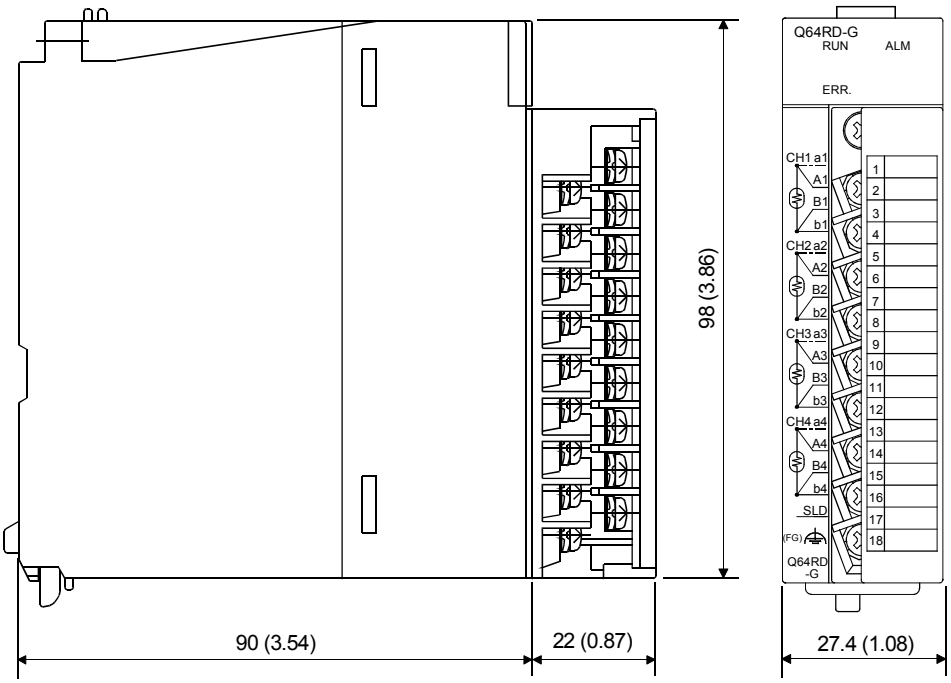
Appendix 4 External Dimension Diagram

(1) Q64RD



Unit: mm (in.)

(2) Q64RD-G



Unit: mm (in.)

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WARRANTY

Please confirm the following product warranty details before using this product.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.
However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.
Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.
(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.
1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.
(2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation of damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products, special damages and secondary damages whether foreseeable or not , compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

6. Product application

(1) In using the Mitsubishi MELSEC programmable 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)-080142-M

RTD Input Module
Channel Isolated RTD Input Module

User's Manual

MODEL	Q64RD-U-S-E
MODEL CODE	13JR31
SH(NA)-080142-M(0805)MEE	

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