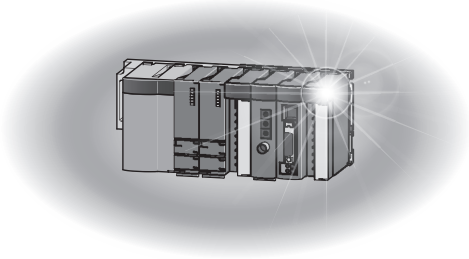
MITSUBISHI ELECTRIC

Mitsubishi Programmable Controller

MELSEC Q series

Thermocouple Input Module Channel Isolated Thermocouple/Micro Voltage Input Module User's Manual

Q64TD
Q64TDV-GH
GX Configurator-TI (SW1D5C-QTIU-E)



• SAFETY PRECAUTIONS •

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.
The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the user's manual for the CPU module used.
In this manual, the safety precautions are classified into two levels: "⚠WARNING" and "⚠CAUTION".

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

Under some circumstances, failure to observe the precautions given under "⚠CAUTION" may lead to serious consequences.
Observe the precautions of both levels because they are important for personal and system safety.
Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

⚠WARNING

- Do not write any data to the "system area" of the buffer memory in the intelligent function module.
  Also, do not use any "use prohibited" signals as an output signal from the programmable controller CPU to the intelligent function module.
  Doing so may cause malfunction of the programmable controller system.

⚠CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables.
  Keep a distance of 100mm or more between them.
  Failure to do so may result in malfunction due to noise.

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[Installation Precautions]

⚠CAUTION

- Use the programmable controller in an environment that meets the general specifications in the user's manual for the CPU module used.
  Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To mount the module, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place.
  Incorrect mounting may cause malfunction, failure or drop of the module.
  When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.
- Tighten the screws within the specified torque range.
  Undertightening can cause drop of the screw, short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Shut off the external power supply (all phases) used in the system before mounting or removing the module.
  Failure to do so may result in damage to the product.
  A module can be replaced online (while power is on) on any MELSECNET/H remote I/O station or in the system where a CPU module supporting the online module change function is used.
  Note that there are restrictions on the modules that can be replaced online, and each module has its predetermined replacement procedure.
  For details, refer to the relevant chapter in this manual.
- Do not directly touch any conductive and electronic component of the module.
  Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠WARNING

- After wiring, attach the included terminal cover to the module before turning it on for operation.
  Failure to do so may result in electric shock.

⚠CAUTION

- Individually ground the FG terminal of the programmable controller with a ground resistance of 100Ω or less.
  Failure to do so may result in electric shock or malfunction.
- Tighten the terminal screws within the specified torque range.
  Undertightening can cause short circuit, fire, or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Prevent foreign matter such as dust or wire chips from entering the module.
  Such foreign matter can cause a fire, failure, or malfunction.
- A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring.
  Do not remove the film during wiring.
  Remove it for heat dissipation before system operation.
- 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.
- Keep a distance of 100mm or more between a thermocouple and the main circuit line or AC control lines.
  Also, keep the thermocouple away from a circuit that includes harmonics, such as a high-voltage circuit and a load circuit of an inverter.
  If not, the thermocouple is more likely to be affected by noise, surges, and induction.

[Startup and Maintenance Precautions]

⚠WARNING

- Do not touch any terminal while power is on.
  Doing so will cause electric shock or malfunction.
- Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal screws, connector screws, or module fixing screws.
  Failure to do so may result in electric shock or cause the module to fail or malfunction.
  Undertightening can cause drop of the screw, short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

⚠CAUTION

- Do not disassemble or modify the modules.
  Doing so may cause failure, malfunction, injury, or a fire.
- Shut off the external power supply (all phases) used in the system before mounting or removing the module.
  Failure to do so may cause the module to fail or malfunction.
  A module can be replaced online (while power is on) on any MELSECNET/H remote I/O station or in the system where a CPU module supporting the online module change function is used.
  Note that there are restrictions on the modules that can be replaced online, and each module has its predetermined replacement procedure.
  For details, refer to the relevant chapter in this manual.
- After the first use of the product, do not mount/remove the module to/from the base unit, and the terminal block to/from the module more than 50 times (IEC 61131-2 compliant).
  Exceeding the limit of 50 times may cause malfunction.
- Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body.
  Failure to do so may cause the module to fail or malfunction.

[Disposal Precaution]

⚠CAUTION

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

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• CONDITIONS OF USE FOR THE PRODUCT •

(1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi representative in your region.

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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)-080141-A	First printing
Jun., 2001	SH (NA)-080141-B	Addition Selection 2.1, 2.2 Correction Conformation to the EMC Directive and Low Voltage Instruction, About the Generic Terms and Abbreviations, Product Structure, Section 3.1.1, Section 5.2, 5.2.1, 5.2.2, 5.3.3
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Print Date	✻ Manual Number	Revision
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May, 2016	SH(NA)-080141-P	Addition Section 2.3, Section 4.3, Section 4.4.2, Section 3.2.1, Appendix 4

Japanese Manual Version SH-080132-Q

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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.

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COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

(1) Method of ensuring compliance

To ensure that Mitsubishi programmable controllers maintain EMC and Low Voltage Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to one of the following manuals.

- QCPU User's Manual (Hardware Design, Maintenance and Inspection)
- Safety Guidelines
  (This manual is included with the CPU module or base unit.)

The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.

(2) Additional measures

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

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ABOUT THE GENERIC TERMS AND ABBREVIATIONS

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

Generic term/Abbreviation	Description
Q64TD	Abbreviation for the Q64TD thermocouple input module
Q64TDV-GH	Abbreviation for the Q64TDV-GH channel isolated thermocouple/micro voltage input module
Personal computer	IBM PC/AT® or compatible computer with DOS/V.
GX Developer	Product name of the software package for the MELSEC programmable controllers
GX Works2	
GX Configurator-TI	Abbreviation for thermocouple input module setting/monitor tool, GX Configurator-TI (SW1D5C-QTIU-E)
QCPU (Q mode)	Generic term for the Q00JCPU, Q00UJCPU, Q00CPU, Q00UCPU, Q01CPU, Q01UCPU, Q02CPU, Q02HCPU, Q02PHCPU, Q02UCPU, Q03UDCPU, Q03UDVCPU, Q03UDECPU, Q04UDHCPU, Q04UDVCPU, Q04UDPVCPU, Q04UDEHCPU, Q06HCPU, Q06PHCPU, Q06UDHCPU, Q06UDVCPU, Q06UDPVCPU, Q06UDEHCPU, Q10UDHCPU, Q10UDEHCPU, Q12HCPU, Q12PHCPU, Q12PRHCPU, Q13UDHCPU, Q13UDVCPU, Q13UDPVCPU, Q13UDEHCPU, Q20UDHCPU, Q20UDEHCPU, Q25HCPU, Q25PHCPU, Q25PRHCPU, Q26UDHCPU, Q26UDVCPU, Q26UDPVCPU, Q26UDEHCPU, Q50UDEHCPU, Q100UDEHCPU
Process CPU	Generic term for the Q02PHCPU, Q06PHCPU, Q12PHCPU, and Q25PHCPU
Redundant CPU	Generic term for the Q12PRHCPU and Q25PRHCPU
Personal computer	IBM PC/AT® or compatible computer with DOS/V.
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
Windows® 7	Generic term for the following: Microsoft Windows® 7 Starter Operating System, Microsoft Windows® 7 Home Premium Operating System, Microsoft Windows® 7 Professional Operating System, Microsoft Windows® 7 Ultimate Operating System, Microsoft Windows® 7 Enterprise Operating System Note that the 32-bit version is designated as "32-bit Windows® 7", and the 64-bit version is designated as "64-bit Windows® 7".

PACKING LIST

The product package contains the following.

Model	Product	Quantity
Q64TD	Q64TD thermocouple input module	1
Q64TDV-GH	Q64TDV-GH channel isolated thermocouple/micro voltage 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

MEMO

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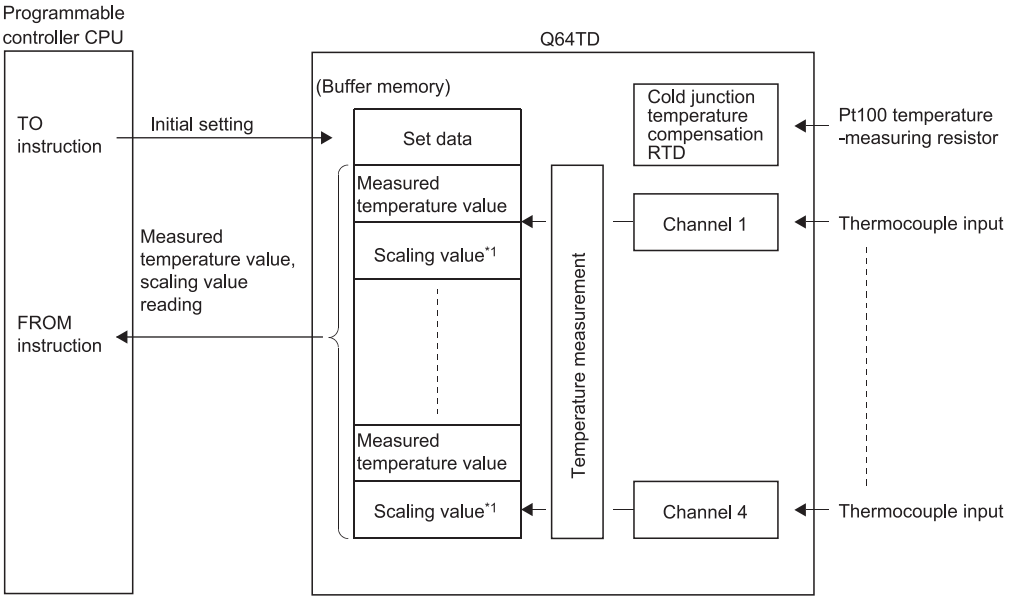
1 OVERVIEW

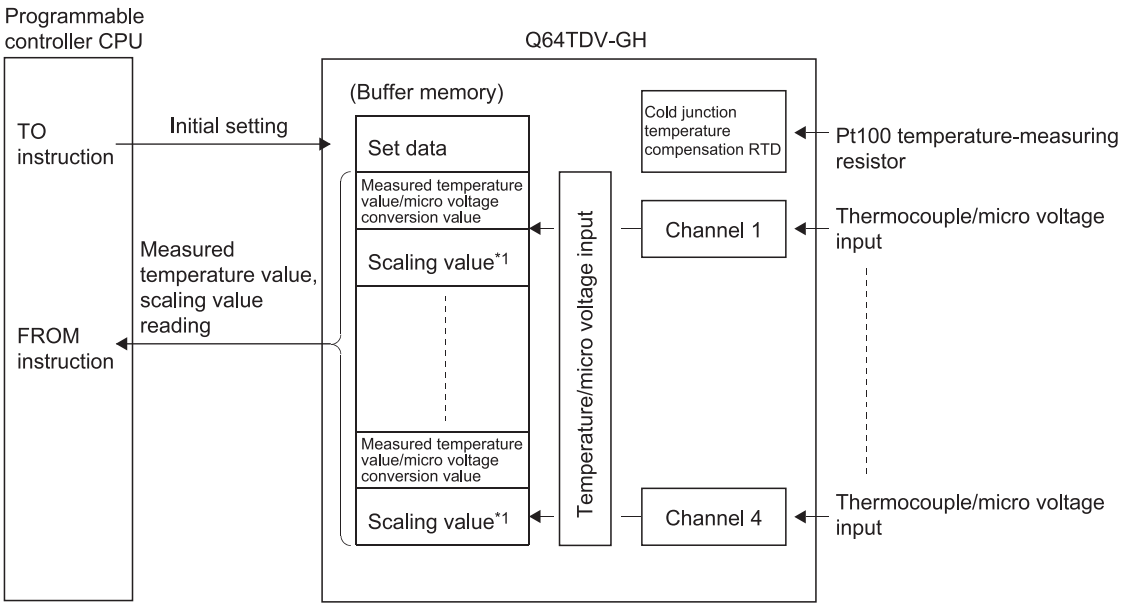
This user's manual provides the specifications, handling instructions, programming procedures and others of the Q64TD thermocouple input module (abbreviated to the Q64TD) and Q64TDV-GH channel isolated thermocouple/micro voltage input module (abbreviated to the Q64TDV-GH) used with the MELSEC-Q series CPU module (hereafter abbreviated to the CPU).

The Q64TD is a module designed to convert thermocouple input values from outside the programmable controller into 16-bit signed binary measured temperature values and 16-bit signed binary scaling values (ratios).



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

In addition to the temperature measurement functions of the Q64TD, the Q64TDV-GH has a function that converts a micro voltage signal into a 16-bit, signed binary data.



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

1.1 Features

(1) Channels isolated

Both the Q64TD and Q64TDV-GH are channel isolated modules.

(2) 4 channels of temperatures measured by one module

One Q64TD module can measure temperatures of four channels.
It can also convert the detected temperature values into scaling values (ratios (%)).

(3) Micro voltages of four channels can be converted on one module (Q64TDV-GH only)

One Q64TDV-GH module can make micro voltage conversion of four channels.
It can also convert the detected micro voltage conversion values into scaling values (ratio values (%)).

(4) Setting of conversion enable/disable

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.

(5) Thermocouples conforming to JIS Standards usable

You can use eight different thermocouples (K, E, J, T, B, R, S, N) conforming to the JIS Standards. You can also select the thermocouple type for each channel using GX Developer.

(6) Disconnection detection

The disconnection of a thermocouple or compensation conductor can be detected on each channel.

(7) Selection of sampling processing/time averaging processing/count averaging processing

As a conversion processing method, you can choose sampling processing, time averaging processing or count averaging processing on each channel.

(8) Pt100 temperature-measuring resistor for cold junction temperature compensation

The Pt100 temperature-measuring resistor connected makes cold junction temperature compensation automatically.

(9) Setting of Pt100 cold junction temperature compensation enable/disable

Disabling cold junction temperature compensation with Pt100 temperature-measuring resistor enables cold junction temperature compensation to be made outside the module.
By providing a precision ice bath externally, the thermoelectromotive force generated at the tip of the thermocouple can be led to the Q64TD/Q64TDV-GH without any change, improving the cold junction temperature compensation accuracy.

(10) 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 range setting and factory default setting.

(11) Warning output

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

(12) Online module change

A module can be replaced without stopping the system.
Furthermore, original specifications can be transferred to the replacement module by using a sequence program and by executing the following. (Note that this is for modules of the same model only.)

- Inheritance of offset/gain settings to the new Q64TD/Q64TDV-GH after online module change
- Transfer of offset/gain settings to the other Q64TD/Q64TDV-GH mounted on the other slot

(13) Easy setting with GX Confogurator-TI

The use of GX Configurator-TI, which is sold separately, reduces sequence programming since Q64TD/Q64TDV-GH settings can be configured on the screen. In addition, setting status and operating status of modules can be checked easily.

1.2 Added Functions

The following is a function added for the Q64TD/Q64TDV-GH.

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 3.4.22
		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 2.2
		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	First 5 digits of product information are 07072 or later	For values to be stored in the CH□ measured temperature value/micro voltage conversion value (buffer memory addresses 11 to 14: Un\G11 to 14) 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 3.2.4

POINT

(1) For function comparison by function versions, refer to Appendix 1.1.
(2) For Q64TD/Q64TDV-GH with product information (first five digits) of 07071 or earlier or 07072 or later, refer to Appendix 1.2.
(3) For how to check the function version and product information, refer to Section 2.3.

2 SYSTEM CONFIGURATION

This chapter explains the system configuration of the Q64TD/Q64TDV-GH.

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

For the applicable CPU modules and base units, and the number of mountable modules, refer to the user's manual for the CPU module used.

When mounting the Q64TD/Q64TDV-GH with a CPU module, observe the following precautions.

・When mounting the Q64TD/Q64TDV-GH with a Redundant CPU, use the Q64TD/Q64TDV-GH with a serial No. (first five digits) of 09012 or later.

・Depending on the combination with other modules or the number of mounted modules, power supply capacity may be insufficient. Consider the power supply capacity before mounting modules, and if the power supply capacity is insufficient, change the combination of the modules.

・Mount the modules within the number of I/O points of a CPU module. The modules can be mounted on any slots within the usable number of slots.

REMARK

For use of a C Controller module, refer to the C Controller Module User's Manual.

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

For the applicable MELSECNET/H remote I/O station and base units, and the number of mountable modules, refer to the Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O network).

(2) Support of the multiple CPU system

When using the Q64TD/Q64TDV-GH in a multiple CPU system, refer to the following manual first.

• QCPU User's Manual (Multiple CPU System)

(3) Compatibility with online module change

To make an online module change, use the Q64TD/Q64TDV-GH of function version C or later.

Refer to Chapter 7.

(4) Q64TD-compatible software packages

Relation between the system containing the Q64TD and software package is shown in the following table.
GX Developer or GX Works2 is necessary when using the Q64TD.

		Software Version		
		GX Developer	GX Configurator-TI ＊1 ＊2	GX Works2
Q00J/Q00/Q01CPU	Single CPU system	Version 7 or later	Version 1.10L or later	Refer to the GX Works2 Version1 Operating Manual (Common).
	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 system	Version 8.45X or later	Version 1.14Q or later	
Q00UJ/Q00U/Q01UCPU	Single CPU system	Version 8.76E or later	Version 1.24AA or later	
	Multiple CPU system			
Q02U/Q03UD/ Q04UDH/Q06UDHCPU	Single CPU system	Version 8.48A or later		
	Multiple CPU system			
Q10UDH/Q20UDHCPU	Single CPU system	Version 8.76E 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			
Q10UDEH/Q20UDEHCPU	Single CPU system	Version 8.76E or later		
	Multiple CPU system			
CPU module other than the above	Single CPU system	Cannot be used	Cannot be used	
	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 "Conversion setting for disconnection detection function". Use the product of Version 1.21X or later.

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(5) Q64TDV-GH-compatible software packages

Relation between the system containing the Q64TDV-GH and software package is shown in the following table.
GX Developer or GX Works2 is necessary when using the Q64TDV-GH.

		Software Version		
		GX Developer	GX Configurator-TI ＊1 ＊2	GX Works2
Q00J/Q00/Q01CPU	Single CPU system	Version 7 or later	Version 1.13P or later	Refer to the GX Works2 Version1 Operating Manual (Common).
	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 system	Version 8.45X or later	Version 1.14Q or later	
Q00UJ/Q00U/Q01UCPU	Single CPU system	Version 8.76E or later	Version 1.24AA or later	
	Multiple CPU system			
Q02U/Q03UD/ Q04UDH/Q06UDHCPU	Single CPU system	Version 8.48A or later		
	Multiple CPU system			
Q10UDH/Q20UDHCPU	Single CPU system	Version 8.76E 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			
Q10UDEH/Q20UDEHCPU	Single CPU system	Version 8.76E or later		
	Multiple CPU system			
CPU module other than the above	Single CPU system	Cannot be used	Cannot be used	
	Multiple CPU system			
If installed in a MELSECNET/H remote I/O station		Version 6 or later	Version 1.13P or later	

＊1 The product of Version 1.14Q or earlier is not compatible with "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 "Conversion setting for disconnection detection function". Use the product of Version 1.21X or later.

POINT

(1) The Q64TD of function version A is not available.
The Q64TDV-GH of function version B is not available.
The products of function version C include the functions of the products of function version A and B.

(2) Depending on the version of GX Configurator-TI, applicable system, CPU module and functions of the Q64TD/Q64TDV-GH vary.

(3) When using GX Works2, refer to the following.
- GX Works2 Version1 Operating Manual (Common)
- GX Works2 Version1 Operating Manual (Intelligent Function Module)

2.2 About Use of the Q64TD/Q64TDV-GH in the Redundant System

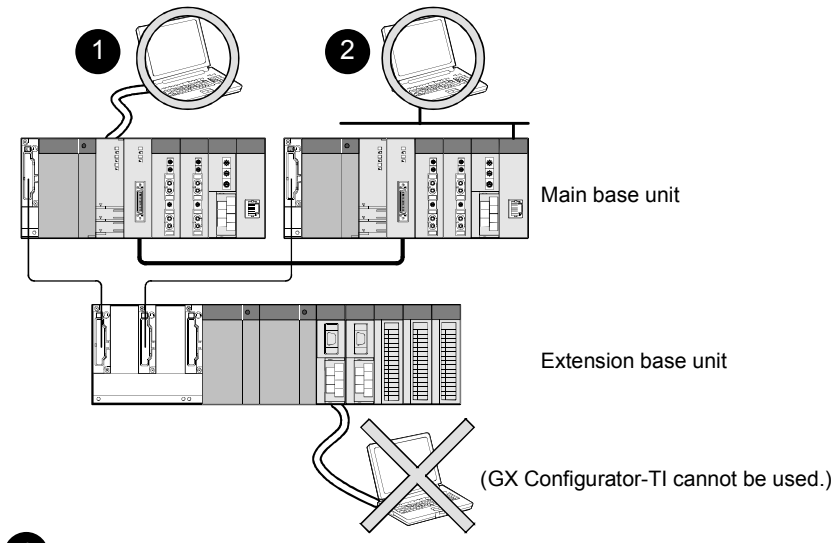
This section describes the case when the Q64TD/Q64TDV-GH is used in the redundant system.

(1) Dedicated instruction

The dedicated instruction cannot be used.

(2) GX Configurator-TI

When using GX Developer to access the Redundant CPU through the intelligent function module on the extension base unit, GX Configurator-TI cannot be used. Connect a personal computer to the Redundant CPU 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

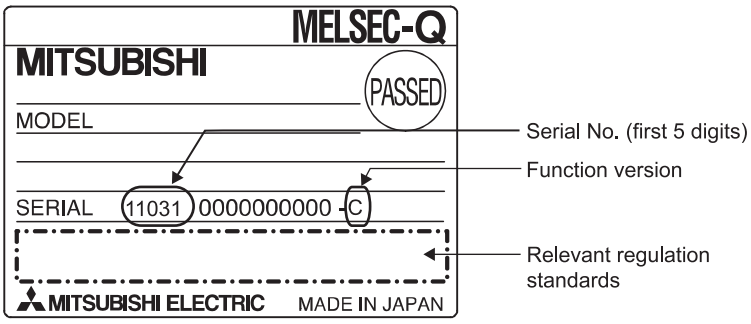
This section describes how to check the function version and product information of the Q64TD/Q64TDV-GH and the GX Configuration-TI software version.

(1) Checking the function version and serial number

The function version and serial number of the Q64TD/Q64TDV-GH can be checked on the rating plate, front of the module, or system monitor of GX Developer.

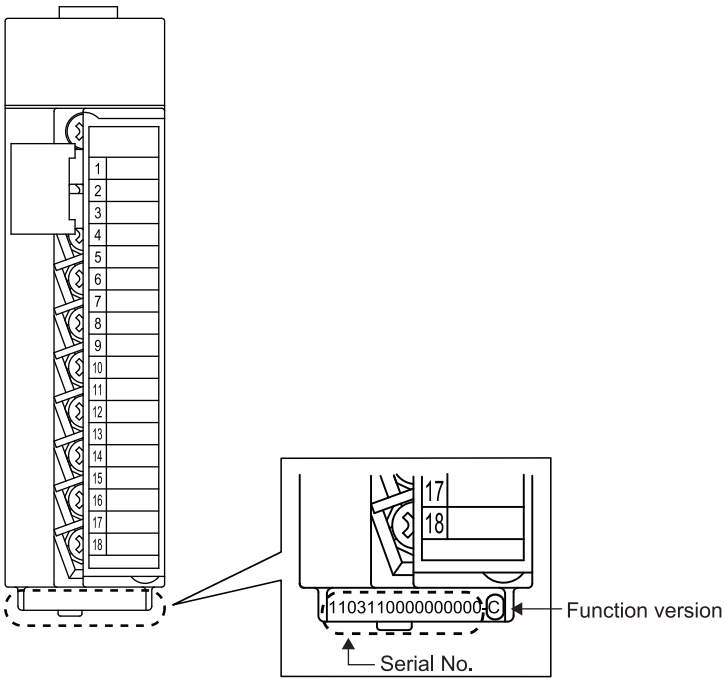
(a) Checking on the rating place

The rating plate is on the side of the Q64TD/Q64TDV-GH.

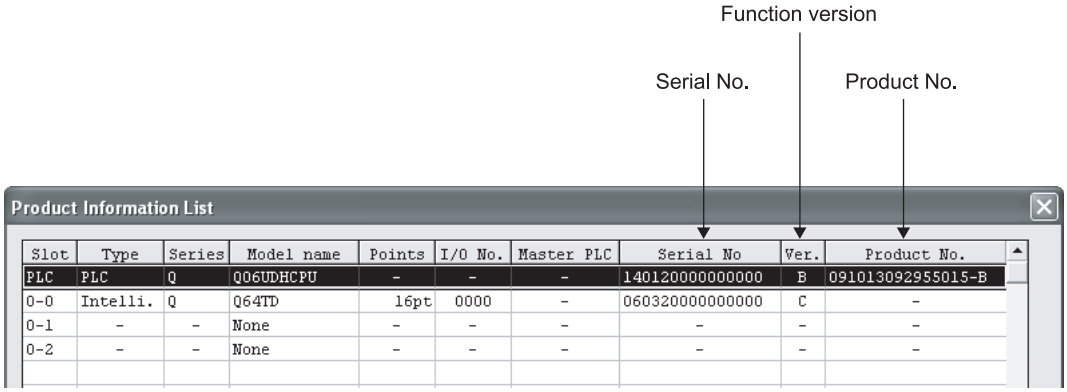


(b) Checking on the front of the module

The function version and serial number on the rating plate are also shown on the front (bottom part) of the module.



(c) Checking on the system monitor (Product Information List)
To display the system monitor, select [Diagnostics] → [System monitor] → Product Inf. List of GX Developer.



Slot	Type	Series	Model name	Points	I/O No.	Master PLC	Serial No	Ver.	Product No.
PLC	PLC	Q	Q06UDHCPU	-	-	-	140120000000000	B	091013092955015-B
0-0	Intelli.	Q	Q64TD	16pt	0000	-	060320000000000	C	-
0-1	-	-	None	-	-	-	-	-	-
0-2	-	-	None	-	-	-	-	-	-

1). Displaying product number
For the Q64TD/Q64TDV-GH, "-" is displayed since the product number display is not supported.

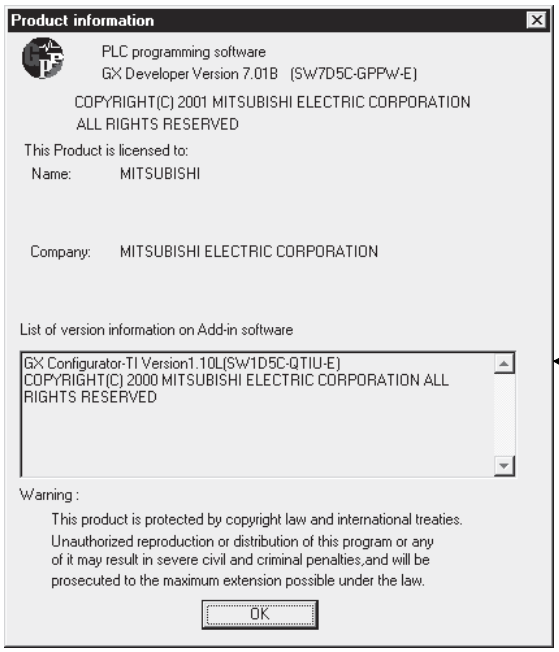
POINT

The serial No. on the rating plate and front of the module may be different from the serial No. displayed on the product information list of GX Developer.

- The serial No. on the rating plate and front of the module indicates the management information of the product.
- The serial No. displayed on the product information list 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

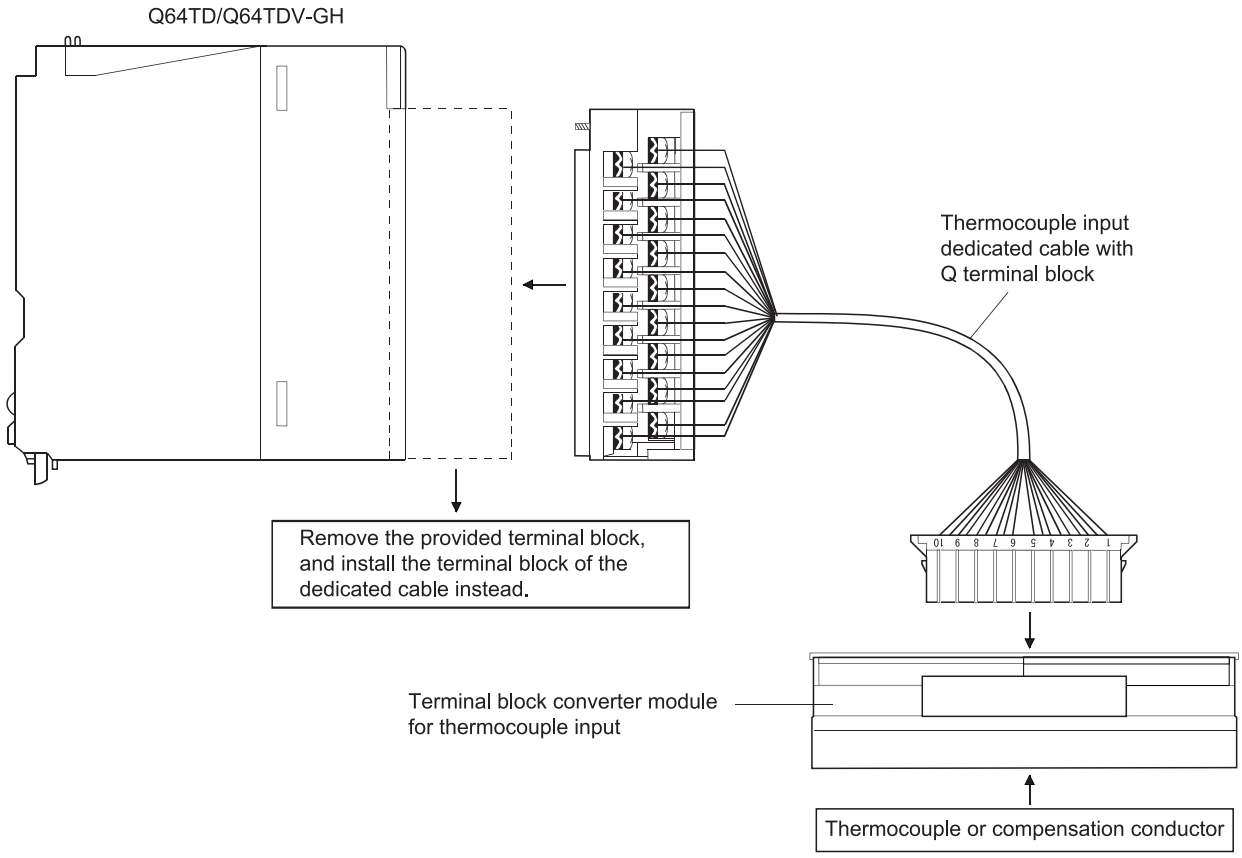
The software version of GX Configurator-TI can be checked by selecting [Help] → [Product information] of GX Developer.



(In the case of GX Developer Version 7)

2.4 Precautions for System Configuration

The Q64TD/Q64TDV-GH measures a temperature on the basis of the temperature of a terminal block. Therefore, depending on a system configuration (especially for the case when two or more the Q64TD/Q64TDV-GH are mounted side by side, or when the Q64TD/Q64TDV-GH is mounted next to the power supply module or the CPU module), the temperature distribution of the terminal block becomes inhomogeneous because of the effect of heat emitted from each module, thus the measured temperature error may become large.
In such case, use a terminal block converter module and a dedicated cable shown below to prevent the error caused by the heat emission.



The following table lists the dedicated cable and the terminal block converter module.

Product name	Model	Manufacturer
Thermocouple input dedicated cable with Q terminal block	FA-CBLQ64TD** (**: Cable length)	Mitsubishi Electric Engineering Co., Ltd.
Terminal block converter module for thermocouple input	FA-TB20TD	

For inquiries related to the products or your order, please consult your local Mitsubishi Electric sales office or representative.

MEMO

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3 SPECIFICATIONS

3.1 Performance Specifications

The following are the performance specifications of the Q64TD/Q64TDV-GH.

3.1.1 Specifications of Q64TD

(1) Performance specification list

<table>
<tr><th colspan="2">Item</th><th>Specifications</th></tr>
<tr><td colspan="2">Number of channels</td><td>4 channels</td></tr>
<tr><td rowspan="2">Output</td><td>Measured temperature value</td><td>16-bit, signed binary
(-2700 to 18200: Value to the first decimal place × 10 times)</td></tr>
<tr><td>Scaling value</td><td>16-bit, signed binary</td></tr>
<tr><td colspan="2">Standard with which thermocouple conforms</td><td>JIS C 1602-1995</td></tr>
<tr><td colspan="2">Usable thermocouples, measured temperature range accuracies, and effect from wiring resistance of 1Ω</td><td>Refer to Section (2)</td></tr>
<tr><td colspan="2">Cold junction temperature compensation accuracy</td><td>±1.0℃</td></tr>
<tr><td colspan="2">Accuracy</td><td>As per calculation expression marked ＊1</td></tr>
<tr><td colspan="2">Resolution</td><td>B,R,S,N : 0.3℃ K,E,J,T : 0.1℃</td></tr>
<tr><td colspan="2">Conversion speed</td><td>40ms/channel ＊2</td></tr>
<tr><td colspan="2">Number of analog input points</td><td>4 channels + Pt100 connection channel/module</td></tr>
<tr><td colspan="2">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 thermocouple input and programmable controller power supply</td><td>Transformer isolation</td><td rowspan="2">1780VrmsAC /3 cycles (Altitude 2000m)</td><td>100MΩ or more using 500VDC isolation resistance tester</td></tr>
<tr><td>Between thermocouple input channels</td><td>Transformer isolation</td><td>10MΩ or more using 500VDC isolation resistance tester</td></tr>
<tr><td>Between cold junction temperature compensation channel and programmable controller power supply</td><td>No insulation</td><td>–</td><td>–</td></tr>
</table>
</td></tr>
<tr><td colspan="2">Wire break detection</td><td>Yes (Each channel independent) ＊3</td></tr>
<tr><td colspan="2">E^2PROM write count</td><td>Max. 100 thousand times</td></tr>
<tr><td colspan="2">Number of occupied I/O points</td><td>16 points (I/O assignment: Intelligent 16 points)</td></tr>
<tr><td colspan="2">Connection terminals</td><td>18-point terminal block</td></tr>
<tr><td colspan="2">Applicable wire size</td><td>0.3 to 0.75mm^2</td></tr>
<tr><td colspan="2">Applicable crimping terminals</td><td>1.25-3 R1.25-3(Sleeved crimping terminals are unusable)</td></tr>
<tr><td colspan="2">Internal current consumption (5VDC)</td><td>0.50A</td></tr>
<tr><td colspan="2">Weight</td><td>0.25kg</td></tr>
<tr><td colspan="2">Outline dimensions</td><td>98(H) × 27.4(W) × 112(D)mm</td></tr>
</table>

＊1: Calculate the accuracy in the following method.
(Accuracy) = (conversion accuracy) + (temperature characteristic) × (operating ambient temperature variation) + (cold junction temperature compensation accuracy)
An operating ambient temperature variation indicates a deviation of the operating ambient temperature from the 25±5℃ range.Example: When the thermocouple used is B (Refer to Section 3.1.1 (2)), the operating ambient temperature is 35℃, and the measured temperature is 1000℃, the accuracy is: (±2.5℃) + (±0.4℃) × (35℃ - 30℃) + (±1℃) = ±5.5℃

*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". (see Section 3.2.4.)

3 - 2

(2) Usable thermocouples, measured temperature range accuracies, and effect from wiring resistance of 1Ω

This section explains the usable thermocouples, measured temperature range accuracies, and effect from wiring resistance of 1Ω.

Usable Thermocouple Type	Measured Temperature Range *1	Conversion Accuracy (At operating ambient temperature 25±5℃)	Temperature Characteristic (Per operating ambient temperature variation of 1℃)	Max. Temperature Error at Ambient Temperature 55℃	Effect from wiring resistance of 1Ω *4
B	0 to 600℃	— *3	— *3	— *3	— *3
	600 to 800℃ *2	±3.0℃	±0.4℃	±13.0℃	0.009℃/Ω
	800 to 1700℃ *2	±2.5℃		±12.5℃	0.008℃/Ω
	1700 to 1820℃	— *3	— *3	— *3	— *3
R	-50 to 0℃	— *3	— *3	— *3	— *3
	0 to 300℃ *2	±2.5℃	±0.4℃	±12.5℃	0.011℃/Ω
	300 to 1600℃ *2	±2.0℃	±0.3℃	±9.5℃	0.006℃/Ω
	1600 to 1760℃	— *3	— *3	— *3	— *3
S	-50 to 0℃	— *3	— *3	— *3	— *3
	0 to 300℃ *2	±2.5℃	±0.4℃	±12.5℃	0.011℃/Ω
	300 to 1600℃ *2	±2.0℃	±0.3℃	±9.5℃	0.006℃/Ω
	1600 to 1760℃	— *3	— *3	— *3	— *3
K	-270 to -200℃	— *3	— *3	— *3	— *3
	-200 to 0℃ *2	Larger value of ±0.5℃ and ±0.5% of measured temperature	Larger value of ±0.06℃ and ± 0.2% of measured temperature	±11.0℃	0.004℃/Ω
	0 to 1200℃ *2	Larger value of ±0.5℃ and ±0.25% of measured temperature	Larger value of ±0.06℃ and ± 0.02% of measured temperature	±9.0℃	0.002℃/Ω
	1200 to 1370℃	— *3	— *3	— *3	— *3
E	-270 to -200℃	— *3	— *3	— *3	— *3
	-200 to 0℃ *2	Larger value of ±0.5℃ and ±0.5% of measured temperature	Larger value of ±0.06℃ and ± 0.15% of measured temperature	±8.5℃	0.003℃/Ω
	0 to 900℃ *2	Larger value of ±0.5℃ and ±0.25% of measured temperature	Larger value of ±0.06℃ and ± 0.02% of measured temperature	±6.75℃	0.001℃/Ω
	900 to 1000℃	— *3	— *3	— *3	— *3
J	-210 to -40℃	— *3	— *3	— *3	— *3
	-40 to 750℃ *2	Larger value of ±0.5℃ and ±0.25% of measured temperature	Larger value of ±0.06℃ and ± 0.02% of measured temperature	±5.625℃	0.002℃/Ω
	750 to 1200℃	— *3	— *3	— *3	— *3
T	-270 to -200℃	— *3	— *3	— *3	— *3
	-200 to 0℃ *2	Larger value of ±0.5℃ and ±0.5% of measured temperature	Larger value of ±0.06℃ and ± 0.1% of measured temperature	±6.0℃	0.004℃/Ω
	0 to 350℃ *2	Larger value of ±0.5℃ and ±0.25% of measured temperature	Larger value of ±0.06℃ and ± 0.02% of measured temperature	±2.625℃	0.002℃/Ω
	350 to 400℃	— *3	— *3	— *3	— *3

Usable Thermocouple Type	Measured Temperature Range ＊1	Conversion Accuracy (At operating ambient temperature 25±5℃)	Temperature Characteristic (Per operating ambient temperature variation of 1℃)	Max. Temperature Error at Ambient Temperature 55℃	Effect from wiring resistance of 1Ω ＊4
N	-270 to -200℃	— ＊3	— ＊3	— ＊3	— ＊3
	-200 to 0℃ ＊2	Larger value of ±0.5℃ and ±0.5% of measured temperature	Larger value of ±0.06℃ and ± 0.2% of measured temperature	±11.0℃	0.006℃/Ω
	0 to 1250℃ ＊2	Larger value of ±0.5℃ and ±0.25% of measured temperature	Larger value of ±0.06℃ and ± 0.02% of measured temperature	±9.375℃	0.003℃/Ω
	1250 to 1300℃	— ＊3	— ＊3	— ＊3	— ＊3

＊1: If a value entered from the thermocouple is outside the measured temperature range given in the table, it is handled as the maximum/minimum value of the measured temperature range.

＊2: The accuracies only in the temperature ranges of Class 1 to 3 (shaded areas) in JIS C1602-1995 apply.

＊3: Temperature measurement can be made, but accuracy is not guaranteed.

＊4: Means temperature error per Ω of wiring resistance of the thermocouple. Check the wiring resistance value and calculate the temperature error in the system. In case of a temperature error that exceeds the measurement range of the system, compensate the measured temperature value using the offset/gain setting. (Refer to Section 4.6.)

3.1.2 Specifications of Q64TDV-GH

(1) Performance specifications

<table>
<tr><th colspan="2">Item</th><th>Specifications</th></tr>
<tr><td colspan="2">Number of channels</td><td>4 channels</td></tr>
<tr><td rowspan="3">Output</td><td>Measured temperature value</td><td>16-bit, signed binary
(-2700 to 18200: Value to the first decimal place × 10 times)</td></tr>
<tr><td>Micro voltage conversion value</td><td>16-bit signed binary (-25000 to 25000)</td></tr>
<tr><td>Scaling value</td><td>16-bit, signed binary</td></tr>
<tr><td colspan="2">Standard with which thermocouple conforms</td><td>JIS C 1602-1995</td></tr>
<tr><td colspan="2">Usable thermocouples, measured temperature range accuracies, and effect from wiring resistance of 1Ω</td><td>Refer to Section (2)</td></tr>
<tr><td colspan="2">Cold junction temperature compensation accuracy</td><td>±1.0°C</td></tr>
<tr><td colspan="2">Thermocouple input accuracy</td><td>As per calculation expression marked ＊1</td></tr>
<tr><td colspan="2">Micro voltage input range</td><td>-100mV to +100mV (input resistance 2MΩ or more)</td></tr>
<tr><td colspan="2">Micro voltage input accuracy</td><td>Refer to Section (3)</td></tr>
<tr><td rowspan="2">Resolution</td><td>Thermocouple input</td><td>B:0.7°C R,S:0.8°C K,T:0.3°C E:0.2°C J:0.1°C N:0.4°C</td></tr>
<tr><td>Micro voltage input</td><td>4μV</td></tr>
<tr><td colspan="2">Sampling period</td><td>20ms/channel ＊2</td></tr>
<tr><td colspan="2">Conversion speed</td><td>Sampling period×3 ＊3</td></tr>
<tr><td colspan="2">Number of analog input points</td><td>4 channels + Pt100 connection channel/module</td></tr>
<tr><td colspan="2">Absolute maximum input</td><td>±5V</td></tr>
<tr><td colspan="2">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 thermocouple input/micro voltage input and programmable controller power supply</td><td>Transformer isolation</td><td rowspan="2">1780VrmsAC/3 cycles (Altitude 2000m)</td><td>100MΩ or more using 500VDC isolation resistance tester</td></tr>
<tr><td>Between thermocouple input/micro voltage input channels</td><td>Transformer isolation</td><td>10MΩ or more using 500VDC isolation resistance tester</td></tr>
<tr><td>Between cold junction temperature compensation channel and programmable controller power supply</td><td>No insulation</td><td>－</td><td>－</td></tr>
</table>
</td></tr>
<tr><td colspan="2">Wire break detection</td><td>Yes (Each channel independent) ＊4</td></tr>
<tr><td colspan="2">E^2PROM write count</td><td>Max. 100 thousand times</td></tr>
<tr><td colspan="2">Number of occupied I/O points</td><td>16 points (I/O assignment: Intelligent 16 points)</td></tr>
<tr><td colspan="2">Connection terminals</td><td>18-point terminal block</td></tr>
<tr><td colspan="2">Applicable wire size</td><td>0.3 to 0.75mm^2</td></tr>
<tr><td colspan="2">Applicable crimping terminals</td><td>1.25-3 R1.25-3(Sleeved crimping terminals are unusable)</td></tr>
<tr><td colspan="2">Internal current consumption (5VDC)</td><td>0.50A</td></tr>
<tr><td colspan="2">Weight</td><td>0.25kg</td></tr>
<tr><td colspan="2">Outline dimensions</td><td>98(H) × 27.4(W) × 112(D)mm</td></tr>
</table>

∗1: Calculate the accuracy in the following method.

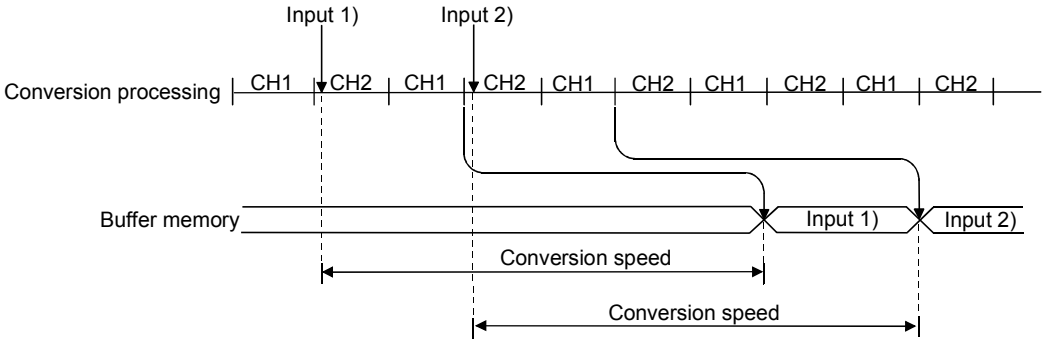
(Accuracy) = (conversion accuracy) + (temperature characteristic) × (operating ambient temperature variation) + (cold junction temperature compensation accuracy)

An operating ambient temperature variation indicates a deviation of the operating ambient temperature from the 25±5°C range.

Example: When the thermocouple used is B (Refer to Section 3.1.2 (2)), the operating ambient temperature is 35°C, and the measured temperature is 1000°C, the accuracy is: (±3.5°C) + (±0.4°C) × (35°C - 30°C) + (±1°C) = ±6.5°C

∗2: A period until a thermocouple input value/micro voltage input value is converted into a measured temperature value/micro voltage conversion value.

∗3: A period until a thermocouple input value/micro voltage input value is converted into a measured temperature value/micro voltage conversion value and the resultant value is stored into the buffer memory.
The conversion speed is a delay time that occurs during sampling processing. It is independent of averaging processing.
Example: When two channels are enabled for conversion
(Conversion speed) = (sampling period) × 3
= (20ms × 2 channels) × 3
= 120ms



∗4: 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". (see Section 3.2.4.)

(2) Usable thermocouples, measured temperature range accuracies, and effect from wiring resistance of 1Ω

This section explains the usable thermocouples, measured temperature range accuracies, and effect from wiring resistance of 1Ω.

Usable Thermocouple Type	Measured Temperature Range *1	Conversion Accuracy (At operating ambient temperature 25±5°C)	Temperature Characteristic (Per operating ambient temperature variation of 1°C)	Max. Temperature Error at Ambient Temperature 55°C	Effect from wiring resistance of 1Ω *4
B	0 to 600°C	— *3	— *3	— *3	— *3
	600 to 800°C *2	±4.0°C	±0.4°C	±14.0°C	0.011°C/Ω
	800 to 1700°C *2	±3.5°C		±13.5°C	0.010°C/Ω
	1700 to 1820°C	— *3	— *3	— *3	— *3
R	-50 to 0°C	— *3	— *3	— *3	— *3
	0 to 300°C *2	±4.0°C	±0.4°C	±14.0°C	0.013°C/Ω
	300 to 1600°C *2	±3.5°C		±13.5°C	0.008°C/Ω
	1600 to 1760°C	— *3	— *3	— *3	— *3
S	-50 to 0°C	— *3	— *3	— *3	— *3
	0 to 300°C *2	±4.0°C	±0.4°C	±14.0°C	0.013°C/Ω
	300 to 1600°C *2	±3.5°C		±13.5°C	0.008°C/Ω
	1600 to 1760°C	— *3	— *3	— *3	— *3
K	-270 to -200°C	— *3	— *3	— *3	— *3
	-200 to 0°C *2	±2.0°C	±0.25°C	±8.25°C	0.005°C/Ω
	0 to 200°C *2	±1.5°C		±7.75°C	0.002°C/Ω
	0 to 1200°C *2	±2.0°C		±8.25°C	0.002°C/Ω
	1200 to 1370°C	— *3	— *3	— *3	— *3
E	-270 to -200°C	— *3	— *3	— *3	— *3
	-200 to 200°C *2	±1.5°C	±0.15°C	±5.25°C	0.003°C/Ω
	200 to 900°C *2	±2.0°C		±5.75°C	0.001°C/Ω
	900 to 1000°C	— *3	— *3	— *3	— *3
J	-210 to -40°C	— *3	— *3	— *3	— *3
	-40 to 200°C *2	±1.5°C	±0.15°C	±5.25°C	0.002°C/Ω
	200 to 750°C *2	±2.0°C		±5.75°C	0.002°C/Ω
	750 to 1200°C	— *3	— *3	— *3	— *3
T	-270 to -200°C	— *3	— *3	— *3	— *3
	-200 to 0°C *2	±2.0°C	±0.1°C	±4.5°C	0.004°C/Ω
	0 to 350°C *2	±1.5°C		±4.0°C	0.002°C/Ω
	350 to 400°C	— *3	— *3	— *3	— *3
N	-270 to -200°C	— *3	— *3	— *3	— *3
	-200 to 0°C *2	±2.5°C	±0.25°C	±8.75°C	0.007°C/Ω
	0 to 200°C *2	±2.0°C		±8.25°C	0.003°C/Ω
	0 to 1250°C *2	±2.5°C		±8.75°C	0.002°C/Ω
	1250 to 1300°C	— *3	— *3	— *3	— *3

*1: If a value entered from the thermocouple is outside the measured temperature range given in the table, it is handled as the maximum/minimum value of the measured temperature range.
*2: The accuracies only in the temperature ranges of Class 1 to 3 (shaded areas) in JIS C1602-1995 apply.
*3: Temperature measurement can be made, but accuracy is not guaranteed.
*4: Means temperature error per Ω of wiring resistance of the thermocouple. Check the wiring resistance value and calculate the temperature error in the system. In case of a temperature error that exceeds the measurement range of the system, compensate the measured temperature value using the offset/gain setting. (Refer to Section 4.6.)

(3) Micro voltage input range, accuracies, and effect from wiring resistance of 1Ω

The following table lists a micro voltage input range, accuracies, and the effect from wiring resistance of 1Ω.

Input Type	Measurable Voltage Range	Conversion Accuracy		Effect from wiring resistance of 1Ω ∗1
		(At 25±5°C operating ambient temperature)	(At 0 to 55°C operating ambient temperature)	
Micro voltage input	-100 to 100mV	±0.2mV	±0.8mV	0.064μV/Ω

∗1: Means error per Ω of wiring resistance. Check the wiring resistance value and calculate the error in the system. In case of an error that exceeds the measurement range of the system, compensate the micro voltage conversion value using the offset/gain setting. (Refer to Section 4.6.)

3.2 Function List

The following table lists the Q64TD/Q64TDV-GH functions.

Item	Description	Refer To
Temperature conversion function	This function allows temperature data to be imported by connecting a thermocouple. Temperature data are 16-bit signed binary (-2700 to 18200) and stored into buffer memory.	Section 3.4.7
Micro voltage conversion function (Q64TDV-GH only)	This function converts a -100mV to +100mV micro voltage into a 16-bit, signed binary (-25000 to 25000) and stores it into the buffer memory.	–
Temperature conversion system (Q64TD)	(1) Sampling processing A temperature input value is converted into a temperature one by one on each channel and a measured temperature value is output after every conversion. (2) Averaging processing Temperature conversion is averaged by count or time on each channel and an averaged value is stored.	Section 3.2.2
Temperature/micro voltage conversion system (Q64TDV-GH)	(1) Sampling processing A temperature/micro voltage input value is converted one by one on each channel and a measured temperature value is output after every conversion. (2) Averaging processing Temperature conversion is averaged by count or time on each channel and an averaged value/micro voltage conversion value is stored.	Section 3.2.3
Conversion enable/disable function	This function specifies whether temperature/micro voltage conversion is enabled or disabled on each channel. Setting temperature/micro voltage conversion enable/disable reduces the processing time of unused channels. In addition, it prevents unnecessary disconnection detection of unused channels.	Section 3.4.3 Section 3.4.6
Input type selection function	This function sets the input type per channel.	Section 4.5
Disconnection detection function	This function detects the disconnection of the connected thermocouple/micro voltage signal cable on each channel.	Section 3.4.14
Conversion setting for disconnection detection function	For values to be stored in the CH□ measured temperature value/micro voltage value (buffer memory addresses 11 to 14: Un\G11 to 14) 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 3.2.4
Pt100 cold junction temperature compensation yes/no setting function	This function determines whether cold junction temperature compensation is made or not using the Pt100 attached to the terminals. Use this function to measure temperatures with higher accuracy than the cold junction temperature compensation accuracy (±1℃) of the Pt100 that is attached to the Q64TD/Q64TDV-GH. The cold junction temperature compensation accuracy can be improved by disabling the cold junction temperature compensation of the Pt100 and providing a precision ice bath externally.	Section 4.7
Warning output function	This function outputs a warning when the measured temperature value/micro voltage conversion value is equal to or more than the warning output upper limit value or is equal to or less than the warning output lower limit value.	Section 3.4.13 Section 3.4.18
Scaling function	This function can convert a measured temperature value/micro voltage conversion value into a preset range ratio (%) and import it into buffer memory.	Section 3.4.15 Section 3.4.16 Section 3.4.17
Offset/gain setting function	This function compensates for an error of a measured temperature value or changes the conversion characteristic of a micro voltage conversion value.	Section 3.4.19 Section 4.6
Online module change	A module change is made without the system being stopped.	Chapter 7

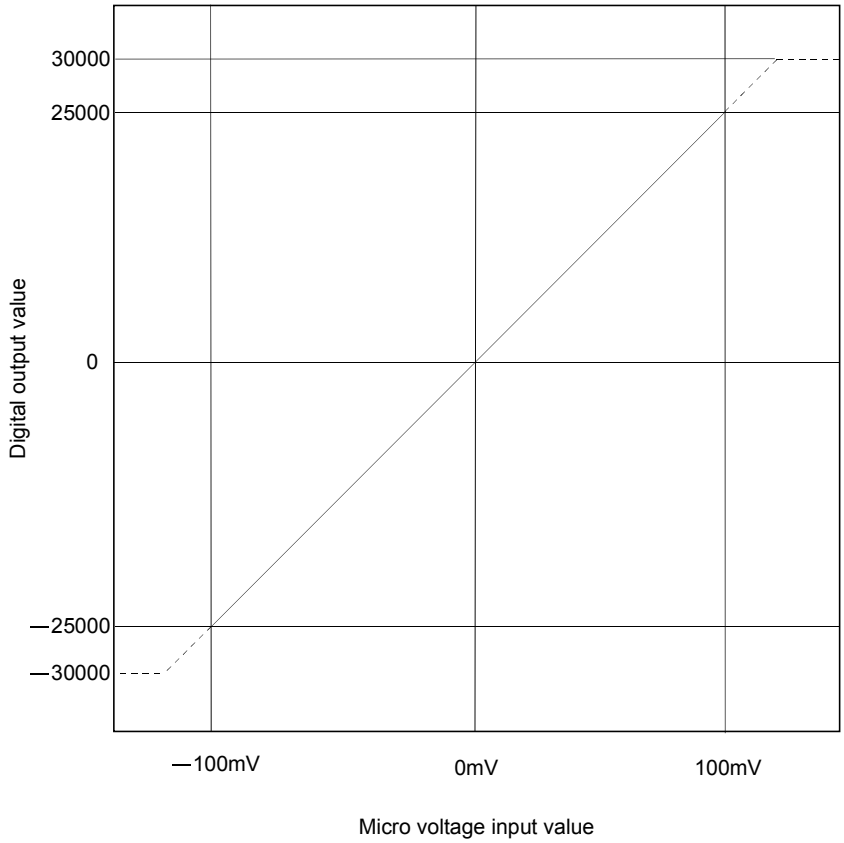
3.2.1 Micro voltage input/output conversion characteristic (Q64TDV-GH only)

A micro voltage input/output conversion characteristic indicates the slope of a straight line that connects an offset value and gain value when an external micro voltage signal is converted into a digital value.

Offset value
A micro voltage input value whose digital output value will be -25000.

Gain value
A micro voltage input value whose digital output value will be 25000.

The following indicates the micro voltage input/output conversion characteristic as set at the factory (offset value: -100mV, gain value: 100mV).



POINT
(1) Use the module within the micro voltage input range and digital output range. Outside those ranges, the maximum resolution and accuracy may not fall within the ranges of the performance specifications. (Avoid using the dotted line areas in the chart.) (2) Do not input voltage of 5V or higher, or -5V or lower. Doing so may damage the elements.

3.2.2 Temperature conversion system (Q64TD)

There are two temperature conversion systems, sampling processing and averaging processing.

(1) Sampling processing

A temperature input value is converted into a measured temperature value successively and the digital output value is stored into the 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

The temperatures of the channels specified for averaging processing are converted by the preset count or for the preset period of time, the sum of the resultant values except the maximum and minimum values is averaged, and the result is stored into the buffer memory.
Averaging processing requires at least 2 times of conversion processing excluding the maximum and the minimum values.

(a) Time averaging processing

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 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 62500 times.
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

3.2.3 Temperature/micro voltage conversion system (Q64TDV-GH)

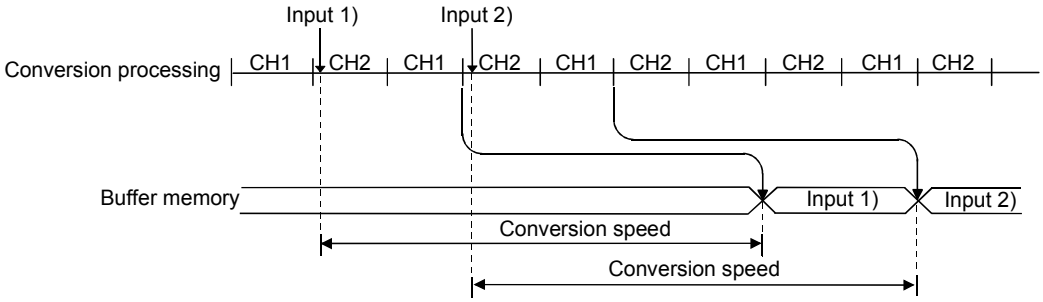
Temperature/micro voltage conversion can either be made by sampling processing or averaging processing.

(1) Sampling processing

A temperature/micro voltage input value is converted successively and a digital output value is stored into the buffer memory.
The conversion speed changes depending on the number of channels used (number of channels set for conversion enable).

(Conversion speed) = (sampling period) × 3
= {(number of used channels) × (20ms)} × 3

[Example] When 2 channels are enabled for conversion
(Conversion speed) = (sampling period) × 3
= (20ms × 2 channels) × 3
= 120ms



(2) Averaging processing

The input value of the channel specified for averaging processing is converted by the preset number of times or for the preset period of time, the sum of the resultant values except the maximum and minimum values is averaged, and the average value is stored into the buffer memory.
Averaging processing requires at least 2 times of conversion processing excluding the maximum and the minimum values.

(a) Time averaging processing

The number of processings performed within the preset time changes depending on the number of channels used (number of channels set for conversion enable).

$$\text{(Processing count)} = \frac{\text{(preset time)}}{\text{(number of used channels)} \times \text{(20ms)}}$$

Setting range of preset time is 80 to 2500ms.
When setting a value out of the setting range, an error (error code 20□) occurs.

[Example]
When four channels, channels 1, 2, 3 and 4, are enabled for conversion and the preset time is 760ms, the sampling count is 9.5.
760ms ÷ (4 channels (20ms) = 9.5
If the result cannot be divided, its fractional portion is rounded down and the sampling count is 9 times.

(b) Count averaging processing

The time when the count-based average value is stored into the buffer memory changes depending on the number of channels used (number of channels set for conversion enable).

(Processing time) = (preset count) × (number of used channels) × (20ms)

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

[Example]
When two channels, channels 3 and 4, are enabled for conversion and the preset count is 4, the average value is output per 160ms.
4 times × (2 channels × 20ms) = 160ms

3 - 13

3.2.4 Conversion setting for disconnection detection function

(1) For values to be stored in the CH□ measured temperature value/micro voltage value (buffer memory addresses 11 to 14: Un\G11 to 14) 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.

Input type	Set value	Measurement range	Up scale	Down scale
Thermocouple K	0	-270 to 1370℃	1452.0℃	-352.0℃
Thermocouple E	1	-270 to 1000℃	1063.5℃	-333.5℃
Thermocouple J	2	-210 to 1200℃	1270.5℃	-280.5℃
Thermocouple T	3	-270 to 400℃	433.5℃	-303.5℃
Thermocouple B	4	0 to 1820℃	1911.0℃	-91.0℃
Thermocouple R	5	-50 to 1760℃	1850.5℃	-140.5℃
Thermocouple S	6	-50 to 1760℃	1850.5℃	-140.5℃
Thermocouple N	7	-270 to 1300℃	1378.5℃	-348.5℃
Micro voltage input	8	-30000 to 30000℃	32767 ＊1	-32768 ＊1

＊1 For the Up scale and Down scale of the micro voltage input, the maximum and minimum of the micro voltage conversion values are applied.

(4) 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 153) in units of 0.1℃.
The value set in the area is stored in CH□ measured temperature value/micro voltage 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 Q64TD/Q64TDV-GH.
The I/O numbers (X/Y) given in this chapter and later assume that the first I/O number of the Q64TD is set to 0.

Input Signal (Signal Direction: Programmable controller CPU ← Q64TD/Q64TDV-GH)		Output Signal (Signal Direction: Programmable controller CPU → Q64TD/Q64TDV-GH)	
Device No.	Signal name	Device No.	Signal name
X0	Module Ready	Y0	Reserved ＊1
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 ＊1	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 ＊1	YB	Reserved ＊1
XC	Disconnection Detection Flag	YC	
XD	Warning Output Signal	YD	
XE	Conversion Completion Flag	YE	
XF	Error Flag	YF	Error Clear Request

POINT

The reserved signals marked ＊1 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 Q64TD/Q64TDV-GH.

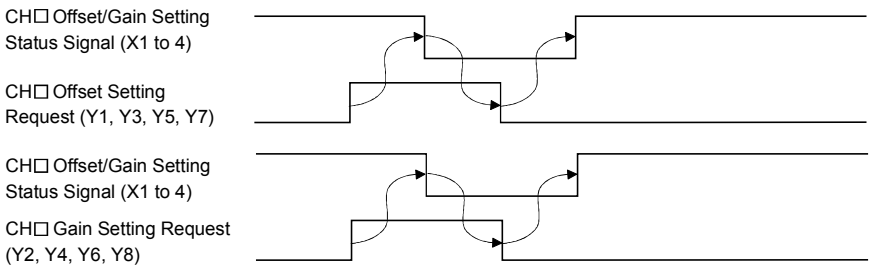
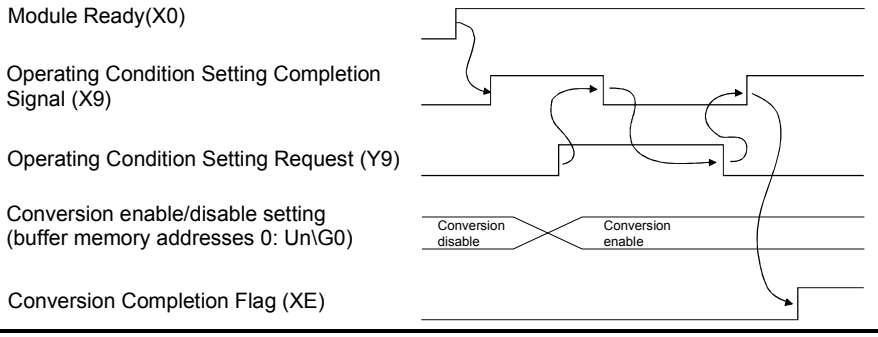
REMARK

Between the Q64TD/Q64TDV-GH 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 1.2.

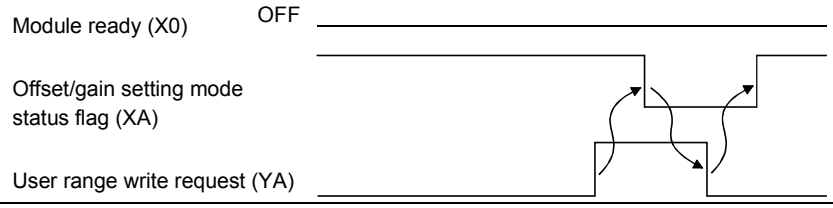
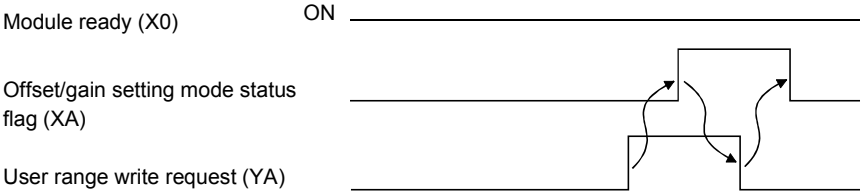
3.3.2 I/O signal details

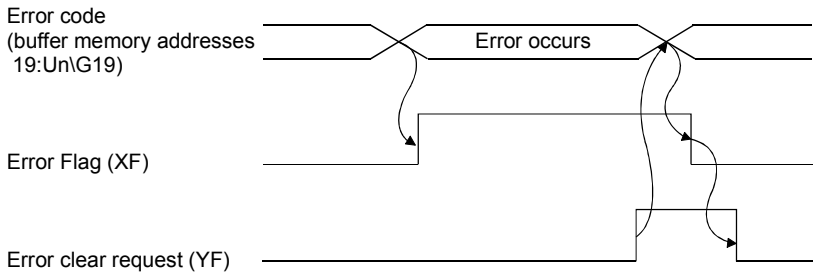
The following are details of the Q64TD/Q64TDV-GH I/O signals.

(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 conversion processing as soon as it gets ready for conversion. (2) When this signal (X0) is off in the normal mode, conversion processing is not performed. In the offset/gain setting mode, conversion processing is performed if this signal (X0) is off. (3) This signal (X0) turns off when: • The module is in the offset/gain setting mode; • The Q64TD/Q64TDV-GH is in a watchdog timer error ＊1; or • The module can be changed during online module change
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 range setting, 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 averaging setting", "Averaging processing specification", "Warning output enable/disable setting", "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. 

＊1 Occurs if program operation is not completed within the intended time due to a hardware fault of the Q64TD/Q64TDV-GH. The RUN LED of the Q64TD/Q64TDV-GH goes off when a watchdog timer error occurs.

Device No.	Signal Name	Description
XA	Offset/Gain Setting Mode Status Flag	[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 completion of offset/gain setting adjustment is registered. (2) See Section 4.6 regarding the offset/gain settings. 
		[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. 
XC	Disconnection Detection Flag	(1) The input circuit for the thermocouple of the conversion-enabled channel turns ON the Disconnection Detection Flag (XC) when any input signal line including the thermocouple/micro voltage signal line 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/micro voltage conversion value (buffer memory addresses 11 to 14: Un\G11 to 14). Conversion of the channels not disconnected is continued. (2) For temperature conversion values to be stored when the Disconnection Detection Flag (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 Flag (XC). (4) When the line connection is recovered, the temperature conversion value update is restarted independently of the Disconnection Detection Flag (XC) reset.
XD	Warning Output Signal	(1) This signal turns on when the measured temperature value/micro voltage conversion value has fallen out of the temperature range set in the warning output upper/lower limit values (buffer memory addresses 86 to 101: Un\G86 to 101) on any of the channels enabled for conversion. (2) This signal turns off automatically as soon as the measured temperature value/micro voltage conversion value returned to within the ranges on all channels enabled for conversion.

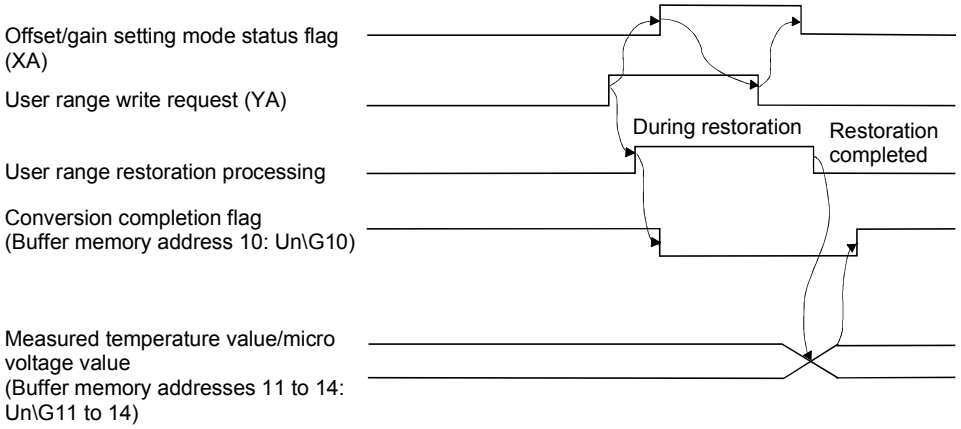
Device No.	Signal Name	Description
XE	Conversion Completion Flag	(1) This signal (XE) turns on when the measured temperature value/micro voltage conversion value of all channels enabled for conversion are stored into buffer memory after power-on or hardware reset. (2) When averaging processing is performed, this signal also turns on when the measured temperature value/micro voltage conversion value are stored into buffer memory after completion of averaging processing. (3) This signal (XE) varies as described below depending on whether the Operation Condition Setting Completed Signal (X9) has turned on or off. • When the Operation Condition Setting Completed Signal (X9) has turned on (stop → conversion) 1) Temperature conversions of the enabled channels are started. 2) After the measured temperature value/micro voltage conversion value 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 measured temperature value/micro voltage conversion value of all channels enabled for conversion are stored into buffer memory. • When the Operation Condition Setting Completed 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 measured temperature value/micro voltage conversion value 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. (5) Read measured temperature value/micro voltage conversion value using this signal or the Conversion completion flag (buffer memory address 10: Un\G10) as an interlock.
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). 

(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 measured temperature value/micro voltage conversion value to be an offset 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 measured temperature value/micro voltage conversion value to be a gain 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 averaging setting", "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", "Mode switching setting", "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 Flag (XC) and Warning Output Signal (XD) turn off. (3) For the on/off timing, refer to the field of the Operation Condition Setting Completed Signal (X9).
YA	User Range Write Request	[In offset/gain setting mode] (1) This turns ON when the value for the adjusted offset/gain settings are registered in E^2PROM. (2) Refer to the section of Offset/Gain Setting Mode Status Flag (XA) for ON/OFF timing. Refer to 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 section of Offset/Gain Setting Mode Status Flag (XA) for 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 Flag (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 Q64TD/Q64TDV-GH restores the user range.



During user range restoration: Conversion stop, Conversion completion flag (buffer memory addresses 10: Un\G10) OFF, measured temperature value/micro voltage value held as previously.

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

3.4 Buffer Memory

3.4.1 Buffer memory assignment (Q64TD)

This section describes the assignment of the Q64TD 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.

Table 3.1 Buffer memory assignment (Q64TD) (1/3)

Address		Description	R/W ＊1	Reference
Hex.	Dec.			
00H	0	Conversion enable/disable setting	R/W ＊2	Section 3.4.3
01H	1	CH1 time/count averaging setting	R/W ＊2	Section 3.4.4
02H	2	CH2 time/count averaging setting	R/W ＊2	
03H	3	CH3 time/count averaging setting	R/W ＊2	
04H	4	CH4 time/count averaging setting	R/W ＊2	
05H	5	System area	—	—
to	to			
08H	8			
09H	9	Averaging processing specification	R/W ＊2	Section 3.4.5
0AH	10	Conversion completion flag	R	Section 3.4.6
0BH	11	CH1 measured temperature value	R	Section 3.4.7
0CH	12	CH2 measured temperature value	R	
0DH	13	CH3 measured temperature value	R	
0EH	14	CH4 measured temperature value	R	
0FH	15	System area	—	—
to	to			
12H	18			
13H	19	Error code	R	Section 3.4.8
14H	20	Setting range	R	Section 3.4.9
15H	21	System area	—	—
to	to			
2EH	46			
2FH	47	Warning output enable/disable setting	R/W ＊2	Section 3.4.12
30H	48	Warning output flag	R	Section 3.4.13
31H	49	Disconnection detection flag	R	Section 3.4.14
32H	50	CH1 scaling value	R	Section 3.4.15
33H	51	CH2 scaling value	R	
34H	52	CH3 scaling value	R	
35H	53	CH4 scaling value	R	
36H	54	System area	—	—
to	to			
3DH	61			
3EH	62	CH1 scaling range lower limit value	R/W ＊2	Section 3.4.16
3FH	63	CH1 scaling range upper limit value	R/W ＊2	
40H	64	CH2 scaling range lower limit value	R/W ＊2	
41H	65	CH2 scaling range upper limit value	R/W ＊2	

Table 3.1 Buffer memory assignment (Q64TD) (2/3)

Address		Description	R/W ＊1	Reference
Hex.	Dec.			
42H	66	CH3 scaling range lower limit value	R/W ＊2	Section 3.4.16
43H	67	CH3 scaling range upper limit value	R/W ＊2	
44H	68	CH4 scaling range lower limit value	R/W ＊2	
45H	69	CH4 scaling range upper limit value	R/W ＊2	
46H	70	System area	—	—
to	to			
4DH	77			
4EH	78	CH1 scaling width lower limit value	R/W ＊2	Section 3.4.17
4FH	79	CH1 scaling width upper limit value	R/W ＊2	
50H	80	CH2 scaling width lower limit value	R/W ＊2	
51H	81	CH2 scaling width upper limit value	R/W ＊2	
52H	82	CH3 scaling width lower limit value	R/W ＊2	
53H	83	CH3 scaling width upper limit value	R/W ＊2	
54H	84	CH4 scaling width lower limit value	R/W ＊2	
55H	85	CH4 scaling width upper limit value	R/W ＊2	
56H	86	CH1 warning output lower lower limit value	R/W ＊2	Section 3.4.18
57H	87	CH1 warning output lower upper limit value	R/W ＊2	
58H	88	CH1 warning output upper lower limit value	R/W ＊2	
59H	89	CH1 warning output upper upper limit value	R/W ＊2	
5AH	90	CH2 warning output lower lower limit value	R/W ＊2	
5BH	91	CH2 warning output lower upper limit value	R/W ＊2	
5CH	92	CH2 warning output upper lower limit value	R/W ＊2	
5DH	93	CH2 warning output upper upper limit value	R/W ＊2	
5EH	94	CH3 warning output lower lower limit value	R/W ＊2	
5FH	95	CH3 warning output lower upper limit value	R/W ＊2	
60H	96	CH3 warning output upper lower limit value	R/W ＊2	
61H	97	CH3 warning output upper upper limit value	R/W ＊2	
62H	98	CH4 warning output lower lower limit value	R/W ＊2	
63H	99	CH4 warning output lower upper limit value	R/W ＊2	
64H	100	CH4 warning output upper lower limit value	R/W ＊2	
65H	101	CH4 warning output upper upper limit value	R/W ＊2	
66H	102	System area	—	—
to	to			
75H	117			
76H	118	CH1 offset temperature set value	R/W ＊2	Section 3.4.19
77H	119	CH1 gain temperature set value	R/W ＊2	
78H	120	CH2 offset temperature set value	R/W ＊2	
79H	121	CH2 gain temperature set value	R/W ＊2	
7AH	122	CH3 offset temperature set value	R/W ＊2	
7BH	123	CH3 gain temperature set value	R/W ＊2	
7CH	124	CH4 offset temperature set value	R/W ＊2	
7DH	125	CH4 gain temperature set value	R/W ＊2	
7EH	126	System area	—	—
to	to			
93H	147			

Table 3.1 Buffer memory assignment (Q64TD) (3/3)

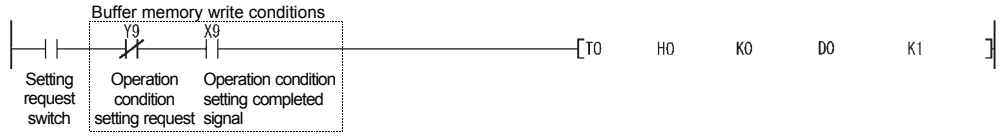
Address		Description	R/W ＊1	Reference
Hex.	Dec.			
94H	148	Conversion setting for disconnection detection	R/W ＊2	Section 3.4.20
95H	149	System area	—	—
96H	150	CH1 Conversion setting for disconnection detection	R/W ＊2	Section 3.4.21
97H	151	CH2 Conversion setting for disconnection detection	R/W ＊2	
98H	152	CH3 Conversion setting for disconnection detection	R/W ＊2	
99H	153	CH4 Conversion setting for disconnection detection	R/W ＊2	
9AH	154	System area	—	—
to	to			
9DH	157			
9EH	158	Mode switching setting	R/W	Section 3.4.22
9FH	159			
A0H	160	CH1 factory default offset value ＊3	R/W	Section 3.4.23
A1H	161	CH1 factory default gain value ＊3	R/W	
A2H	162	CH1 user range settings offset value ＊3	R/W	
A3H	163	CH1 user range settings gain value ＊3	R/W	
A4H	164	CH1 user range settings offset value (L) ＊3	R/W	
A5H	165	(H)		
A6H	166	CH1 user range settings gain value (L) ＊3	R/W	
A7H	167	(H)		
A8H	168	CH2 factory default offset value ＊3	R/W	
A9H	169	CH2 factory default gain value ＊3	R/W	
AAH	170	CH2 user range settings offset value ＊3	R/W	
ABH	171	CH2 user range settings gain value ＊3	R/W	
ACH	172	CH2 user range settings offset value (L) ＊3	R/W	
ADH	173	(H)		
AEH	174	CH2 user range settings gain value (L) ＊3	R/W	
AFH	175	(H)		
B0H	176	CH3 factory default offset value ＊3	R/W	
B1H	177	CH3 factory default gain value ＊3	R/W	
B2H	178	CH3 user range settings offset value ＊3	R/W	
B3H	179	CH3 user range settings gain value ＊3	R/W	
B4H	180	CH3 user range settings offset value (L) ＊3	R/W	
B5H	181	(H)		
B6H	182	CH3 user range settings gain value (L) ＊3	R/W	
B7H	183	(H)		
B8H	184	CH4 factory default offset value ＊3	R/W	
B9H	185	CH4 factory default gain value ＊3	R/W	
BAH	186	CH4 user range settings offset value ＊3	R/W	
BBH	187	CH4 user range settings gain value ＊3	R/W	
BCH	188	CH4 user range settings offset value (L) ＊3	R/W	
BDH	189	(H)		
BEH	190	CH4 user range settings gain value (L) ＊3	R/W	
BFH	191	(H)		
C0H	192	System area	—	
to	to			

3 - 23

✻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.

• Operation 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 (Q64TDV-GH)

The assignment of the Q64TDV-GH buffer memory will be explained.

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.

Table 3.2 Buffer memory assignment (Q64TDV-GH) (1/3)

Address		Description	R/W ＊1	Reference
Hex.	Dec.			
00H	0	Conversion enable/disable setting	R/W ＊2	Section 3.4.3
01H	1	CH1 time/count averaging setting	R/W ＊2	Section 3.4.4
02H	2	CH2 time/count averaging setting	R/W ＊2	
03H	3	CH3 time/count averaging setting	R/W ＊2	
04H	4	CH4 time/count averaging setting	R/W ＊2	
05H	5	System area	—	—
to	to			
08H	8			
09H	9	Averaging processing specification	R/W ＊2	Section 3.4.5
0AH	10	Conversion completion flag	R	Section 3.4.6
0BH	11	CH1 measured temperature value/micro voltage conversion value	R	Section 3.4.7
0CH	12	CH2 measured temperature value/micro voltage conversion value	R	
0DH	13	CH3 measured temperature value/micro voltage conversion value	R	
0EH	14	CH4 measured temperature value/micro voltage conversion value	R	
0FH	15	System area	—	—
to	to			
12H	18			
13H	19	Error code	R	Section 3.4.8
14H	20	Setting range 1	R	Section 3.4.10
15H	21	Setting range 2	R	Section 3.4.11
16H	22	System area	—	—
to	to			
2EH	46			
2FH	47	Warning output enable/disable setting	R/W ＊2	Section 3.4.12
30H	48	Warning output flag	R	Section 3.4.13
31H	49	Disconnection detection flag	R	Section 3.4.14
32H	50	CH1 scaling value	R	Section 3.4.15
33H	51	CH2 scaling value	R	
34H	52	CH3 scaling value	R	
35H	53	CH4 scaling value	R	
36H	54	System area	—	—
to	to			
3DH	61			
3EH	62	CH1 scaling range lower limit value	R/W ＊2	Section 3.4.16
3FH	63	CH1 scaling range upper limit value	R/W ＊2	
40H	64	CH2 scaling range lower limit value	R/W ＊2	
41H	65	CH2 scaling range upper limit value	R/W ＊2	

Table 3.2 Buffer memory assignment (Q64TDV-GH) (2/3)

Address		Description	R/W ＊1	Reference
Hex.	Dec.			
42H	66	CH3 scaling range lower limit value	R/W ＊2	Section 3.4.16
43H	67	CH3 scaling range upper limit value	R/W ＊2	
44H	68	CH4 scaling range lower limit value	R/W ＊2	
45H	69	CH4 scaling range upper limit value	R/W ＊2	
46H	70	System area	—	—
to	to			
4DH	77			
4EH	78	CH1 scaling width lower limit value	R/W ＊2	Section 3.4.17
4FH	79	CH1 scaling width upper limit value	R/W ＊2	
50H	80	CH2 scaling width lower limit value	R/W ＊2	
51H	81	CH2 scaling width upper limit value	R/W ＊2	
52H	82	CH3 scaling width lower limit value	R/W ＊2	
53H	83	CH3 scaling width upper limit value	R/W ＊2	
54H	84	CH4 scaling width lower limit value	R/W ＊2	
55H	85	CH4 scaling width upper limit value	R/W ＊2	
56H	86	CH1 warning output lower lower limit value	R/W ＊2	Section 3.4.18
57H	87	CH1 warning output lower upper limit value	R/W ＊2	
58H	88	CH1 warning output upper lower limit value	R/W ＊2	
59H	89	CH1 warning output upper upper limit value	R/W ＊2	
5AH	90	CH2 warning output lower lower limit value	R/W ＊2	
5BH	91	CH2 warning output lower upper limit value	R/W ＊2	
5CH	92	CH2 warning output upper lower limit value	R/W ＊2	
5DH	93	CH2 warning output upper upper limit value	R/W ＊2	
5EH	94	CH3 warning output lower lower limit value	R/W ＊2	
5FH	95	CH3 warning output lower upper limit value	R/W ＊2	
60H	96	CH3 warning output upper lower limit value	R/W ＊2	
61H	97	CH3 warning output upper upper limit value	R/W ＊2	
62H	98	CH4 warning output lower lower limit value	R/W ＊2	
63H	99	CH4 warning output lower upper limit value	R/W ＊2	
64H	100	CH4 warning output upper lower limit value	R/W ＊2	
65H	101	CH4 warning output upper upper limit value	R/W ＊2	
66H	102	System area	—	—
to	to			
75H	117			
76H	118	CH1 offset setting value	R/W ＊2	Section 3.4.19
77H	119	CH1 gain setting value	R/W ＊2	
78H	120	CH2 offset setting value	R/W ＊2	
79H	121	CH2 gain setting value	R/W ＊2	
7AH	122	CH3 offset setting value	R/W ＊2	
7BH	123	CH3 gain setting value	R/W ＊2	
7CH	124	CH4 offset setting value	R/W ＊2	
7DH	125	CH4 gain setting value	R/W ＊2	
7EH	126	System area	—	—
to	to			
93H	147			
94H	148	Conversion setting for disconnection detection	R/W ＊2	Section 3.4.20
95H	149	System area	—	—

Table 3.2 Buffer memory assignment (Q64TDV-GH) (3/3)

Address		Description	R/W ＊1	Reference
Hex.	Dec.			
96H	150	CH1 Conversion setting for disconnection detection	R/W ＊2	Section 3.4.21
97H	151	CH2 Conversion setting for disconnection detection	R/W ＊2	
98H	152	CH3 Conversion setting for disconnection detection	R/W ＊2	
99H	153	CH4 Conversion setting for disconnection detection	R/W ＊2	
9AH	154	System area	—	—
to	to			
9DH	157			
9EH	158	Mode switching setting	R/W	Section 3.4.22
9FH	159			
A0H	160	CH1 factory default offset value ＊3	R/W	Section 3.4.23
A1H	161	CH1 factory default gain value ＊3	R/W	
A2H	162	CH1 user range settings offset value ＊3	R/W	
A3H	163	CH1 user range settings gain value ＊3	R/W	
A4H	164	CH1 user range settings thermal EMF offset value (L) ＊3	R/W	
A5H	165	(H)		
A6H	166	CH1 user range settings thermal EMF gain value (L) ＊3	R/W	
A7H	167	(H)		
A8H	168	CH2 factory default offset value ＊3	R/W	
A9H	169	CH2 factory default gain value ＊3	R/W	
AAH	170	CH2 user range settings offset value ＊3	R/W	
ABH	171	CH2 user range settings gain value ＊3	R/W	
ACH	172	CH2 user range settings thermal EMF offset value (L) ＊3	R/W	
ADH	173	(H)		
AEH	174	CH2 user range settings thermal EMF gain value (L) ＊3	R/W	
AFH	175	(H)		
B0H	176	CH3 factory default offset value ＊3	R/W	
B1H	177	CH3 factory default gain value ＊3	R/W	
B2H	178	CH3 user range settings offset value ＊3	R/W	
B3H	179	CH3 user range settings thermal EMF gain value ＊3	R/W	
B4H	180	CH3 user range settings thermal EMF offset value (L) ＊3	R/W	
B5H	181	(H)		
B6H	182	CH3 user range settings gain value (L) ＊3	R/W	
B7H	183	(H)		
B8H	184	CH4 factory default offset value ＊3	R/W	
B9H	185	CH4 factory default gain value ＊3	R/W	
BAH	186	CH4 user range settings offset value ＊3	R/W	
BBH	187	CH4 user range settings gain value ＊3	R/W	
BCH	188	CH4 user range settings thermal EMF offset value (L) ＊3	R/W	
BDH	189	(H)		
BEH	190	CH4 user range settings thermal EMF gain value (L) ＊3	R/W	
BFH	191	(H)		
C0H	192	System area	—	—
to	to			

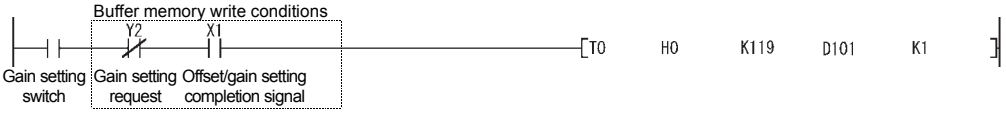
*1 Indicates whether reading from and writing to a sequence program are enabled.
R : Read enabled W : Write enabled

*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.

3.4.3 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.

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

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

(2) Setting can be made within the following ranges.
Time averaging processing: 160 to 5000ms (Q64TD)
80 to 2500ms (Q64TDV-GH)
Count averaging processing: 4 to 62500 times∗1
If you set any value outside the range, it will result in an error and the previous setting will not be updated.
∗1: when setting 32768 times or more in the sequence program, set the count in hexadecimal. For instance, set F424H to specify 62500 times.

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

(4) At power-on or reset, this area 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.

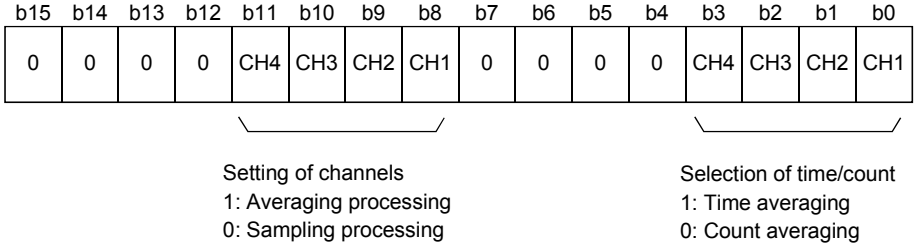
(6) Refer to Section 3.4.5 for details of sampling processing/time averaging processing/count averaging processing.

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.

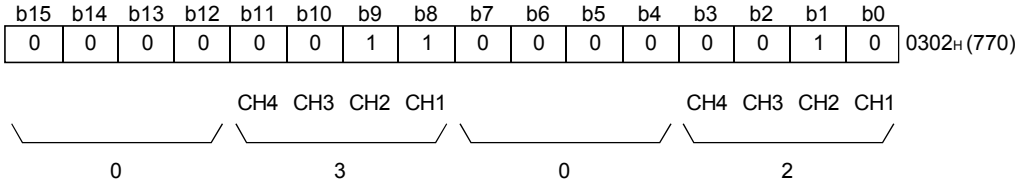
(3) The default is set to sampling processing for all channels.



(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).



3.4.6 Conversion completion flag (Un\G10)

(1) You can check whether the channels specified for conversion enable succeeded in normal 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 conversion-enabled channels are completed.

- When conversion enable/disable setting is turned from 1 (disable) to 0 (enable)
  After the measured temperature value/micro voltage conversion voltage is stored into the buffer memory, the conversion completion flag of the corresponding channel is turned to 1.
- When the 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	CH4	CH3	CH2	CH1

1: Conversion completed
0: During conversion or unused

(5) Read measured temperature value/micro voltage conversion value using this area or the Conversion completion flag (XE) as an interlock.

REMARK

Between the Q64TD/Q64TDV-GH 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 1.2.

3.4.7 CH □ measured temperature value/micro voltage value (Un\G11 to 14)

(1) Thermocouple input

(a) The "thermal EMF value" input from the thermocouple is converted into a "temperature value" to detect a temperature.

(b) 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. (The second decimal place and on are rounded down.)

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

(d) 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

(2) Micro voltage input

(a) A micro voltage of -100mV to +100mV is converted into a 16-bit, signed binary value of -25000 to 25000, and the result is stored.

(b) A negative micro voltage conversion value is displayed as two's complement.

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

[Example 1] At the micro voltage input value of 51.300mV ..... 12825 is stored.

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

[Example 2] At the micro voltage input value of -51.300mV ..... -12825 is stored.

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

POINT

Read measured temperature value/micro voltage conversion value using the Conversion completion flag (XE) or the Conversion completion flag (buffer memory address 10: Un\G10) as an interlock.

3.4.8 Error code (Un\G19)

(1) When the Q64TD/Q64TDV-GH has detected a set value or operation procedure error, 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 LED" of the Q64TD/Q64TDV-GH is lit.

(4) The following are main checking details.

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 averaging processing specification • 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 preset CH□ offset temperature value/CH□ gain temperature 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∗1	• Check whether the same data was written consecutively or not. • Check whether the pass data has been set or not.
When G(P).OGSTOR instruction is executed in sequence program∗1	• 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.

∗1 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.

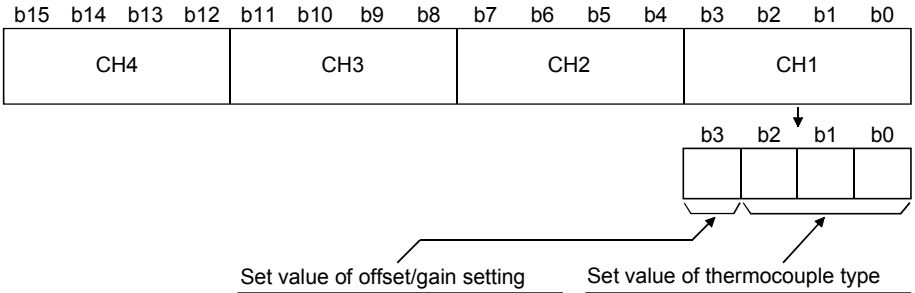
(6) Giving the Error Clear Request (YF) clears the error code and turns off the lit "ERROR LED".

(7) Clearing the error stores 0.

3.4.9 Setting range (Q64TD) (Un\G20)

(1) The settings of the "thermocouple type" and "offset/gain setting" are stored.

(2) Use the intelligent function module switches of GX Developer to make settings of the "thermocouple type" and "offset/gain 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 range setting	1

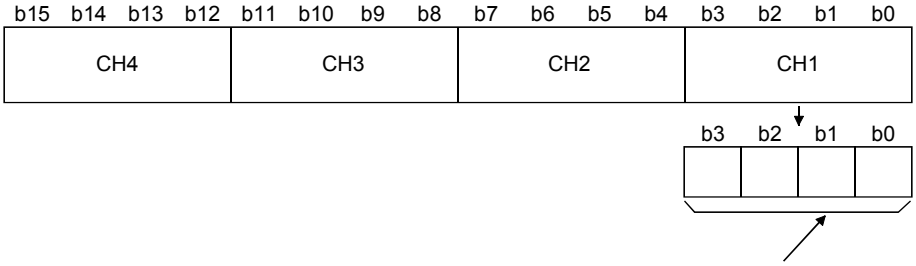
Set value of thermocouple type

Thermocouple Type	Set Value
K	0
E	1
J	2
T	3
B	4
R	5
S	6
N	7

3.4.10 Setting range 1 (Q64TDV-GH) (Un\G20)

(1) The setting of the "input type" is stored.

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



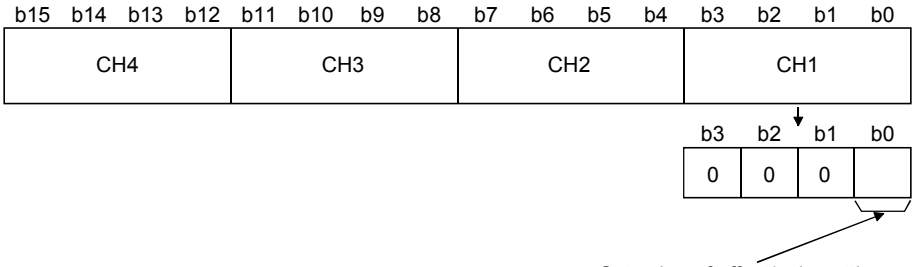
Set value of input type

Input Type	Set Value
Thermocouple K	0
Thermocouple E	1
Thermocouple J	2
Thermocouple T	3
Thermocouple B	4
Thermocouple R	5
Thermocouple S	6
Thermocouple N	7
Micro voltage input	8

3.4.11 Setting range 2 (Q64TDV-GH) (Un\G21)

(1) The setting of the "offset/gain setting" is stored.

(2) Use the intelligent function module switches of GX Developer to make the setting of the "offset/gain 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 range setting	1

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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, the warning output enable/disable setting 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	CH4	CH3	CH2	CH1

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 CH□ measured temperature value/micro voltage conversion value (buffer memory addresses 11 to 14: Un\G 11 to 14) is outside the range set for the CH□ warning output upper/lower limit value (buffer memory addresses 86 to 101: Un\G86 to 101), 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 measured temperature value/micro voltage 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 Operation Condition Setting Request (Y9) is turned 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 3.4.18 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 thermocouple, compensation conductor or micro voltage signal cable is detected.

(2) Disconnection detection is made on only the channels set for conversion enable.

(3) Disconnection is detected on each channel.

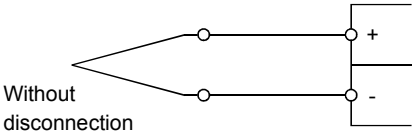
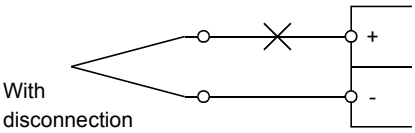
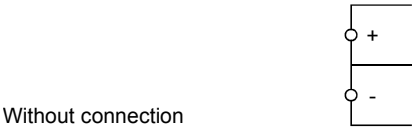
(4) For a channel where disconnection is detected, a value based on the Conversion setting for disconnection detection (buffer memory address 148: Un\G148) is stored in the CH□ measured temperature value/micro voltage value (buffer memory addresses 11 to 14: Un\G11 to 14).
Conversion of the channels not disconnected is continued.

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

(5) The disconnection detection flag is cleared when the Operation Condition Setting Request (Y9) or Error Clear Request (YF) is turned on.
Clearing of the disconnection detection flag using the Error Clear Request (YF) is supported by the module of function version C or later.

(6) The relationships between disconnection detection and conversion enable/disable setting 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 connection	Conversion enable	ON
	Conversion disable	OFF

POINT

- Any channel where no thermocouple, compensation conductor or micro voltage signal cable is connected must be set to "conversion disable".
  Not doing so will turn on the disconnection detection flag.
- For measured temperature values/micro voltage conversion values to be stored when the Disconnection Detection Flag (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 3.2.4.)
  After disconnection detection, update of measured temperature values/micro voltage conversion values resumes if the connection is re-established.
- Refer to Section 4.4 for the wiring of the thermocouple, compensation conductor or micro voltage signal cable.
- Refer to Section 8.2.5 for the troubleshooting of disconnection detection.

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

(1) The measured temperature value/micro voltage conversion value within the scaling range set for the CH☐ scaling range upper/lower limit values (buffer memory address 62 to 69: Un\G62 to 69) 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.

$$\text{Scaling value} = (\text{Scaling width upper limit value} - \text{Scaling width lower limit value}) \times \frac{\text{Measured temperature value/micro voltage conversion value} - \text{Scaling range lower limit value}}{\text{Scaling range upper limit value} - \text{Scaling range lower limit value}} = \text{Scaling width lower limit value}$$

[Example]
To scale a temperature to a percent
When the CH1 measured temperature value of 360℃ (measured temperature value = 3600) is scaled at the following settings,
Scaling range: -100 to 500℃ (lower limit value = -1000, upper limit value = 5000)
Scaling width: 0 to 100% (lower limit value = 0, upper limit value = 100)

Scaling value=

$$(100\text{-}0) \times \frac{3600\text{-}(\text{-}1000)}{5000\text{-}(\text{-}1000)} + 0 = 76.666666\cdots$$ 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 69: Un\G62 to 69) 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/micro voltage 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 ☐ scaling range upper/lower limit values (Un\G62 to 69)

(1) Set the scaling range of the temperature measurement value/micro voltage conversion value on each channel.
The setting for the measured temperature value is in 0.1℃ increments.

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

(3) The scaling range that may be set is -32768 to 32767.

(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.

3.4.17 CH ☐ scaling width upper/lower limit values (Un\G78 to 85)

(1) Set the scaling width on each channel.

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

(3) The scaling range that may be set 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.

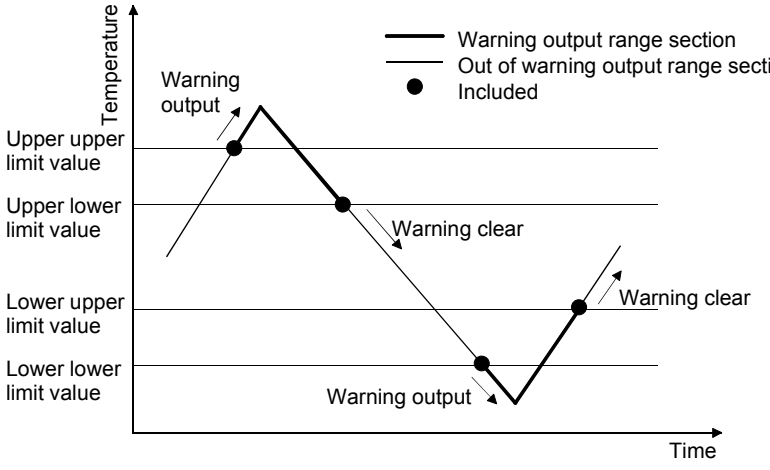
3.4.18 CH ☐ warning output upper/lower limit values (Un\G86 to 101)

(1) Set the warning output range of the measured temperature value/micro voltage conversion value on each channel.
The setting for the measured temperature value is in 0.1℃ increments.

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



(5) At power-on or reset, the minimum and maximum values of the accuracy guarantee range of the input type set as the input type (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.

Input type	Settings at Power-On or Reset				Available Temperature Range(Accuracy guarantee range)
	Lower upper limit value	Lower lower limit value	Upper upper limit value	Upper lower limit value	
Thermocouple K	-2000		12000		-2700 to 13700 (-2000 to 12000)
Thermocouple E	-2000		9000		-2700 to 10000 (-2000 to 9000)
Thermocouple J	-400		7500		-2100 to 12000 (-400 to 7500)
Thermocouple T	-2000		3500		-2700 to 4000 (-2000 to 3500)
Thermocouple B	6000		17000		0 to 18200 (-6000 to 17000)
Thermocouple R	0		1600		-500 to 17600 (-0 to 1600)
Thermocouple S	0		1600		-500 to 17600 (-0 to 1600)
Thermocouple N	-2000		12500		-2700 to 13000 (-2000 to 12500)
Micro voltage input	-2500		25000		-30000 to 30000 (-25000 to 25000)

(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, an error does not 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.

3.4.19 CH ☐ offset/gain temperature value (Q64TD)/CH ☐ offset/gain setting value (Q64TDV-GH) (Un\G118 to 125)

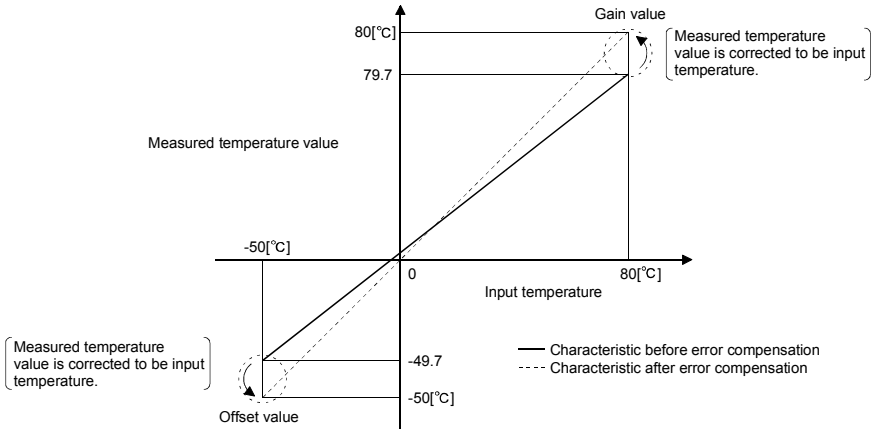
(1) Offset/gain setting (error compensation) is a function designed to compensate for the value at any two points (offset value/gain value) within the operating range when the proper measured temperature value/micro voltage conversion value is not available at a system start or when the input type is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

(2) When the Offset Setting Request/Gin Setting Request (Y1 to 8) is turned on in the offset/gain setting mode, the measured temperature value/micro voltage conversion value is corrected to be the set value written to this area. (Setting for measured temperature value in 0.1℃ increments)
[Example] To set to 80℃ ..... Store 800.

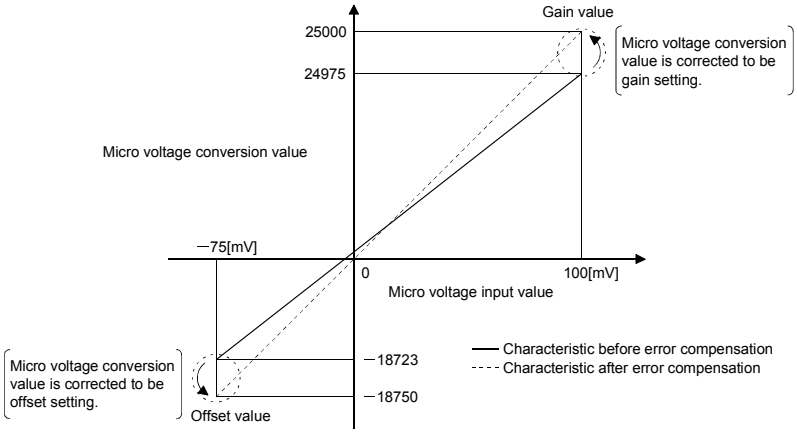
(3) Error compensation is made by reading the measured temperature value/micro voltage conversion value of the buffer memory using a sequence program and monitoring the values on the peripheral device.

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

(a) Thermocouple input



(b) Micro voltage input



(5) At power-on or reset, the minimum and maximum values in the accuracy guarantee range of the input type set as Input type (set using GX Developer) are stored.
Refer to Section 3.4.18 for the accuracy guarantee range.

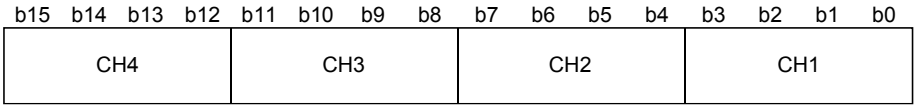
POINT

- High accuracy is ensured for the offset and gain values when the minimum and maximum values within the operating range are used to make error compensation.
- Make offset/gain value setting while simultaneously reading the measured temperature value/micro voltage conversion 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 the input enabled range
  Condition 2: (Gain value) - (offset value) > 0.1 [℃] (for temperature input)
  or (Gain value) - (offset value) > 4 [μV] (for micro voltage input)
- By giving the user range write request, the offset and gain values are stored into the E^2PROM of the Q64TD/Q64TDV-GH and will not be erased at power-off.
- For thermocouple input, error compensation may also be made using a standard DC voltage generator or like instead of inputting a temperature directly to the thermocouple.

Power value of standard DC voltage generator	=	Thermoelectromotive force value of thermocouple used as offset/gain value relative to input temperature

3.4.20 Conversion setting for disconnection detection (Un\G148)

(1) Select the value to be stored in the CH□ measured temperature value/micro voltage value (buffer memory address 11 to 14: Un\G11 to 14) 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 0_H (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.

3.4.21 Conversion setting value for disconnection detection (Un\G150 to 153)

(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/micro voltage value (buffer memory addresses 11 to 14: Un\G11 to 14).
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 –32768 to 32767 (0000H to FFFFH). (Setting in 0.1℃ increments.)
[Example] To set to 0.3℃ ..... Store 3.

(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.

3.4.22 Mode switching setting (Un\G158 to 159)

Used to change between the normal mode and offset/gain setting mode. You can change the mode without resetting the programmable controller CPU.

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

(2) After setting the value, turn the operating condition setting request (Y9) from OFF to ON to shift the mode.

(3) When the mode is switched, this area is cleared to zero and the operating condition setting completion flag (X9) turns off.
After making sure that the operating condition setting completion flag (X9) has turned off, turn off the operating condition setting request (Y9).

Mode to Be Shifted to	Set Value	
	Buffer memory address 158	Buffer memory address 159
Normal mode	0964H	4144H
Offset/gain setting mode	4144H	0964H

POINT

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

3.4.23 Factory default offset/gain value/User range settings offset/gain value/User range settings thermal EMF offset/gain value (Un\G160 to 191)

(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 write is performed by the utility;
• The operating condition is set (Y9 turns from OFF to ON ∗1)
• 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 values have been written to the mode switching setting area (buffer memory addresses 158, 159: Un\G158, Un\G159).

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

(4) Buffer memory saving recording procedure for online module change
1) 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 thermal EMF offset/gain value (buffer memory addresses 160 to 191: Un\G160 to Un\G191) with the range reference values. Refer to Section 7.4 for the range reference values.
3) If the values are proper, record the Factory default offset/gain value/User range settings offset/gain value/User range settings thermal EMF offset/gain value.

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

POINT
This area is not used for the offset/gain settings. For the offset/gain settings, 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.

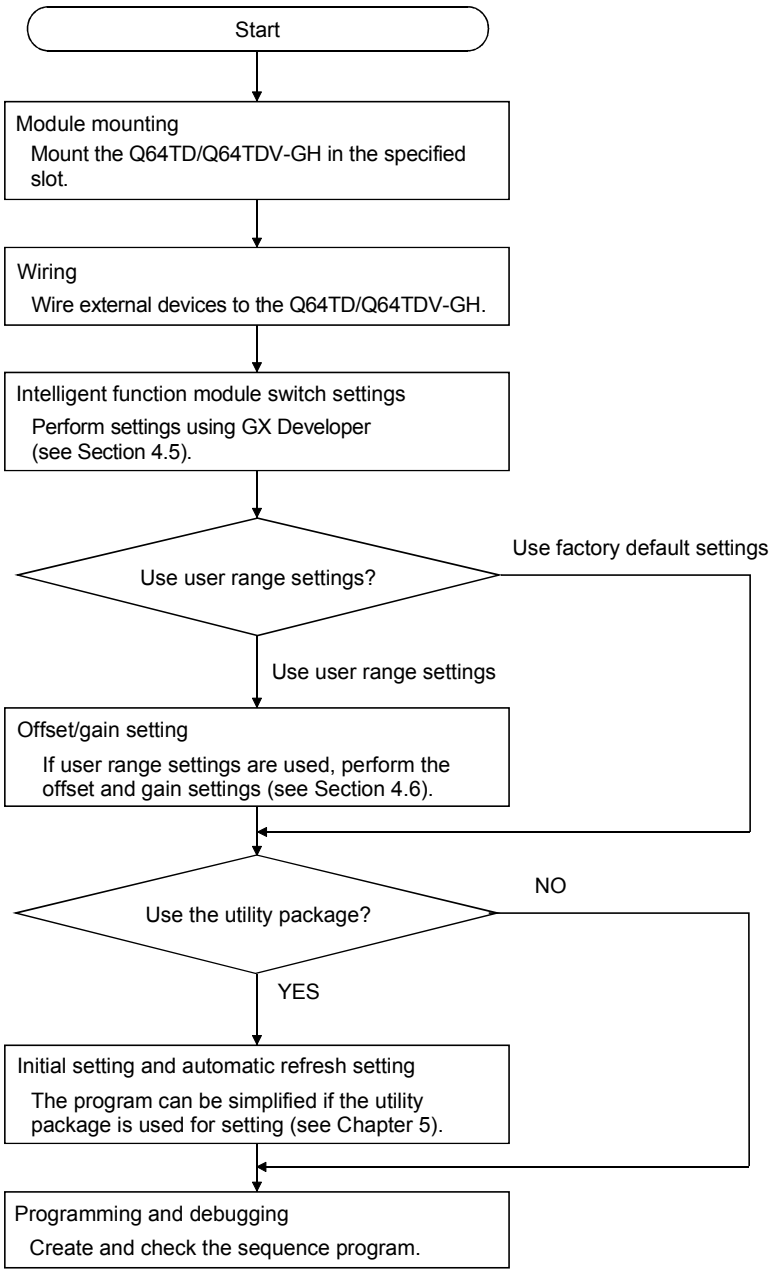
(5) Tighten the screws such as module fixing screws within the following ranges. Loose screws may cause short circuits, failures, or malfunctions.

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, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place.
Incorrect mounting may cause malfunction, failure or drop of the module.
When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.

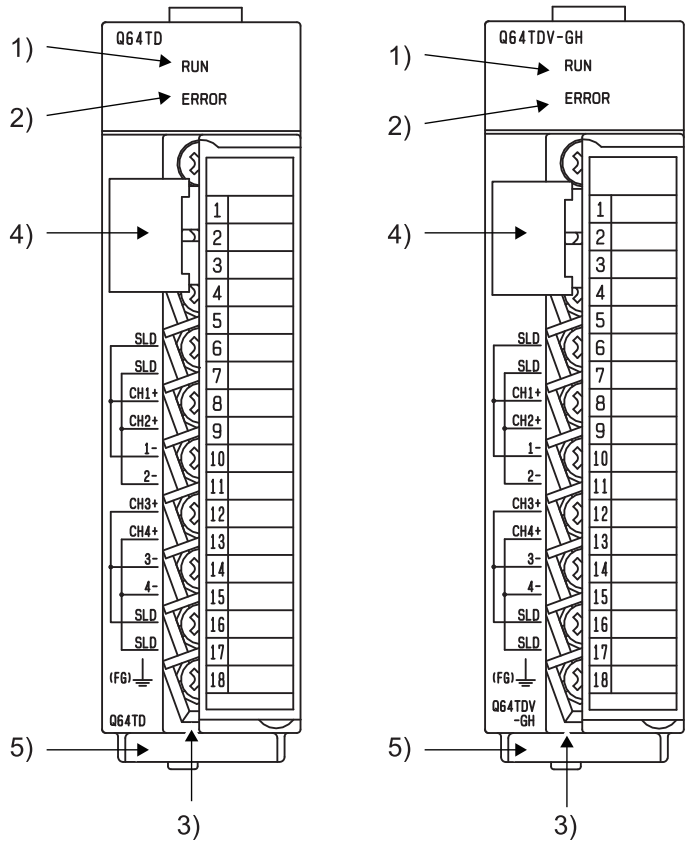
4.2 Setup and Procedures before Operation



4 - 2

4.3 Part Names and Settings

The name of each part of the 64TD/Q64TDV-GH is listed below.



Terminal Block Layout	
Terminal number	Signal name
1	RTD +
2	Empty
3	RTD -
4	Empty
5	Empty
6	CH1 SLD
7	CH2 SLD
8	CH1 +
9	CH2 +
10	CH1 -
11	CH2 -
12	CH3 +
13	CH4 +
14	CH3 -
15	CH4 -
16	CH3 SLD
17	CH4 SLD
18	FG

Number	Name and Appearance	Description
1)	RUN LED	Indicates the operating status of the Q64TD/Q64TDV-GH. On : Operating normally. Flicker : Offset/gain setting mode Off : 5V power switched off, watchdog timer error occurred, or online module change enabled
2)	ERROR LED	Indicates the error status of the Q64TD/Q64TDV-GH. On : Error occurrence Flicker : Switch setting error Switch 5 was set to other than 0 in intelligent function module switch setting of GX Developer. Off : Operating normally.
3)	Terminal block	Used for wiring of the thermocouple, etc.
4)	Cold junction temperature compensation resistor	Used for cold junction temperature compensation using Pt100.
5)	Serial number display	Displays the serial number of the Q64TD/Q64TDV-GH.

4.4 Wiring

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

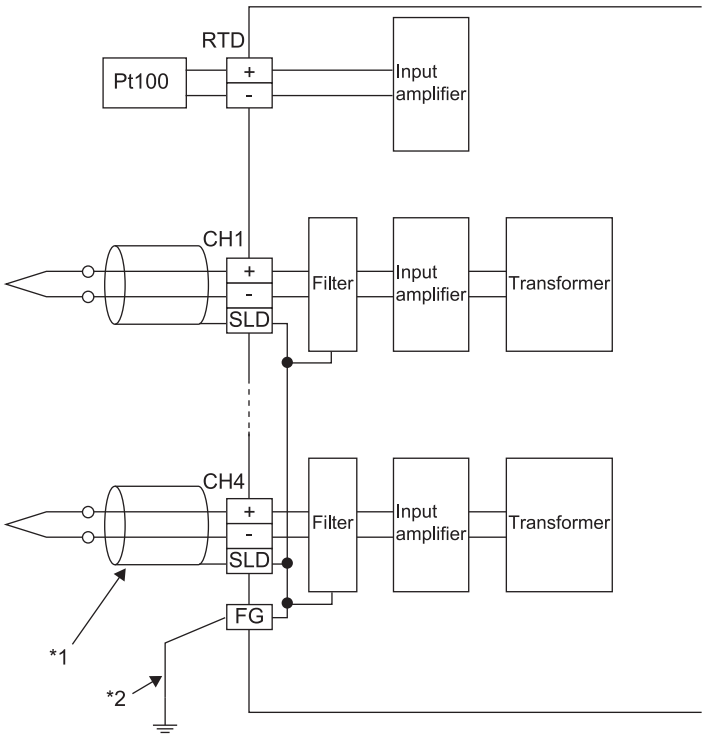
4.4.1 Wiring instructions

In order to optimize the functions of the Q64TD/Q64TDV-GH 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 Q64TD/Q64TDV-GH's external input signals to avoid the influence of AC side surges and inductions.
(2) Always place the thermocouple/micro voltage signal cable at least 100mm away from the main circuit cables and AC control lines.
Fully keep it away from high-voltage cables and circuits which include harmonics, such as an inverter's load circuit. Not doing so will make the module more susceptible to noises, surges and inductions.
(3) 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.

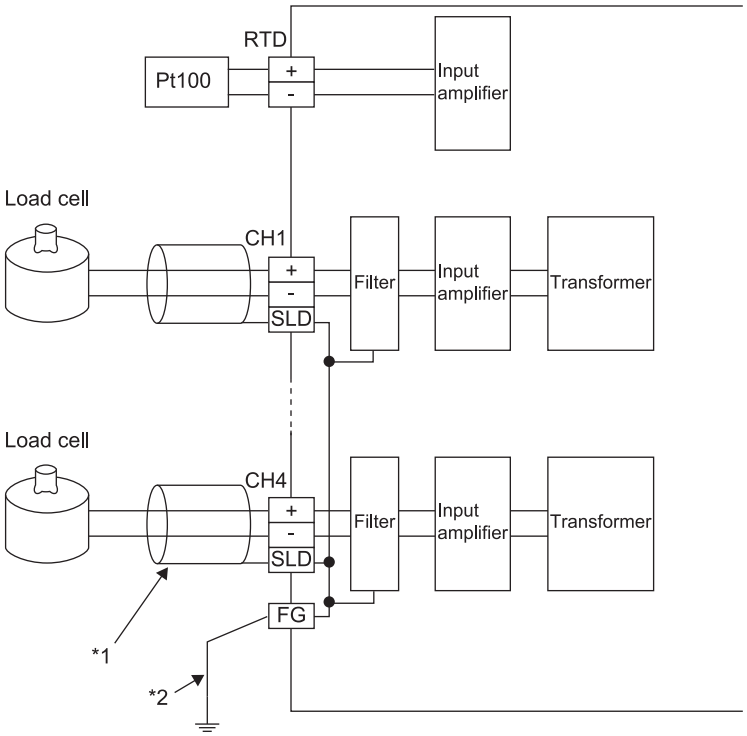
4.4.2 External wiring

(1) Thermocouple



＊1 As cables, always use shielded compensation conductors.
Also, wire the shielded cables as short as possible.
＊2 Always connect to the earth terminal of the control box.

(2) Micro voltage signal



＊1 As cables, always use shielded conductors.
Also, wire the shielded cables as short as possible.

＊2 Always connect to the earth terminal of the control box.

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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.

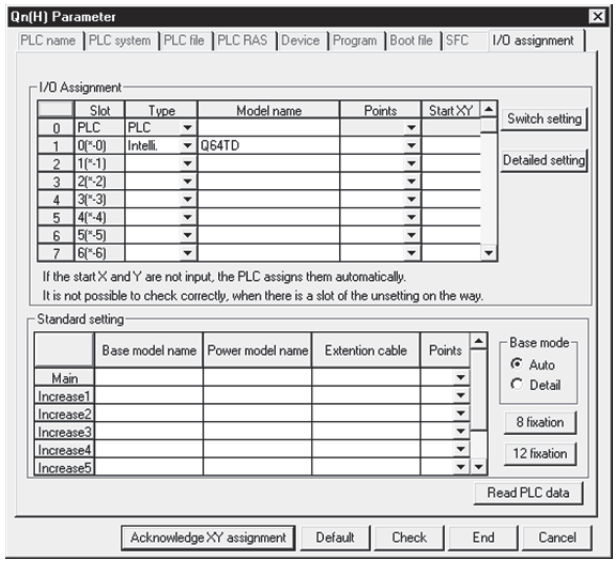
<table>
<tr><th></th><th colspan="2">Setting Item</th></tr>
<tr><td>Switch 1</td><td>Input type setting
□ □ □ □ H
CH4 CH3 CH2 CH1</td><td><table><tr><th>Input type</th><th>Set value</th></tr><tr><td>Thermocouple K</td><td>0</td></tr><tr><td>Thermocouple E</td><td>1</td></tr><tr><td>Thermocouple J</td><td>2</td></tr><tr><td>Thermocouple T</td><td>3</td></tr><tr><td>Thermocouple B</td><td>4</td></tr><tr><td>Thermocouple R</td><td>5</td></tr><tr><td>Thermocouple S</td><td>6</td></tr><tr><td>Thermocouple N</td><td>7</td></tr><tr><td>Micro voltage input ∗1</td><td>8</td></tr></table></td></tr>
<tr><td>Switch 2</td><td>Offset/gain setting
□ □ □ □ H
CH4 CH3 CH2 CH1</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 colspan="2">Empty</td></tr>
<tr><td>Switch 4</td><td colspan="2">□□□□
0H : With cold junction temperature compensation
1 to FH*2 : Without cold junction temperature compensation
) Invalid when the setting of Switch 1 is 8 (micro voltage input)
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: Micro voltage input can be set on the Q64TDV-GH only.

∗2: Setting any value within the setting range activates the same operation. In the setting range of 1H to FH, set 1 for example.

(2) Operating procedure

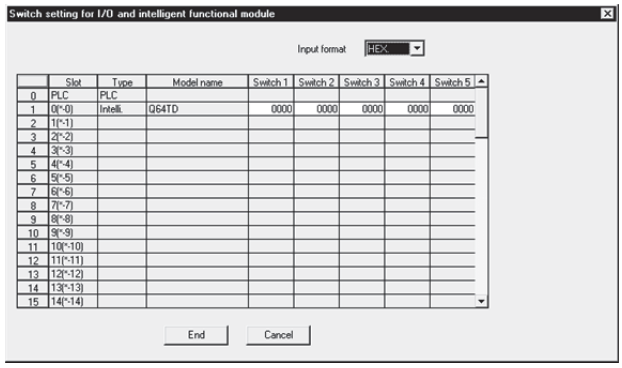
Start the settings with GX Developer assignment setting screen.



(a) I/O assignment setting screen

Set the following for the slot in which the Q64TD/Q64TDV-GH 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 Q64TD/Q64TDV-GH.
Detailed setting : Specify the "H/W error time PLC operation mode" and "Control PLC" for the Q64TD/Q64TDV-GH.
It is unnecessary to set the "Error time output mode" because this setting is invalid for the Q64TD/Q64TDV-GH.



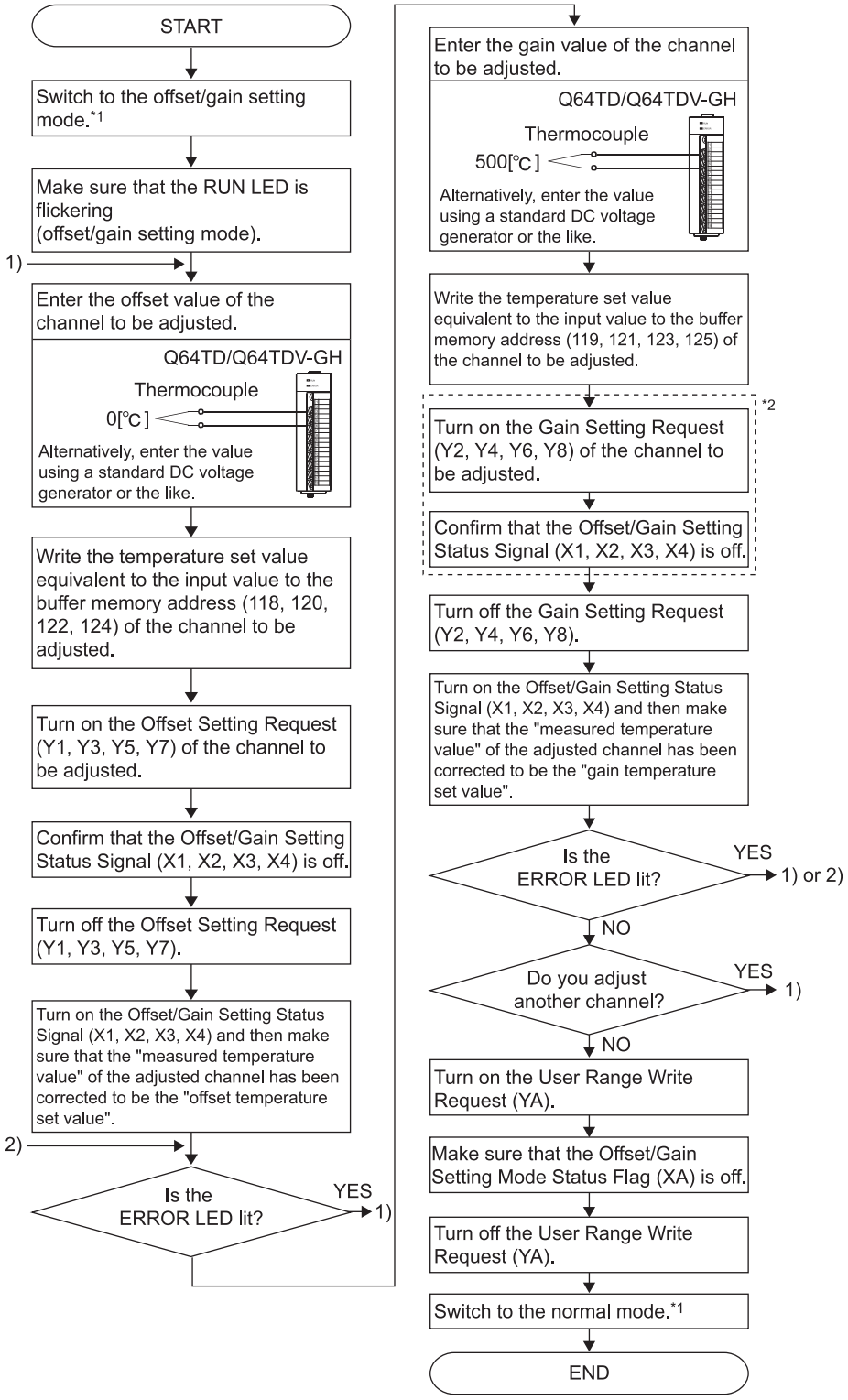
(b) Switch setting for intelligent function module screen

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.

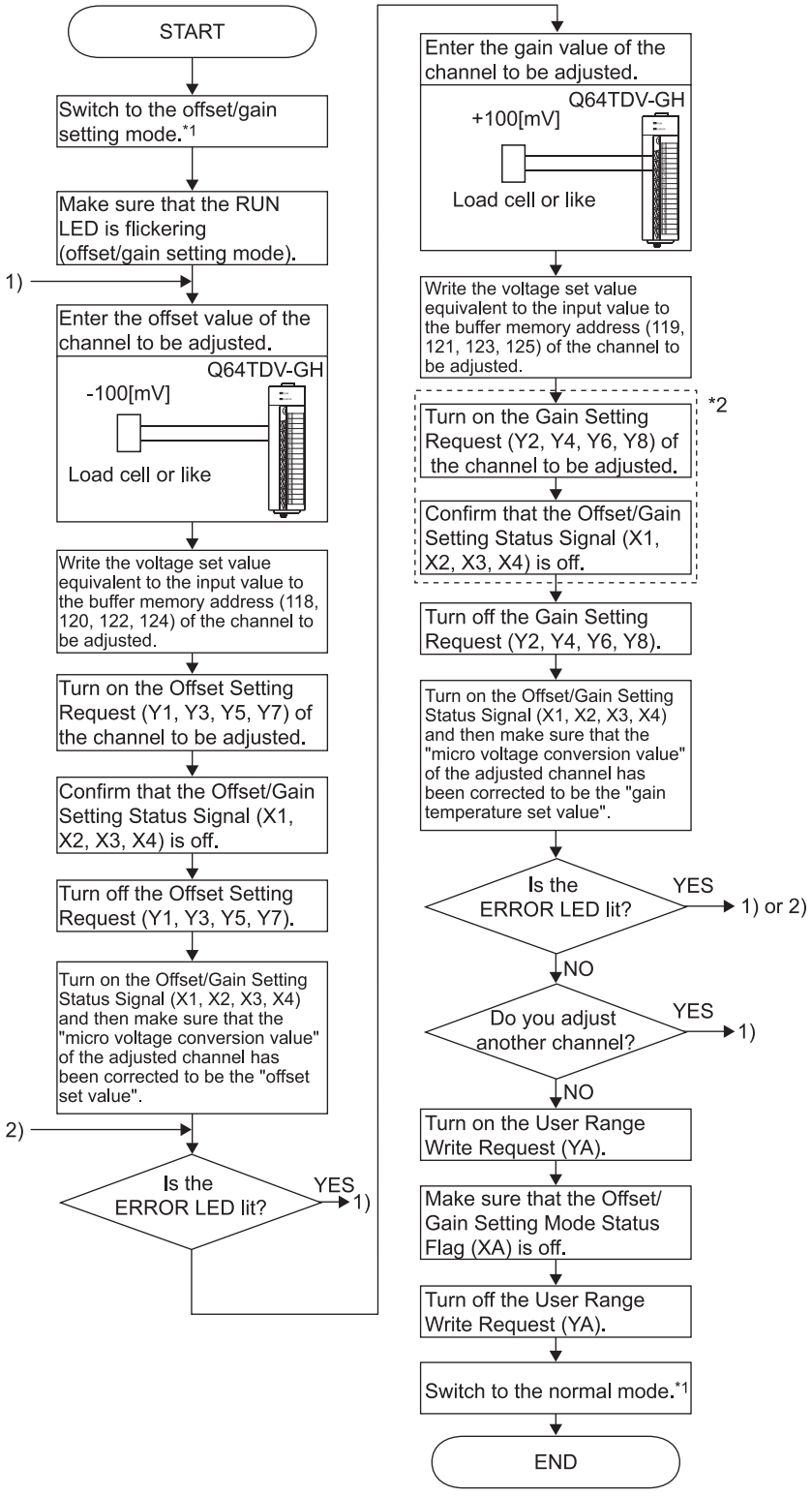
4.6 Offset/Gain Setting

Perform offset/gain settings in the procedure given in Section 4.6 (1) or Section 4.6 (2).
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 for thermocouple input



(2) Offset/gain setting for the micro voltage input



∗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 (3), (a)
- Setting made to mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159) and turning the operation condition setting request (Y9) from OFF to ON ..... Refer to Section 4.6 (3), (b)
- Intelligent function module switch setting .... Refer to Section 4.5, Section 4.6 (3), (c) (After intelligent function module switch setting, reset the programmable controller CPU or switch power OFF, then ON.)

∗2 Do not perform the following during the steps marked ∗2
If any of the following is performed, the data in E^2PROM will have a problem and the Q64TD/Q64TDV-GH may not operate normally.
- Powering off the programmable controller CPU
- Resetting the programmable controller CPU

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 guarantee range (refer to Section 3.1.1 (2), Section 3.1.2 (2)) or within the measurable voltage range (refer to Section 3.1.2 (3)).
  If setting is made outside the measured temperature guarantee range or measurable voltage range, the resolution and accuracy may not fall within the ranges of the performance specifications.
- Set the offset and gain values within the ranges where the following conditions are satisfied.
  (Gain value) - (offset value) > 0.1 [℃] (for temperature input)
  or (Gain value) - (offset value) > 4 [μV] (for micro voltage input)
- Offset/gain setting may be made for two or more channels at the same time.
- Do not set the offset and gain values concurrently.
  Doing so will cause an error, lighting up the ERROR 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. (Refer to Section 3.4.8.)
- 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 Q64TD/Q64TDV-GH. (∗1 □ indicates the corresponding channel number.)
- The module ready (X0) turns from OFF to ON when the offset/gain setting mode is switched to the normal mode by the setting of the dedicated instruction (G(P).OFFGAN) or 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 will perform initial setting when the module ready (X0) turns on.
  Also, for only the Q64TD, the error is cleared when the mode is switched.
- The factory default offset/gain values, user range settings offset/gain values and user range settings thermal EMF offset/gain values (buffer memory addresses 160 to 255: Un\G160 to 255) are related with the user range save/restore function and allow users to re-set the offset/gain values easily in the case of online module change.
  These areas are not used for the offset/gain setting.

(3) Program examples

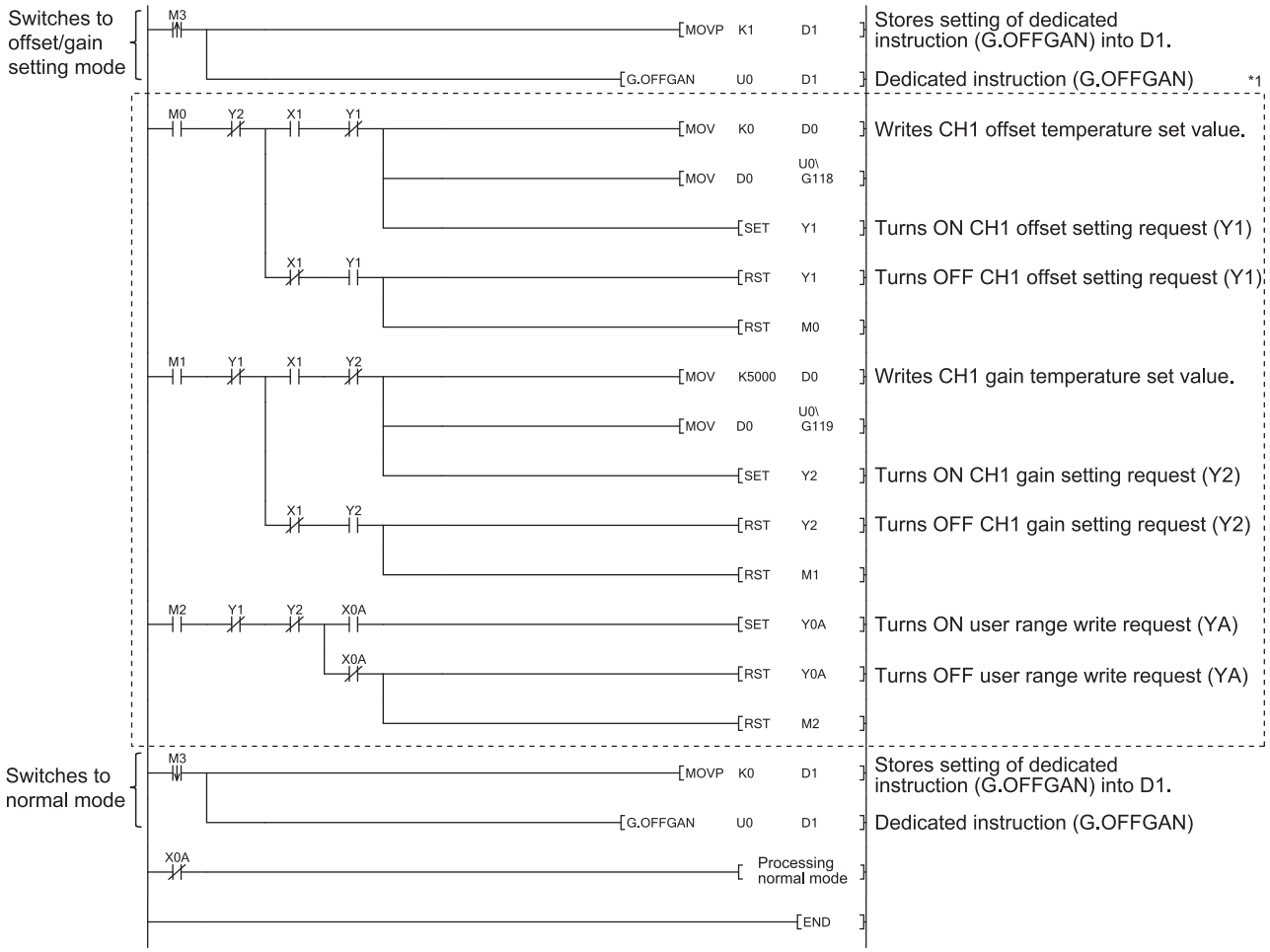
The program in the dotted area of (a) is common to (a), (b) and (c).

In this example, the I/O signals for Q64TD/Q64TDV-GH are X/Y0 to X/YF.

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

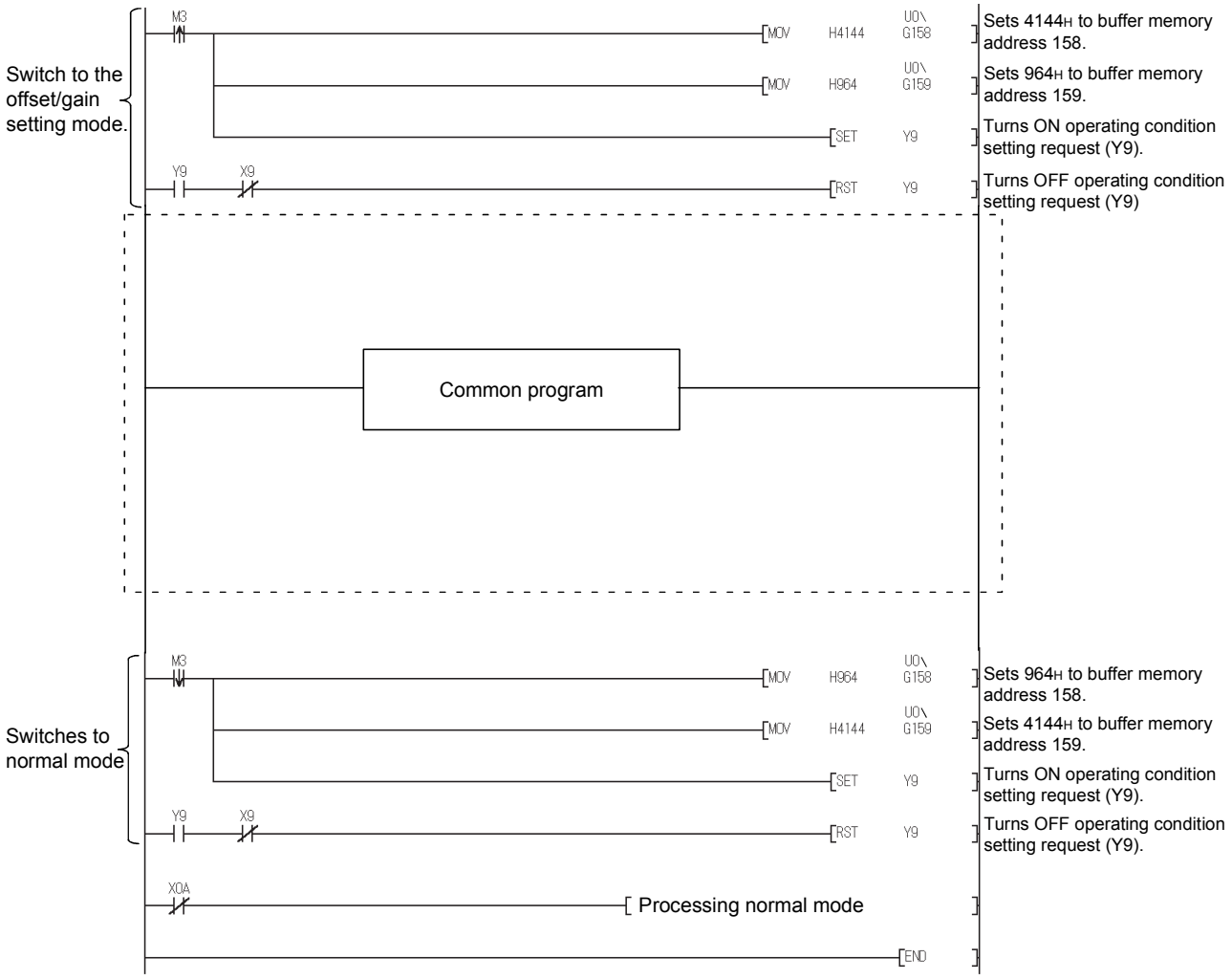
(a) When dedicated instruction (G.OFFGAN) is used to change mode

The following program example is designed to shift to the offset/gain setting mode using the dedicated instruction (G.OFFGAN) and write the offset and gain values of CH1 to the Q64TD/Q64TDV-GH.



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

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



(c) When switching the mode by making intelligent function module switch setting

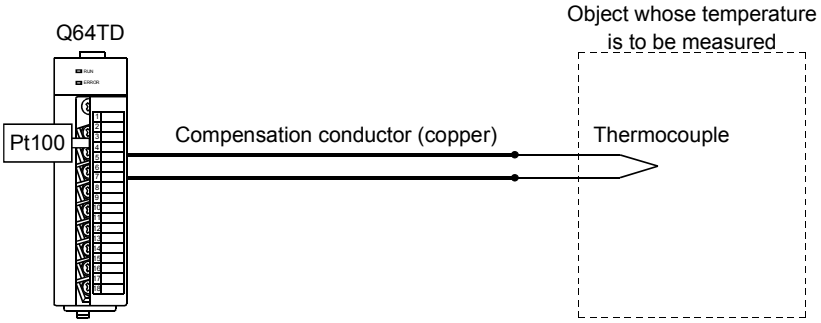
Only the common program is necessary.

4.7 Cold Junction Temperature Compensation Yes/No Setting

The Q64TD/Q64TDV-GH can perform the following two different cold junction temperature compensations by making intelligent function module switch setting (switch 4) to select whether a cold junction temperature compensation will be made or not using the Pt100 temperature-measuring resistor.

(1) Pt100 temperature-measuring resistor is used to perform cold junction temperature compensation (cold junction temperature compensation set for "Yes")

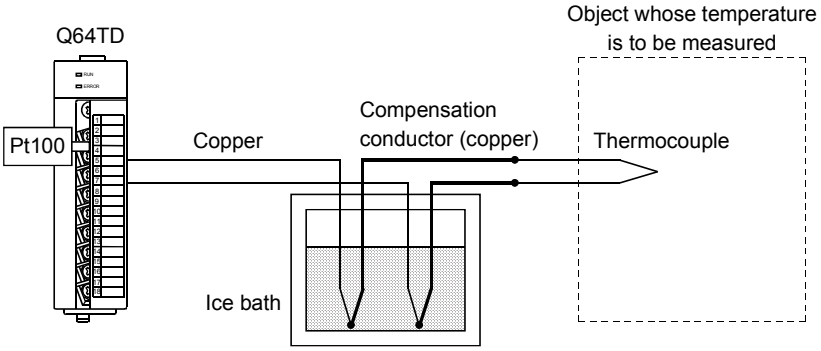
A cold junction temperature compensation using the Pt100 temperature-measuring resistor attached to the Q64TD/Q64TDV-GH is made automatically.



(2) Cold junction temperature compensation is performed externally (cold junction temperature compensation set for "No")

Use this compensation when you want to make temperature measurement at so high accuracy that the cold junction temperature compensation accuracy using the Pt100 temperature-measuring resistor attached to the Q64TD/Q64TDV-GH cannot be ignored as an error.

By providing a precision ice bath externally, the thermoelectromotive force generated at the tip of the thermocouple can be led to this module without any change, improving the cold junction temperature compensation accuracy.



POINT

- The ice bath is designed to connect the thermocouple and conductor in the pot whose internal temperature is controlled to be 0°C.
  Hence, the thermoelectromotive force at the contact portion of the thermocouple and conductor will be 0mV, preventing the generation of extra thermoelectromotive force which can cause errors.
- Use the accessory Pt100 temperature-measuring resistor as it is connected.

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) Make initial setting for operating the Q64TD/Q64TDV-GH channel-by-channel. Set the values of the items which require initial setting. · Conversion Enable/Disable Setting · Sampling Averaging Processing Selection · Time/Count Averaging Selection · Time/Count Averaging Setting · Warning Output Enable/Disable Setting · Thermocouple Type (Q64TD) · Setting Range (Q64TDV-GH) · 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 for which initial setting has been completed is registered in the parameters for the programmable controller CPU, and automatically written to the Q64TD/Q64TDV-GH when the programmable controller CPU changes to the RUN status.	Section 5.4
Automatic refresh	(1) Set the automatically refreshed Q64TD/Q64TDV-GH buffer memory channel-by-channel. · Conversion Completion Flag · CH□ Measured Temperature Value (Q64TD) · CH□ Measured Temperature Value/ Micro Voltage Conversion Value (Q64TDV-GH) · Error Code · Setting Range (Q64TD) · Signal Range 1 (Q64TDV-GH) · Warning Output Flag · Disconnection Detection Flag · CH□ Scaling Value (2) The values stored in the Q64TD/Q64TDV-GH buffer memory where automatic refresh setting was made are automatically read or written when the END instruction of the programmable controller CPU is executed.	Section 5.5

Function	Description	Reference section
Monitor/test	Monitors and tests the buffer memory and I/O signals for the Q64TD/Q64TDV-GH. · Module Ready · Operating Condition Setting Completion Signal · Operating Condition Setting Request · Offset/gain Setting Mode Status Flag · User Range Write Request · Disconnection Detection Signal · Warning Output Signal · Conversion Completion Flag · Error Signal · Error Clear Request (1) CH□ Monitor/Test · Conversion Enable/Disable Setting · Sampling/Averaging Processing Selection · Time/Count Averaging Selection · Time/Count Averaging Setting · Conversion Completion Flag · Measured Temperature Value (Q64TD) · Measured Temperature Value/Micro Voltage Conversion Value (Q64TDV-GH) · Error Code · Thermocouple Type (Q64TD) · Setting Range 1 (Q64TDV-GH) · Warning Output Enable/Disable Setting · Warning Output Flag Lower Limit Value (Q64TD) · 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 ＊2 · Conversion setting value for disconnection detection ＊2 (2) Offset/Gain Setting · Mode Switching Setting · Mode Switching Setting Status · CH□ Thermocouple Type (Q64TD) · CH□ Setting Range 1 (Q64TDV-GH) · CH□ Offset Temperature Setting Value (Q64TD) · CH□ Offset Setting Value (Q64TDV-GH) · CH□ Offset Setting Request · CH□ Gain Temperature Setting Value (Q64TD) · CH□ Gain Setting Value (Q64TDV-GH) · CH□ Gain Setting Request · CH□ Measured Temperature Value (Q64TD) · CH□ Measured Temperature Value/Micro Voltage Conversion Value (Q64TDV-GH) · 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 Flag · 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 · CH□ Factory default offset/gain value · CH□ User range settings thermal EMF offset/gain value · OMC refresh data write request · CH□ User range settings offset/gain value · OMC refresh data read request	Section 5.6

POINT

＊1 To make initial and automatic refresh settings, a maximum of 76 bytes are required for the intelligent function module parameters per module.

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

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

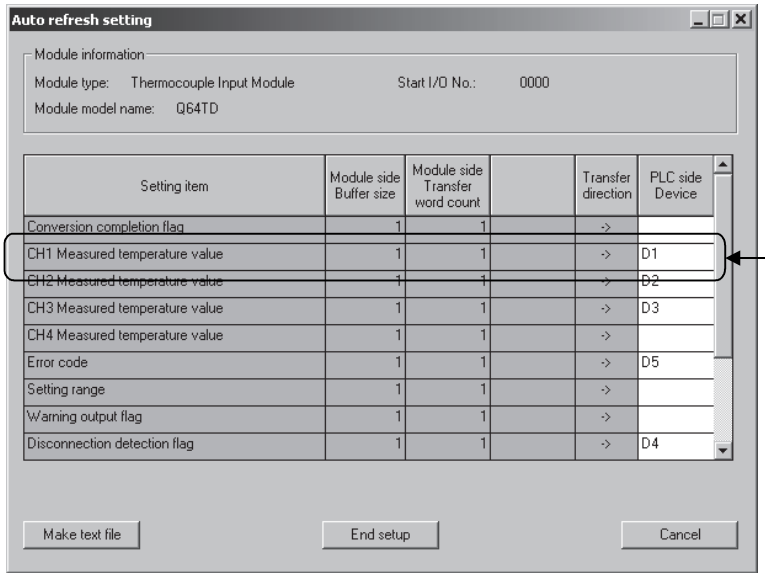
When multiple intelligent function modules are mounted, the number of parameter settings must not exceed the following limit.

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
Q00UJ/Q00U/Q01UCPU	512	256
Q02UCPU	2048	1024
Q03UD/Q04UDH/Q06UDH/ Q10UDH/Q13UDH/Q20UDH/ Q26UDH/Q03UDE/Q04UDEH/ Q06UDEH/Q10UDEH/Q13UDEH/ Q20UDEH/Q26UDEHCPU	4096	2048
CPU module other than the above	N/A	N/A
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-TI 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
Q64TD	6 (Fixed)	13 (Max.)
Q64TDV-GH	6 (Fixed)	13 (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＊4
Computer		A personal computer with any of the operating systems below
	CPU	Refer to the next page "Operating system and performance required for personal computer".
	Required memory	
Hard disk space ＊3	For installation	65 MB or more
	For operation	10 MB or more
Display		800 × 600 dots or more resolution ＊3
Operating system		Microsoft® Windows® 95 Operating System (English version) Microsoft® Windows® 98 Operating System (English version) Microsoft® Windows® Millennium Edition Operating System (English version) Microsoft® Windows NT® Workstation Operating System Version 4.0 (English version) Microsoft® Windows® 2000 Professional Operating System (English version) Microsoft® Windows® XP Professional Operating System (English version) Microsoft® Windows® XP Home Edition Operating System (English version) 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) Microsoft Windows® 7 Starter Operating System (English version) ＊4 Microsoft Windows® 7 Home Premium Operating System (English version) ＊4 Microsoft Windows® 7 Professional Operating System (English version) ＊4 Microsoft Windows® 7 Ultimate Operating System (English version) ＊4 Microsoft Windows® 7 Enterprise Operating System (English version) ＊4

＊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: When Windows Vista® or Windows® 7 is used, resolution of 1024 × 768 dots or more is recommended.

＊4: When 32-bit Windows® 7 is used, add GX Configurator-TI Version 1.28AE or later in GX Developer Version 8.91V or later.
When 64-bit Windows® 7 is used, add GX Configurator-TI Version 1.28AE or later in GX Developer Version 8.98C or later.

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	Pentium® 300MHz or more	128MB or more
Windows Vista®	Pentium® 1GHz or more	1GB or more
Windows® 7	Pentium® 1GHz or more	1 GB or more (32-bit) 2 GB or more (64-bit)

POINT

- The following functions cannot be used when the computer is running under Windows® XP, Windows Vista®, and Windows® 7. This product may not perform properly, when these functions are used.
  - Activating the application with Windows® compatible mode
  - Simplified user switch-over
  - Remote desktop
  - Large font size (Advanced setting of Display Properties)
  - DPI setting other than 100%
  - 64-bit edition*1
  - Windows XP Mode
  - Windows Touch

  *1 This function can be used for Windows® 7.
- A user with USER authority or higher can access GX Configurator-TI for 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.

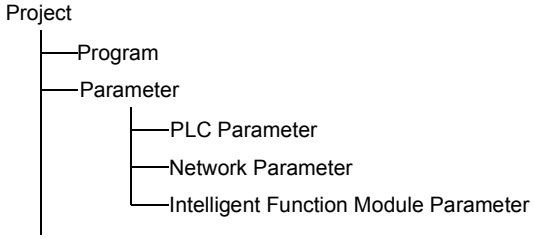
Key	Application
Esc	Cancels the current entry in a cell. Closes the window.
Tab	Moves between controls in the window.
Ctrl	Used in combination with the mouse operation to select multiple cells for test execution.
Delete	Deletes the character where the cursor is positioned. When a cell is selected, clears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

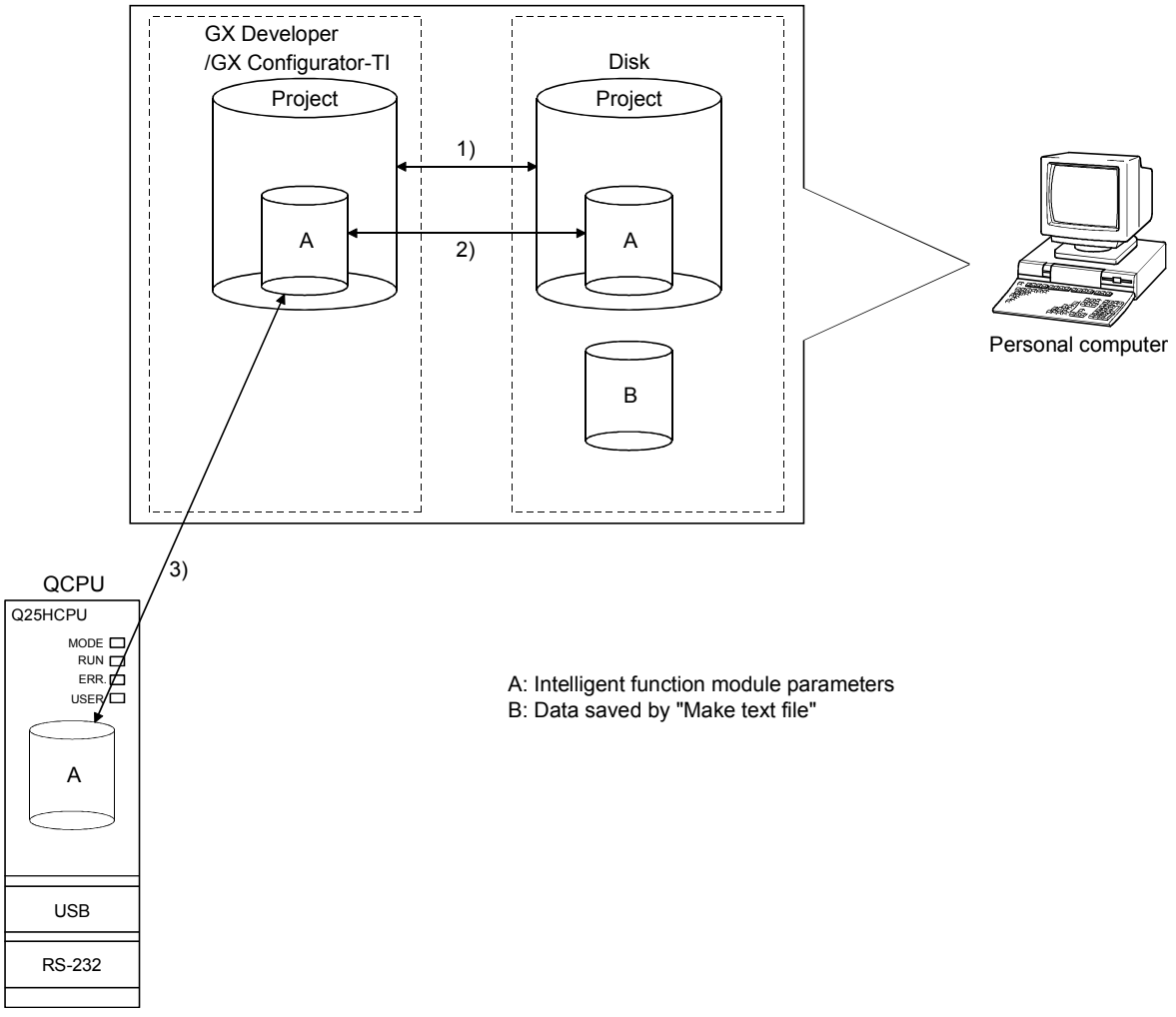
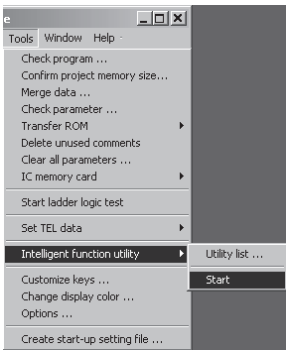


Figure 5.1 Correlation chart for data created with the utility package

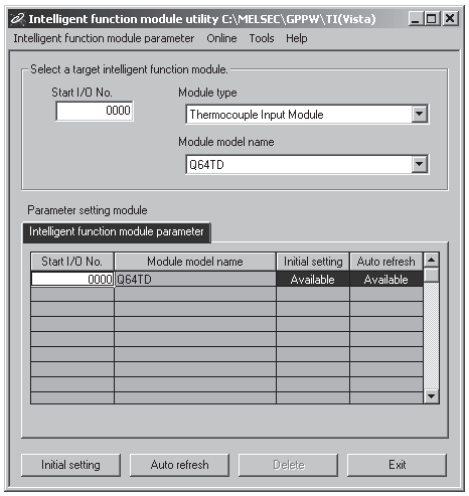
5.3.2 Operation overview

GX Developer screen



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

Screen for selecting a target intelligent function module



Refer to Section 5.3.3.

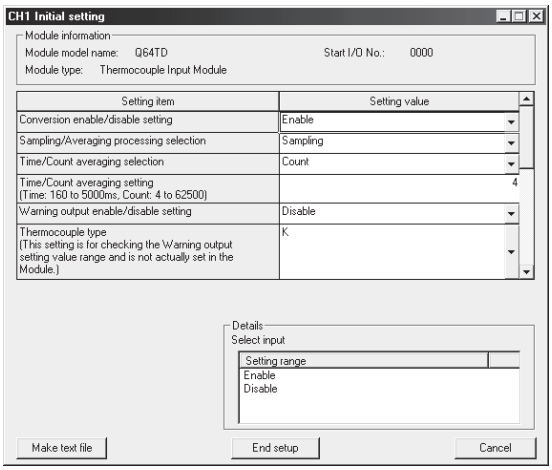
Enter "Start I/O No.", and select "Module type" and "Module model name".

1)

Initial setting

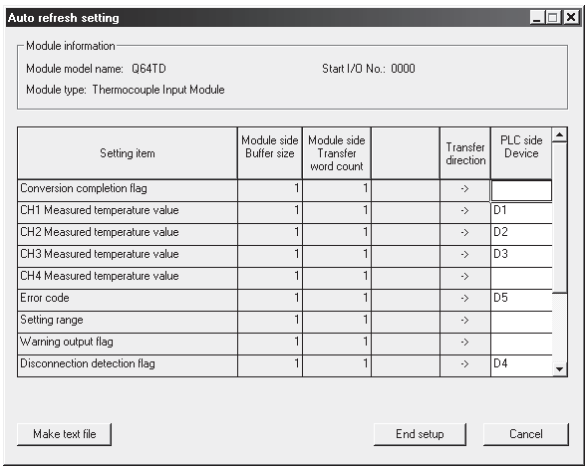
Auto refresh

Initial setting screen



Refer to Section 5.4.

Automatic refresh setting screen

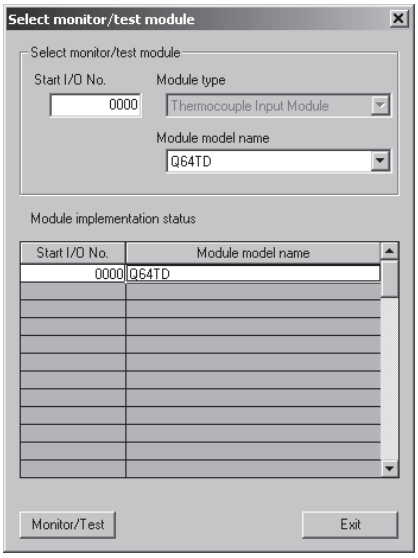


Refer to Section 5.5.

1)

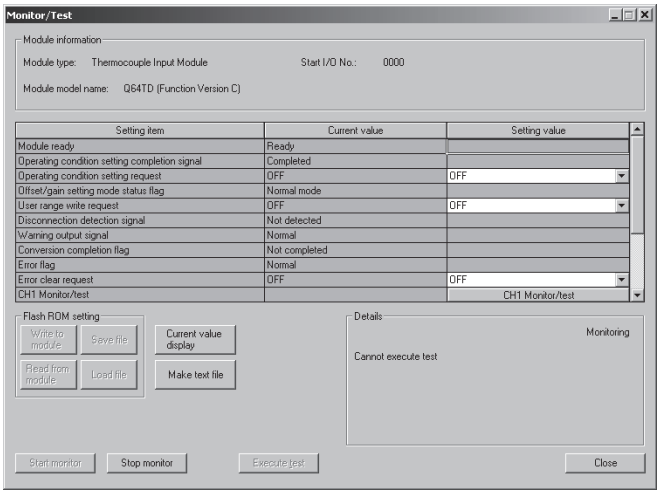
[Online] – [Monitor/Test]

Selecting monitor/test module screen



Select a module to be monitored/tested.

Monitor/Test screen



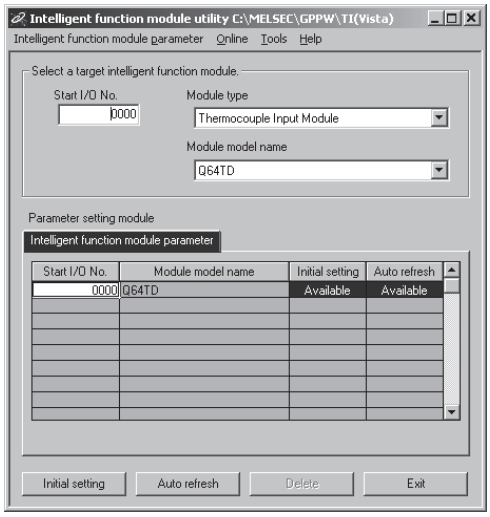
Refer to Section 5.6.

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]

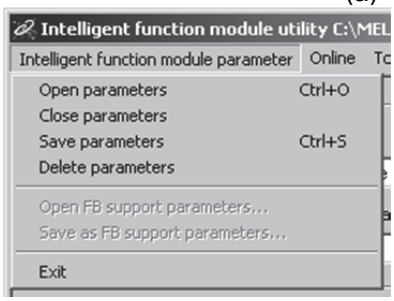
*1 Enter the start I/O No. in hexadecimal.

(2) Command buttons

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

(3) Menu bar

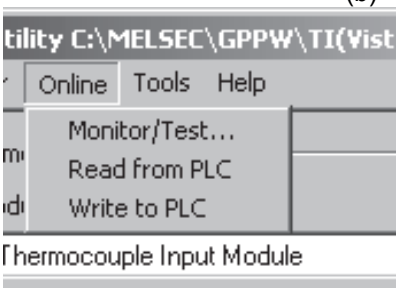
(a) File menu



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 the intelligent function module parameters from the CPU module.
[Write to PLC]	:	Writes the intelligent function module parameters to the CPU module.

POINT

(1) Saving 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 Q64TD/Q64TDV-GH 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]

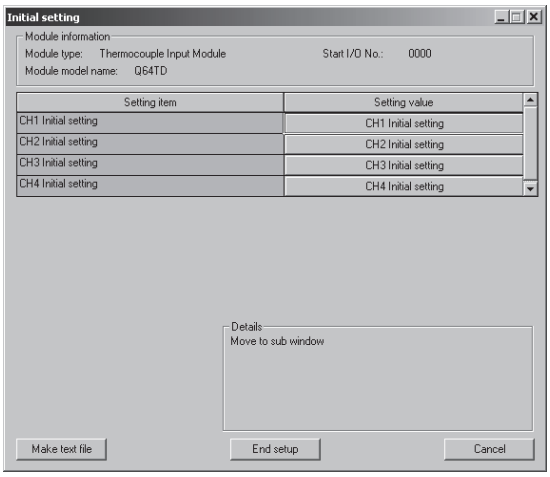
Make initial setting for operating the Q64TD/Q64TDV-GH on each channel.
Refer to Section 5.1 for the initial setting parameter types.
Parameter setting in the initial setting window omits parameter setting through a sequence program.

[Operating procedure]

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

＊1 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 Q64TD/Q64TDV-GH's buffer memory for automatic refresh.

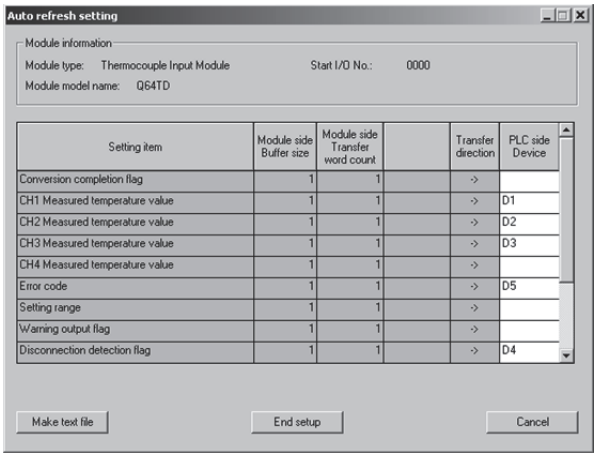
[Operating procedure]

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

Auto refresh

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

[Setting screen]



[Explanation of items]

(1) Items

Model side Buffer size : Displays the buffer memory size of the setting item that can be transferred (fixed at one word).

Model 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

Auto refresh settings are stored in the intelligent function module parameters. After being written to the CPU module, the auto refresh settings are 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.

Auto refresh settings cannot be changed through a sequence program. Although, processing that is equivalent to auto refresh can be added using the FROM/TO instruction in a sequence program.

5.6 Monitoring/Test

5.6.1 Monitor/test screen

[Purpose]

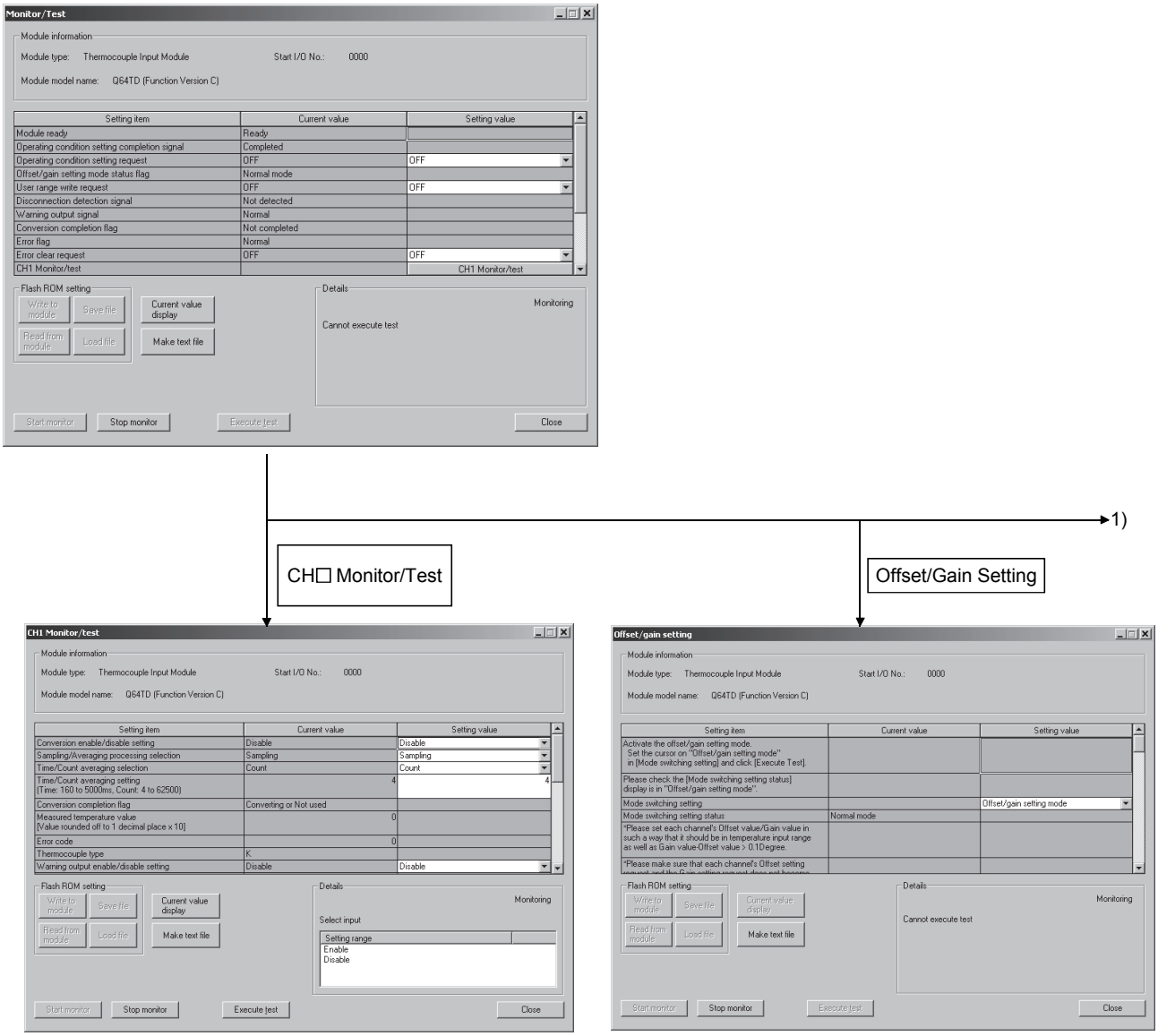
Start buffer memory monitoring/testing, I/O signal monitoring/testing, offset/gain settings (refer to Section 5.6.2, 5.6.3) and pass data (refer to Section 5.6.4) from this screen.

[Operating procedure]

"Select monitor/test module" screen → "Start I/O No."*1 → "Module type" → "Module model name" → Monitor/test

*1 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]

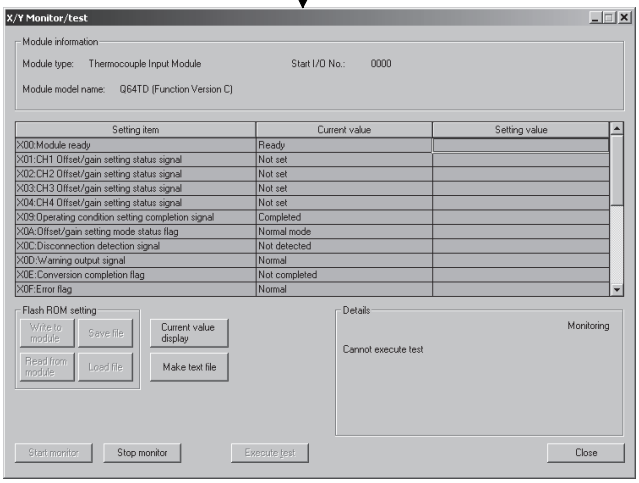


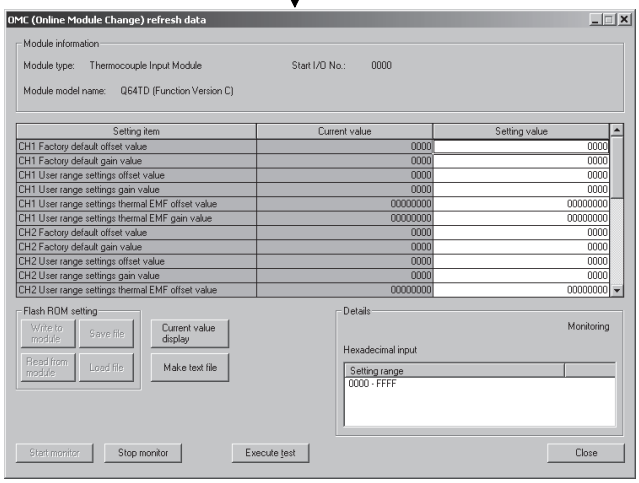
5 - 16

1)

X/Y Monitor/Test

OMC refresh





[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.

(3) Example of using "Execute test"

The following is an example to change sampling processing to count averaging processing in 10 times.

(a) Set "Averaging" in the setting value field for Sampling/Averaging processing selection.
(b) Set a count value in the setting value field for "Time/Count averaging setting".
At this point, the set data have not been written to the Q64TD/Q64TDV-GH.
(c) Select the setting value fields that were specified in steps (a) and (b) while holding down the Ctrl key.
(d) Click Execute test to execute data writing.
Once the writing is completed, the written values are displayed in the current value fields.

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

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

(1) Using a user range setting

Specify a user range setting for Switch 2 of the intelligent function module switch 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) 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".

(4) Adjustment of the offset and gain values

(a) Offset value adjustment

1) Set the offset value
Enter the desired value into the Setting value field for CH☐ Offset Setting Value, and click the Execute test button.

2) 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 CH☐ 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.

(b) Gain value adjustment

1) Set the gain value
Enter the desired value into the Setting value field for CH☐ Gain Setting Value, and click the Execute test button.

2) 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 CH☐ 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.

(c) To set the offset/gain for more than one channel, repeat steps (a) and (b).

(5) 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) How to write the values

1) Write to the Q64TD/Q64TDV-GH
Select "Request" from the Setting value field for User Range Write Request, and click the Execute test button.

2) Confirm the execution of writing
Confirm that the indication of the Current value field for Offset/gain Setting Mode Status Flag changes from "Completed" to "Writing ".

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

POINT

While the set data of the steps (a)1) to (a)2) above are written to the module, do not perform the operations below. If they are performed, the data inside E^2PROM will have a problem, and the Q64TD/Q64TDV-GH may not operate normally.

- Powering off the programmable controller CPU
- Resetting the programmable controller CPU

(b) Error handling
Confirm that the ERR. LED for the Q64TD/Q64TDV-GH 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.

(6) 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 range 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 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 CH☐ 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 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 CH☐ 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) How to write the values

1) Write to the Q64TD/Q64TDV-GH
Select "Request" from the Setting value field for User Range Write Request, and click the Execute test button.

2) Confirm the execution of writing
Confirm that the indication of the Current value field for Offset/gain Setting Mode Status Flag changes from "Completed" to "Writing ".

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

POINT

While the set data of the steps (a)1) to (a)2) above are written to the module, do not perform the operations below. If they are performed, the data inside E^2PROM will have a problem, and the Q64TD/Q64TDV-GH may not operate normally.

• Powering off the programmable controller CPU

• Resetting the programmable controller CPU

(b) Error handling
Confirm that the ERR. LED for the Q64TD/Q64TDV-GH 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

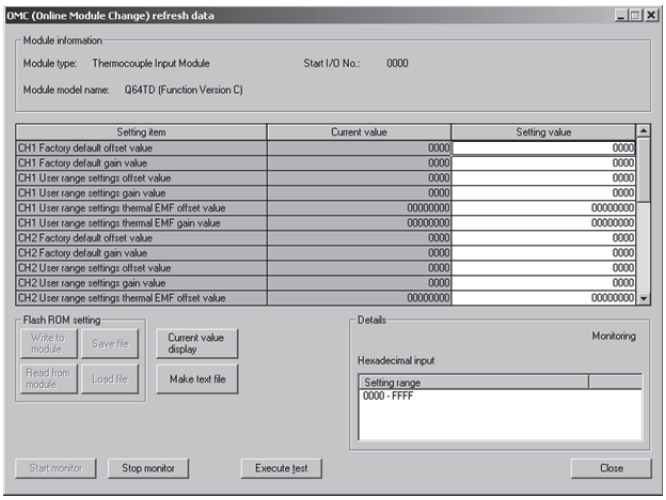
Specify the normal mode for Switch 4 of the intelligent function module switch setting. (Refer to Section 4.5.)

5.6.4 OMC (Online Module Change) refresh data

Perform operation in the following sequence 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 Online Module Change read request to "Request", and click the Execute test button.

When read is completed, the values are displayed in the Current value fields of CH☐ Factory default offset/gain value/User range settings offset/gain value/User range settings offset/gain thermal EMF value.

(b) Compare the values with those in the range reference table, and take a note of the values if they are correct.
Refer to Section 7.4 for the range reference table.

(3) User range restoration

(a) Set the noted values into the Setting value fields of CH☐ Factory default offset/gain value/User range settings offset/gain value/User range settings thermal EMF offset/gain value.

(b) Select all the Setting value fields of CH☐ Factory default offset/gain input value/User range settings offset/gain value/User range settings thermal EMF offset/gain value, and click the Execute test button.

When write is completed, the set values are displayed in the Current value fields of them.

(c) Change the Setting value field of online module change write request to "Request", and click the Execute test button.

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

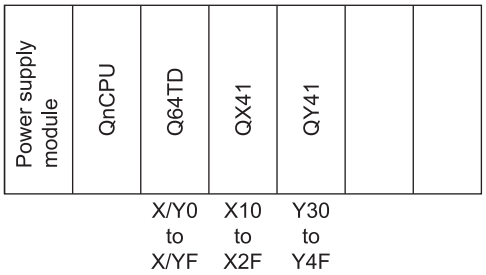
6 PROGRAMMING

This chapter describes Q64TD/Q64TDV-GH 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 Q64TD.
Sampling processing is to be set for CH1, and average processing of 500-count timing and 1000ms-interval is for CH2 and CH3 respectively.
If a write error occurs, the corresponding error code appears in BCD.
Disconnection detection is processed on CH1 only.

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

(b) Devices used by user
- Measured temperature value read command signal (Turned on when user wants to read a 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 (BCD 3 digits) ····· Y40 to Y4B
- Conversion completion flag ····· M0 to M2
- Module ready check flag ····· M100
- Measured temperature value (16-bit) ····· D1 to D3 (D11 to D13)
- Disconnection detection flag ····· D4, M10
- Error code storage ····· D5

POINT

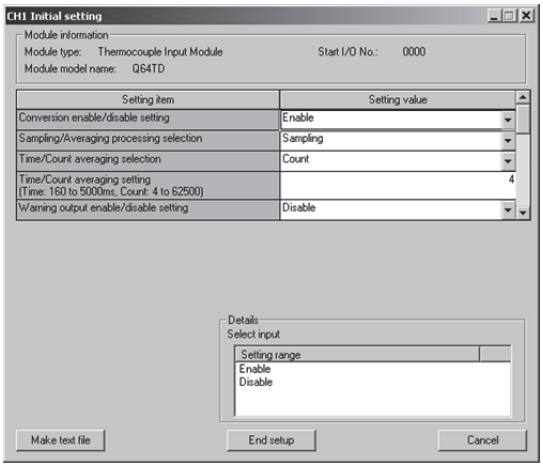
(1) Refer to Section 3.3 for the I/O signals (X0 to XF, Y0 to YF).
(2) Perform the disconnection detection reset operation after the connection is re-established.

6.1.1 Program example when utility package is used

(1) Operation of utility package

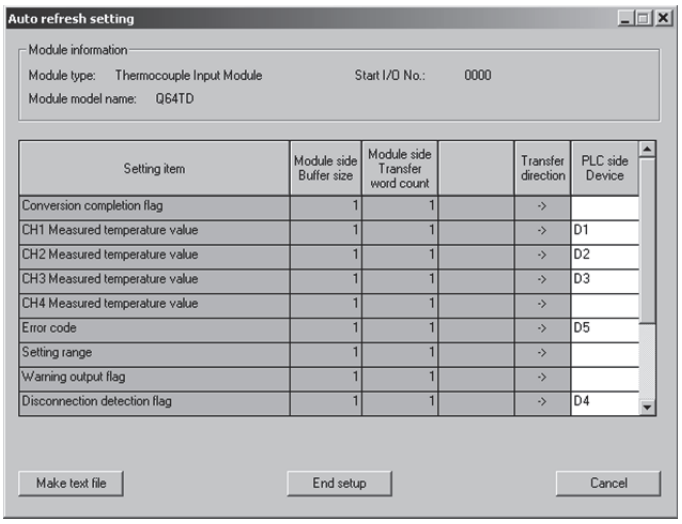
(a) Initial setting (Refer to Section 5.4)

Set sampling processing for CH1, and averaging processing of 500-count timing and 1000ms-interval for CH2 and CH3 respectively.



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

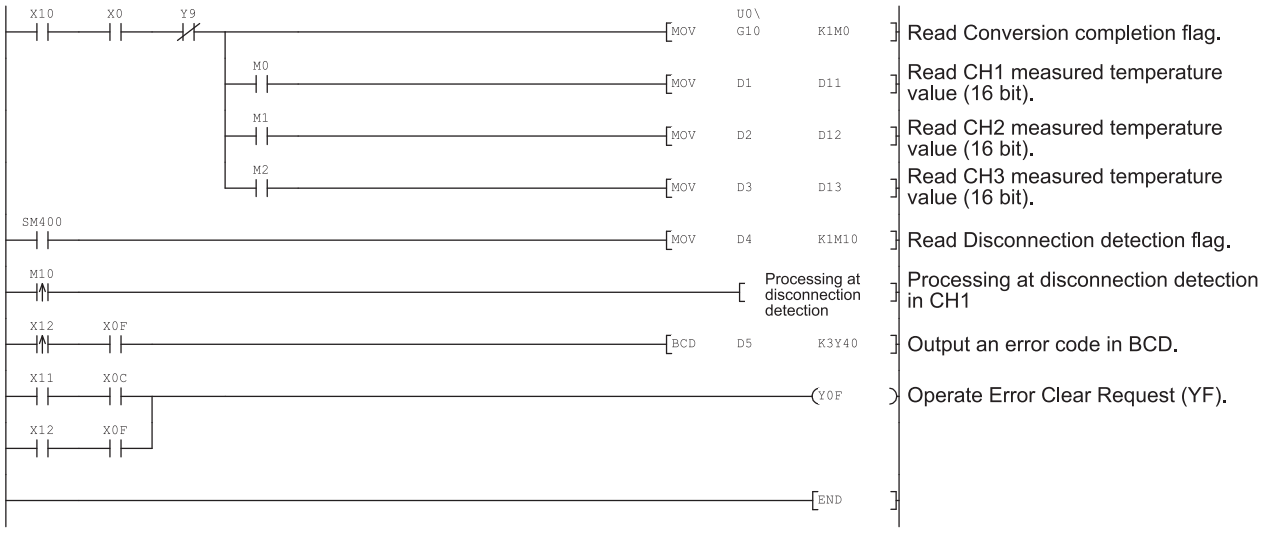
Set devices to store CH1 to CH3 Measured temperature values, error code, and disconnection detection flag.



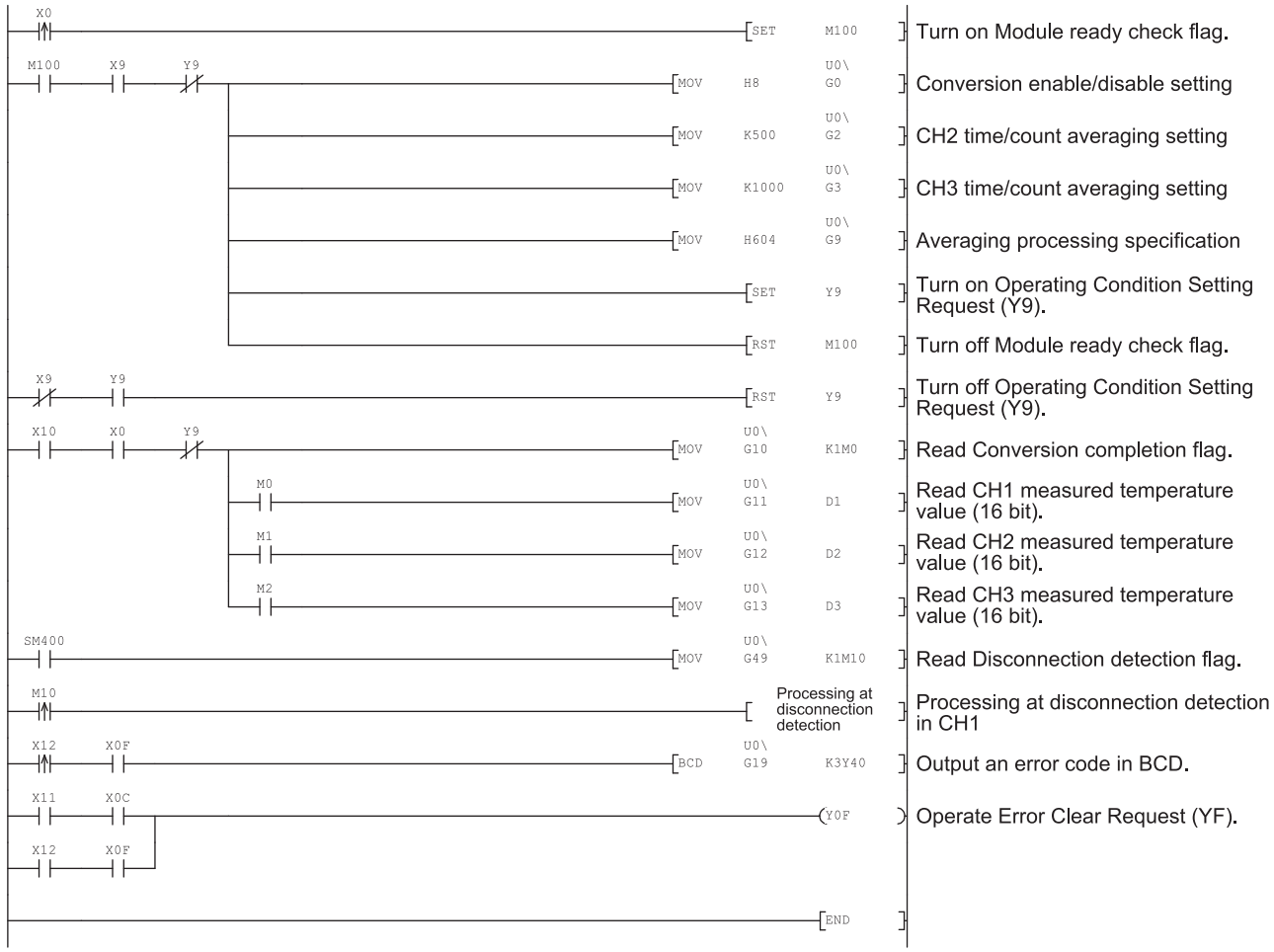
(c) Write of intelligent function module parameters (Refer to Section 5.3.3)

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

(2) Program example



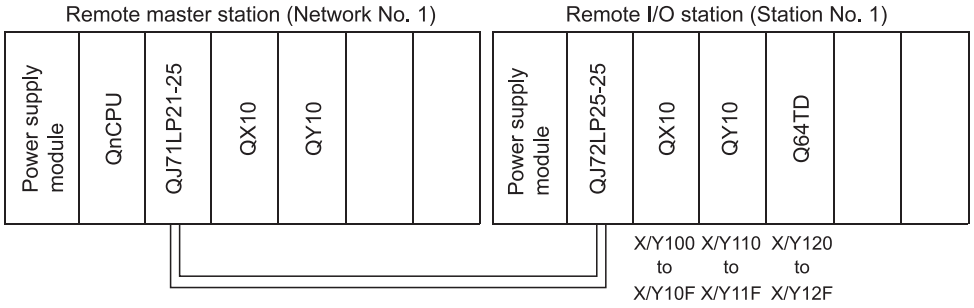
6.1.2 Program example when utility package is not used



6.2 Programs Used on Remote I/O Network

System configuration used to describe programs

(1) System configuration



(2) Program conditions

This program was written for the CPU on the remote master station to read the digital values of temperature conversions made on CH1 to CH3 of the Q64TD. Sampling processing is to be set for CH1, and average processing of 500-count timing and 1000ms-interval is for CH2 and CH3 respectively. If a write error occurs, the corresponding error code appears in BCD.
Disconnection detection is processed on CH1 only.

(3) Initial settings

- Temperature conversion enabled channel ····· CH1 to CH3
- Sampling channel ····· CH1
- Count averaging channel ····· CH2
- Time 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 a measured temperature value) ····· X21
- Disconnection detection reset signal ····· X22
- Error reset signal
  (Turned on when user wants to make error reset) ····· X23
- Error code display (BCD 3 digits) ····· Y30 to Y3B
- Conversion completion flag ····· W0, M0 to M2
- CH1 to 3 measured 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) Perform the disconnection detection reset operation after the connection is re-established.
(3) 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 when utility package is used

(1) Operation of GX Developer

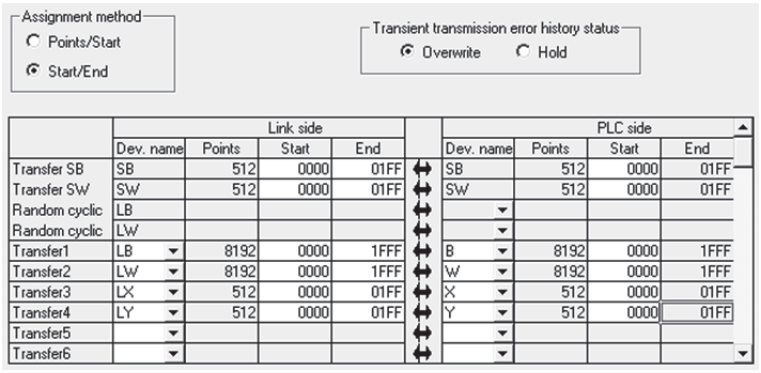
(a) Setting of CPU parameters

- 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:



	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					⇔				

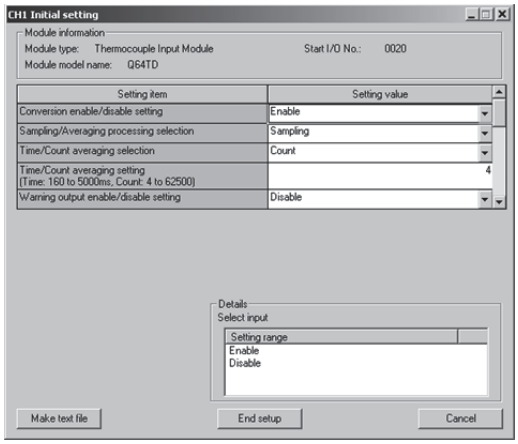
(2) Operation of utility package

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: Q64TD / Q64TDV-GH

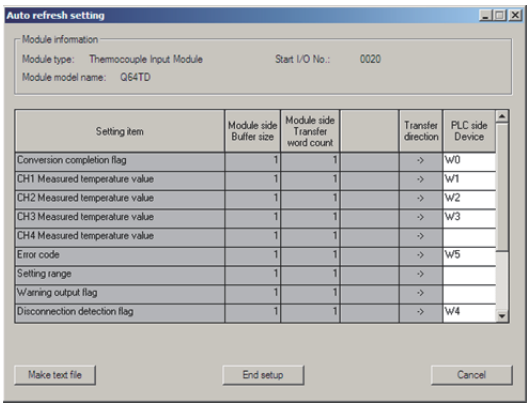
(a) Initial setting (Refer to Section 5.4)

Set sampling processing for CH1, and averaging processing of 500-count timing and 1000ms-interval for CH2 and CH3 respectively.



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

Set devices to store CH1 to CH3 Measured temperature values, error code, and disconnection detection flag.

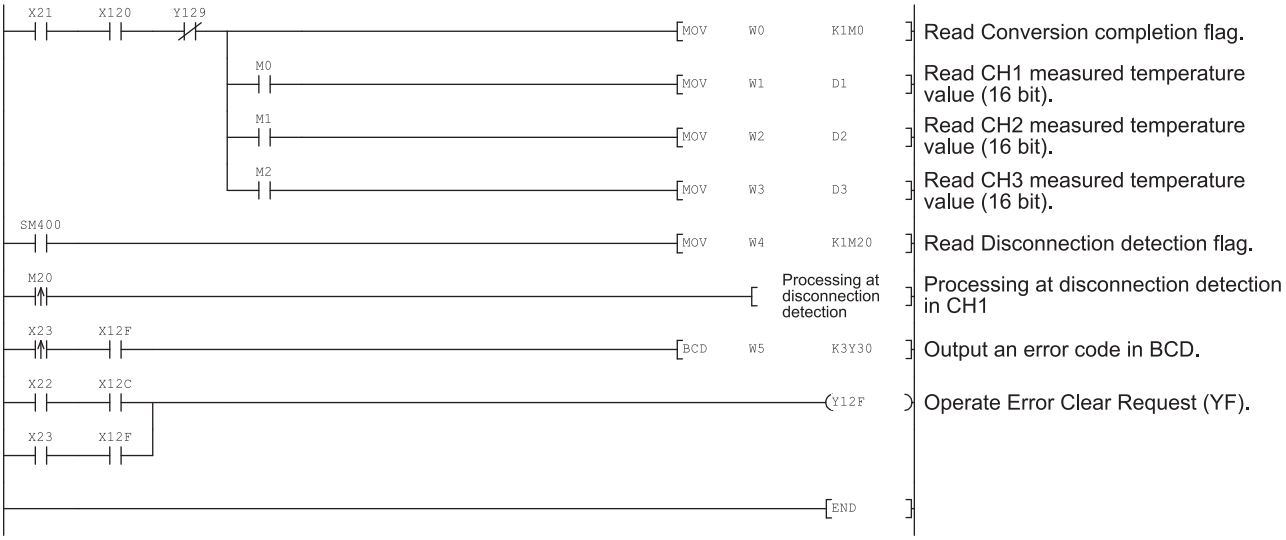


(c) Write of intelligent function module parameters (refer to Section 5.3.3)

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 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 Q64TD 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 to prevent 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

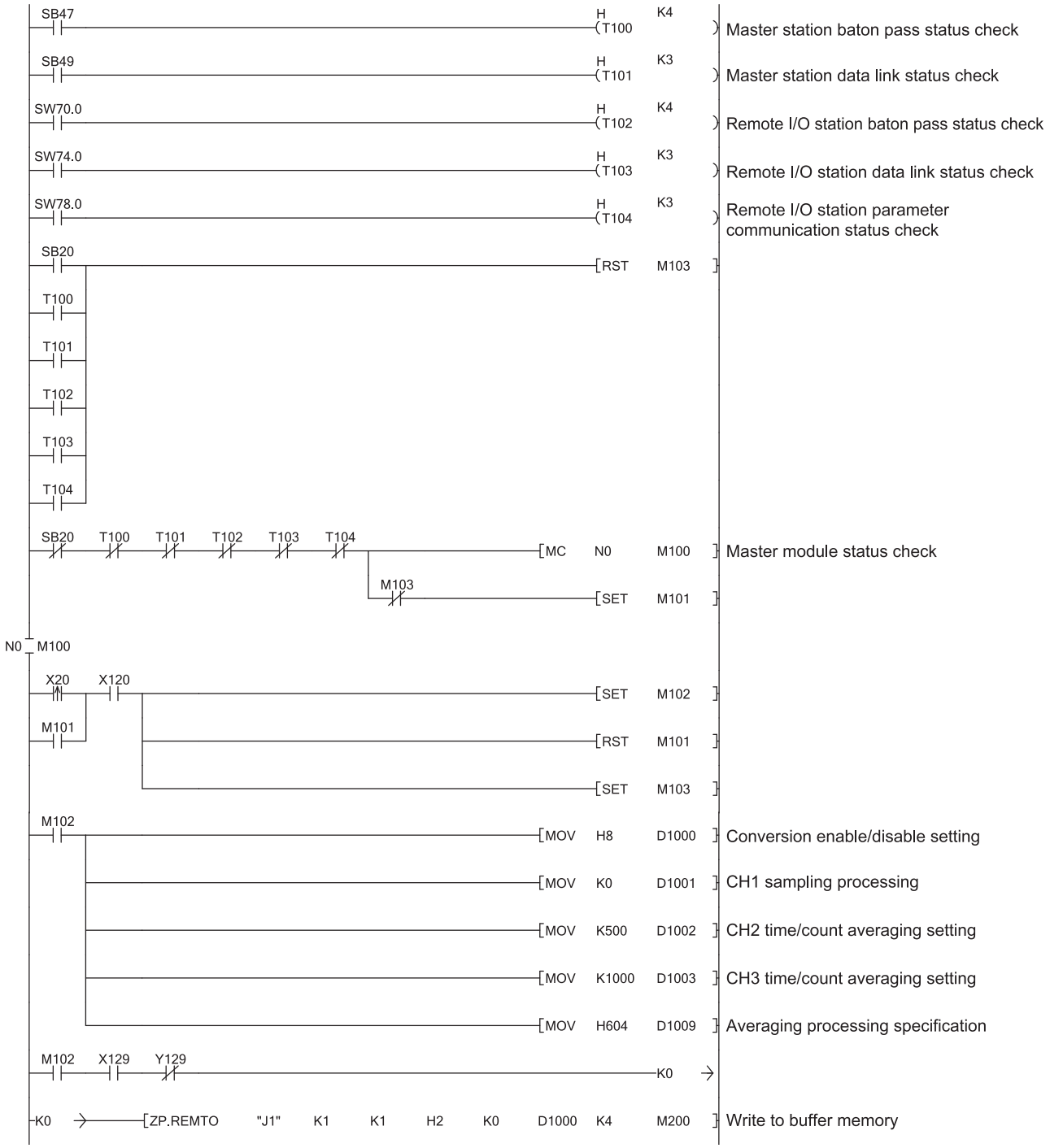
- Refresh parameters:

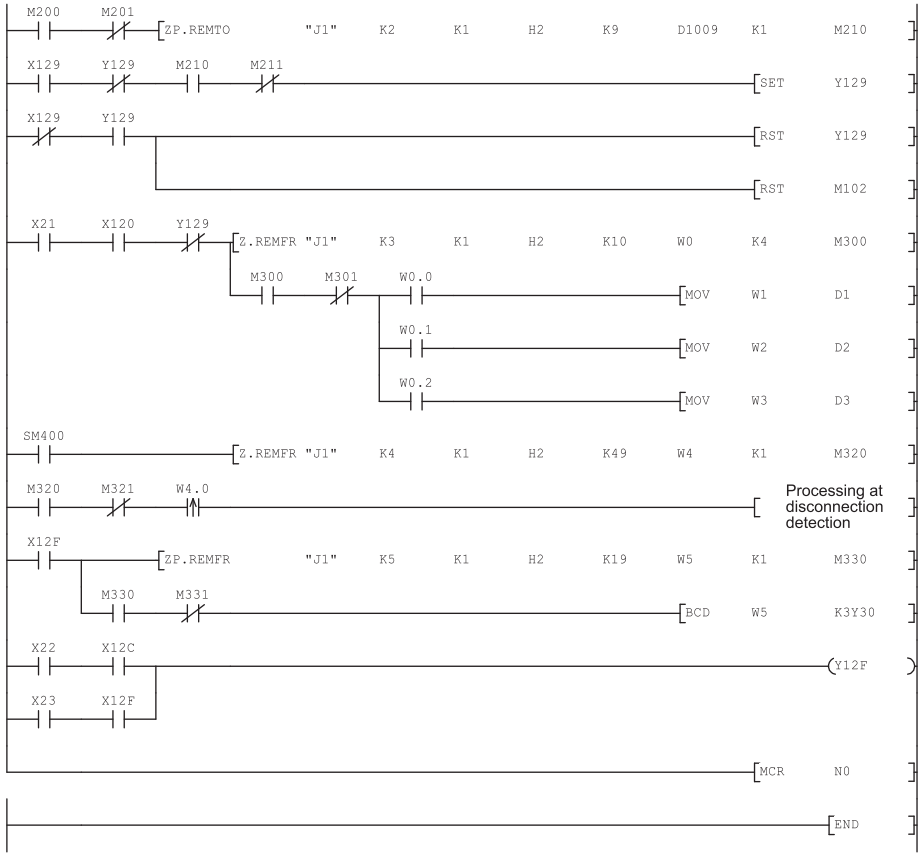
Assignment method: (○) Points/Start (●) Start/End

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




M200 M201 ZP.REMTO "J1" K2 K1 H2 K9 D1009 K1 M210
Write data to a buffer memory.
X129 Y129 M210 M211 SET Y129
Turn on Operating Condition Setting Request (Y9).
X129 Y129 RST Y129
Turn off Operating Condition Setting Request (Y9).
RST M102
X21 X120 Y129 Z.REMFR "J1" K3 K1 H2 K10 W0 K4 M300
Concurrently read Conversion completion flag and CH1 to CH3 measured temperature value (16 bit).
M300 M301 W0.0 MOV W1 D1
Read CH1 measured temperature value (16 bit).
W0.1 MOV W2 D2
Read CH2 measured temperature value (16 bit).
W0.2 MOV W3 D3
Read CH3 measured temperature value (16 bit).
SM400 Z.REMFR "J1" K4 K1 H2 K49 W4 K1 M320
Read Disconnection detection flag.
M320 M321 W4.0 Processing at disconnection detection
Processing at disconnection detection in CH1
X12F ZP.REMFR "J1" K5 K1 H2 K19 W5 K1 M330
Read Error code.
M330 M331 BCD W5 K3Y30
Output an error code in BCD.
X22 X12C Y12F
Operate Error Clear Request (YF).
X23 X12F
MCR N0
END

7 ONLINE MODULE CHANGE

When changing a module online, read the following manual.
• QCPU User's Manual (Hardware Design, Maintenance and Inspection)
This chapter describes the specifications of an online module change.
(1) Perform an online module change by operating GX Developer.

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

POINT

(1) Perform an online module change after making sure that the system outside the programmable controller will not malfunction.
(2) To prevent an electric shock and malfunction of operating modules, provide means such as switches for powering off each of the external power supply and external devices connected to the module to be replaced online.
(3) After the module has failed, data may not be saved properly. Referring to Section 3.4.23, therefore, prerecord the data to be saved (Factory default offset/gain value/User range settings offset/gain value/User range settings thermal EMF offset/gain 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 ＊1.
If the other system is unavailable, execute restoration by performing write to the buffer memory.
＊1 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, Q64TD/Q64TDV-GH, GX Developer and base unit given below are needed to perform an online module change.

(1) CPU

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

(2) MELSECNET/H remote I/O module

The module of function version D or later is necessary.

(3) Q64TD/Q64TDV-GH

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. Operation check before control start	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.)
○	×	×	○	×	○	(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

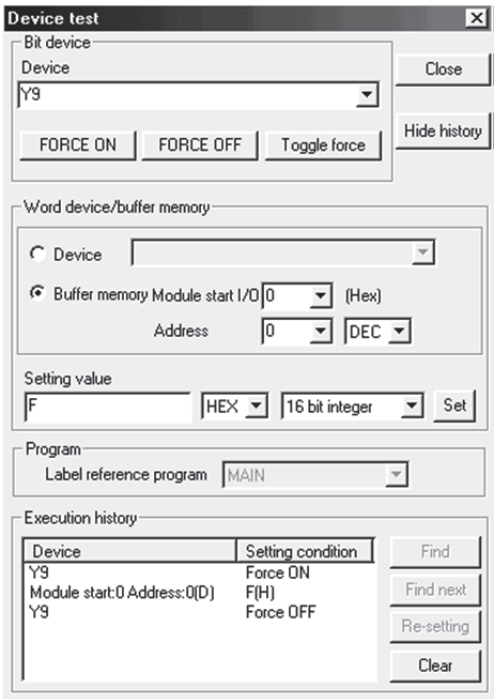
There are the following online module change procedures depending on whether the user range setting has been made or not, whether the initial setting of GX Configurator-TI has been made or not, and whether the other system exists or not.

Range setting	Initial setting	Other system	Reference section
Factory setting	GX Configurator-TI	—	Section 7.3.1
Factory setting	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

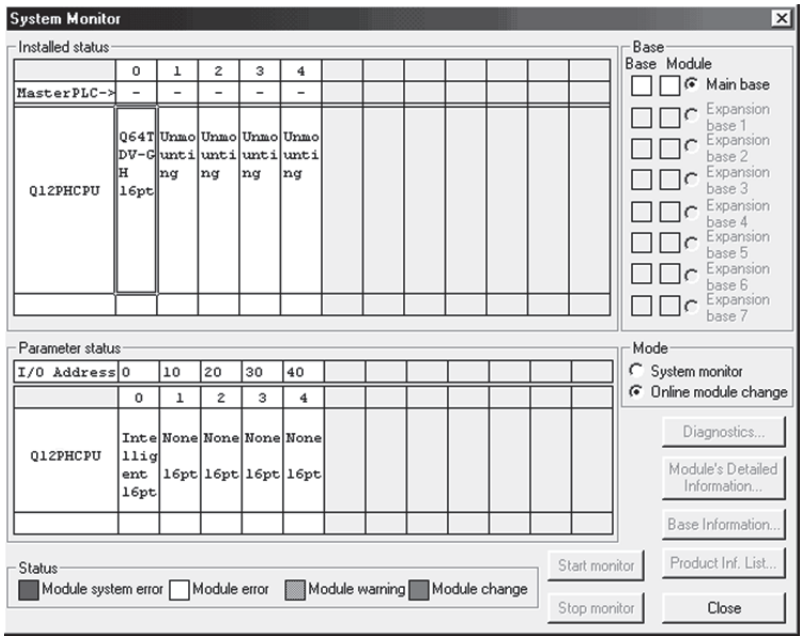
(1) Conversion disable

(a) Set conversion enable/disable setting (buffer memory address 0: Un\G0) for all channel conversion disable and turn 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).

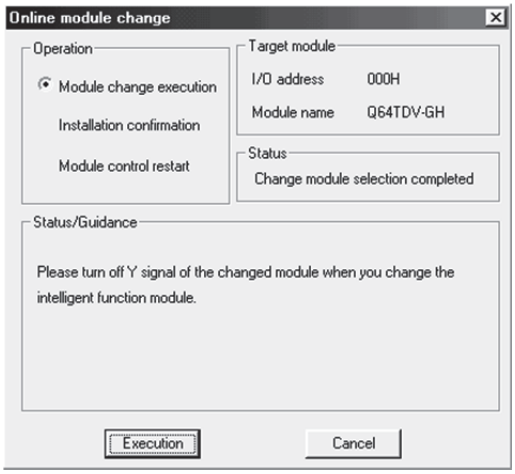


(2) Dismounting of module

(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, and mount a new module.

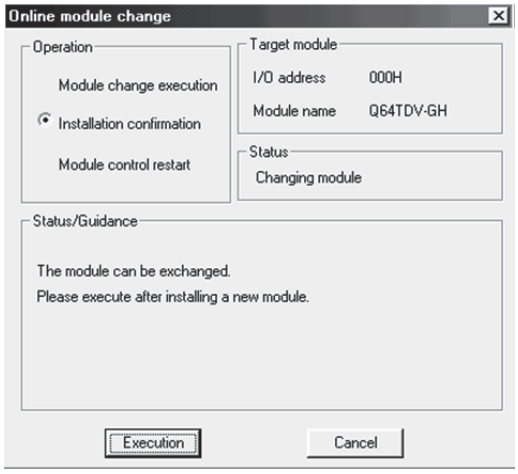
(c) After confirming that the "RUN" LED of the module has turned off, remove the external wiring and dismount the module.

POINT
(1) If you have removed the wiring together with the terminal block, the measured temperature values may vary within the accuracy range due to the error of the specific cold junction compensation resistor. (2) Always dismount the module. If you execute mounting confirmation without dismounting the module, the module will not start properly and the "RUN" LED will not be lit.

(3) Mounting of new module

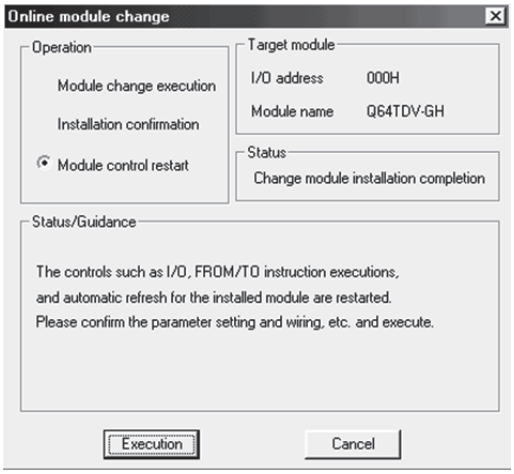
(a) Mount a new module to the same slot and install the external wiring.

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

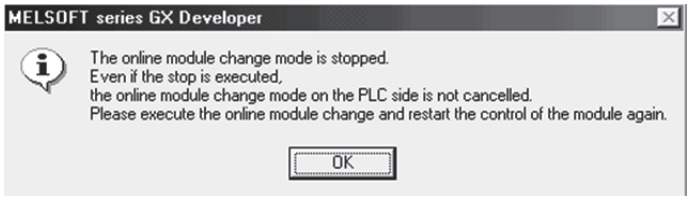


(4) Operation check

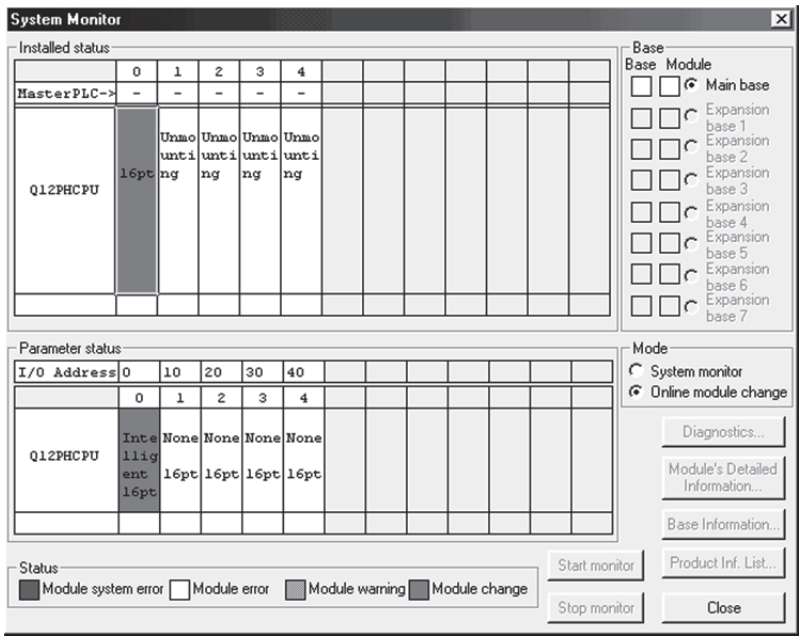
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



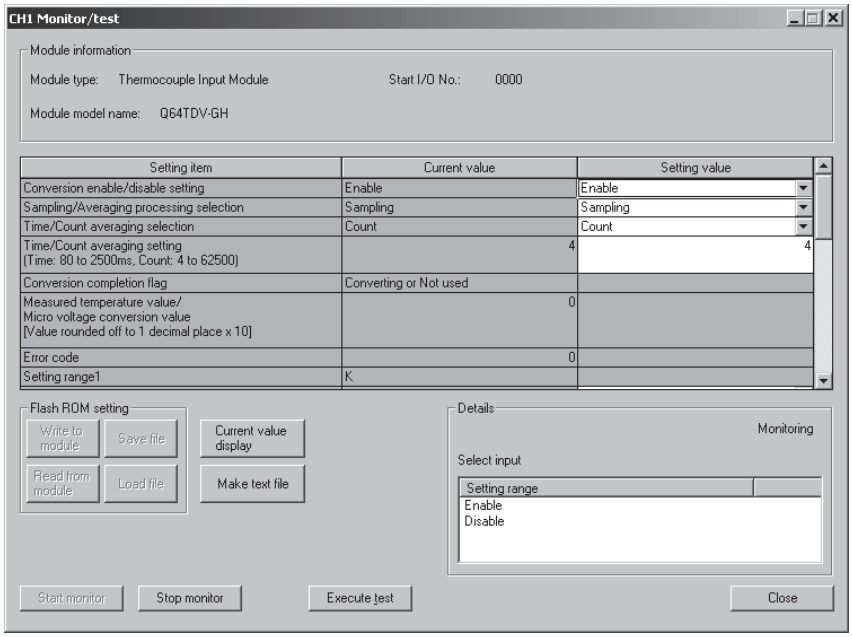
(b) Click the [OK] button to leave the "Online module change" mode.



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

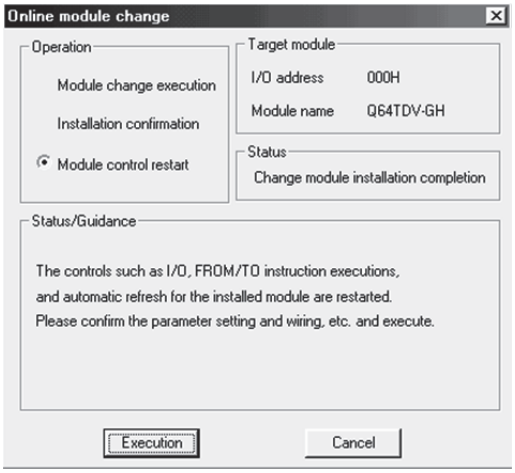


(d) Monitor CH□ measured temperature value/micro voltage conversion value (buffer memory addresses 11 to 14: Un\G11 to 14) to check that proper conversion has been made.



(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. Module READY (X0) turns ON.

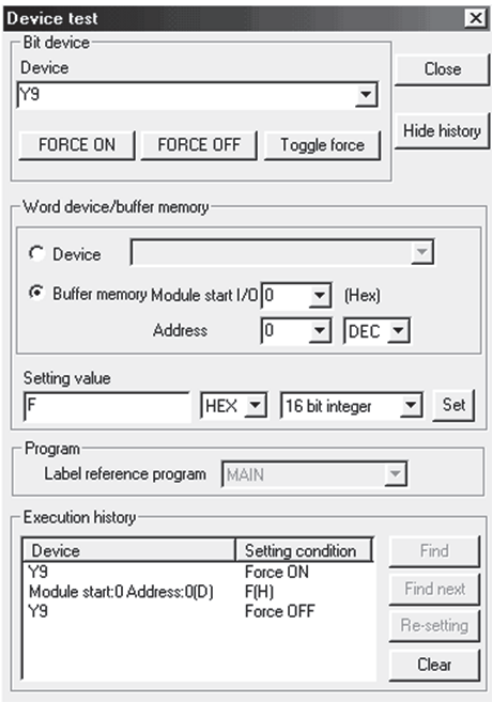


(b) The "Online module change completed" screen appears.

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

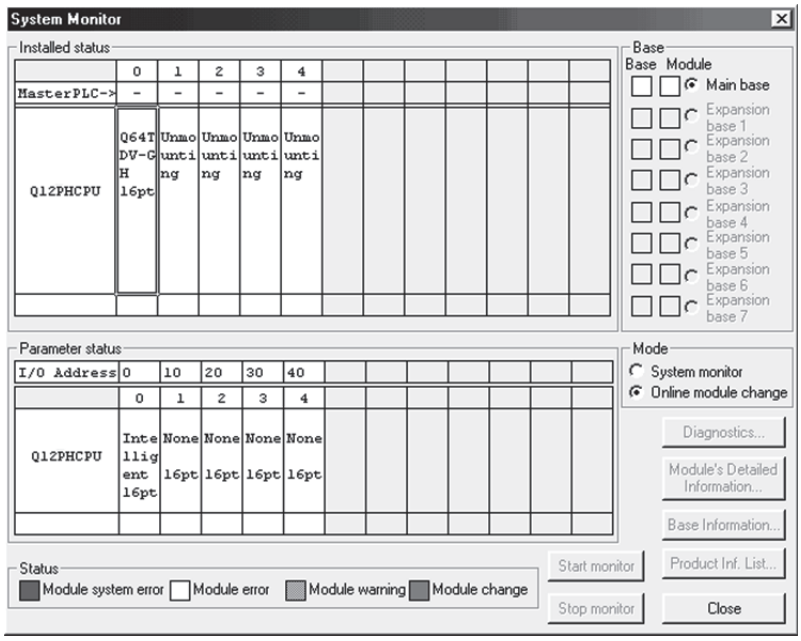
(1) Conversion disable

(a) Set 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).

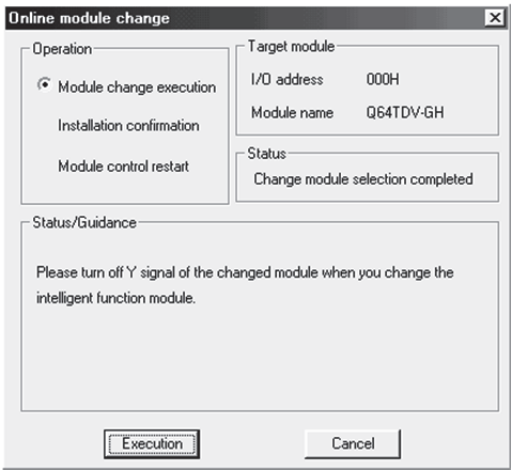


(2) Dismounting of module

(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, and mount a new module.

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

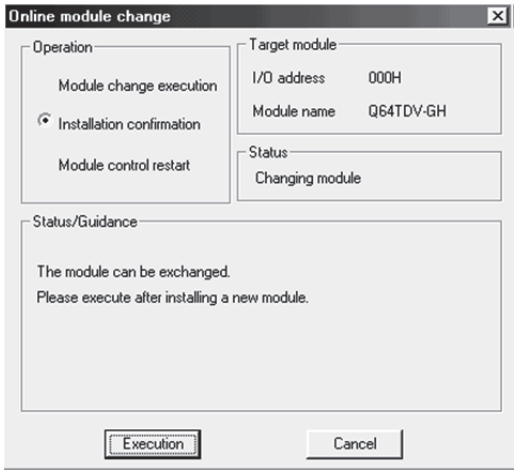
POINT

(1) If you have removed the wiring together with the terminal block, the measured temperature values may vary within the accuracy range due to the error of the specific cold junction compensation resistor.
(2) Always dismount the module. If you execute mounting confirmation without dismounting the module, the module will not start properly and the "RUN" LED will not be lit.

(3) Mounting of new module

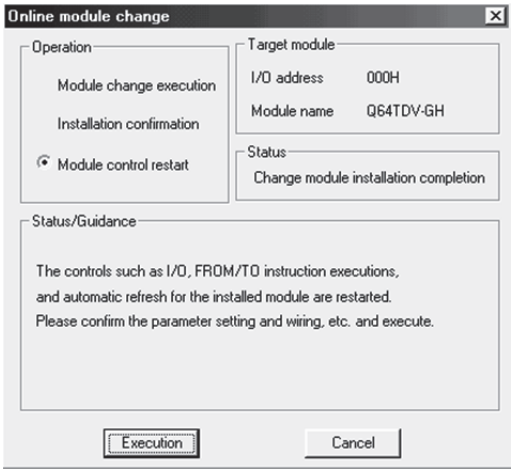
(a) Mount a new module to the same slot and install the external wiring.

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

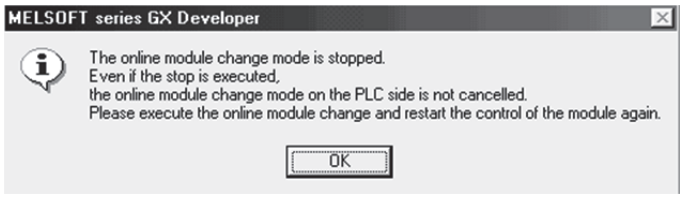


(4) Operation check

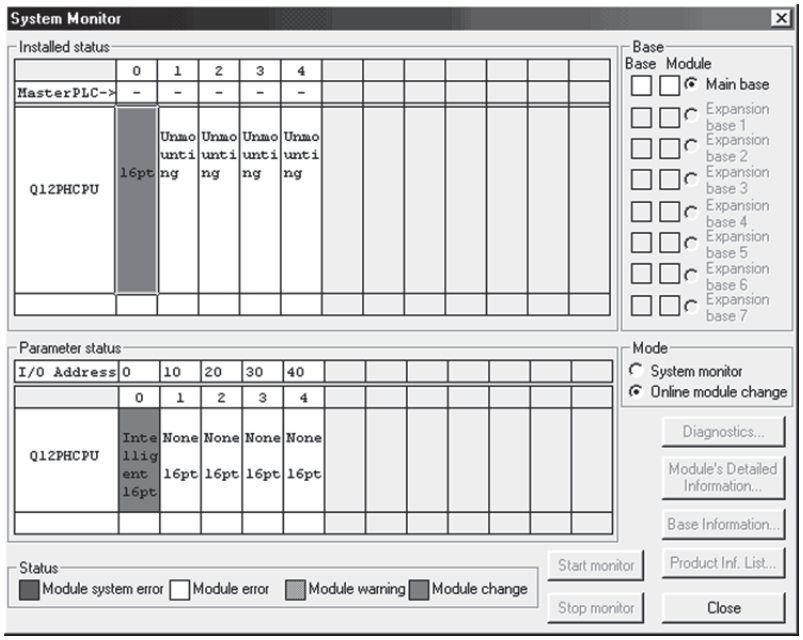
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



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



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



(d) Enable the conversion of the channel to be used through conversion enable/disable setting (buffer memory address 0: Un\G0), and monitor CH□ measured temperature value/micro voltage conversion value (buffer memory addresses 11 to 14: Un\G11 to 14) to check that proper conversion has been made.

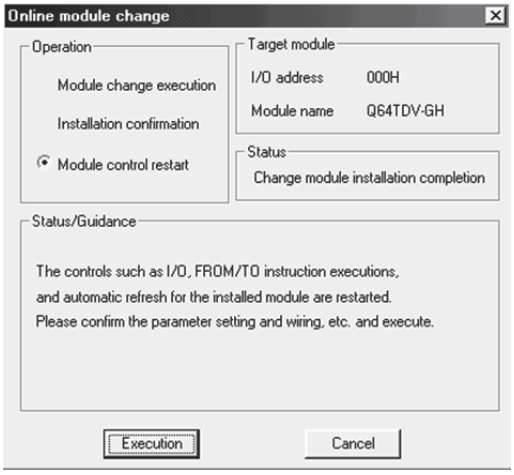
(e) Since the new module is in a default status, it must be initialized by a sequence program after control resumption.
Before performing initialization, check whether the contents of the initialization program are correct or not.

1) Normal system configuration
The sequence program should perform initialization on the leading edge of Module READY (X9) of the Q64TD/Q64TDV-GH.
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. Module READY (X0) turns ON.

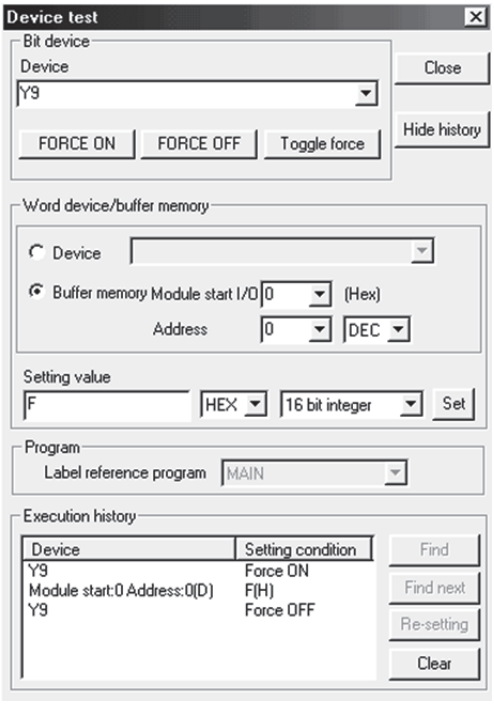


(b) The "Online module change completed" screen appears.

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

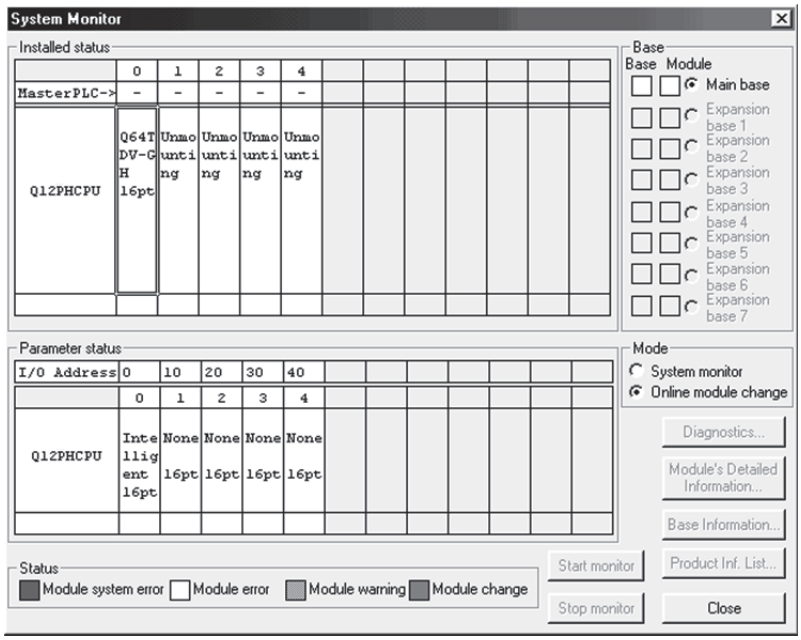
(1) Conversion disable

(a) Set 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).

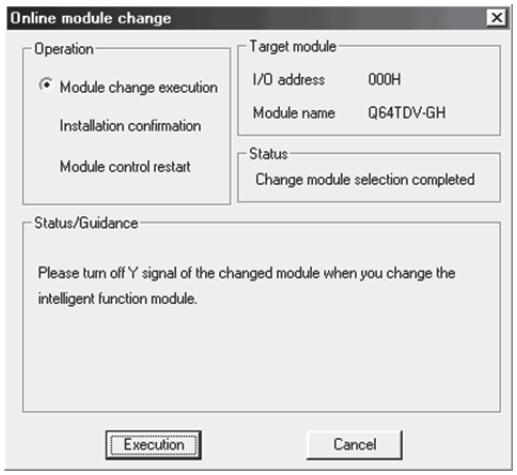


(2) Dismounting of module

(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, and perform the operation in Section 7.3.4 (2)(c) and later.

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

POINT

(1) If you have removed the wiring together with the terminal block, the measured temperature values may vary within the accuracy range due to the error of the specific cold junction compensation resistor.

(2) Always dismount the module. If you execute mounting confirmation without dismounting the module, the module will not start properly and the "RUN" LED will not be lit.

(3) Mounting of new module

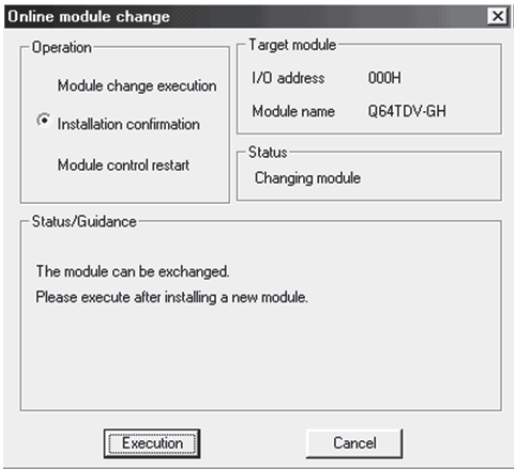
(a) Mount the dismounted module and new module to the other system.

(b) Using the G.OGLOAD instruction, save the user range setting values to the CPU device. Refer to Appendix 2.3 for the G.OGLOAD instruction.

(c) Using the G.OGSTOR instruction, restore the user range setting values to the module. Refer to Appendix 2.4 for the G.OGSTOR instruction.

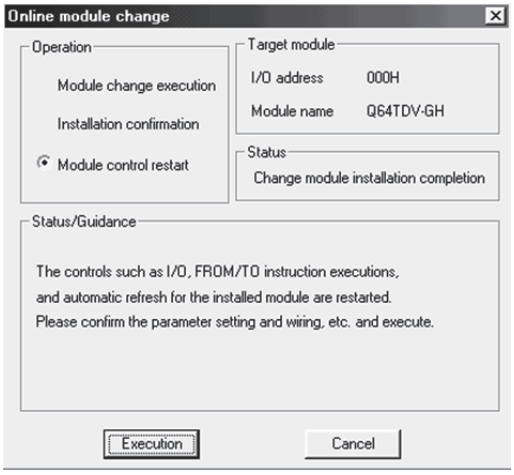
(d) Dismount the new module from the other system, mount it to the slot from where the old module was dismounted in the original system, and install the external wiring.

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

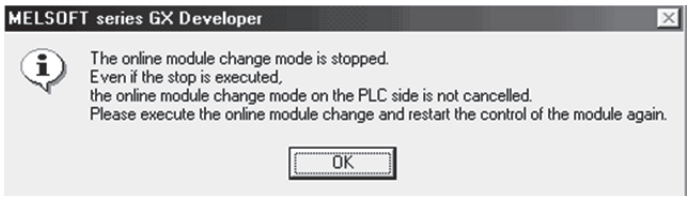


(4) Operation check

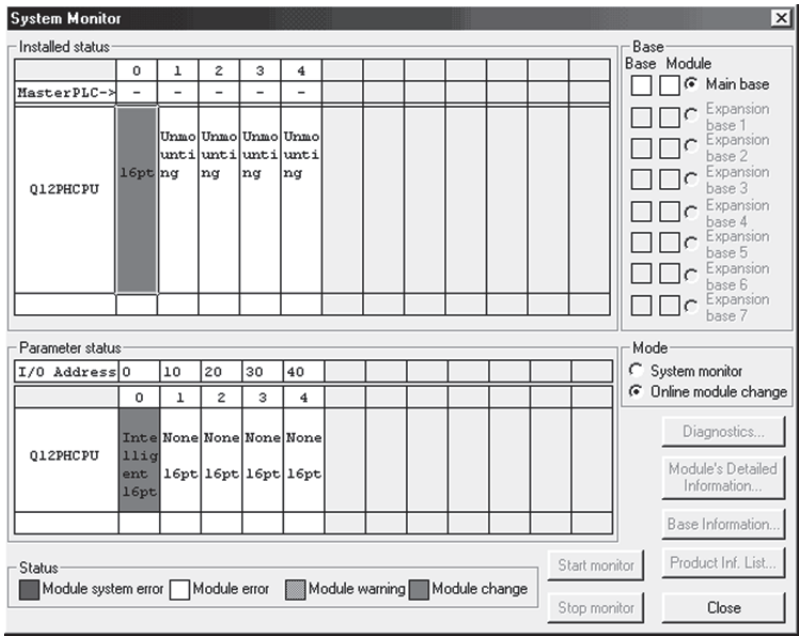
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



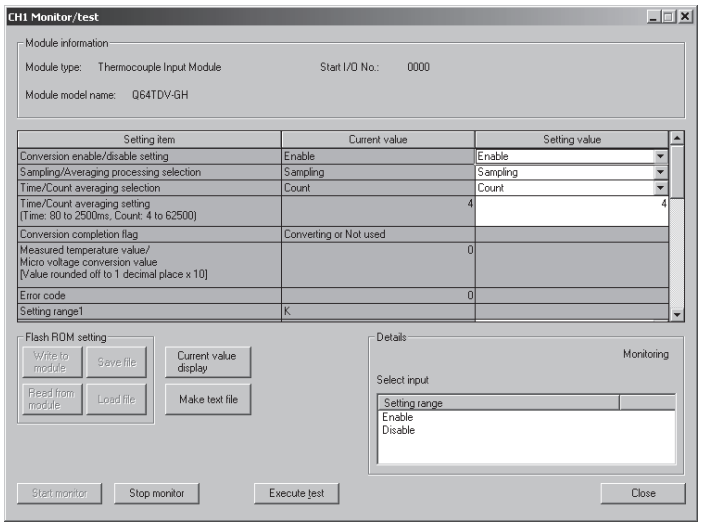
(b) Click the [OK] button to leave the "Online module change" mode.



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

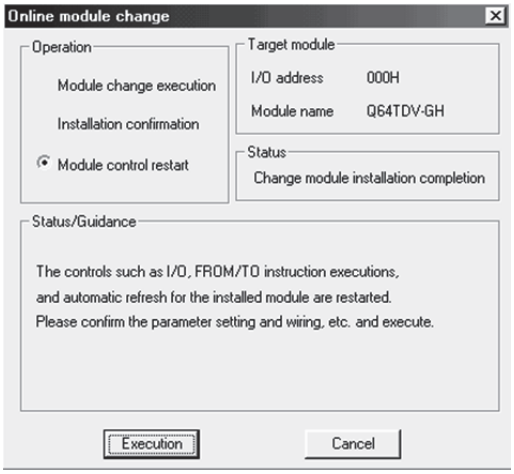


(d) Monitor CH□ measured temperature value/micro voltage conversion value (buffer memory addresses 11 to 14: Un\G11 to 14) to check that proper conversion has been made.



(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. Module READY (X0) turns ON.

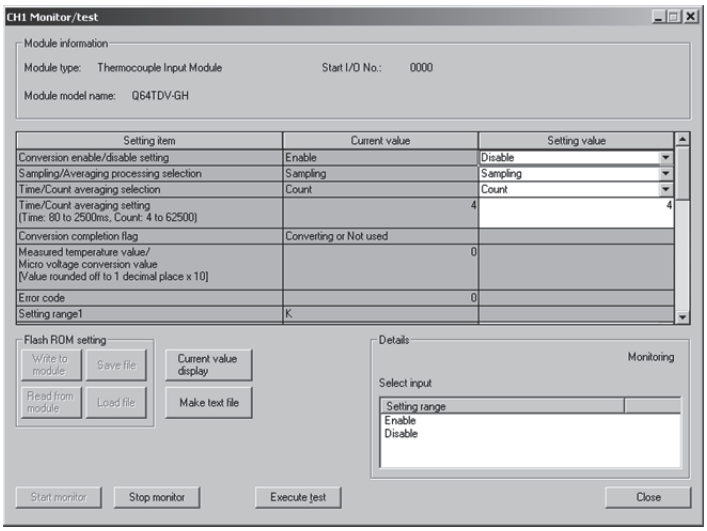


(b) The "Online module change completed" screen appears.

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

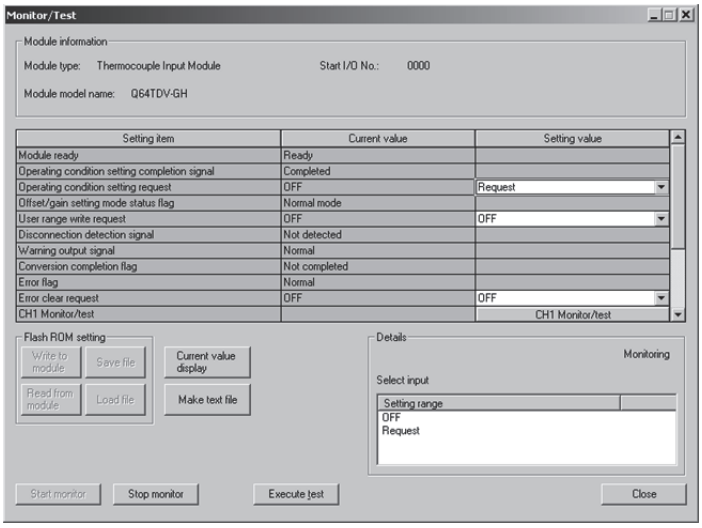
(1) Conversion disable

(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 Operation 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.

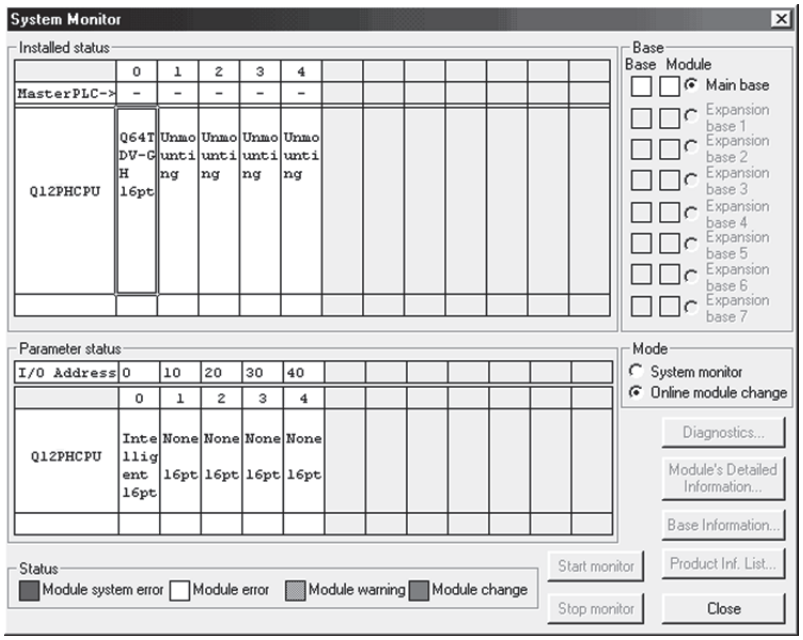
1) Display the OMC refresh data screen of GX Configurator-TI.
2) Make a OMC refresh data read request. (Refer to Section 5.6.4)
3) Compare the current values of the Factory default offset/gain value/User range settings offset/gain value/User range settings thermal EMF offset/gain value with those of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

POINT

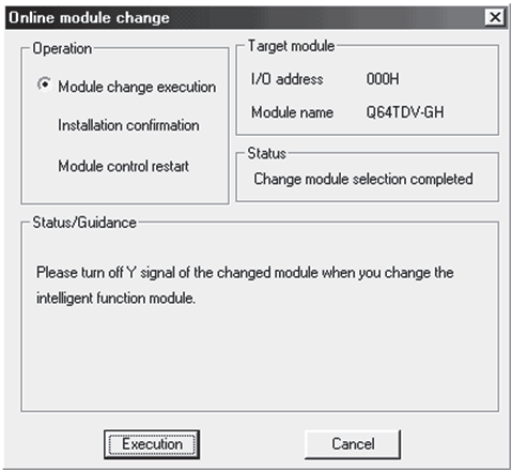
If the buffer memory values compared with the reference table are not proper, save and restoration of the user range cannot be executed.
Before executing module control resumption, make offset/gain setting in the GX Configurator-TI. (Refer to Section 5.6.2.)
Note that if module control is resumed without 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 this section (2) (c) and later.

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

POINT

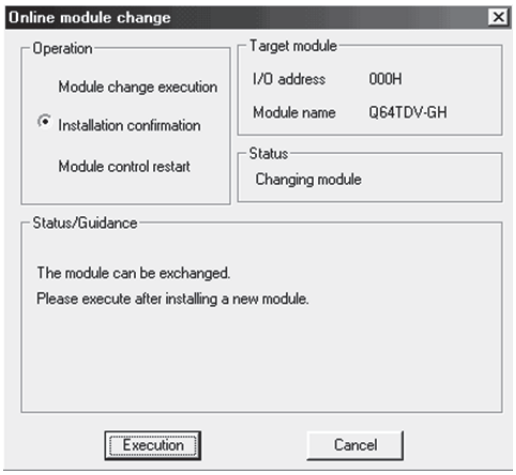
(1) If you have removed the wiring together with the terminal block, the measured temperature values may vary within the accuracy range due to the error of the specific cold junction compensation resistor.

(2) Always dismount the module. If you execute mounting confirmation without dismounting the module, the module will not start properly and the "RUN" LED will not be lit.

(3) Mounting of new module

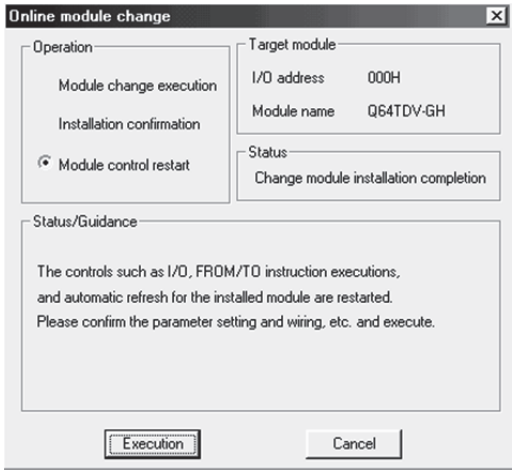
(a) Mount a new module to the same slot and install the external wiring.

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

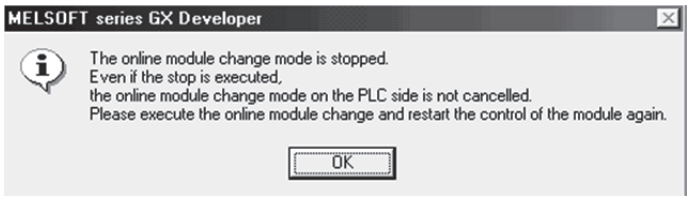


(4) Operation check

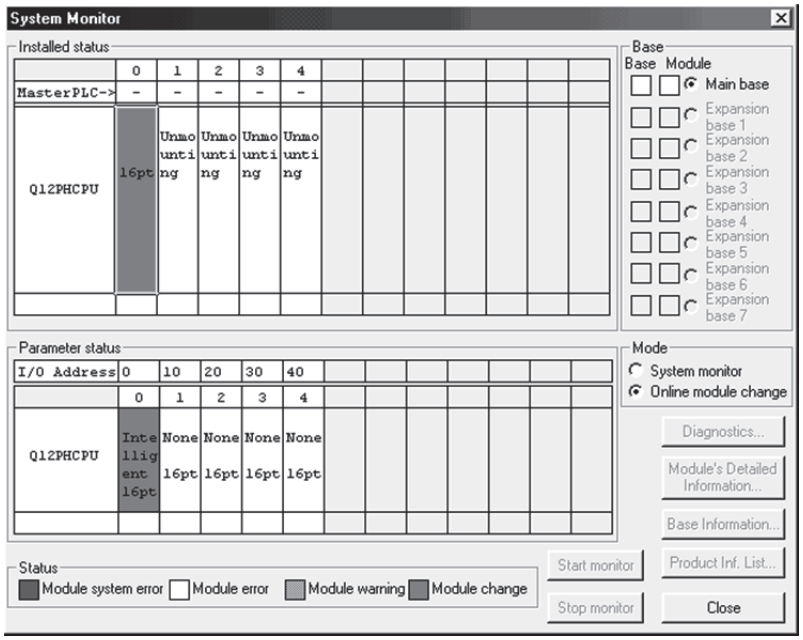
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



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

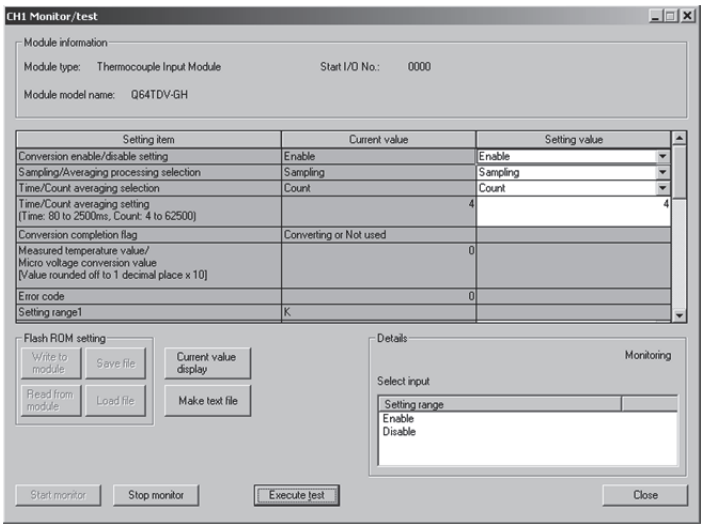


(c) Click the [Close] button to close the System monitor screen.



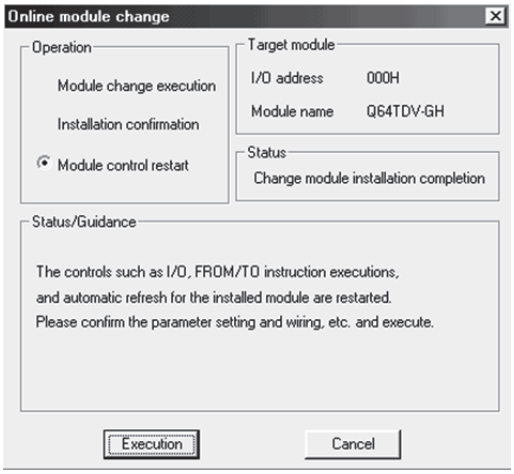
(d) On the OMC refresh data screen of GX Configurator-TI, set the prerecorded values and make a OMC refresh data write request. (Refer to Section 5.6.4.)

(e) Monitor CH□ measured temperature value/micro voltage conversion value (buffer memory addresses 11 to 14: Un\G11 to 14) 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. Module READY (X0) turns ON.

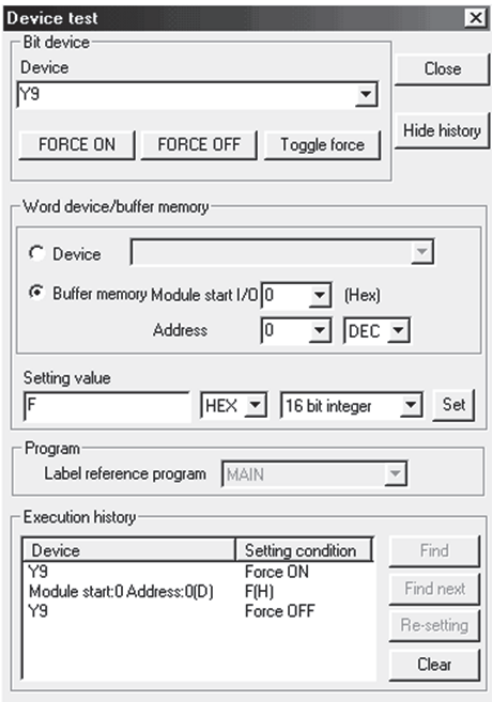


(b) The "Online module change completed" screen appears.

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

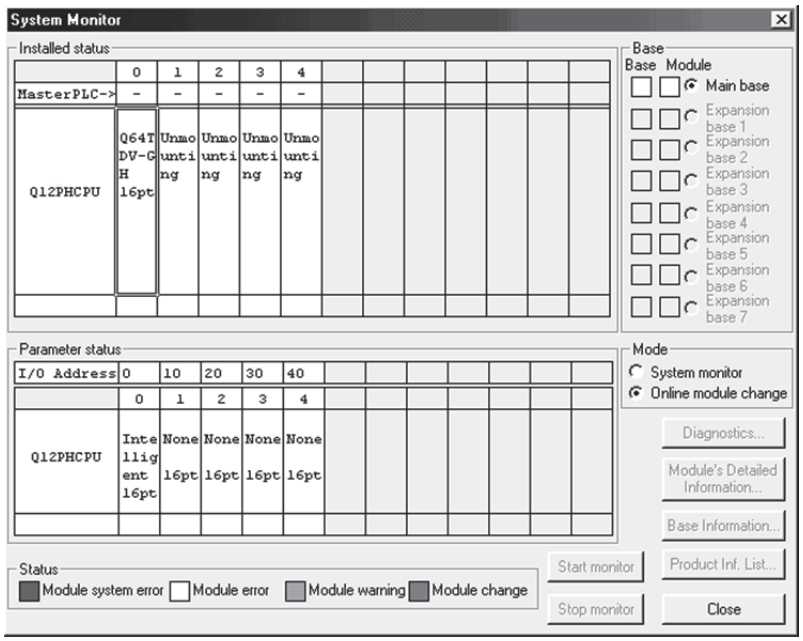
(1) Conversion disable

(a) Set conversion enable/disable setting (buffer memory address 0: Un\G0) for all channel conversion disable and turn 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).

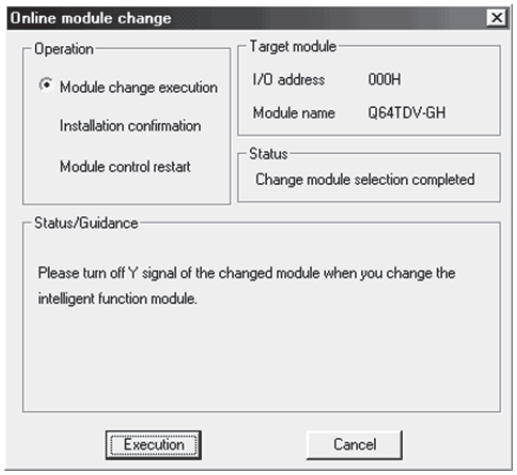


(2) Dismounting of module

(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, remove the external wiring and dismount the module.

POINT

(1) If you have removed the wiring together with the terminal block, the temperature measurement values may vary within the accuracy range due to the error of the specific cold junction compensation resistor.

(2) Always dismount the module. If you execute mounting confirmation without dismounting the module, the module will not start properly and the "RUN" LED will not be lit.

(3) Mounting of new module

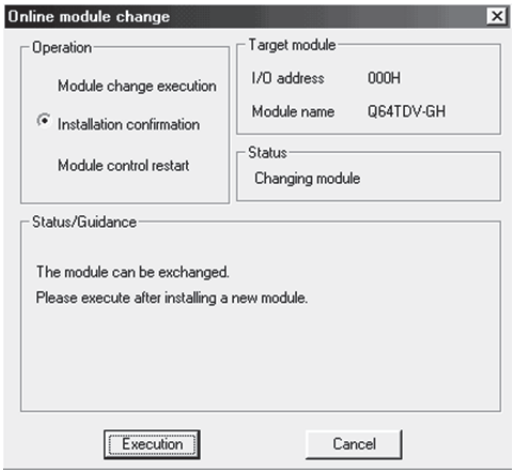
(a) Mount the dismounted module and new module to the other system.

(b) Using the G(P).OGLOAD instruction, save the user range setting values to the CPU device. Refer to Appendix 2.3 for the G(P).OGLOAD instruction.

(c) Using the G(P).OGSTOR instruction, restore the user range setting set values to the module. Refer to Appendix 2.4 for the G(P).OGSTOR instruction.

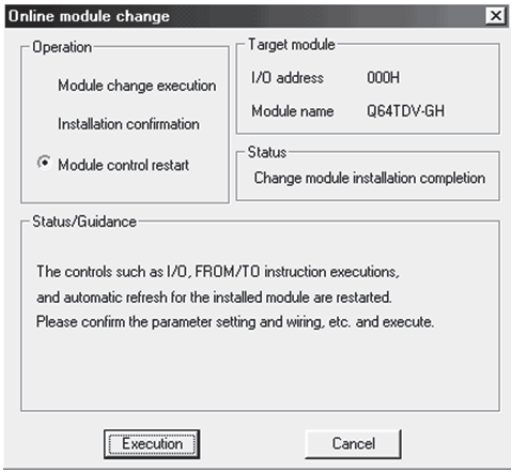
(d) Dismount the new module from the other system, mount it to the slot from where the old module was dismounted in the original system, and install the external wiring.

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

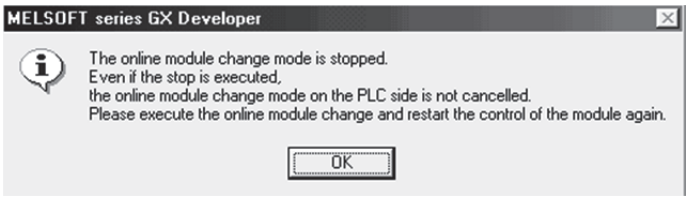


(4) Operation check

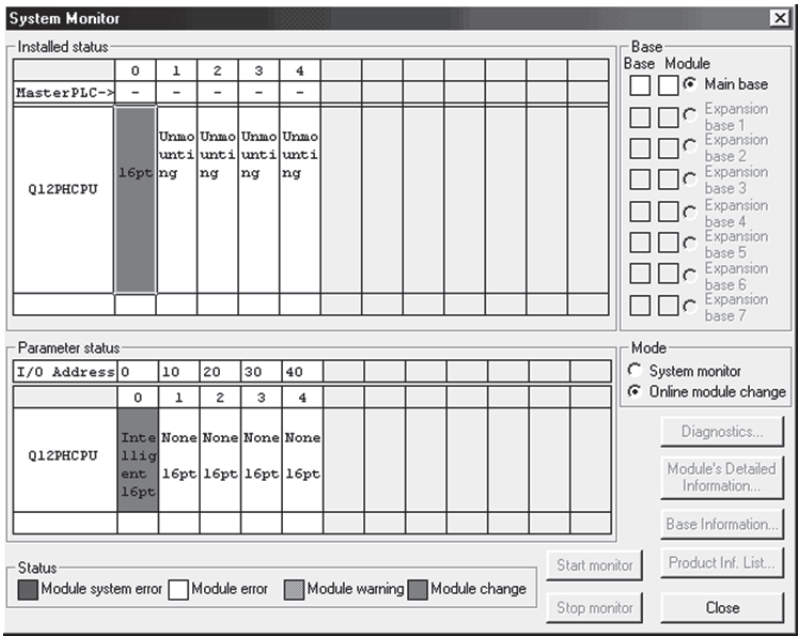
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



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



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



(d) Enable the conversion of the channel to be used through conversion enable/disable setting (buffer memory address 0: Un\G0), and monitor CH□ measured temperature value/micro voltage conversion value (buffer memory addresses 11 to 14: Un\G11 to 14) to check that proper conversion has been made.

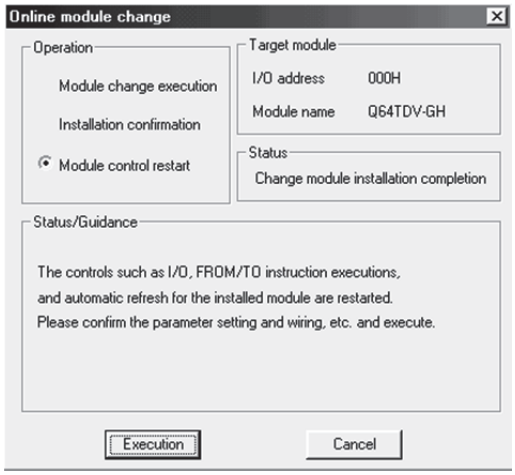
(e) Since the new module is in a default status, it must be initialized by a sequence program after control resumption.
Before performing initialization, check whether the contents of the initialization program are correct or not.

1) Normal system configuration
The sequence program should perform initialization on the leading edge of Module READY (X9) of the Q64TD/Q64TDV-GH.
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. Module READY (X0) turns ON.

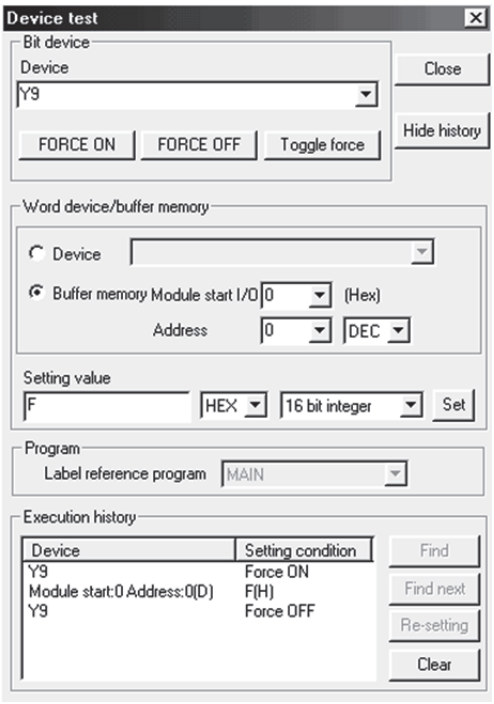


(b) The "Online module change completed" screen appears.

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 "Disable" in the conversion enable/disable setting (buffer memory address 0: Un\G0) for all channels 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).



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

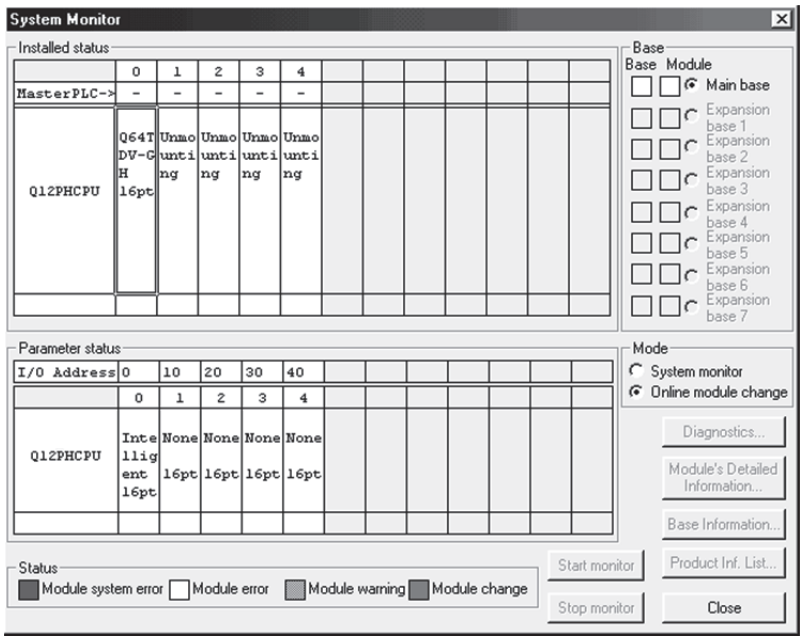
1) Turn Operating Condition Setting Request (Y9) form OFF to ON.
2) Compare the Factory default offset/gain value/User range settings offset/gain value/User range settings thermal EMF offset/gain value (buffer memory addresses 160 to 191: Un\G160 to Un\G191) with the range reference table. Refer to Section 7.4 for the range reference table.
3) If the values are proper, take a note of them.

POINT

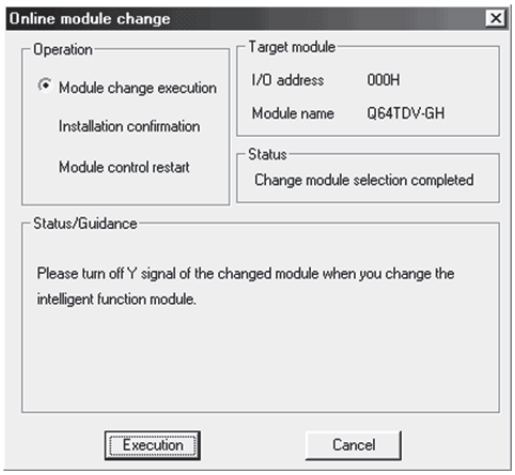
If the buffer memory values compared with the reference table are not proper, save and restoration of the user range cannot be executed.
Before executing module control resumption, follow the flowchart in Section 4.6 and make offset/gain setting in the device test of GX Developer.
Perform mode switching by making the setting of the mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159) and turning 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 this section (2) (c) and later.

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

POINT

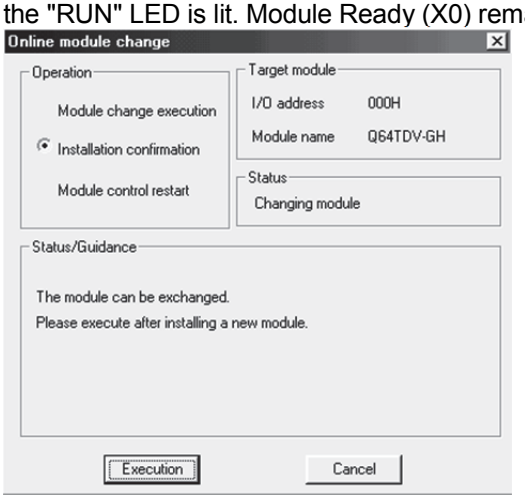
(1) If you have removed the wiring together with the terminal block, the measured temperature values may vary within the accuracy range due to the error of the specific cold junction compensation resistor.

(2) Always dismount the module. If you execute mounting confirmation without dismounting the module, the module will not start properly and the "RUN" LED will not be lit.

(3) Mounting of new module

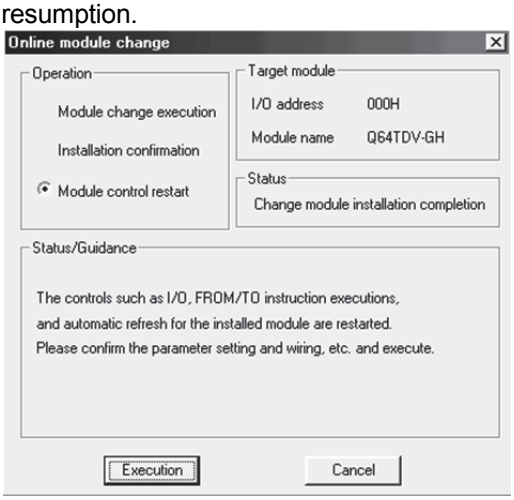
(a) Mount a new module to the same slot and install the external wiring.

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

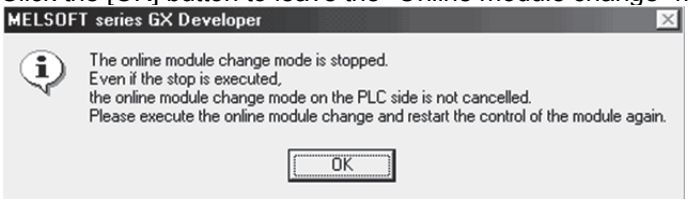


(4) Operation check

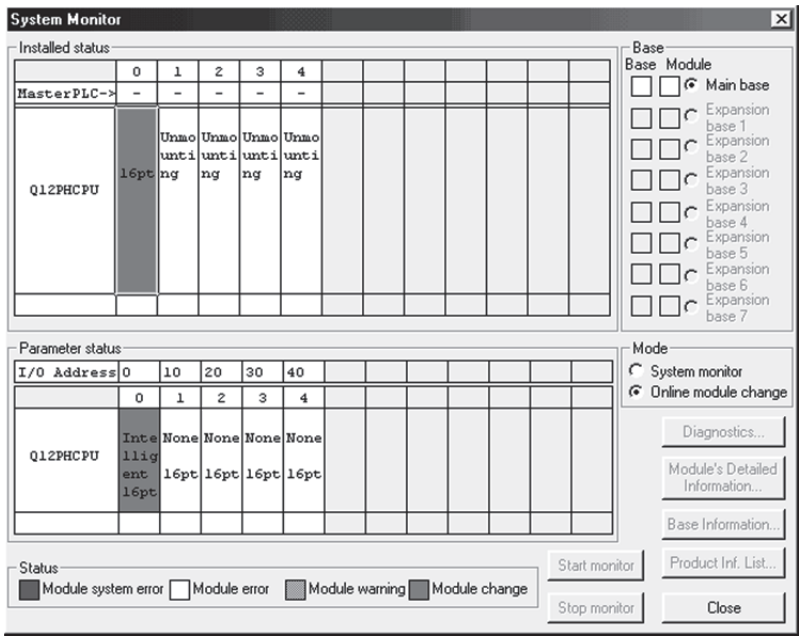
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



(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 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) Enable the conversion of the channel to be used through conversion enable/disable setting (buffer memory address 0: Un\G0), and monitor CH□ measured temperature value/micro voltage conversion value (buffer memory addresses 11 to 14: Un\G11 to 14) to check that proper conversion has been made.

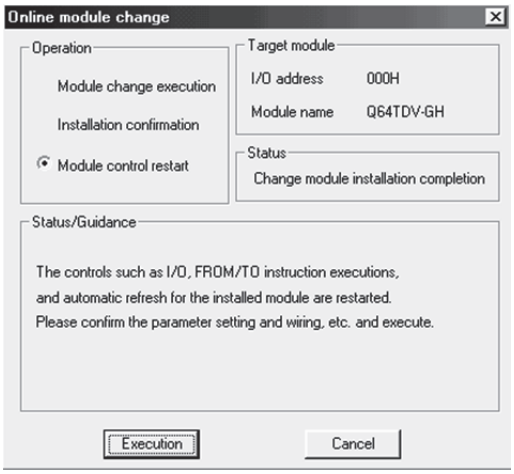
(g) Since the new module is in a default status, it must be initialized by a sequence program after control resumption.
Before performing initialization, check whether the contents of the initialization program are correct or not.

1) Normal system configuration
The sequence program should perform initialization on the leading edge of Module READY (X9) of the Q64TD/Q64TDV-GH.
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. Module READY (X0) turns ON.



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

7.4 Range Reference Table

The range reference tables are given below.

Address (Decimal)				Description	Reference value
CH1	CH2	CH3	CH4		
160	168	176	184	Factory default offset value	Digital offset value set prior to shipment (Reference value 8000H)
161	169	177	185	Factory default gain value	Digital gain value set prior to shipment (Reference value EB85H)
162	170	178	186	User range settings offset value	Digital value for user-set offset value (Refer to (3).)
163	171	179	187	User range settings gain value	Digital value for user-set gain value (Refer to (4).)
164	172	180	188	User range settings thermal EMF offset value (L)	Thermoelectromotive force or offset set voltage for user-set offset set temperature (μV unit) (Refer to (5).)
165	173	181	189	User range settings thermal EMF offset value (H)	
166	174	182	190	User range settings thermal EMF gain value (L)	Thermoelectromotive force or gain set voltage for user-set gain set temperature (μV unit) (Refer to (6).)
167	175	183	191	User range settings thermal EMF gain value (H)	

(1) Compare the factory default offset value with the reference value 8000H.

(2) Compare the factory default gain value with the reference value EB85H.

(3) Compare the user range settings offset value with the value obtained by the following formula
Digital value = User range settings thermal EMF offset value (μV) × 0.65536 + 10922

(4) Compare the user range settings gain value with the value obtained by the following formula
Digital value = User range settings thermal EMF gain value (μV) × 0.65536 + 10922

(5) Obtain a value that corresponds to the offset setting temperature set by the user from the chart of standard thermal electromotive force that is compliant with JIS C 1602-1995, IEC584-1, and IEC584-2. Compare the value with the user range settings thermal EMF offset value.

(6) Obtain a value that corresponds to the offset setting temperature set by the user from the chart of standard thermal electromotive force that is compliant with JIS C 1602-1995, IEC584-1, and IEC584-2. Compare the value with the user range settings thermal EMF gain value.

POINT

The chart of standard thermal electromotive force compliant with JIS C 1602-1995 and IEC584-1, or IEC584-2 needs to be arranged by the user.

(Example) When offset/gain setting is made at the offset set temperature of -200.0°C and the gain set temperature of 900.0°C with an E type thermocouple connected

Value type	Set temperature	Thermal EMF	Set value	Input value
Offset value	-200.0°C	-8825 μV	-8825	-8825 × 0.65536 + 10922 = 5138
Gain value	900.0°C	68787 μV	68787	68787 × 0.65536 + 10922 = 56002

7.5 Precautions for Online Module Change

The following are the precautions for online module change.

(1) Always perform an online module change in the correct procedure. A failure to do so can cause a malfunction or failure.

(2) If an online module change is made with the user range setting, the accuracy after that will fall to about less than 1/3 of the accuracy before that.
Re-set the offset/gain values as necessary.

(3) During an online module change, do not perform the operations below.
If they are performed, the Q64TD/Q64TDV-GH may not operate normally.
(a) Powering off the programmable controller CPU
(b) Resetting the programmable controller CPU

8 TROUBLESHOOTING

This chapter explains the natures of errors which may occur during use of the Q64TD/Q64TDV-GH and troubleshooting.

8.1 Error Code List

If an error occurs during reading/writing data from/to a programmable controller CPU, the Q64TD/Q64TDV-GH writes the corresponding error code to the buffer memory address 19 (Un\G19).

Error Code (Decimal)	Description	Remedy
10□	The input type setting is other than 0 to 7 (Q64TD)/0 to 8 (Q64TDV-GH) 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 a start.	Switch power off, then on again. If the error recurs, the module may have failed. Please consult your local Mitsubishi representative.
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.)
161 ∗ 2	The G(P).OGSTOR instruction was executed in the offset/gain setting mode.	Do not execute the G(P).OGSTOR instruction in the offset/gain setting mode.
162 ∗ 1	• The G(P).OGSTOR instruction was executed consecutively. • At the time of offset/gain setting, a set value was written to the 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 ∗ 1	• The G(P).OGSTOR instruction was executed for the model that differs from the model for which the G(P).OGLOAD instruction had been executed. • 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□ ∗ 1	The averaging time 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□ ∗ 1	The averaging count 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.)
40□ ∗ 1	Gain value - offset value ≤ 0.1 [°C] (for temperature input) or gain value - offset value ≤ 4 [μV] (for micro voltage input). □ indicates the channel number set incorrectly.	Set a correct value in buffer memory, or measure and check the voltage at the thermocouple/micro voltage input terminal.
50□ ∗ 1	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 of the intelligent function module switch setting on that channel is not user range setting. □ indicates the channel number set incorrectly.	Make a correct setting in the intelligent function module switch setting. (Refer to Section 4.5.)
51□ ∗ 1	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 measured range. □ indicates the channel number set incorrectly.	Check the measured range and set the offset/gain value within the range. (Refer to Section 3.1.1, 3.1.2.)
52□ ∗ 1	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.
6△□ ∗ 1	The warning output upper/lower limit value setting is outside the measurable range specified for the input type. □ 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 101 (Un\G86 to 101). (Refer to Section 3.4.18.)

POINT

- For the Q64TD, the code of the first error found by the Q64TD is stored when two or more errors occur. The latter errors are not stored. In addition, the error is cleared by mode switching.
- For the Q64TDV-GH, the code of the latest error found by the Q64TDV-GH is stored when two or more errors occur.
- The errors marked ＊1 can be cleared by turning on the error clear request (YF).
- The error marked ＊2 is not written to the buffer memory address 19 (Un\G19). It is written to the completion status area (S) + 1 of the G(P).OGSTOR instruction.

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. Please consult your local Mitsubishi 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 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 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 Disconnection detection flag (XC) has turned on

Check Item	Remedy
Check whether the thermocouple, compensation conductor or micro voltage signal cable is connected incompletely or not.	Connect the thermocouple, compensation conductor or micro voltage signal cable securely.
Check for loose terminal screws.	Retighten the terminal screws within the specified torque range.
Check the connected thermocouple, compensation conductor or micro voltage signal cable for wire break.	Make continuity check on the thermocouple, compensation conductor or micro voltage signal cable, and change the thermocouple, compensation conductor or micro voltage signal cable if its wire is broken.
Check whether the channel where no thermocouple or micro voltage signal cable is connected is set to conversion enable.	Check the channels which are set to conversion enable and the channels where thermocouples or micro voltage signal cables are connected, and set to conversion enable correctly.

8.2.6 Measured temperature value/micro voltage 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.

8.2.7 Measured temperature value is abnormal

Check Item	Remedy
Check whether the connected thermocouple or compensation conductor differs from the setting.	Set the thermocouple type connected to the switch 1 in the intelligent function module switch setting.
Check whether the connected thermocouple or compensation conductor is connected reversely.	Connect the thermocouple or compensation conductor correctly.
Check for noise in the thermocouple input.	Check influence from the ground and adjacent devices, and take action to prevent noise.
Check the Pt100 temperature-measuring resistor for making cold junction temperature compensation for wire break or disconnection from the terminal block.	Confirm that the Pt100 temperature-measuring resistor is connected to the terminal block and there is continuity, and if not, connect or change the Pt100 temperature-measuring resistor.
Check whether the cold junction temperature compensation yes/no setting is correct.	Set the switch 4 to the correct position in the intelligent function module switch setting. (Refer to Section 4.5)
Check whether conversion is made with the other thermocouple set after setting of the offset/gain value	Make offset/gain setting again after changing the thermocouple.
Is the measured temperature value greatly affected by a temperature error due to wiring resistance of the thermocouple?	Check the wiring resistance value of the thermocouple and calculate the temperature error in the system. (Refer to Section 3.1.1 (2) for the Q64TD and Section 3.1.2 (2) for the Q64TDV-GH.) If the temperature error is large, the error may be affecting the measured temperature value. Compensate the measured temperature value using the offset/gain setting. (Refer to Section 4.6.)

8.2.8 Micro voltage conversion value is abnormal

Check Item	Remedy
Check whether the input type set is a thermocouple or not.	Set the switch for micro voltage input in the intelligent function module switch setting.
Check the micro voltage signal cable for noise.	Check influence from grounding and adjacent equipment, and take noise reduction measures.
After offset/gain value setting, the other signal cable was connected.	Make offset/gain setting again with the newly connected signal cable.
Is the micro voltage conversion value greatly affected by an error due to wiring resistance?	Check the wiring resistance value and calculate the error in the system. (Refer to Section 3.1.2 (3).) If the error is large, the error may be affecting the micro voltage conversion value. Compensate the micro voltage conversion value using the offset/gain setting. (Refer to Section 4.6.)

8.2.9 Checking the Q64TD/Q64TDV-GH status using GX Developer system monitor

When the Q64TD/Q64TDV-GH detail information is selected in GX Developer system monitor, error code can be checked.

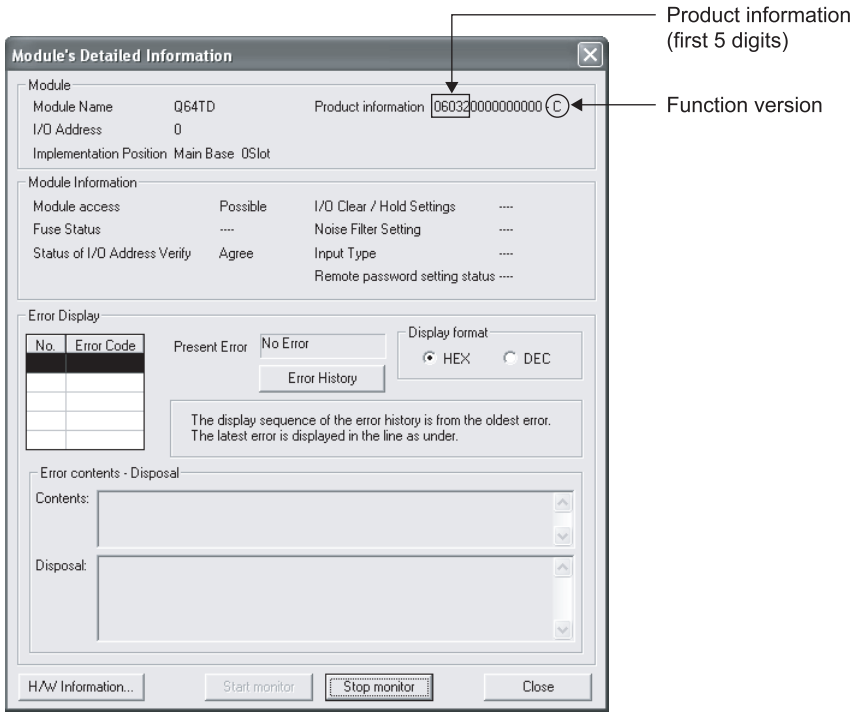
(1) Operating GX Developer

[Diagnostics] → [System monitor] → "Select Q64TD/Q64TDV-GH" → Module Detailed Information

(2) Module Detail Information

(a) Checking the function version and product information
The function version and product information of the Q64TD/Q64TDV-GH 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 Q64TD/Q64TDV-GH is displayed in the Present Error field.
(When the Error History button is pressed, the contents displayed in the Present Error field are displayed in the No. 1 field.)



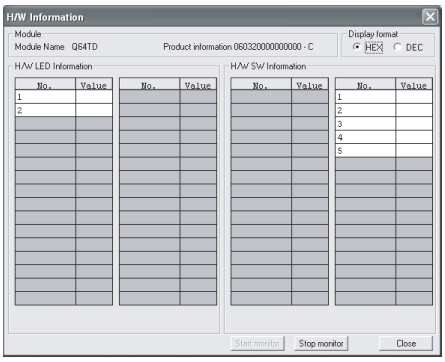
(3) H/W information

(a) H/W LED information
The LED 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

(b) H/W SW information
The status of the intelligent function module switch setting is displayed.

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



APPENDICES

Appendix 1 Upgrading of Q64TD/Q64TDV-GH Functions

The Q64TD of function version C has new functions that the conventional product (function version B) does not have.
The Q64TDV-GH does not have a product of function version B.

Appendix 1.1 Comparison between Q64TD and Q64TDV-GH Functions

The following functions are supported by function version C.

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 (G(P).OFFGAN/G(P).OGLOAD/ G(P).OGSTOR)		×	○	○
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		×	×	○

○ : Compatible × : Not compatible

App. - 1

Appendix 1.2 When the Q64TD/Q64TDV-GH has Product Information which First 5 Digits are 07071 or Earlier

The following shows differences between the Q64TD/Q64TDV-GH whose first 5 digits of product information are 07071 or earlier and those of 07072 or later.

Item	Q64TD/Q64TDV-GH	
	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 conversion setting for disconnection detection function	For values to be stored in the CH□ measured temperature value/micro voltage value (buffer memory addresses 11 to 14: Un\G11 to 14) 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/micro voltage value (Un\G11 to 14).	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/micro voltage value (Un\G11 to 14).
	The Conversion completion flag (XE) turns OFF when disconnection is detected. Upon recovery of the connection, the update of the measured temperature value/micro voltage conversion value is resumed regardless of Disconnection detection flag (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 update of the measured temperature value/micro voltage conversion value is resumed regardless of Disconnection detection flag (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/micro voltage value (buffer memory addresses 11 to 14: Un\G11 to 14) 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 3.4.20)
CH□ Conversion setting value for disconnection detection (Un\G150 to 153)	The Conversion setting value for disconnection detection (Un\G150 to 153) 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/micro voltage value (Un\G11 to 14). (see Section 3.4.21)

Appendix 2 Dedicated Instruction

Appendix 2.1 Dedicated Instruction List and Available Device

(1) Dedicated instruction list

The following table lists the dedicated instructions that can be used with the Q64TD/Q64TDV-GH converter modules.

Instruction	Description	Reference section
G(P).OFFGAN	Switches to the offset/gain setting mode. Switches to the normal mode.	Appendix 2.2
G(P).OGLOAD	Reads the offset/gain values of the user range setting to the CPU.	Appendix 2.3
G(P).OGSTOR	Restores the offset/gain values of the user range setting stored in the CPU to the Q64TD/Q64TDV-GH converter module.	Appendix 2.4

POINT

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

(2) Available devices

The following devices are available for the dedicated instructions:

Internal devices		File register	Constant
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).

Appendix 2.2 G(P).OFFGAN

Switches the mode of the Q64TD/Q64TDV-GH converter module. (Normal mode to offset/gain setting mode, offset/gain setting mode to normal mode)

Setting 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)	—	○		—				—	—	—

[Instruction symbol] [Execution condition]

Setting data

Setting data	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 Q64TD/Q64TDV-GH converter module.

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

POINT

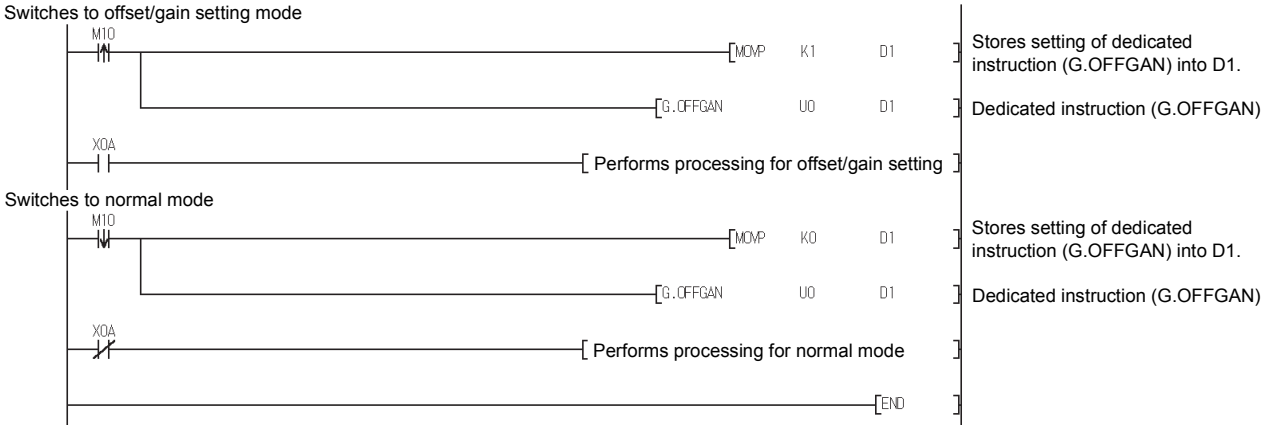
(1) When the offset/gain setting mode is switched to the normal mode, Module Ready (X0) turns from OFF to ON.
Note that initial setting processing will be executed if there is a sequence program that makes initial setting when Module Ready (X0) turns ON.
(2) For the Q64TD only, an error is cleared when mode switching is performed.

(2) Operation error

No errors.

(3) Program example

The following program is designed to switch the Q64TD/Q64TDV-GH converter module mounted in the position of I/O number X/Y0 to X/YF to the offset/gain setting mode when M10 is turned ON, and to return it to the normal mode when M10 is turned OFF.

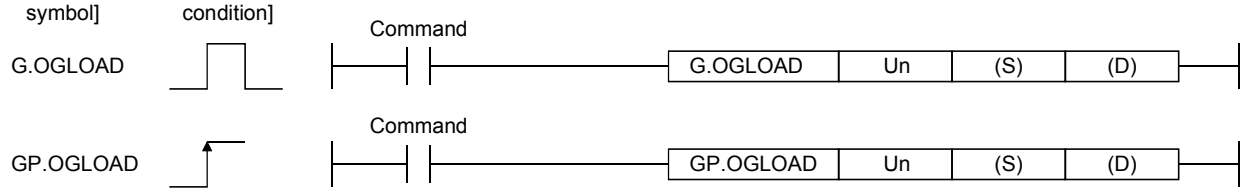


Appendix 2.3 G(P).OGLOAD

Reads the offset/gain values of the user range setting of the Q64TD/Q64TDV-GH converter module to the CPU.

Setting 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)	—	○		—				—	—	—
(D)	○			—				—	—	—

[Instruction symbol] [Execution condition]



Setting data

Setting data	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

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				
(S) + 4	CH1 Factory default offset value	—	—	System
(S) + 5	CH1 Factory default gain value	—	—	System
(S) + 6	CH1 User range settings offset value	—	—	System
(S) + 7	CH1 User range settings gain value	—	—	System
(S) + 8	CH1 User range settings thermal EMF offset value (L)	—	—	System
(S) + 9	(H)	—	—	System
(S) + 10	CH1 User range settings thermal EMF gain value (L)	—	—	System
(S) + 11	(H)	—	—	System
(S) + 12	CH2 Factory default offset value	—	—	System
(S) + 13	CH2 Factory default gain value	—	—	System
(S) + 14	CH2 User range settings offset value	—	—	System
(S) + 15	CH2 User range settings gain value	—	—	System
(S) + 16	CH2 User range settings thermal EMF offset value (L)	—	—	System
(S) + 17	(H)	—	—	System
(S) + 18	CH2 User range settings thermal EMF gain value (L)	—	—	System
(S) + 19	(H)	—	—	System
(S) + 20	CH3 Factory default offset value	—	—	System
(S) + 21	CH3 Factory default gain value	—	—	System
(S) + 22	CH3 User range settings offset value	—	—	System
(S) + 23	CH3 User range settings gain value	—	—	System
(S) + 24	CH3 User range settings thermal EMF offset value (L)	—	—	System
(S) + 25	(H)	—	—	System
(S) + 26	CH3 User range settings thermal EMF gain value (L)	—	—	System
(S) + 27	(H)	—	—	System
(S) + 28	CH4 Factory default offset value	—	—	System
(S) + 29	CH4 Factory default gain value	—	—	System
(S) + 30	CH4 User range settings offset value	—	—	System
(S) + 31	CH4 User range settings gain value	—	—	System
(S) + 32	CH4 User range settings thermal EMF offset value (L)	—	—	System
(S) + 33	(H)	—	—	System
(S) + 34	CH4 User range settings thermal EMF gain value (L)	—	—	System
(S) + 35	(H)	—	—	System

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

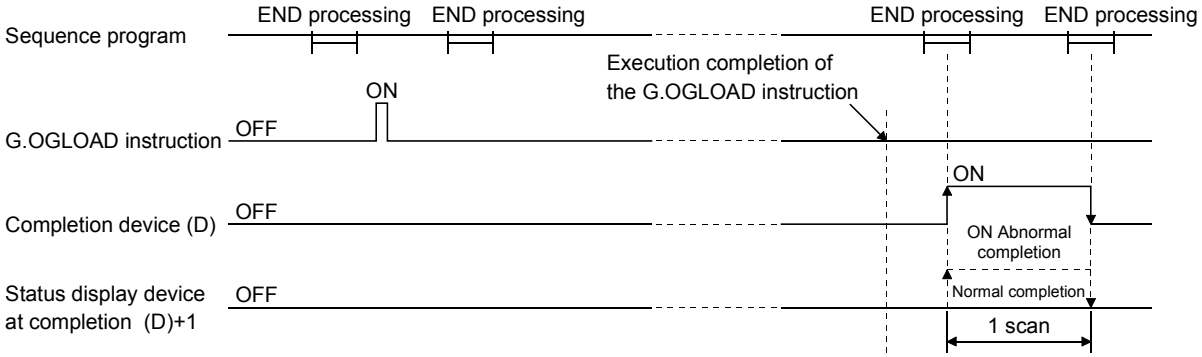
(1) Functions

(a) Reads the offset/gain values of the user range setting of the Q64TD/Q64TDV-GH converter module 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.

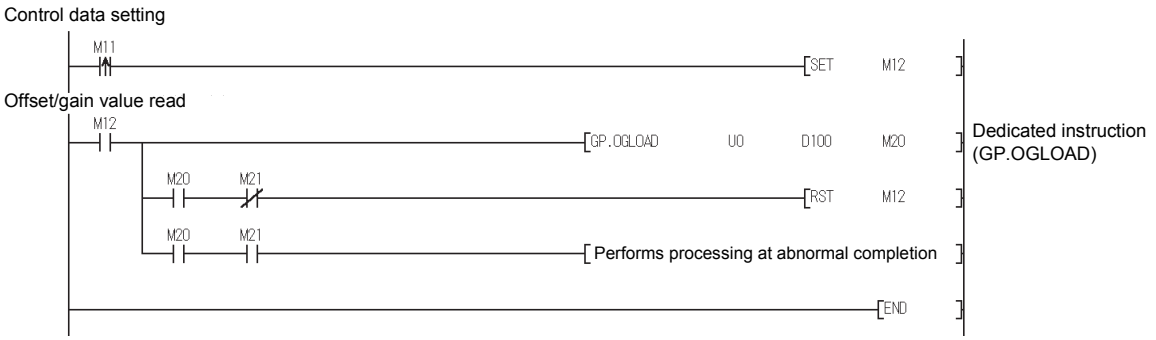


(2) Operation error

No errors.

(3) Program example

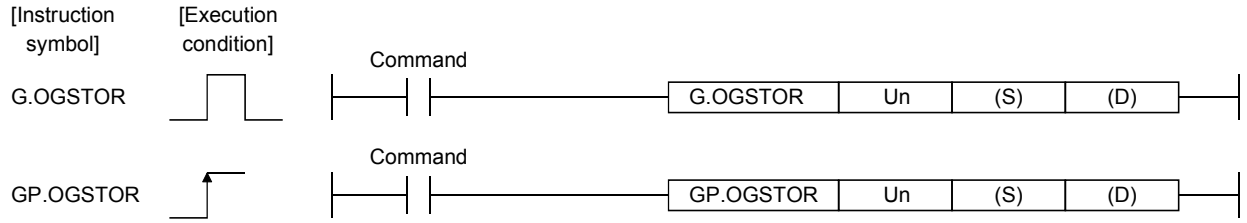
The following program is designed to read the offset/gain values of the Q64TD/Q64TDV-GH converter module mounted in the position of I/O number X/Y0 to X/YF when M11 is turned ON.



Appendix 2.4 G(P).OGSTOR

Restores the offset/gain values of the user range setting stored in the CPU to the Q64TD/Q64TDV-GH converter module.

Setting 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)	—	○		—				—	—	—
(D)	○			—				—	—	—



Setting data

Setting data	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

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				
(S) + 4	CH1 Factory default offset value	—	—	System
(S) + 5	CH1 Factory default gain value	—	—	System
(S) + 6	CH1 User range settings offset value	—	—	System
(S) + 7	CH1 User range settings gain value	—	—	System
(S) + 8	CH1 User range settings thermal EMF offset value (L)	—	—	System
(S) + 9	(H)	—	—	System
(S) + 10	CH1 User range settings thermal EMF gain value (L)	—	—	System
(S) + 11	(H)	—	—	System
(S) + 12	CH2 Factory default offset value	—	—	System
(S) + 13	CH2 Factory default gain value	—	—	System
(S) + 14	CH2 User range settings offset value	—	—	System
(S) + 15	CH2 User range settings gain value	—	—	System
(S) + 16	CH2 User range settings thermal EMF offset value (L)	—	—	System
(S) + 17	(H)	—	—	System
(S) + 18	CH2 User range settings thermal EMF gain value (L)	—	—	System
(S) + 19	(H)	—	—	System
(S) + 20	CH3 Factory default offset value	—	—	System
(S) + 21	CH3 Factory default gain value	—	—	System
(S) + 22	CH3 User range settings offset value	—	—	System
(S) + 23	CH3 User range settings gain value	—	—	System
(S) + 24	CH3 User range settings thermal EMF offset value (L)	—	—	System
(S) + 25	(H)	—	—	System
(S) + 26	CH3 User range settings thermal EMF gain value (L)	—	—	System
(S) + 27	(H)	—	—	System
(S) + 28	CH4 Factory default offset value	—	—	System
(S) + 29	CH4 Factory default gain value	—	—	System
(S) + 30	CH4 User range settings offset value	—	—	System
(S) + 31	CH4 User range settings gain value	—	—	System
(S) + 32	CH4 User range settings thermal EMF offset value (L)	—	—	System
(S) + 33	(H)	—	—	System
(S) + 34	CH4 User range settings thermal EMF gain value (L)	—	—	System
(S) + 35	(H)	—	—	System

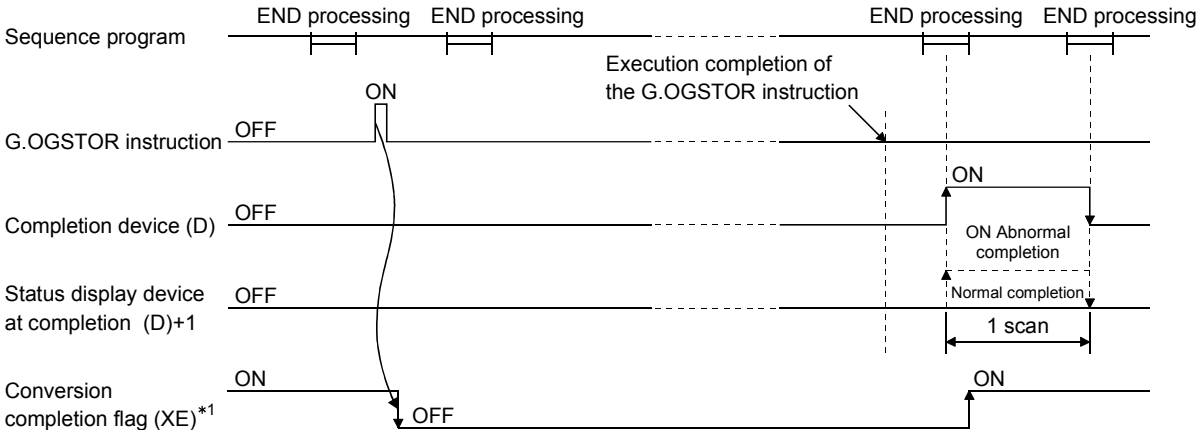
(1) Functions

(a) Restores the offset/gain values of the user range setting stored in the CPU to the Q64TD/Q64TDV-GH converter module.

(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, conversion is not performed. After the completion device (D) turns ON, conversion starts, the conversion value is stored into the buffer memory, and the conversion completion flag (XE) turns ON.

(c) When the offset/gain values are restored, the reference accuracy falls to about less than 1/3 times of the previous accuracy.

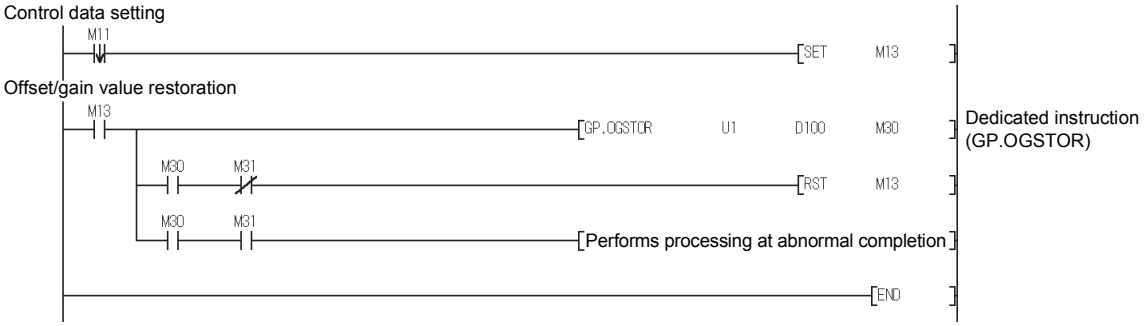
(2) Operation error

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 Q64TD/Q64TDV-GH converter module mounted in the position of I/O number X/Y0 to X/YF when M11 is turned ON.



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Appendix 3 Differences between Q64TD and Q64TDV-GH

The main differences between the Q64TD and Q64TDV-GH are described below.

(1) Presence/absence of micro voltage input

Only the Q64TDV-GH allows micro voltage input.

(2) Accuracy

The accuracy differs between the Q64TD and Q64TDV-GH. Refer to Section 3.1.1 and Section 3.1.2 for details.

(3) Conversion speed

The conversion speed differs between the Q64TD and Q64TDV-GH. Refer to Section 3.1.1 and Section 3.1.2 for details.

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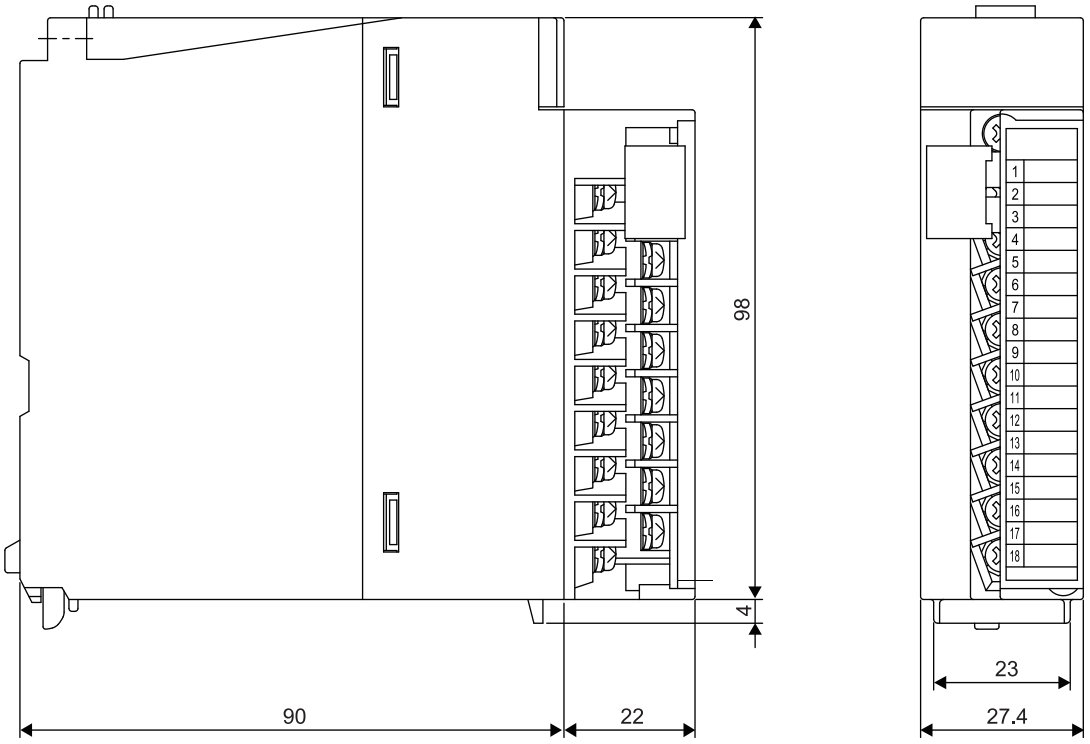
Appendix 4 External Dimension Diagram

(1) Q64TD, Q64TDV-GH



Unit: mm

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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 to:

(1) Damages caused by any cause found not to be the responsibility of Mitsubishi.

(2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.

(3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.

(4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

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

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SH(NA)-080141-P

SH(NA)-080141-P(1605)MEE
MODEL: Q64TD-U-S-E
MODEL CODE: 13JR30

MITSUBISHI ELECTRIC CORPORATION

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NAGOYA WORKS : 1-14 , YADA-MINAMI 5-CHOME , HIGASHI-KU, NAGOYA , JAPAN

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