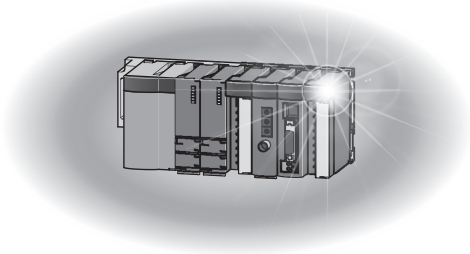
MITSUBISHI ELECTRIC

Mitsubishi Programmable Controller

MELSEC Q series

MELSEC-Q Current Transformer Input Module User's Manual

-Q68CT



●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" and "write-protect area" of the buffer memory in the intelligent function module. Also, do not use any "use prohibited" signal as an output signal from the CPU module 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. Failure to do so may result in malfunction due to noise.

[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 interconnection may cause malfunction, failure, or drop of the module. When using the programmable controller in an environment of frequent vibrations, fix the module with a screw. Tighten the screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- 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 parts and electronic components of the module. Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠WARNING

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

⚠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.

[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 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) respectively. Exceeding the limit of 50 times may cause malfunction.
- Before handling the module, touch a grounded metal object to discharge the static electricity from the human body. Failure to do so may cause the module to fail or malfunction.

[Disposal Precautions]

⚠CAUTION

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

●CONDITIONS OF USE FOR THE PRODUCT●

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

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

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

INTRODUCTION

Thank you for purchasing the Mitsubishi MELSEC-Q series programmable controllers.
This manual describes the operating procedure, system configuration, parameter settings, functions, programming, and troubleshooting of the Q68CT current transformer input module (hereafter abbreviated as CT input module).

Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the MELSEC-Q series programmable controller to handle the product correctly.
When applying the program examples introduced in this manual to an actual system, ensure the applicability and confirm that it will not cause system control problems.

■Relevant module: Q68CT

Remark

- Unless otherwise specified, this manual describes the program examples in which the I/O numbers of X/Y00 to X/Y0F are assigned for a CT input module.
  For I/O number assignment, refer to the following manuals.
  - QnUCPU User's Manual (Function Explanation, Program Fundamentals)
  - Qn(H)/QnPH/QnPRHCPU User's Manual (Function Explanation, Program Fundamentals)
- Operating procedures are explained using GX Works2. When using GX Developer, refer to the following.
  - When using GX Developer (☞ Page 251, Appendix 2)

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.

RELEVANT MANUALS

(1) CPU module user's manual

Manual name <manual number (model code)>	Description
QCPU User's Manual (Hardware Design, Maintenance and Inspection) <SH-080483ENG, 13JR73>	Specifications of the hardware (CPU modules, power supply modules, base units, extension cables, and memory cards), system maintenance and inspection, troubleshooting, and error codes
QnUCPU Users Manual (Function Explanation, Program Fundamentals) <SH-080807ENG, 13JZ27>	Functions, methods, and devices for programming
Qn(H)/QnPH/QnPRHCPU User's Manual (Function Explanation, Program Fundamentals) <SH-080808ENG, 13JZ28>	

(2) Programming manual

Manual name <manual number (model code)>	Description
MELSEC-Q/L Programming Manual (Common Instruction) <SH-080809ENG, 13JW10>	Detailed description and usage of instructions used in programs

(3) Operating manual

Manual name <manual number (model code)>	Description
GX Works2 Version1 Operating Manual (Common) <SH-080779ENG, 13JU63>	System configuration, parameter settings, and online operations (common to Simple project and Structured project) of GX Works2
GX Developer Version 8 Operating Manual <SH-080373E, 13JU41>	Operating methods of GX Developer, such as programming, printing, monitoring, and debugging

Memo

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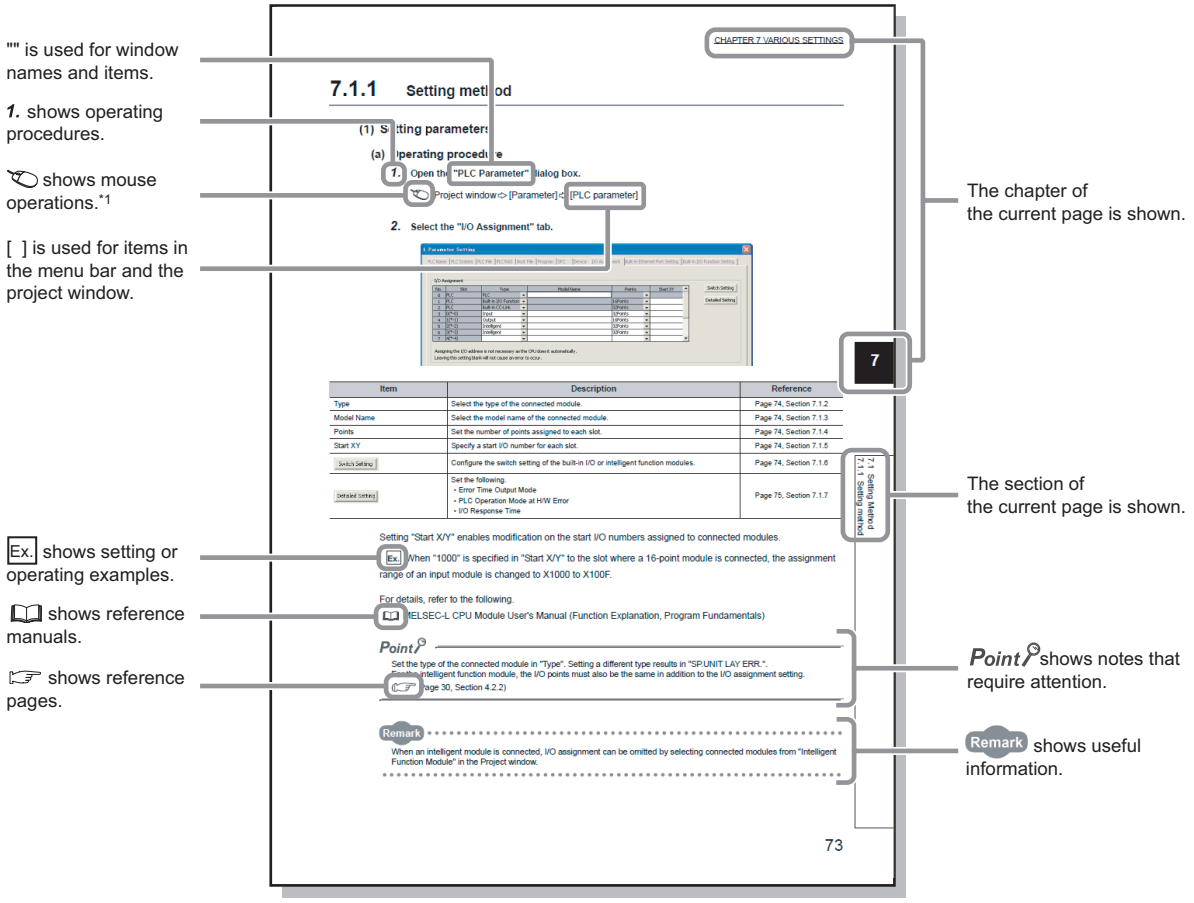
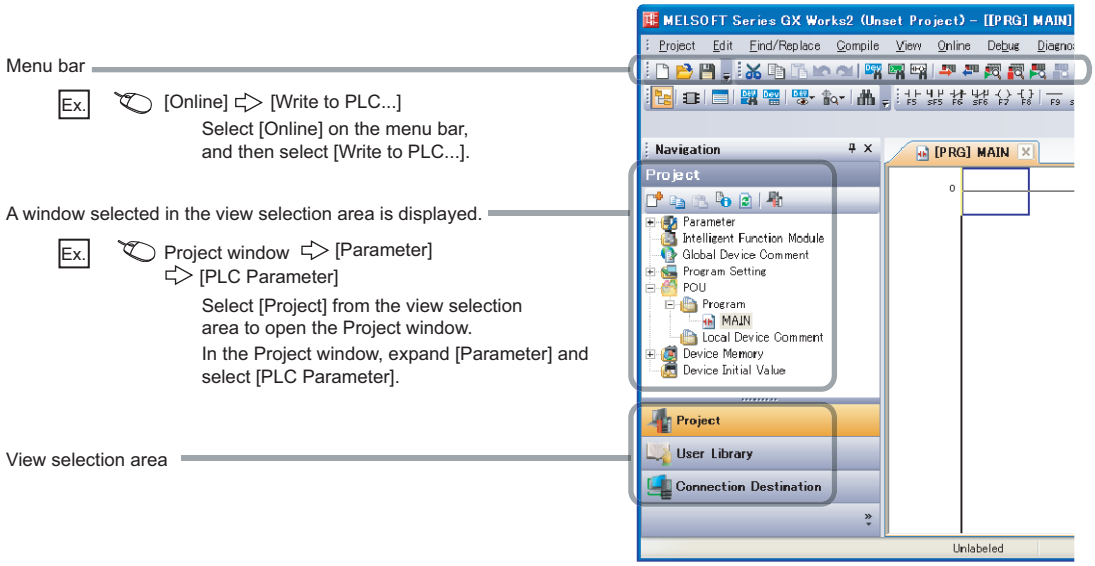
MANUAL PAGE ORGANIZATION

In this manual, pages are organized and the symbols are used as shown below.
The following illustration is for explanation purpose only, and should not be referred to as an actual documentation.

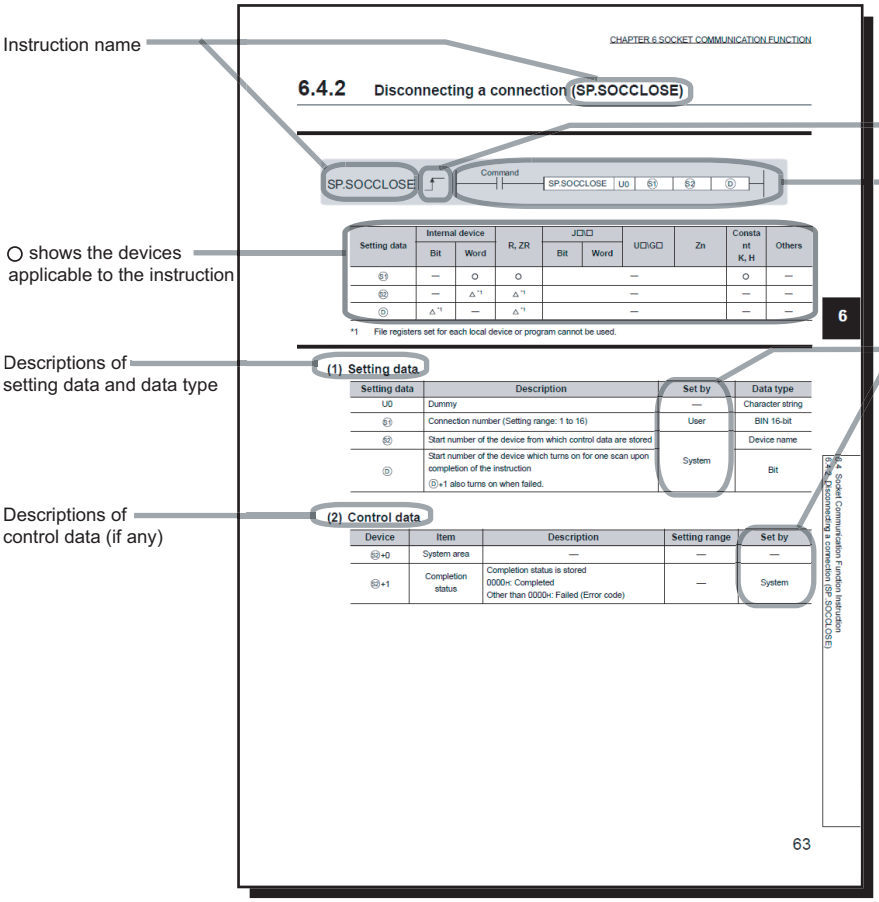


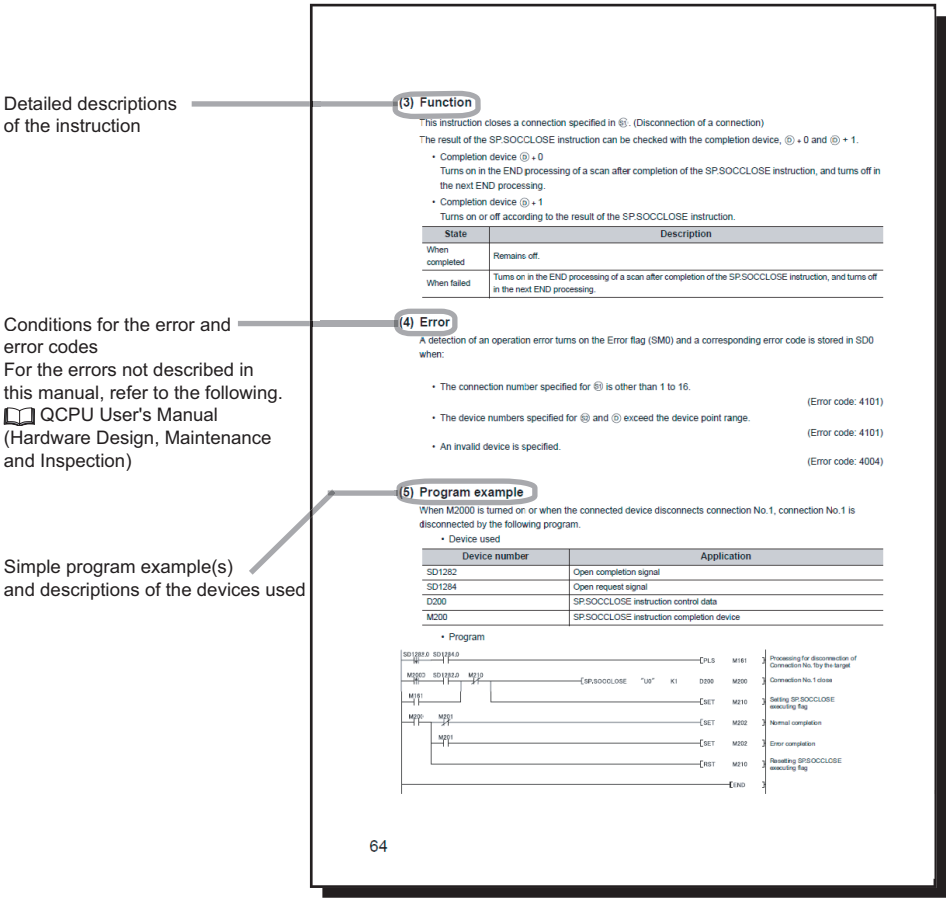
*1 The mouse operation example is provided below.



Pages describing instructions are organized as shown below.

The following illustration is for explanation purpose only, and should not be referred to as an actual documentation.





• Instructions can be executed under the following conditions.

Execution condition	Any time	During on	On the rising edge	During off	On the falling edge
Symbol	No symbol				

• The following devices can be used.

Setting data	Internal device (system, user)		File register	Link direct device J□\□		Intelligent function module device U□\G□	Index register Zn	Constant *3	Others *3
	Bit	Word		Bit	Word				
Applicable device*1	X, Y, M, L, SM, F, B, SB, FX, FY *2	T, ST, C, D, W, SD, SW, FD, @□	R, ZR	-		U□\G□	Z	K, H, E, $	P, I, J, U, D, X, DY, N, BL, TR, BL\S, V

*1 For details on each device, refer to the following.

QnUCPU User's Manual (Function Explanation, Program Fundamentals)

Qn(H)/QnPH/QnPRHCPU User's Manual (Function Explanation, Program Fundamentals)

*2 FX and FY can be used for bit data only, and FD for word data only.

*3 In the "Constant" and "Others" columns, a device(s) that can be set for each instruction is shown.

• The following data types can be used.

Data type	Description
Bit	Bit data or the start number of bit data
BIN 16-bit	16-bit binary data or the start number of word device
BIN 32-bit	32-bit binary data or the start number of double-word device
BCD 4-digit	Four-digit binary-coded decimal data
BCD 8-digit	Eight-digit binary-coded decimal data
Real number	Floating-point data
Character string	Character string data
Device name	Device name data

TERM

Unless otherwise specified, this manual uses the following terms.

Term	Description
CT input module	The abbreviation for the Q68CT current transformer input module
CT	Another term for a current transformer
QCPU	Another term for the MELSEC-Q series CPU module
Process CPU	A generic term for the Q02PHCPU, Q06PHCPU, Q12PHCPU, and Q25PHCPU
Redundant CPU	A generic term for the Q12PRHCPU and Q25PRHCPU
GX Works2	Product name of the software package for the MELSEC programmable controllers
GX Developer	
Programming tool	Generic term for GX Works2 and GX Developer
CT input value	An alternating current value measured using a CT. This manual describes a primary current value as a CT input value.
Factory default range	A generic term for factory-default input ranges (0 to 5AAC, 0 to 50AAC, 0 to 100AAC, 0 to 200AAC, 0 to 400AAC, and 0 to 600AAC)
User range	A generic term for user-defined input ranges (0 to 5AAC, 0 to 50AAC, 0 to 100AAC, 0 to 200AAC, 0 to 400AAC, and 0 to 600AAC)
Buffer memory	The memory of an intelligent function module used to store data (such as setting values and monitored values) for communication with a CPU module.

PACKING LIST

The product package contains the following.

Model	Product	Quantity
Q68CT	Q68CT current transformer input module	1
-	Before Using the Product (BCN-P5901)	1

CHAPTER 1 OVERVIEW

(1) CT

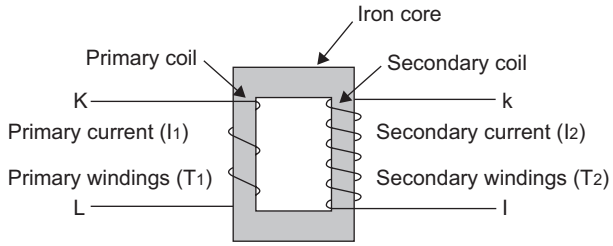
A CT means "Current Transformer" and is a current sensor which is necessary to measure an alternating current.
A CT is used for the following purposes widely.

- To control a load or monitor an operation of equipment and devices
- To control or monitor of an electric power system

When a high current is measured in an electric power receiving facility, measurement devices cannot be wired directly. A CT is used for such a situation.

(a) Mechanism of a CT

A CT utilizes characteristics of an alternating current.



Primary and secondary coils winded an iron core are isolated electrically. When a primary current (I_1) is applied to the iron core, a secondary current (I_2) can be extracted depending on the turn ratio (current transformation ratio).
The following shows the relationship of a primary current, a secondary current, and windings

$$\text{Primary current } (I_1) \times \text{Windings } (T_1) = \text{Secondary current } (I_2) \times \text{Windings } (T_2)$$

$$\left(\begin{matrix}\text{Current transformation} \\ \text{ratio (CT ratio)}\end{matrix}\right) = \frac{\text{Primary current } (I_1)}{\text{Secondary current } (I_2)} \fallingdotseq \frac{\text{Secondary windings } (T_2)}{\text{Primary windings } (T_1)}$$

There are two CT types: the contact type and noncontact type. The noncontact type is classified into the window-type and split-type which is easy to be retrofitted.

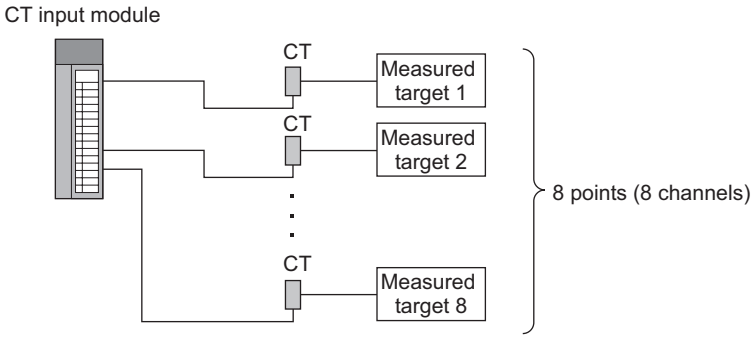
(2) Operation of a CT input module

A CT input module measures an alternating current by converting a secondary current input from a CT to a digital value after carrying out an effective value operation.
The above flows are defined as "digital conversion" in this manual.

1.1 Features

(1) Alternating current measurement of eight points (eight channels) by one module

One module can measure an alternating current with eight points (eight channels).



A CT input range can be selected for each channel.

(2) Reliability by high accuracy

A CT input module can achieve the high accuracy of ±0.5% (when the ambient temperature is 25 ± 5°C) and ±1.0% (when the ambient temperature is 0 to 55°C) at the maximum digital output value.

(3) Operation of a digital output value by the scaling function

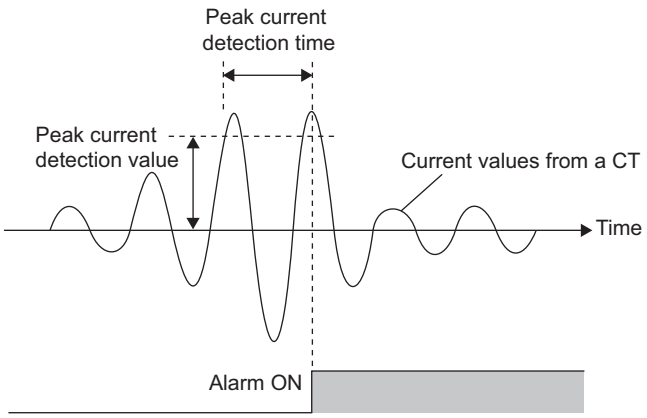
The scaling function can represent a digital output value in an easily understandable value depending on a purpose.

(4) Monitoring of a measured target

By using the input signal error detection function, warning output function, or dropout function, the status of a measured target can be monitored easily.

(5) Detection of the peak current

- By setting the peak current detection value and peak current detection time, the peak current occurred excessively at a system start-up or an overload of devices can be detected. Doing so improves maintainability of devices and the failure diagnosis for a measured target.



- The number of peak current detection is recorded in a non-volatile memory. Therefore the number of peak current detection is not cleared after turning off the power supply or resetting the CPU module.

(6) Logging function

5000 data can be collected for each channel. The analysis of the collected data can improves maintainability of the system used.

(7) Backup of a set value to a non-volatile memory

Initial settings in the buffer memory can be backed up to a non-volatile memory. Initial settings do not need to be reset when the power supply is turned on or the CPU module is reset.

(8) Changeable slope of I/O conversion characteristics

A slope of I/O conversion characteristics can be changed by configuring the offset/gain settings.

(9) Easy setting with GX Works2

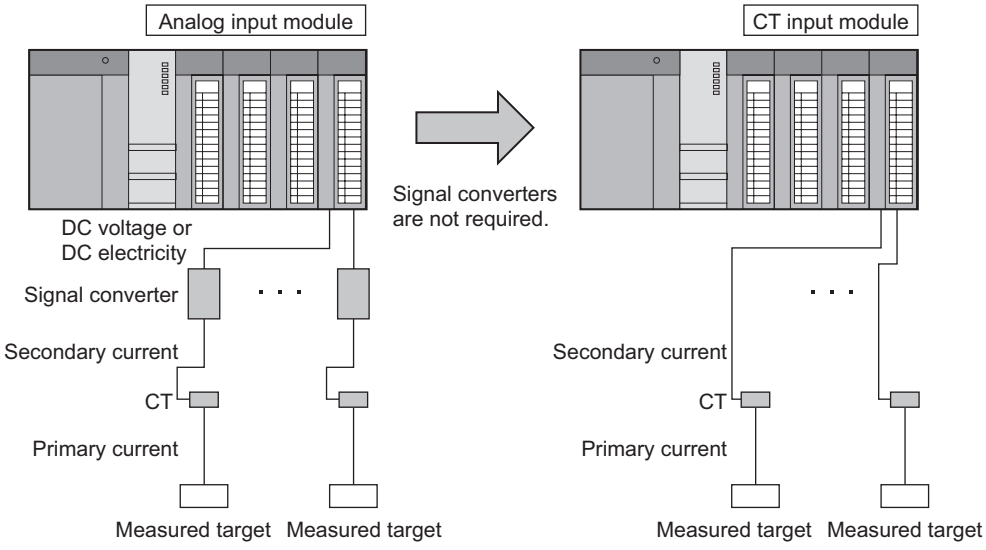
Sequence programming is reduced since initial settings or an auto refresh setting can be configured on the screen. In addition, setting status and operating status of modules can be checked easily.

(10)Online module change

This module can be replaced without stopping the system.

(11)Reduced man-hours and costs (A signal converter is not needed.)

A CT can be connected to a programmable controller directory using a CT input module; as a result, a signal converter installed outside is not required. Therefore man-hours and costs are reduced.



<<Existing system>> **<<System with a CT input module>>**

CHAPTER 2 SYSTEM CONFIGURATION

This chapter describes the system configuration of the CT input module.

2.1 Applicable Systems

This section describes applicable systems.

(1) Applicable CPU modules and base units, and number of mountable modules

(a) When mounted with a CPU module

The following table lists CPU modules and base units applicable to the CT input module and the number of mountable CT input modules.

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

Select the power supply capacity according to the module to be used.

If the power supply capacity is insufficient, change the combination of the modules.

Applicable CPU module			Number of modules*1	Applicable base unit*2	
CPU type		CPU model		Main base unit	Extension base unit
Programmable controller CPU	Basic model QCPU	Q00JCPU	Up to 16	○	○
		Q00CPU	Up to 24		
		Q01CPU			
	High Performance model QCPU	Q02CPU	Up to 64	○	○
		Q02HCPU			
		Q06HCPU			
		Q12HCPU			
		Q25HCPU			
	Process CPU	Q02PHCPU	Up to 64	○	○
		Q06PHCPU			
		Q12PHCPU			
		Q25PHCPU			
	Redundant CPU	Q12PRHCPU	Up to 53	×	○
		Q25PRHCPU			
	Universal model QCPU	Q00UJCPU	Up to 16	○	○
		Q00UCPU	Up to 24		
		Q01UCPU			
		Q02UCPU	Up to 36		
		Q03UDCPU	Up to 64		
		Q04UDHCPU			
		Q06UDHCPU			
		Q10UDHCPU			
		Q13UDHCPU			
		Q20UDHCPU			
		Q26UDHCPU			

Applicable CPU module			Number of modules*1	Applicable base unit*2	
CPU type		CPU model		Main base unit	Extension base unit
Programmable controller CPU	Universal model QCPU	Q03UDECPU	Up to 64	○	○
		Q04UDEHCPU			
		Q06UDEHCPU			
		Q10UDEHCPU			
		Q13UDEHCPU			
		Q20UDEHCPU			
		Q26UDEHCPU			
		Q50UDEHCPU			
		Q100UDEHCPU			
	Safety CPU	QS001CPU	N/A	×	×*3
C Controller module		Q06CCPU-V	Up to 64	○	○
		Q06CCPU-V-B			
		Q12DCCPU-V			

○: Applicable, ×: N/A

*1 Limited within the range of I/O points for the CPU module.
*2 Can be mounted to any I/O slot of a base unit.
*3 Connection of an extension base unit is not available with any safety CPU.

Remark

To use a C Controller module with the CT input module, refer to the C Controller Module User's Manual.

(b) When mounted on MELSECNET/H remote I/O station

The following table lists the network modules and base units applicable to the CT input module and the number of mountable CT input modules.

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

Select the power supply capacity according to the module to be used.

If the power supply capacity is insufficient, change the combination of the modules.

Applicable network module	Number of modules*1	Applicable base unit*2	
		Main base unit of remote I/O station	Extension base unit of remote I/O station
QJ72LP25-25	Up to 64	○	○
QJ72LP25G			
QJ72LP25GE			
QJ72BR15			

○: Applicable, ×: N/A

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

Remark

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

(2) For multiple CPU system

The function version of the first released CT input module is C, and the CT input module supports multiple CPU systems.

When using the CT input module in a multiple CPU system, refer to the following.

QCPU User's Manual (Multiple CPU System)

(a) Intelligent function module parameters

Write intelligent function module parameters to only the control CPU of the CT input module.

(3) For online module change

The CT input module supports online module change. For details on online module change, refer to the following.

ONLINE MODULE CHANGE (Page 182, CHAPTER 10)

Online Module Change Procedure (When Using GX Developer) (Page 253, Appendix 3)

(4) Applicable software packages

The following table lists systems that use a CT input module and applicable software packages.
A programming tool is required to use a CT input module.

Item		Software version	
		GX Developer*1	GX Works2
Q00J/Q00/Q01CPU	Single CPU system	Version 7 or later	Version 1.77F or later
	Multiple CPU system	Version 8 or later	
Q02/Q02H/Q06H/Q12H/Q25HCPU	Single CPU system	Version 4 or later	
	Multiple CPU system	Version 6 or later	
Q02PH/Q06PHCPU	Single CPU system	Version 8.68W or later	N/A
	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	
Q00UJ/Q00U/Q01UCPU	Single CPU system	Version 8.76E or later	Version 1.77F 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		
Q50UDEH/Q100UDEHCPU	Single CPU system	N/A	
	Multiple CPU system		
If installed in a MELSECNET/H remote I/O station		Version 6 or later	

*1 When using GX Developer, create a sequence program for initial settings and auto refresh setting.

(5) Products prepared by user

(a) CT

Manufacturer	Model name	Input range	Secondary winding
Multi Measuring Instruments Sales Co., Ltd.	CTF-5A	0 to 5AAC	3000 turns
	CTF-50A	0 to 50AAC	3000 turns
	CTF-100A	0 to 100AAC	3000 turns
	CTF-200A	0 to 200AAC	3000 turns
	CTF-400A	0 to 400AAC	6000 turns
	CTF-600A	0 to 600AAC	9000 turns
U.R.D.,LTD.	CTL-10-3FC*1	0 to 5AAC, 0 to 50AAC	3000 turns
	CTL-16-3FC*1	0 to 100AAC	3000 turns
	CTL-24-3FC*1	0 to 200AAC	3000 turns
	CTL-36-6SC*1	0 to 400AAC	6000 turns
	CTT-36-9SC	0 to 600AAC	9000 turns
Mitsubishi Electric Corporation	EMU-CT50	0 to 50AAC	3000 turns
	EMU-CT100	0 to 100AAC	3000 turns
	EMU-CT400	0 to 400AAC	6000 turns
	EMU-CT600	0 to 600AAC	9000 turns

*1 The following connection cable is available for a connection with the CT input module.

Manufacturer	Model name
U.R.D.,LTD.	CABLE-4

(b) Connection cable

Use a shielded twisted pair cable for a connection between the CT input module and CT. The shielded twisted pair cable must satisfy the input specifications described in the performance specifications.

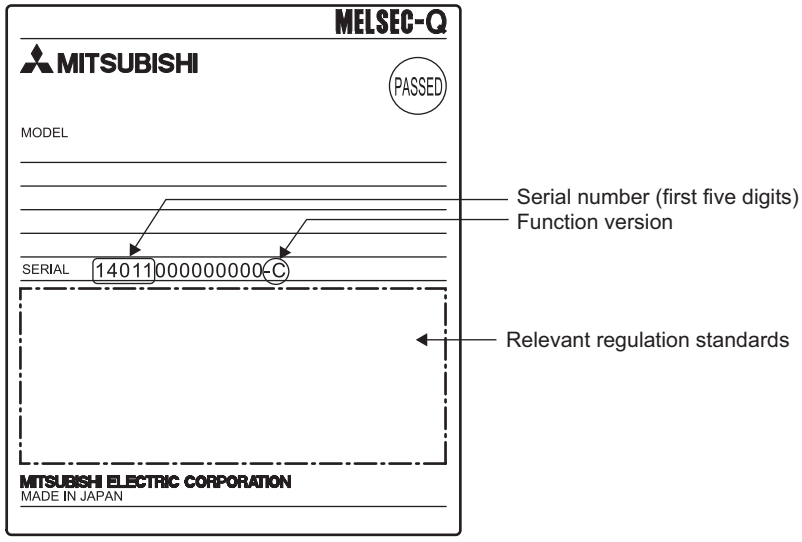
Performance Specifications (☞Page 27, Section 3.2)

2.2 How to Check the Function Version and Serial Number

The function version and serial number of a CT input module can be checked on the rating plate, front part of the module, or system monitor of the programming tool.

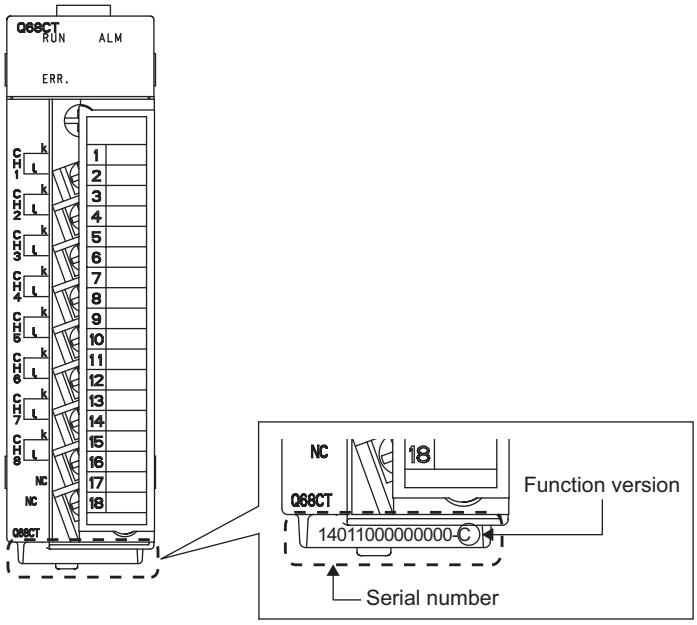
(1) Checking on the rating plate

The rating plate is on the side of the CT input module.



(2) Checking on the front part (bottom part) of module

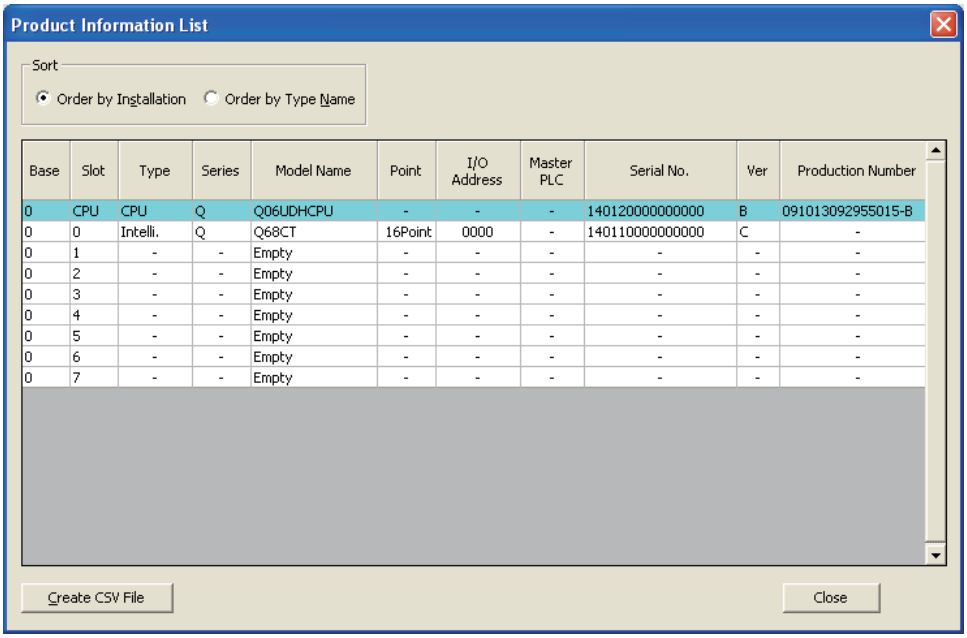
The function version and serial number on the rating plate are also shown on the front part (bottom part) of the module.



(3) Checking on the system monitor

The function version and serial number can be checked on the "Product Information List" window.

[Diagnostics]➪[System Monitor...]➪ Product Information List



(a) Displaying product number

For the CT input module, "-" is displayed since the product number display is not supported.

Point

The serial number displayed on the product information list of a programming tool may differ from that on the rating plate and on the front part of the module.

- The serial number on the rating plate and front part of the module indicates the management information of the product.
- The serial number displayed on the product information list of a programming tool indicates the function information of the product. The function information of the product is updated when a new function is added.

CHAPTER 3 SPECIFICATIONS

This chapter describes general specifications, performance specifications, I/O conversion characteristics, accuracy, and functions.

3.1 General Specifications

For the general specifications of the CT input module, refer to the following.

QCPU User's Manual (Hardware Design, Maintenance and Inspection)

3.2 Performance Specifications

This section describes the performance specifications of the CT input module.

3.2.1 Performance specifications list

The following table lists the performance specifications of the CT input module.

Item		Specifications		
Number of input points		8 points (8 channels)		
Operation method		Effective value operation		
Input range		0 to 5AAC	0 to 50AAC	0 to 100AAC
		0 to 200AAC	0 to 400AAC	0 to 600AAC
Digital output	Converted current value	0 to 12000		
	Scaling value	-32768 to 32767		
Input frequency		50/60Hz		
Excessive input		200% for 1 minute, 150% for continuous time		
I/O characteristics, maximum resolution		**Input range**	**Digital output value**	**Maximum resolution**
		0 to 5AAC	0 to 10000	0.5mA
		0 to 50AAC		5mA
		0 to 100AAC		10mA
		0 to 200AAC		20mA
		0 to 400AAC		40mA
		0 to 600AAC		60mA
Accuracy (accuracy for the maximum digital output value)[*1*2]	Ambient temperature 25 ± 5°C	Within ± 0.5% (±50 digits)		
	Ambient temperature 0 to 55°C	Within ± 1.0% (±100 digits)		
Sampling cycle[*3]		10ms/8CH	20ms/8CH	50ms/8CH 100ms/8CH
Response time[*4]		0.4s or less		
Number of access to the non-volatile memory		Up to 10^{12} times		
Isolation method		Between input terminals and the programmable controller power supply: Transformer Between input channels: No isolation		
Dielectric withstand voltage		Between I/O terminals and the programmable controller power supply: 1500VACrms for 1 minute		
Insulation resistance		Between I/O terminals and the programmable controller power supply: 500VDC 10MΩ or higher		
Number of occupied I/O points		16 points (I/O assignment: 16 points for intelligent)		
External connection system		18-point terminal block		
Applicable wire size		0.3 to 0.75mm^2		
Applicable solderless terminal		R1.25-3 (Do not use a solderless terminal with an insulation sleeve.)		
Internal current consumption (5VDC)		0.35A		
Weight		0.19kg		

*1 Except in case when the CT input module is influenced by noise

*2 The accuracy when a CT is connected is a sum of the CT input module's accuracy and the CT's accuracy.
The following is the formula to calculate accuracy.
(Accuracy) = (Accuracy of the CT input module) + (Accuracy of the CT to be used)
For the accuracy of the CT to be used, contact its manufacturer.

*3 The default value is 10ms/8CH.

*4 Response time complies with IEC 60688.
The larger one of the following
- The time from when the CT input changes from 0 to 90% till when the converted digital value reaches 90% ± 1%
- The time from when the CT input changes from 100 to 10% till when the converted digital value reaches 10% ± 1%

3.2.2 I/O conversion characteristics

An I/O conversion characteristic is expressed with the slope of the line connecting an offset value and gain value when a CT input value (current) is converted to a digital value.

(1) Offset value

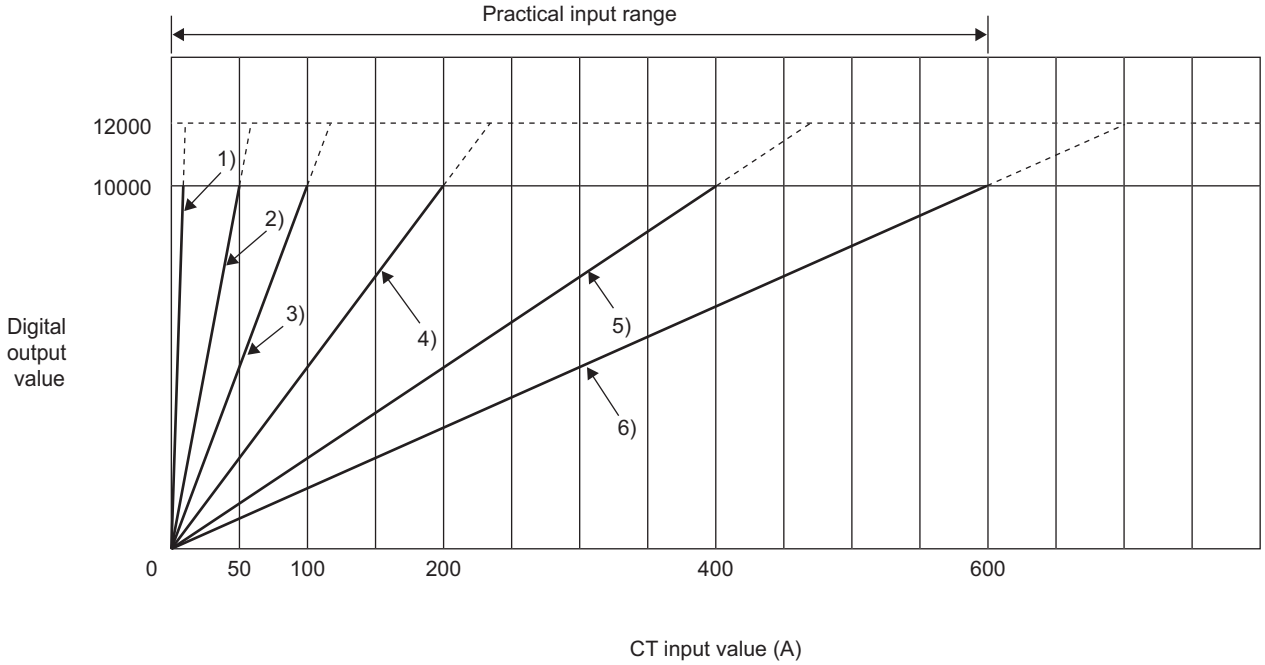
This is the CT input value (current) converted to the digital output value of 0.

(2) Gain value

This is the CT input value (current) converted to the digital output value of 10000.

(3) I/O conversion characteristics

The following graph shows the I/O conversion characteristics.



No.	Input range setting	Offset value	Gain value	Digital output value*1	Maximum resolution
1)	0 to 5AAC	0A	5A	0 to 10000	0.5mA
2)	0 to 50AAC	0A	50A		5mA
3)	0 to 100AAC	0A	100A		10mA
4)	0 to 200AAC	0A	200A		20mA
5)	0 to 400AAC	0A	400A		40mA
6)	0 to 600AAC	0A	600A		60mA

*1 If an analog value is input exceeding the digital output range, the digital output value is fixed to the maximum (12000) or minimum (0).

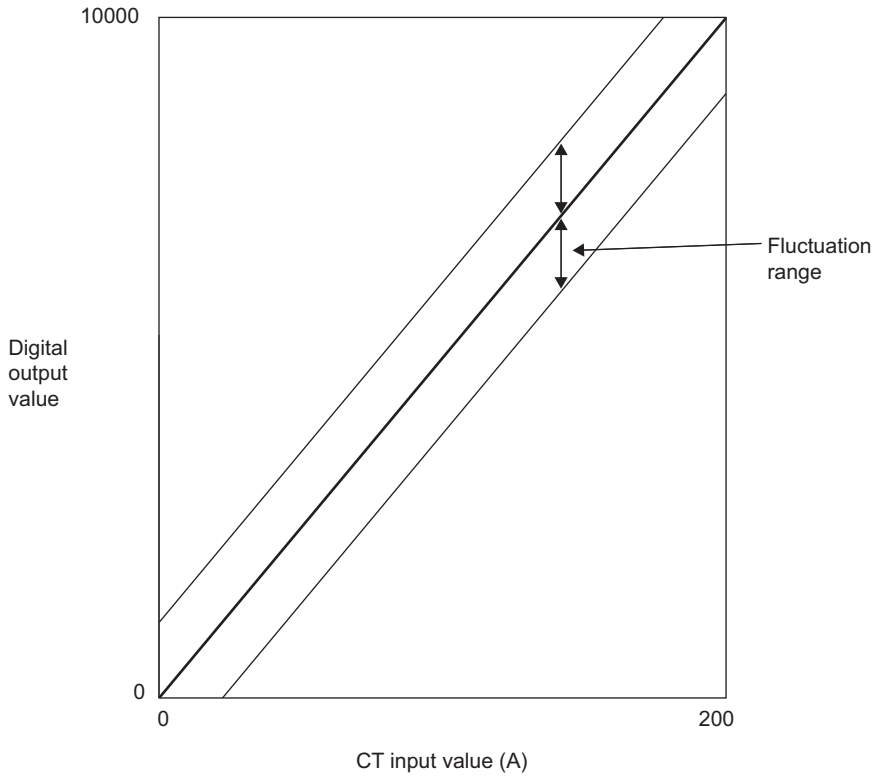
Point

- Use the CT input module so that the input and output are within the specified practical ranges. If a value is out of the range, the maximum resolution and accuracy may not fall within the range described in performance specifications. (Avoid values on the dotted line region in the graph of I/O conversion characteristics.)
- For each input range, avoid inputting a value that exceeds the one in the following table to the CT. (Avoid inputting the value that is 150% or more over the maximum input range.) Elements may be damaged.

Input range setting	CT input value (primary current value of a CT)
0 to 5AAC	7.5A or more
0 to 50AAC	75A or more
0 to 100AAC	150A or more
0 to 200AAC	300A or more
0 to 400AAC	600A or more
0 to 600AAC	900A or more

3.2.3 Accuracy

The accuracy of the CT input module is measured for the maximum digital output value.
Even if the offset/gain setting or input range was changed to change input characteristics, the accuracy remains the same, and is kept within the range described in performance specifications.
The following graph shows the fluctuation range of accuracy when the range of 0 to 200AAC is selected.
The accuracy is ±0.5% (±50 digits) when the ambient temperature is 25 ± 5°C, and ±1.0% (±100 digits) when the ambient temperature is 0 to 55°C (excluding the case under noise effect).



3.2.4 Number of parameter settings

Set initial settings and auto refresh settings of the CT input module so that the number of parameters, including those of other intelligent function modules, does not exceed the number of parameters that can be set in the CPU module. For the maximum number of parameters that can be set in the CPU module, refer to the following.

QCPU User's Manual (Hardware Design, Maintenance and Inspection)

(1) Number of CT input module parameters

For a CT input module, the following number of parameters can be set.

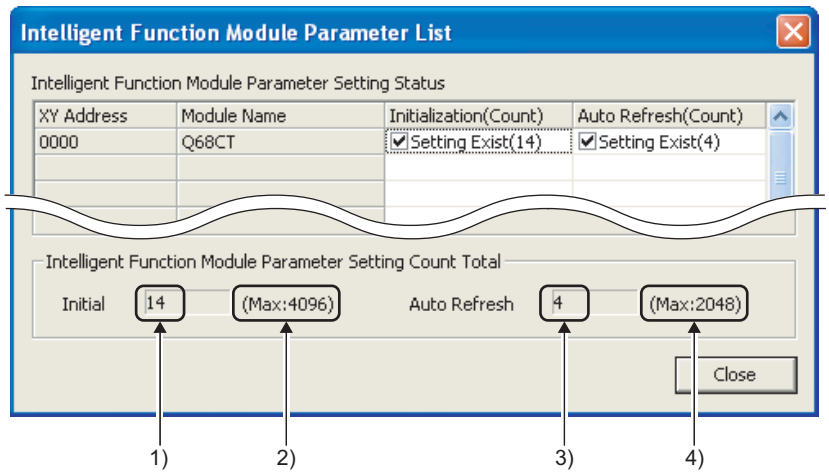
Model	Initial setting	Auto refresh setting
Q68CT	14	89 (maximum)

(2) Checking method

The maximum number of parameter settings and the number of parameter settings set for the intelligent function module can be checked on the following.

Project window⇨[Intelligent Function Module]⇨Right-click

⇨[Intelligent Function Module Parameter List...]



No.	Description
1)	The total number of parameters in initial settings checked on the window
2)	The maximum number of parameter settings in initial settings
3)	The total number of parameters in the auto refresh setting checked on the window
4)	The maximum number of parameter settings in the auto refresh setting

3.3 Function list

The following is the function list of the CT input module.

Item			Description	Reference
Input range setting			An input range can be selected for each channel depending on a measured target from the following ranges. • Factory default ranges (0 to 5AAC, 0 to 50AAC, 0 to 100AAC, 0 to 200AAC, 0 to 400AAC, and 0 to 600AAC) • User ranges (0 to 5AAC, 0 to 50AAC, 0 to 100AAC, 0 to 200AAC, 0 to 400AAC, and 0 to 600AAC)	Page 36, Section 4.2
Conversion enable/disable function			Digital conversion can be enabled or disabled for each channel.	Page 37, Section 4.3
Sampling cycle switching function			A sampling cycle can be selected from 10ms/8CH, 20ms/8CH, 50ms/8CH, or 100ms/8CH.	Page 37, Section 4.4
Digital conversion method	Sampling processing		CT input values are converted to digital values in each sampling cycle. The converted values are stored as digital output values in the buffer memory.	Page 38, Section 4.5.1 (1)
	Averaging process	Time average	Digital conversion is performed for a set time, and a sum of the converted values except the maximum and minimum values is averaged. The averaged values are stored in the buffer memory.	Page 39, Section 4.5.1 (2) (a)
		Count average	Digital conversion is performed the set number of times, and a sum of the converted values except the maximum and minimum values is averaged. The averaged values are stored in the buffer memory.	Page 39, Section 4.5.1 (2) (b)
		Moving average	Digital output values for the specified number of times are averaged in each sampling cycle. The averaged values are stored in the buffer memory.	Page 40, Section 4.5.1 (2) (c)
	Primary delay filter		Depending on the set time constant, digital output values with smoothed noise can be obtained.	Page 41, Section 4.5.1 (3)
Input signal error detection function			Overrange of a CT input value (excess of a peak value) can be detected. Since a CT input module can detect that a high current out of range flew through a measured target, an error on the measured target is monitored easily.	Page 44, Section 4.6
Peak current detection function			When digital output values exceed the set peak current detection value consecutively for the duration of the peak current detection time set in advance, an error can be detected.	Page 46, Section 4.7
Dropout function			When an input current is around 0A, a CT's conversion accuracy is low. To avoid digital output of such an unstable CT input value, digital output values within the set value can be dropped to 0 forcibly.	Page 49, Section 4.8
Scaling function			A digital output value can be scaled into a value within the range of the set scaling upper limit value to lower limit value. The sequence programming for scale conversion can be omitted.	Page 50, Section 4.9
Warning output function	Process alarm		When a digital output value enters the alert output range set in advance, an alert is output.	Page 53, Section 4.10 (1)
	Rate alarm		When a change rate of a digital output value is equal to or more than the rate alarm upper limit value (%/s) or that is equal to or less than the rate alarm lower limit value (%/s), an alert is output.	Page 55, Section 4.10 (2)
Maximum value/minimum value hold function			The maximum and minimum of digital output values or scaling values are stored to the buffer memory for each channel.	Page 59, Section 4.11
Logging function			A digital output value or scaling value can be logged. 5000 data can be logged for each channel.	Page 60, Section 4.12

Item	Description	Reference
Set value backup function	Set values in the buffer memory can be backed up into the non-volatile memory. Since backup data are restored at the next start-up, programs for initial settings are not required after the set value backup function was executed.	Page 72, Section 4.13
Default setting registration function	Values in the buffer memory can be changed back to the default.	Page 73, Section 4.14
Offset/gain setting	A slope of I/O conversion characteristics can be changed.	Page 150, Section 8.5
Error history function	Errors and alarms occurred in the CT input module are stored up to the latest 16 records in the buffer memory.	Page 74, Section 4.15
Module error collection function	Errors and alarms occurred in the CT input module can be collected into the CPU module.	Page 77, Section 4.16
Error clear function	When an error occurs, the error can be cleared on the system monitor.	Page 78, Section 4.17
Online module change	A module can be replaced without stopping the system.	Page 182, CHAPTER 10

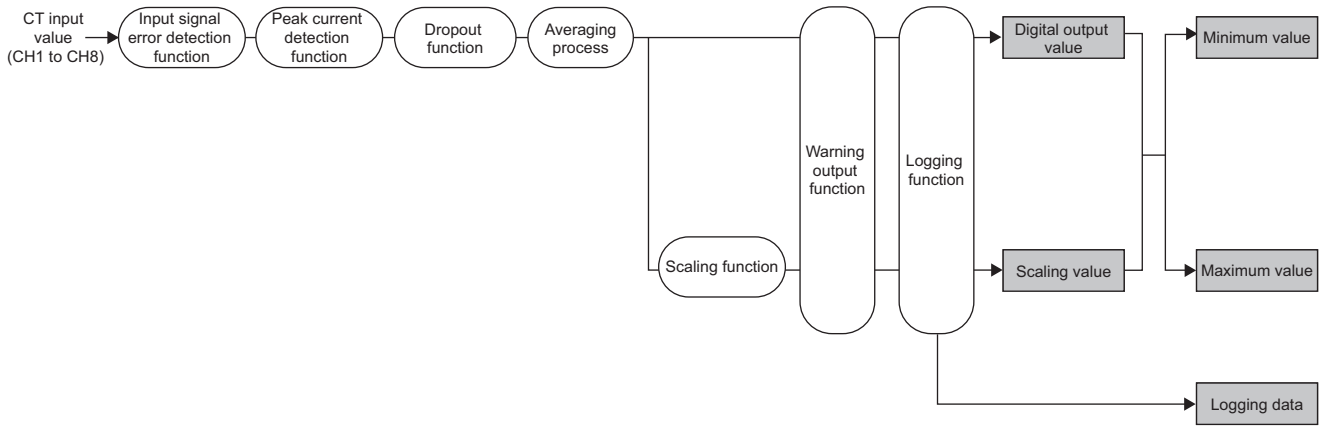
CHAPTER 4 FUNCTIONS

This chapter describes the details of the CT input module's function, and the setting procedures for the functions. For details on I/O signals and the buffer memory, refer to the following.

- Details of I/O Signals (☞Page 80, Section 5.2)
- Details of Buffer Memory Addresses (☞Page 106, Section 6.2)

4.1 Processing Each Function

A CT input value and digital value are processed in the following order. If multiple functions are enabled, the output of the first-processed function is used as the input for the next function.



(1) CT input value

This is an alternating current value measured using a CT. This is a primary current which a CT imports.

(2) Digital output value

A digital value after the sampling processing or an averaging process was performed.

(3) Scaling value

This is a digital output value which was performed scale conversion.

(4) Maximum and minimum values

Either of the following are stored.

- The maximum and minimum digital output values (when the scaling function is disabled.)
- The maximum and minimum scaling values (when the scaling function is enabled.)

(5) Logging data

A digital output value or scaling value is collected.

4.2 Input Range Setting

An input range can be selected for each channel depending on the CT to be connected.
Select a factory default range normally. If the slope of I/O conversion characteristics is changed, select a user range and configure the offset/gain setting.

Point

- Select an input range depending on the CT to be connected. In case of excessive input, safety problems such as heat generation may occur.
- If a set input value is not supported by the CT to be connected, and Operating condition setting request (Y9) is turned on then off, an input signal error may occur.
  If an input signal error occurs, check if the input range setting is supported by the connected CT. If the input range setting is incorrect, reset the setting.
  For details on the input signal error detection function, refer to the following.
  - Input Signal Error Detection Function (☞Page 44, Section 4.6)

(1) Setting procedure

1. **Set values to CH□ Input range setting (Un\G150 to Un\G157) depending on the CT to be connected.**

Input range		Setting value
Factory default range	0 to 5AAC	0000_H
	0 to 50AAC	0001_H
	0 to 100AAC	0002_H
	0 to 200AAC	0003_H
	0 to 400AAC	0004_H
	0 to 600AAC	0005_H
User range	0 to 5AAC	0010_H
	0 to 50AAC	0011_H
	0 to 100AAC	0012_H
	0 to 200AAC	0013_H
	0 to 400AAC	0014_H
	0 to 600AAC	0015_H

2. **Turn on then off Operating condition setting request (Y9).**

(2) When using a user range

- Set 0010_H to 0015_H to CH□ Input range setting (Un\G150 to Un\G157) depending on the CT to be connected.
- Configure the offset/gain setting. For the offset/gain setting, refer to ☞Page 150, Section 8.5.
- One offset value and one gain value are saved in the CT input value as the user range setting for each channel. When connecting a new CT to a channel where a user range was set with a different CT before, configure the offset/gain setting again.

4.3 Conversion Enable/Disable Function

Set whether to enable or disable the digital conversion for each channel.

(1) Setting procedure

1. **Set Enable (0) or Disable (1) to Conversion enable/disable setting (Un\G0).**
2. **Turn on then off Operating condition setting request (Y9).**

4.4 Sampling Cycle Switching Function

A sampling cycle can be selected from one of the following.

- 10ms/8CH
- 20ms/8CH
- 50ms/8CH
- 100ms/8CH

(1) Setting procedure

1. **Set a sampling cycle to Sampling cycle setting (Un\G26).**

Item	Setting
Sampling cycle setting (Un\G26)	• 10ms/8CH (0) • 20ms/8CH (1) • 50ms/8CH (2) • 100ms/8CH (3)

2. **Turn on then off Operating condition setting request (Y9).**

Point

Digital conversion is performed in the set sampling cycle regardless of the number of conversion enabled channels.

4.5 Digital Conversion Method

One of the following digital conversion methods can be set for each channel.

- Sampling processing
- Averaging process
- Primary delay filter

For the operation of each digital conversion method, refer to the following.

- Operations of digital conversion methods (☞Page 38, Section 4.5.1)

For the setting procedure for each digital conversion method, refer to the following.

- Setting procedures for digital conversion methods (☞Page 43, Section 4.5.2)

4.5.1 Operations of digital conversion methods

(1) Sampling processing

CT input values are converted to digital values in each set sampling cycle. The converted values are stored as digital output values in the buffer memory.

(2) Averaging process

Digital output values are averaged for each channel. The averaged values are stored as digital output values in the buffer memory.

There are three types of averaging process as follows:

- Time average
- Count average
- Moving average

(a) Time average

Digital conversion is performed for the duration of the set time, and a sum of the converted values except the maximum and minimum values is averaged. The averaged value is stored in the buffer memory.
The number of processing within the duration of the set time varies depending on the set time and sampling cycle.

$$\text{Number of processing} = \frac{\text{Set time}}{\text{Sampling cycle}}$$

Ex. The number of processing is as follows in case of the settings below.

Item	Setting
Sampling cycle	50ms/8CH
Set time	380ms

$$\frac{380}{50} = 7.6 \text{ (times)} \cdots \text{Figures after the decimal point are omit.}$$

→ Conversion is processed seven times to output the average value.

Point

The valid lower limit setting value for a time average is calculated as: "(Minimum 4 times) × (Sampling cycle)".

Ex. When the sampling cycle is 50ms/8CH:
4 × 50 = 200ms
If the number of processing is less than four due to the set time, the error (error code: 20□) occurs and the digital output value becomes 0.

(b) Count average

Digital conversion is performed the set number of times, and a sum of the converted values except the maximum and minimum values is averaged. The averaged value is stored in the buffer memory.
The processing time that takes to store the averaged value of count average in the buffer memory varies depending on the sampling cycle.

$$\text{Processing time} = \text{Set number of times} \times \text{Sampling cycle}$$

Ex. The processing time is as follows in case of the settings below.

Item	Setting
Sampling cycle	50ms/8CH
Set number of times	20 times

20 × 50 = 1000 (ms) → The averaged value is output in each 1000ms.

Point

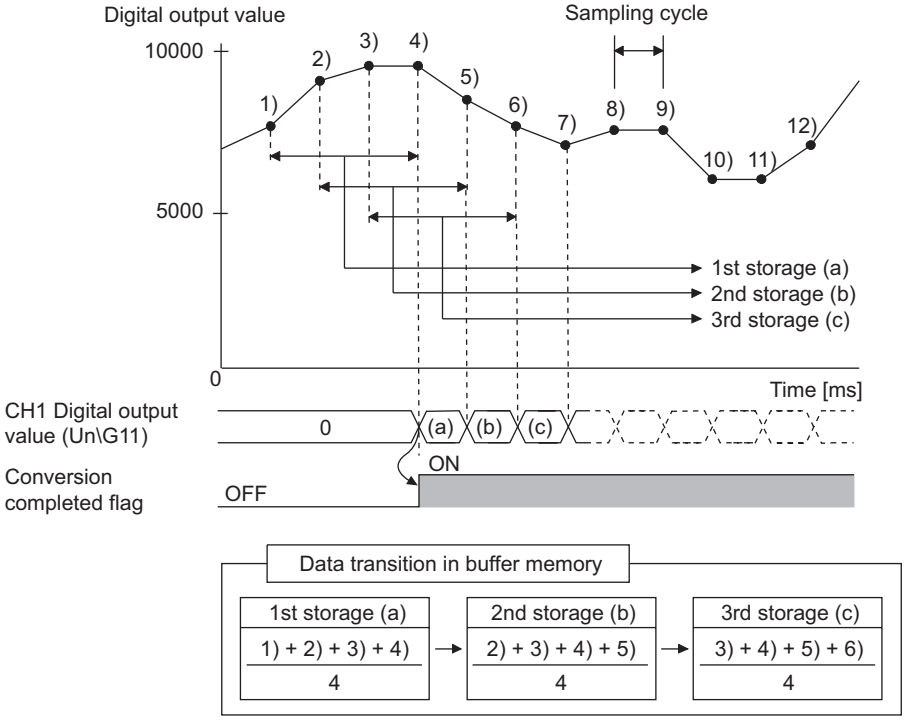
Since the count average requires a sum of at least two digital conversions besides the maximum and minimum values, the set number of times must be four or more.

(c) Moving average

Digital output values of the number of specified times are averaged in each sampling cycle. The averaged values are stored in the buffer memory.

Digital output values to be averaged move one by one in each sampling cycle as below.

Ex. Moving average processing of when the set number of times is four



(3) Primary delay filter

Depending on the set time constant, digital output values with smoothed noise can be obtained. A smoothing degree varies by setting the time constant.

The following are the relational expressions of time constants and digital output values.

[n = 1]*1

$Y_n = 0$

[n = 2]

$$Y_n = y_{n-1} + \frac{\Delta t}{\Delta t + TA} (y_n - y_{n-1})$$

[n ≥ 3]

$$Y_n = Y_{n-1} + \frac{\Delta t}{\Delta t + TA} (y_n - Y_{n-1})$$

Y_n	:	Present digital output value	y_n	:	Digital output value before smoothing
Y_{n-1}	:	Last digital output value	y_{n-1}	:	Last digital output value before smoothing
n	:	Number of sampling processing	Δt	:	Sampling cycle
TA	:	Time constant*2 (ms)			

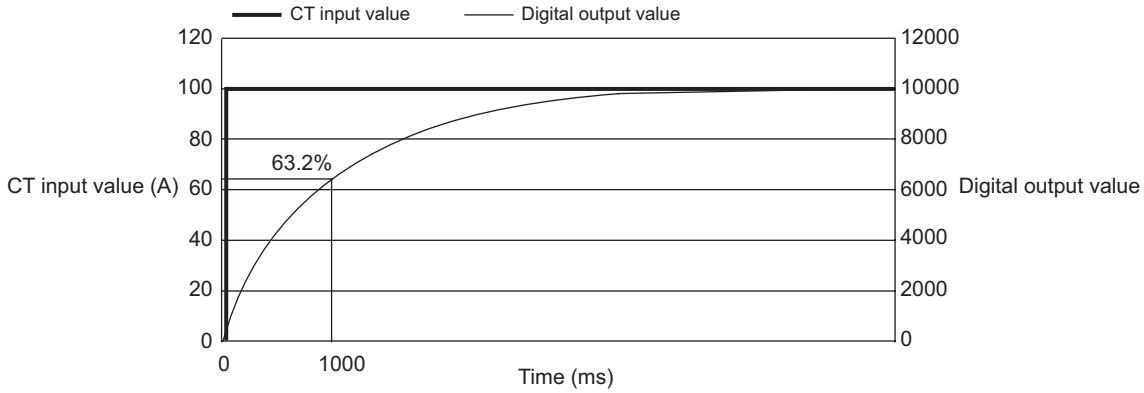
*1 When n is 2 or larger, Conversion completed (1) is stored in Conversion completed flag (Un\G10).

*2 Set a value which is equal to or larger than the sampling cycle. If the time constant is smaller than the sampling cycle, the error (error code: 32□) occurs, and the digital output value becomes 0.

Ex. 1: Change of digital output values under the following conditions

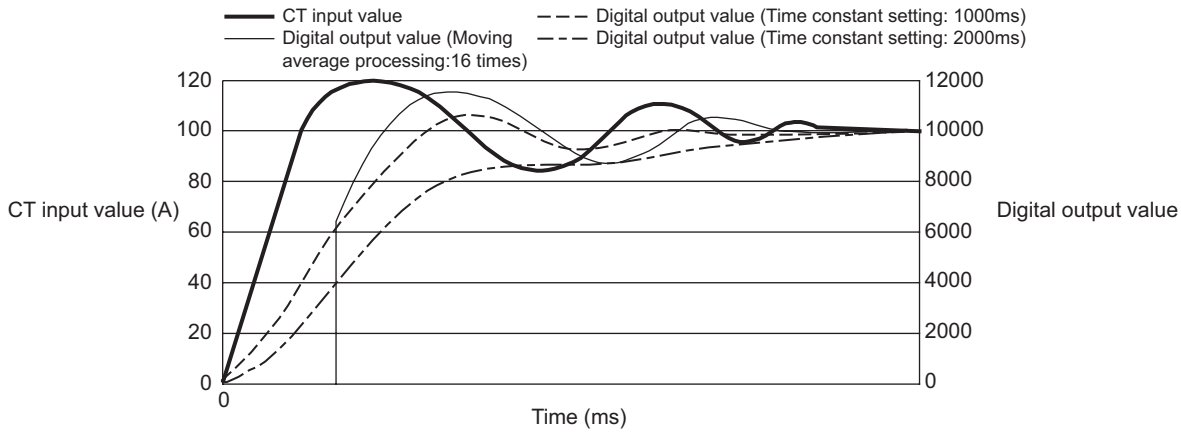
- Input range: 0 to 100AAC
- Sampling cycle: 10ms/8CH
- Time constant setting: 1000ms (1s)
- CT input value: changed from 0A to 100A

When 1000ms passes after the CT input value reaches 100A, the digital output value with a primary delay filter reaches 63.2% of the digital output value in the sampling process.



Ex. 2: When CT input values form a ringing waveform, change of digital output values in the following conditions

- Time constant setting: 2000ms (2s)
- Time constant setting: 1000ms (1s)
- Moving average processing: 16 times



4.5.2 Setting procedures for digital conversion methods

(1) Sampling processing

1. **Set Enable (0) to Conversion enable/disable setting (Un\G0).**
2. **Set Sampling processing (0) to Averaging process setting (Un\G24, Un\G25).**
3. **Turn on then off Operating condition setting request (Y9).**

(2) Averaging process and primary delay filter

1. **Set Enable (0) to Conversion enable/disable setting (Un\G0).**
2. **Set digital conversion methods to Averaging process setting (Un\G24, Un\G25).**

Item	Setting
Averaging process setting (Un\G24, Un\G25)	• Time average (1) • Count average (2) • Moving average (3) • Primary delay filter (4)

3. **Set values to CH□ Average time/Average number of times/Moving average/Time constant settings (Un\G1 to Un\G8)**

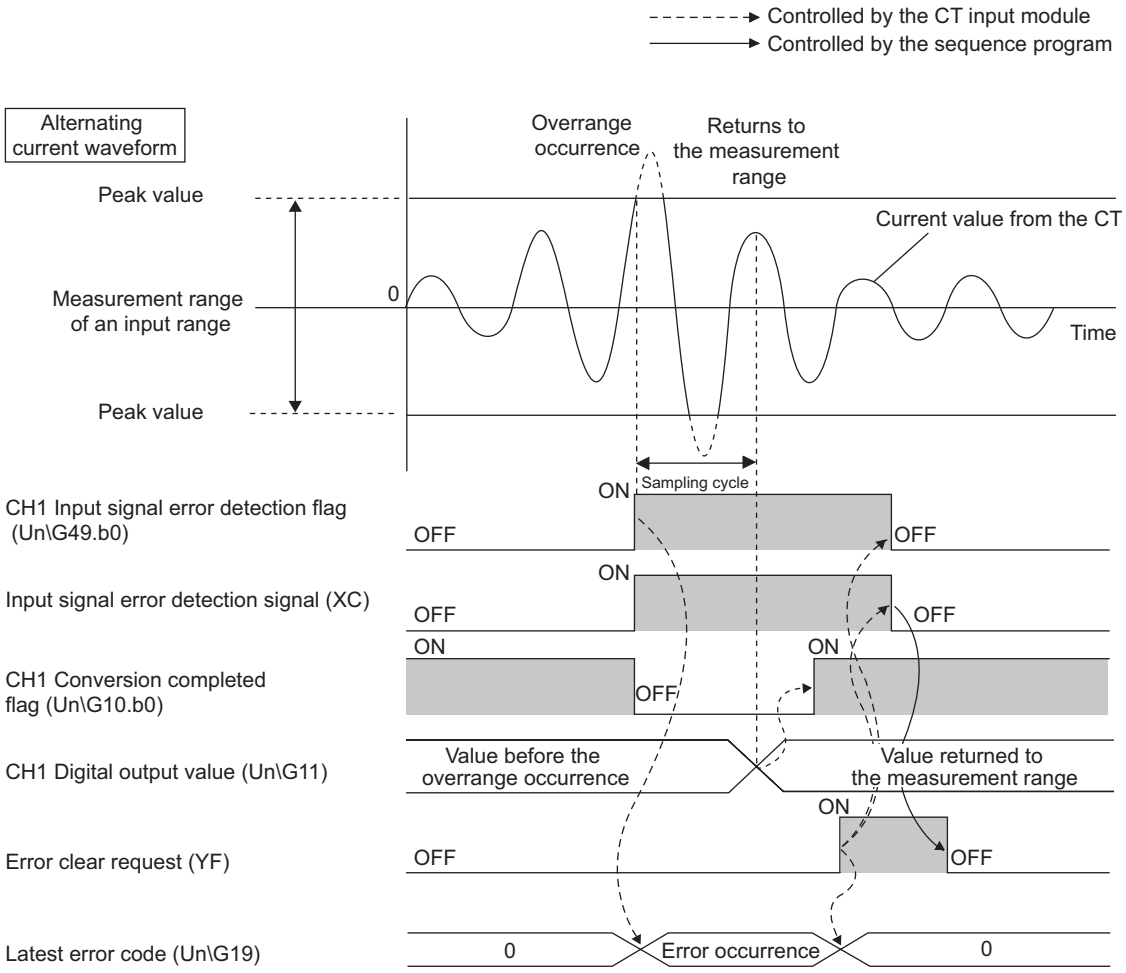
Item	Processing	Setting range
CH□ Average time/Average number of times/Moving average/Time constant settings (Un\G1 to Un\G8)	Time average	40 to 5000 (ms)*1
	Count average	4 to 500 (times)
	Moving average	2 to 1000 (times)
	Primary delay filter	10 to 10000 (ms)*1

*1 Set an integral multiple of the sampling cycle. If not, digital output values are averaged in the maximum cycle that satisfies both of the following.
• Duration of the set time or less
• Integral multiple of the sampling cycle
In addition, set a value per 10ms unit. A value per 1ms unit is rounded off.

4. **Turn on then off Operating condition setting request (Y9).**

4.6 Input Signal Error Detection Function

Overrange of a CT input value (excess of a peak value) can be detected. Since a CT input module can detect that a high current out of range flew through a measured target, an error on the measured target is monitored easily.



(1) Detection level of Input signal errors

The level of current that is detected as an input signal error depends on the input range setting. The current level is about 125% of the gain value for the input range.

Input range setting	Detection level
Factory default range 0 to 5AAC User range 0 to 5AAC	Approximately 6.25AAC
Factory default range 0 to 50AAC User range 0 to 50AAC	Approximately 62.5AAC
Factory default range 0 to 100AAC User range 0 to 100AAC	Approximately 125AAC
Factory default range 0 to 200AAC User range 0 to 200AAC	Approximately 250AAC
Factory default range 0 to 400AAC User range 0 to 400AAC	Approximately 500AAC
Factory default range 0 to 600AAC User range 0 to 600AAC	Approximately 750AAC

(2) Notifying an input signal error

When a CT input value exceeds the input range, an input signal error is notified as follows.

- Input signal error (1) is stored in Input signal error detection flag (Un\G49).
- Input signal error detection signal (XC) turns on.
- The ALM LED flashes.
- Alarm code 110☐ is stored in Latest error code (Un\G19).
  Alarm codes are stored as below.

(3) Operation of the input signal error detection function

In addition, Converting or unused (0) is stored in Conversion completed flag (Un\G10) on the corresponding channel, and Conversion completed flag (XE) turns off.
When the CT input value returns within the input range, the digital conversion resumes regardless of reset of Input signal error detection flag (Un\G49) and Input signal error detection signal (XC). Conversion completed (1) is stored in Conversion completed flag (Un\G10) on the corresponding channel after the first update of a digital output value. (The ALM LED is flashing.)

(4) Detection cycle

This function is executed in each sampling cycle.

(5) Clearing the input signal error detection

After the CT input value returns within the input range, turn on then off Error clear request (YF).
When the input signal error is cleared, the CT input module results in the following states:

- Input signal error detection flag (Un\G49) is cleared.
- Input signal error detection signal (XC) turns off.
- The ALM LED turns off.
- The alarm code 110☐ which is stored in Latest error code (Un\G19) is cleared.

(6) Setting procedure

1. **Set Enable (0) to Conversion enable/disable setting (Un\G0).**
2. **Set Enable (0) to Input signal error detection setting (Un\G47).**
3. **Turn on then off Operating condition setting request (Y9).**

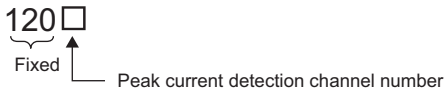
4.7 Peak Current Detection Function

An abnormal current value from a CT can be detected. The peak current occurred excessively at a system start-up or an overload of devices can be detected using the peak current detection function. Doing so improves maintainability of devices and the failure diagnosis for a measured target.

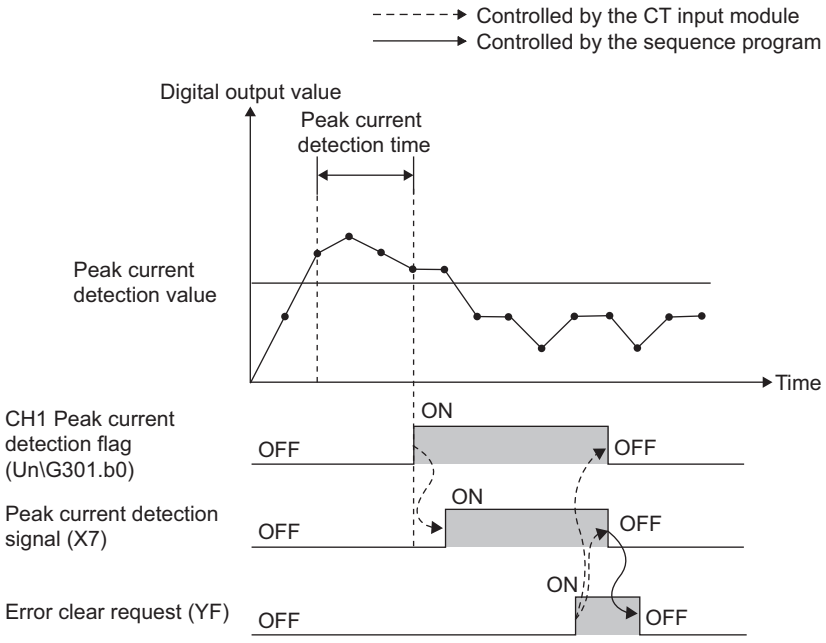
(1) Notifying the peak current detection

When CH☐ Digital output value (Un\G11 to Un\G18) exceeds set CH☐ Peak current detection value (Un\G326 to Un\G333) consecutively for the duration of set CH☐ Peak current detection time (Un\G318 to Un\G325), an error is notified as follows.

- Peak current detected (1) is stored in Peak current detection flag (Un\G301).
- Peak current detection signal (X7) turns on.
- The ALM LED flashes.
- Alarm code 120☐ is stored in Latest error code (Un\G19).
  Alarm codes are stored as below.

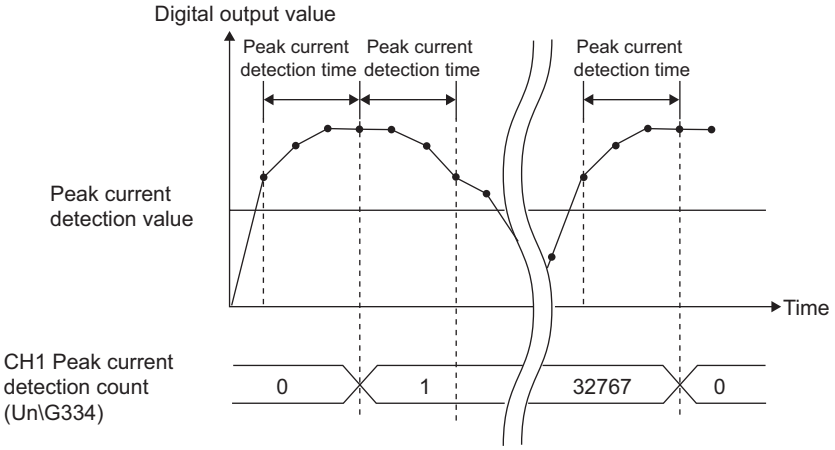


However, digital conversion on the channel where an error is notified was held.



(2) Counting the peak current detection

- The number of peak current detection is stored in CH☐ Peak current detection count (Un\G334 to Un\G341).
- When a peak current is detected, 1 is added in CH☐ Peak current detection count (Un\G334 to Un\G341). However, next addition is not performed unless a digital output value falls below the peak current detection value once.
- CH☐ Peak current detection count (Un\G334 to Un\G341) is saved automatically in the non-volatile memory in the CT input module. When the module starts up by turning off then on, or resetting the CPU module, the saved detection count is read in CH☐ Peak current detection count (Un\G334 to Un\G341). Therefore, the number of peak current detection is not cleared even after the power supply was turned off then on, or the CPU module was reset.
- The count range of CH☐ Peak current detection count (Un\G334 to Un\G341) is 0 to 32767. When the number of peak current detection exceeds the upper limit of the count range, the number returns to 0.

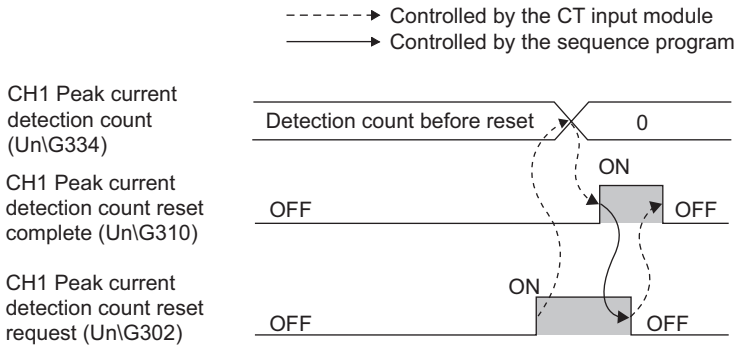


Point

When a digital output value has exceeded the peak current detection value at power on, the number of peak current detection is added 1.

(a) Resetting the number of peak current detection

To reset the number of peak current detection, store Reset requested (1) in CH☐ Peak current detection count reset request (Un\G302 to Un\G309). 0 is stored in CH☐ Peak current detection count (Un\G334 to Un\G341). After the reset was completed, Reset request completed (1) is stored in CH☐ Peak current detection count reset complete (Un\G310 to Un\G317).



(3) Peak current detection time

The setting range of CH☐ Peak current detection time (Un\G318 to Un\G325) is 10 to 10000ms.
Set CH☐ Peak current detection time (Un\G318 to Un\G325) to an integral multiple of the sampling cycle.
When CH☐ Peak current detection time (Un\G318 to Un\G325) is not set as the integral multiple of the sampling cycle, the peak current is detected in the maximum cycle that satisfy both of the following.

- Peak current detection time or less
- Integral multiple of the sampling cycle

Ex. When the sampling cycle setting and peak current detection time is set to 100ms/8CH and 950ms, the peak current is detected in 900ms intervals (integral multiple of 100ms).

(4) Clearing the notification of the peak current detection

Check that a digital output value is the peak current detection value or less, and turn on then off Error clear request (YF).
When the notification of the peak current detection is cleared, the CT input module results in the following states:

- Peak current detection flag (Un\G301) is cleared.
- Peak current detection signal (X7) turns off.
- The ALM LED turns off.
- The alarm code 120☐ which is stored in Latest error code (Un\G19) is cleared.

Point

When Error clear request (YF) is turned on then off in the condition where a digital output value exceeds the peak current detection value, the peak current detection is notified again after a lapse of the peak current detection time.

(5) Detection target

CH☐ Digital output value (Un\G11 to Un\G18) is a target regardless of the use of the scaling function.

(6) Setting procedure

1. **Set Enable (0) to Conversion enable/disable setting (Un\G0).**
2. **Set Enable (0) to Peak current detection setting (Un\G300).**
3. **Set values to CH☐ Peak current detection time (Un\G318 to Un\G325) and CH☐ Peak current detection value (Un\G326 to Un\G333).**

Item	Setting range
CH☐ Peak current detection time (Un\G318 to Un\G325)	10 to 10000 (ms)*1
CH☐ Peak current detection value (Un\G326 to Un\G333)	0 to 11999

*1 Set an integral multiple of the sampling cycle. If not, the peak current is detected in the maximum cycle that satisfies both of the following.
• Peak current detection time or less
• Integral multiple of the sampling cycle
In addition, set a value per 10ms unit. A value per 1ms unit is rounded off.

4. **Turn on then off Operating condition setting request (Y9).**

4.8 Dropout Function

When an input current is around 0A, a CT's conversion accuracy is low. To avoid digital output of such an unstable CT input value, digital output values within the set value can be dropped to 0 forcibly.

(1) Operation of the dropout function

When the value in CH☐ Digital output value (Un\G11 to Un\G18) is equal to or less than the set value in CH☐ Dropout value (Un\G162 to Un\G169) in advance, 0 is stored in CH☐ Digital output value (Un\G11 to Un\G18).

(2) Setting procedure

1. **Set Enable (0) to Conversion enable/disable setting (Un\G0).**
2. **Set Enable (0) to Dropout detection setting (Un\G160).**
3. **Set values to CH☐ Dropout value (Un\G162 to Un\G169).**

Item	Setting range
CH☐ Dropout value (Un\G162 to Un\G169)	1 to 10000

4. **Turn on then off Operating condition setting request (Y9).**

Remark

To check whether the dropout function is enabled or disabled, refer to the following.

- Dropout status flag (Un\G161) (☞Page 121, Section 6.2 (23))

4.9 Scaling Function

A digital output value can be scaled into a value within the range of the set scaling upper limit value to lower limit value.
The sequence programming for scale conversion can be omitted.
The scale-converted values are stored in CH☐ Scaling value (Un\G54 to Un\G61).

(1) Concept of scaling setting

Set values corresponding to the lower limit value (0) of the input range to CH☐ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68, Un\G70, Un\G72, Un\G74, Un\G76).
Set values corresponding to the upper limit value (10000) of the input range to CH☐ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69, Un\G71, Un\G73, Un\G75, Un\G77).

(2) Calculation method for a scaling value

A value is performed scale conversion using the following formula. The scaled values after the decimal point are rounded off.

$$\text{Scaling value} = \frac{D_X \times (S_H - S_L)}{D_{Max}} + S_L$$

Item	Description
D_X	Digital output value
D_{Max}	Maximum digital output value for the used input range (10000)
S_H	Scaling upper limit value
S_L	Scaling lower limit value

(3) Setting procedure

1. **Set Enable (0) to Conversion enable/disable setting (Un\G0).**
2. **Set Enable (0) to Scaling enable/disable setting (Un\G53).**
3. **Set values to CH1 Scaling lower limit value (Un\G62) to CH8 Scaling upper limit value (Un\G77).**

Item	Setting range
CH☐ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68, Un\G70, Un\G72, Un\G74, Un\G76)	-32000 to 32000
CH☐ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69, Un\G71, Un\G73, Un\G75, Un\G77)	

4. **Turn on then off Operating condition setting request (Y9).**

Point

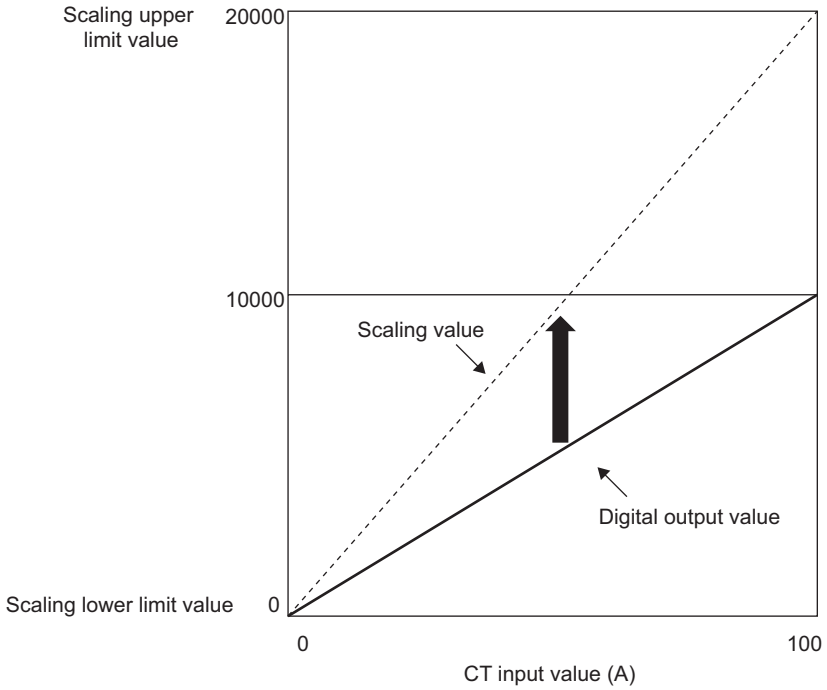
- The maximum resolution does not change regardless of the scaling upper limit value and the scaling lower limit value to be set.
  Performance specifications (☞Page 27, Section 3.2.1)
- Digital output values can be scaled in a negative slope so that the values become as follows: Scaling lower limit value > Scaling upper limit value

(4) Example settings of the scaling

Ex. 1: Setting values as: Scaling upper limit value > Scaling lower limit value

- Input range: 0 to 100AAC
- CH□ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69, Un\G71, Un\G73, Un\G75, Un\G77): 20000
- CH□ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68, Un\G70, Un\G72, Un\G74, Un\G76): 0

The digital output values and scaling values are as follows:

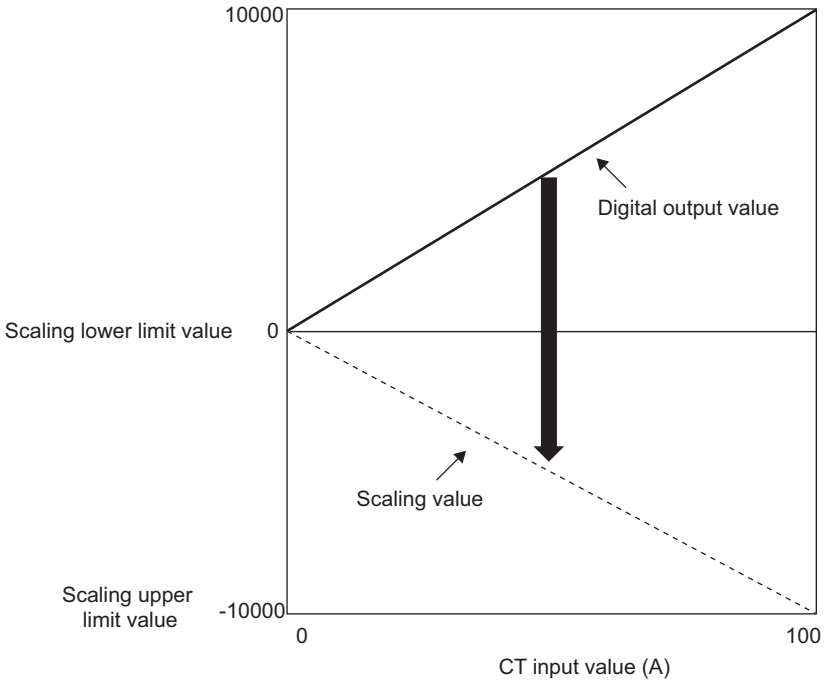


CT input value (A)	Digital output value	Scaling values
0	0	0
25	2500	5000
50	5000	10000
75	7500	15000
100	10000	20000

Ex. 2: Setting values as: Scaling upper limit value lower < Scaling lower limit value

- Input range: 0 to 100AAC
- CH□ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69, Un\G71, Un\G73, Un\G75, Un\G77): -10000
- CH□ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68, Un\G70, Un\G72, Un\G74, Un\G76): 0

The digital output values and scaling values are as follows:

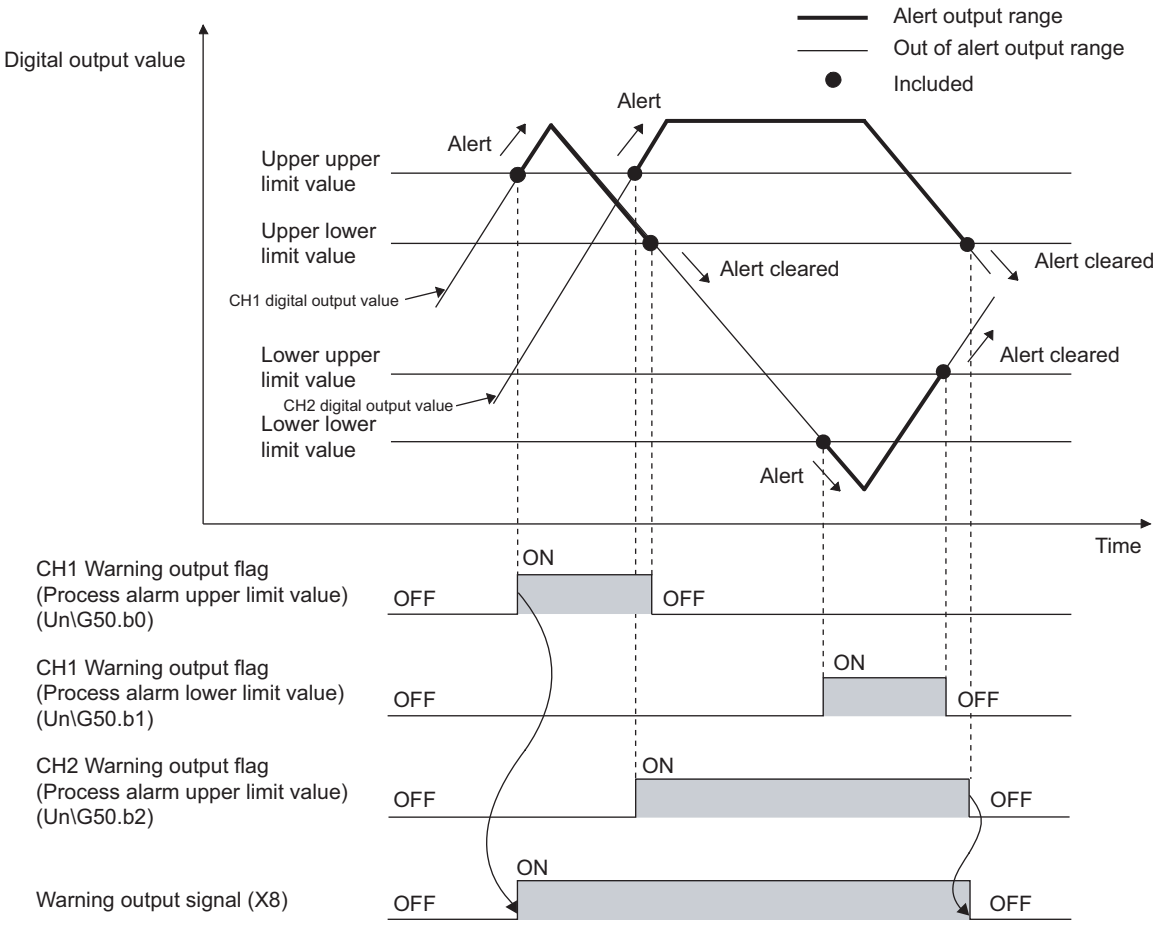


CT input value (A)	Digital output value	Scaling values
0	0	0
25	2500	-2500
50	5000	-5000
75	7500	-7500
100	10000	-10000

4.10 Warning Output Function

(1) Process alarm

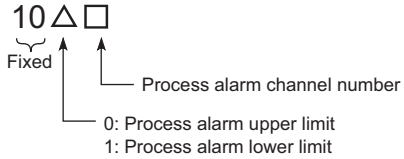
When a digital output value enters the alert output range set in advance, an alert is output.
When the scaling function is enabled, scaling values are applied to the warning detection.



(a) Operation of warning output

If a digital output value enters the alert output range (process alarm upper upper limit value or more, or process alarm lower lower limit value or less), an alert is output as follows.

- Alarm ON (1) is stored in Warning output flag (Process alarm) (Un\G50).
- Warning output signal (X8) turns on.
- The ALM LED turns on.
- Alarm code 10△□ is stored in Latest error code (Un\G19).
  Alarm codes are stored as below.



However, the digital conversion continues on the channel where an alert was output.

(b) Operation after an alert was output

After an alert was output, when a digital output value is less than the process alarm upper lower limit value or more than process alarm lower upper limit value, Normal (0) is stored in the corresponding bit of Warning output flag (Process alarm) (Un\G50) for the channel.

When digital output values in all channels are within the setting range, Warning output signal (X8) turns off, and the ALM LED turns off.

However, the alarm code 10△□ which is stored in Latest error code (Un\G19) is not cleared. Clear the alarm code 10△□ by turning on then off.

(c) Warning detection period

When time average is specified, the function is executed per set average time. When count average is specified, the function is executed per set average count.

For other digital conversion methods, the function is executed in each sampling cycle.

(d) Warning detection target

When the scaling function is enabled, CH□ Scaling value (Un\G54 to Un\G61) is applied to the warning detection.

For CH1 Process alarm lower lower limit value (Un\G86) to CH8 Process alarm upper upper limit value (Un\G117), set values considering the scale conversion.

(e) Setting procedure

1. **Set Enable (0) to Conversion enable/disable setting (Un\G0).**
2. **Set Enable (0) to Warning output setting (Un\G48).**
3. **Set values in CH1 Process alarm lower lower limit value (Un\G86) to CH8 Process alarm upper upper limit value (Un\G117).**

Item	Setting range
CH□ Process alarm upper upper limit value (Un\G89, Un\G93, Un\G97, Un\G101, Un\G105, Un\G109, Un\G113, Un\G117)	-32768 to 32767
CH□ Process alarm upper lower limit value (Un\G88, Un\G92, Un\G96, Un\G100, Un\G104, Un\G108, Un\G112, Un\G116)	
CH□ Process alarm lower upper limit value (Un\G87, Un\G91, Un\G95, Un\G99, Un\G103, Un\G107, Un\G111, Un\G115)	
CH□ Process alarm lower lower limit value (Un\G86, Un\G90, Un\G94, Un\G98, Un\G102, Un\G106, Un\G110, Un\G114)	

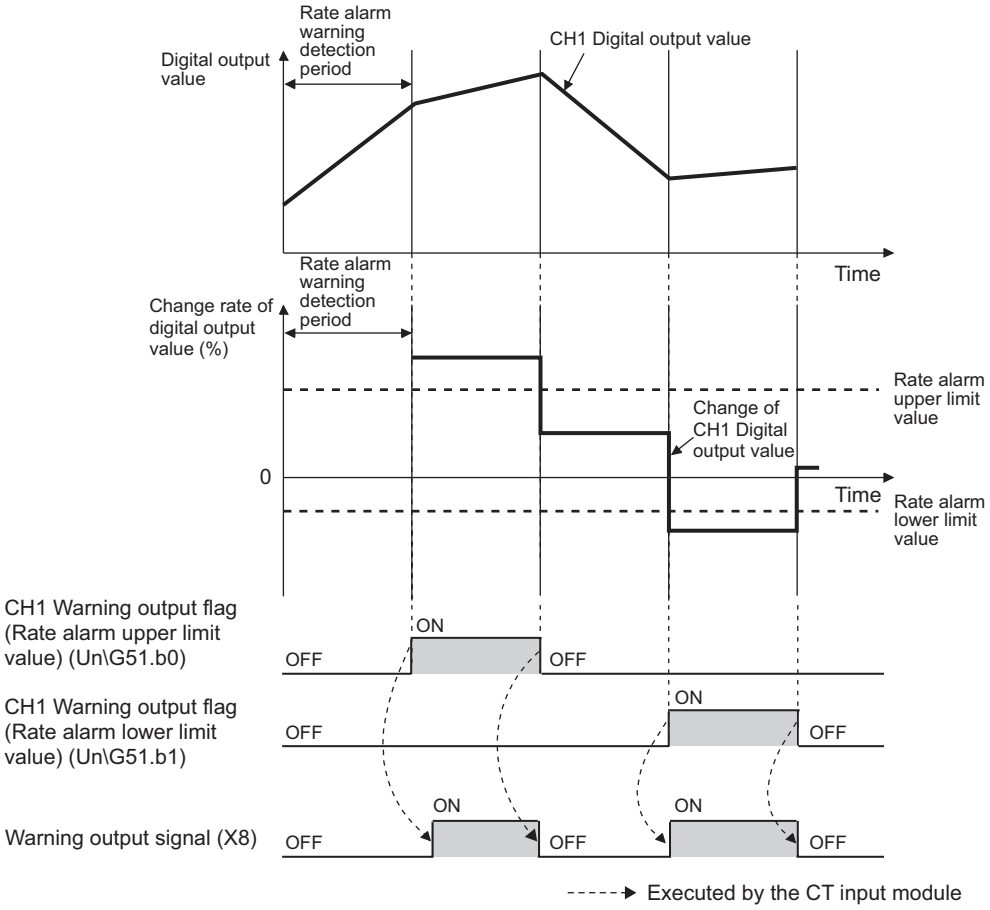
4. **Turn on then off Operating condition setting request (Y9).**

Point

Set the warning output setting as follows:
Process alarm upper upper limit value ≥ Process alarm upper lower limit value ≥ Process alarm lower upper limit value ≥ Process alarm lower lower limit value

(2) Rate alarm

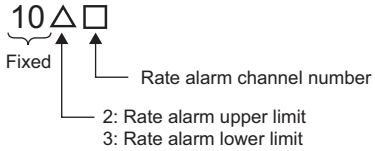
When a change rate of a digital output value is equal to or more than the rate alarm upper limit value (%/s) or that is equal to or less than the rate alarm lower limit value (%/s), an alert is output.



(a) Operation of warning output

Digital output values are monitored in each set rate alarm warning detection period. A change rate of the digital output value compared to the previous value is equal to or more than the rate alarm upper limit value (%/s) or that equal to or less than the rate alarm lower limit value (%/s), an alert is output as follows.

- Alarm ON (1) is stored in Warning output flag (Rate alarm) (Un\G51).
- Warning output signal (X8) turns on.
- The ALM LED turns on.
- Alarm code 10△□ is stored in Latest error code (Un\G19).
  Alarm codes are stored as below.



However, the digital conversion continues on the channel where an alert was output.

(b) Operation after an alert was output

When a digital output value is less than the rate alarm upper limit value or more than the rate alarm lower limit value, Normal (0) is stored in the corresponding bit of Warning output flag (Rate alarm) (Un\G51) for the channel after an alert was output.

When digital output values in all channels are within the setting range, Warning output signal (X8) turns off, and the ALM LED turns off.

However, the alarm code 10△□ which is stored in Latest error code (Un\G19) is not cleared. Clear the alarm code 10△□ by turning on then off.

(c) Warning detection period

Set a rate alarm warning detection period to CH□ Rate alarm warning detection period (Un\G118 to Un\G125). Set an integral multiple of the conversion cycle as the rate alarm warning detection period for each digital conversion method. If not, change rates are detected in the maximum cycle that satisfies both of the following.

- Rate alarm warning detection period or less
- Integral multiple of the conversion cycle

Ex. Rate alarm warning detection period in case of the following conditions

- Digital conversion method: Count average
- Average times: 10
- Sampling cycle: 100ms/8CH
- Rate alarm warning detection period: 4500ms

The conversion cycle is 1000ms (10 (times) × 100 (ms)), and a digital output value is compared in 4000ms intervals to check the change rate.

(d) Judgement of rate alarm

A change rate is judged that the rate alarm upper limit value and the rate alarm lower limit value are converted to digital values per rate alarm warning detection period. Set a rate alarm upper limit value and rate alarm lower limit value to the following buffer memory areas.

- CH□ Rate alarm upper limit value (Un\G126, Un\G128, Un\G130, Un\G132, Un\G134, Un\G136, Un\G138, Un\G140)
- CH□ Rate alarm lower limit value (Un\G127, Un\G129, Un\G131, Un\G133, Un\G135, Un\G137, Un\G139, Un\G141)

Conversion formula of judgement value for the rate alarm is as follows:

$$\text{Judgement value for rate alarm detection (digit)} = \left(\frac{R_H \text{ or } R_L}{1000}\right) \times D_{Max} \times \left(\frac{\Delta t}{1000}\right)$$

Item	Description
R_H	Rate alarm upper limit value (Unit: 0.1%/s)
R_L	Rate alarm lower limit value (Unit: 0.1%/s)
D_{Max}	Maximum digital output value of the input range: 10000
Δt	Rate alarm warning detection period (Unit: ms)

Ex. Judgement value in case of the following conditions

- Sampling cycle: 10ms/8CH
- Rate alarm warning detection period: 10 (10ms)
- Rate alarm upper limit value: 300 (30%/s)

$$\left(\frac{300}{1000}\right) \times 10000 \times \left(\frac{10}{1000}\right) = 30 \text{ [digit]}$$

The present value is compared to the previous value in 10ms intervals, and is checked if the value increased by 30 digits (0.3%).

(e) Warning detection target

CH☐ Digital output value (Un\G11 to Un\G18) is a target regardless of the use of the scaling function.

(f) Setting procedure

1. **Set Enable (0) to Conversion enable/disable setting (Un\G0).**

2. **Set Enable (0) to Warning output setting (Un\G48).**

3. **Set values to CH☐ Rate alarm warning detection period (Un\G118 to Un\G125).**

Item	Setting range
CH☐ Rate alarm warning detection period (Un\G118 to Un\G125)	10 to 5000 (ms)*1

*1 Set an integral multiple of the conversion cycle for each digital conversion method. If not, change rates are detected in the maximum cycle that satisfies both of the following.
• Rate alarm warning detection period or less
• Integral multiple of the conversion cycle
In addition, set a value per 10ms unit. A value per 1ms unit is rounded off.

4. **Set values to CH1 Rate alarm upper limit value (Un\G126) to CH8 Rate alarm lower limit value (Un\G141).**

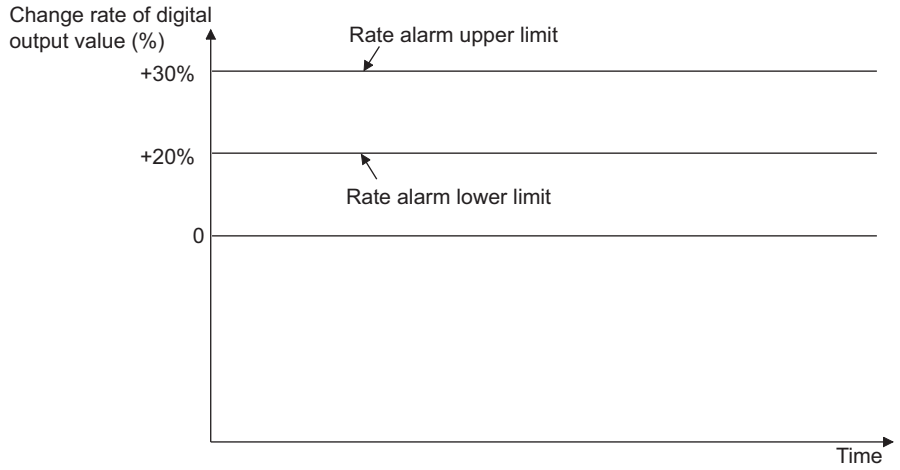
Item	Setting range
CH☐ Rate alarm upper limit value (Un\G126, Un\G128, Un\G130, Un\G132, Un\G134, Un\G136, Un\G138, Un\G140)	-32768 to 32767 (-3276.8%/s to 3276.7%/s)
CH☐ Rate alarm lower limit value (Un\G127, Un\G129, Un\G131, Un\G133, Un\G135, Un\G137, Un\G139, Un\G141)	

5. **Turn on then off Operating condition setting request (Y9).**

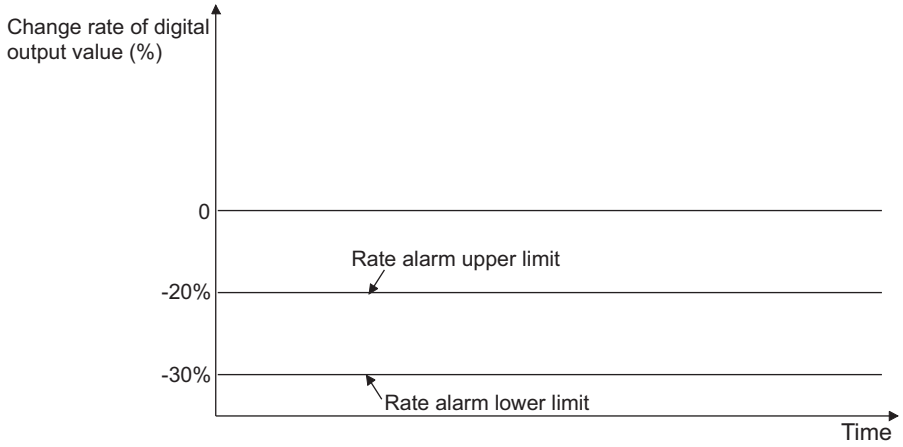
(g) Examples to use a rate alarm

The change rate of digital output values in a limited range can be monitored easily as follows:

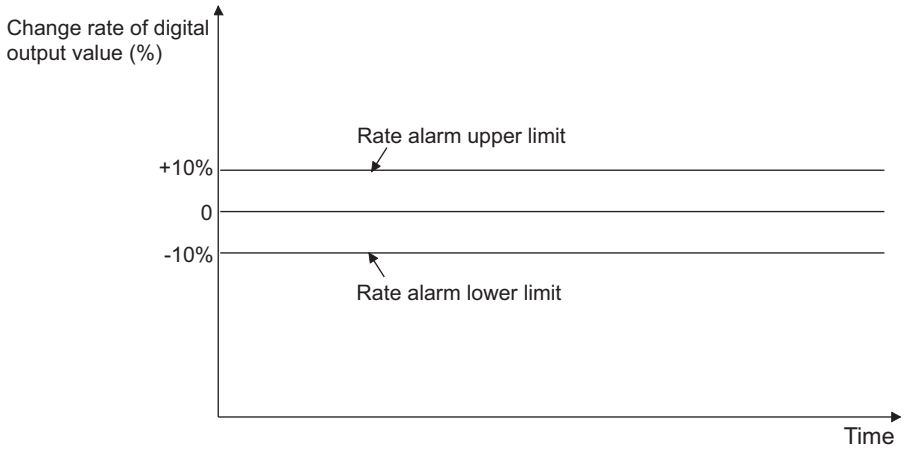
Ex. 1: To monitor that a rising rate of a digital output value is within the specified range



Ex. 2: To monitor a drop rate of a digital output value is within the specified range



Ex. 3: To monitor a change rate of a digital output value is within the specified range



4.11 Maximum Value/Minimum Value Hold Function

The maximum and minimum of digital output values or scaling values are stored in the buffer memory for each channel.
When time average or count average is specified as the averaging process, the values are updated in each averaging process cycle. For other digital conversion methods, the values are updated in each sampling cycle.
For buffer memory addresses where the values are stored, refer to the following.

- List of Buffer Memory Addresses (☞Page 91, Section 6.1)

(1) Resetting maximum and minimum values

The maximum and minimum values are updated to the present value when Maximum value/minimum value reset request (YD) or Operating condition setting request (Y9) is turned on then off.

(2) Corresponding maximum and minimum values

When the scaling function is enabled, the maximum and minimum of scaling values are stored.
For details on the scaling function, refer to the following.

- Scaling Function (☞Page 50, Section 4.9)

4.12 Logging Function

Data can be collected consecutively in a set cycle and stored in the buffer memory. Using the data stored in the buffer memory, debugging can be performed and data variation can be checked periodically.
In addition, the time-series data that are imported as logs can be checked easily.

(1) Logging function

(a) Collectable data

The following types of data can be collected.

- Digital output value
- Scaling value

(b) Number of collectable data

The maximum 5000 logging data can be stored for each channel.

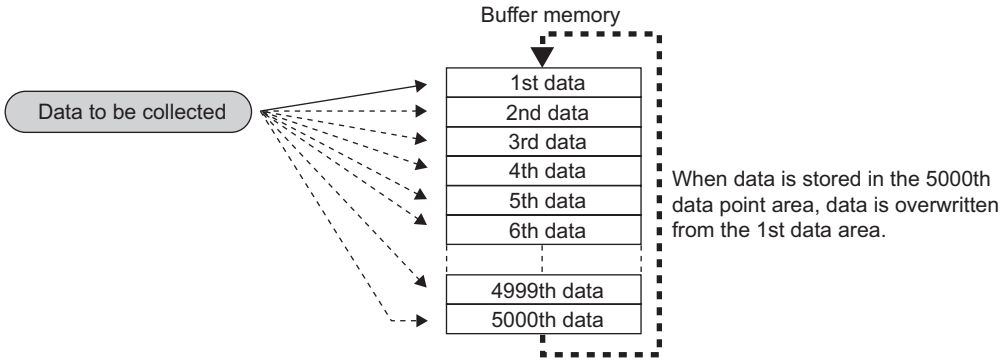
(c) Collection cycle

The data can be collected in 10ms at the minimum and in 3600s at the maximum intervals.
For details on the collection cycle, refer to the following.

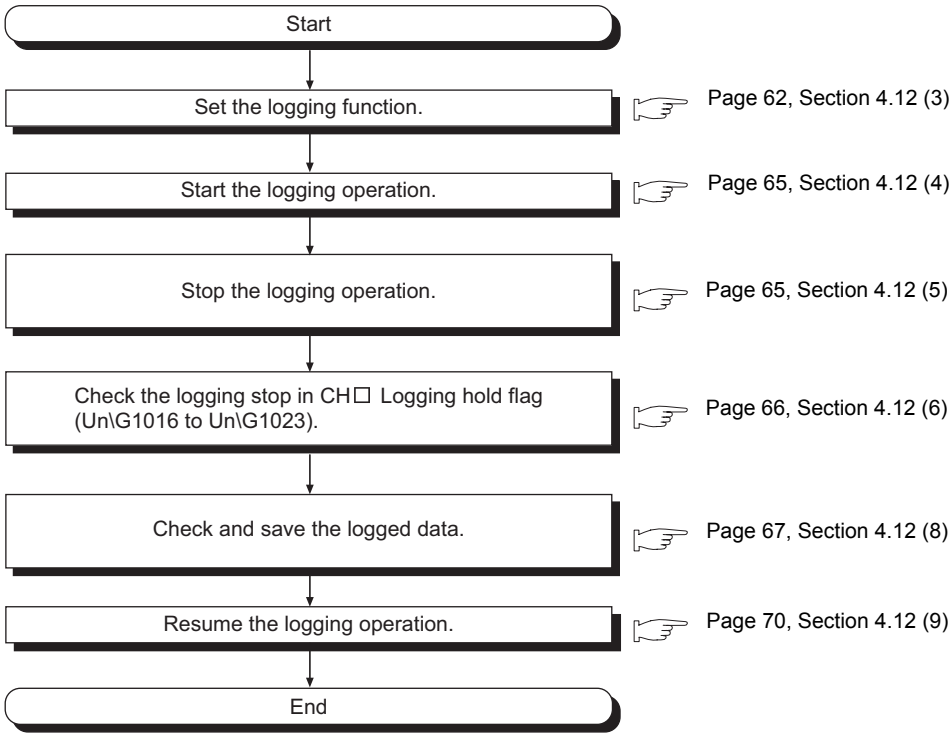
- Setting procedure (☞Page 62, Section 4.12 (3))

(d) Storing the collected data

Logging data are stored orderly in the logging data storage area of the buffer memory, starting from the head area.



(2) Logging procedure



Point

Logging data can also be checked without stopping logging. For details, refer to the following.

- To check logging data without stopping logging (Page 71, Section 4.12 (10))

(3) Setting procedure

Follow the procedure below.

1. **Set Enable (0) to Conversion enable/disable setting (Un\G0).**
2. **Set Enable (0) to CH☐ Logging enable/disable setting (Un\G1000 to Un\G1007).**
3. **Set the type of data to be logged to CH☐ Logging data setting (Un\G1024 to Un\G1031).**

Item	Setting value
CH☐ Logging data setting (Un\G1024 to Un\G1031)	• Digital output value (0) • Scaling value (1)

4. **Set the cycle in which logging data are stored to CH☐ Logging cycle setting value (Un\G1032 to Un\G1039).**
5. **Set the unit of the logging cycle in CH☐ Logging cycle unit setting (Un\G1040 to Un\G1047).**

Logging cycle unit	Setting value of CH☐ Logging cycle unit setting (Un\G1040 to Un\G1047)	Setting range of CH☐ Logging cycle setting value (Un\G1032 to Un\G1039)
Update cycle	0	The value is ignored.
ms	1	10 to 32767
s	2	1 to 3600

The actual logging cycle is an integral multiple of the conversion cycle for each conversion method. The following table lists the conversion cycle for each conversion method.

Conversion method	Conversion cycle
Sampling processing	Sampling cycle
Time average	$\left(\frac{\text{Time set to CH☐ Average time/Average number of times/ Moving average/Time constant settings (Un\G1 to Un\G8)}}{\text{Sampling cycle}}\right)^{*1} \times \text{Sampling cycle}$
Count average	(Setting of CH☐ Average time/Average number of times/Moving average/Time constant settings (Un\G1 to Un\G8) × Sampling cycle)
Moving average	Sampling cycle
Primary delay filter	Sampling cycle

*1 The value after the decimal point is rounded off.

If the set logging cycle is not an integral multiple of the conversion cycle shown above, the logging function operates in the maximum cycle of an integral multiple within the set range.

Ex. 1: When setting as below in CH1 to CH8:

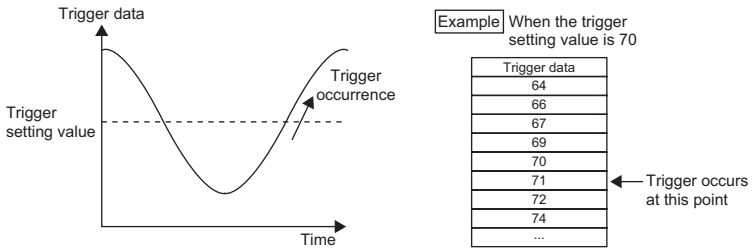
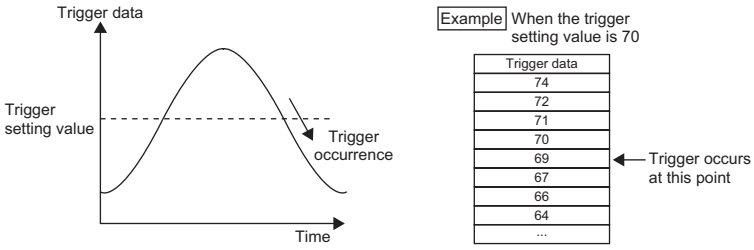
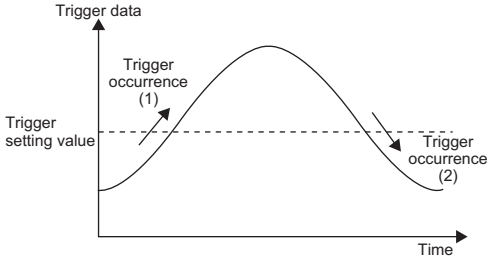
- Averaging process setting (Un\G24, Un\G25): Sampling processing (0)
- Sampling cycle setting (Un\G26): 100ms/8CH (3)
- CH☐ Logging data setting (Un\G1024 to Un\G1031): Digital output value (0)
- CH☐ Logging cycle setting value (Un\G1032 to Un\G1039): 1950
- CH☐ Logging cycle unit setting (Un\G1040 to Un\G1047): ms (1)

The conversion cycle is 100ms. The actual logging cycle is 1900ms (an integral multiple of 100ms).

6. **In CH☐ Logging points after trigger (Un\G1048 to Un\G1055), set the number of data to be collected from when the logging stop request (hold trigger) occurs until the logging stops. The setting range of CH☐ Logging points after trigger (Un\G1048 to Un\G1055) is as below.**

Item	Setting range
CH☐ Logging points after trigger (Un\G1048 to Un\G1055)	1 to 5000

7. **In CH☐ Level trigger condition setting (Un\G1056 to Un\G1063), select any of the following.**

<table>
<tr><th>Setting value</th><th colspan="2">Description</th></tr>
<tr><td>Disable (0)</td><td colspan="2">Select this not to set the condition to stop logging. (Logging can be stopped at any time).</td></tr>
<tr><td>Above (1)</td><td rowspan="3">Select this to set the condition to stop logging. (When a value in the buffer memory areas become the set condition, the logging stops.)</td><td>The logging stops when "Trigger data < Trigger setting value" changes to "Trigger data > Trigger setting value".
 
</td></tr>
<tr><td>Below (2)</td><td>The logging stops when "Trigger data > Trigger setting value" changes to "Trigger data < Trigger setting value".
 
</td></tr>
<tr><td>Pass through (3)</td><td>The logging stops when the trigger data passes the trigger setting value. (Either of the following (1) or (2)).
(1) When "Trigger data < Trigger setting value" changes to "Trigger data > Trigger setting value"
(2) When "Trigger data > Trigger setting value" changes to "Trigger data < Trigger setting value"
 
</td></tr>
</table>

8. When a setting value other than Disable (0) is selected in CH☐ Level trigger condition setting (Un\G1056 to Un\G1063), set a logging stop condition to CH☐ Trigger data (Un\G1064 to Un\G1071) and CH☐ Trigger setting value (Un\G1082 to Un\G1089).

Item	Description	Setting range
CH☐ Trigger data (Un\G1064 to Un\G1071)	Set a buffer memory address monitored as an occurrence condition to stop logging.*1	0 to 4999
CH☐ Trigger setting value (Un\G1082 to Un\G1089)	Set a value of the buffer memory to stop logging.	-32768 to 32767

*1 By setting Level data ☐ (Un\G1072 to Un\G1081) as a monitoring target, a device value of a CPU module can be set as trigger data.

For details on the level data, refer to the following.

• Level data ☐ (☞Page 132, Section 6.2 (41))

9. Turn on then off Operating condition setting request (Y9).

Point

- If CH☐ Logging cycle setting value (Un\G1032 to Un\G1039) and the logging cycle set in CH☐ Logging cycle unit setting (Un\G1040 to Un\G1047) is shorter CH☐ Digital output value (Un\G11 to Un\G18) and the conversion cycle of CH☐ Scaling value (Un\G54 to Un\G61), the error (error code: 202☐) occurs and the logging cannot be performed.
- When the logging function turns invalid
  When any of the following error occurs after the logging function is enabled and Operating condition setting request (Y9) is turned on then off, the logging function turns disabled.
  - Error code (20☐): Setting error of CH☐ Average time/Average number of times/Moving average/Time constant settings (Un\G1 to Un\G8)
  - Error code (30☐): Setting error of CH☐ Average time/Average number of times/Moving average/Time constant settings (Un\G1 to Un\G8)
  - Error code (31☐): Setting error of CH☐ Average time/Average number of times/Moving average/Time constant settings (Un\G1 to Un\G8)
  - Error code (32☐): Setting error of CH☐ Average time/Average number of times/Moving average/Time constant settings (Un\G1 to Un\G8)
  - Error code (350): Setting error of Sampling cycle setting (Un\G26)
  - Error code (200☐ to 206☐): Setting error of a parameter setting item for the logging function

(4) Starting logging

Turn on then off Operating condition setting request (Y9). Data is logged in set logging cycle.

(5) Stopping logging

Use a hold trigger to stop logging. When the hold trigger is detected, the CT input module stops logging after the number of logging data set in advance were collected.

The logging stopping method is as below.

1. **Set ON (1) to CH☐ Logging hold request (Un\G1008 to Un\G1015).**

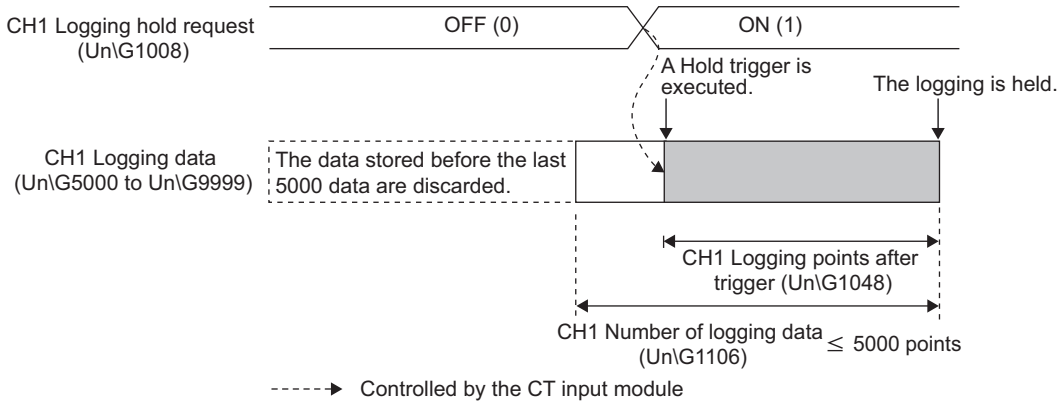
When Disable (0) is set to CH☐ Level trigger condition setting (Un\G1056 to Un\G1063), the set number of logging data are collected and the logging stops.

When CH☐ Level trigger condition setting (Un\G1056 to Un\G1063) is set to Above (1), Below (2), or Pass through (3), the set number of logging data are collected after the conditions of CH☐ Trigger data (Un\G1064 to Un\G1071) and CH☐ Trigger setting value (Un\G1082 to Un\G1089) are satisfied, and the logging stops.

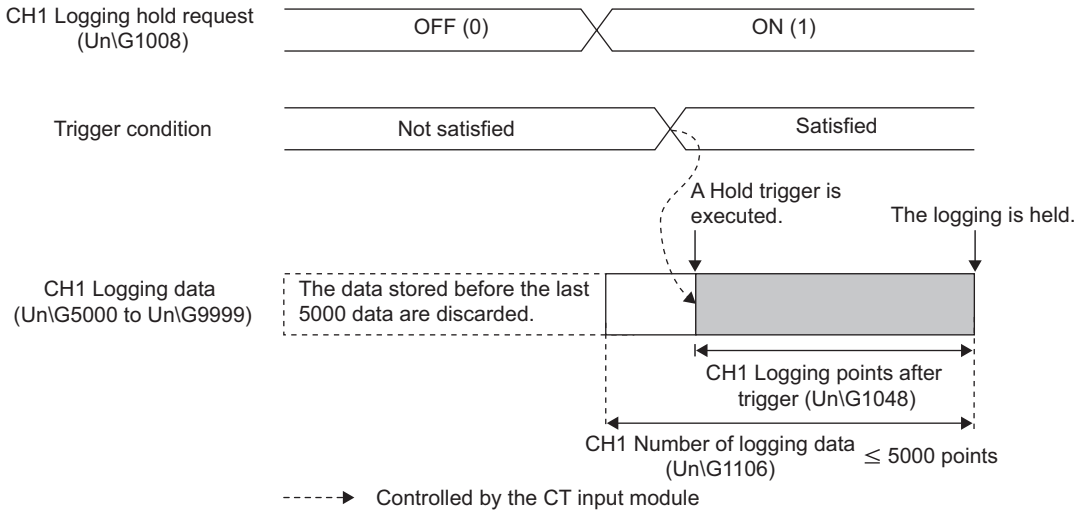
Point

- When Operating condition setting request (Y9) is turned on, the logging stops regardless of ON or OFF of the hold trigger. All the logging data stored before Operating condition setting request (Y9) is turned on are cleared.
- Check that CH☐ Logging hold flag (Un\G1016 to Un\G1023) turned ON (1), and set OFF (0) to CH☐ Logging hold request (Un\G1008 to Un\G1015). If CH☐ Logging hold request (Un\G1008 to Un\G1015) is set OFF (0) before hold, the logging does not stop.
- After CH☐ Logging hold request (Un\G1008 to Un\G1015) is set ON (1), the following delay occurs at the maximum until the CT input module receives a hold trigger.
  Trigger delay = Logging cycle (Cycle at which the logging is actually performed) + Scan time of CPU module

Ex. When CH☐ Level trigger condition setting (Un\G1056 to Un\G1063) is set to Disable (0) and CH1 Digital output value (Un\G11) is logged



Ex. When CH□ Level trigger condition setting (Un\G1056 to Un\G1063) is set to a value other than Disable (0) and CH1 Digital output value (Un\G11) is logged



(6) Checking the stop of the logging

Check that CH□ Logging hold flag (Un\G1016 to Un\G1023) turns ON (1).

(7) Checking trigger detection time

The time at that the hold trigger was detected can be checked in the buffer memory.*1

Even when the logging cycle is set as less than 1s, the minimum time unit recorded in CH□ Trigger detection time (Un\G1154 to Un\G1185) is second. Use trigger detection time as an indication to refer to the logging data.

*1 When the hold trigger is detected as soon as turning on the programmable controller, the CT input module may not obtain the time in the CPU module. If the module could not obtain the time, the trigger detection time is recorded "0:0:0 on January 1st, 2000".

Trigger detection time is stored in the following buffer memory areas.

Channel	Address for trigger detection time
CH1	CH1 Trigger detection time (Un\G1154 to Un\G1157)
CH2	CH2 Trigger detection time (Un\G1158 to Un\G1161)
CH3	CH3 Trigger detection time (Un\G1162 to Un\G1165)
CH4	CH4 Trigger detection time (Un\G1166 to Un\G1169)
CH5	CH5 Trigger detection time (Un\G1170 to Un\G1173)
CH6	CH6 Trigger detection time (Un\G1174 to Un\G1177)
CH7	CH7 Trigger detection time (Un\G1178 to Un\G1181)
CH8	CH8 Trigger detection time (Un\G1182 to Un\G1185)

Ex. For CH1 Trigger detection time (Un\G1154 to Un\G1157)

	b15 to b8	b7 to b0
Un\G1154	First two digits of the year	Last two digits of the year
Un\G1155	Month	Day
Un\G1156	Hour	Minute
Un\G1157	Second	Day of the week

Item	Stored data	Storage example*1
First two digits of the year/Last two digits of the year	Stored in BCD code.	2011_H
Month/Day		329_H
Hour/Minute		1035_H
Second		40_H
Day of the week	The value that corresponds to the day of the week is stored in BCD code. • Sunday: 00 • Monday: 01 • Tuesday: 02 • Wednesday: 03 • Thursday: 04 • Friday: 05 • Saturday: 06	02_H

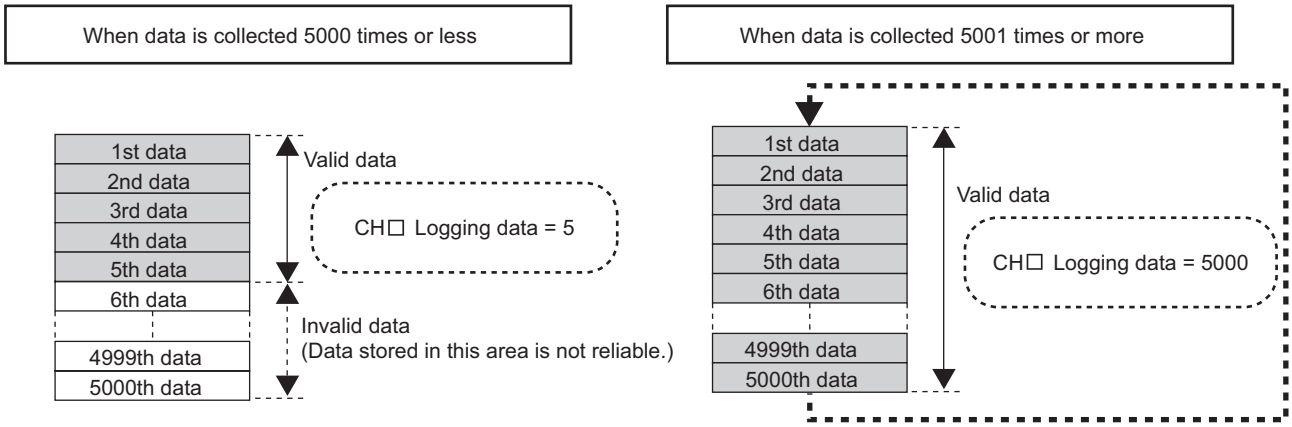
*1 Those are values when a hold trigger was detected at 10:35:40 on Tuesday, March 29th, 2011.

(8) Checking logging data

Logging data are stored in the following buffer memory areas.

Channel	Collectable data		Storage area of logging data	
	Buffer memory name	Buffer memory address	Buffer memory name	Buffer memory address
CH1	CH□ Digital output value	Un\G11	CH□ Logging data	Un\G5000 to Un\G9999
CH2		Un\G12		Un\G10000 to Un\G14999
CH3		Un\G13		Un\G15000 to Un\G19999
CH4		Un\G14		Un\G20000 to Un\G24999
CH5		Un\G15		Un\G25000 to Un\G29999
CH6		Un\G16		Un\G30000 to Un\G34999
CH7		Un\G17		Un\G35000 to Un\G39999
CH8		Un\G18		Un\G40000 to Un\G44999
CH1	CH□ Scaling value	Un\G54		Un\G5000 to Un\G9999
CH2		Un\G55		Un\G10000 to Un\G14999
CH3		Un\G56		Un\G15000 to Un\G19999
CH4		Un\G57		Un\G20000 to Un\G24999
CH5		Un\G58		Un\G25000 to Un\G29999
CH6		Un\G59		Un\G30000 to Un\G34999
CH7		Un\G60		Un\G35000 to Un\G39999
CH8		Un\G61		Un\G40000 to Un\G44999

1. **Check the number of valid logging data with CH☐ Number of logging data (Un\G1106 to Un\G1113).**

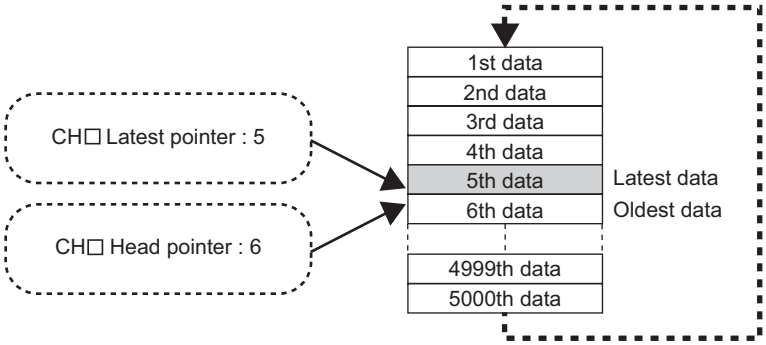


2. **Check where the latest data and the oldest data are stored.**

The places can be checked in the following buffer memory areas.

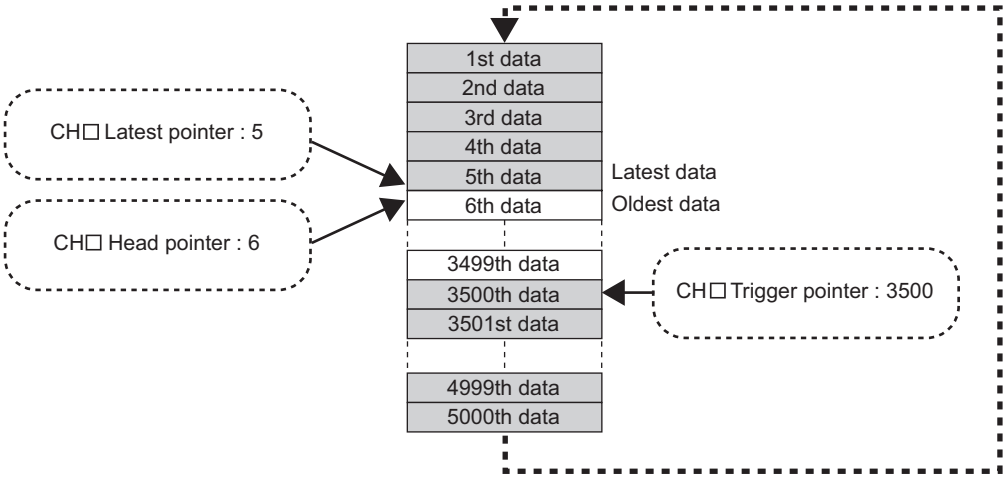
- CH☐ Head pointer (Un\G1090 to Un\G1097) (☞ Page 133, Section 6.2 (43))
- CH☐ Latest pointer (Un\G1098 to Un\G1105) (☞ Page 134, Section 6.2 (44))

Ex. When data was collected 5001 times or more



3. **Check the storage place of when the logging stopped in CH☐ Trigger pointer (Un\G1114 to Un\G1121).**

Ex. When the logging stopped under the following conditions
CH☐ Logging points after trigger (Un\G1048 to Un\G1055): 1505 points
Logging hold request: At the 3500th data
(The hold place is determined as the 5th data.)



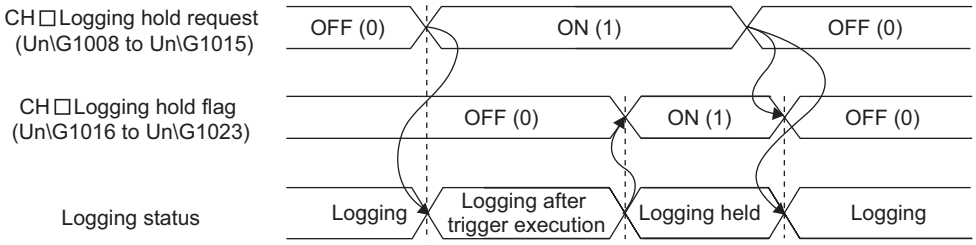
(9) Resuming the logging

To resume the logging, set OFF (0) to CH□ Logging hold request (Un\G1008 to Un\G1015). The logging resumes from the head of the logging data storage area.

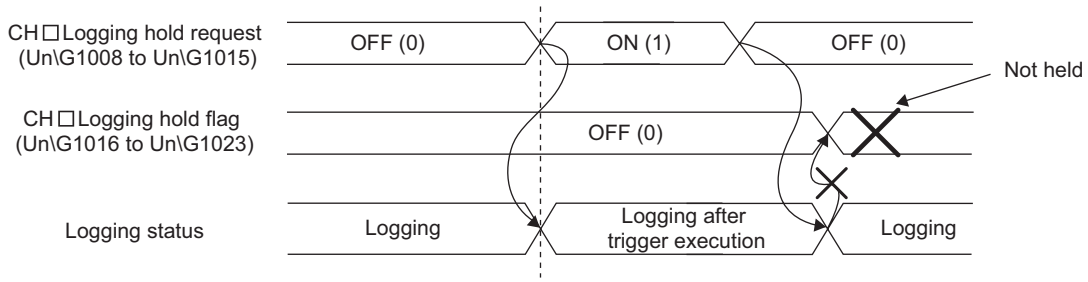
At this time, the head pointer, latest pointer, number of logging data, and trigger pointer are cleared, and OFF (0) is stored in CH□ Logging hold flag (Un\G1016 to Un\G1023).

(a) Precautions

- It may take some time from when ON (1) is stored in CH□ Logging hold request (Un\G1008 to Un\G1015) till when ON (1) is set to CH□ Logging hold flag (Un\G1016 to Un\G1023). To resume the logging, set OFF (0) to CH□ Logging hold request (Un\G1008 to Un\G1015) after checking ON (1) is stored in CH□ Logging hold flag (Un\G1016 to Un\G1023).



- When OFF (0) is set to CH□ Logging hold request (Un\G1008 to Un\G1015) before ON (1) is stored in CH□ Logging hold flag (Un\G1016 to Un\G1023), the logging does not stop.



(b) Each buffer memory when logging resumes

When the logging resumes, the value in each buffer memory area is as below.

Buffer memory	Value status
CH□ Head pointer (Un\G1090 to Un\G1097)	Values are initialized (Initial value: 0).
CH□ Latest pointer (Un\G1098 to Un\G1105)	
CH□ Number of logging data (Un\G1106 to Un\G1113)	
CH□ Trigger pointer (Un\G1114 to Un\G1121)	
CH□ Logging data (Un\G5000 to Un\G44999)	The values before the logging resumption are stored.*1

*1 After the logging resumed, values are stored starting from the head area of the logging data storage area. The values before the logging resumption are stored in CH□ Logging data (Un\G5000 to Un\G44999). To refer to the logging data, check the valid data with CH□ Number of logging data (Un\G1106 to Un\G1113).

(10)To check logging data without stopping logging

Logging data can be checked during the logging. When checking the logging data on a display device, the data can be checked easily by monitoring the buffer memory without stopping logging on the display device.
To check the logging data, adjust the logging cycle to prevent the logging data from being updated during read.

(a) Checking method

Read the logging data monitoring the storage places of the latest data and the oldest data in the following buffer memory areas.

Buffer memory	Description	Reference
CH☐ Head pointer (Un\G1090 to Un\G1097)	Check where the oldest data is stored counting from the head address in the logging data storage area.	Page 133, Section 6.2 (43)
CH☐ Latest pointer (Un\G1098 to Un\G1105)	Check where the latest data is stored counting from the head address in the logging data storage area.	Page 134, Section 6.2 (44)
CH☐ Number of logging data (Un\G1106 to Un\G1113)	Check the number of data stored in the logging data storage area.	Page 134, Section 6.2 (45)

(b) Precautions

- Set CH☐ Logging cycle setting value (Un\G1032 to Un\G1039) so that the data can be checked and read before the logging data are updated. If the logging cycle is short, logging data may be updated while the data are checked or read.
- After the necessary data are logged, monitor the change of the head pointer and the number of logging data, and obtain logging data after the stored value changes.
- If the update of the data and the data being checked do not synchronize due to the logging cycle and the scan time of the CPU module, adjust the logging cycle.
- To check data regardless of the logging cycle, use the logging hold.

4.13 Set Value Backup Function

Set values in the buffer memory can be backed up into the non-volatile memory.
The backup data are restored to the buffer memory when the power is turned off then on or when the CPU module is reset. Therefore, the Initial setting program does not need to be reset.

(1) Condition

Use the set value backup function in a condition where no digital conversion is performed; set Disable (1) to Conversion enable/disable setting (Un\G0) for all channels.
Check that digital conversion is disabled by confirming Converting or unused (0) is stored in Conversion completed flag (Un\G10).
If the set value backup function is used when digital conversion is in process in even one channel, the error code (115) is stored in Latest error code (Un\G19), and Error flag (XF) turns on. In this case, the set values are not backed up.

(2) Corresponding buffer memory data

Buffer memory areas that correspond to this function are marked with ○ in the list of buffer memory addresses (☞Page 91, Section 6.1).

(3) How to use

1. **Set Disable (1) to Conversion enable/disable setting (Un\G0) for all channels.**
2. **Turn on then off Operating condition setting request (Y9).**
3. **Turn on then off Set value backup request (Y6).**

For details on Set value backup request (Y6), refer to the following.

- Output signal (☞Page 89, Section 5.2.2)

(4) Precautions after executing the set value backup function

After the set value backup function was executed, the data restored to the buffer memory when the power was turned off then on or when the CPU module was reset, are overwritten if the parameter settings on GX Works2 are changed.
Do not change parameter settings on GX Works2 after executing the set value backup function.

4.14 Default Setting Registration Function

Values in the buffer memory can be changed back to the default.

(1) Condition

Use the default setting registration function in a condition where no digital conversion is performed; set Disable (1) to Conversion enable/disable setting (Un\G0) for all channels.

Check that digital conversion is disabled by confirming Converting or unused (0) is stored in Conversion completed flag (Un\G10).

If the default setting registration function is used when digital conversion is in process in even one channel, the error code (116) is stored in Latest error code (Un\G19), and Error flag (XF) turns on. In this case, the values in the buffer memory do not change back to the default.

(2) Corresponding buffer memory data and default values

Buffer memory areas that correspond to this function are marked with ○ in the list of buffer memory addresses (☞Page 91, Section 6.1); the corresponding data are the same as those for the set value backup function. Also, the default values are listed in the same table.

(3) How to use

1. **Set Disable (1) to Conversion enable/disable setting (Un\G0) for all channels.**
2. **Turn on then off Operating condition setting request (Y9).**
3. **Turn on then off Default setting request (Y5). (This operation reads default values to the buffer memory.)**
4. **Change values in the buffer memory if necessary.**
5. **Activate the set data by turning on then off Operating condition setting request (Y9).**

For details on Default setting request (Y5), refer to the following.

- Output signal (☞Page 89, Section 5.2.2)

4.15 Error History Function

Errors and alarms that occurred in the CT input module are stored in the buffer memory (Un\G1810 to Un\G1969) as a history.
The maximum of 16 errors and alarms can be stored.

(1) Process of the error history function

The error code and the error time are stored in the buffer memory area, starting from Error history No.1 (start address: Un\G1810) in order. Error time is stored as follows.

Ex. For error history No. 1

	b15 to b8	b7 to b0
Un\G1810	Error code	
Un\G1811	First two digits of the year	Last two digits of the year
Un\G1812	Month	Day
Un\G1813	Hour	Minute
Un\G1814	Second	Day of the week
Un\G1815 ⋮ Un\G1819	System area	

Item	Stored data	Example*1
First two digits of the year/Last two digits of the year	Stored in BCD code.	2011_H
Month/Day		329_H
Hour/Minute		1035_H
Second		40_H
Day of the week	The value that corresponds to the day of the week is stored in BCD code. • Sunday: 00 • Monday: 01 • Tuesday: 02 • Wednesday: 03 • Thursday: 04 • Friday: 05 • Saturday: 06	02_H

*1 This is the example of error occurrence at 10:35:40 on Tuesday, March 29th, 2011.

Point

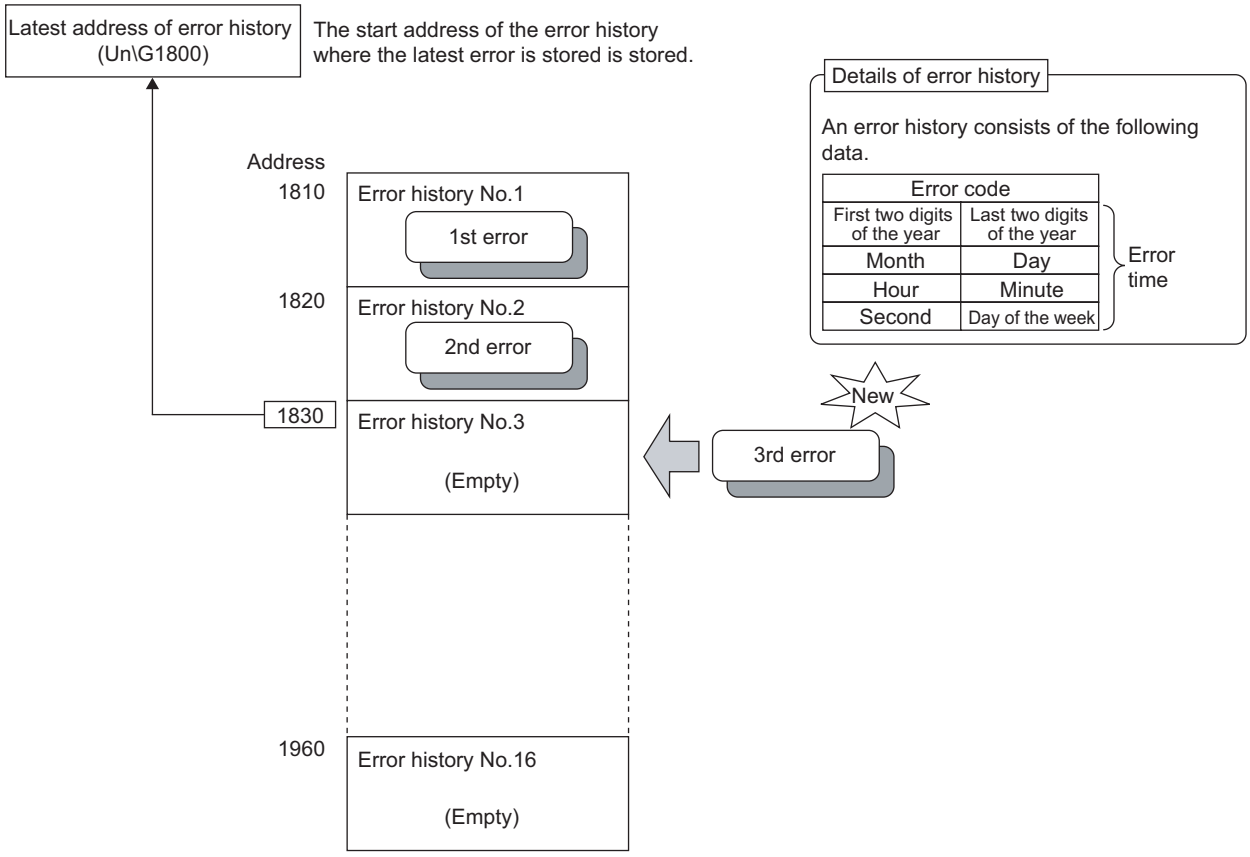
- The process for an alarm is the same as the one for an error.
- Once the error history storage is full, existing data are overwritten, starting from those in Error history No.1 (Un\G1810 to Un\G1819) in order; a new error history replaces existing one.
- The stored error history is cleared when the power is turned off or the CPU module is reset.

(2) Checking the error history

The start address of the latest error history can be checked in Latest address of error history (Un\G1800).

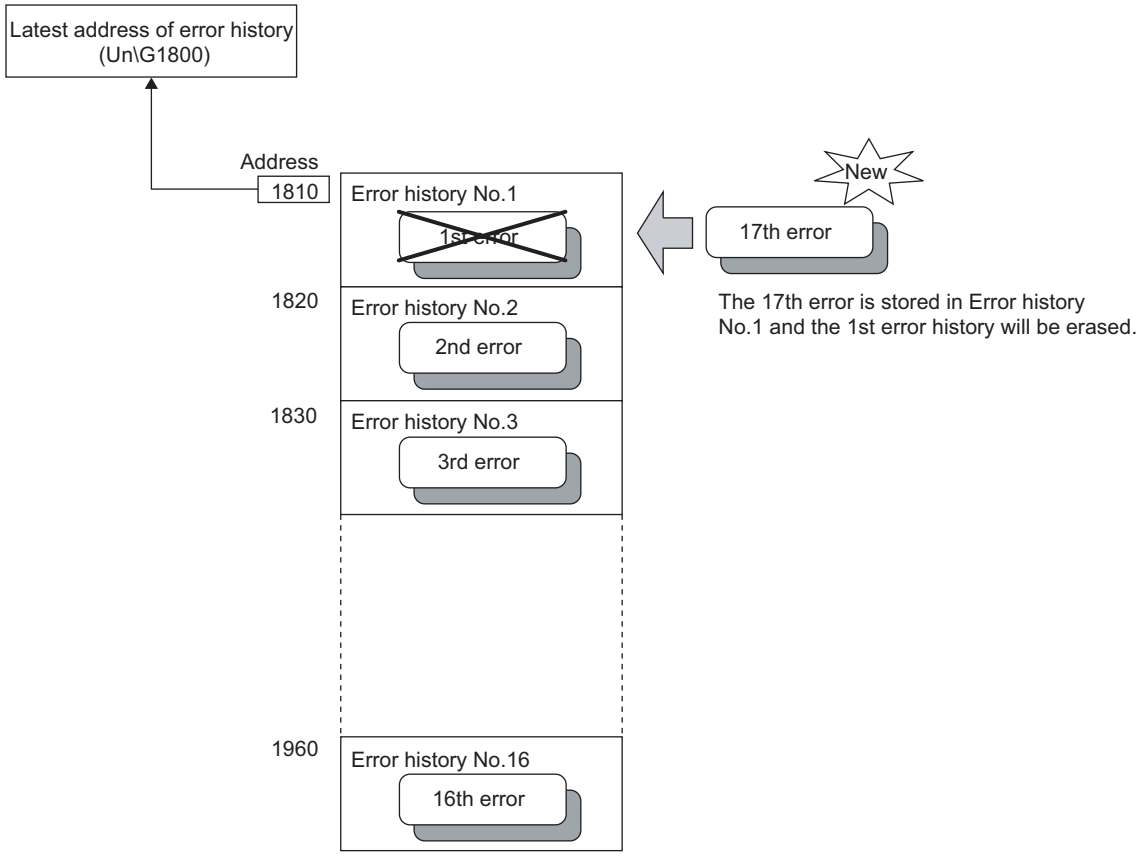
Ex. 1: When the third error occurred

The third error is stored in Error history No.3, and the value "1830" (start address of error history No.3) is stored in Latest address of error history (Un\G1800).



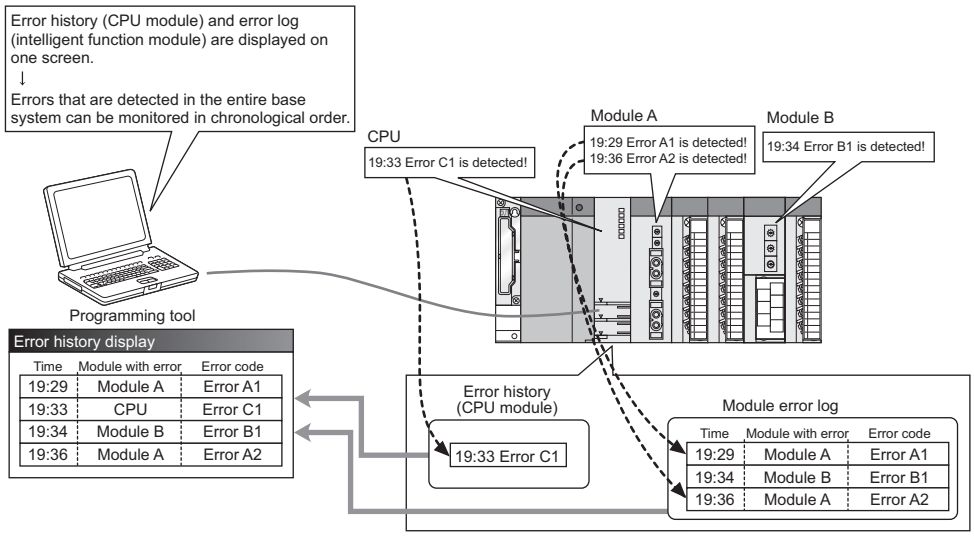
Ex. 2: When the 17th error occurred

The 17th error is stored in Error history No.1, and the value "1810" (start address of error history No.1) is stored in Latest address of error history (Un\G1800).

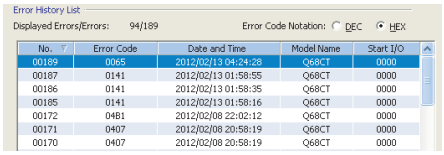


4.16 Module Error Collection Function

Errors and alarms occurred in the CT input module can be collected into the CPU module.
The error information of the CT input module can be held in a CPU module memory as a module error history, even when the power is turned off or the CPU module is reset.



[Example of screen display]



Point

For details on the module error collection function, refer to the following.

QnUCPU Module User's Manual (Function Explanation, Program Fundamentals)

(1) Compatible version

The following table lists the versions of CPU modules and GX Works2 compatible with the module error collection function.

Item	Version
CPU module	Universal model QCPU with a serial number (first five digits) of "11043" or later
GX Works2	Version 1.09K or later

4.17 Error Clear Function

When an error occurs, the error can be cleared on the system monitor.

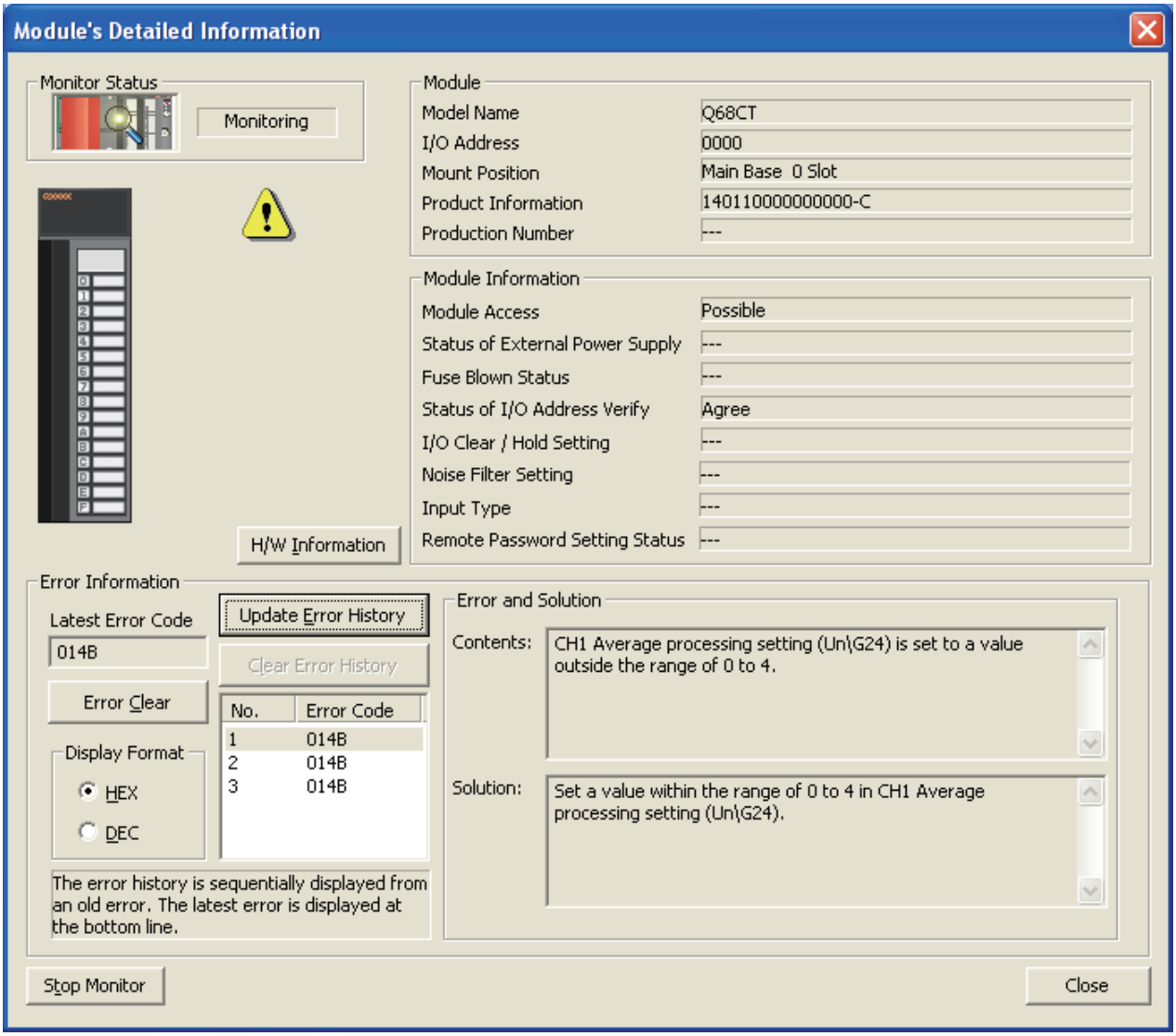
By clicking the Error Clear button in the system monitor, the latest error code stored in Latest error code (Un\G19) is cleared, and the ERR. LED turns off. This operation is the same as the one that uses Error clear request (YF).

However, the error history cannot be cleared with the button.

For the error clearing method using Error clear request (YF), refer to the following.

- Error clear request (YF) (☞Page 90, Section 5.2.2 (7))

[Diagnostics] ➪ [System Monitor...] ➪ Error Module



CHAPTER 5 I/O SIGNALS ASSIGNED TO THE CPU MODULE

This chapter describes the CT input module I/O signals assigned to the CPU module.

5.1 I/O Signal List

The following shows the list of the CT input module I/O signals.
The device numbers (X/Y) in the following table show the case that the start I/O number of the CT input module is set to 0.
For the details of I/O signals, refer to the following.

- Details of I/O Signals (☞Page 80, Section 5.2)

Input signal		Output signal	
Device number	Signal name	Device number	Signal name
X0	Module READY	Y0	Use prohibited
X1	Use prohibited	Y1	
X2		Y2	
X3		Y3	
X4		Y4	
X5	Default setting completed flag	Y5	Default setting request
X6	Set value backup completed flag	Y6	Set value backup request
X7	Peak current detection signal	Y7	Use prohibited
X8	Warning output signal	Y8	
X9	Operating condition setting completed flag	Y9	Operating condition setting request
XA	Offset/gain setting mode flag	YA	User range write request
XB	Channel change completed flag	YB	Channel change request
XC	Input signal error detection signal	YC	Use prohibited
XD	Maximum value/minimum value reset completed flag	YD	Maximum value/minimum value reset request
XE	Conversion completed flag	YE	Use prohibited
XF	Error flag	YF	Error clear request

5.2 Details of I/O Signals

The following describes the details of the CT input module I/O signals assigned to the CPU modules.
The I/O numbers (X/Y) described below show the case that the start I/O number of the CT input module is set to 0.

5.2.1 Input signal

(1) Module READY (X0)

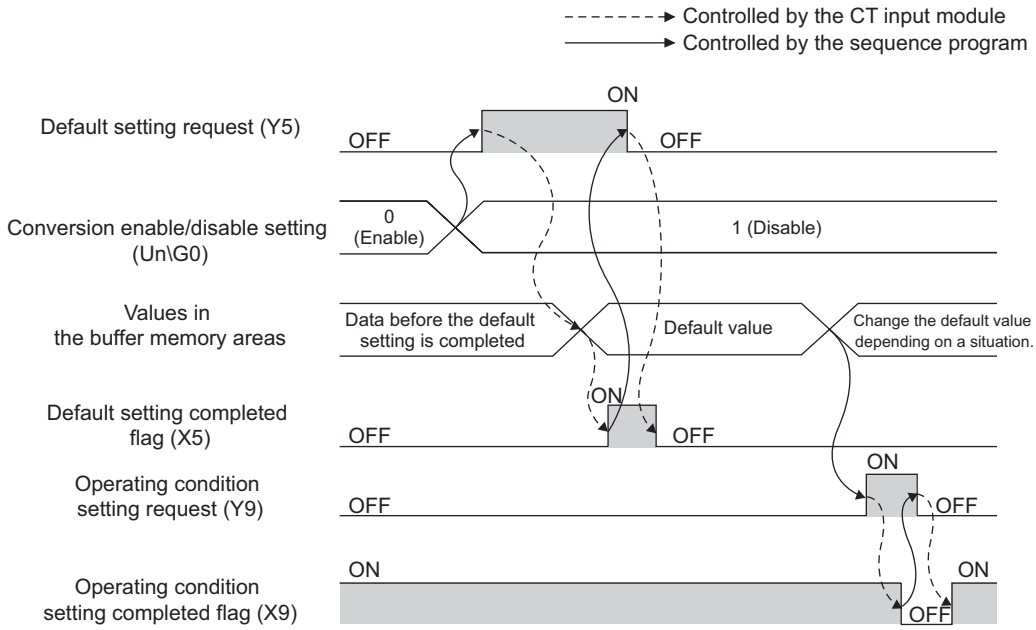
Module READY (X0) turns on to indicate the preparation for the digital conversion is completed at the power-on or reset operation of the CPU module.
Module READY (X0) turns off in the following cases.

- When the offset/gain setting mode is set (The digital conversion processing is executed.)
- When a watchdog timer error occurs in the CT input module (The digital conversion processing is not executed.)

(2) Default setting completed flag (X5)

Use Default setting completed flag (X5) as an interlock condition to turn on then off Default setting request (Y5). When the buffer memory settings return to the default by turning on Default setting request (Y5), Default setting completed flag (X5) turns on. When Default setting request (Y5) is turned off, Default setting completed flag (X5) also turns off.

The buffer memory areas which return to the default value are with ○ in the "Set value backup area" in the List of Buffer Memory Addresses (☞Page 91, Section 6.1).



Point

The setting of buffer memory areas whose default value is read becomes valid by changing the value as necessary and turning on then off Operating condition setting request (Y9).

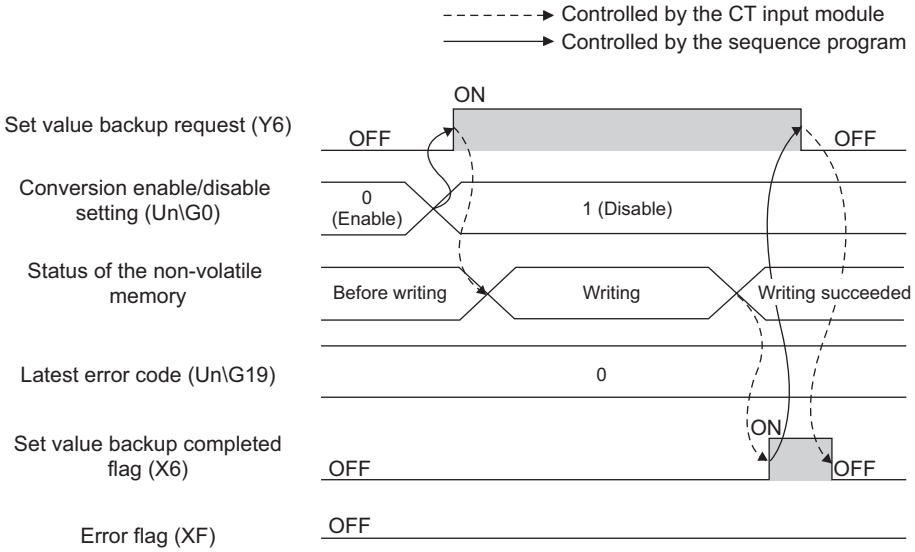
(3) Set value backup completed flag (X6)

Use Set value backup completed flag (X6) as an interlock condition to turn on then off Set value backup request (Y6).

The buffer memory areas whose set values are backed up are with ○ in "Set value backup area" in the List of Buffer Memory Addresses (☞Page 91, Section 6.1).

(a) When writing succeeded

When the set value of each buffer memory area is written to the non-volatile memory by turning on Set value backup request (Y6), Set value backup completed flag (X6) turns on. When Set value backup request (Y6) is turned off, Set value backup completed flag (X6) also turns off.

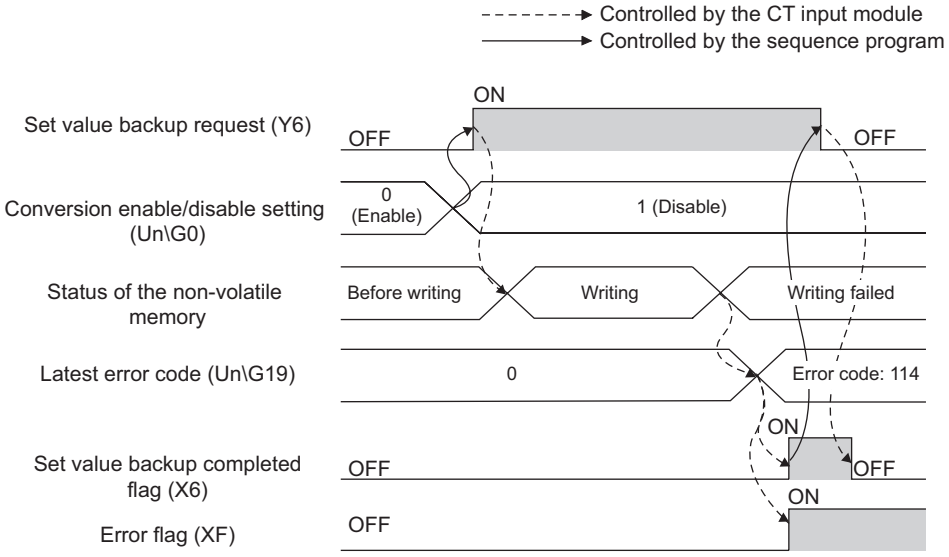


(b) When writing fails

When writing the set value of each buffer memory area failed by turning on Set value backup request (Y6), the error (error code: 114) occurs and the CT input module operates as follows.

- Set value backup completed flag (X6) turns on.
- Error flag (XF) turns on.
- The ERR. LED turns on.

When Set value backup request (Y6) is turned off, Set value backup completed flag (X6) also turns off.



(4) Peak current detection signal (X7)

Peak current detection signal (X7) turns on when a peak current is detected.

A peak current is detected only when the peak current detection function is enabled.

For details on the peak current detection function, refer to the following.

- Peak Current Detection Function (☞ Page 46, Section 4.7)

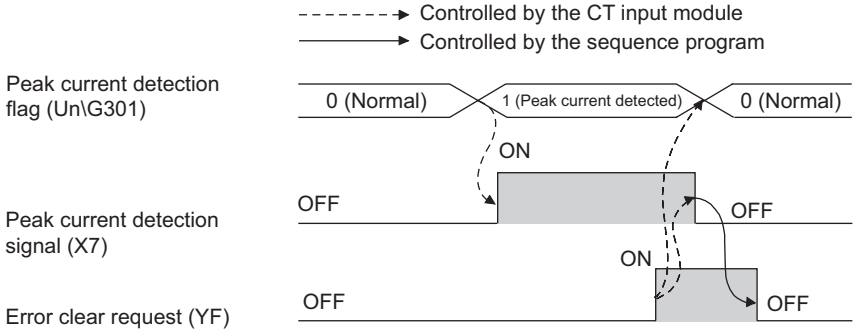
(a) Turning on Peak current detection signal (X7)

When digital output values exceed the set peak current detection value consecutively for the duration of the peak current detection time set in advance, Peak current detection signal (X7) turns on. The ALM LED also flashes.

(b) Turning off Peak current detection signal (X7)

Peak current detection signal (X7) turns off by turning on then off Error clear request (YF).

In addition, Latest error code (Un\G19) is cleared and the ALM LED turns off.



(5) Warning output signal (X8)

Warning output signal (X8) turns on when the process alarm or rate alarm has been detected.
The process alarm and rate alarm can be detected only when the warning output function is enabled.
For details on the warning output function, refer to the following.

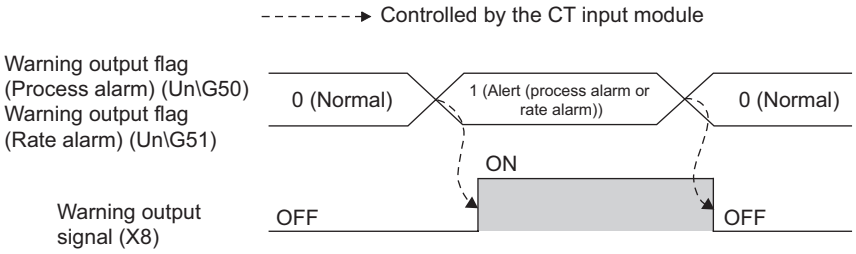
- Warning Output Function (☞ Page 53, Section 4.10)

(a) Process alarm

- Warning output signal (X8) turns on when a digital output value exceeds the set range for CH1 Process alarm lower lower limit value (Un\G86) to CH8 Process alarm upper upper limit value (Un\G117). The ALM LED also turns on along with the on of the signal.
- Warning output signal (X8) turns off when the digital output value falls within the setting range for all the digital conversion enabled channels. The ALM LED also turns off.

(b) Rate alarm

- Warning output signal (X8) turns on when a digital output value exceeds the change rate of CH1 Rate alarm upper limit value (Un\G126) to CH8 Rate alarm lower limit value (Un\G141). The ALM LED also turns on.
- Warning output function turns off when the change of the digital output value falls within the setting range for all the digital conversion enabled channels. The ALM LED also turns off.



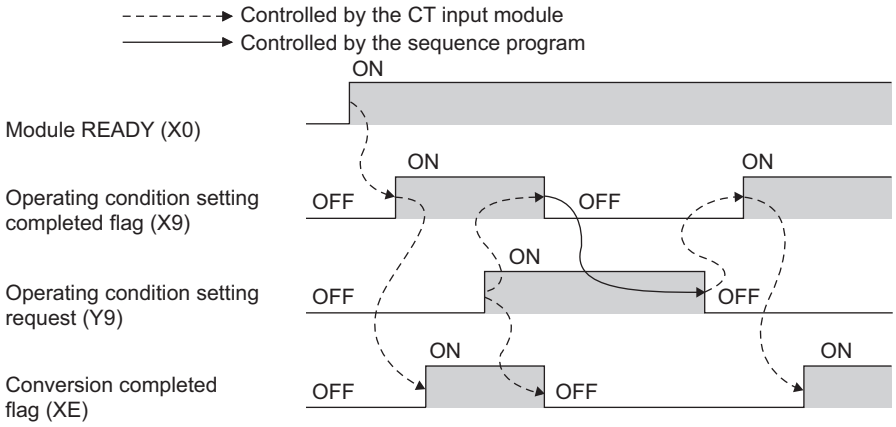
(6) Operating condition setting completed flag (X9)

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

- Conversion enable/disable setting (Un\G0)
- CH☐ Average time/Average number of times/Moving average/Time constant settings (Un\G1 to Un\G8)
- Averaging process setting (Un\G24, Un\G25)
- Sampling cycle setting (Un\G26)
- Input signal error detection setting (Un\G47)
- Warning output setting (Un\G48)
- Scaling enable/disable setting (Un\G53)
- CH☐ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68, Un\G70, Un\G72, Un\G74, Un\G76)
- CH☐ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69, Un\G71, Un\G73, Un\G75, Un\G77)
- CH☐ Process alarm lower lower limit value (Un\G86, Un\G90, Un\G94, Un\G98, Un\G102, Un\G106, Un\G110, Un\G114)
- CH☐ Process alarm lower upper limit value (Un\G87, Un\G91, Un\G95, Un\G99, Un\G103, Un\G107, Un\G111, Un\G115)
- CH☐ Process alarm upper lower limit value (Un\G88, Un\G92, Un\G96, Un\G100, Un\G104, Un\G108, Un\G112, Un\G116)
- CH☐ Process alarm upper upper limit value (Un\G89, Un\G93, Un\G97, Un\G101, Un\G105, Un\G109, Un\G113, Un\G117)
- CH☐ Rate alarm warning detection period (Un\G118 to Un\G125)
- CH☐ Rate alarm upper limit value (Un\G126, Un\G128, Un\G130, Un\G132, Un\G134, Un\G136, Un\G138, Un\G140)
- CH☐ Rate alarm lower limit value (Un\G127, Un\G129, Un\G131, Un\G133, Un\G135, Un\G137, Un\G139, Un\G141)
- CH☐ Input range setting (Un\G150 to Un\G157)
- Mode switching setting (Un\G158, Un\G159)
- Dropout detection setting (Un\G160)
- CH☐ Dropout value (Un\G162 to Un\G169)
- Peak current detection setting (Un\G300)
- CH☐ Peak current detection time (Un\G318 to Un\G325)
- CH☐ Peak current detection value (Un\G326 to Un\G333)
- CH☐ Logging enable/disable setting (Un\G1000 to Un\G1007)
- CH☐ Logging data setting (Un\G1024 to Un\G1031)
- CH☐ Logging cycle setting value (Un\G1032 to Un\G1039)
- CH☐ Logging cycle unit setting (Un\G1040 to Un\G1047)
- CH☐ Logging points after trigger (Un\G1048 to Un\G1055)
- CH☐ Level trigger condition setting (Un\G1056 to Un\G1063)
- CH☐ Trigger data (Un\G1064 to Un\G1071)
- CH☐ Trigger setting value (Un\G1082 to Un\G1089)

When Operating condition setting completed flag (X9) is off, the digital conversion processing is not executed.
Operating condition setting completed flag (X9) turns off in the following status.

- When Operating condition setting request (Y9) is on

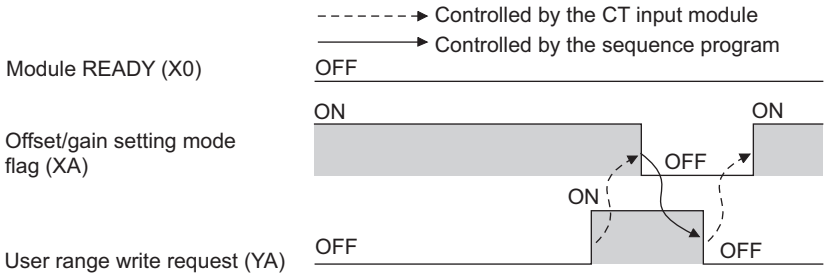


(7) Offset/gain setting mode flag (XA)

(a) Offset/gain setting mode

When registering the value which was adjusted with the offset/gain setting to the module, use Offset/gain setting mode flag (XA) as an interlock condition to turn on then off User range write request (YA).
For the offset/gain setting, refer to the following.

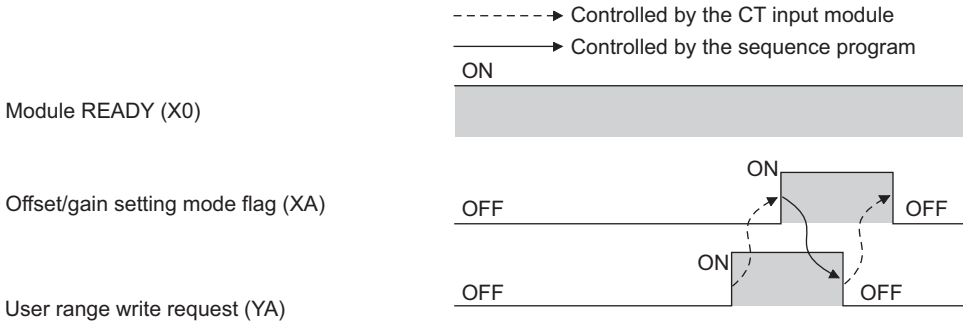
- Offset/gain Setting (☞Page 150, Section 8.5)



(b) Normal mode

At the user range setting restoration, use Offset/gain setting mode flag (XA) as an interlock condition to turn on then off User range write request (YA).
For the user range setting restoration, refer to the following.

- ONLINE MODULE CHANGE (☞Page 182, CHAPTER 10)

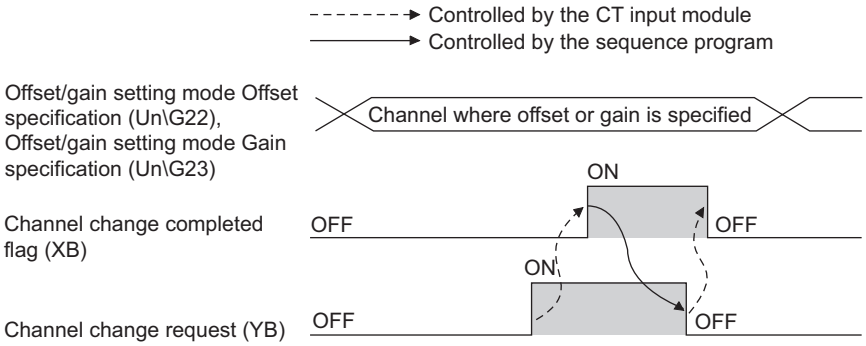


(8) Channel change completed flag (XB)

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

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

- Offset/gain Setting (☞Page 150, Section 8.5)



(9) Input signal error detection signal (XC)

Input signal error detection signal (XC) turns on when an input signal error is detected.

An input signal error is detected only when the input signal error detection function is enabled.

For details on the input signal error detection function, refer to the following.

- Input Signal Error Detection Function (☞ Page 44, Section 4.6)

(a) Turning on Input signal error detection signal (XC)

Input signal error detection signal (XC) turns on when the CT input value exceeds the input range.

The CT input module results in the following states:

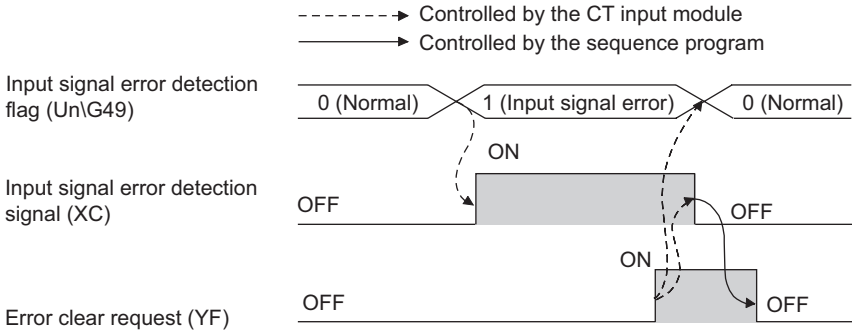
- Converting or unused (0) is stored in Conversion completed flag (Un\G10) in the corresponding channel.
- For the error detected channel, the digital output value just before the error detection is held in the buffer memory.
- ALM LED flashes.

(b) Turning off Input signal error detection signal (XC)

When the CT input value falls within the input range, turn on then off Error clear request (YF) to turn off Input signal error detection signal (XC).

The CT input module results in the following states:

- ALM LED turns off.
- Latest error code (Un\G19) is cleared.



Point

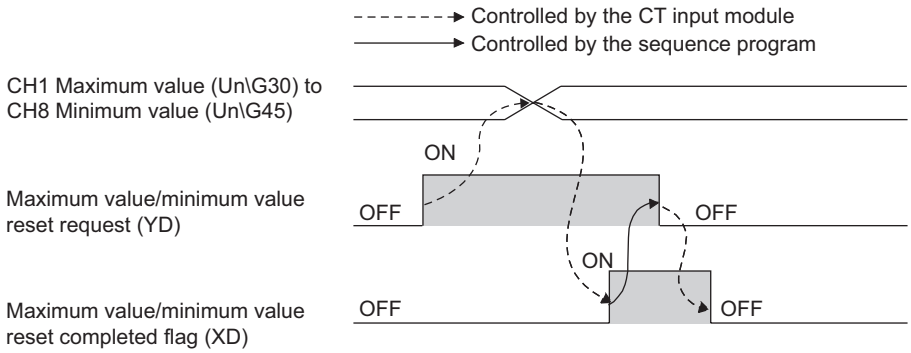
When the CT input value falls within the input range, the digital conversion resumes regardless of the status of Input signal error detection flag (Un\G49) and Input signal error detection signal (XC). After the first update of the digital output value, Conversion completed (1) is stored in Conversion completed flag (Un\G10) in the corresponding channel. (ALM LED remains flashing.)

Averaging processing starts over after the digital conversion resumed.

(10)Maximum value/minimum value reset completed flag (XD)

Maximum value/minimum value reset completed flag (XD) turns on after the maximum or minimum values stored in the following buffer memory areas by turning on then off Maximum value/minimum value reset request (YD).

- CH☐ Maximum value (Un\G30, Un\G32, Un\G34, Un\G36, Un\G38, Un\G40, Un\G42, Un\G44)
- CH☐ Minimum value (Un\G31, Un\G33, Un\G35, Un\G37, Un\G39, Un\G41, Un\G43, Un\G45)

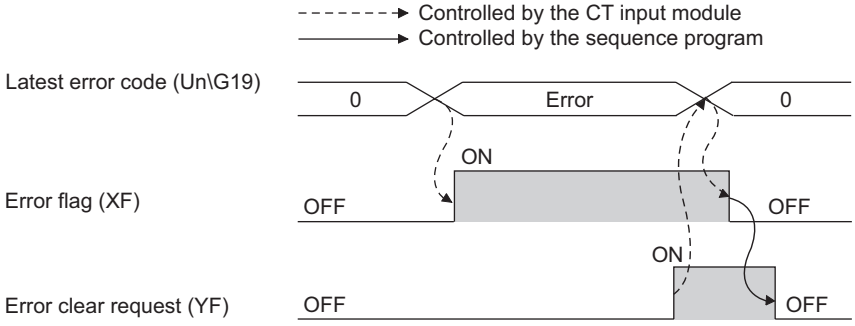


(11)Conversion completed flag (XE)

Conversion completed flag (XE) turns on when the first digital conversion is completed in all conversion enabled channels.

(12)Error flag (XF)

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



(a) Clearing the latest error code and Error flag (XF)

Turn on then off Error clear request (YF).

5.2.2 Output signal

(1) Default setting request (Y5)

Turn on then off Default setting request (Y5) to return the present set value of buffer memory areas to the default value.

For the buffer memory areas which return to the default value, refer to the following.

- List of Buffer Memory Addresses (☞Page 91, Section 6.1)

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

- Default setting completed flag (X5) (☞Page 80, Section 5.2.1 (2))

When turning off then on Default setting request (Y5), set Disable (1) to the setting values of Conversion enable/disable setting (Un\G0) in all the channels and confirm that the digital conversion of the CT input module stops in all channels.

At stopping the digital conversion, confirm if Converting or unused (0) is stored in Conversion completed flag (Un\G10).

If Default setting request (Y5) is turned off then on for any of the channels while the digital conversion is performed, the error code (116) is stored in Latest error code (Un\G19) and Error flag (XF) turns on. The present set values of the buffer memory areas do not return to the default value.

(2) Set value backup request (Y6)

Turn on then off Set value backup request (Y6) to backup the present set value of the buffer memory areas to the non-volatile memory.

For the buffer memory areas in which the set value is backed up, refer to the following.

- List of Buffer Memory Addresses (☞Page 91, Section 6.1)

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

- Set value backup completed flag (X6) (☞Page 81, Section 5.2.1 (3))

When turning off then on Set value backup request (Y6), set Disable (1) to the setting values of Conversion enable/disable setting (Un\G0) in all the channels and confirm that the digital conversion of the CT input module stops in all channels.

At stopping the digital conversion, confirm if Converting or unused (0) is stored in Conversion completed flag (Un\G10).

If Set value backup request (Y6) is turned off then on for any of the channels while the digital conversion is performed, the error code (115) is stored in Latest error code (Un\G19) and Error flag (XF) turns on. The set value is not backed up.

(3) Operating condition setting request (Y9)

To enable the initial settings of the CT input module, turn on then off Operating condition setting request (Y9).

For the contents of the initial settings to be enabled and the timing of turning on then off the signal, refer to the following.

- Operating condition setting completed flag (X9) (☞Page 84, Section 5.2.1 (6))

(4) User range write request (YA)

(a) Offset/gain setting mode

Turn on then off User range write request (YA) to register the adjusted offset/gain values in the CT input module.

The data is written to the non-volatile memory at the timing when this signal is turned off then on.

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

- Offset/gain setting mode flag (XA) (☞Page 85, Section 5.2.1 (7))

(b) Normal mode

Turn on then off User range write request (YA) to perform the user range restoration.

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

- Offset/gain setting mode flag (XA) (☞Page 85, Section 5.2.1 (7))

(5) Channel change request (YB)

Turn on then off Channel change request (YB) to change a channel for which the offset/gain setting is set.

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

- Channel change completed flag (XB) (☞Page 86, Section 5.2.1 (8))

(6) Maximum value/minimum value reset request (YD)

Turn on then off Maximum value/minimum value reset request (YD) to clear the values of the following buffer memory areas.

- CH□ Maximum value (Un\G30, Un\G32, Un\G34, Un\G36, Un\G38, Un\G40, Un\G42, Un\G44)
- CH□ Minimum value (Un\G31, Un\G33, Un\G35, Un\G37, Un\G39, Un\G41, Un\G43, Un\G45)

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

- Maximum value/minimum value reset completed flag (XD) (☞Page 88, Section 5.2.1 (10))

(7) Error clear request (YF)

To clear the following contents, turn on then off Error clear request (YF).

- Peak current detection signal (X7)
- Input signal error detection signal (XC)
- Error flag (XF)
- Latest error code (Un\G19)

For the timing to clear the contents, refer to the following.

- Peak current detection signal (X7) (☞Page 82, Section 5.2.1 (4))
- Input signal error detection signal (XC) (☞Page 87, Section 5.2.1 (9))
- Error flag (XF) (☞Page 88, Section 5.2.1 (12))
- Latest error code (Un\G19) (☞Page 88, Section 5.2.1 (12))

CHAPTER 6 BUFFER MEMORY

This chapter describes the buffer memory of the CT input module.

6.1 List of Buffer Memory Addresses

The following shows the list of the CT input module buffer memory addresses.

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

- Details of Buffer Memory Addresses (☞Page 106, Section 6.2)

Point

Do not write data to the system area and the area where the data cannot be written from the sequence program in the buffer memory.

Writing data to those areas may lead the module to malfunction.

(1) Un\G0 to Un\G1799

Address (decimal)	Address (hexadecimal)	Name	Default value*1	Read/Write *2	Set value backup area *3
0	0_H	Conversion enable/disable setting	$00FF_H$	R/W	—
1	1_H	CH1 Average time/Average number of times/Moving average/Time constant settings	0	R/W	○
2	2_H	CH2 Average time/Average number of times/Moving average/Time constant settings	0	R/W	○
3	3_H	CH3 Average time/Average number of times/Moving average/Time constant settings	0	R/W	○
4	4_H	CH4 Average time/Average number of times/Moving average/Time constant settings	0	R/W	○
5	5_H	CH5 Average time/Average number of times/Moving average/Time constant settings	0	R/W	○
6	6_H	CH6 Average time/Average number of times/Moving average/Time constant settings	0	R/W	○
7	7_H	CH7 Average time/Average number of times/Moving average/Time constant settings	0	R/W	○
8	8_H	CH8 Average time/Average number of times/Moving average/Time constant settings	0	R/W	○
9	9_H	System area	—	—	—
10	A_H	Conversion completed flag	0000_H	R	—
11	B_H	CH1 Digital output value	0	R	—
12	C_H	CH2 Digital output value	0	R	—
13	D_H	CH3 Digital output value	0	R	—
14	E_H	CH4 Digital output value	0	R	—
15	F_H	CH5 Digital output value	0	R	—
16	10_H	CH6 Digital output value	0	R	—
17	11_H	CH7 Digital output value	0	R	—

Address (decimal)	Address (hexadecimal)	Name	Default value*1	Read/Write *2	Set value backup area *3
18	12_H	CH8 Digital output value	0	R	—
19	13_H	Latest error code	0	R	—
20	14_H	System area	—	—	—
21	15_H				
22	16_H	Offset/gain setting mode Offset specification	0000_H	R/W	—
23	17_H	Offset/gain setting mode Gain specification	0000_H	R/W	—
24	18_H	Averaging process setting (CH1 to CH4)	0000_H	R/W	○
25	19_H	Averaging process setting (CH5 to CH8)	0000_H	R/W	○
26	$1A_H$	Sampling cycle setting	0000_H	R/W	○
27 to 29	$1B_H$ to $1D_H$	System area	—	—	—
30	$1E_H$	CH1 Maximum value	0	R	—
31	$1F_H$	CH1 Minimum value	0	R	—
32	20_H	CH2 Maximum value	0	R	—
33	21_H	CH2 Minimum value	0	R	—
34	22_H	CH3 Maximum value	0	R	—
35	23_H	CH3 Minimum value	0	R	—
36	24_H	CH4 Maximum value	0	R	—
37	25_H	CH4 Minimum value	0	R	—
38	26_H	CH5 Maximum value	0	R	—
39	27_H	CH5 Minimum value	0	R	—
40	28_H	CH6 Maximum value	0	R	—
41	29_H	CH6 Minimum value	0	R	—
42	$2A_H$	CH7 Maximum value	0	R	—
43	$2B_H$	CH7 Minimum value	0	R	—
44	$2C_H$	CH8 Maximum value	0	R	—
45	$2D_H$	CH8 Minimum value	0	R	—
46	$2E_H$	System area	—	—	—
47	$2F_H$	Input signal error detection setting	$00FF_H$	R/W	○
48	30_H	Warning output setting	$FFFF_H$	R/W	○
49	31_H	Input signal error detection flag	0000_H	R	—
50	32_H	Warning output flag (Process alarm)	0000_H	R	—
51	33_H	Warning output flag (Rate alarm)	0000_H	R	—
52	34_H	System area	—	—	—
53	35_H	Scaling enable/disable setting	$00FF_H$	R/W	○
54	36_H	CH1 Scaling value	0	R	—
55	37_H	CH2 Scaling value	0	R	—
56	38_H	CH3 Scaling value	0	R	—
57	39_H	CH4 Scaling value	0	R	—
58	$3A_H$	CH5 Scaling value	0	R	—

Address (decimal)	Address (hexadecimal)	Name	Default value*1	Read/Write *2	Set value backup area *3
59	$3B_H$	CH6 Scaling value	0	R	—
60	$3C_H$	CH7 Scaling value	0	R	—
61	$3D_H$	CH8 Scaling value	0	R	—
62	$3E_H$	CH1 Scaling lower limit value	0	R/W	○
63	$3F_H$	CH1 Scaling upper limit value	0	R/W	○
64	40_H	CH2 Scaling lower limit value	0	R/W	○
65	41_H	CH2 Scaling upper limit value	0	R/W	○
66	42_H	CH3 Scaling lower limit value	0	R/W	○
67	43_H	CH3 Scaling upper limit value	0	R/W	○
68	44_H	CH4 Scaling lower limit value	0	R/W	○
69	45_H	CH4 Scaling upper limit value	0	R/W	○
70	46_H	CH5 Scaling lower limit value	0	R/W	○
71	47_H	CH5 Scaling upper limit value	0	R/W	○
72	48_H	CH6 Scaling lower limit value	0	R/W	○
73	49_H	CH6 Scaling upper limit value	0	R/W	○
74	$4A_H$	CH7 Scaling lower limit value	0	R/W	○
75	$4B_H$	CH7 Scaling upper limit value	0	R/W	○
76	$4C_H$	CH8 Scaling lower limit value	0	R/W	○
77	$4D_H$	CH8 Scaling upper limit value	0	R/W	○
78 to 85	$4E_H$ to 55_H	System area	—	—	—
86	56_H	CH1 Process alarm lower lower limit value	0	R/W	○
87	57_H	CH1 Process alarm lower upper limit value	0	R/W	○
88	58_H	CH1 Process alarm upper lower limit value	0	R/W	○
89	59_H	CH1 Process alarm upper upper limit value	0	R/W	○
90	$5A_H$	CH2 Process alarm lower lower limit value	0	R/W	○
91	$5B_H$	CH2 Process alarm lower upper limit value	0	R/W	○
92	$5C_H$	CH2 Process alarm upper lower limit value	0	R/W	○
93	$5D_H$	CH2 Process alarm upper upper limit value	0	R/W	○
94	$5E_H$	CH3 Process alarm lower lower limit value	0	R/W	○
95	$5F_H$	CH3 Process alarm lower upper limit value	0	R/W	○
96	60_H	CH3 Process alarm upper lower limit value	0	R/W	○
97	61_H	CH3 Process alarm upper upper limit value	0	R/W	○
98	62_H	CH4 Process alarm lower lower limit value	0	R/W	○
99	63_H	CH4 Process alarm lower upper limit value	0	R/W	○
100	64_H	CH4 Process alarm upper lower limit value	0	R/W	○
101	65_H	CH4 Process alarm upper upper limit value	0	R/W	○
102	66_H	CH5 Process alarm lower lower limit value	0	R/W	○
103	67_H	CH5 Process alarm lower upper limit value	0	R/W	○
104	68_H	CH5 Process alarm upper lower limit value	0	R/W	○

Address (decimal)	Address (hexadecimal)	Name	Default value*1	Read/Write *2	Set value backup area *3
105	69_H	CH5 Process alarm upper upper limit value	0	R/W	○
106	$6A_H$	CH6 Process alarm lower lower limit value	0	R/W	○
107	$6B_H$	CH6 Process alarm lower upper limit value	0	R/W	○
108	$6C_H$	CH6 Process alarm upper lower limit value	0	R/W	○
109	$6D_H$	CH6 Process alarm upper upper limit value	0	R/W	○
110	$6E_H$	CH7 Process alarm lower lower limit value	0	R/W	○
111	$6F_H$	CH7 Process alarm lower upper limit value	0	R/W	○
112	70_H	CH7 Process alarm upper lower limit value	0	R/W	○
113	71_H	CH7 Process alarm upper upper limit value	0	R/W	○
114	72_H	CH8 Process alarm lower lower limit value	0	R/W	○
115	73_H	CH8 Process alarm lower upper limit value	0	R/W	○
116	74_H	CH8 Process alarm upper lower limit value	0	R/W	○
117	75_H	CH8 Process alarm upper upper limit value	0	R/W	○
118	76_H	CH1 Rate alarm warning detection period	0	R/W	○
119	77_H	CH2 Rate alarm warning detection period	0	R/W	○
120	78_H	CH3 Rate alarm warning detection period	0	R/W	○
121	79_H	CH4 Rate alarm warning detection period	0	R/W	○
122	$7A_H$	CH5 Rate alarm warning detection period	0	R/W	○
123	$7B_H$	CH6 Rate alarm warning detection period	0	R/W	○
124	$7C_H$	CH7 Rate alarm warning detection period	0	R/W	○
125	$7D_H$	CH8 Rate alarm warning detection period	0	R/W	○
126	$7E_H$	CH1 Rate alarm upper limit value	0	R/W	○
127	$7F_H$	CH1 Rate alarm lower limit value	0	R/W	○
128	80_H	CH2 Rate alarm upper limit value	0	R/W	○
129	81_H	CH2 Rate alarm lower limit value	0	R/W	○
130	82_H	CH3 Rate alarm upper limit value	0	R/W	○
131	83_H	CH3 Rate alarm lower limit value	0	R/W	○
132	84_H	CH4 Rate alarm upper limit value	0	R/W	○
133	85_H	CH4 Rate alarm lower limit value	0	R/W	○
134	86_H	CH5 Rate alarm upper limit value	0	R/W	○
135	87_H	CH5 Rate alarm lower limit value	0	R/W	○
136	88_H	CH6 Rate alarm upper limit value	0	R/W	○
137	89_H	CH6 Rate alarm lower limit value	0	R/W	○
138	$8A_H$	CH7 Rate alarm upper limit value	0	R/W	○
139	$8B_H$	CH7 Rate alarm lower limit value	0	R/W	○
140	$8C_H$	CH8 Rate alarm upper limit value	0	R/W	○
141	$8D_H$	CH8 Rate alarm lower limit value	0	R/W	○
142 to 149	$8E_H$ to 95_H	System area	—	—	—
150	96_H	CH1 Input range setting	0000_H	R/W	○

Address (decimal)	Address (hexadecimal)	Name	Default value*1	Read/Write *2	Set value backup area *3
151	97_H	CH2 Input range setting	0000_H	R/W	○
152	98_H	CH3 Input range setting	0000_H	R/W	○
153	99_H	CH4 Input range setting	0000_H	R/W	○
154	$9A_H$	CH5 Input range setting	0000_H	R/W	○
155	$9B_H$	CH6 Input range setting	0000_H	R/W	○
156	$9C_H$	CH7 Input range setting	0000_H	R/W	○
157	$9D_H$	CH8 Input range setting	0000_H	R/W	○
158	$9E_H$	Mode switching setting	0	R/W	—
159	$9F_H$				
160	$A0_H$	Dropout detection setting	$00FF_H$	R/W	○
161	$A1_H$	Dropout status flag	0000_H	R	—
162	$A2_H$	CH1 Dropout value	50	R/W	○
163	$A3_H$	CH2 Dropout value	50	R/W	○
164	$A4_H$	CH3 Dropout value	50	R/W	○
165	$A5_H$	CH4 Dropout value	50	R/W	○
166	$A6_H$	CH5 Dropout value	50	R/W	○
167	$A7_H$	CH6 Dropout value	50	R/W	○
168	$A8_H$	CH7 Dropout value	50	R/W	○
169	$A9_H$	CH8 Dropout value	50	R/W	○
170 to 201	AA_H to $C9_H$	System area	—	—	—
202	CA_H	CH1 Factory default setting offset value	0	R/W	—
203	CB_H	CH1 Factory default setting gain value	0	R/W	—
204	CC_H	CH2 Factory default setting offset value	0	R/W	—
205	CD_H	CH2 Factory default setting gain value	0	R/W	—
206	CE_H	CH3 Factory default setting offset value	0	R/W	—
207	CF_H	CH3 Factory default setting gain value	0	R/W	—
208	$D0_H$	CH4 Factory default setting offset value	0	R/W	—
209	$D1_H$	CH4 Factory default setting gain value	0	R/W	—
210	$D2_H$	CH5 Factory default setting offset value	0	R/W	—
211	$D3_H$	CH5 Factory default setting gain value	0	R/W	—
212	$D4_H$	CH6 Factory default setting offset value	0	R/W	—
213	$D5_H$	CH6 Factory default setting gain value	0	R/W	—
214	$D6_H$	CH7 Factory default setting offset value	0	R/W	—
215	$D7_H$	CH7 Factory default setting gain value	0	R/W	—
216	$D8_H$	CH8 Factory default setting offset value	0	R/W	—
217	$D9_H$	CH8 Factory default setting gain value	0	R/W	—
218	DA_H	CH1 User range setting offset value	0	R/W	—
219	DB_H	CH1 User range setting gain value	0	R/W	—
220	DC_H	CH2 User range setting offset value	0	R/W	—

Address (decimal)	Address (hexadecimal)	Name	Default value*1	Read/Write *2	Set value backup area *3
221	DD_H	CH2 User range setting gain value	0	R/W	—
222	DE_H	CH3 User range setting offset value	0	R/W	—
223	DF_H	CH3 User range setting gain value	0	R/W	—
224	$E0_H$	CH4 User range setting offset value	0	R/W	—
225	$E1_H$	CH4 User range setting gain value	0	R/W	—
226	$E2_H$	CH5 User range setting offset value	0	R/W	—
227	$E3_H$	CH5 User range setting gain value	0	R/W	—
228	$E4_H$	CH6 User range setting offset value	0	R/W	—
229	$E5_H$	CH6 User range setting gain value	0	R/W	—
230	$E6_H$	CH7 User range setting offset value	0	R/W	—
231	$E7_H$	CH7 User range setting gain value	0	R/W	—
232	$E8_H$	CH8 User range setting offset value	0	R/W	—
233	$E9_H$	CH8 User range setting gain value	0	R/W	—
234 to 299	EA_H to $12B_H$	System area	—	—	—
300	$12C_H$	Peak current detection setting	$00FF_H$	R/W	○
301	$12D_H$	Peak current detection flag	0000_H	R	—
302	$12E_H$	CH1 Peak current detection count reset request	0	R/W	—
303	$12F_H$	CH2 Peak current detection count reset request	0	R/W	—
304	130_H	CH3 Peak current detection count reset request	0	R/W	—
305	131_H	CH4 Peak current detection count reset request	0	R/W	—
306	132_H	CH5 Peak current detection count reset request	0	R/W	—
307	133_H	CH6 Peak current detection count reset request	0	R/W	—
308	134_H	CH7 Peak current detection count reset request	0	R/W	—
309	135_H	CH8 Peak current detection count reset request	0	R/W	—
310	136_H	CH1 Peak current detection count reset complete	0	R	—
311	137_H	CH2 Peak current detection count reset complete	0	R	—
312	138_H	CH3 Peak current detection count reset complete	0	R	—
313	139_H	CH4 Peak current detection count reset complete	0	R	—
314	$13A_H$	CH5 Peak current detection count reset complete	0	R	—
315	$13B_H$	CH6 Peak current detection count reset complete	0	R	—
316	$13C_H$	CH7 Peak current detection count reset complete	0	R	—
317	$13D_H$	CH8 Peak current detection count reset complete	0	R	—
318	$13E_H$	CH1 Peak current detection time	1000	R/W	○
319	$13F_H$	CH2 Peak current detection time	1000	R/W	○
320	140_H	CH3 Peak current detection time	1000	R/W	○
321	141_H	CH4 Peak current detection time	1000	R/W	○
322	142_H	CH5 Peak current detection time	1000	R/W	○
323	143_H	CH6 Peak current detection time	1000	R/W	○
324	144_H	CH7 Peak current detection time	1000	R/W	○

Address (decimal)	Address (hexadecimal)	Name	Default value*1	Read/Write *2	Set value backup area *3
325	145_H	CH8 Peak current detection time	1000	R/W	○
326	146_H	CH1 Peak current detection value	0	R/W	○
327	147_H	CH2 Peak current detection value	0	R/W	○
328	148_H	CH3 Peak current detection value	0	R/W	○
329	149_H	CH4 Peak current detection value	0	R/W	○
330	$14A_H$	CH5 Peak current detection value	0	R/W	○
331	$14B_H$	CH6 Peak current detection value	0	R/W	○
332	$14C_H$	CH7 Peak current detection value	0	R/W	○
333	$14D_H$	CH8 Peak current detection value	0	R/W	○
334	$14E_H$	CH1 Peak current detection count	0	R	—
335	$14F_H$	CH2 Peak current detection count	0	R	—
336	150_H	CH3 Peak current detection count	0	R	—
337	151_H	CH4 Peak current detection count	0	R	—
338	152_H	CH5 Peak current detection count	0	R	—
339	153_H	CH6 Peak current detection count	0	R	—
340	154_H	CH7 Peak current detection count	0	R	—
341	155_H	CH8 Peak current detection count	0	R	—
342 to 999	156_H to $3E7_H$	System area	—	—	—
1000	$3E8_H$	CH1 Logging enable/disable setting	1	R/W	○
1001	$3E9_H$	CH2 Logging enable/disable setting	1	R/W	○
1002	$3EA_H$	CH3 Logging enable/disable setting	1	R/W	○
1003	$3EB_H$	CH4 Logging enable/disable setting	1	R/W	○
1004	$3EC_H$	CH5 Logging enable/disable setting	1	R/W	○
1005	$3ED_H$	CH6 Logging enable/disable setting	1	R/W	○
1006	$3EE_H$	CH7 Logging enable/disable setting	1	R/W	○
1007	$3EF_H$	CH8 Logging enable/disable setting	1	R/W	○
1008	$3F0_H$	CH1 Logging hold request	0	R/W	—
1009	$3F1_H$	CH2 Logging hold request	0	R/W	—
1010	$3F2_H$	CH3 Logging hold request	0	R/W	—
1011	$3F3_H$	CH4 Logging hold request	0	R/W	—
1012	$3F4_H$	CH5 Logging hold request	0	R/W	—
1013	$3F5_H$	CH6 Logging hold request	0	R/W	—
1014	$3F6_H$	CH7 Logging hold request	0	R/W	—
1015	$3F7_H$	CH8 Logging hold request	0	R/W	—
1016	$3F8_H$	CH1 Logging hold flag	0	R	—
1017	$3F9_H$	CH2 Logging hold flag	0	R	—
1018	$3FA_H$	CH3 Logging hold flag	0	R	—
1019	$3FB_H$	CH4 Logging hold flag	0	R	—
1020	$3FC_H$	CH5 Logging hold flag	0	R	—

Address (decimal)	Address (hexadecimal)	Name	Default value*1	Read/Write *2	Set value backup area *3
1021	$3FD_H$	CH6 Logging hold flag	0	R	—
1022	$3FE_H$	CH7 Logging hold flag	0	R	—
1023	$3FF_H$	CH8 Logging hold flag	0	R	—
1024	400_H	CH1 Logging data setting	1	R/W	○
1025	401_H	CH2 Logging data setting	1	R/W	○
1026	402_H	CH3 Logging data setting	1	R/W	○
1027	403_H	CH4 Logging data setting	1	R/W	○
1028	404_H	CH5 Logging data setting	1	R/W	○
1029	405_H	CH6 Logging data setting	1	R/W	○
1030	406_H	CH7 Logging data setting	1	R/W	○
1031	407_H	CH8 Logging data setting	1	R/W	○
1032	408_H	CH1 Logging cycle setting value	300	R/W	○
1033	409_H	CH2 Logging cycle setting value	300	R/W	○
1034	$40A_H$	CH3 Logging cycle setting value	300	R/W	○
1035	$40B_H$	CH4 Logging cycle setting value	300	R/W	○
1036	$40C_H$	CH5 Logging cycle setting value	300	R/W	○
1037	$40D_H$	CH6 Logging cycle setting value	300	R/W	○
1038	$40E_H$	CH7 Logging cycle setting value	300	R/W	○
1039	$40F_H$	CH8 Logging cycle setting value	300	R/W	○
1040	410_H	CH1 Logging cycle unit setting	0	R/W	○
1041	411_H	CH2 Logging cycle unit setting	0	R/W	○
1042	412_H	CH3 Logging cycle unit setting	0	R/W	○
1043	413_H	CH4 Logging cycle unit setting	0	R/W	○
1044	414_H	CH5 Logging cycle unit setting	0	R/W	○
1045	415_H	CH6 Logging cycle unit setting	0	R/W	○
1046	416_H	CH7 Logging cycle unit setting	0	R/W	○
1047	417_H	CH8 Logging cycle unit setting	0	R/W	○
1048	418_H	CH1 Logging points after trigger	2500	R/W	○
1049	419_H	CH2 Logging points after trigger	2500	R/W	○
1050	$41A_H$	CH3 Logging points after trigger	2500	R/W	○
1051	$41B_H$	CH4 Logging points after trigger	2500	R/W	○
1052	$41C_H$	CH5 Logging points after trigger	2500	R/W	○
1053	$41D_H$	CH6 Logging points after trigger	2500	R/W	○
1054	$41E_H$	CH7 Logging points after trigger	2500	R/W	○
1055	$41F_H$	CH8 Logging points after trigger	2500	R/W	○
1056	420_H	CH1 Level trigger condition setting	0	R/W	○
1057	421_H	CH2 Level trigger condition setting	0	R/W	○
1058	422_H	CH3 Level trigger condition setting	0	R/W	○
1059	423_H	CH4 Level trigger condition setting	0	R/W	○
1060	424_H	CH5 Level trigger condition setting	0	R/W	○

Address (decimal)	Address (hexadecimal)	Name	Default value*1	Read/Write *2	Set value backup area *3
1061	425_H	CH6 Level trigger condition setting	0	R/W	○
1062	426_H	CH7 Level trigger condition setting	0	R/W	○
1063	427_H	CH8 Level trigger condition setting	0	R/W	○
1064	428_H	CH1 Trigger data	54	R/W	○
1065	429_H	CH2 Trigger data	55	R/W	○
1066	$42A_H$	CH3 Trigger data	56	R/W	○
1067	$42B_H$	CH4 Trigger data	57	R/W	○
1068	$42C_H$	CH5 Trigger data	58	R/W	○
1069	$42D_H$	CH6 Trigger data	59	R/W	○
1070	$42E_H$	CH7 Trigger data	60	R/W	○
1071	$42F_H$	CH8 Trigger data	61	R/W	○
1072	430_H	Level data 0	0	R/W	○
1073	431_H	Level data 1	0	R/W	○
1074	432_H	Level data 2	0	R/W	○
1075	433_H	Level data 3	0	R/W	○
1076	434_H	Level data 4	0	R/W	○
1077	435_H	Level data 5	0	R/W	○
1078	436_H	Level data 6	0	R/W	○
1079	437_H	Level data 7	0	R/W	○
1080	438_H	Level data 8	0	R/W	○
1081	439_H	Level data 9	0	R/W	○
1082	$43A_H$	CH1 Trigger setting value	0	R/W	○
1083	$43B_H$	CH2 Trigger setting value	0	R/W	○
1084	$43C_H$	CH3 Trigger setting value	0	R/W	○
1085	$43D_H$	CH4 Trigger setting value	0	R/W	○
1086	$43E_H$	CH5 Trigger setting value	0	R/W	○
1087	$43F_H$	CH6 Trigger setting value	0	R/W	○
1088	440_H	CH7 Trigger setting value	0	R/W	○
1089	441_H	CH8 Trigger setting value	0	R/W	○
1090	442_H	CH1 Head pointer	0	R	—
1091	443_H	CH2 Head pointer	0	R	—
1092	444_H	CH3 Head pointer	0	R	—
1093	445_H	CH4 Head pointer	0	R	—
1094	446_H	CH5 Head pointer	0	R	—
1095	447_H	CH6 Head pointer	0	R	—
1096	448_H	CH7 Head pointer	0	R	—
1097	449_H	CH8 Head pointer	0	R	—
1098	$44A_H$	CH1 Latest pointer	0	R	—
1099	$44B_H$	CH2 Latest pointer	0	R	—
1100	$44C_H$	CH3 Latest pointer	0	R	—
1101	$44D_H$	CH4 Latest pointer	0	R	—

Address (decimal)	Address (hexadecimal)	Name		Default value*1	Read/Write *2	Set value backup area *3
1102	$44E_H$	CH5 Latest pointer		0	R	—
1103	$44F_H$	CH6 Latest pointer		0	R	—
1104	450_H	CH7 Latest pointer		0	R	—
1105	451_H	CH8 Latest pointer		0	R	—
1106	452_H	CH1 Number of logging data		0	R	—
1107	453_H	CH2 Number of logging data		0	R	—
1108	454_H	CH3 Number of logging data		0	R	—
1109	455_H	CH4 Number of logging data		0	R	—
1110	456_H	CH5 Number of logging data		0	R	—
1111	457_H	CH6 Number of logging data		0	R	—
1112	458_H	CH7 Number of logging data		0	R	—
1113	459_H	CH8 Number of logging data		0	R	—
1114	$45A_H$	CH1 Trigger pointer		0	R	—
1115	$45B_H$	CH2 Trigger pointer		0	R	—
1116	$45C_H$	CH3 Trigger pointer		0	R	—
1117	$45D_H$	CH4 Trigger pointer		0	R	—
1118	$45E_H$	CH5 Trigger pointer		0	R	—
1119	$45F_H$	CH6 Trigger pointer		0	R	—
1120	460_H	CH7 Trigger pointer		0	R	—
1121	461_H	CH8 Trigger pointer		0	R	—
1122	462_H	CH1 Logging cycle monitoring value	(s)	0	R	—
1123	463_H		(ms)	0	R	—
1124	464_H		(μs)	0	R	—
1125	465_H	CH2 Logging cycle monitoring value	(s)	0	R	—
1126	466_H		(ms)	0	R	—
1127	467_H		(μs)	0	R	—
1128	468_H	CH3 Logging cycle monitoring value	(s)	0	R	—
1129	469_H		(ms)	0	R	—
1130	$46A_H$		(μs)	0	R	—
1131	$46B_H$	CH4 Logging cycle monitoring value	(s)	0	R	—
1132	$46C_H$		(ms)	0	R	—
1133	$46D_H$		(μs)	0	R	—
1134	$46E_H$	CH5 Logging cycle monitoring value	(s)	0	R	—
1135	$46F_H$		(ms)	0	R	—
1136	470_H		(μs)	0	R	—
1137	471_H	CH6 Logging cycle monitoring value	(s)	0	R	—
1138	472_H		(ms)	0	R	—
1139	473_H		(μs)	0	R	—
1140	474_H	CH7 Logging cycle monitoring value	(s)	0	R	—
1141	475_H		(ms)	0	R	—
1142	476_H		(μs)	0	R	—

Address (decimal)	Address (hexadecimal)	Name			Default value*1	Read/Write *2	Set value backup area *3
1143	477_H	CH8 Logging cycle monitoring value		(s)	0	R	—
1144	478_H			(ms)	0	R	—
1145	479_H			(μs)	0	R	—
1146 to 1153	$47A_H$ to 481_H	System area			—	—	—
1154	482_H	CH1 Trigger detection time	First two digits of the year	Last two digits of the year	0	R	—
1155	483_H		Month	Day	0	R	—
1156	484_H		Hour	Minute	0	R	—
1157	485_H		Second	Day of the week	0	R	—
1158	486_H	CH2 Trigger detection time	First two digits of the year	Last two digits of the year	0	R	—
1159	487_H		Month	Day	0	R	—
1160	488_H		Hour	Minute	0	R	—
1161	489_H		Second	Day of the week	0	R	—
1162	$48A_H$	CH3 Trigger detection time	First two digits of the year	Last two digits of the year	0	R	—
1163	$48B_H$		Month	Day	0	R	—
1164	$48C_H$		Hour	Minute	0	R	—
1165	$48D_H$		Second	Day of the week	0	R	—
1166	$48E_H$	CH4 Trigger detection time	First two digits of the year	Last two digits of the year	0	R	—
1167	$48F_H$		Month	Day	0	R	—
1168	490_H		Hour	Minute	0	R	—
1169	491_H		Second	Day of the week	0	R	—
1170	492_H	CH5 Trigger detection time	First two digits of the year	Last two digits of the year	0	R	—
1171	493_H		Month	Day	0	R	—
1172	494_H		Hour	Minute	0	R	—
1173	495_H		Second	Day of the week	0	R	—
1174	496_H	CH6 Trigger detection time	First two digits of the year	Last two digits of the year	0	R	—
1175	497_H		Month	Day	0	R	—
1176	498_H		Hour	Minute	0	R	—
1177	499_H		Second	Day of the week	0	R	—
1178	$49A_H$	CH7 Trigger detection time	First two digits of the year	Last two digits of the year	0	R	—
1179	$49B_H$		Month	Day	0	R	—
1180	$49C_H$		Hour	Minute	0	R	—
1181	$49D_H$		Second	Day of the week	0	R	—

Address (decimal)	Address (hexadecimal)	Name			Default value*1	Read/Write *2	Set value backup area *3
1182	$49E_H$	CH8 Trigger detection time	First two digits of the year	Last two digits of the year	0	R	—
1183	$49F_H$		Month	Day	0	R	—
1184	$4A0_H$		Hour	Minute	0	R	—
1185	$4A1_H$		Second	Day of the week	0	R	—
1186 to 1799	$4A2_H$ to 707_H	System area			—	—	—

*1 Default value set at factory shipment

*2 This shows whether read or write from sequence program is possible.
R: Readable W: Writable

*3 This shows that whether write to the non-volatile memory by the set value backup function and read by the default setting registration function is possible.
○: Writable and readable —: Unwritable and unreadable

For details on the set value backup function, refer to ☞ Page 72, Section 4.13.

For details on the default setting registration function, refer to ☞ Page 73, Section 4.14.

(2) Un\G1800 to Un\G4999 (Error history)

Address (decimal)	Address (hexadecimal)	Name				Default value*1	Read/Write *2	Set value backup area *3
1800	708_H	Latest address of error history				0	R	—
1801 to 1809	709_H to 711_H	System area				—	—	—
1810	712_H	No. 1	Error code			0	R	—
1811	713_H		Error time	First two digits of the year	Last two digits of the year	0	R	—
1812	714_H			Month	Day	0	R	—
1813	715_H			Hour	Minute	0	R	—
1814	716_H			Second	Day of the week	0	R	—
1815 to 1819	717_H to $71B_H$		System area			—	—	—
1820 to 1829	$71C_H$ to 725_H	No. 2	Same as No. 1					
1830 to 1839	726_H to $72F_H$	No. 3	Same as No. 1					
1840 to 1849	730_H to 739_H	No. 4	Same as No. 1					
1850 to 1859	$73A_H$ to 743_H	No. 5	Same as No. 1					
1860 to 1869	744_H to $74D_H$	No. 6	Same as No. 1					
1870 to 1879	$74E_H$ to 757_H	No. 7	Same as No. 1					
1880 to 1889	758_H to 761_H	No. 8	Same as No. 1					
1890 to 1899	762_H to $76B_H$	No. 9	Same as No. 1					

Address (decimal)	Address (hexadecimal)	Name		Default value*1	Read/Write *2	Set value backup area *3
1900 to 1909	$76C_H$ to 775_H	No. 10	Same as No. 1			
1910 to 1919	776_H to $77F_H$	No. 11	Same as No. 1			
1920 to 1929	780_H to 789_H	No. 12	Same as No. 1			
1930 to 1939	$78A_H$ to 793_H	No. 13	Same as No. 1			
1940 to 1949	794_H to $79D_H$	No. 14	Same as No. 1			
1950 to 1959	$79E_H$ to $7A7_H$	No. 15	Same as No. 1			
1960 to 1969	$7A8_H$ to $7B1_H$	No. 16	Same as No. 1			
1970 to 4999	$7B2_H$ to 1387_H	System area		—	—	—

*1 Default value set at factory shipment

*2 This shows whether read or write from sequence program is possible.
R: Readable W: Writable

*3 This shows that whether write to the non-volatile memory by the set value backup function and read by the default setting registration function is possible.
○: Writable and readable —: Unwritable and unreadable

For details on the set value backup function, refer to ☞ Page 72, Section 4.13.

For details on the default setting registration function, refer to ☞ Page 73, Section 4.14.

(3) Un\G5000 to Un\G44999 (Logging section)

Address (decimal)	Address (hexadecimal)	Name	Default value*1	Read/Write *2	Set value backup area *3
5000 to 9999	1388_H to $270F_H$	CH1 Logging data	0	R	—
10000 to 14999	2710_H to $3A97_H$	CH2 Logging data	0	R	—
15000 to 19999	$3A98_H$ to $4E1F_H$	CH3 Logging data	0	R	—
20000 to 24999	$4E20_H$ to $61A7_H$	CH4 Logging data	0	R	—
25000 to 29999	$61A8_H$ to $752F_H$	CH5 Logging data	0	R	—
30000 to 34999	7530_H to $88B7_H$	CH6 Logging data	0	R	—
35000 to 39999	$88B8_H$ to $9C3F_H$	CH7 Logging data	0	R	—
40000 to 44999	$9C40_H$ to $AFC7_H$	CH8 Logging data	0	R	—

*1 Default value set at factory shipment

*2 This shows whether read or write from sequence program is possible.
R: Readable W: Writable

*3 This shows that whether write to the non-volatile memory by the set value backup function and read by the default setting registration function is possible.
○: Writable and readable —: Unwritable and unreadable

For details on the set value backup function, refer to Page 72, Section 4.13.

For details on the default setting registration function, refer to Page 73, Section 4.14.

6.2 Details of Buffer Memory Addresses

The following describes the details of buffer memory addresses.

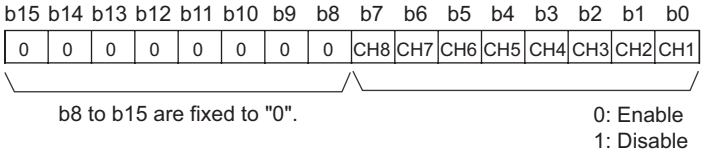
(1) Conversion enable/disable setting (Un\G0)

Set whether to enable or disable the conversion for each channel.

After setting CH□ Input range setting (Un\G150 to Un\G157) depending on the CT connected, set Enable (0).

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

- Conversion Enable/Disable Function (☞Page 37, Section 4.3)



(a) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(b) Default value

All channels are set to Disable (1).

(2) CH□ Average time/Average number of times/Moving average/Time constant settings (Un\G1 to Un\G8)

Set the time average, count average, moving average, and time constant of the primary delay filter for each channel for which the averaging processing is specified.
For details on the digital conversion method, refer to the following.

- Digital Conversion Method (☞Page 38, Section 4.5)

- The following shows the setting range.

Digital conversion method	Setting range
Time average	40 to 5000 (ms)*1
Count average	4 to 500 (times)
Moving average	2 to 1000 (times)
Primary delay filter	10 to 10000 (ms)*1

*1 Set an integral multiple of the sampling cycle. If the time average and primary delay filter are not set as the integral multiple, the time average and Primary delay filter are averaged at the maximum cycle satisfying "the set time or less and the integral multiple of the sampling cycle". In addition, configure per 10ms unit. A value per 1ms unit is rounded off.

- When the value out of the setting range above is written in a channel, an error occurs in the channel. The error code (20□, 30□, 31□, or 32□) corresponding to Latest error code (Un\G19) is stored, and Error flag (XF) turns on. The conversion processing is performed based on the setting before the error occurs.
- When a value is set to the channel for which the sampling processing is specified, the set value is ignored.

(a) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(b) Default value

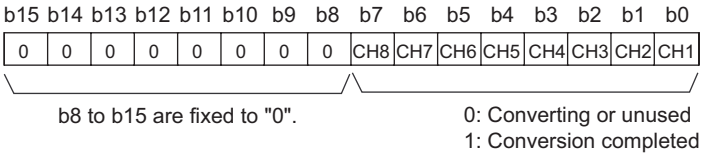
All channels are set to 0.

Point

Since 0 is set as the default value, change the setting value depending on the digital conversion method.

(3) Conversion completed flag (Un\G10)

The conversion status can be checked with this flag for each channel.



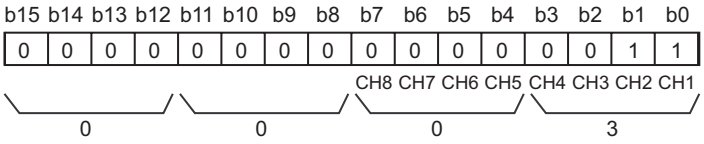
(a) Conversion completion

When the first digital conversion is completed for the channel for which Enable is set, Conversion completed (1) is stored.

Conversion completed flag (XE) turns on when the digital conversion of all the channels for which Enable is set is completed.

When Operating condition setting request (Y9) is turned on then off, Converting or unused (0), which is the default setting, is stored. When the first digital conversion is completed, Conversion completed (1) is stored again.

Ex. When CH1 and CH2 are set to Enable and the conversion of CH1 and CH2 is completed, 0003_H(3) is stored in Conversion completed flag (Un\G10), as shown below.



(4) CH□ Digital output value (Un\G11 to Un\G18)

The digital output value after digital conversion is stored in each channel.

(a) Updating cycle

When the average processing is performed, the value is updated in each specified averaging process cycle.

When the average processing is not performed, the value is updated in each sampling cycle.

(5) Latest error code (Un\G19)

The latest error code or alarm code detected by the CT input module is stored.

For details on the error code and alarm code, refer to the following.

- Error Code List (☞ Page 228, Section 11.1)
- Alarm Code List (☞ Page 235, Section 11.2)

(a) Clearing an error

Turn on then off Error clear request (YF).

(6) Offset/gain setting mode Offset specification (Un\G22), Offset/gain setting mode Gain specification (Un\G23)

Specify the channel to adjust the offset/gain setting.

- Offset/gain setting mode Offset specification (Un\G22): channel to adjust the offset
- Offset/gain setting mode Gain specification (Un\G23): channel to adjust the gain

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Offset/gain setting mode Offset specification (Un\G22)	0	0	0	0	0	0	0	0	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1
Offset/gain setting mode Gain specification (Un\G23)	0	0	0	0	0	0	0	0	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1

b8 to b15 are fixed to "0".

0: Not specified
1: Specified channel

(a) Default value

All channels are set to Not specified (0).

Point

- Multiple channels can be simultaneously set. In that case, set Not specified (0) to either of Offset/gain setting mode Offset specification (Un\G22) and Offset/gain setting mode Gain specification (Un\G23). When the settings for both of them are configured at the same time, the offset/gain setting mode error (error code: 500) occurs.
- If the user range is not used in CH□ Input range setting (Un\G150 to Un\G157) when the offset/gain setting is set, the error (error code: 51□) occurs.
- For details on the offset/gain setting, refer to the following.
  - Offset/gain Setting (☞ Page 150, Section 8.5)

(7) Averaging process setting (Un\G24, Un\G25)

Set these areas when selecting sampling or averaging processing for each channel.

Averaging processing includes time average, count average, moving average, and primary delay filter.

For details on the digital conversion method, refer to the following.

- Digital Conversion Method (☞Page 38, Section 4.5)

	b15 to b12	b11 to b8	b7 to b4	b3 to b0
Averaging process setting (CH1 to CH4) (Un\G24)	CH4	CH3	CH2	CH1
Averaging process setting (CH5 to CH8) (Un\G25)	CH8	CH7	CH6	CH5

Digital conversion method	Setting value
Sampling processing	0_H
Time average	1_H
Count average	2_H
Moving average	3_H
Primary delay filter	4_H

- When the value out of the setting range above is written in a channel, an error occurs in the channel. The error code (33□) is stored in Latest error code (Un\G19), and Error flag (XF) turns on. The conversion processing is performed based on the setting before the error occurs.

(a) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(b) Default value

All channels are set to Sampling processing (0).

(8) Sampling cycle setting (Un\G26)

Set the sampling cycle shared by all the channels.

For details on the sampling cycle switching function, refer to the following.

- Sampling Cycle Switching Function (☞Page 37, Section 4.4)

Sampling cycle	Setting value
10ms/8CH	0_H
20ms/8CH	1_H
50ms/8CH	2_H
100ms/8CH	3_H

- When the value out of the setting range above is written in a channel, an error occurs in the channel. The error code (350) is stored in Latest error code (Un\G19), and Error flag (XF) turns on. The sampling cycle performs in the setting before the error occurs.

(a) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(b) Default value

10ms/8CH (0) is set as the default value.

(9) CH1 Maximum value (Un\G30) to CH8 Minimum value (Un\G45)

The maximum and minimum values of the digital value digital-converted for each channel are stored as signed 16-bit binary.

For details on the maximum and minimum values hold function, refer to the following.

- Maximum Value and Minimum Values Hold Function (☞Page 59, Section 4.11)

CH1 Maximum value (Un\G30) to CH8 Minimum value (Un\G45) are updated to the present value when either of the following operations is performed:

- When the setting is changed after Operating condition setting request (Y9) is turned on then off
- When Maximum value/minimum value reset request (YD) is turned on then off

Point

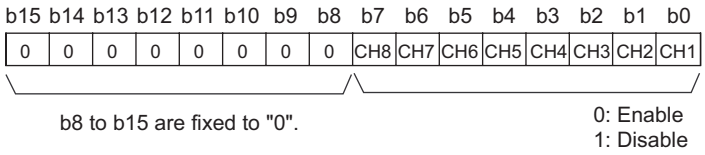
- When the time average method is specified, the maximum and minimum values are stored in each average time specified. When the count average method is specified, the maximum and minimum values are stored in each count average specified. When one of other digital conversion methods is specified, the maximum and minimum values are stored in each sampling cycle.
- When the scaling function is used, the maximum and minimum values after scale conversion are stored.

(10)Input signal error detection setting (Un\G47)

Set whether to enable or disable the input signal error detection for each channel.

For details on the input signal error detection function, refer to the following.

- Input Signal Error Detection Function (☞Page 44, Section 4.6)



(a) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(b) Default value

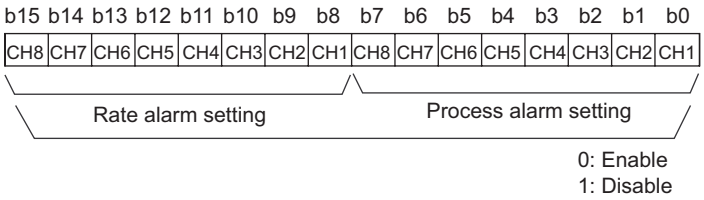
All channels are set to Disable (1).

(11)Warning output setting (Un\G48)

Set whether to enable or disable the warning output (process alarm and rate alarm) for each channel.

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

- Warning Output Function (☞Page 53, Section 4.10)



(a) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(b) Default value

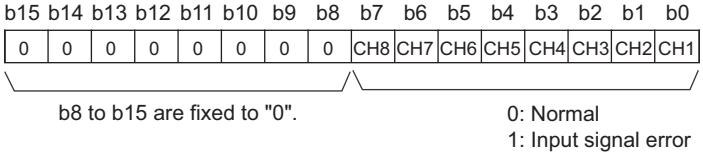
All channels are set to Disable (1).

(12)Input signal error detection flag (Un\G49)

Input signal status can be checked with this flag for each channel.

For details on the input signal error detection function, refer to the following.

- Input Signal Error Detection Function (☞Page 44, Section 4.6)



(a) Input signal error detection flag (Un\G49) status

- When a CT input value out of the input range is detected, Input signal error detection flag (Un\G49) corresponding to each channel turns to Input signal error (1).
- When an error is detected in any channels in which the digital conversion or input signal error detection is enabled, Input signal error detection signal (XC) turns on.

(b) Clearing Input signal error detection flag (Un\G49)

To clear Input signal error detection flag (Un\G49), turn on then off Error clear request (YF) when the CT input value is within the measurement range.

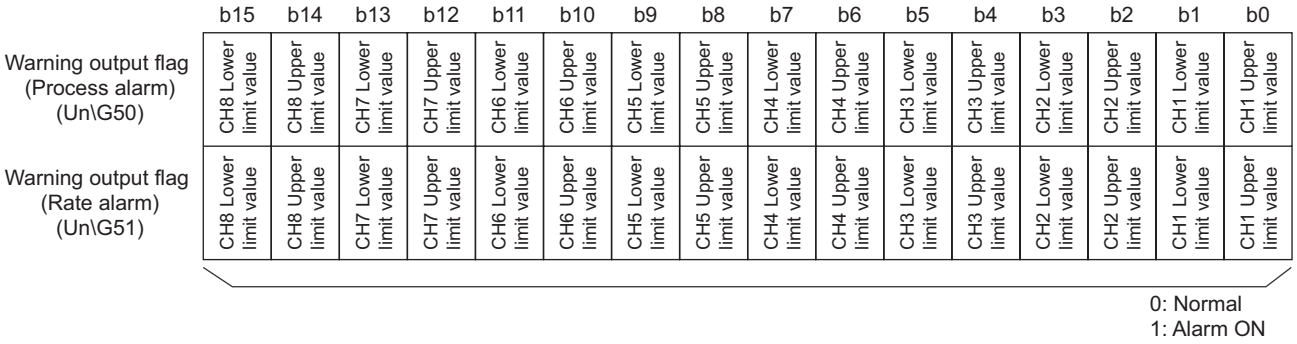
Input signal error detection flag (Un\G49) is also cleared by turning on then off Operating condition setting request (Y9).

(13)Warning output flag (Process alarm) (Un\G50), Warning output flag (Rate alarm) (Un\G51)

The process alarm and rate alarm can be checked whether the alarm is the upper limit alarm or lower limit alarm for each channel.

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

- Warning Output Function (☞Page 53, Section 4.10)



(a) Status of Warning output flag (Process alarm) (Un\G50) and Warning output flag (Rate alarm) (Un\G51)

When an alarm is detected due to any of the following, Alarm ON (1) is stored in Warning output flag corresponding to each channel.

- The digital output value exceeds the setting range of CH1 Process alarm lower lower limit value (Un\G86) to CH8 Process alarm upper upper limit value (Un\G117).
- The digital output value exceeds the change rate of CH1 Rate alarm upper limit value (Un\G126) to CH8 Rate alarm lower limit value (Un\G141).

When an error is detected in any channels in which the digital conversion or input signal error detection is enabled, Warning output signal (X8) turns on.

(b) Clearing Warning output flag (Process alarm) (Un\G50) and Warning output flag (Rate alarm) (Un\G51)

The alarms are cleared by any of the following.

- The digital output value or the change rate of the digital output value returns within the setting range.
- Turn on then off Operating condition setting request (Y9)

(14)Scaling enable/disable setting (Un\G53)

Set whether the scaling is enabled or disabled for each channel.

For details on scaling function, refer to the following.

- Scaling Function (☞Page 50, Section 4.9)

Point

When Scaling enable/disable setting (Un\G53) is disabled, 0 is stored in CH□ Scaling value (Un\G54 to Un\G61).

(a) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

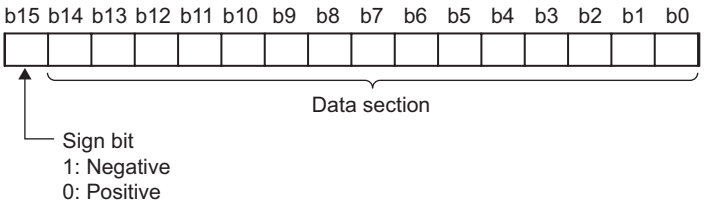
(b) Default value

All channels are set to Disable (1).

(15)CH□ Scaling value (Un\G54 to Un\G61)

The digital output values after scale conversion by the scaling function are stored for each channel.

The scaling values are stored with 16-bit signed binary.



(16)CH1 Scaling lower limit value (Un\G62) to CH8 Scaling upper limit value (Un\G77)

Set the range of scale conversion for each channel.

For details on scaling function, refer to the following.

- Scaling Function (☞Page 50, Section 4.9)

(a) Setting range

- Setting range: -32000 to 32000
- In the channel where a value other than the above is set, an error occurs. The error code (90□) is stored in Latest error code (Un\G19) and Error flag (XF) turns on. The scaling upper limit value and scaling lower limit value in the channel for which an error occurred operate in the setting before the error occurs.
- When Disable (1) is set to Scaling enable/disable setting (Un\G53), the setting for CH1 Scaling lower limit value (Un\G62) to CH8 Scaling upper limit value (Un\G77) is ignored.
- Setting the scaling lower limit value more than the scaling upper limit value allows scale conversion with a negative slope.

(b) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(c) Default value

All channels are set to 0.

Point

Since 0 is set as the default value, change the set value to use the scaling function.

(17)CH1 Process alarm lower lower limit value (Un\G86) to CH8 Process alarm upper upper limit value (Un\G117)

Set the alert output range of the digital output value for each channel. Configure the 4-step setting of process alarm upper upper limit value, process alarm upper lower limit value, process alarm lower upper limit value and process alarm lower lower limit value.

For details on the warning output function (process alarm), refer to the following.

- Warning Output Function (Process Alarm) (☞Page 53, Section 4.10 (1))

(a) Setting range

- Setting range: -32768 to 32767
- The setting must satisfy the following condition: process alarm upper upper limit value ≥ process alarm upper lower limit value ≥ process alarm lower upper limit value ≥ process alarm lower lower limit value. In the channel where the condition is not satisfied, an error occurs. The error code (6△□) is stored in Latest error code (Un\G19) and Error flag (XF) turns on. The process alarm operates in the setting before the error occurs.
- When using the scaling function, set values considering the scale conversion. For details on the scaling function, refer to the following.

  Scaling Function (☞Page 50, Section 4.9)

(b) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(c) Default value

All channels are set to 0.

Point

Since 0 is set as the default value, change the set value to use the process alarm.

(18)CH□ Rate alarm warning detection period (Un\G118 to Un\G125)

Set the cycle for checking the change rate of digital output values for each channel.

For details on the warning output function (rate alarm), refer to the following.

- Warning Output Function (Rate Alarm) (☞Page 55, Section 4.10 (2))

(a) Setting range

- Setting range: 10 to 5000ms
- Configure per 10ms unit. A value per 1ms unit is rounded off.
- In the channel where a setting value other than the above is set, an error occurs. The error code (70□) is stored in Latest error code (Un\G19) and Error flag (XF) turns on. The time average, count average, and rate alarm operate in the setting before the error occurs.
- Set an integral multiple of the conversion cycle on each digital conversion method. If these areas are not set as the integral multiple, an alert is output at the maximum cycle satisfying the rate alarm warning detection period or less and the integral multiple of the conversion cycle.

Ex. Rate alarm warning detection period for the following condition

- Digital conversion method: Count average
- Count average: 10 times
- Sampling cycle: 100ms/8CH

The conversion cycle is 1000ms (10 (times) × 100 (ms)). Therefore, set an integral multiple of 1000ms, such as 1000ms or 2000ms for the rate alarm warning detection period.

Remark

When a small value is set for the rate alarm upper limit value or the rate alarm lower limit value, even a slight disturbance may cause the alert output to turn on. To prevent this, set a long rate alarm warning detection period.

(b) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(c) Default value

All channels are set to 0.

Point

Since 0 is set as the default value, change the set value to use the rate alarm.

(19)CH1 Rate alarm upper limit value (Un\G126) to CH8 Rate alarm lower limit value (Un\G141)

Set the change rate range of the digital output value for each channel.

For details on the warning output function (rate alarm), refer to the following.

- Warning Output Function (Rate Alarm) (☞Page 55, Section 4.10 (2))

(a) Setting range

- Setting range: -32768 to 32767 (-3276.8 to 3276.7%/s) (Set in 0.1%/s)

  Ex. To set the rate alarm upper limit value to 30%/s, store 300 in the buffer memory.
- The range must satisfy the following condition: rate alarm upper limit value ≥ rate alarm lower limit value. In the channel where the condition is not satisfied, an error occurs. The error code (34☐) is stored in Latest error code (Un\G19) and Error flag (XF) turns on. The rate alarm operates in the setting before the error occurs.

(b) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(c) Default value

All channels are set to 0.

Point

Since 0 is set as the default value, change the set value to use the rate alarm.

(20)CH□ Input range setting (Un\G150 to Un\G157)

Set the CT input range for each channel.

For details on the input range setting, refer to the following.

- Input Range Setting (☞Page 36, Section 4.2)

Input range		Setting value
Factory default range	0 to 5AAC	0000_H
	0 to 50AAC	0001_H
	0 to 100AAC	0002_H
	0 to 200AAC	0003_H
	0 to 400AAC	0004_H
	0 to 600AAC	0005_H
User range	0 to 5AAC	0010_H
	0 to 50AAC	0011_H
	0 to 100AAC	0012_H
	0 to 200AAC	0013_H
	0 to 400AAC	0014_H
	0 to 600AAC	0015_H

- In the channel where a setting value other than the above is set, an error occurs. The error code (10□) is stored in Latest error code (Un\G19) and Error flag (XF) turns on. The setting range before the error occurs is applied.

(a) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(b) Default value

All channels are set to 0 to 5AAC (factory default range) (0000_H).

Point

Since 0 to 5AAC (factory default range) (0000_H) is set as the default value, change the setting depending on the connected CT.

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

Set the value for the mode to be switched to.

Mode	Setting value	
	Un\G158	Un\G159
Normal mode	0964_H	4144_H
Offset/gain setting mode	4144_H	0964_H

Point

When a value out of the setting range above is written, the mode is not switched and only the operating condition is changed.

(a) Mode switching

To perform the mode switching, turn off then on Operating condition setting request (Y9).

(b) After the mode is switched

When the mode is switched, these areas are cleared and Operating condition setting completed flag (X9) turns off.

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

(c) Default value

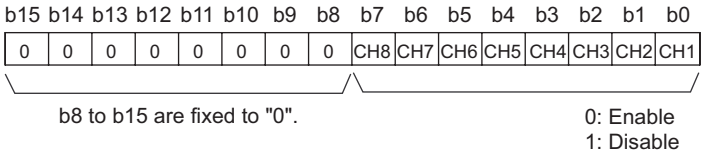
The default value is set to 0.

(22)Dropout detection setting (Un\G160)

Set whether to enable or disable the dropout detection for each channel.

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

- Dropout Function (☞Page 49, Section 4.8)



(a) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(b) Default value

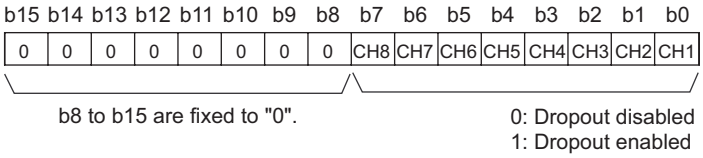
All channels are set to Disable (1).

(23)Dropout status flag (Un\G161)

The setting status of the dropout function can be checked for each channel.

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

- Dropout Function (☞Page 49, Section 4.8)



(a) Dropout status flag (Un\G161) status

- When the dropout function is enabled, Dropout enabled (1) is stored in Dropout status flag (Un\G161).
- When the dropout function is disabled, Dropout disabled (0) is stored in Dropout status flag (Un\G161).

(24)CH□ Dropout value (Un\G162 to Un\G169)

Set the digital output value which is dropped out for each channel.

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

- Dropout Function (☞Page 49, Section 4.8)

(a) Setting range

- Setting range: 1 to 10000
- When the value after digital conversion is the dropout value or less, 0 is stored in CH□ Digital output value (Un\G11 to Un\G18).

(b) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(c) Default value

All channels are set to 50.

(25)CH1 Factory default setting offset value (Un\G202) to CH8 User range setting gain value (Un\G233)

These are the areas for restoring the offset/gain setting value in the user range.

Data for restoring the offset/gain setting value of the user range is stored (saved) at operations below.

- Writing the initial setting by a programming tool
- Turning off then on Operating condition setting request (Y9)*1
- Turning off then on User range write request (YA) (in offset/gain setting mode)

*1 The data is not saved when the setting value is written to Mode switching setting (Un\G158, Un\G159).

When restoring the offset/gain setting value in the user range, set the data saved in these areas to the same area in the CT input module where the data is restored.

(a) Procedure for saving offset/gain values into the buffer memory area

1. **Turn off then on Operating condition setting request (Y9).**
2. **Compare CH1 Factory default setting offset value (Un\G202) to CH8 User range setting gain value (Un\G233) with the values in the range reference table. For the range reference table, refer to the following.**
   • Range Reference Table (☞Page 227, Section 10.11)
3. **If the values are proper, save the values in CH1 Factory default setting offset value (Un\G202) to CH8 User range setting gain value (Un\G233).**

For setting procedure of the offset/gain values, refer to the following.

- Offset/gain Setting (☞Page 150, Section 8.5)

(b) Default value

All channels are set to 0.

(26)Peak current detection setting (Un\G300)

Set whether to enable or disable the peak current detection for each channel.

For details on the peak current detection function, refer to the following.

Peak Current Detection Function (☞Page 46, Section 4.7)

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

b8 to b15 are fixed to "0".

0: Enable
1: Disable

(a) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(b) Default value

All channels are set to Disable (1).

(27)Peak current detection flag (Un\G301)

The peak current status can be checked with this flag for each channel.

For details on the peak current detection function, refer to the following.

Peak Current Detection Function (☞Page 46, Section 4.7)

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

b8 to b15 are fixed to "0".

0: Normal
1: Peak current detected

(a) Peak current detection flag (Un\G301) status

- When CH□ Digital output value (Un\G11 to Un\G18) exceeds set CH□ Peak current detection value (Un\G326 to Un\G333) consecutively for the duration of CH□ Peak current detection time (Un\G318 to Un\G325) set in advance, Peak current detected (1) is stored in Peak current detection flag (Un\G301) of the corresponding channel.
- When a peak current is detected in even one of the channels for which the digital conversion or peak current detection are enabled, Peak current detection signal (X7) turns on.

(b) Clearing Peak current detection flag (Un\G301)

To clear Peak current detection flag (Un\G301), turn on then off Error clear request (YF) when the digital output value is the peak current detection value or less.

Peak current detection flag (Un\G301) is also cleared by turning on then off Operating condition setting request (Y9).

(28)CH□ Peak current detection count reset request (Un\G302 to Un\G309)

To set the number of peak current detection to 0, set Reset requested (1) for each channel.
For details on the peak current detection function, refer to the following.

- Peak Current Detection Function (☞Page 46, Section 4.7)

Peak current detection count reset request	Setting value
Reset not requested	0
Reset requested	1

(a) Default value

All channels are set to Reset not requested (0).

(29)CH□ Peak current detection count reset complete (Un\G310 to Un\G317)

The number of peak current detection can be checked for completion for each channel.
For details on the peak current detection function, refer to the following.

- Peak Current Detection Function (☞Page 46, Section 4.7)

When Reset requested (1) is set to CH□ Peak current detection count reset request (Un\G302 to Un\G309) and Peak current detection count (Un\G334 to Un\G341) is reset, Reset request completed (1) is stored in Peak current detection count reset complete (Un\G310 to Un\G317).

When Reset not requested (0) is set to CH□ Peak current detection count reset request (Un\G302 to Un\G309), Reset not requested (0) is stored in CH□ Peak current detection count reset complete (Un\G310 to Un\G317).

(30)CH☐ Peak current detection time (Un\G318 to Un\G325)

Set the unit time (in ms) for peak current detection for each channel.

For details on the peak current detection function, refer to the following.

- Peak Current Detection function (☞Page 46, Section 4.7)

(a) Setting range

- Setting range: 10 to 10000ms
- Configure per 10ms unit. A value per 1ms unit is rounded off.
- Set an integral multiple of the sampling cycle. If these areas are not set as the integral multiple, the peak current is detected at the maximum cycle satisfying "the peak current detection time or less and the integral multiple of the sampling cycle".

Ex. The actual peak current detection time for the following setting is 900ms (integral multiple of 100ms).

- Sampling cycle setting: 100ms/8CH
- Peak current detection time: 950ms

- In the channel where a value of the sampling cycle or lower is set, an error occurs. The error code (36☐) is stored in Latest error code (Un\G19) and Error flag (XF) turns on. The peak current detection time before the error occurs is applied.
- When Disable (1) is set to Peak current detection setting (Un\G300), the setting of CH☐ Peak current detection time (Un\G318 to Un\G325) is ignored.

(b) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(c) Default value

All channels are set to 1000 (ms).

(31)CH☐ Peak current detection value (Un\G326 to Un\G333)

Set the digital output value detected as peak current for each channel.

For details on the peak current detection function, refer to the following.

- Peak Current Detection Function (☞Page 46, Section 4.7)

(a) Setting range

- Setting range: 0 to 11999
- When Disable (1) is set to Peak current detection setting (Un\G300), the setting of CH☐ Peak current detection value (Un\G326 to Un\G333) is ignored.

(b) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(c) Default value

All channels are set to 0.

Point

Since 0 is set as the default value, change the set value to use the peak current detection function.

(32)CH□ Peak current detection count (Un\G334 to Un\G341)

These are the areas for storing the number of peak current detection for each channel.

For details on the peak current detection function, refer to the following.

- Peak Current Detection Function (☞Page 46, Section 4.7)

(a) Counting the number of peak current detection

- When a digital output value exceeds set CH□ Peak current detection value (Un\G326 to Un\G333) consecutively for the duration of CH□ Peak current detection time (Un\G318 to Un\G325) set in advance, 1 is added to CH□ Peak current detection count (Un\G334 to Un\G341). However, after the addition to the peak current detection count, 1 is not added unless the digital output value becomes less than the peak current detection value.
- The number of peak current detection is stored automatically in the non-volatile memory in the CT input module. The number of peak current detection continues to be counted until the reset of the number of the detection.

(b) Resetting the number of peak current detection

By setting Reset requested (1) to CH□ Peak current detection count reset request (Un\G302 to Un\G309), 0 is stored in CH□ Peak current detection count (Un\G334 to Un\G341).

(c) Measurement range of the number of peak current detection

- Measurement range: 0 to 32767

When the upper limit of the measurement range is exceeded, 0 is set again.

(33)CH□ Logging enable/disable setting (Un\G1000 to Un\G1007)

Set whether to enable or disable the logging function for each channel.

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

- Logging Function (☞Page 60, Section 4.12)

Logging enable/disable setting	Setting value
Enable	0
Disable	1

In the channel where a setting value other than the above is set, an error occurs. The error code (200□) is stored in Latest error code (Un\G19) and Error flag (XF) turns on. Also, logging cannot be performed.

(a) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(b) Default value

All channels are set to Disable (1).

(34)CH□ Logging hold request (Un\G1008 to Un\G1015)

Use Logging hold request (Un\G1008 to Un\G1015) as a trigger to hold (stop) the logging at any timing during the logging for each channel.

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

- Logging Function (☞Page 60, Section 4.12)

Logging hold request	Setting value
OFF	0
ON	1

- In the channel where a setting value other than the above is set, an error occurs. The error code (207□) is stored in Latest error code (Un\G19) and Error flag (XF) turns on. However, the logging continues.
- When Disable (1) is set to CH□ Logging enable/disable setting (Un\G1000 to Un\G1007), the setting for CH□ Logging hold request (Un\G1008 to Un\G1015) is ignored.

(a) Operation of the logging hold processing

When Disable (0) is set to CH□ Level trigger condition setting (Un\G1056 to Un\G1063)

- When ON (1) is set to CH□ Logging hold request (Un\G1008 to Un\G1015), the logging hold processing starts.

When Above (1), Below (2), or Pass through (3) is set to CH□ Level trigger condition setting (Un\G1056 to Un\G1063)

- When the trigger condition is satisfied after ON (1) is set to CH□ Logging hold request (Un\G1008 to Un\G1015), the logging hold processing starts. When the level trigger is enabled, use Logging hold request (Un\G1008 to Un\G1015) as an interlock to generate the level trigger.

If CH□ Logging hold request (Un\G1008 to Un\G1015) is turned OFF (0), the hold status (stop) is cleared. Also, the logging resumes.

(b) Default value

All channels are set to OFF (0).

(35)CH□ Logging hold flag (Un\G1016 to Un\G1023)

Logging hold status can be checked with this flag for each channel.

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

- Logging Function (☞Page 60, Section 4.12)

Logging hold status	Stored value
OFF	0
ON	1

- When the logging status changes to the stop (hold) from the execution, ON (1) is stored.
- When the logging is resumed, OFF (0) is stored.

(36)CH☐ Logging data setting (Un\G1024 to Un\G1031)

Set whether the logging target is the digital output value or the scaling value for each channel.

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

- Logging Function (☞Page 60, Section 4.12)

Logging target	Setting value
Digital output value	0
Scaling value	1

- In the channel where a setting value other than the above is set, an error occurs. The error code (203☐) is stored in Latest error code (Un\G19) and Error flag (XF) turns on. Also, logging cannot be performed.
- When Disable (1) is set to CH☐ Logging enable/disable setting (Un\G1000 to Un\G1007), the setting for CH☐ Logging data setting (Un\G1024 to Un\G1031) is ignored.

(a) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(b) Default value

All channels are set to Scaling value (1).

(37)CH☐ Logging cycle setting value (Un\G1032 to Un\G1039), CH☐ Logging cycle unit setting (Un\G1040 to Un\G1047)

Set the cycle of storing the logging data for each channel.

Set a value for one cycle in CH☐ Logging cycle setting value (Un\G1032 to Un\G1039).

Set a unit of one cycle in CH☐ Logging cycle unit setting (Un\G1040 to Un\G1047).

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

- Logging Function (☞Page 60, Section 4.12)

(a) Setting range

- The setting range of CH☐ Logging cycle setting value (Un\G1032 to Un\G1039) depends on the setting for CH☐ Logging cycle unit setting (Un\G1040 to Un\G1047).

Logging cycle unit	Setting value of CH☐ Logging cycle unit setting (Un\G1040 to Un\G1047)	Setting range of CH☐ Logging cycle setting value (Un\G1032 to Un\G1039)
Update cycle	0	The setting is ignored.
ms	1	10 to 32767
s	2	1 to 3600

- If a setting above is outside the setting range, an error occurs. The error code (201☐) is stored in Latest error code (Un\G19) and Error flag (XF) turns on. Also, logging cannot be performed.
- If the set logging cycle is shorter than the update cycle of the data to be logged, an error occurs. The error code (202☐) is stored in Latest error code (Un\G19) and Error flag (XF) turns on. Also, logging cannot be performed.
- When Disable (1) is set to CH☐ Logging enable/disable setting (Un\G1000 to Un\G1007), the setting value is ignored.

(b) Actual logging cycle

The actual logging cycle is an integral multiple of the conversion cycle of digital output value or scaling value. The conversion cycle of each conversion method is as follows.

Digital conversion method	Conversion cycle
Sampling processing	Sampling cycle
Time average	$\left(\frac{\text{Time set to CH☐ Average time/Average number of times/ Moving average/Time constant settings (Un\G1 to Un\G8)}}{\text{Sampling cycle}}\right)^{*1} \times$ Sampling cycle
Count average	(Times set in (CH☐ Average time/Average number of times/Moving average/Time constant settings (Un\G1 to Un\G8)) × Sampling cycle
Moving average	Sampling cycle
Primary delay filter	Sampling cycle

*1 The value after the decimal point is rounded off.

If the set logging cycle is not an integral multiple of the conversion cycle, the logging function operates in the maximum cycle of an integral multiple within the setting range.

Ex. The processing time for the following settings is calculated below:

- Averaging process setting (Un\G24, Un\G25): Sampling processing (0)
- Sampling cycle setting (Un\G26): 100ms/8CH (3)
- CH☐ Logging data setting (Un\G1024 to Un\G1031): Digital output value (0)
- CH☐ Logging cycle setting value (Un\G1032 to Un\G1039): 1950
- CH☐ Logging cycle unit setting (Un\G1040 to Un\G1047): ms (1)

The conversion cycle is 100ms. The actual logging cycle is 1900ms (an integral multiple of 100ms).

Point

When Update cycle (0) is set to Logging cycle unit setting, the logging is performed in the conversion cycle of the logging target data. In this case, the setting of CH☐ Logging cycle setting value (Un\G1032 to Un\G1039) is ignored.

(c) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(d) Default value

- For CH☐ Logging cycle setting value (Un\G1032 to Un\G1039), all channels are set to 300.
- For CH☐ Logging cycle unit setting (Un\G1040 to Un\G1047), all channels are set to Update cycle (0).

(38)CH□ Logging points after trigger (Un\G1048 to Un\G1055)

Set the data points recorded from hold trigger occurs until logging holds (stops) for each channel.

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

- Logging Function (☞Page 60, Section 4.12)

(a) Setting range

- Setting range: 1 to 5000
- In the channel where a setting value out of the above setting range is set, an error occurs. Then the error code (204□) is stored in Latest error code (Un\G19) and Error flag (XF) turns on. Also, logging cannot be performed.
- When Disable (1) is set to CH□ Logging enable/disable setting (Un\G1000 to Un\G1007), the setting for CH□ Logging points after trigger (Un\G1048 to Un\G1055) is ignored.

(b) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(c) Default value

All channels are set to 2500.

(39)CH□ Level trigger condition setting (Un\G1056 to Un\G1063)

When the level trigger is used with the logging function, set the occurrence condition of the hold trigger for each channel.

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

- Logging Function (☞Page 60, Section 4.12)

Setting	Setting value
Disable	0
Above	1
Below	2
Pass through	3

- In the channel where a setting value other than the above is set, an error occurs. The error code (205□) is stored in Latest error code (Un\G19) and Error flag (XF) turns on. Also, logging cannot be performed.
- When Disable (1) is set to CH□ Logging enable/disable setting (Un\G1000 to Un\G1007), the setting for CH□ Level trigger condition setting (Un\G1056 to Un\G1063) is ignored.

(a) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(b) Default value

All channels are set to Disable (0).

(40)CH☐ Trigger data (Un\G1064 to Un\G1071)

Set a buffer memory address monitored for the occurrence condition of level trigger.

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

- Logging Function (☞Page 60, Section 4.12)

(a) Setting range

- Setting range: 0 to 4999
- In the channel where a setting value other than the above is set, an error occurs. The error code (206☐) is stored in Latest error code (Un\G19) and Error flag (XF) turns on. Also, logging cannot be performed.

Point

Set the following buffer memory addresses in the trigger data.

- CH☐ Digital output value (Un\G11 to Un\G18): 11 to 18
- CH☐ Scaling value (Un\G54 to Un\G61): 54 to 61
- Level data ☐ (Un\G1072 to Un\G1081): 1072 to 1081
- Buffer memory address with "R" in List of Buffer Memory Addresses
  For details on the buffer memory address, refer to the following.
  List of Buffer Memory Addresses (☞Page 91, Section 6.1)

Do not set the buffer memory addresses with "R/W" or "W" or system area in List of Buffer Memory Addresses. If they are set, the normal operation of the CT input module may not be ensured.

(b) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(c) Default value

Channel	Default value	Buffer memory to be monitored
CH1	54	CH1 Scaling value (Un\G54)
CH2	55	CH2 Scaling value (Un\G55)
CH3	56	CH3 Scaling value (Un\G56)
CH4	57	CH4 Scaling value (Un\G57)
CH5	58	CH5 Scaling value (Un\G58)
CH6	59	CH6 Scaling value (Un\G59)
CH7	60	CH7 Scaling value (Un\G60)
CH8	61	CH8 Scaling value (Un\G61)

(41)Level data □ (Un\G1072 to Un\G1081)

These are the areas for storing the data to be monitored when the level trigger of the logging function is used. 10 types of data are available: Level data 0 (Un\G1072) to Level data 9 (Un\G1081)

Use Level data □ to monitor device values in other than the CT input module such as the CPU module.

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

- Logging Function (☞Page 60, Section 4.12)

(a) Setting range

Setting range: -32768 to 32767

(b) Default value

All are set to 0.

(c) Example of use

To monitor data register D100 in the CPU module and generate the level trigger in CH1, create a program as follows.

1. **Set 1073 (Level data 1) to CH1 Trigger data (Un\G1064) (When Level data 1 is used).**
2. **Store the storage data of D100 in the program in Level data 1 (Un\G1073) as needed. (The start I/O number is set to 0_H in the following program example.)**

(42)CH□ Trigger setting value (Un\G1082 to Un\G1089)

Set a value where a level trigger is generated for each channel in the logging function.

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

- Logging Function (☞Page 60, Section 4.12)

(a) Setting range

Setting range: -32768 to 32767

(b) Enabling the setting

Turn on then off Operating condition setting request (Y9) to enable the setting.

(c) Default value

All channels are set to 0.

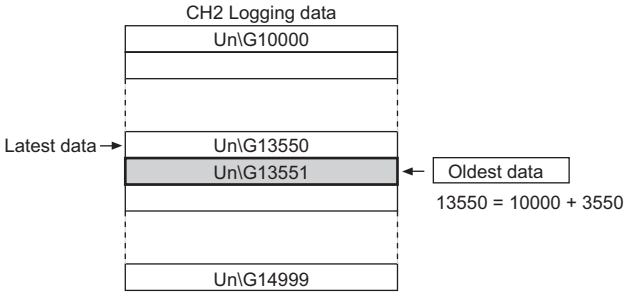
(43)CH□ Head pointer (Un\G1090 to Un\G1097)

The buffer memory address where the oldest data is stored can be checked in CH□ Logging data (Un\G5000 to Un\G44999) for each channel. The difference between the buffer memory address where the oldest data is stored and the start address in CH□ Logging data (Un\G5000 to Un\G44999) is stored.

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

Logging Function (☞Page 60, Section 4.12)

Ex. When the value of CH2 Head pointer (Un\G1091) is 3551



Point

- The oldest data is stored in the start address of CH□ Logging data (Un\G5000 to Un\G44999) while the first 5000 data is logged from when the logging is started. Therefore, the value in CH□ Head pointer (Un\G1090 to Un\G1097) is fixed to 0. After the 5001st data, the place of CH□ Head pointer (Un\G1090 to Un\G1097) moves one by one.
- When CH□ Logging hold request (Un\G1008 to Un\G1015) is turned OFF (0), CH□ Head pointer (Un\G1090 to Un\G1097) is cleared.

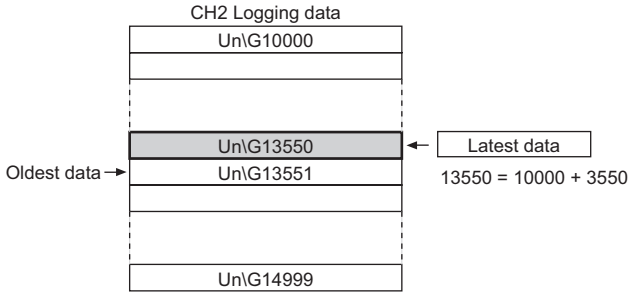
(44)CH□ Latest pointer (Un\G1098 to Un\G1105)

The buffer memory address where the latest data is stored can be checked in CH□ Logging data (Un\G5000 to Un\G44999) for each channel. The difference between the buffer memory address where the latest data is stored and the start address in CH□ Logging data (Un\G5000 to Un\G44999) is stored.

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

Logging Function (☞ Page 60, Section 4.12)

Ex. When the value of CH2 Latest pointer (Un\G1099) is 3550



Point

- CH□ Latest pointer (Un\G1098 to Un\G1105) moves one by one each time data is stored from when the logging starts.
- When CH□ Logging hold request (Un\G1008 to Un\G1015) is turned OFF (0), CH□ Latest pointer (Un\G1098 to Un\G1105) is cleared.

(45)CH□ Number of logging data (Un\G1106 to Un\G1113)

The number of data stored in the logging data storage area can be checked for each channel during the logging.

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

Logging Function (☞ Page 60, Section 4.12)

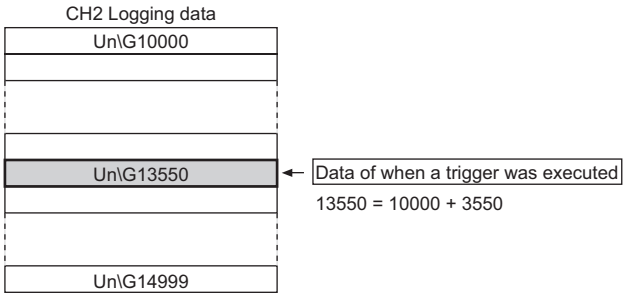
Point

- The number of logging data is added one by one each time data is stored from when the logging starts.
- When the 5000 data is stored in the logging data storage area, the value is overwritten from the head again. Therefore, CH□ Number of logging data (Un\G1106 to Un\G1113) is fixed to 5000.
- When CH□ Logging hold request (Un\G1008 to Un\G1015) is turned OFF (0), CH□ Number of logging data (Un\G1106 to Un\G1113) is cleared.

(46)CH☐ Trigger pointer (Un\G1114 to Un\G1121)

The address of buffer memory which stores the data of when a hold trigger was generated can be checked in CH☐ Logging data (Un\G5000 to Un\G44999) for each channel.
The difference between the address of buffer memory which stores the data of when a hold trigger was executed and the start address in CH☐ Logging data (Un\G5000 to Un\G44999) is stored.
For details on the logging function, refer to the following.
Logging Function (☞Page 60, Section 4.12)

Ex. When the value of CH2 Trigger pointer (Un\G1115) is 3550



Point

When CH☐ Logging hold request (Un\G1008 to Un\G1015) is turned OFF (0), CH☐ Trigger pointer (Un\G1114 to Un\G1121) is cleared.

(47)CH☐ Logging cycle monitoring value (Un\G1122 to Un\G1145)

These are the areas for storing the actual logging cycle for each channel. The actual logging cycle is calculated from the update cycle of data to be logged.
When Operating condition setting request (Y9) is turned on then off, the logging cycle is stored in CH☐ Logging cycle monitoring value (Un\G1122 to Un\G1145) in the corresponding channel where the logging function is enabled.
For details on the logging function, refer to the following.

- Logging Function (☞Page 60, Section 4.12)

	b15 to b0
Un\G1122	(s)
Un\G1123	(ms)
Un\G1124	(μs)

Ex. When the calculated value of logging cycle in CH1 is 6960ms

Buffer memory address	Stored value
Un\G1122	6(s)
Un\G1123	960(ms)
Un\G1124	0(μs)

(48)CH□ Trigger detection time (Un\G1154 to Un\G1185)

The time that the hold trigger occurred is recorded for each channel.

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

- Logging Function (☞Page 60, Section 4.12)

	b15 to b8	b7 to b0
Un\G1154	First two digits of the year	Last two digits of the year
Un\G1155	Month	Day
Un\G1156	Hour	Minute
Un\G1157	Second	Day of the week

Item	Storage contents	Storage example*1
First two digits of the year/Last two digits of the year	Stored in BCD code.	2011_H
Month/Day		329_H
Hour/Minute		1035_H
Second		40_H
Day of the week	One of the following values is stored for each day of the week in BCD code. • Sunday: 00 • Monday: 01 • Tuesday: 02 • Wednesday: 03 • Thursday: 04 • Friday: 05 • Saturday: 06	02_H

*1 Those are values when a hold trigger is detected at 10:35:40 on Tuesday, March 29th, 2011.

Point

- Time units shorter than one second are not recorded.
- When CH□ Logging hold request (Un\G1008 to Un\G1015) is turned OFF (0), CH□ Trigger detection time (Un\G1154 to Un\G1185) is cleared.

(49)Latest address of error history (Un\G1800)

The start address of the latest error history is stored.

For details on the error history function, refer to the following.

- Error History Function (☞Page 74, Section 4.15)

(50)Error history No. ☐ (Un\G1810 to Un\G1969)

Up to 16 errors occurred in the module are recorded.

For details on the error history function, refer to the following.

- Error History Function (☞Page 74, Section 4.15)

	b15 to b8	b7 to b0
Un\G1810	Error code	
Un\G1811	First two digits of the year	Last two digits of the year
Un\G1812	Month	Day
Un\G1813	Hour	Minute
Un\G1814	Second	Day of the week
Un\G1815 ⋮ Un\G1819	System area	

Item	Storage contents	Storage example*1
First two digits of the year/Last two digits of the year	Stored in BCD code.	2011_H
Month/Day		329_H
Hour/Minute		1035_H
Second		40_H
Day of the week	One of the following values is stored for each day of the week in BCD code. • Sunday: 00 • Monday: 01 • Tuesday: 02 • Wednesday: 03 • Thursday: 04 • Friday: 05 • Saturday: 06	02_H

*1 Those are values when an error occurs at 10:35:40 on Tuesday, March 29th, 2011.

(51)CH☐ Logging data (Un\G5000 to Un\G44999)

These are the areas for storing the logged data for each channel. Up to 5000 data can be stored per channel.

After the 5001st data for CH☐ Logging data (Un\G5000 to Un\G44999) for each channel, the logging is continued with the data overwritten from the head.

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

- Logging Function (☞Page 60, Section 4.12)

Point

- When Operating condition setting request (Y9) is turned on then off, the logging data in all the channels are cleared.
- Even if CH☐ Logging hold request (Un\G1008 to Un\G1015) is turned OFF (0) and the logging resumes, the logged data is not cleared.

CHAPTER 7 SETTINGS AND THE PROCEDURE BEFORE OPERATION

This chapter describes the procedure prior to a CT input module operation, the name of each part of a CT input module, and wiring method.

7.1 Handling Precautions

This section describes the handling precautions for a CT input module.

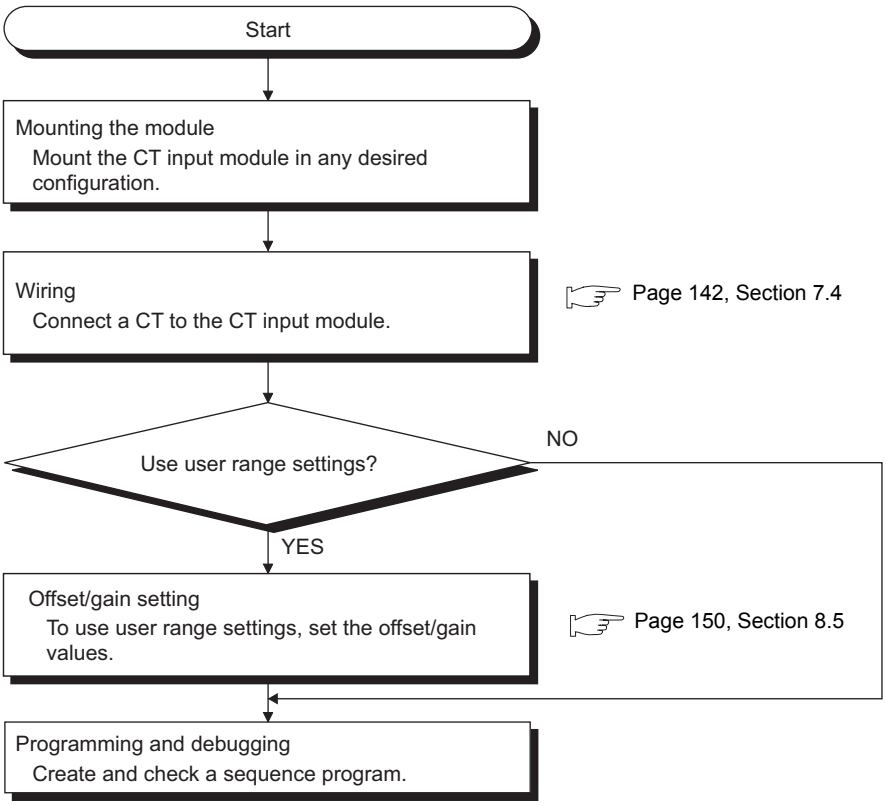
- Do not drop the module case, or do not subject it to strong impact.
- Do not remove the printed-circuit board from the case. Doing so can cause module failure.
- Do not disassemble the module. Doing so can cause module failure.
- Prevent foreign matter such as dust or wire chips from entering the module. 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.
- Tighten the screws such as a module fixing screw within the specified torque range. Undertightening the screws can cause short circuit or malfunction. Overtightening can damage the screws and/or module, resulting in short circuit or malfunction.

Screw	Tightening torque range
Module fixing screw (M3 screw)*1	0.36 to 0.48N • m
Terminal block terminal screw (M3)	0.42 to 0.58N • m
Terminal block mounting screw (M3.5)	0.66 to 0.89N • 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.

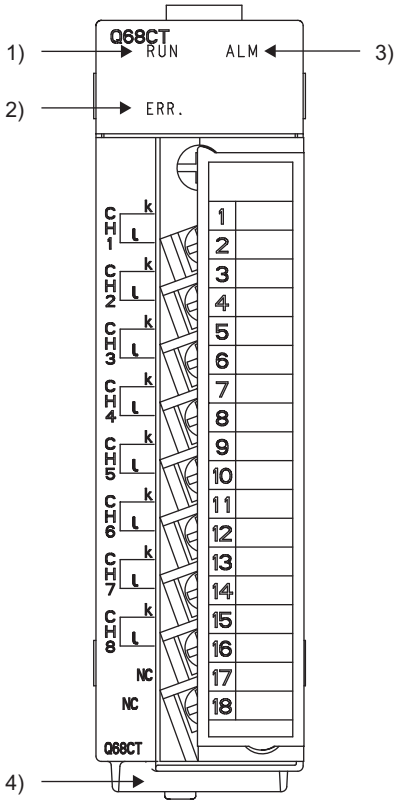
- To mount the module, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection into the hole in the base unit and press the module until it snaps into place. Incorrect mounting may cause malfunction, failure or drop of the module.
- Before handling the module, touch a grounded metal object to discharge the static electricity from the human body. Failure to do so may cause the module to fail or malfunction.

7.2 Settings and the Procedure Before Operation



7.3 Part Names

This section describes the part names of a CT input module.



(1) Part names

The following table lists the part names of a CT input module.

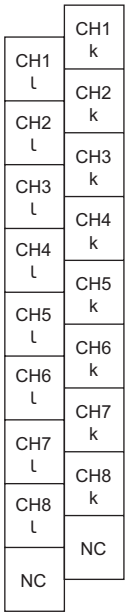
Number	Name	Description
1)	RUN LED (green)	Indicates the operating status of the CT input module. On: The module is operating normally. Flashing: In the offset/gain setting mode Off: The 5V power off or watchdog timer error has occurred, or online module change enabled.
2)	ERR. LED (red)	Indicates the errors and status of the CT input module. On: An error has occurred except for error code: 112[*1] Flashing: Error code: 112 is occurring.[*1] Off: The module is operating normally.
3)	ALM LED (red)	Indicates the alarm status of the CT input module. On: Alarm (process alarm/rate alarm) is occurring.[*2] Flashing: Input signal error detection/ peak current detection is occurring.[*2] Off: The module is operating normally.
4)	Serial number display	Displays the serial number printed on the rating plate.

*1 Error Code List (☞ Page 228, Section 11.1)

*2 Alarm Code List (☞ Page 235, Section 11.2)

(2) Signal names of the terminal block

The following shows signal names of the terminal block.



Pin number	Signal name	
1	CH1	k
2		l
3	CH2	k
4		l
5	CH3	k
6		l
7	CH4	k
8		l
9	CH5	k
10		l
11	CH6	k
12		l
13	CH7	k
14		l
15	CH8	k
16		l
17	NC	
18	NC	

7.4 Wiring

This section describes the wiring precautions and module connection examples of a CT input module.

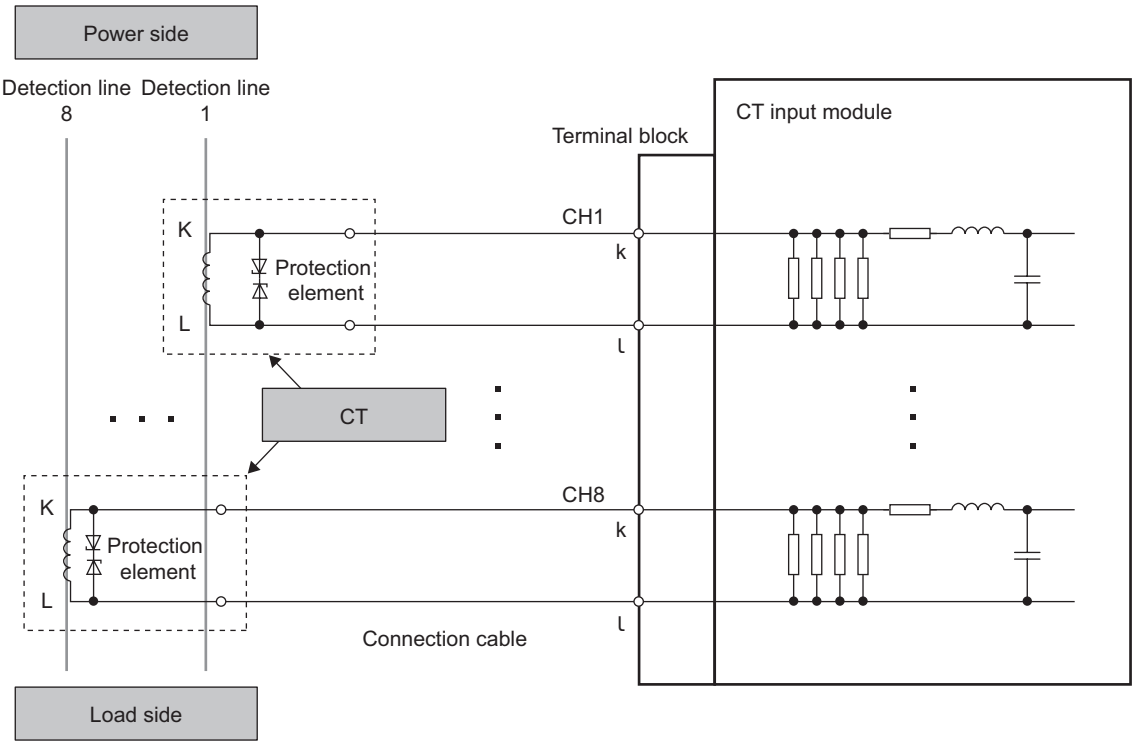
7.4.1 Wiring precautions

External wiring that is less likely to be affected by noise is one of the conditions for a highly reliable system that fully utilizes the CT input module.
This section describes the precautions on external wiring.

- Use separate cables for the AC control circuit and the CT input module's external I/O signals to avoid influence of AC side surges and induction.
- Do not locate external wires near the main circuit line, high-voltage circuit lines, and load circuit lines of devices other than programmable controllers. Also, do not bunch external wires with these lines. Otherwise, the external wires are more likely to be affected by noise, surges, and induction.
- Ground shielded cables at one end.
- A solderless terminal with an insulation sleeve cannot be used on the terminal block. It is recommended to put a mark tube or an insulation tube on the wire connection part of a solderless terminal.

7.4.2 External wiring

The following describes the external wiring.



Point

- Set Disable (1) to Conversion enable/disable setting (Un\G0) for unused channels. If Enable (0) is set to Conversion enable/disable setting (Un\G0) and the circuit between two terminals is kept open, an undefined digital value may be output.
- To replace a CT for a channel using a user range, set the offset/gain setting again.

CHAPTER 8 VARIOUS SETTINGS

This chapter describes the setting procedures of the CT input module.

Point

After writing the contents of new module, switch settings, parameter settings and auto refresh settings into the CPU module, reset the CPU module, switch STOP → RUN → STOP → RUN, or switch on the power supply, to validate the setting contents.

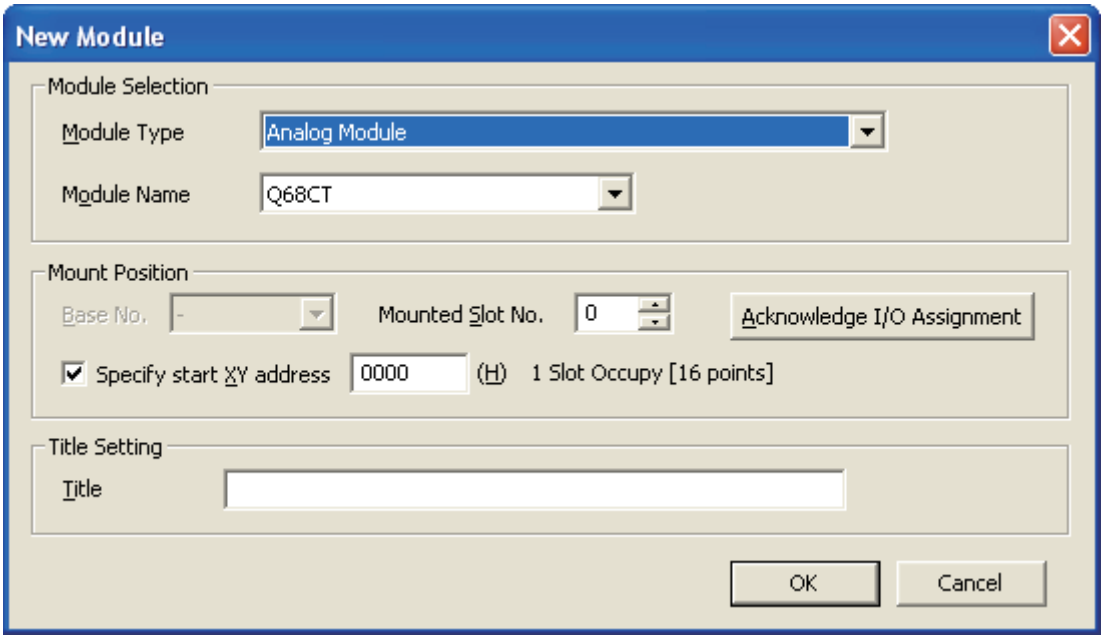
8.1 Adding a Module

Add the model name of the CT input module to use on the project.

(1) Addition procedure

Open the "New Module" window.

Project window⇨[Intelligent Function Module]⇨Right-click⇨[New Module...]



Item		Description
Module Selection	Module Type	Set [Analog Module].
	Module Name	Set the name of the module to mount.
Mount Position	Base No.	Set the base No. where the module is mounted.
	Mounted Slot No.	Set the slot No. where the module is mounted.
	Specify start XY address	The start I/O number (hexadecimal) of the target module is set, according to the mounted slot No. Any start I/O number can be set.
Title Setting	Title	Set any title.

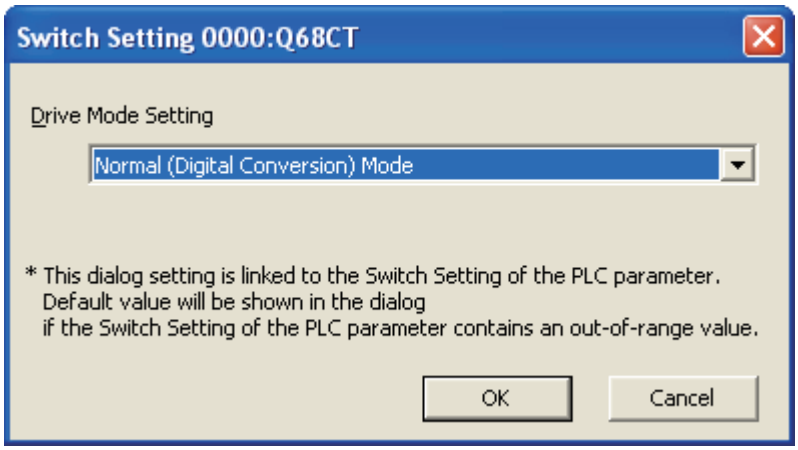
8.2 Switch Setting

Set the operation mode.

(1) Setting procedure

Open the "Switch Setting" window.

Project window⇨[Intelligent Function Module]⇨Module name⇨[Switch Setting]



Item	Description	Setting value
Drive Mode Setting	Set the operation mode of the CT input module.	• Normal (Digital Conversion) Mode • Offset-Gain Setting Mode

8.3 Parameter Setting

Set the parameters for each channel.

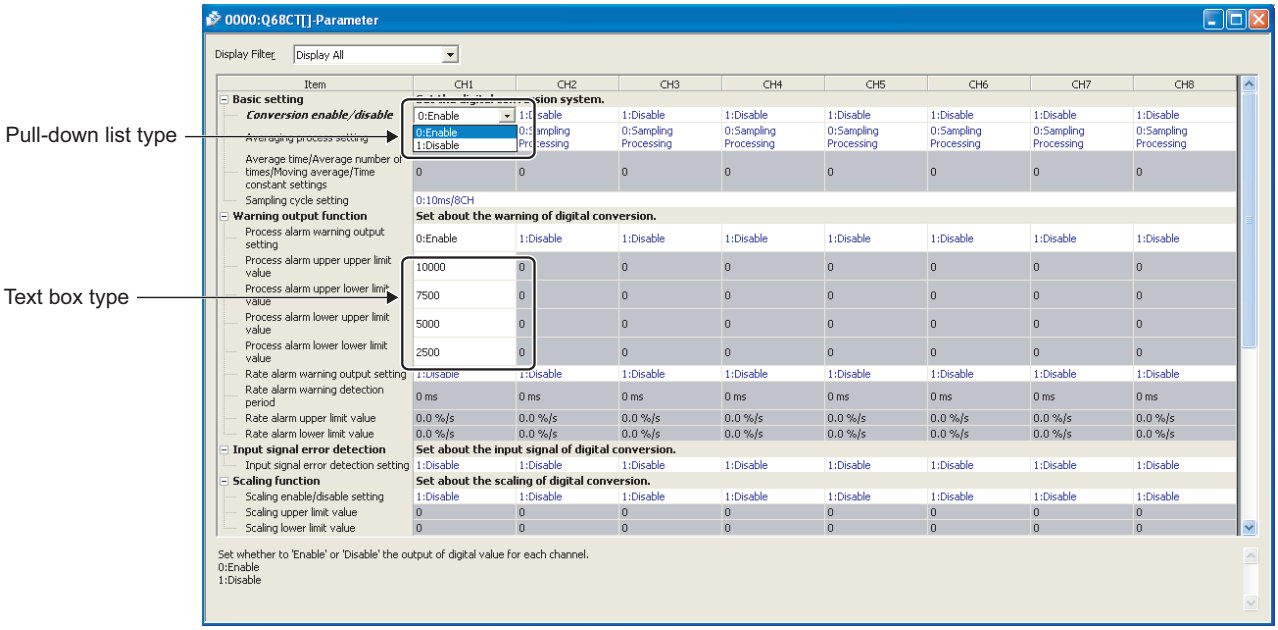
Setting parameters on the screen omits the parameter setting in a program.

(1) Setting procedure

Open the "Parameter" window.

1. **Start "Parameter".**

Project window⇨[Intelligent Function Module]⇨Module name⇨[Parameter]



2. **Double-click the item to change the setting, and input the setting value.**

- Items to input from the pull-down list

  Double-click the item to set to display the pull-down list. Select the item.

- Items to input from the text box

  Double-click the item to set, and input the setting value.

3. **For setting CH2 to CH8, follow the operation of the Step 2.**

Item		Setting value		Reference
Basic setting	Conversion enable/disable setting	0: Enable 1: Disable (default value)		Page 37, Section 4.3
	Averaging process setting	0: Sampling Processing (default value) 1: Time Average 2: Count Average 3: Moving Average 4: Primary Delay Filter		Page 38, Section 4.5
	Average time/Average number of times/Moving average/Time constant settings	Time Average	40 to 5000ms (default value: 0)	
		Count Average	4 to 500 Times (default value: 0)	
		Moving Average	2 to 1000 Times (default value: 0)	
		Primary Delay Filter	10 to 10000ms (default value: 0)	
	Sampling cycle setting	0: 10ms/8CH (default value) 1: 20ms/8CH 2: 50ms/8CH 3: 100ms/8CH		Page 37, Section 4.4
Warning output function	Process alarm warning output setting	0: Enable 1: Disable (default value)		Page 53, Section 4.10 (1)
	Process alarm upper upper limit value	-32768 to 32767 (default value: 0)		
	Process alarm upper lower limit value	-32768 to 32767 (default value: 0)		
	Process alarm lower upper limit value	-32768 to 32767 (default value: 0)		
	Process alarm lower lower limit value	-32768 to 32767 (default value: 0)		
	Rate alarm warning output setting	0: Enable 1: Disable (default value)		Page 55, Section 4.10 (2)
	Rate alarm warning detection period	10 to 5000ms (default value: 0)		
	Rate alarm upper limit value	-3276.8 to 3276.7%/s (default value: 0)		
	Rate alarm lower limit value	-3276.8 to 3276.7%/s (default value: 0)		
Input signal error detection	Input signal error detection setting	0: Enable 1: Disable (default value)		Page 44, Section 4.6
Scaling function	Scaling enable/disable setting	0: Enable 1: Disable (default value)		Page 50, Section 4.9
	Scaling upper limit value	-32000 to 32000 (default value: 0)		
	Scaling lower limit value	-32000 to 32000 (default value: 0)		
Input range setting	Input range setting	0: Factory Default Range 0 to 5AAC (default value) 1: Factory Default Range 0 to 50AAC 2: Factory Default Range 0 to 100AAC 3: Factory Default Range 0 to 200AAC 4: Factory Default Range 0 to 400AAC 5: Factory Default Range 0 to 600AAC 16: User Range 0 to 5AAC 17: User Range 0 to 50AAC 18: User Range 0 to 100AAC 19: User Range 0 to 200AAC 20: User Range 0 to 400AAC 21: User Range 0 to 600AAC		Page 36, Section 4.2
Dropout setting	Dropout detection setting	0: Enable 1: Disable (default value)		Page 49, Section 4.8
	Dropout value	1 to 10000 (default value: 50)		

Item		Setting value	Reference
Peak current detection setting	Peak current detection setting	0: Enable 1: Disable (default value)	Page 46, Section 4.7
	Peak current detection time	10 to 10000ms (default value: 1000)	
	Peak current detection value	0 to 11999 (default value: 0)	
Logging function	Logging enable/disable setting	0: Enable 1: Disable (default value)	Page 60, Section 4.12
	Logging cycle setting value	ms: 10 to 32767 (default value: 300) s: 1 to 3600 (default value: 300)	
	Logging cycle unit setting	0: Update Cycle (default value) 1: ms 2: s	
	Logging data setting	0: Digital Output Value 1: Scaling Value (default value)	
	Logging points after trigger	1 to 5000 (default value: 2500)	
	Level trigger condition setting	0: Disable (default value) 1: Above 2: Below 3: Pass Through	
	Trigger data	0 to 4999 (CH1 default value: 54) (CH2 default value: 55) (CH3 default value: 56) (CH4 default value: 57) (CH5 default value: 58) (CH6 default value: 59) (CH7 default value: 60) (CH8 default value: 61)	
	Trigger setting value	-32768 to 32767 (default value: 0)	

8.4 Auto Refresh

This function transfers data in the buffer memory to specified devices.
Programming of reading/writing data is unnecessary.

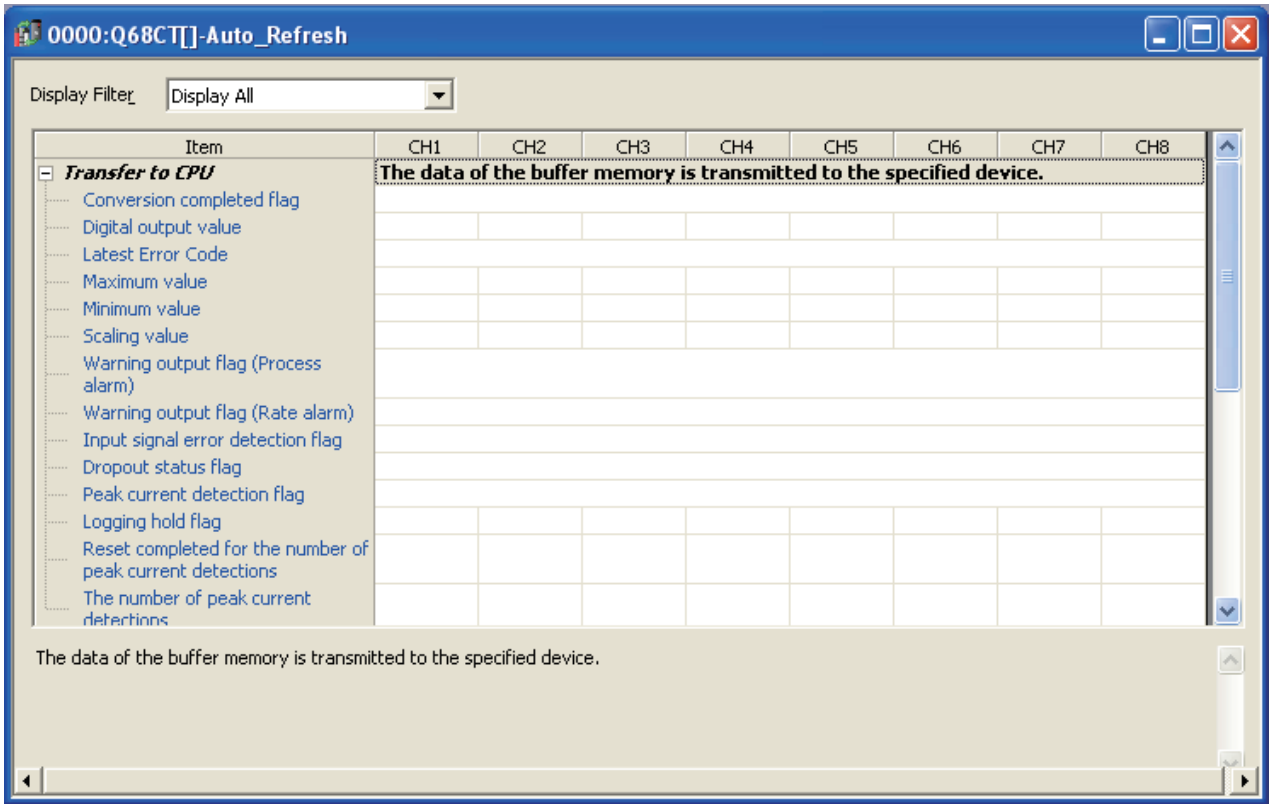
(1) Setting procedure

Open the "Auto_Refresh" window.

1. Start "Auto_Refresh".

Project window⇨[Intelligent Function Module]⇨Module Name⇨[Auto_Refresh]

2. Click the item to set, and input the destination device for auto refresh.



Point

Available devices are X, Y, M, L, B, T, C, ST, D, W, R, and ZR.
When a bit device X, Y, M, L, or B is used, set a number that is divisible by 16 points (example: X10, Y120, M16).
Data in the buffer memory are stored in 16 points of devices starting from the set device No. (Example: When X10 is set, the data are stored in X10 to X1F).

8.5 Offset/gain Setting

When using a user range, configure the offset/gain setting with the following operations.
When using a factory default range, the offset/gain setting is not required.
The offset/gain setting can be configured from the following two types of operations.

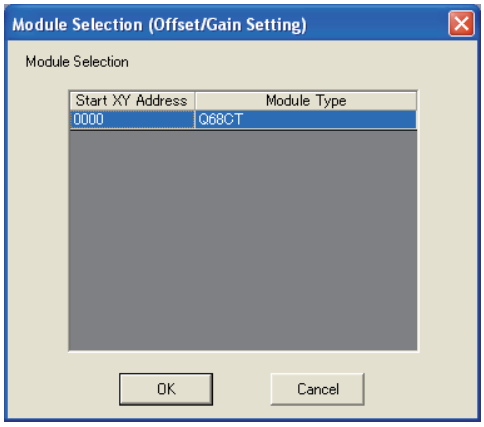
- Setting from "Offset/Gain Setting" of GX Works2
- Setting from a program

8.5.1 Setting from "Offset/Gain Setting" of GX Works2

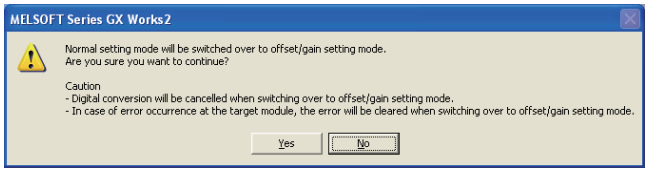
(1) Setting procedure

Open the "Offset/Gain Setting" window.

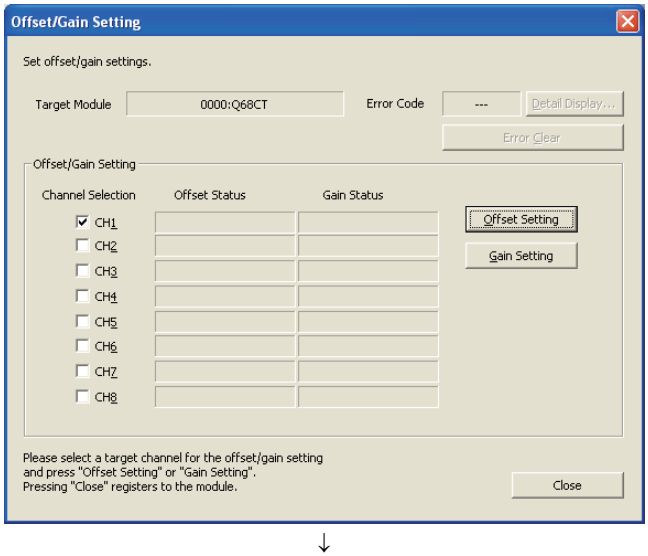
[Tool]⇨[Intelligent Function Module Tool]⇨[Analog Module]⇨[Offset/Gain Setting...]



↓



↓

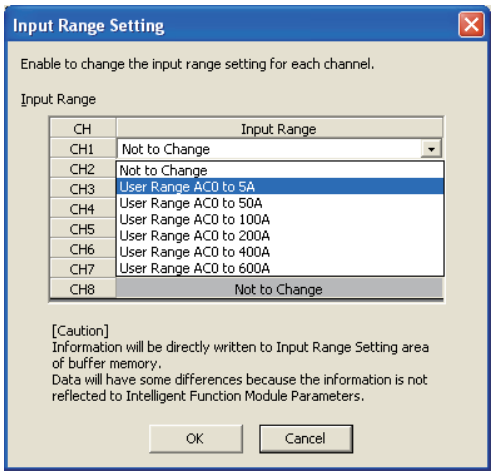


↓

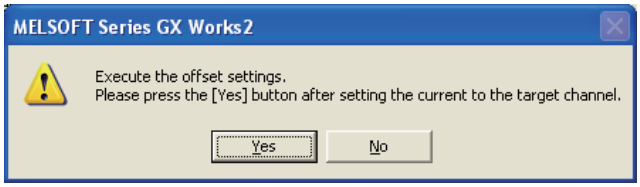
1. **Select the module to configure the offset/gain setting, and click the** OK **button.**

2. **Click the** Yes **button.**

3. **Select the channel to use the offset/gain setting, and click the** Offset Setting **button.**



↓



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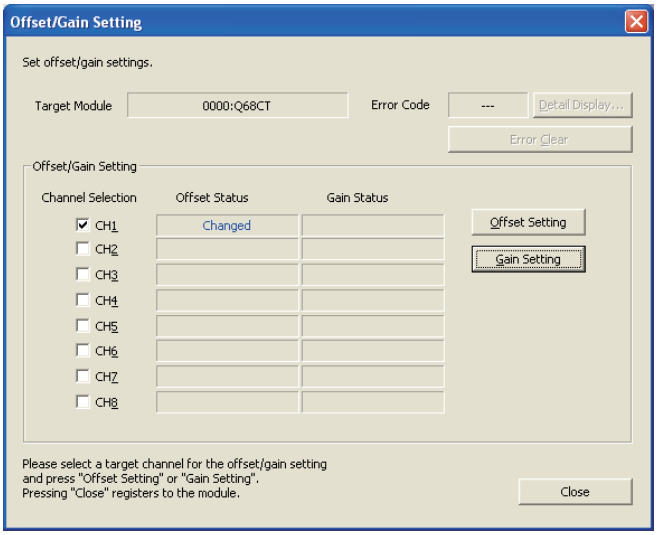
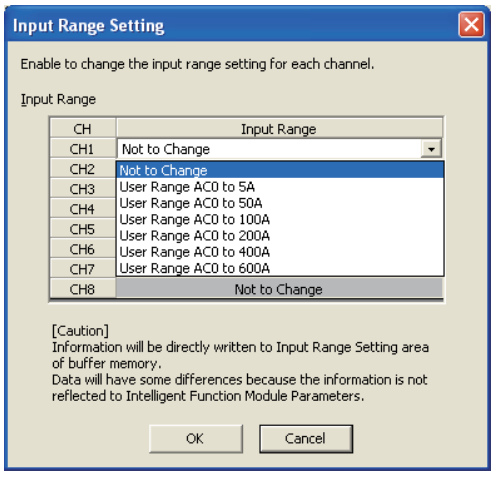




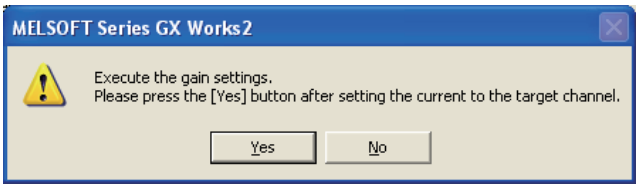
↓

4. **Select a user range according to the type of the CT to be connected, and click the OK button.**
To use the input range set at the beginning of "Offset/Gain Setting", select "Not to Change" and click the OK button.

5. **Input the offset value current to the target channel terminals, and click the Yes button.**

6. **Check that "Offset Status" changed to "Changed", and click the Gain Setting button.**

7. **Select "Not to Change", and click the OK button.*1**
***1 When setting a gain only, set an input range according to the Step 4.**



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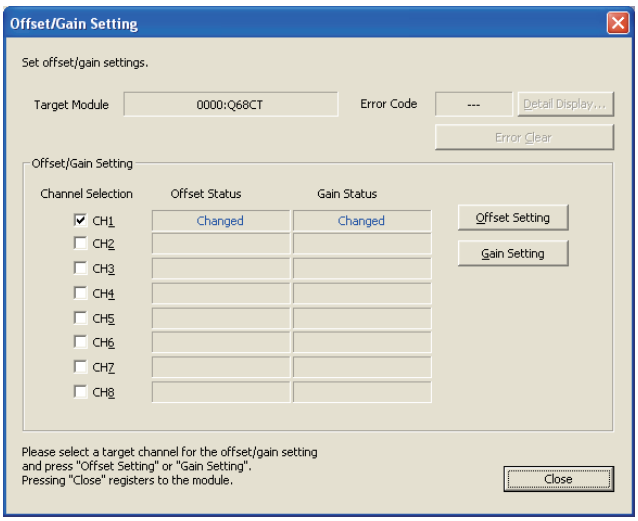
8. **Input the gain value current to the target channel terminals, and click the [Yes] button.**



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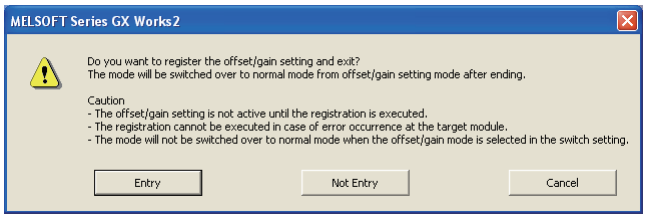
9. **Check that "Gain Status" changed to "Changed", and click the [Close] button.**



↓

10. **Click the [Entry] button.**

↓

End

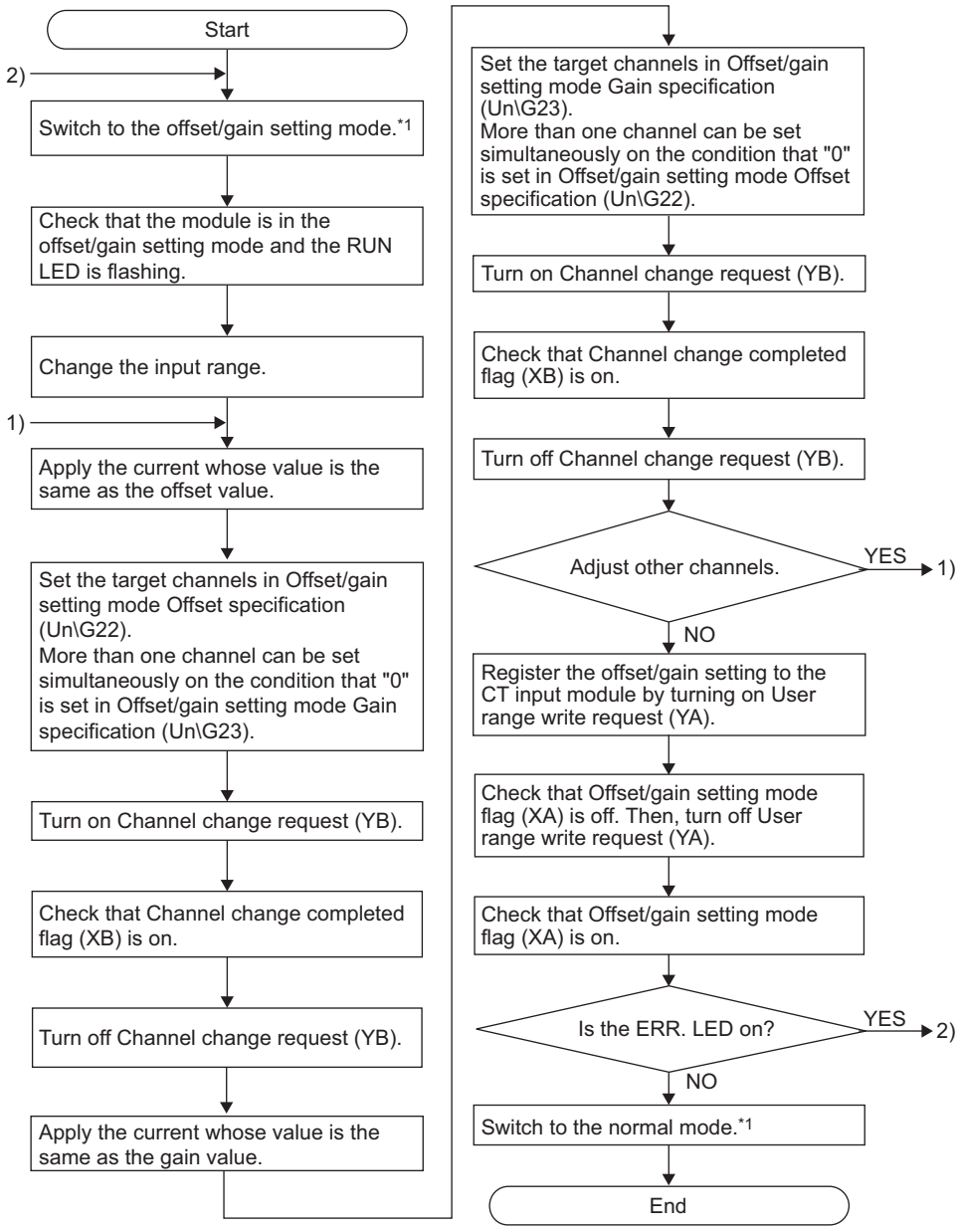
Point

The same input range must be selected for an offset setting and gain setting for the same channel.

8.5.2 Setting from a program

(1) Setting procedure

The following is the procedure to configure the offset/gain setting using a sequence program.



*1 The following are the methods to switch modes (normal mode → offset/gain setting mode → normal mode).

- Dedicated Instruction (G(P).OFFGAN (☞ Page 241, Appendix 1.1))
- Setting Mode switching setting (Un\G158, Un\G159) and turning on then off Operating condition setting request (Y9) (☞ Page 120, Section 6.2 (21))
- Intelligent Function Module Switch Setting (☞ Page 145, Section 8.2)

Point

- Configure the offset/gain setting in accordance with the actual use situation.
- Offset and gain values are recorded in the non-volatile memory in the CT input module by turning on then off User range write request (YA). The values are not deleted even after the power is turned off. If the values are written 26 times in succession, an error (error code: 162) occurs and the error code is stored in Latest error code (Un\G19) to prevent an improper write to non-volatile memory.
- Configure the offset/gain setting in the range satisfying the condition described in the following section. If a setting is out of the specified range, the maximum resolution and accuracy of the module may not fall within the range described in the performance specifications list.
  - I/O conversion characteristics (☞ Page 29, Section 3.2.2)
- The offset/gain setting can be configured for multiple channels at the same time; however, the offset setting and gain setting must be configured separately. If the settings are configured at the same time, an error (error code: 500) occurs and the ERR. LED turns on.
- When User range write request (YA) is turned on, the integrity of the offset and gain values are checked. If an error (error code: 40□) occurs in even one channel, the offset and gain values are not written to the module. Check the value in Latest error code (Un\G19), and take the action described in the following section to start over the offset/gain setting.
  - Error Code List (☞ Page 228, Section 11.1)
- When the mode is switched from the offset/gain setting mode to the normal mode by the setting of the dedicated instruction (G(P).OFFGAN) or Mode switching setting (Un\G158, Un\G159), Module READY (X0) turns on. Note that initial settings are processed at this timing if any sequence program is set to configure initial settings when Module READY (X0) turns on.
- To activate the intelligent function module switch setting after writing the setting to the CPU module, reset the CPU module or turn off then on the power supply.
- If a user range is not set in CH□ Input range setting (Un\G150 to Un\G157), an error (error code: 511) occurs.
- When the mode is switched from the offset/gain setting mode to the normal mode, the stored value of the buffer memory is restored to the status before the switching. The CT input module operates with the restored buffer memory values.
- If a gain setting is configured for input whose digital value exceeds 10000, the accuracy of digital values cannot be guaranteed. Configure an offset/gain setting so that the digital values are within 0 t0 10000.
- When the mode is switched using the dedicated instruction (G(P).OFFGAN) or Mode switching setting (Un\G158, Un\G159), the digital conversion stops. To resume the digital conversion, turn on then off Operating condition setting request (Y9) after switching the mode to the normal mode.

(2) Program example

(a) Device

Ex. The I/O numbers of the CT input module are X/Y00 to 0F.

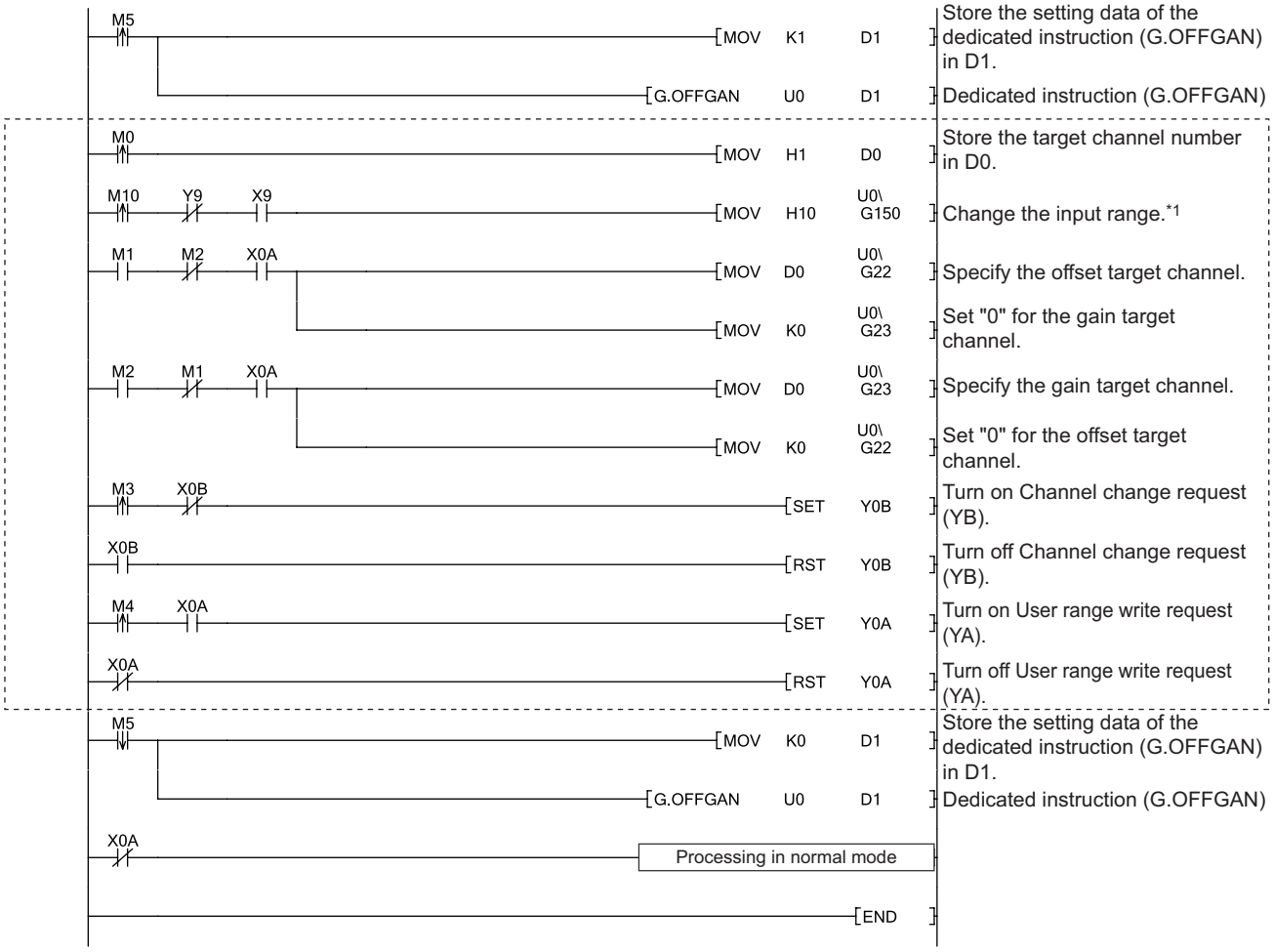
The following table lists the devices used in the program example.

Device	Function
M0	Channel selection
M1	Offset setting
M2	Gain setting
M3	Channel change command
M4	Command to write offset/gain setting values to the module
M5	Mode switching
M10	Input range change command
D0	Channel-specified storage device
D1	Storage device for the setting value of the dedicated instruction (G(P).OFFGAN)

(b) Switching the mode using the dedicated instruction (G(P).OFFGAN)

This sequence program executes the following operations.

- Switching the mode from the normal mode to the offset/gain setting mode using the dedicated instruction (G(P).OFFGAN)
- Switching the channels for which the offset/gain settings are configured
- Writing the offset/gain values to the CT input module
- Switching the mode from the offset/gain setting mode back to the normal mode using the dedicated instruction (G(P).OFFGAN)



*1 Set one of the following values (input range) according to the specifications of the CT to be connected.

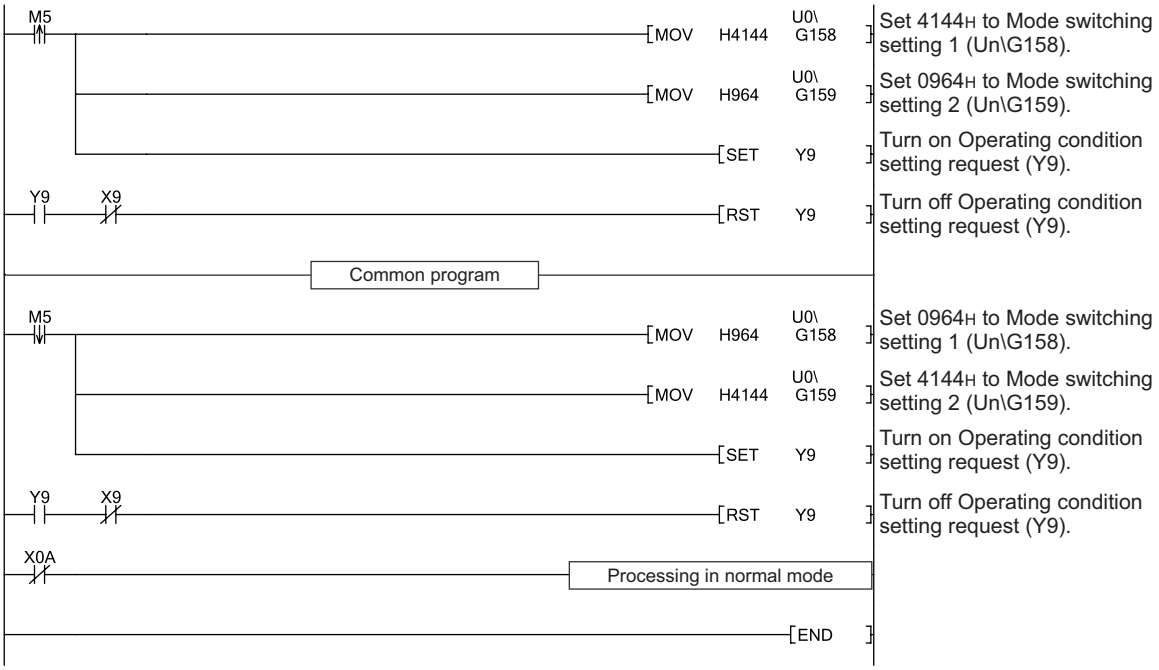
- 0 to 5AAC (0010_H)
- 0 to 50AAC (0011_H)
- 0 to 100AAC (0012_H)
- 0 to 200AAC (0013_H)
- 0 to 400AAC (0014_H)
- 0 to 600AAC (0015_H)

Point

The program enclosed by the dotted line is the common programs among the following three programs.

- Switching the mode using the dedicated instruction (G(P).OFFGAN)
- Switching the mode by setting Mode switching setting (Un\G158, Un\G159) and using Operating condition setting request (Y9)
- Switching the mode using the intelligent function module switch setting

(c) Switching the mode by setting Mode switching setting (Un\G158, Un\G159) and using Operating condition setting request (Y9)



(d) Switching the mode using the intelligent function module switch setting

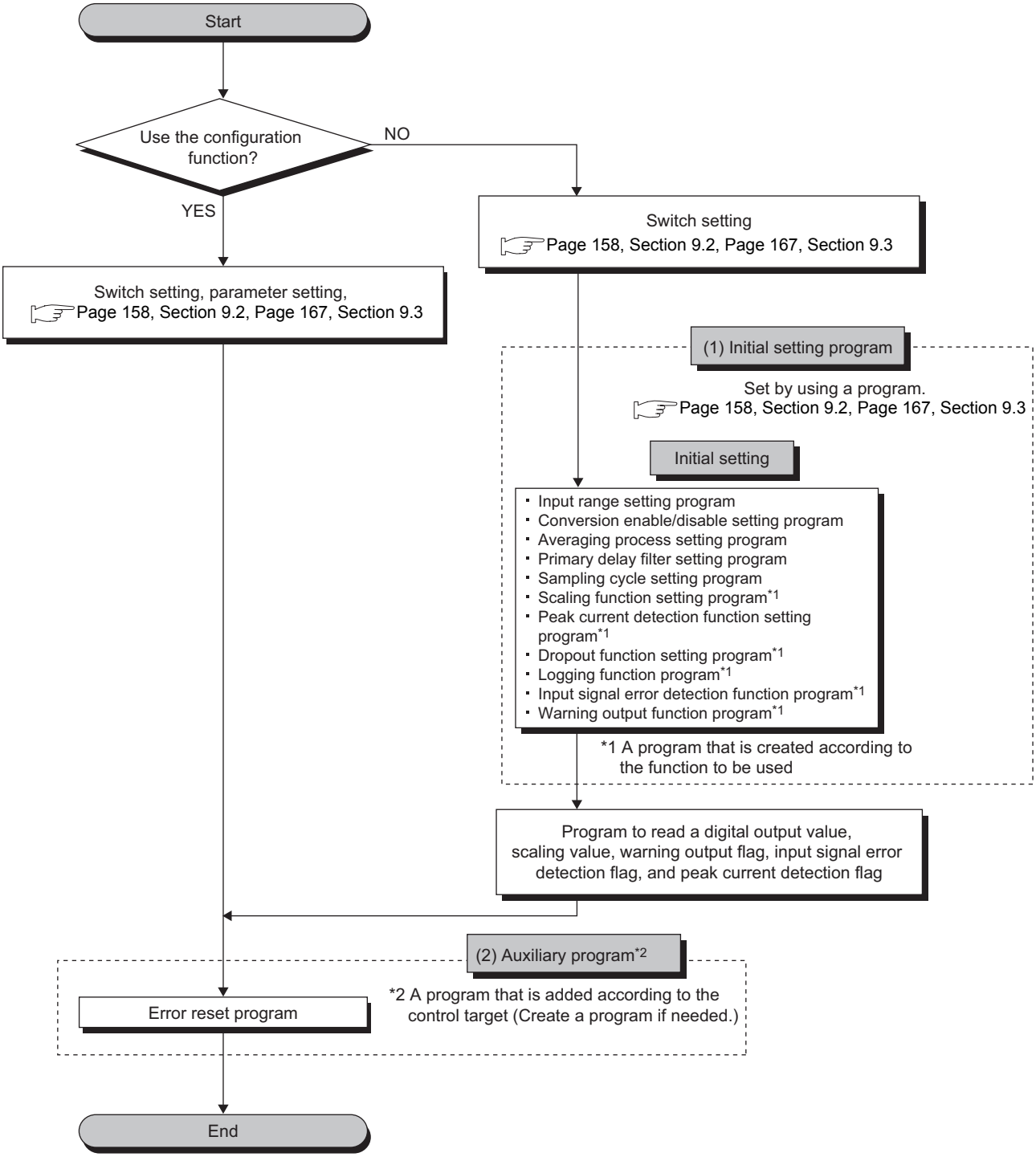
The programs other than the common program are not necessary.

CHAPTER 9 PROGRAMMING

This chapter describes the programming procedure and basic programs for the CT input module.

9.1 Programming Procedure

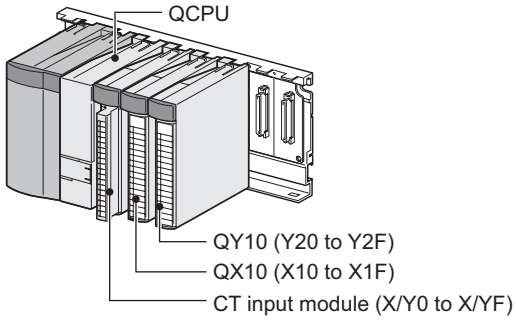
Create a program to execute digital conversion, according to the following procedure.



9.2 When Using the Module in a Standard System Configuration

This section introduces program examples where the following system configuration and conditions apply.

(1) System configuration



(2) Programming condition

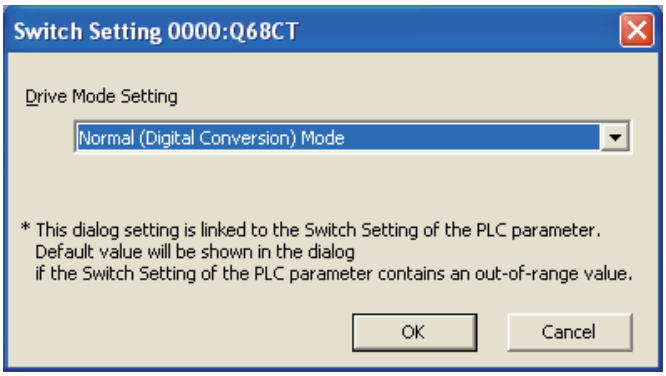
Digital output values are read in the following conditions.

- Used channel: CH1 to CH3
- Input range: Factory default range 0 to 5AAC
- Digital conversion method in CH1: Sampling processing
- Digital conversion method in CH2: Count average processing (50 times)
- Digital conversion method in CH3: Primary delay filter (Time constant: 100ms)
- If an error occurs in the module, an error code is displayed in BCD notation

(3) Switch setting

Set the operation mode.

Project window⇨[Intelligent Function Module]⇨[Q68CT]⇨[Switch Setting]



(4) Initial setting

(a) Channel setting

Item	Setting			
	CH1	CH2	CH3	CH4 to CH8
Conversion enable/disable setting	Enable	Enable	Enable	Disable
Averaging process setting	Sampling Processing	Count Average	Primary Delay Filter	Sampling Processing
Average time/Average number of times/Moving average/Time constant settings	0	50 Times	100ms	0
Sampling cycle setting	10ms/8CH			
Process alarm warning output setting	Disable	Enable	Disable	Disable
Process alarm upper upper limit value	0	7000	0	0
Process alarm upper lower limit value	0	6000	0	0
Process alarm lower upper limit value	0	1500	0	0
Process alarm lower lower limit value	0	1000	0	0
Rate alarm warning output setting	Disable	Disable	Enable	Disable
Rate alarm warning detection period	0	0	50ms	0
Rate alarm upper limit value	0	0	0.3%/s	0
Rate alarm lower limit value	0	0	0.1%/s	0
Input signal error detection setting	Enable	Disable	Disable	Disable
Input range setting	Factory Default Range 0 to 5AAC	Factory Default Range 0 to 5AAC	Factory Default Range 0 to 5AAC	Factory Default Range 0 to 5AAC
Peak current detection setting	Enable	Disable	Disable	Disable
Peak current detection time	1000ms	1000ms	1000ms	1000ms
Peak current detection value	7000	0	0	0

9.2.1 Program example when using parameters of the intelligent function module

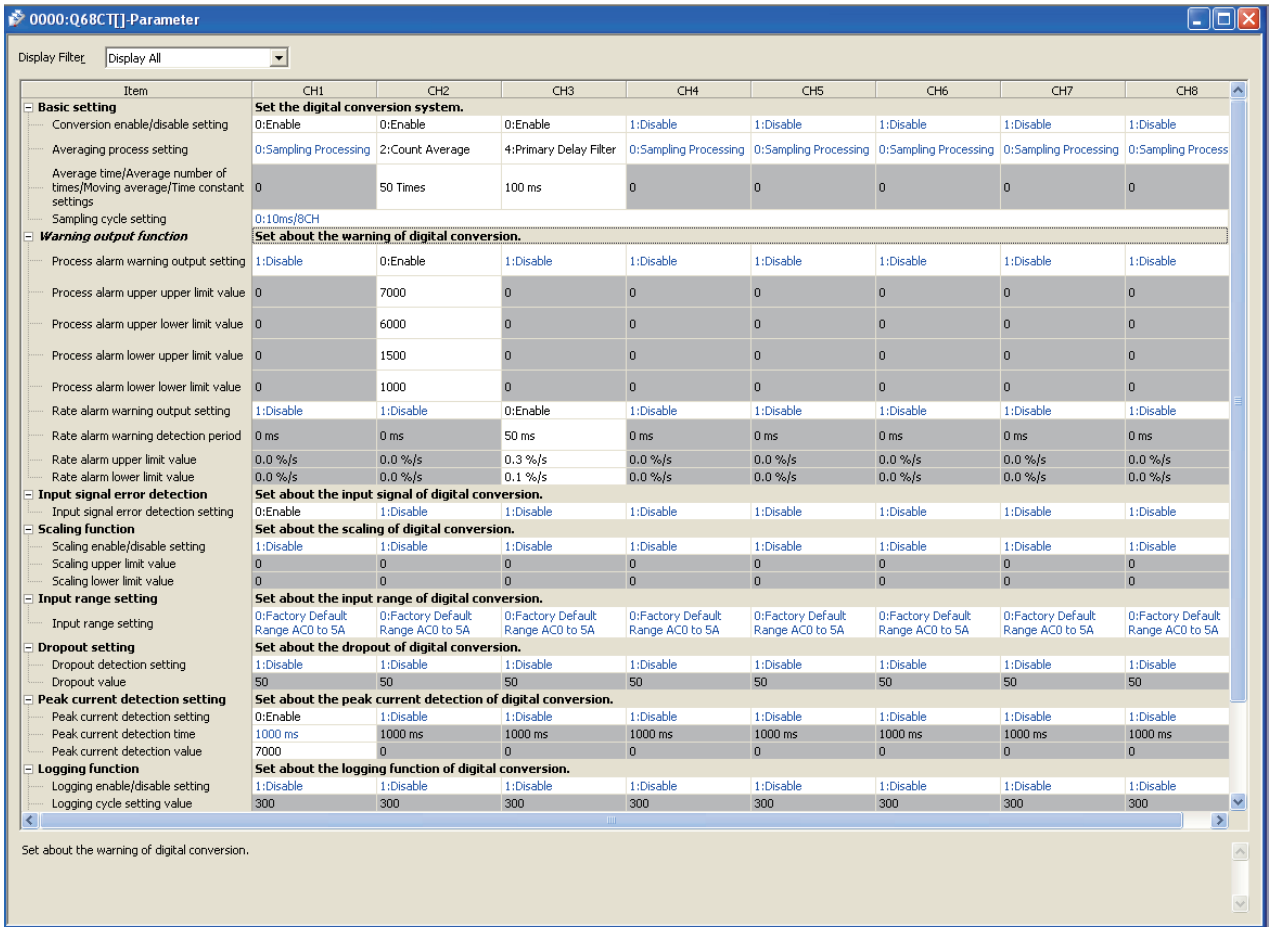
(1) Device for user

Device	Description	
D0	Conversion completed flag	
D1 (D11)	CH1 Digital output value	
D2 (D12)	CH2 Digital output value	
D3 (D13)	CH3 Digital output value	
D6	Warning output flag (Process alarm)	
D7	Warning output flag (Rate alarm)	
D8	Input signal error detection flag	
D9	Peak current detection flag	
D10	Latest error code	
M0	CH1 Conversion completed flag	
M1	CH2 Conversion completed flag	
M2	CH3 Conversion completed flag	
M10 to M25	Warning output flag (Process alarm)	
M30 to M45	Warning output flag (Rate alarm)	
M50 to M57	Input signal error detection flag	
M70 to M77	Peak current detection flag	
X0	Module READY	CT input module (X/Y0 to X/YF)
XC	Input signal error detection signal	
XE	Conversion completed flag	
XF	Error flag	
Y9	Operating condition setting request	
YF	Error clear request	
X10	Digital output value read command input signal	QX10 (X10 to X1F)
X13	Input signal error detection reset signal	
X14	Error reset signal	
Y20 to Y2F	Error code display (BCD 4 digits)	QY10 (Y20 to Y2F)

(2) Parameter setting

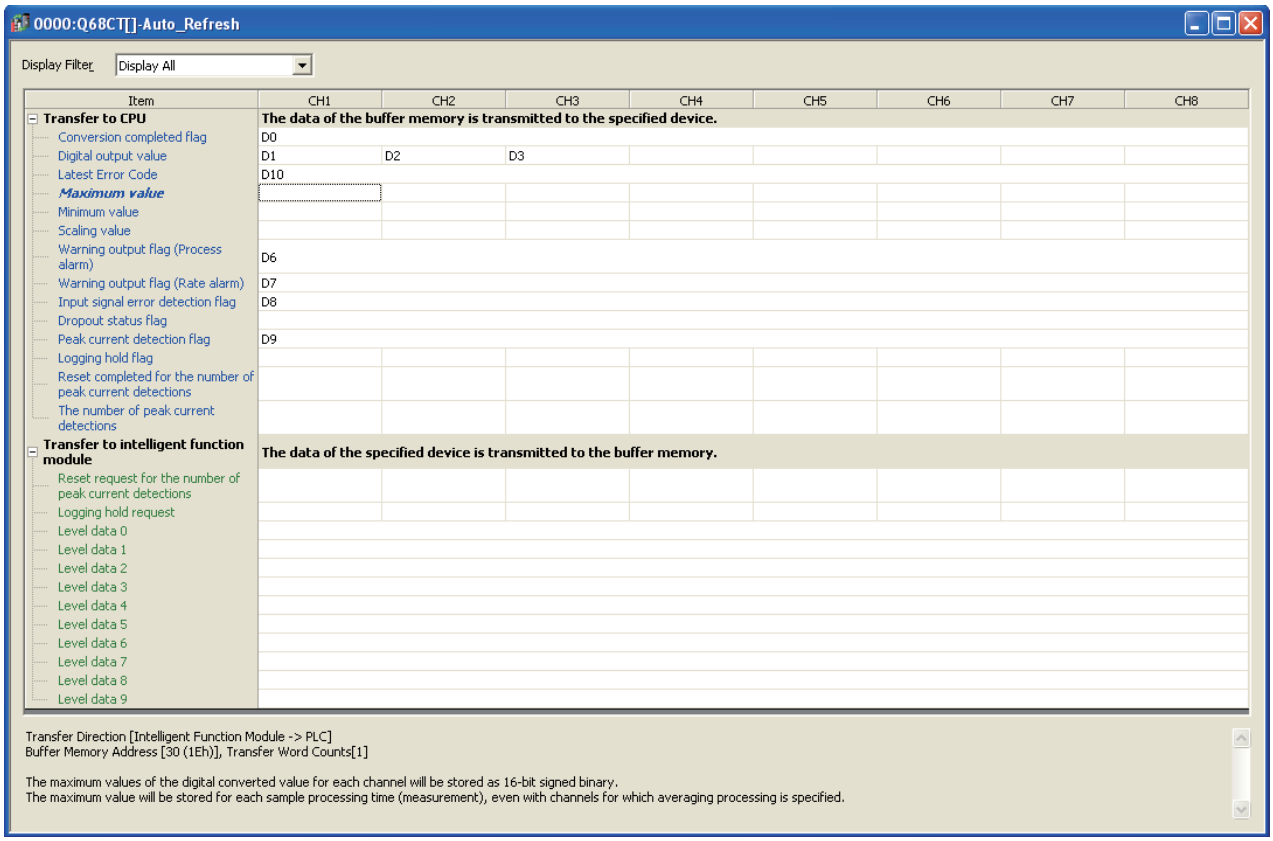
Set the contents of initial settings to the parameters.

Project window⇨[Intelligent Function Module]⇨[Q68CT]⇨[Parameter]



(3) Auto refresh setting

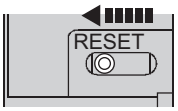
Project window➪[Intelligent Function Module]➪[Q68CT]➪[Auto_Refresh]



(4) Writing the parameters of intelligent function module

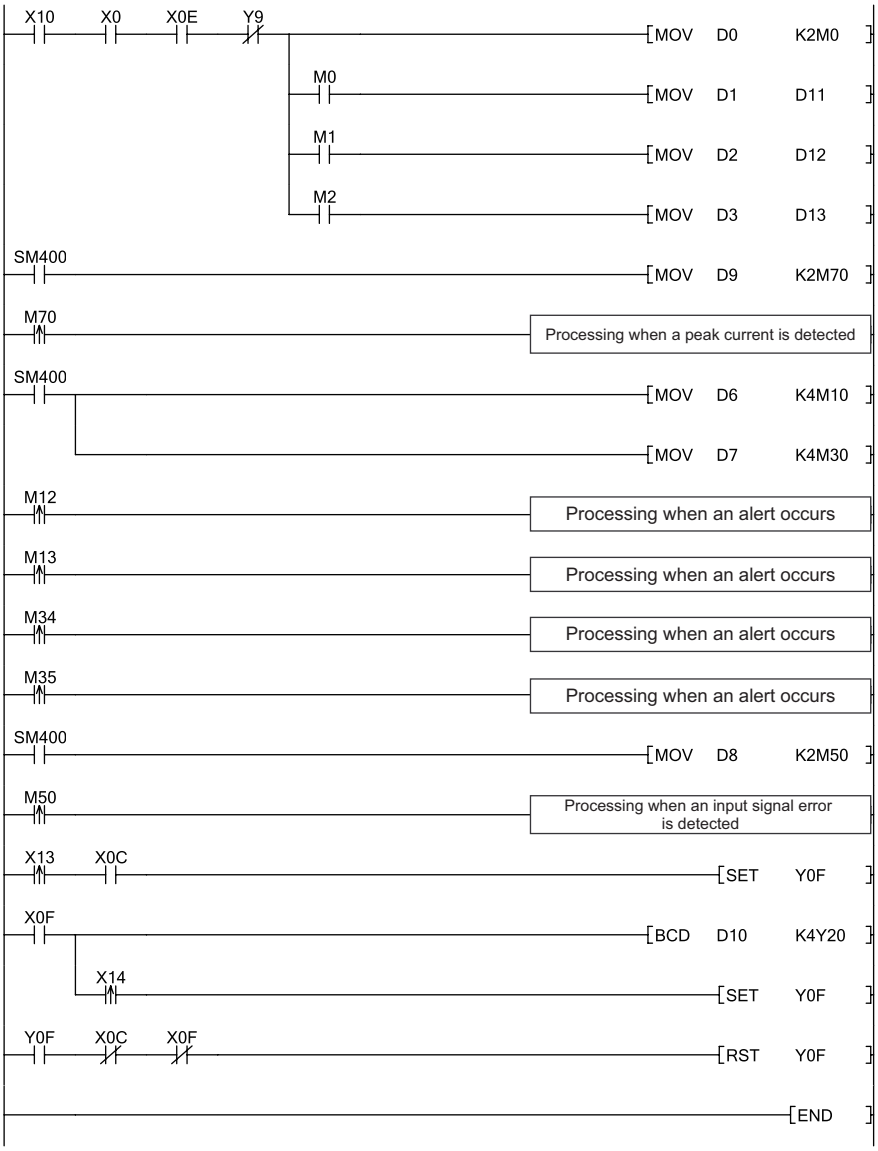
Write the set parameters to the CPU module, and reset the CPU module or turn off then on the programmable controller power supply.

[Online]➪[Write to PLC...]



or Power OFF→ON

(5) Program example

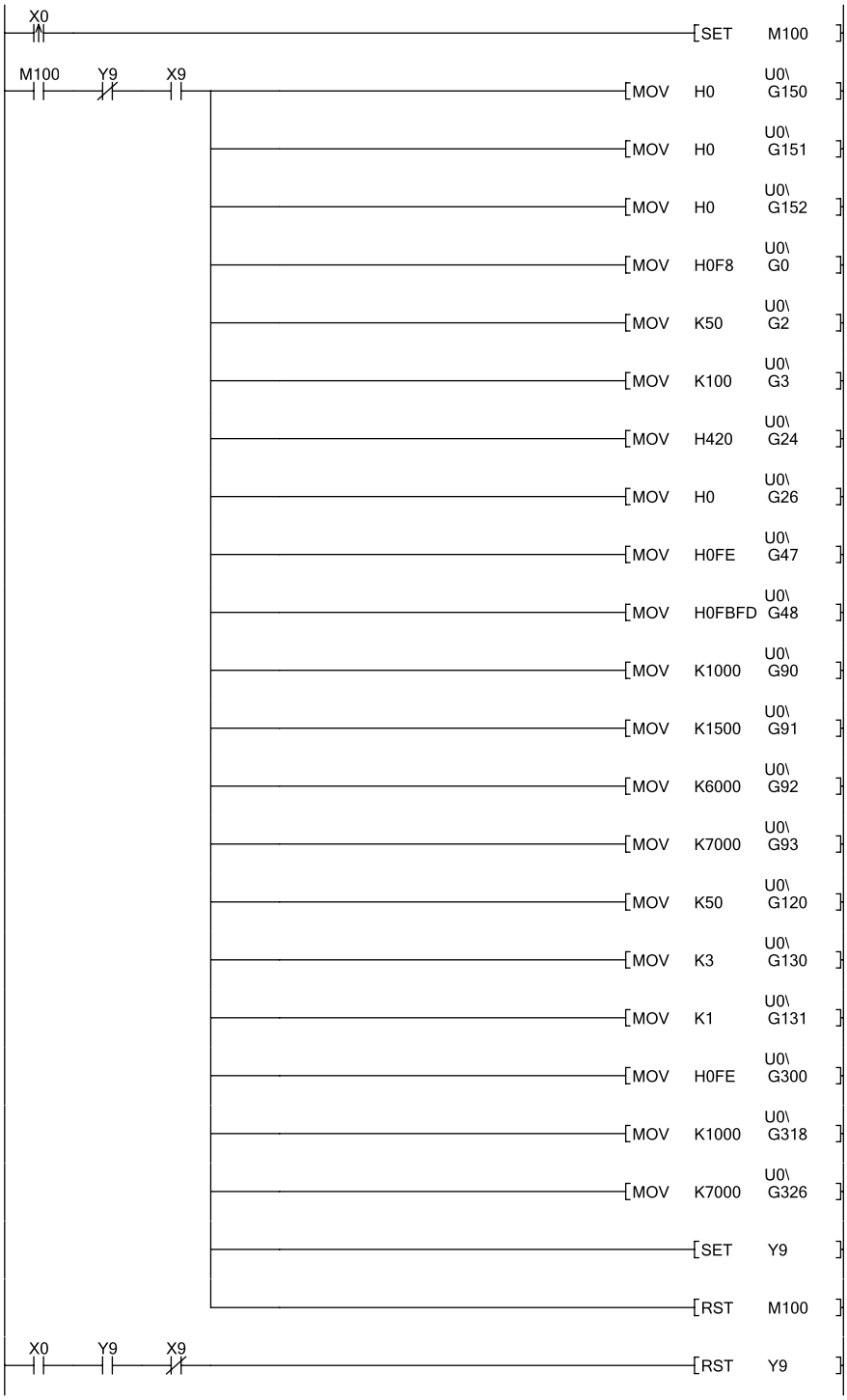


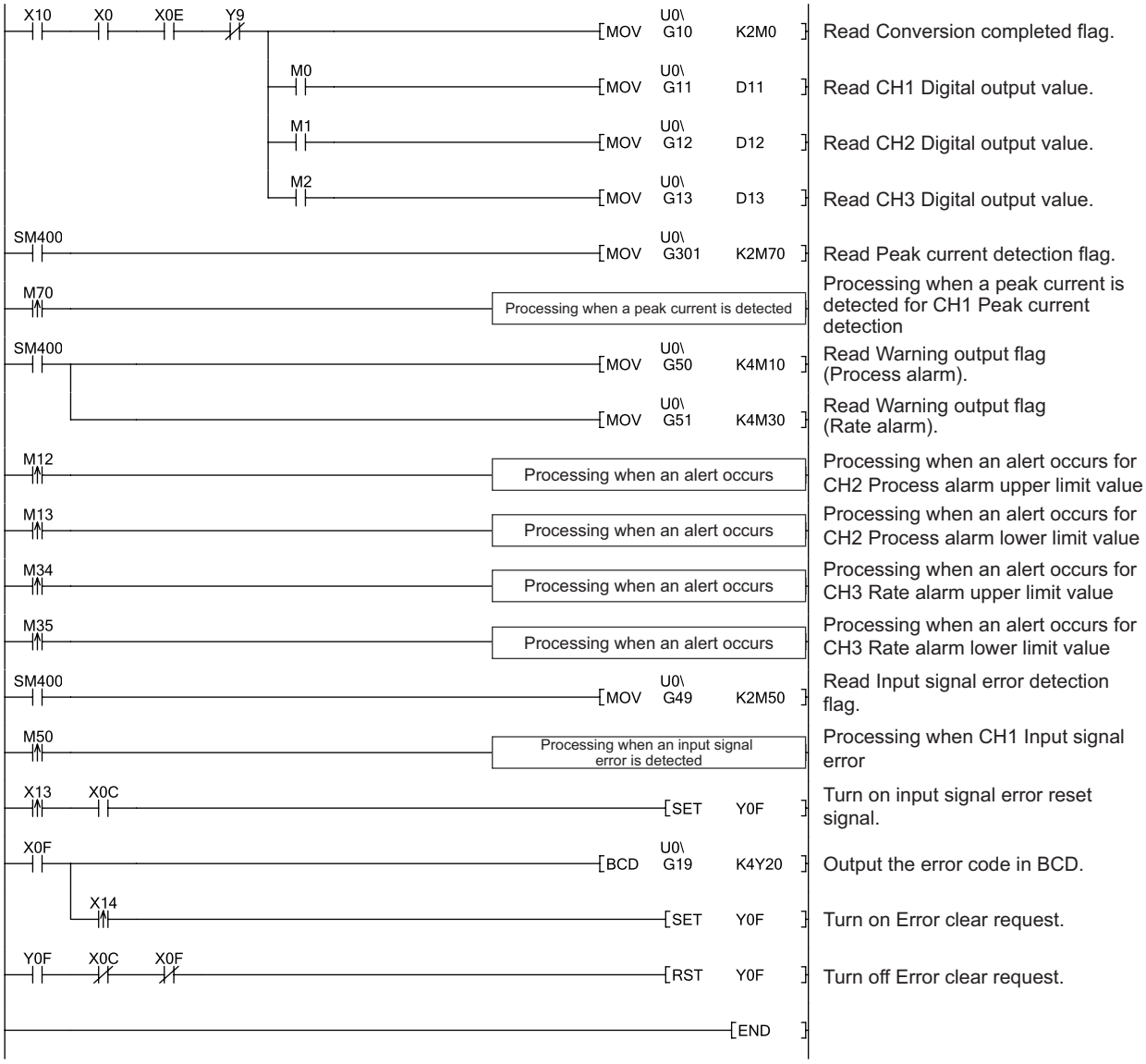
9.2.2 Program example when not using parameters of the intelligent function module

(1) Device for user

Device	Description	
D11	CH1 Digital output value	
D12	CH2 Digital output value	
D13	CH3 Digital output value	
M0	CH1 Conversion completed flag	
M1	CH2 Conversion completed flag	
M2	CH3 Conversion completed flag	
M10 to M25	Warning output flag (Process alarm)	
M30 to M45	Warning output flag (Rate alarm)	
M50 to M57	Input signal error detection flag	
M70 to M77	Peak current detection flag	
M100	Module READY check flag	
X0	Module READY	CT input module (X/Y0 to X/YF)
X9	Operating condition setting completed flag	
XC	Input signal error detection signal	
XE	Conversion completed flag	
XF	Error flag	
Y9	Operating condition setting request	
YF	Error clear request	
X10	Digital output value read command input signal	QX10 (X10 to X1F)
X13	Input signal error detection reset signal	
X14	Error reset signal	
Y20 to Y2F	Error code display (BCD 4 digits)	QY10 (Y20 to Y2F)

(2) Program example




X10 X0 X0E Y9
MOV U0\G10 K2M0
Read Conversion completed flag.
M0
MOV U0\G11 D11
Read CH1 Digital output value.
M1
MOV U0\G12 D12
Read CH2 Digital output value.
M2
MOV U0\G13 D13
Read CH3 Digital output value.
SM400
MOV U0\G301 K2M70
Read Peak current detection flag.
M70
Processing when a peak current is detected
Processing when a peak current is detected for CH1 Peak current detection
SM400
MOV U0\G50 K4M10
Read Warning output flag (Process alarm).
MOV U0\G51 K4M30
Read Warning output flag (Rate alarm).
M12
Processing when an alert occurs
Processing when an alert occurs for CH2 Process alarm upper limit value
M13
Processing when an alert occurs
Processing when an alert occurs for CH2 Process alarm lower limit value
M34
Processing when an alert occurs
Processing when an alert occurs for CH3 Rate alarm upper limit value
M35
Processing when an alert occurs
Processing when an alert occurs for CH3 Rate alarm lower limit value
SM400
MOV U0\G49 K2M50
Read Input signal error detection flag.
M50
Processing when an input signal error is detected
Processing when CH1 Input signal error
X13 X0C
SET Y0F
Turn on input signal error reset signal.
X0F
BCD U0\G19 K4Y20
Output the error code in BCD.
X14
SET Y0F
Turn on Error clear request.
Y0F X0C X0F
RST Y0F
Turn off Error clear request.
END

9.3 When Using the Module on the Remote I/O Network

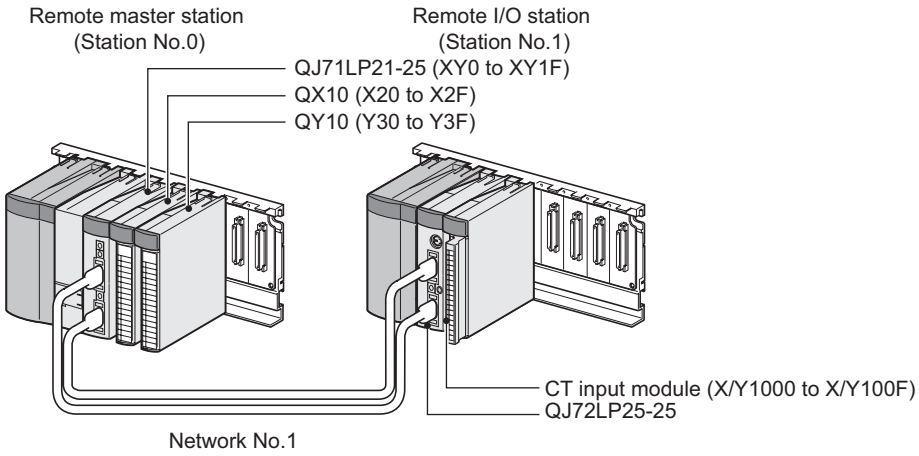
This section describes the system configuration and program examples of when the CT input module is used on a remote I/O network.

Point

For details on the MELSECNET/H remote I/O network, refer to the following.

Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O network)

(1) System configuration



(2) Programming condition

Digital output values are read in the following conditions.

- Used channel: CH1 to CH3
- Input range: Factory default range 0 to 5AAC
- Digital conversion method in CH1: Sampling processing
- Digital conversion method in CH2: Count average processing (50 times)
- Digital conversion method in CH3: Primary delay filter (Time constant: 100ms)
- If an error occurs in the module, an error code is displayed in BCD notation

(3) Switch setting

For the switch setting, refer to the procedure described in the following section.

☞Page 171, Section 9.3 (6)

(4) Initial setting

(a) Channel setting

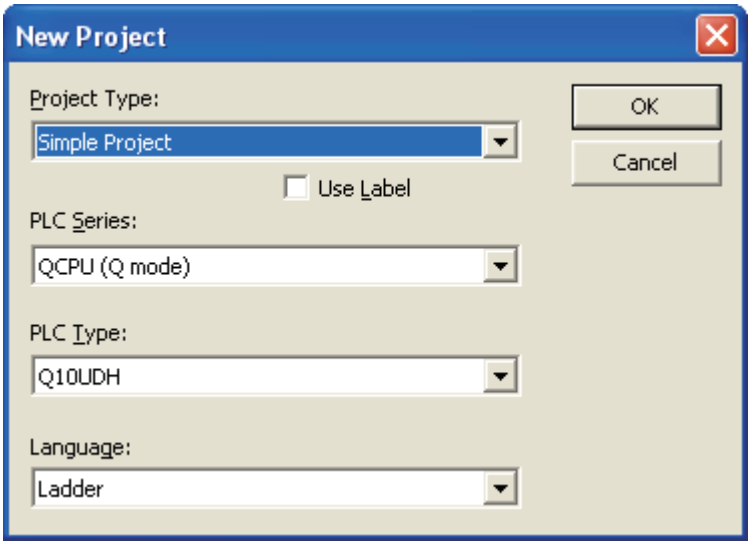
Item	Setting			
	CH1	CH2	CH3	CH4 to CH8
Conversion enable/disable setting	Enable	Enable	Enable	Disable
Averaging process setting	Sampling Processing	Count Average	Primary Delay Filter	Sampling Processing
Average time/Average number of times/Moving average/Time constant settings	0	50 Times	100ms	0
Sampling cycle setting	10ms/8CH			
Process alarm warning output setting	Disable	Enable	Disable	Disable
Process alarm upper upper limit value	0	7000	0	0
Process alarm upper lower limit value	0	6000	0	0
Process alarm lower upper limit value	0	1500	0	0
Process alarm lower lower limit value	0	1000	0	0
Rate alarm warning output setting	Disable	Disable	Enable	Disable
Rate alarm warning detection period	0	0	50ms	0
Rate alarm upper limit value	0	0	0.3%/s	0
Rate alarm lower limit value	0	0	0.1%/s	0
Input signal error detection setting	Enable	Disable	Disable	Disable
Input range setting	Factory Default Range 0 to 5AAC	Factory Default Range 0 to 5AAC	Factory Default Range 0 to 5AAC	Factory Default Range 0 to 5AAC
Peak current detection setting	Enable	Disable	Disable	Disable
Peak current detection time	1000ms	1000ms	1000ms	1000ms
Peak current detection value	7000	0	0	0

(5) Setting on the master station

1. Create a project on GX Works2.

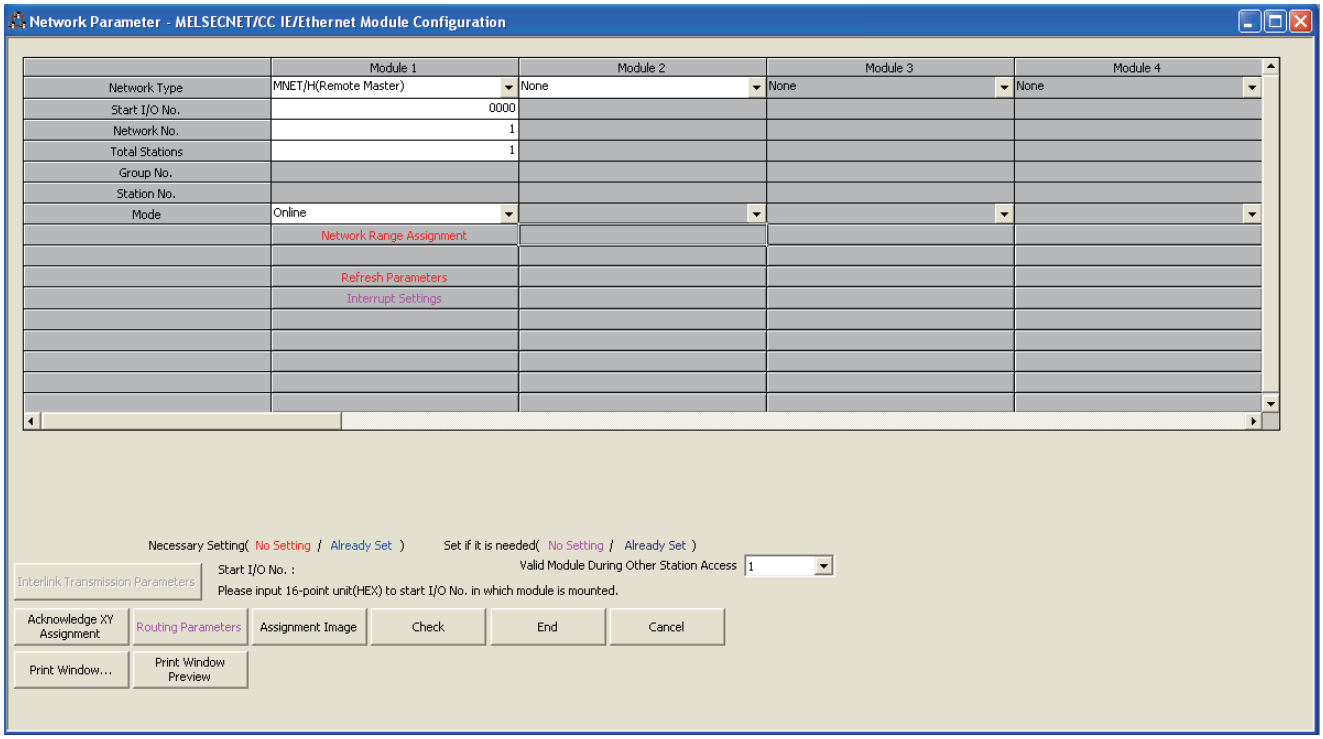
Select "QCPU (Q mode)" for "PLC Series", and select the CPU module used for "PLC Type".

[Project]⇨[New...]



2. Display the network parameter setting window, and configure the setting as follows.

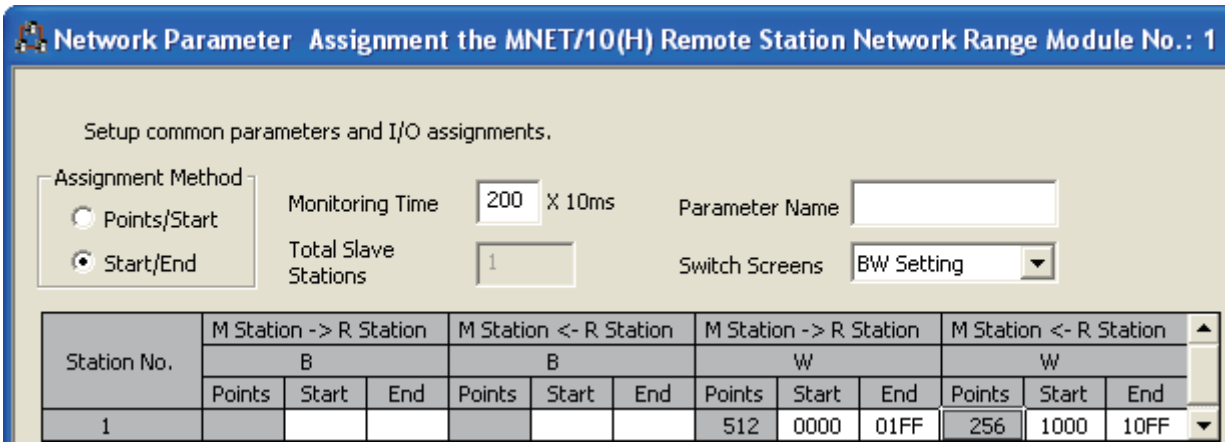
Project window⇨[Parameter] ⇨[Network Parameter]⇨[Ethernet/CC IE/MELSECNET]



3. **Display the network range assignment setting window, and configure the setting as follows.**

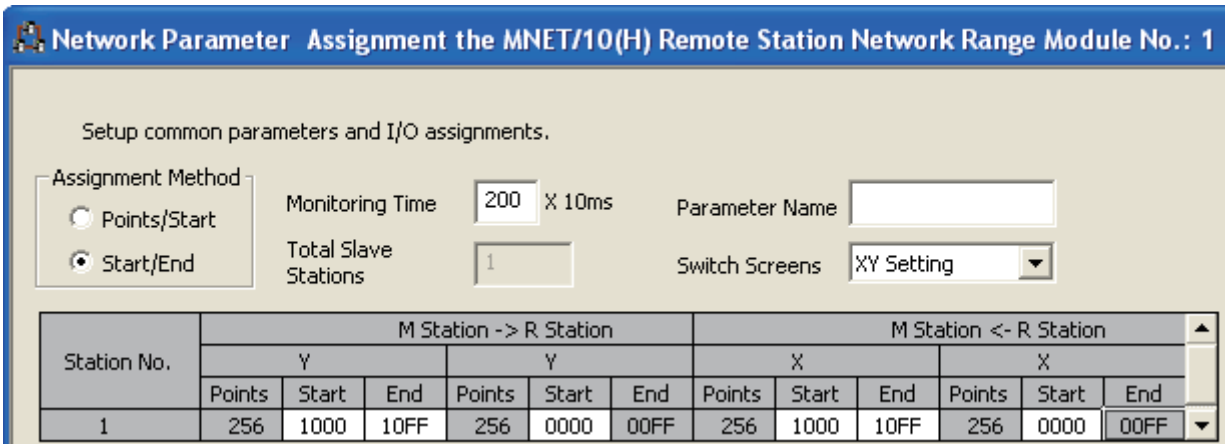
Project window⇨[Parameter] ⇨[Network Parameter]⇨[Ethernet/CC IE/MELSECNET]

⇨ Network Range Assignment button



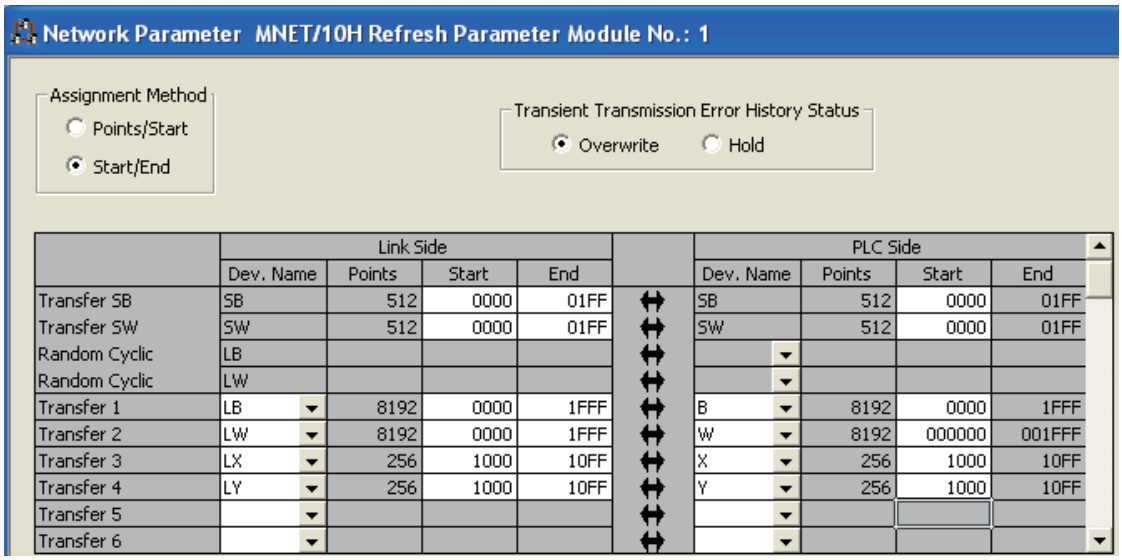
Project window⇨[Parameter] ⇨[Network Parameter]⇨[Ethernet/CC IE/MELSECNET]

⇨ Network Range Assignment button⇨"Switch Screens"⇨"XY Setting"



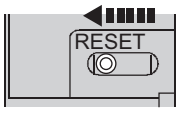
4. Display the refresh parameter setting window, and configure the setting as follows.

Project window⇨[Parameter] ⇨[Network Parameter]⇨[Ethernet/CC IE/MELSECNET] ⇨ Refresh Parameters button



5. Write the set parameters to the CPU module on the master station. Then reset the CPU module or turn off and on the power supply of the programmable controller.

[Online]⇨[Write to PLC...]



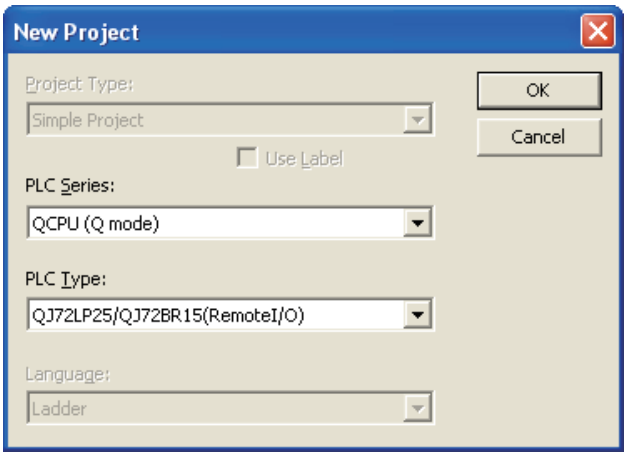
or Power OFF→ON

(6) Setting on the remote I/O station

1. Create a project on GX Works2.

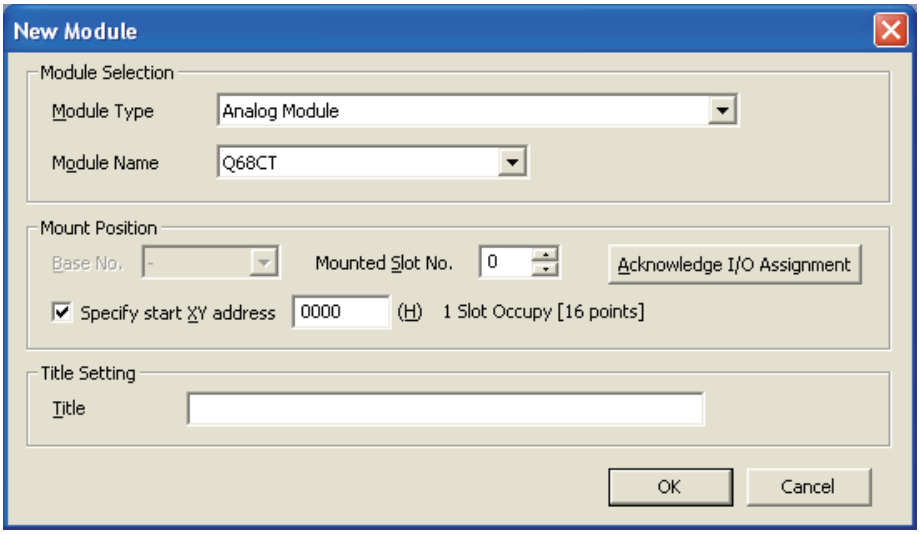
Select "QCPU (Q mode)" for "PLC Series", and select "QJ72LP25/QJ72BR15(RemoteI/O)" for "PLC Type".

[Project]⇨[New...]



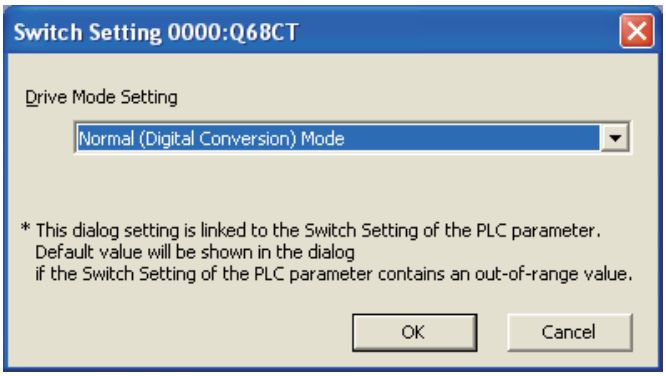
2. Add the Q68CT to the project on GX Works2.

Project window➪[Intelligent Function Module]➪Right-click➪[New Module...]



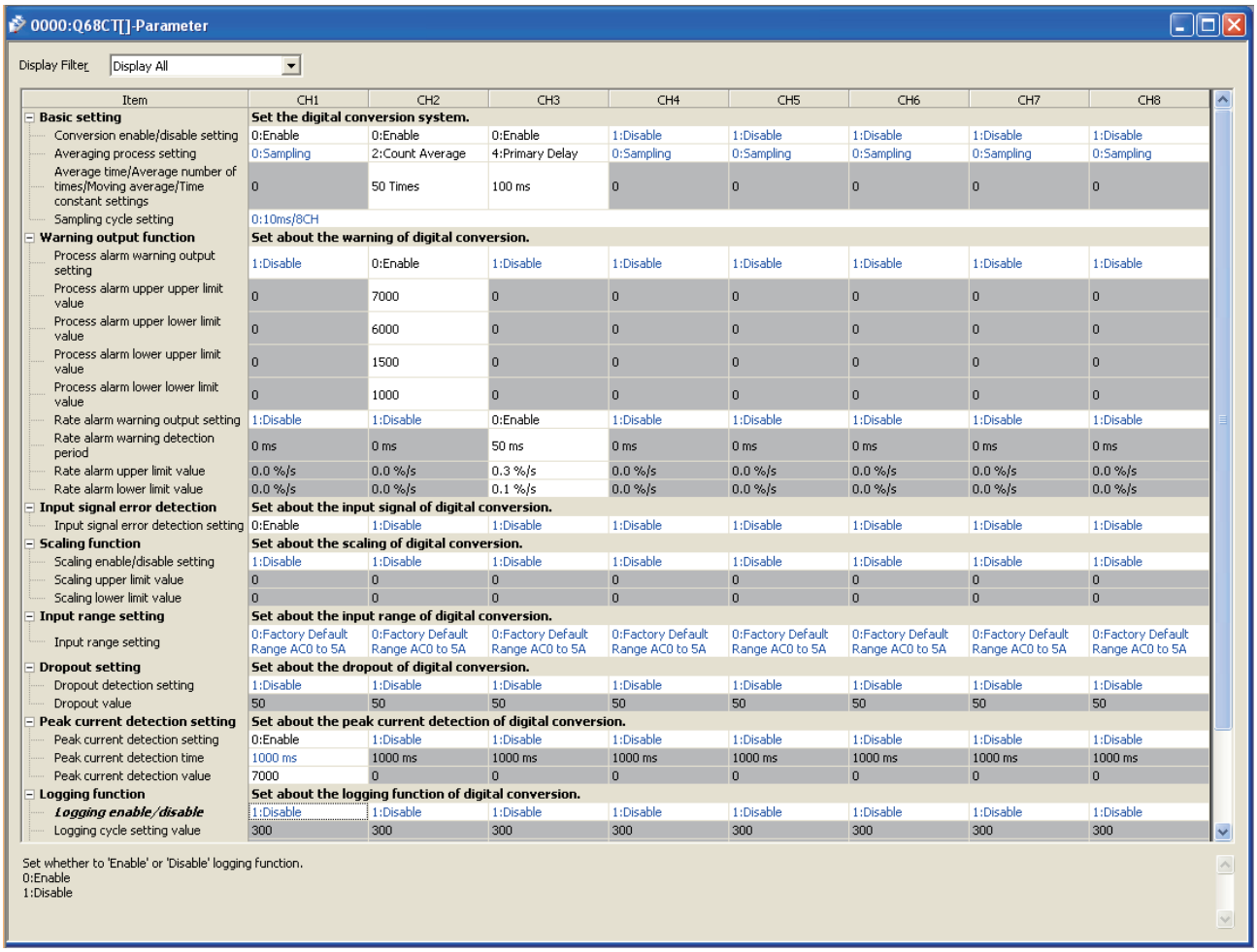
3. Display the Q68CT "Switch Setting" window, and configure the setting as follows.

Project window➪[Intelligent Function Module]➪[Q68CT]➪[Switch Setting]



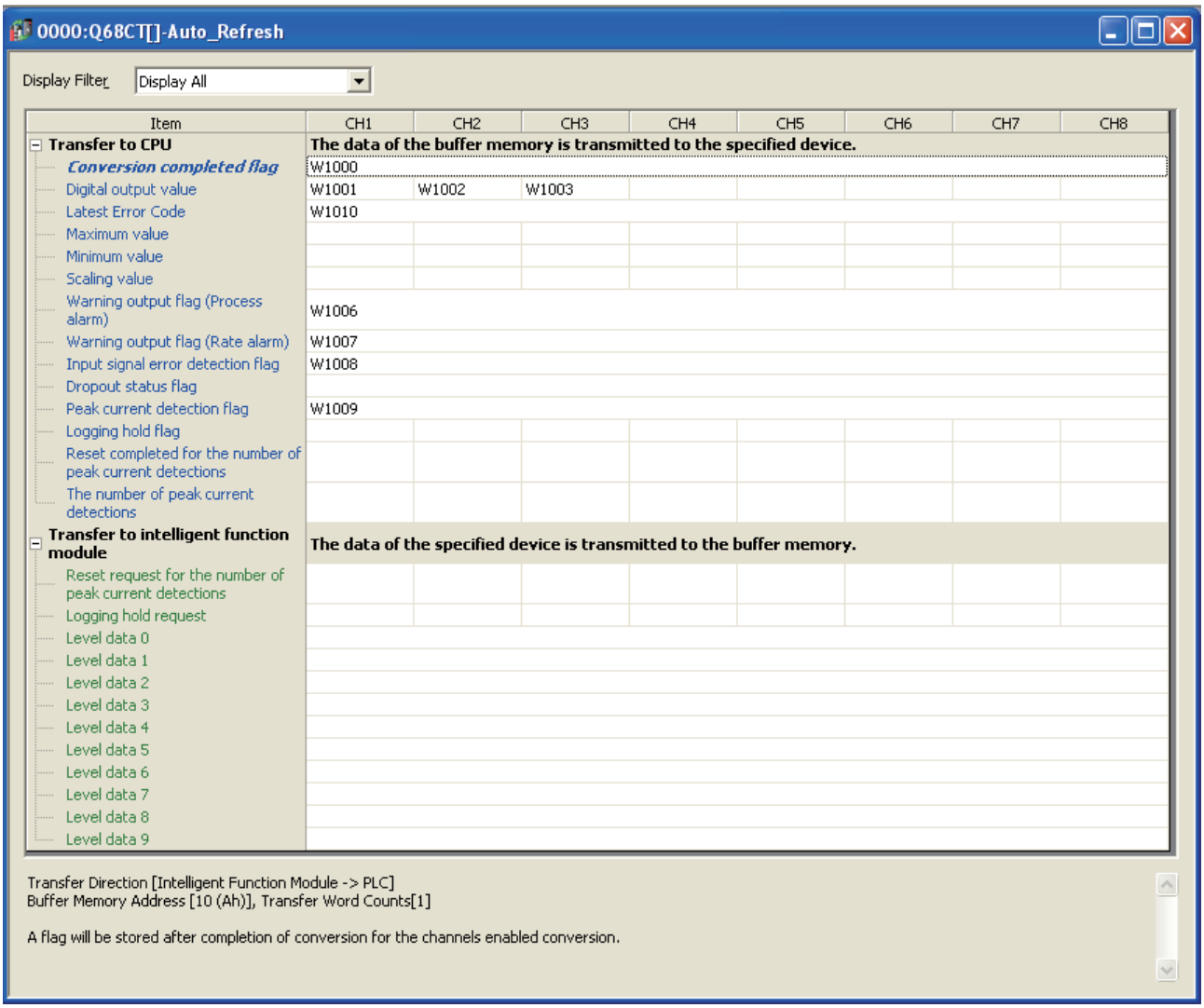
4. Display the Q68CT initial setting window, and configure the setting as follows. When creating a program without using parameters of an intelligent function module, skip this procedure.

Project window⇨[Intelligent Function Module]⇨[Q68CT]⇨[Parameter]



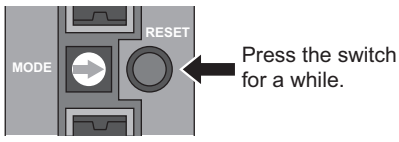
5. **Display the Q68CT auto refresh setting window, and configure the setting as follows. When creating a program without using parameters of an intelligent function module, skip this procedure.**

Project window ⇨[Intelligent Function Module]⇨[Q68CT] ⇨[Auto_Refresh]



6. **Write the set parameters to the remote I/O module, and reset the remote I/O module.**

[Online]⇨[Write to PLC...]

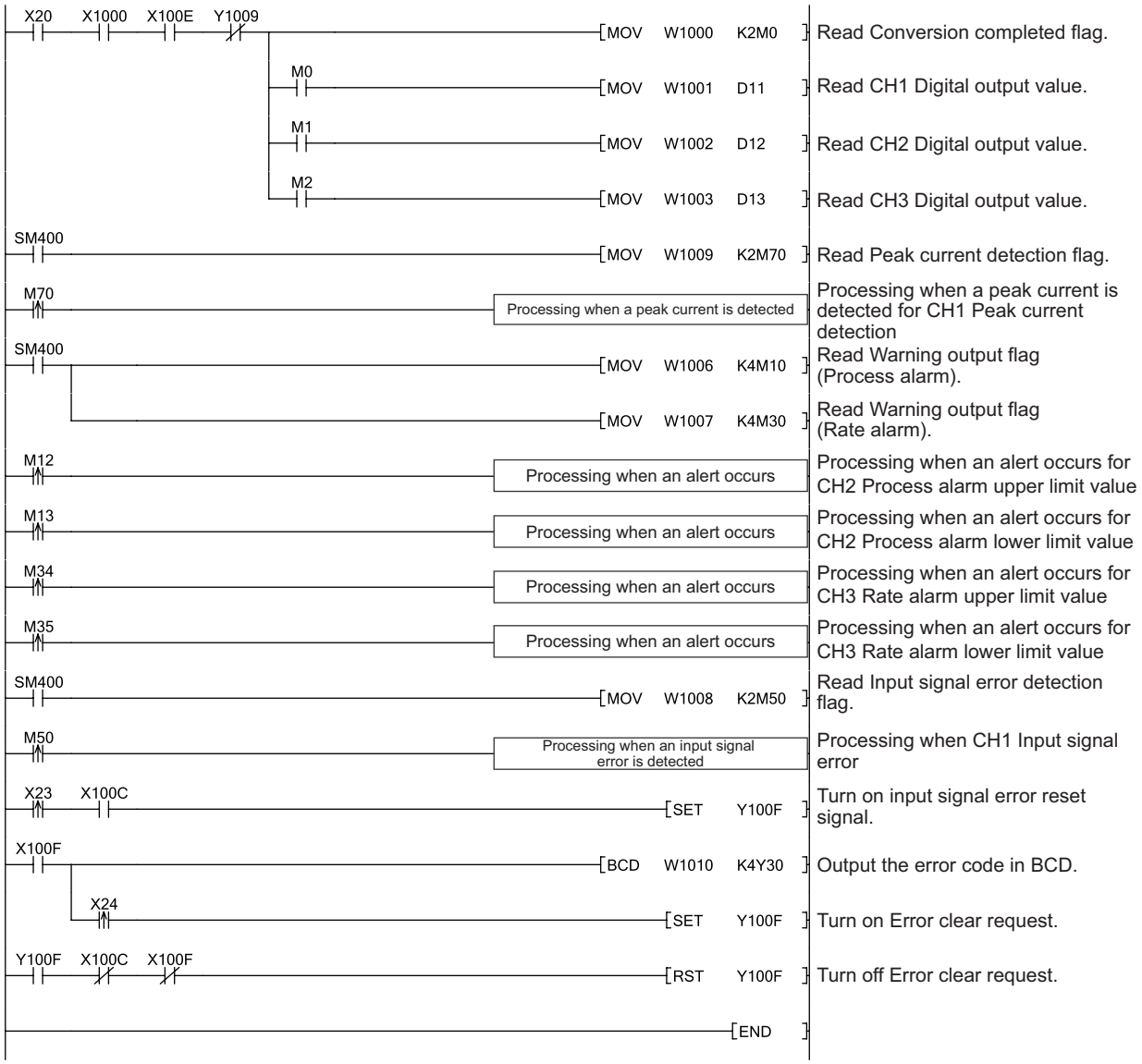


9.3.1 Program example when using parameters of the intelligent function module

(1) Device for user

Device	Description	
W1000	Conversion completed flag	
W1001 (D11)	CH1 Digital output value	
W1002 (D12)	CH2 Digital output value	
W1003 (D13)	CH3 Digital output value	
W1006	Warning output flag (Process alarm)	
W1007	Warning output flag (Rate alarm)	
W1008	Input signal error detection flag	
W1009	Peak current detection flag	
W1010	Latest error code	
M0	CH1 Conversion completed flag	
M1	CH2 Conversion completed flag	
M2	CH3 Conversion completed flag	
M10 to M25	Warning output flag (Process alarm)	
M30 to M45	Warning output flag (Rate alarm)	
M50 to M57	Input signal error detection flag	
M70 to M77	Peak current detection flag	
X1000	Module READY	CT input module (X/Y1000 to X/Y100F)
X100C	Input signal error detection signal	
X100E	Conversion completed flag	
X100F	Error flag	
Y1009	Operating condition setting request	
Y100F	Error clear request	
X20	Digital output value read command input signal	QX10 (X20 to X2F)
X23	Input signal error detection reset signal	
X24	Error reset signal	
Y30 to Y3F	Error code display (BCD 4 digits)	QY10 (Y30 to Y3F)

(2) Program example



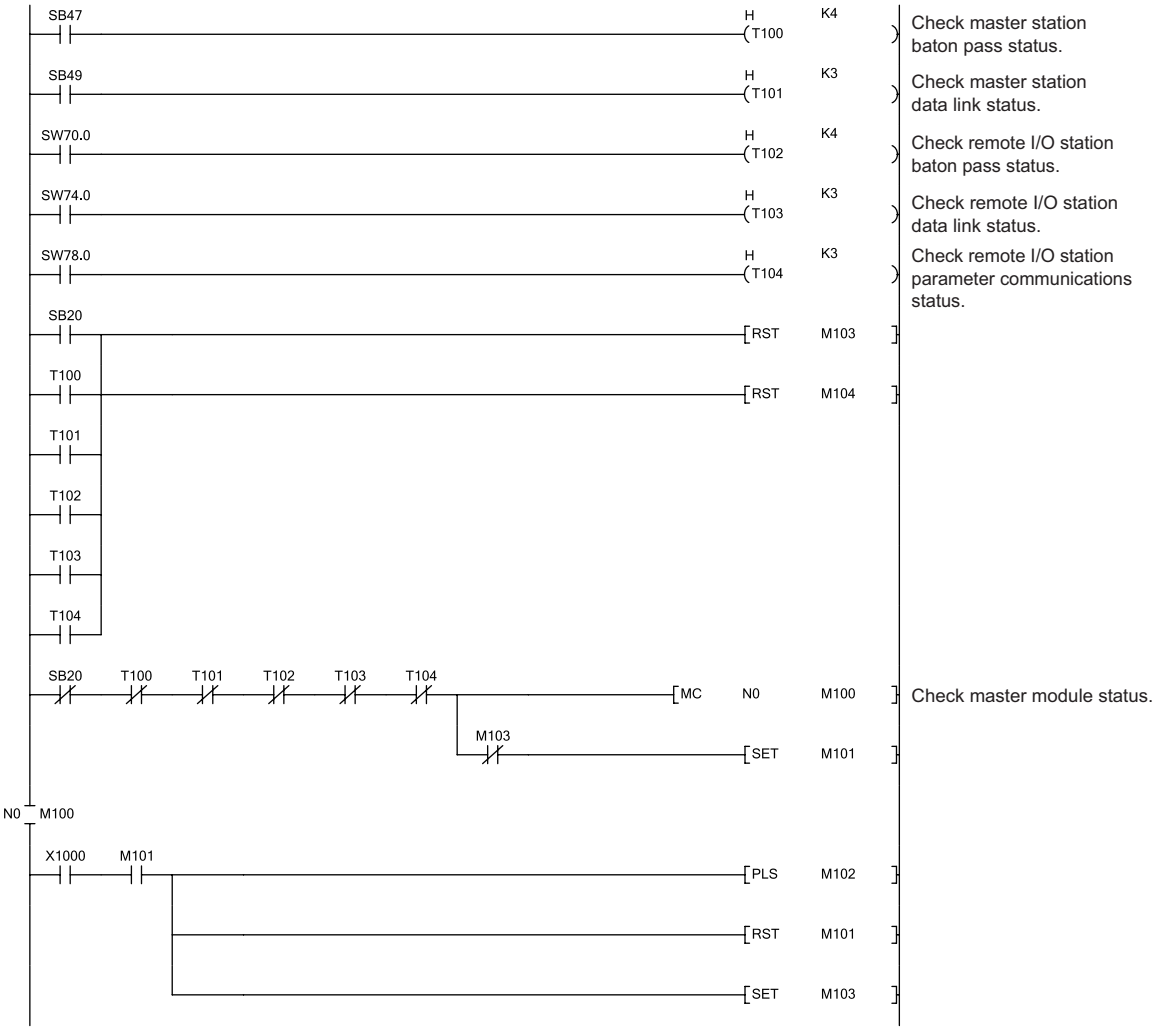
9.3.2 Program example when not using parameters of the intelligent function module

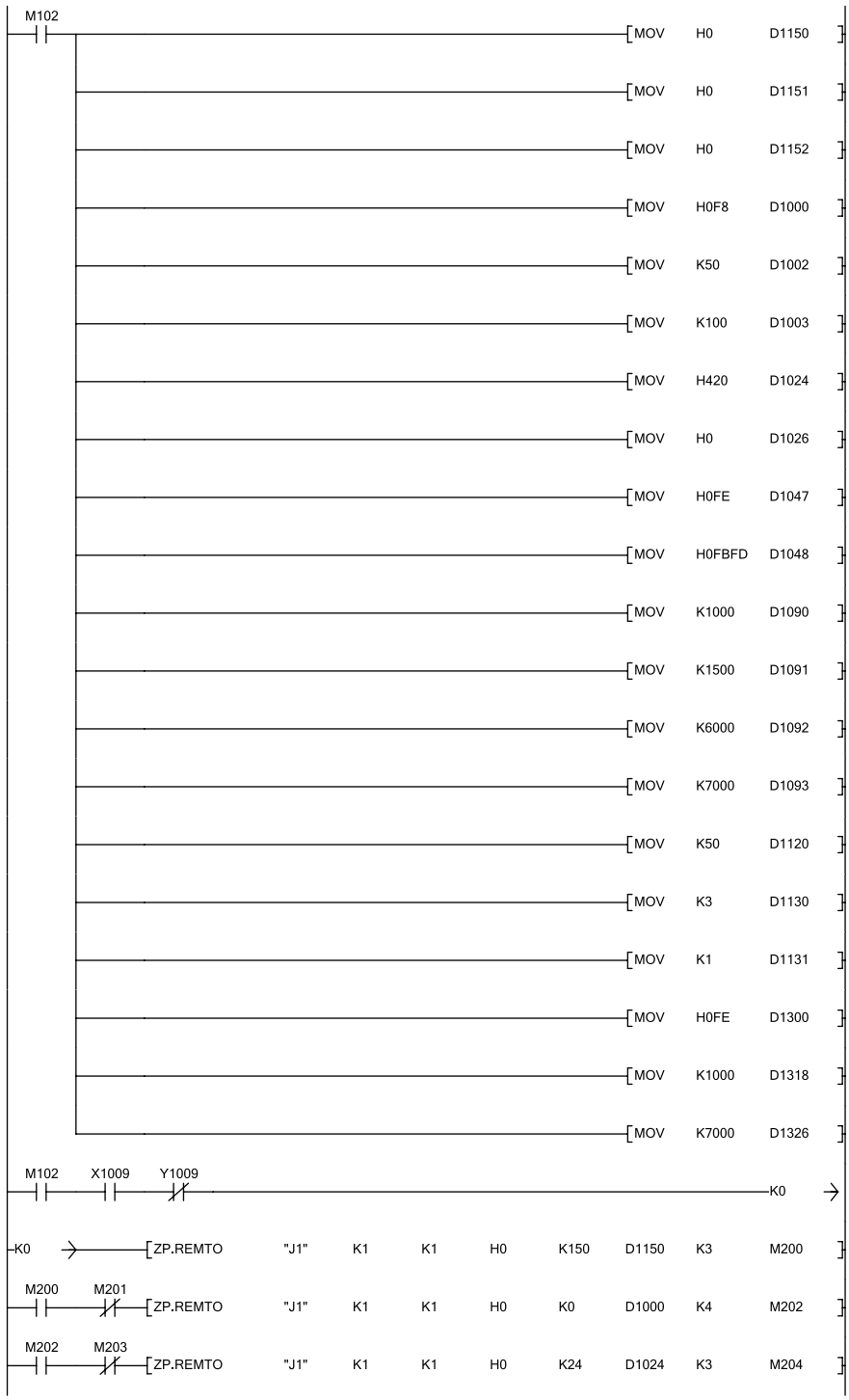
(1) Device for user

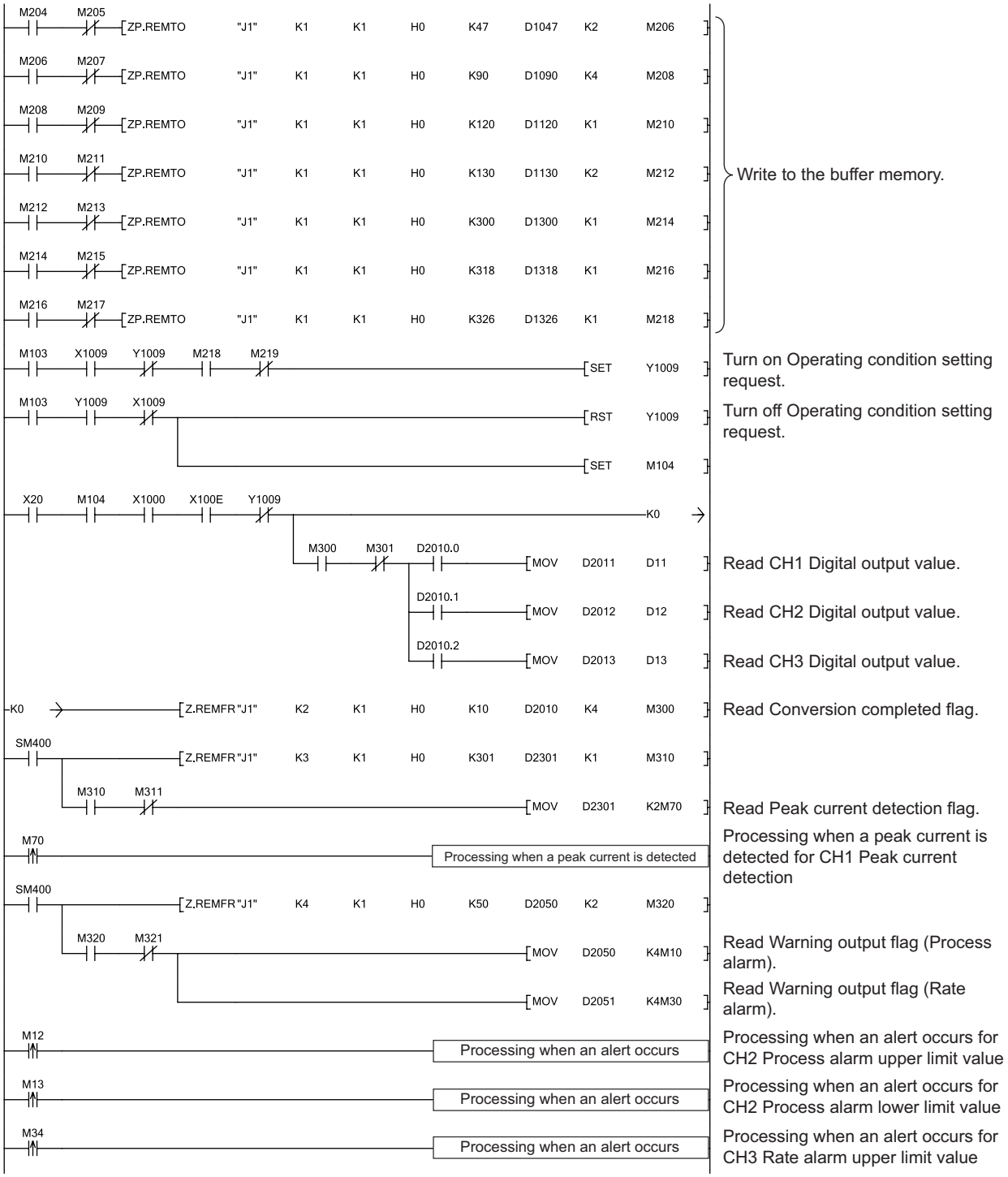
Device	Description	
D1000 to D1326	Device for initial value setting	
D2010	Conversion completed flag	
D2011 (D11)	CH1 Digital output value	
D2012 (D12)	CH2 Digital output value	
D2013 (D13)	CH3 Digital output value	
D2019	Latest error code	
D2049	Input signal error detection flag	
D2050	Warning output flag (Process alarm)	
D2051	Warning output flag (Rate alarm)	
D2301	Peak current detection flag	
M10 to M25	Warning output flag (Process alarm)	
M30 to M45	Warning output flag (Rate alarm)	
M50 to M57	Input signal error detection flag	
M70 to M77	Peak current detection flag	
M100	Master station status check flag	
M101	Initial setting start trigger	
M102	Initial setting start flag	
M103	During initial setting flag	
M104	Initial setting completed flag	
M200 to M219	Z(P).REMTO and Z(P).REMFR instructions completion/result device	
M300, M301		
M310, M311		
M320, M321		
M330, M331		
M340, M341		
X1000	Module READY	CT input module (X/Y1000 to X/Y100F)
X1009	Operating condition setting completed flag	
X100C	Input signal error detection signal	
X100E	Conversion completed flag	
X100F	Error flag	
Y1009	Operating condition setting request	
Y100F	Error clear request	
X20	Digital output value read command input signal	QX10 (X20 to X2F)
X23	Input signal error detection reset signal	
X24	Error reset signal	
Y30 to Y3F	Error code display (BCD 4 digits)	QY10 (Y30 to Y3F)
SB20	Module status	
SB47	Baton pass status of own station	
SB49	Data link status (own station)	
SW70	Baton pass status of each station	
SW74	Cyclic transmission status of each station	

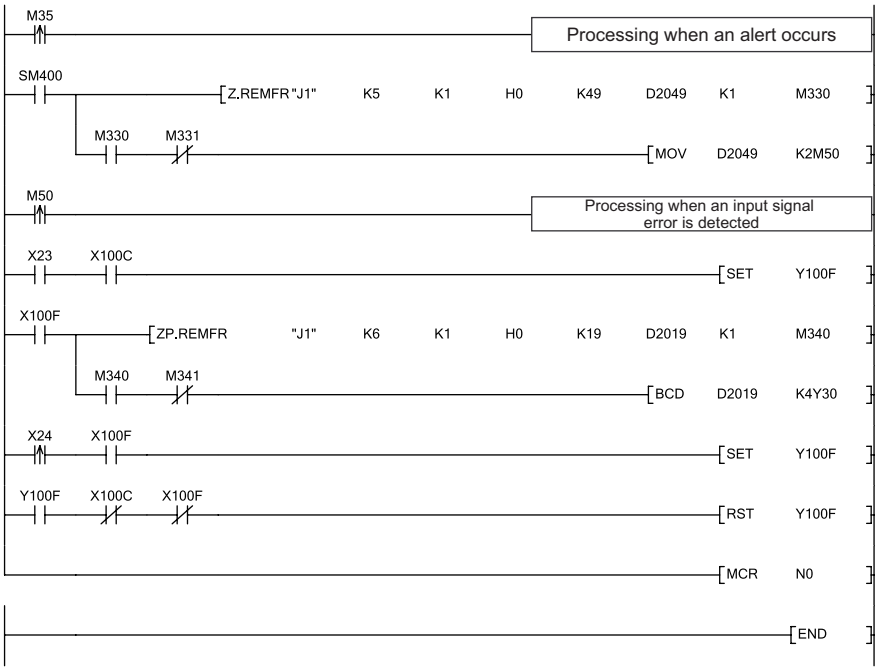
Device	Description
SW78	Parameter communication status of each station
T100 to T104	Interlock for own station and other stations

(2) Program example




M102
MOV H0 D1150
Set CH1 Input range setting.
MOV H0 D1151
Set CH2 Input range setting.
MOV H0 D1152
Set CH3 Input range setting.
MOV H0F8 D1000
Enable CH1 to CH3 Digital conversion.
MOV K50 D1002
CH2 Average time/Average number of times/Moving average/Time constant settings
MOV K100 D1003
CH3 Average time/Average number of times/Moving average/Time constant settings
MOV H420 D1024
Set CH1 to CH3 averaging process setting.
MOV H0 D1026
Set conversion speed.
MOV H0FE D1047
Activate CH1 Input signal error detection.
MOV H0FBFD D1048
Set CH2 and CH3 Warning output.
MOV K1000 D1090
Set CH2 Process alarm lower lower limit value.
MOV K1500 D1091
Set CH2 Process alarm lower upper limit value.
MOV K6000 D1092
Set CH2 Process alarm upper lower limit value.
MOV K7000 D1093
Set CH2 Process alarm upper upper limit value.
MOV K50 D1120
Set CH3 Rate alarm warning detection period.
MOV K3 D1130
Set CH3 Rate alarm upper limit value.
MOV K1 D1131
Set CH3 Rate alarm lower limit value.
MOV H0FE D1300
Set CH1 Peak current detection setting.
MOV K1000 D1318
Set CH1 Peak current detection time.
MOV K7000 D1326
Set CH1 Peak current detection value.
M102 X1009 Y1009
K0
K0 ZP.REMTO "J1" K1 K1 H0 K150 D1150 K3 M200
M200 M201 ZP.REMTO "J1" K1 K1 H0 K0 D1000 K4 M202
M202 M203 ZP.REMTO "J1" K1 K1 H0 K24 D1024 K3 M204
Write to the buffer memory.


M204 M205 ZP.REMTO "J1" K1 K1 H0 K47 D1047 K2 M206
M206 M207 ZP.REMTO "J1" K1 K1 H0 K90 D1090 K4 M208
M208 M209 ZP.REMTO "J1" K1 K1 H0 K120 D1120 K1 M210
M210 M211 ZP.REMTO "J1" K1 K1 H0 K130 D1130 K2 M212
M212 M213 ZP.REMTO "J1" K1 K1 H0 K300 D1300 K1 M214
M214 M215 ZP.REMTO "J1" K1 K1 H0 K318 D1318 K1 M216
M216 M217 ZP.REMTO "J1" K1 K1 H0 K326 D1326 K1 M218
Write to the buffer memory.
M103 X1009 Y1009 M218 M219 SET Y1009
Turn on Operating condition setting request.
M103 Y1009 X1009 RST Y1009
Turn off Operating condition setting request.
SET M104
X20 M104 X1000 X100E Y1009 K0
M300 M301 D2010.0 MOV D2011 D11
Read CH1 Digital output value.
D2010.1 MOV D2012 D12
Read CH2 Digital output value.
D2010.2 MOV D2013 D13
Read CH3 Digital output value.
K0 Z.REMFR "J1" K2 K1 H0 K10 D2010 K4 M300
Read Conversion completed flag.
SM400 Z.REMFR "J1" K3 K1 H0 K301 D2301 K1 M310
M310 M311 MOV D2301 K2M70
Read Peak current detection flag.
M70
Processing when a peak current is detected
Processing when a peak current is detected for CH1 Peak current detection
SM400 Z.REMFR "J1" K4 K1 H0 K50 D2050 K2 M320
M320 M321 MOV D2050 K4M10
Read Warning output flag (Process alarm).
MOV D2051 K4M30
Read Warning output flag (Rate alarm).
M12
Processing when an alert occurs
Processing when an alert occurs for CH2 Process alarm upper limit value
M13
Processing when an alert occurs
Processing when an alert occurs for CH2 Process alarm lower limit value
M34
Processing when an alert occurs
Processing when an alert occurs for CH3 Rate alarm upper limit value



Processing when an alert occurs for CH3 Rate alarm lower limit value

Read Input signal error detection flag.

Processing when CH1 Input signal error

Turn on input signal error reset signal.

Output the error code in BCD.

Turn on Error clear request.

Turn off Error clear request.

CHAPTER 10 ONLINE MODULE CHANGE

This chapter describes the online module change procedure using GX Works2.
The online module change procedure with GX Works2 is applicable only when the CT input module is used on a MELSECNET/H remote I/O network. When the CT input module is not used on the MELSECNET/H remote I/O network, perform the online module change using GX Developer (☞Page 253, Appendix 3).

When performing an online module change, carefully read the following.

- 🕮 QCPU User's Manual (Hardware Design, Maintenance and Inspection)

10.1 Precautions on Online Module Change

This section lists precautions on an online module change.

- Always perform an online module change in the correct procedure (☞Page 185, Section 10.4). A failure to do so can cause a malfunction or failure.
- Perform an online module change after making sure that the system outside the programmable controller will not malfunction.
- 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. Failure to do so may cause an electric shock and malfunction of operating modules.
- After the module has failed, the buffer memory data may not be saved properly. Prerecord the data to be saved.
- 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. For the operational verification, check 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.
- 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) respectively. Exceeding the limit may cause malfunction.

10.2 Conditions for Online Module Change

To perform an online module change, satisfy the following conditions.

Remark

The function version of the first released CT input module is C, and the CT input module supports the online module change.

(1) Function version of MELSECNET/H remote I/O module

A module of function version D or later is necessary.

(2) Compatible version of GX Works2

GX Works2 of Version 1.40S or later is necessary.

(3) Restrictions of base unit

When the module is mounted on any of the following base units, an online module change cannot be performed.

- Slim type main base unit (Q3□SB)
- Extension base unit (Q5□B) which does not require the power supply module (An online module change cannot be performed for all modules on the base unit.)

10.3 Online Module Change Operations

The following table explains the operations for an online module change.

○: Executed ×: Not executed

User operation	Operation of the CT input module	Operation of the CPU module				Operation of the remote I/O module	
		X/Y refresh	FROM/TO instructions*1	Dedicated instruction	Device test	Parameter setting	Device test
(1) Stop the operation. Turn off all of the Y signals turned on using the sequence program.	The module is operating normally.	○	○	○	○	×	○
(2) Remove the module. Start the online module change using GX Works2. Click the [Execution] button on GX Works2 to enable the module to be removed. Remove the module.	The operation of the module stops. ・The RUN LED turns off. ・Conversion disabled.	×	×	×	×	×	×
(3) Mount a new module. Mount a new module. After mounting the module, click the [Execution] button on GX Works2. Check the operation before the control starts.	The X/Y refresh restarts and the module starts up. ・The RUN LED turns on. ・Default operation starts. (Module READY (X0) remains off.) (When there are initial setting parameters, the module starts to operate based on the initial setting parameters at this point.)	○	×	×	×	○	×
(4) Check the operation. Click the [Cancel] button on GX Works2 to turn off the online mode. On "Device test" on GX Works2, test the operation of the module. (Restore the user range settings by writing of buffer memory addresses at this point.) Operation check is completed.	The module operates based on the test operation.*2	○	×	×	○	×	○
(5) Resume the control. Restart the online module change using GX Works2. Click the [Execution] button to resume the control.	Module READY (X0) turns on. ↓ The module operates based on the initial setting sequence program which runs when Module READY (X0) turns on.*2	○	○	○	○	×	○

*1 An access to 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.

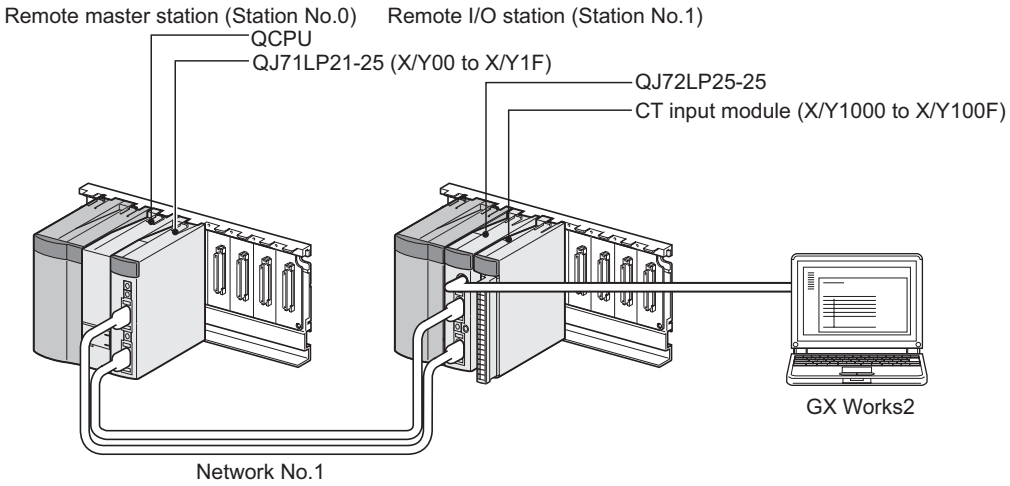
10.4 Online Module Change Procedure

Perform an online module change using GX Works2 connected to a remote I/O module.
This section describes two online module change procedures: setting parameters using GX Works2 and setting parameters using a sequence program.

Range setting	Parameter setting	Another system	Reference
Factory default range	Configuration function	—	Page 187, Section 10.5
	Sequence program	—	Page 193, Section 10.6
User range	Configuration function	Present	Page 200, Section 10.7
		Absent	Page 213, Section 10.9
	Sequence program	Present	Page 206, Section 10.8
		Absent	Page 220, Section 10.10

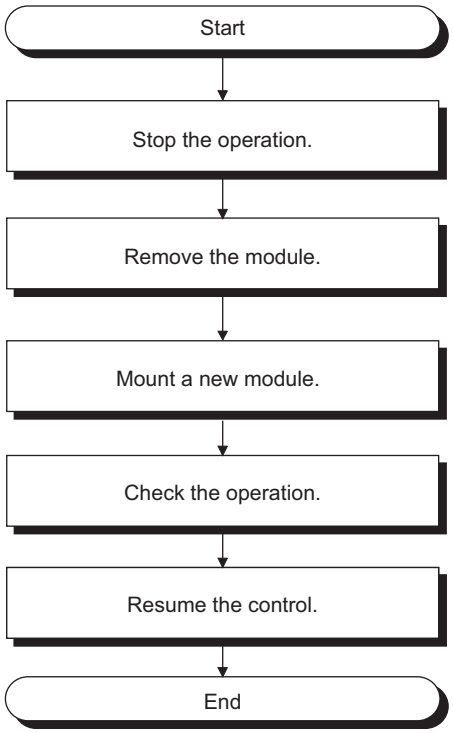
(1) System configuration

The following system configuration is used to explain the online module change procedure.



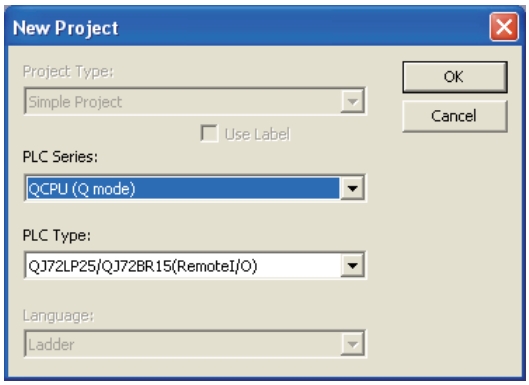
(2) Procedure

The following flow shows the online module change procedure.



10.5 When a Factory Default Range Is Used and Parameters Are Set Using the Configuration Function

(1) Stopping operation



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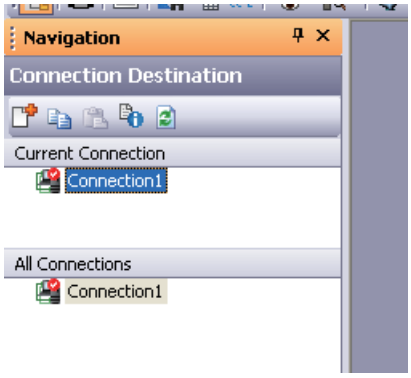

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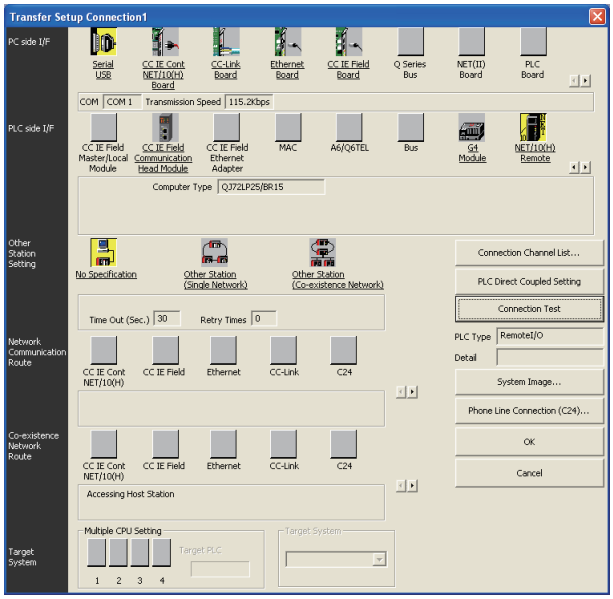

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1. **Create a new project.**

[Project] ⇨ [New...]

2. **Select "QJ72LP25/QJ72BR15(RemoteI/O)" in "PLC Type" and click the** OK **button.**

3. **Open the "Transfer Setup" window.**

Navigation window ⇨ Connection Destination view ⇨ (Connection destination data name)

4. **Configure the settings to access the module on the remote I/O station and click the** OK **button.**

(From the previous page)

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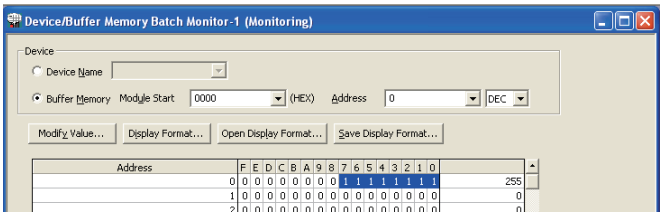

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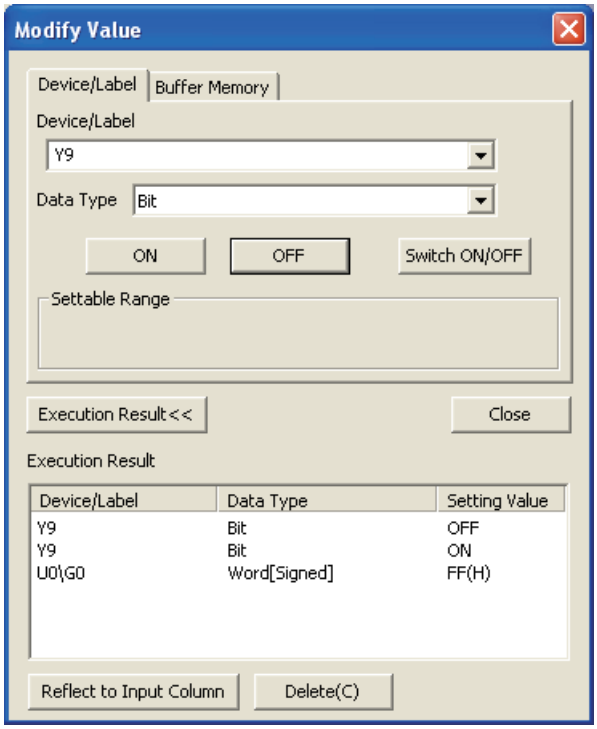


5. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

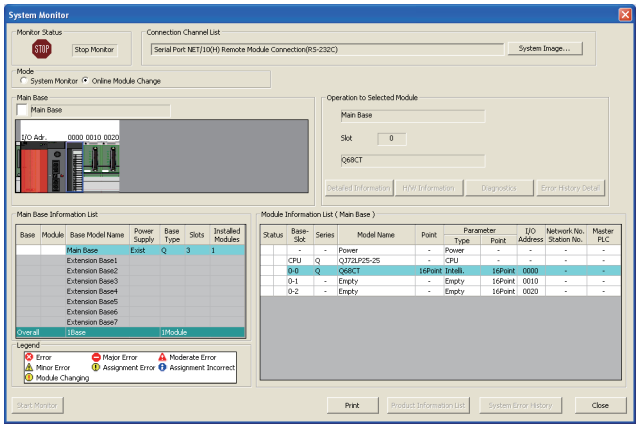
6. **Enter and display the buffer memory address of Conversion enable/disable setting (Un\G0).**

7. **Set Conversion enable/disable setting (Un\G0) to Disable (1) for all channels.**

8. **Turn on then off Operating condition setting request (Y9).**

9. **Confirm that the digital conversion has stopped with Conversion completed flag (Un\G10).**

(2) Removing a module



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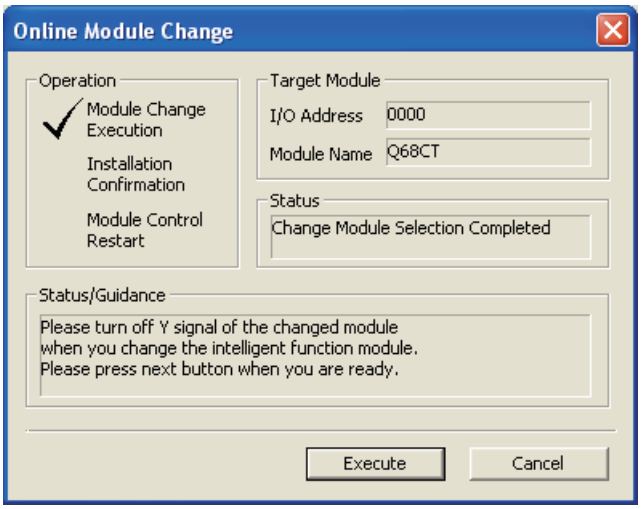


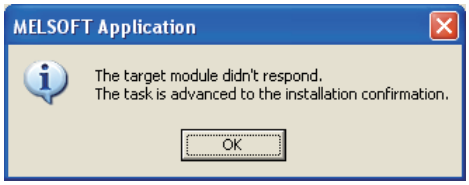
1. **Open the "System Monitor" window.**

[Diagnostics] ⇨ [Online Module Change...]

2. **Select "Online module change" under the "Mode" field and double-click the module name to be changed online.**

3. **Click the** Execute **button to enable a module change.**

4. **When the following error window appears, click the** OK **button and perform the operation described in** **Page 190, Section 10.5 (3).**



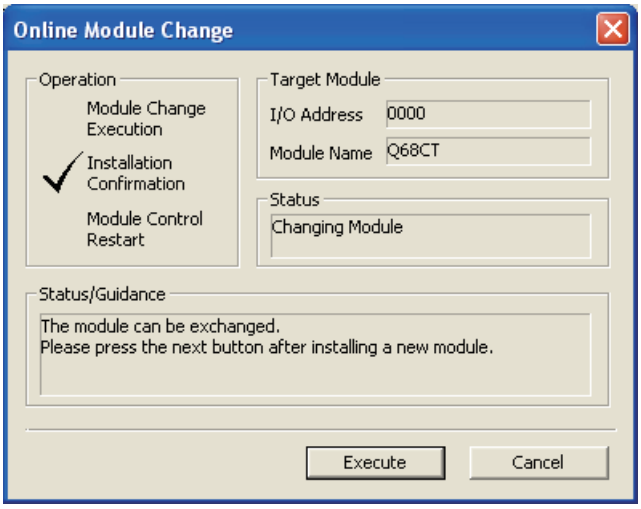
5. **After confirming that the RUN LED of the module has turned off, remove the terminal block.**

6. **Remove the module.**

Point

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

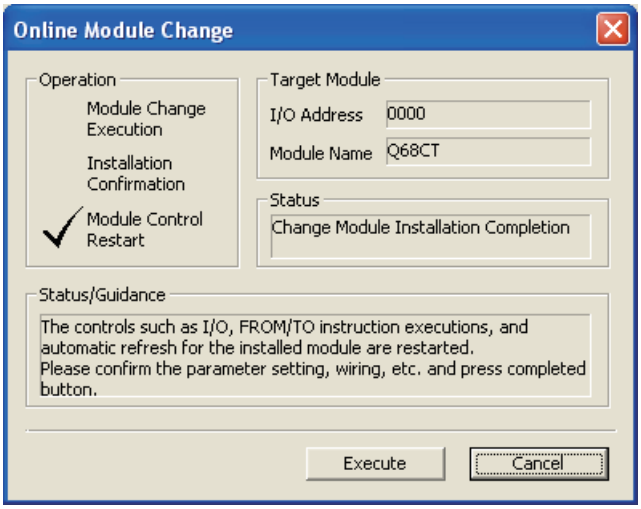
(3) Mounting a new module



1. **Mount a new module in the same slot and install the terminal block.**

2. **After mounting the module, click the** [Execute] **button and make sure that the RUN LED is lit. Module READY (X0) remains off.**

(4) Checking operation



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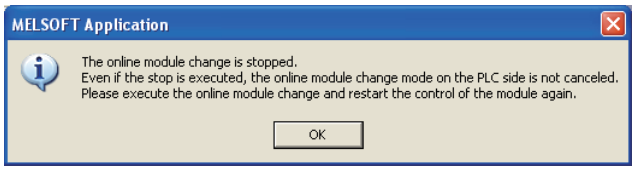

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1. **To check the operation, click the** [Cancel] **button to cancel the control start.**

2. **Click the** [OK] **button to leave the "Online Module Change" mode.**

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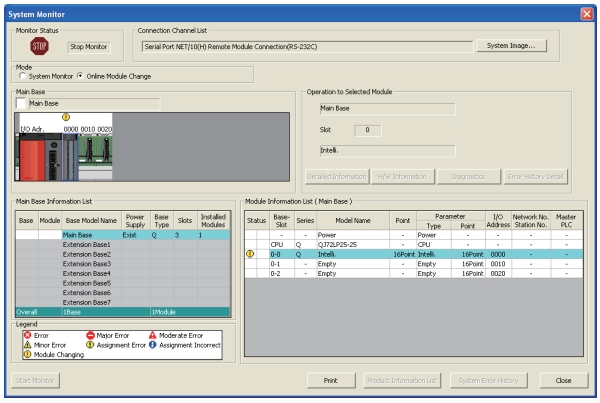

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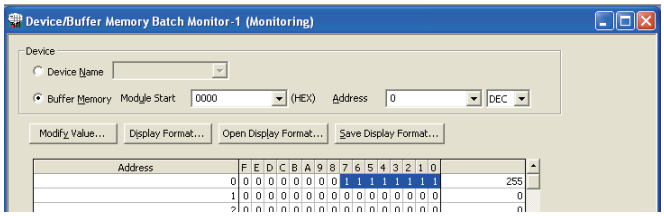


3. **Click the Close button to close the "System Monitor" window.**

4. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

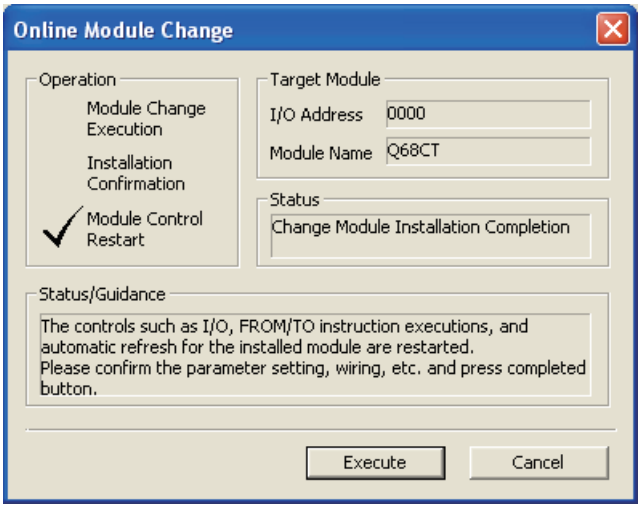
5. **Monitor Conversion enable/disable setting (Un\G0) to check if the channel to be used is set to Enable (0).**

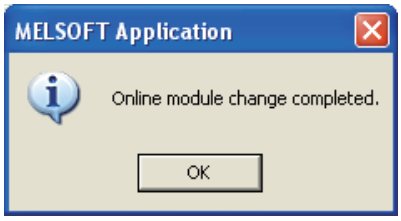
6. **Monitor CH☐ Digital output value (Un\G11 to Un\G18) to check if the digital conversion is performed properly.**

7. **Before starting the control, check the CT input module for the following. If an error occurs, refer to TROUBLESHOOTING (Page 228, CHAPTER 11) and take a corrective action.**

- If the RUN LED is on.
- If the ERR. LED is off.
- If Error flag (XF) is off.

(5) Resuming operation





1. **Open the "Online Module Change" window again.**

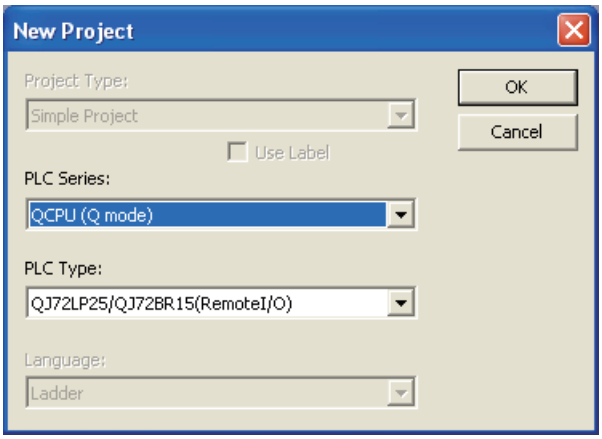
[Diagnostics] ⇨ [Online Module Change...]

2. **Click the Execute button on the appeared window to resume control. Module READY (X0) turns on.**

3. **The online module change is complete.**

10.6 When a Factory Default Range Is Used and Parameters Are Set Using a Sequence Program

(1) Stopping operation



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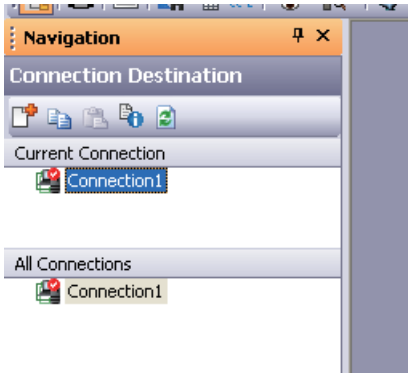

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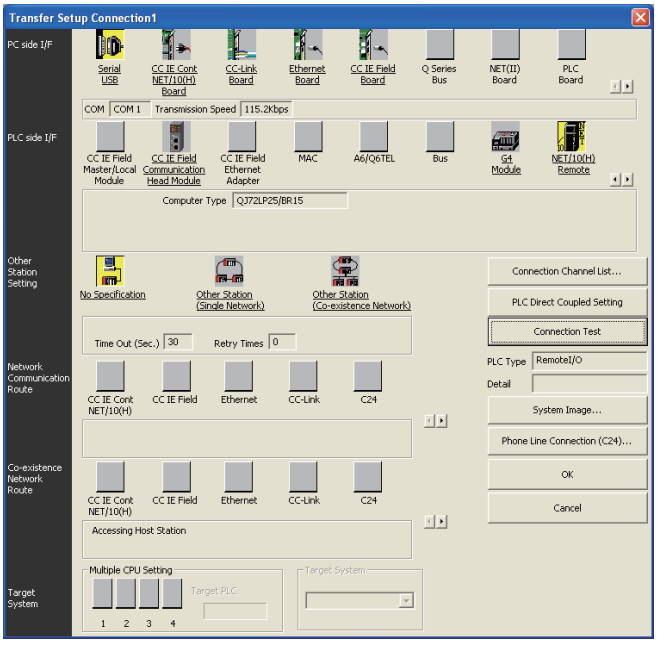

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1. **Create a new project.**

[Project] ⇨ [New...]

2. **Select "QJ72LP25/QJ72BR15(RemoteI/O)" in "PLC Type" and click the OK button.**

3. **Open the "Transfer Setup" window.**

Navigation window ⇨ Connection Destination view ⇨ (Connection destination data name)

4. **Configure the settings to access the module on the remote I/O station and click the OK button.**

(From the previous page)

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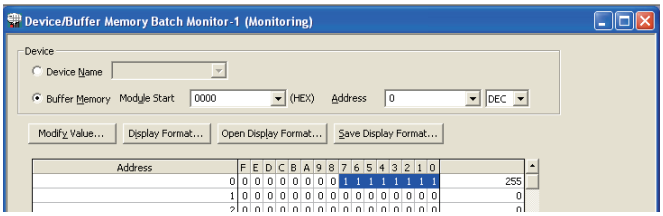

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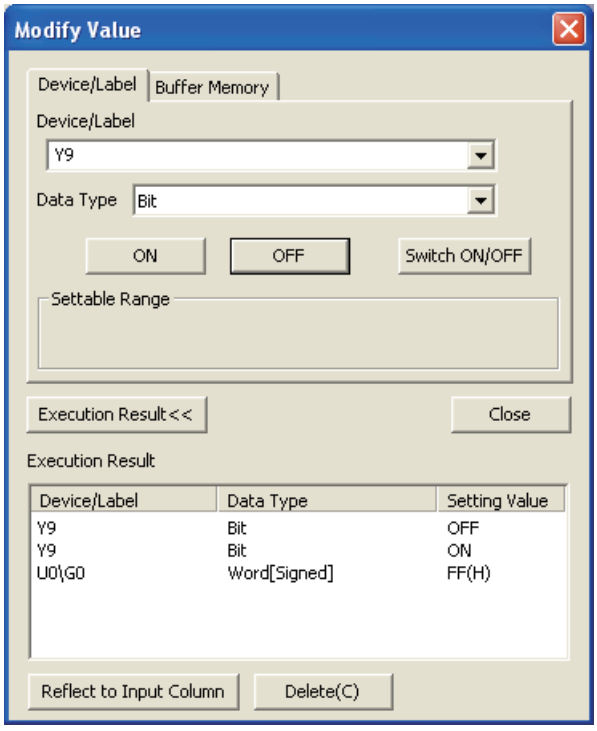


5. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

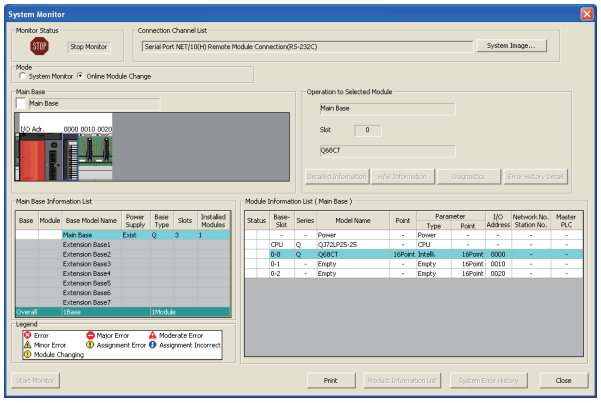
6. **Enter and display the buffer memory address of Conversion enable/disable setting (Un\G0).**

7. **Set Conversion enable/disable setting (Un\G0) to Disable (1) for all channels.**

8. **Turn on then off Operating condition setting request (Y9).**

9. **Confirm that the digital conversion has stopped with Conversion completed flag (Un\G10).**

(2) Removing a module



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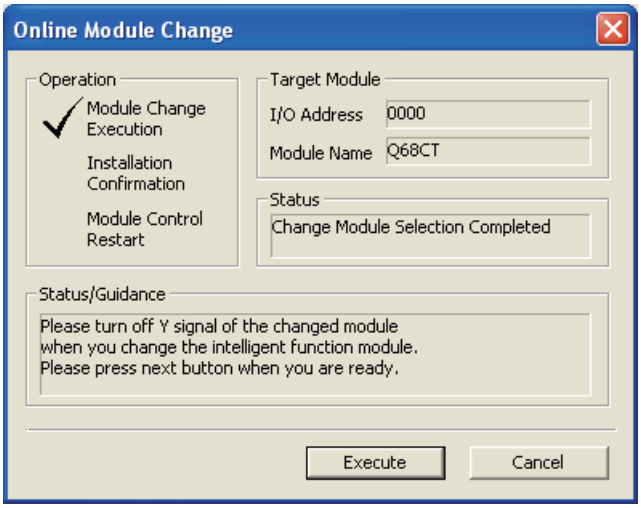


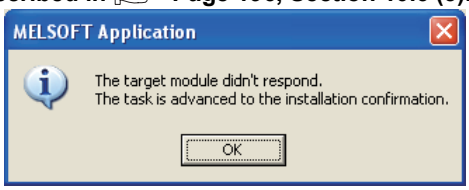
1. **Open the "System Monitor" window of the remote I/O module.**

[Diagnostics] ⇨ [Online Module Change...]

2. **Select "Online Module Change" under the "Mode" field and double-click the module name to be changed online.**

3. **Click the Execute button to enable a module change.**

4. **When the following error window appears, click the OK button and perform the operation described in Page 196, Section 10.6 (3).**



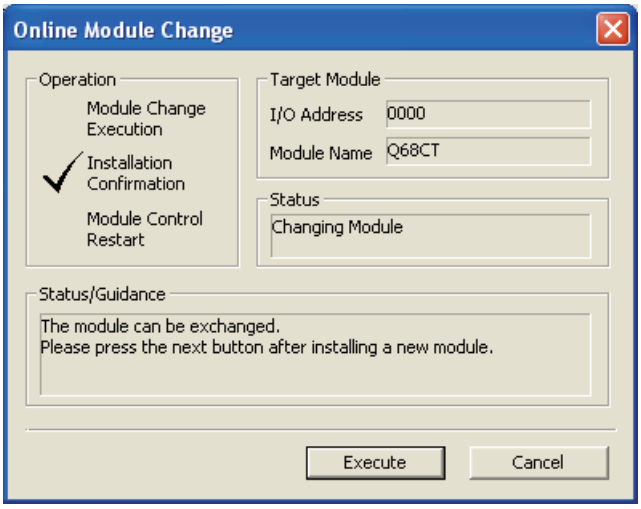
5. **After confirming that the RUN LED of the module has turned off, remove the terminal block.**

6. **Remove the module.**

Point

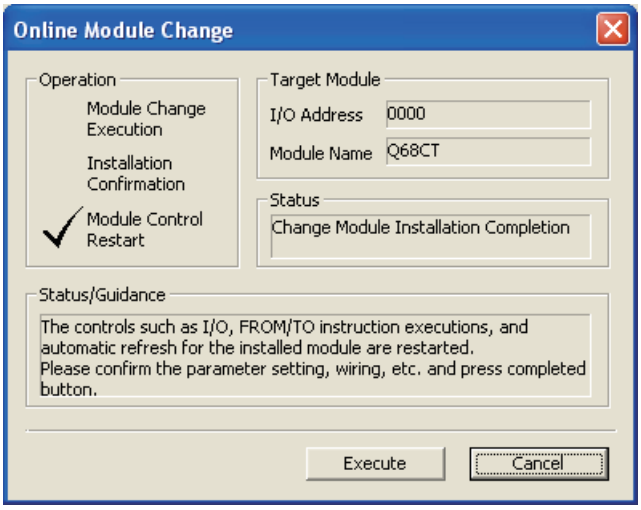
Always remove the module. If mounting confirmation is made without the module being removed, the module will not start properly and the RUN LED will not be lit.

(3) Mounting a new module



1. **Mount a new module in the same slot and install the terminal block.**
2. **After mounting the module, click the [Execute] button and make sure that the RUN LED is lit. Module READY (X0) remains off.**

(4) Checking operation



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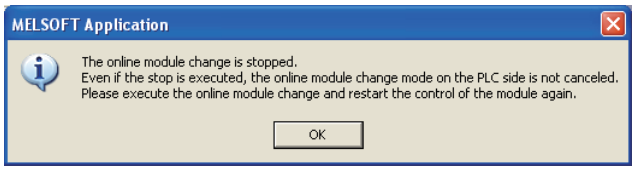

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1. **To check the operation, click the [Cancel] button to cancel the control start.**
2. **Click the [OK] button to leave the "Online Module Change" mode.**

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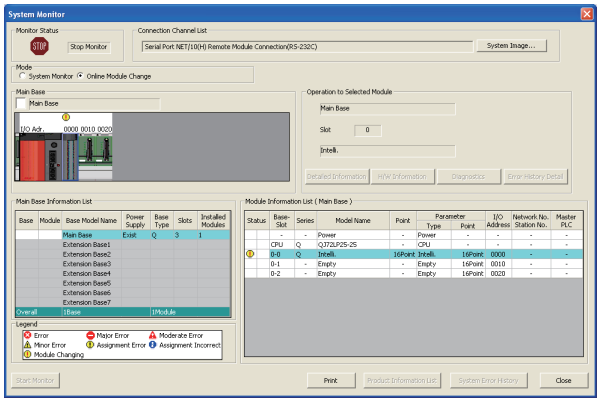

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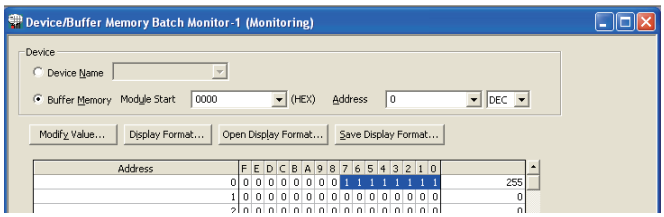

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3. **Click the [Close] button to close the "System Monitor" window.**

4. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

5. **Enter and display the buffer memory address of Conversion enable/disable setting (Un\G0).**

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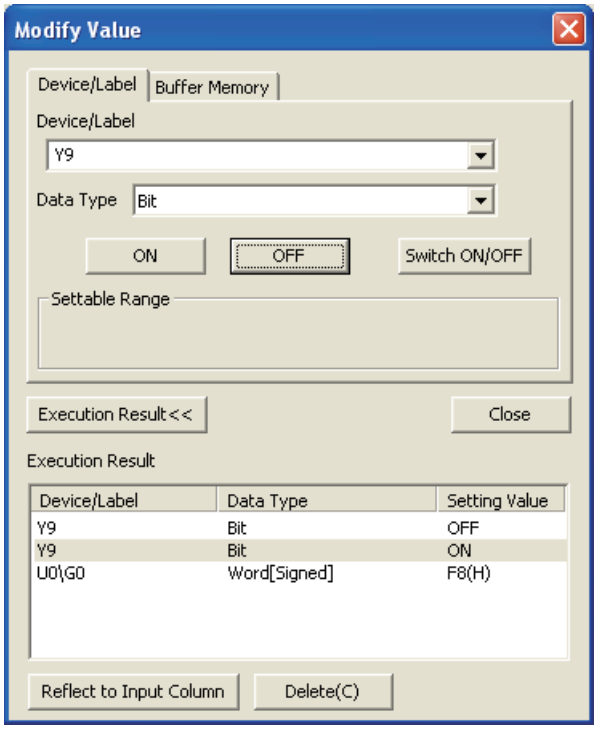


6. **Set Conversion enable/disable setting (Un\G0) to Enable (0) for the channel used, and turn on then off Operating condition setting request (Y9).**

7. **Monitor CH□ Digital output value (Un\G11 to Un\G18) to check if the digital conversion is performed properly.**

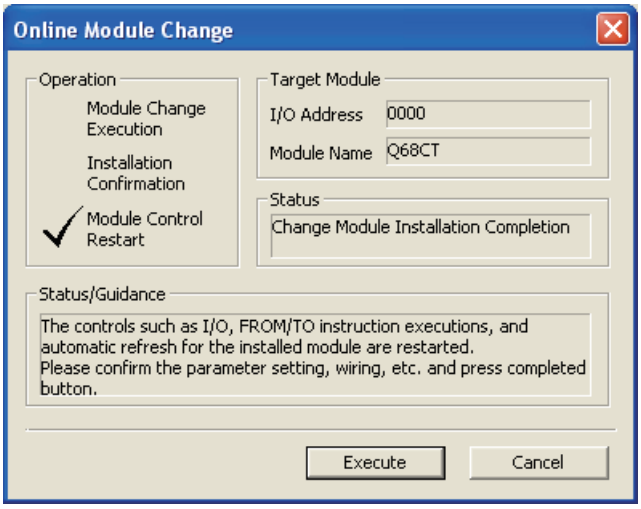
8. **Before starting the control, check the CT input module for the following. If an error occurs, refer to TROUBLESHOOTING (☞Page 228, CHAPTER 11) and take a corrective action.**

- If the RUN LED is on.
- If the ERR. LED is off.
- If Error flag (XF) is off.

9. **Since the new module is in the default status, initial settings must be configured using a sequence program after the control resumed. Before the initial setting, check if the initial setting program is proper, satisfying the following.**

- Insert a user device where the initial setting will be set at any timing (initial setting request signal) into the sequence program.
- Do not create a sequence program which sets the initial setting only one scan after a data link start of the remote I/O network. In this case, the initial setting is not set.

(5) Resuming operation



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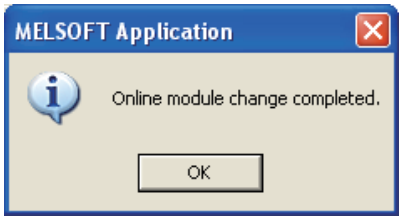


1. **Open the "Online Module Change" window again.**

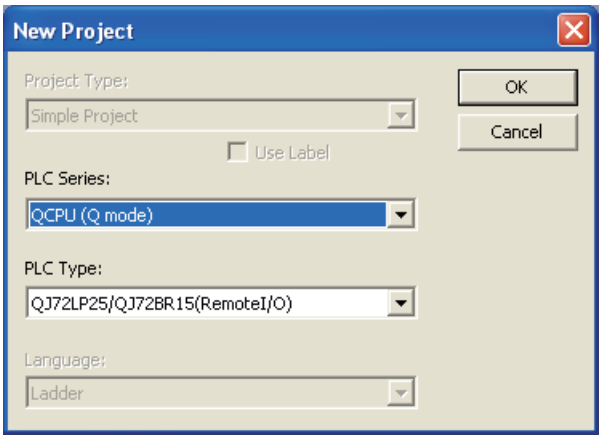
[Diagnostics] ⇨ [Online Module Change...]

2. **Click the Execute button on the appeared window to resume control. Module READY (X0) turns on.**

3. **The online module change is complete.**

10.7 When a User Range Is Used and Parameters Are Set Using the Configuration Function (with Another System)

(1) Stopping operation



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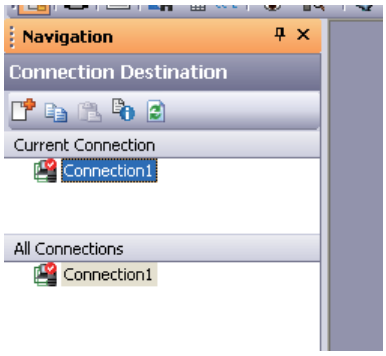

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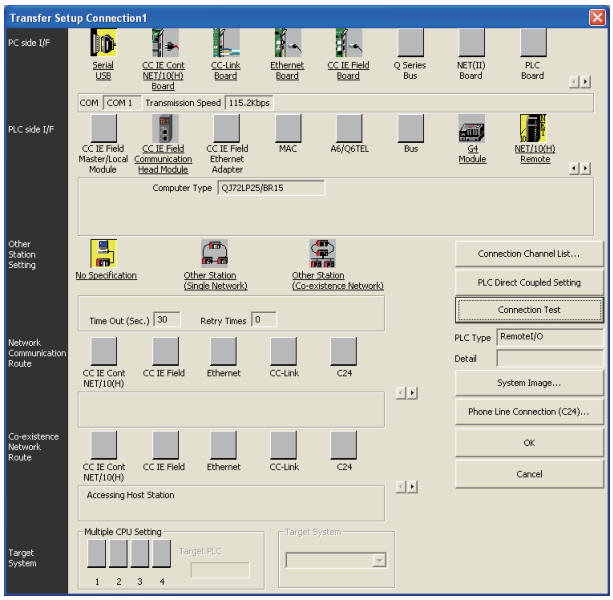

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1. **Create a new project.**

[Project] ⇨ [New...]

2. **Select "QJ72LP25/QJ72BR15(RemoteI/O)" in "PLC Type" and click the** OK **button.**

3. **Open the "Transfer Setup" window.**

Navigation window ⇨ Connection Destination view ⇨ (Connection destination data name)

4. **Configure the settings to access the module on the remote I/O station and click the** OK **button.**

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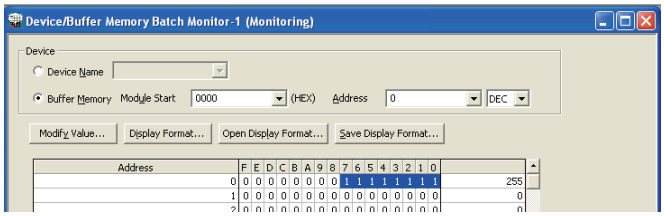

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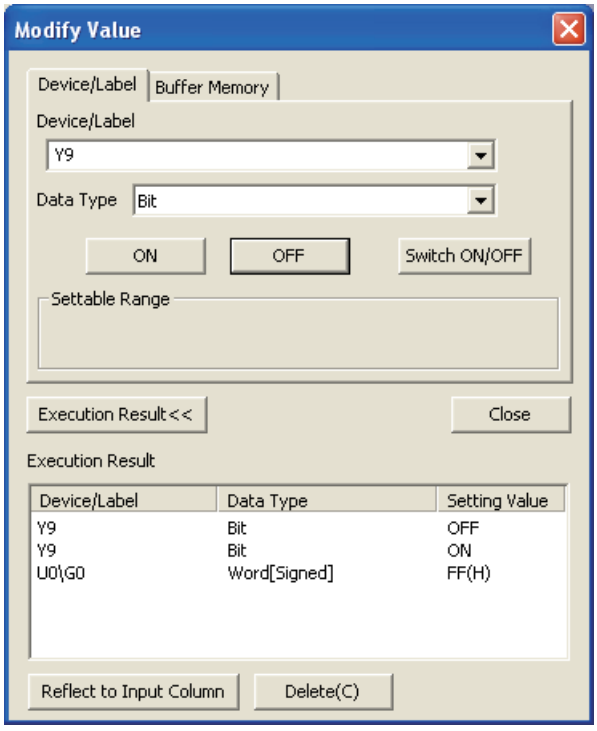


5. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

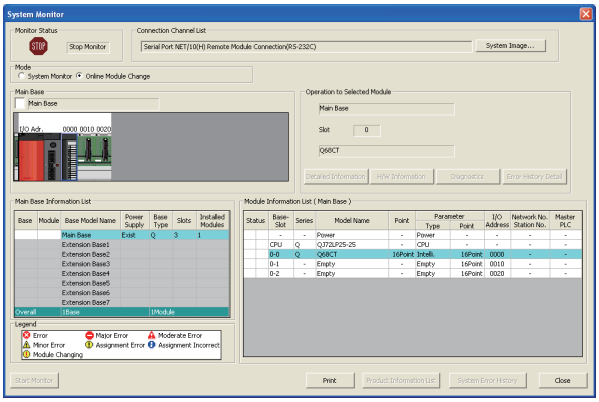
6. **Enter and display the buffer memory address of Conversion enable/disable setting (Un\G0).**

7. **Set Conversion enable/disable setting (Un\G0) to Disable (1) for all channels.**

8. **Turn on then off Operating condition setting request (Y9).**

9. **Confirm that the digital conversion has stopped with Conversion completed flag (Un\G10).**

(2) Removing a module



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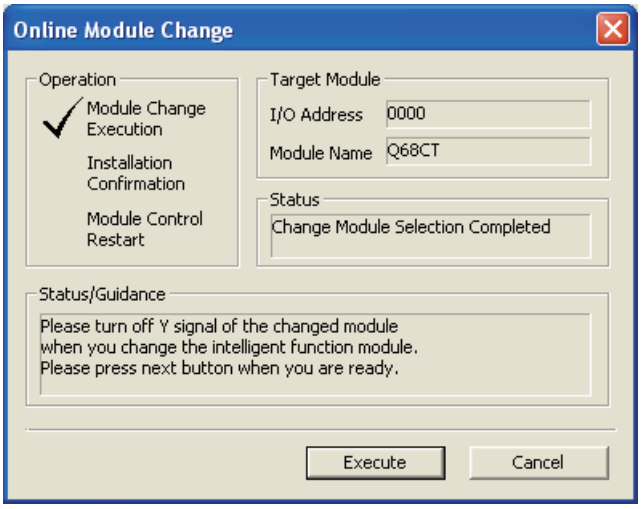


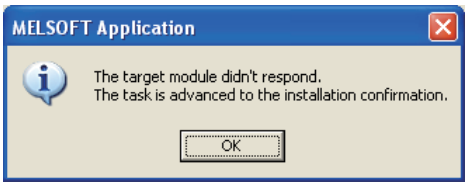
1. **Open the "System Monitor" window of the remote I/O module.**

[Diagnostics] ⇨ [Online Module Change...]

2. **Select "Online Module Change" under the "Mode" field and double-click the module name to be changed online.**

3. **Click the Execute button to enable a module change.**

4. **When the following error window appears, click the OK button and perform the operation described in Page 203, Section 10.7 (3).**



5. **After confirming that the RUN LED of the module has turned off, remove the terminal block.**

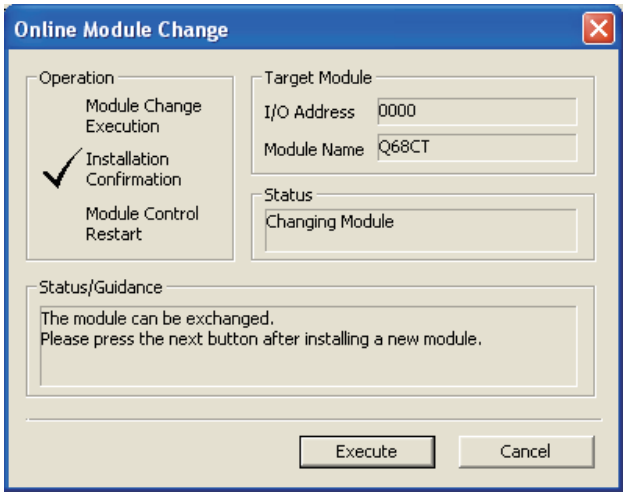
6. **Remove the module.**

Point

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

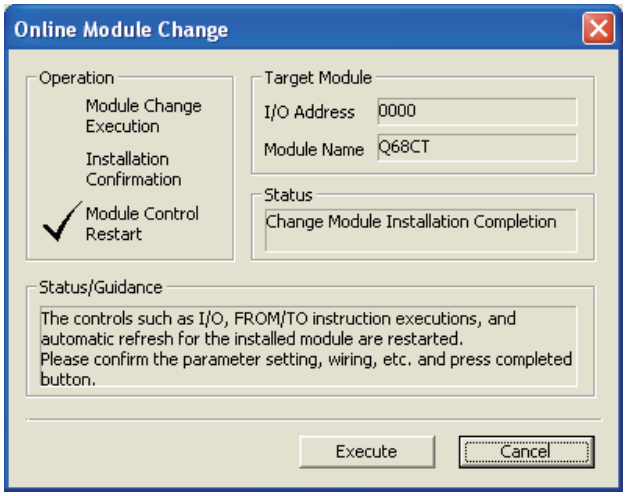
(3) Mounting a new module

1. **Mount the removed module and new module to the other system.**
2. **Using the G(P).OGLOAD instruction, save the offset/gain setting values in the user range from the removed module to the CPU device. Refer to ☞ Page 243, Appendix 1.2 for the G(P).OGLOAD instruction.**
3. **Using the G(P).OGSTOR instruction, restore the offset/gain setting values in the user range to a new module. Refer to ☞ Page 247, Appendix 1.3 for the G(P).OGSTOR instruction.**
4. **Remove the new module from the other system, mount it to the slot from where the old module was removed in the original system, and install the terminal block.**
5. **After mounting the module, click the [Execute] button and make sure that the RUN LED is lit. Module READY (X0) remains off.**



(4) Checking operation

1. **To check the operation, click the [Cancel] button to cancel the control start.**



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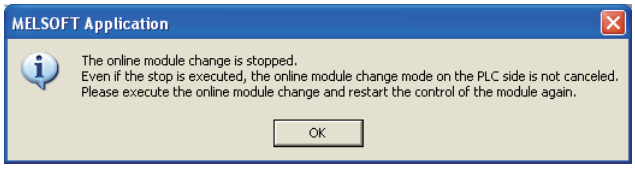

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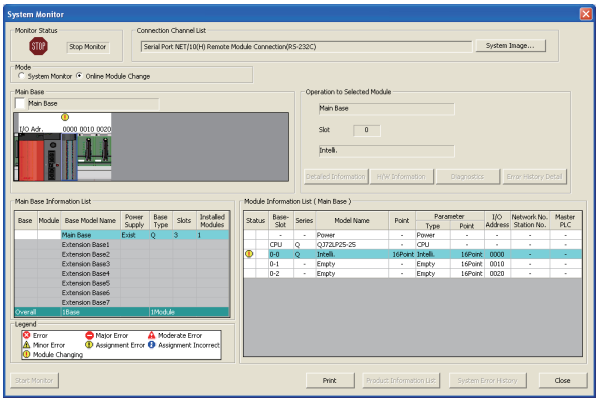
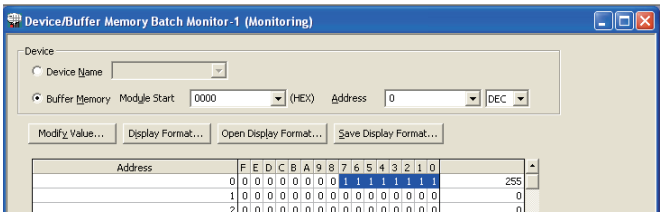
2. **Click the [OK] button to leave the "Online Module Change" mode.**



3. **Click the [Close] button to close the "System Monitor" window.**



4. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

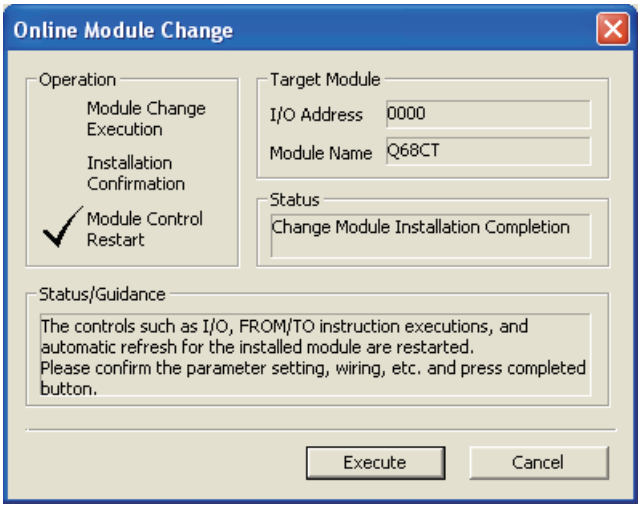
5. **Monitor the buffer memory address of Conversion enable/disable setting (Un\G0) to check if the channel to be used is set to Enable (0).**

6. **Monitor CH☐ Digital output value (Un\G11 to Un\G18) to check if the digital conversion is performed properly.**

7. **Before starting the control, check the CT input module for the following. If an error occurs, refer to TROUBLESHOOTING (☞Page 228, CHAPTER 11) and take a corrective action.**

- If the RUN LED is on.
- If the ERR. LED is off.
- If Error flag (XF) is off.

(5) Resuming operation



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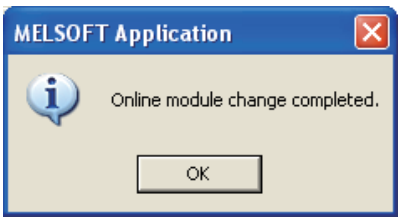


1. **Open the "Online Module Change" window again.**

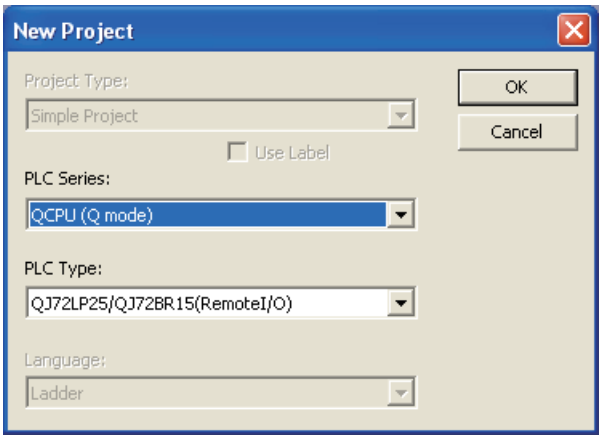
[Diagnostics] ⇨ [Online Module Change...]

2. **Click the Execute button on the appeared window to resume control. Module READY (X0) turns on.**

3. **The online module change is complete.**

10.8 When a User Range Is Used and Parameters Are Set Using a Sequence Program (with Another System)

(1) Stopping operation



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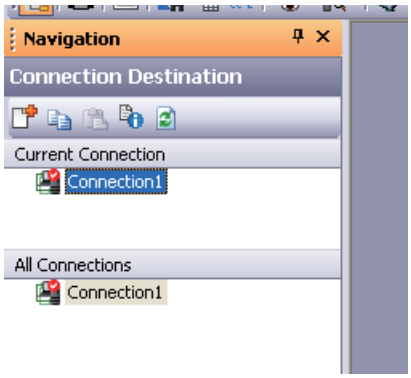

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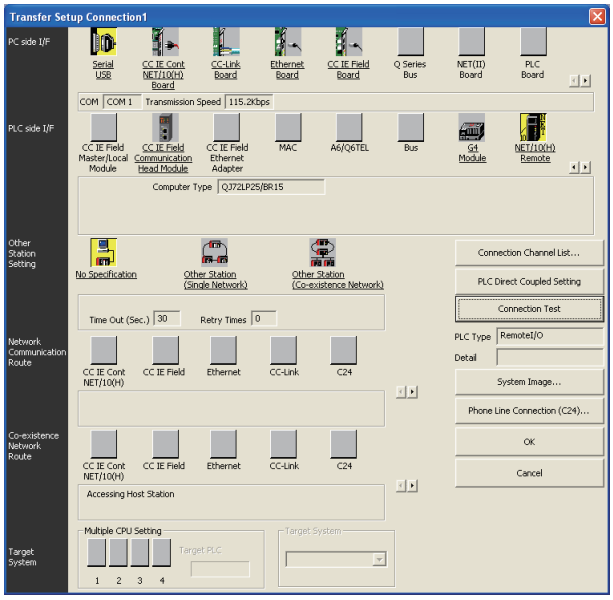

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1. **Create a new project.**

[Project] ⇨ [New...]

2. **Select "QJ72LP25/QJ72BR15(RemoteI/O)" in "PLC Type" and click the** OK **button.**

3. **Open the "Transfer Setup" window.**

Navigation window ⇨ Connection Destination view ⇨ (Connection destination data name)

4. **Configure the settings to access the module on the remote I/O station and click the** OK **button.**

(From the previous page)

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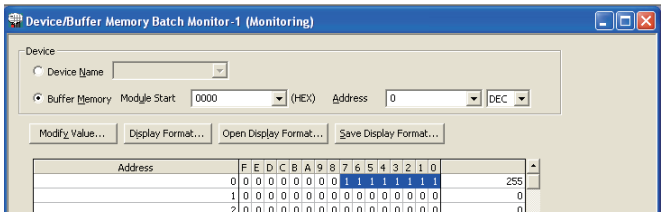

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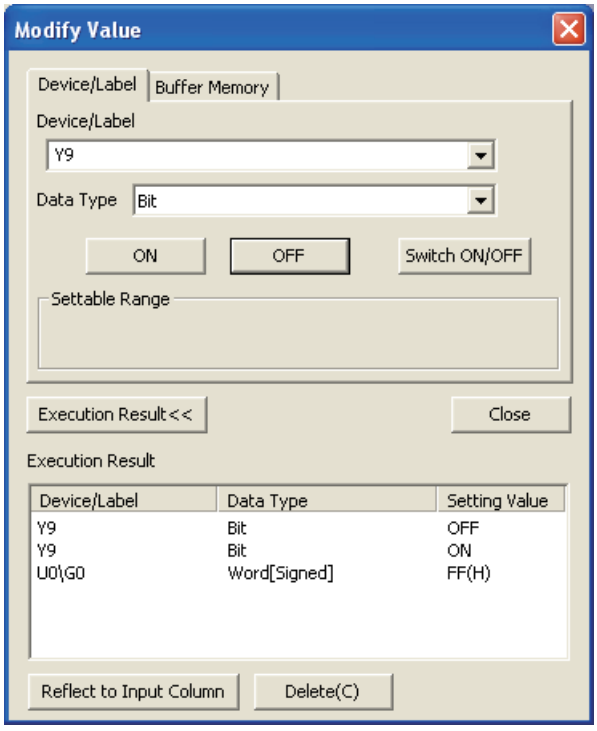


5. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

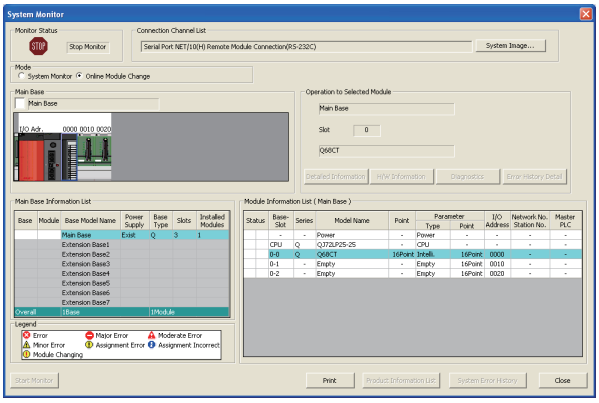
6. **Enter and display the buffer memory address of Conversion enable/disable setting (Un\G0).**

7. **Set Conversion enable/disable setting (Un\G0) to Disable (1) for all channels.**

8. **Turn on then off Operating condition setting request (Y9).**

9. **Confirm that the digital conversion has stopped with Conversion completed flag (Un\G10).**

(2) Removing a module



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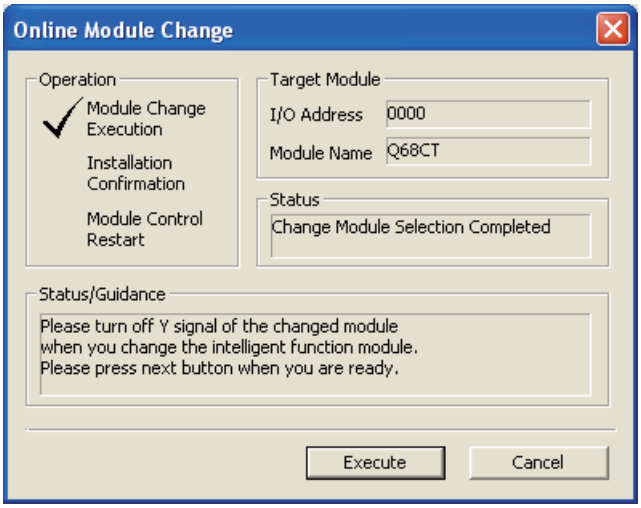


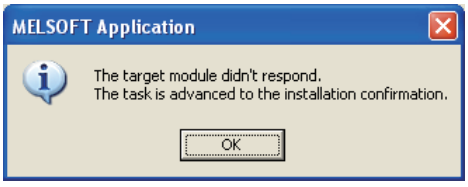
1. **Open the "System Monitor" window of the remote I/O module.**

[Diagnostics] ⇨ [Online Module Change...]

2. **Select "Online Module Change" under the "Mode" field and double-click the module name to be changed online.**

3. **Click the Execute button to enable a module change.**

4. **When the following error window appears, click the OK button and perform the operation described in Page 209, Section 10.8 (3).**



5. **After confirming that the RUN LED of the module has turned off, remove the terminal block.**

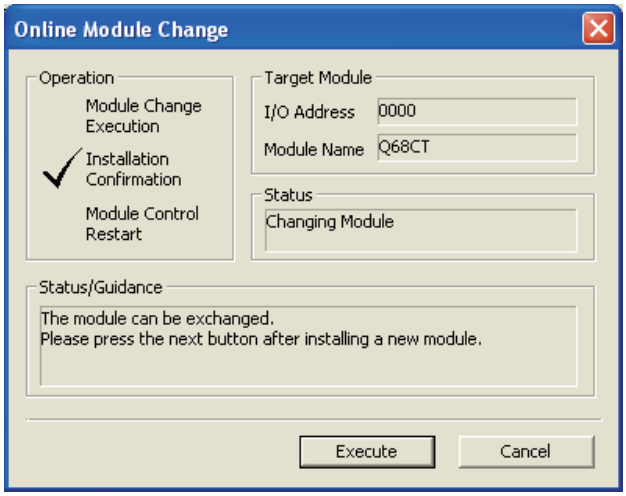
6. **Remove the module.**

Point

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

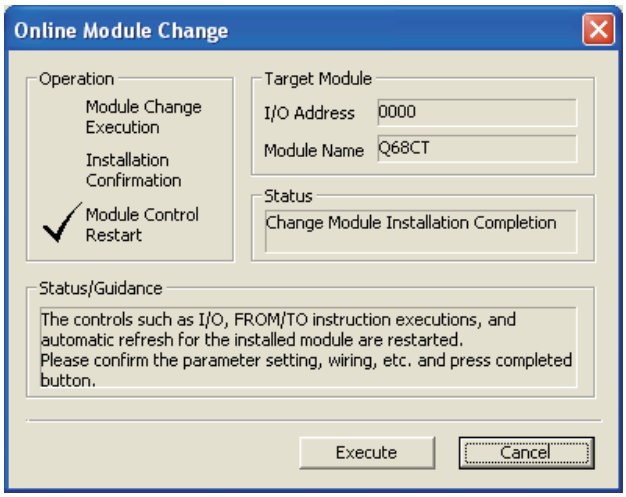
(3) Mounting a new module

1. **Mount the removed module and new module to the other system.**
2. **Using the G(P).OGLOAD instruction, save the offset/gain setting values in the user range from the removed module to the CPU device. Refer to Page 243, Appendix 1.2 for the G(P).OGLOAD instruction.**
3. **Using the G(P).OGSTOR instruction, restore the offset/gain setting values in the user range to a new module. Refer to Page 247, Appendix 1.3 for the G(P).OGSTOR instruction.**
4. **Remove the new module from the other system, mount it to the slot from where the old module was removed in the original system, and install the terminal block.**
5. **After mounting the module, click the Execute button and make sure that the RUN LED is lit. Module READY (X0) remains off.**



(4) Checking operation

1. **To check the operation, click the Cancel button to cancel the control start.**



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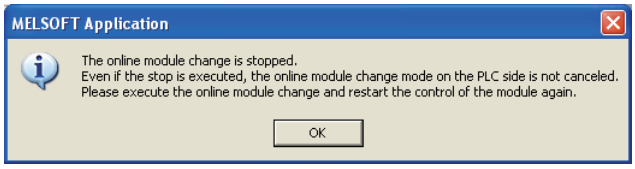

2. **Click the OK button to leave the "Online Module Change" mode.**

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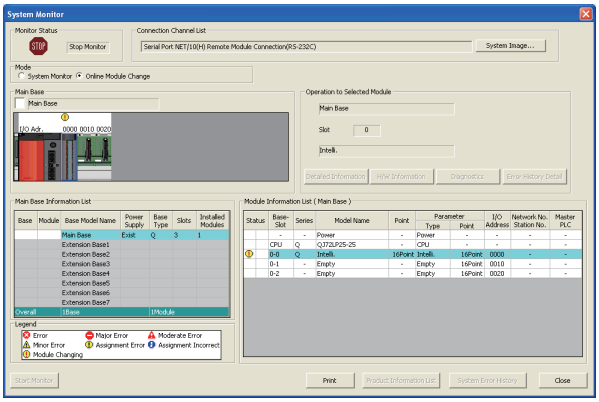

3. **Click the Close button to close the "System Monitor" window.**

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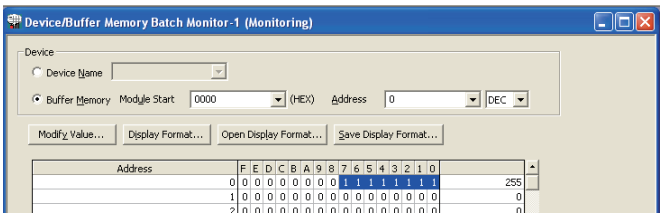

4. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

5. **Enter and display the buffer memory address of Conversion enable/disable setting (Un\G0).**

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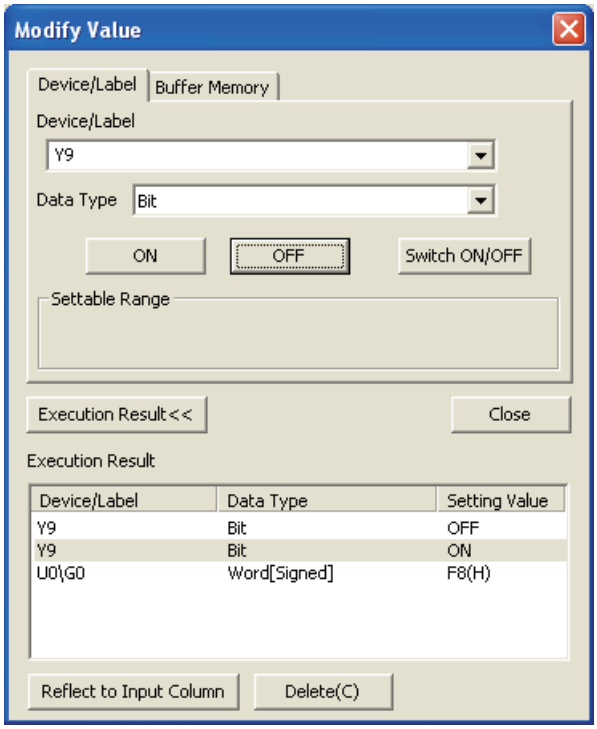


6. **Set Conversion enable/disable setting (Un\G0) to Enable (0) for the channel used, and turn on then off Operating condition setting request (Y9).**

7. **Monitor CH☐ Digital output value (Un\G11 to Un\G18) to check if the digital conversion is performed properly.**

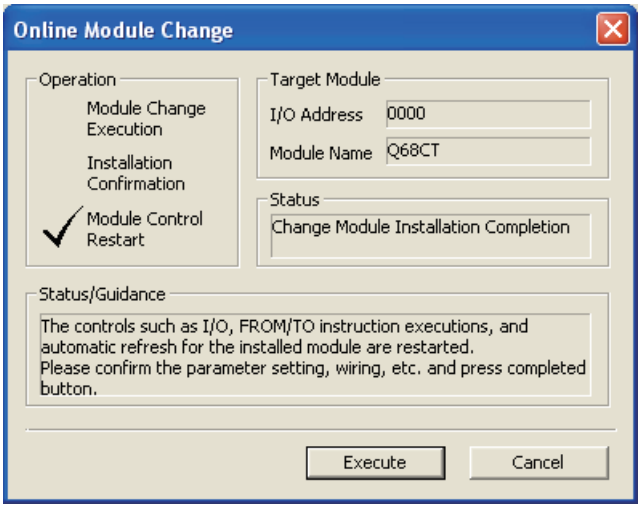
8. **Before starting the control, check the CT input module for the following. If an error occurs, refer to TROUBLESHOOTING (☞Page 228, CHAPTER 11) and take a corrective action.**

- If the RUN LED is on.
- If the ERR. LED is off.
- If Error flag (XF) is off.

9. **Since the new module is in the default status, initial settings must be configured using a sequence program after the control resumed. Before the initial setting, check if the initial setting program is proper, satisfying the following.**

- Insert a user device where the initial setting will be set at any timing (initial setting request signal) into the sequence program.
- Do not create a sequence program which sets the initial setting only one scan after a data link start of the remote I/O network. In this case, the initial setting is not set.

(5) Resuming operation



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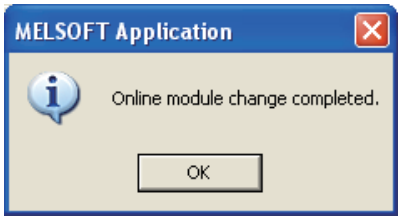


1. **Open the "Online Module Change" window again.**

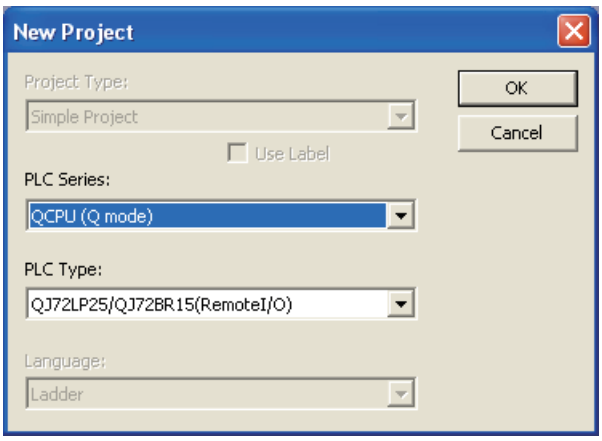
[Diagnostics] ⇨ [Online Module Change...]

2. **Click the Execute button on the appeared window to resume control. Module READY (X0) turns on.**

3. **The online module change is complete.**

10.9 When a User Range Is Used and Parameters Are Set Using the Configuration Function (without Another System)

(1) Stopping operation



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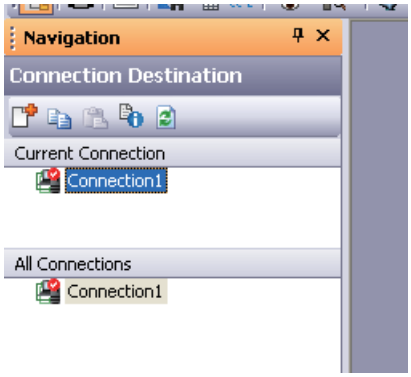

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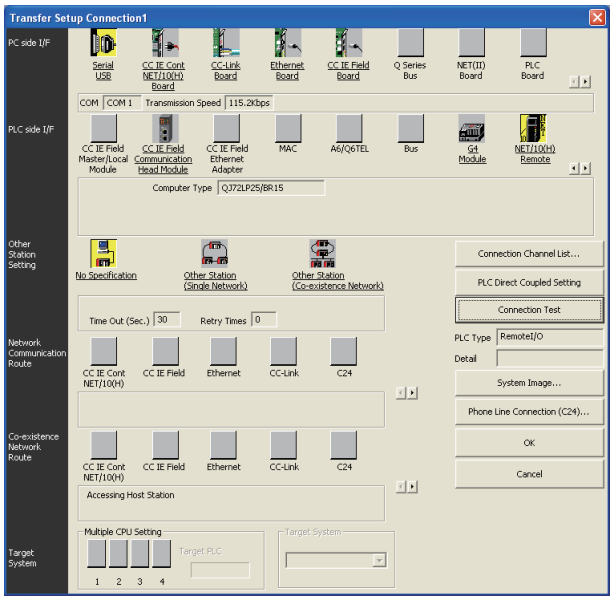

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1. **Create a new project.**

[Project] ⇨ [New...]

2. **Select "QJ72LP25/QJ72BR15(RemoteI/O)" in "PLC Type" and click the OK button.**

3. **Open the "Transfer Setup" window.**

Navigation window ⇨ Connection Destination view ⇨ (Connection destination data name)

4. **Configure the settings to access the module on the remote I/O station and click the OK button.**

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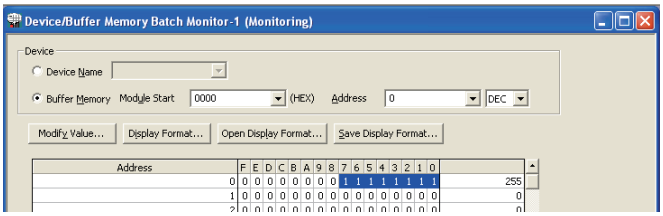

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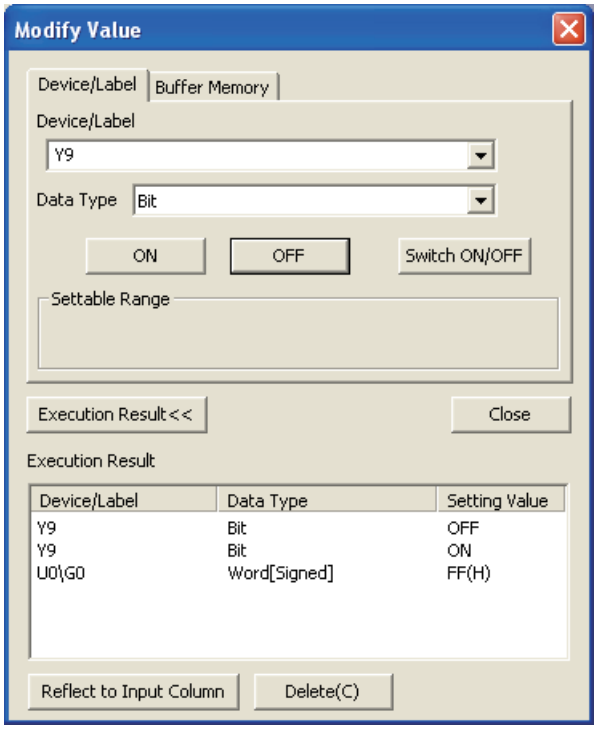


5. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

6. **Enter and display the buffer memory address of Conversion enable/disable setting (Un\G0).**

7. **Set Conversion enable/disable setting (Un\G0) to Disable (1) for all channels.**

8. **Turn on then off Operating condition setting request (Y9).**

9. **Confirm that the digital conversion has stopped with Conversion completed flag (Un\G10).**

10. **If the buffer memory data are not recorded, follow the procedures 11 and 12.**

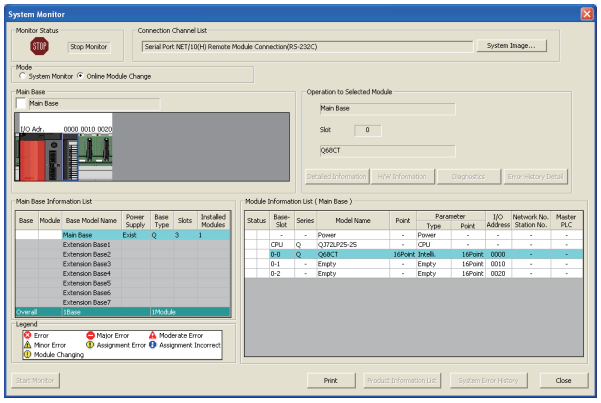
11. **Compare the values in CH1 Factory default setting offset value (Un\G202) to CH8 User range setting gain value (Un\G233) with the values in Range Reference Table (☞ Page 227, Section 10.11).**

12. **If the values are proper, save the values in CH1 Factory default setting offset value (Un\G202) to CH8 User range setting gain value (Un\G233).**

Point

- If the buffer memory values are improper compared to the reference table, the offset/gain values cannot be saved and restored. Before resuming the control, configure an offset/gain setting according to the flowchart (☞ Page 153, Section 8.5.2). Note that if module control is resumed without offset/gain setting being made, operation will be performed with the default values.
- Switch the mode by setting Mode switching setting (Un\G158, Un\G159) and turning on Operating condition setting request (Y9).

(2) Removing a module



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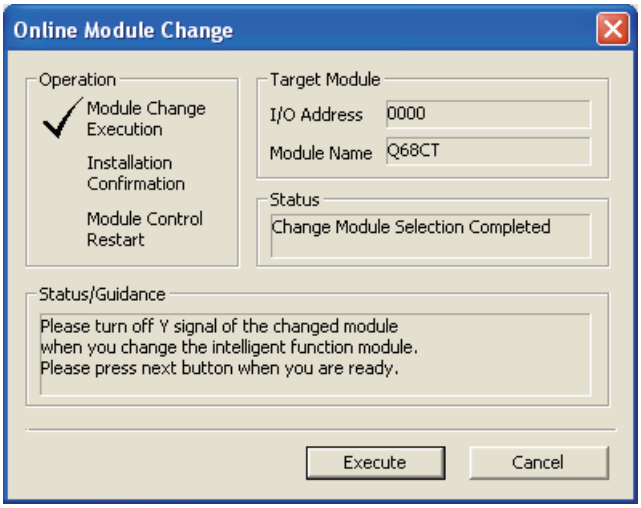


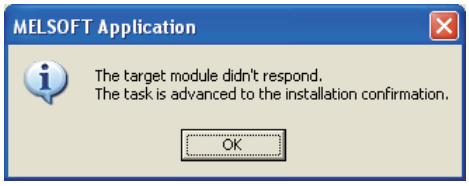
1. **Open the "System Monitor" window.**

[Diagnostics] ⇨ [Online Module Change...]

2. **Select "Online Module Change" under the "Mode" field and double-click the module name to be changed online.**

3. **Click the Execute button to enable a module change.**

4. **When the following error window appears, click the OK button and perform the operation described in Page 216, Section 10.9 (3).**



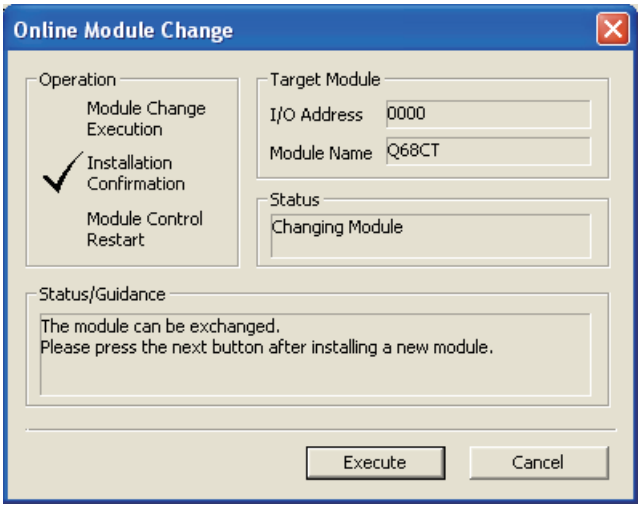
5. **After confirming that the RUN LED of the module has turned off, remove the terminal block.**

6. **Remove the module.**

Point

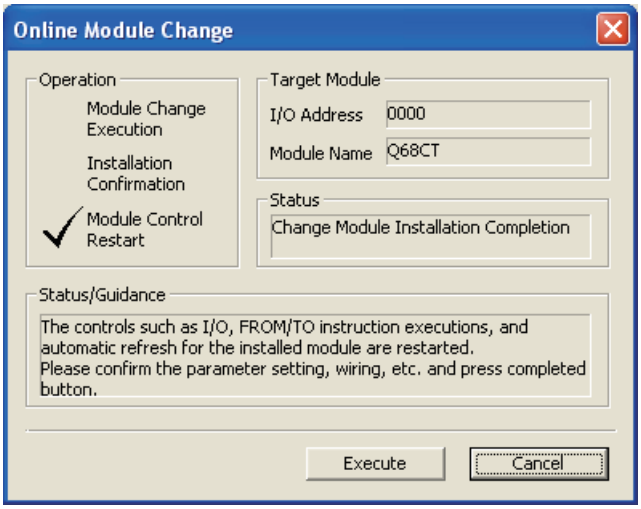
Always remove the module. If mounting confirmation is made without the module being removed, the module will not start properly and the RUN LED will not be lit.

(3) Mounting a new module



1. **Mount a new module in the same slot and install the terminal block.**
2. **After mounting the module, click the [Execute] button and make sure that the RUN LED is lit. Module READY (X0) remains off.**

(4) Checking operation



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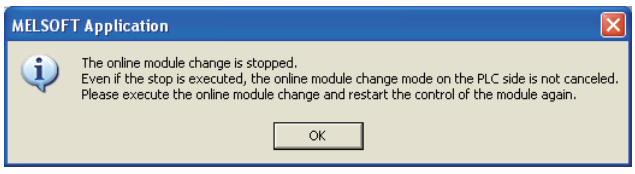

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1. **To check the operation, click the [Cancel] button to cancel the control start.**
2. **Click the [OK] button to leave the "Online Module Change" mode.**

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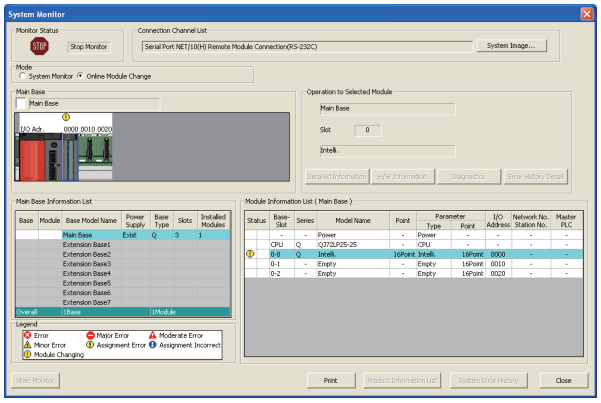

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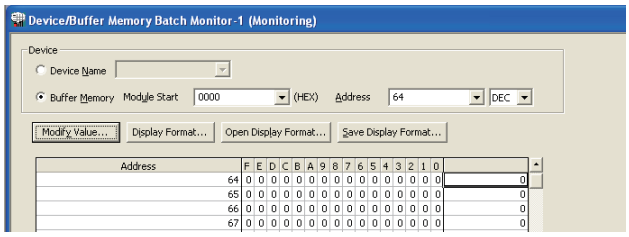

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3. **Click the Close button to close the "System Monitor" window.**

4. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] [Monitor] ⇨ [Device/Buffer Memory Batch]

5. **Display the address of the prerecorded buffer memory area and select it. Then click the Modify Value... button.**

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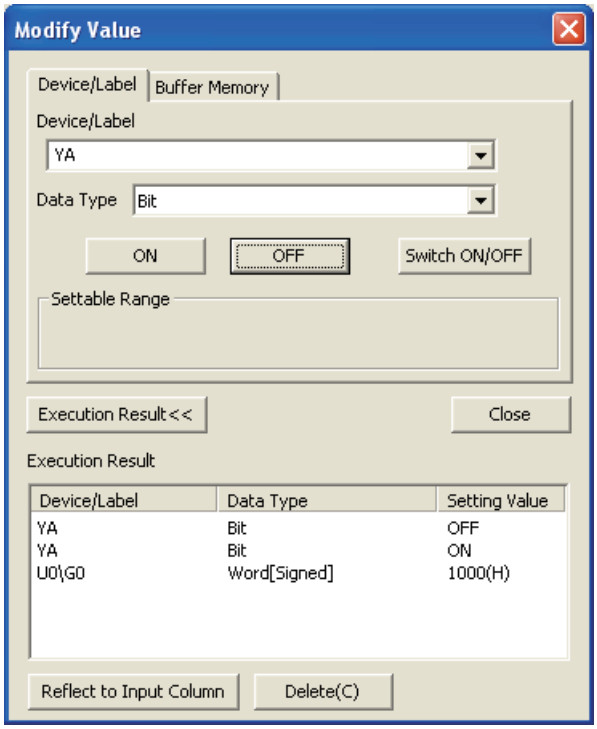


6. **Set the prerecorded data to the buffer memory.**

7. **Turn User range write request (YA) from off to on to restore the offset/gain setting value in the user range to the module.**

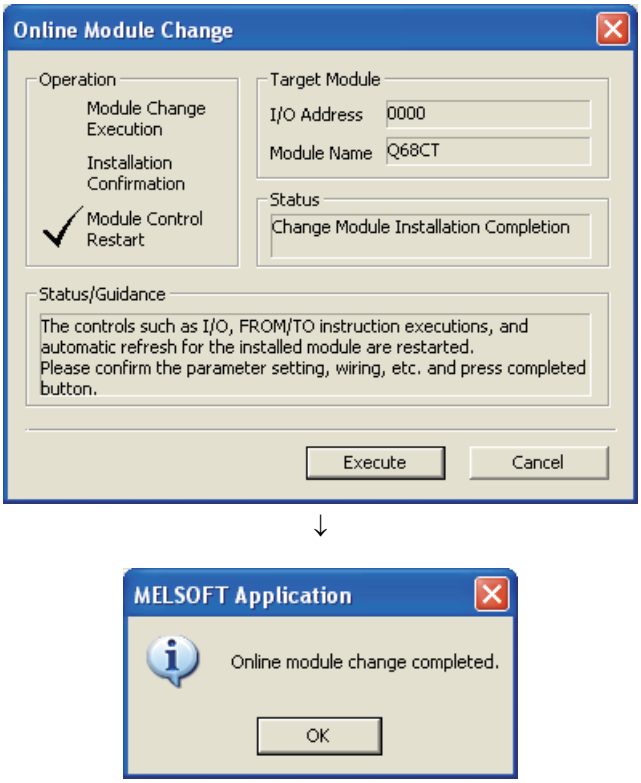
8. **After confirming that Offset/gain setting mode flag (XA) is on, turn off User range write request (YA).**

9. **Monitor CH☐ Digital output value (Un\G11 to Un\G18) to check if the digital conversion is performed properly.**

10. **Before starting the control, check the CT input module for the following. If an error occurs, refer to TROUBLESHOOTING (☞ Page 228, CHAPTER 11) and take a corrective action.**

- If the RUN LED is on.
- If the ERR. LED is off.
- If Error flag (XF) is off.

(5) Resuming operation



1. **Open the "Online Module Change" window again.**

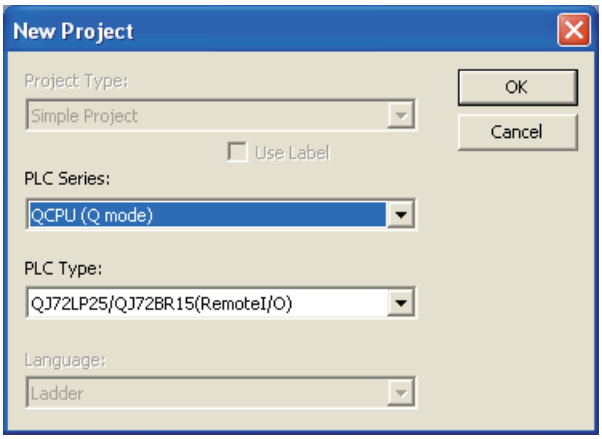
[Diagnostics] ⇨ [Online Module Change...]

2. **Click the Execute button on the appeared window to resume control. Module READY (X0) turns on.**

3. **The online module change is complete.**

10.10 When a User Range Is Used and Parameters Are Set Using a Sequence Program (without Another System)

(1) Stopping operation



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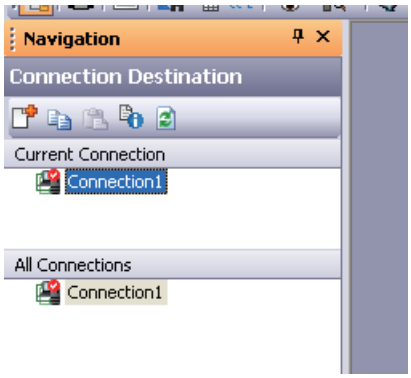

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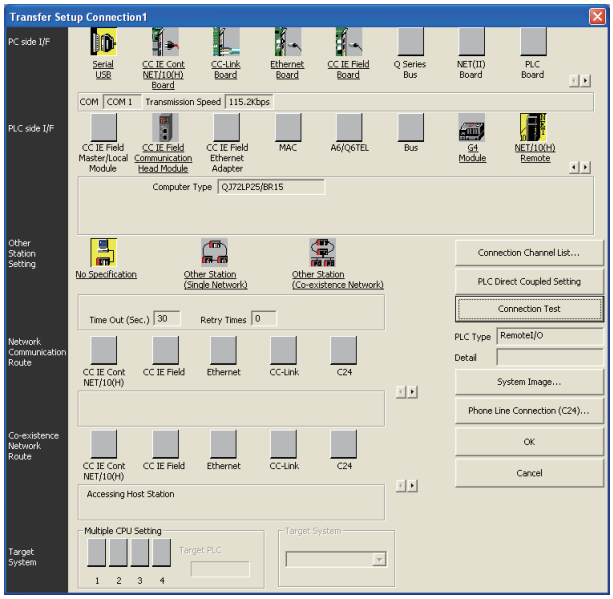

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1. **Create a new project.**

[Project] ⇨ [New...]

2. **Select "QJ72LP25/QJ72BR15(RemoteI/O)" in "PLC Type" and click the** OK **button.**

3. **Open the "Transfer Setup" window.**

Navigation window ⇨ Connection Destination view ⇨ (Connection destination data name)

4. **Configure the settings to access the module on the remote I/O station and click the** OK **button.**

(From the previous page)

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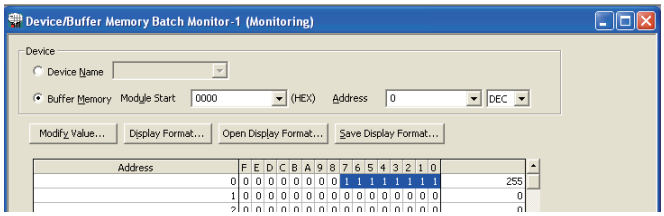

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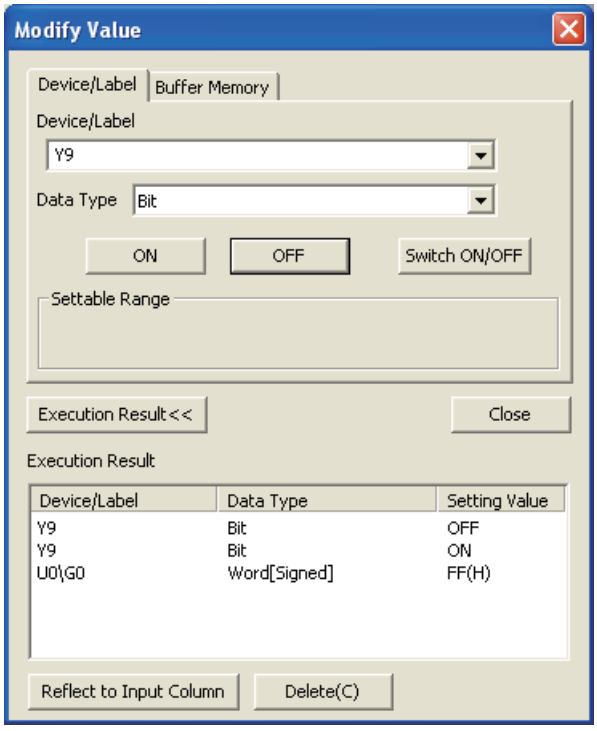


5. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

6. **Enter and display the buffer memory address of Conversion enable/disable setting (Un\G0).**

7. **Set Conversion enable/disable setting (Un\G0) to Disable (1) for all channels.**

8. **Turn on then off Operating condition setting request (Y9).**

9. **Confirm that the digital conversion has stopped with Conversion completed flag (Un\G10).**

10. **If the buffer memory data are not recorded, follow the procedures 11 and 12.**

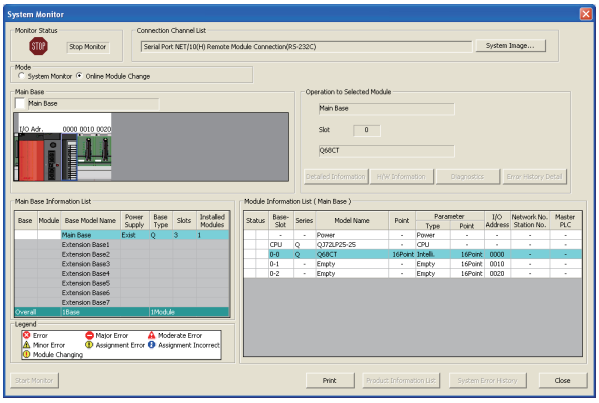
11. **Compare the values in CH1 Factory default setting offset value (Un\G202) to CH8 User range setting gain value (Un\G233) with the values in Range Reference Table (☞ Page 227, Section 10.11).**

12. **If the values are proper, save the values in CH1 Factory default setting offset value (Un\G202) to CH8 User range setting gain value (Un\G233).**

Point

- If the buffer memory values are improper compared to the reference table, the offset/gain values cannot be saved and restored. Before resuming the control, configure an offset/gain setting according to the flowchart (☞ Page 153, Section 8.5.2). Note that if module control is resumed without offset/gain setting being made, operation will be performed with the default values.
- Switch the mode by setting Mode switching setting (Un\G158, Un\G159) and turning on Operating condition setting request (Y9).

(2) Removing a module



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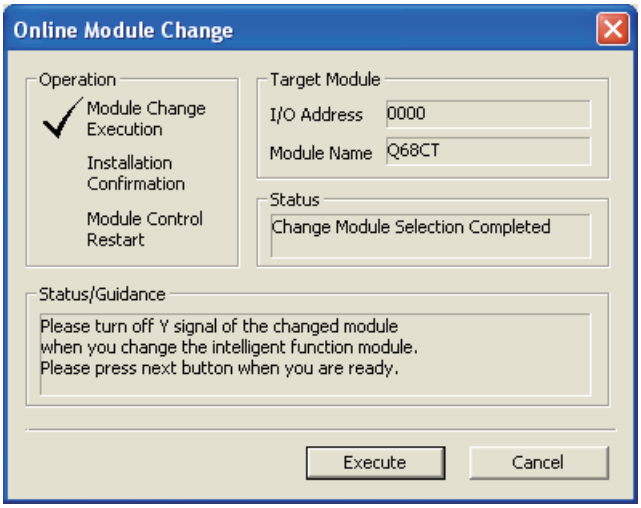


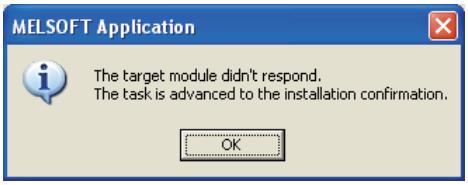
1. **Open the "System Monitor" window.**

[Diagnostics] ➪ [Online Module Change...]

2. **Select "Online Module Change" under the "Mode" field and double-click the module name to be changed online.**

3. **Click the** Execute **button to enable a module change.**

4. **When the following error window appears, click the** OK **button and perform the operation described in** ☞ **Page 223, Section 10.10 (3).**



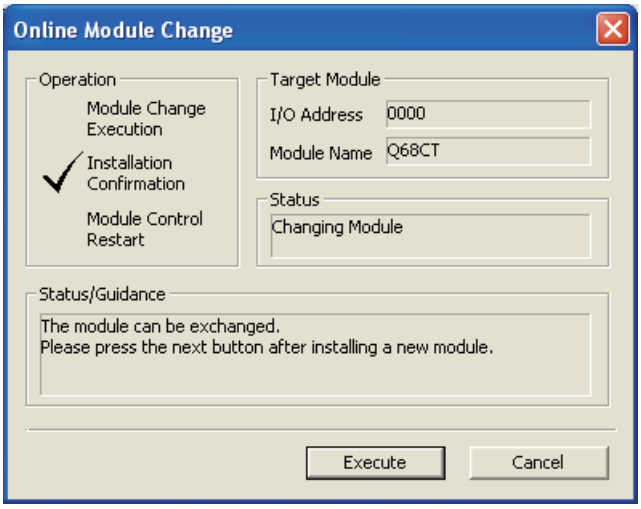
5. **After confirming that the RUN LED of the module has turned off, remove the terminal block.**

6. **Remove the module.**

Point

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

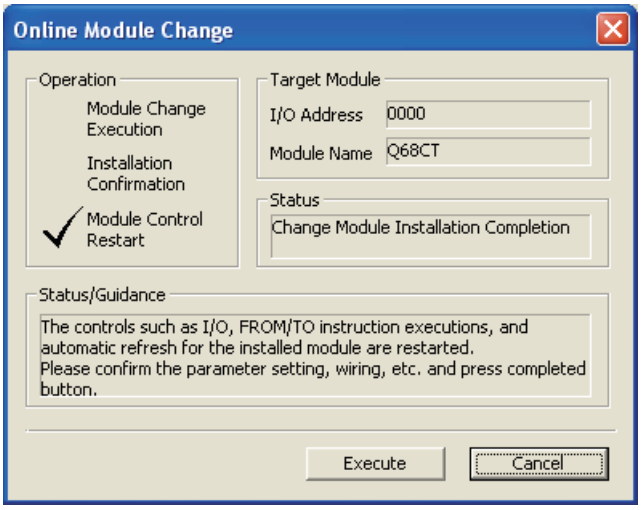
(3) Mounting a new module



1. **Mount a new module in the same slot and install the terminal block.**

2. **After mounting the module, click the [Execute] button and make sure that the RUN LED is lit. Module READY (X0) remains off.**

(4) Checking operation



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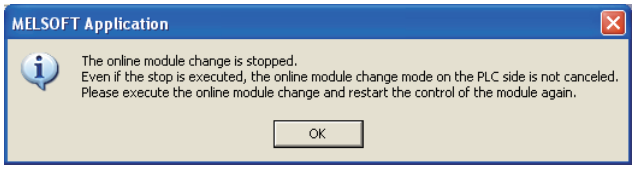

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1. **To check the operation, click the [Cancel] button to cancel the control start.**

2. **Click the [OK] button to leave the "Online Module Change" mode.**

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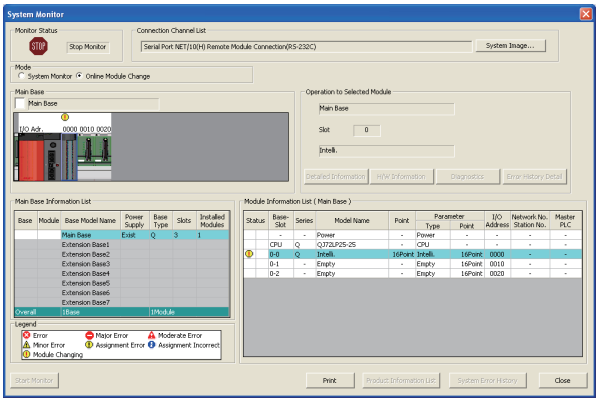

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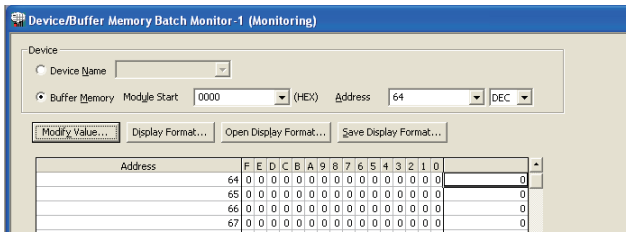

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3. **Click the Close button to close the "System Monitor" window.**

4. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ➪ [Monitor] ➪ [Device/Buffer Memory Batch]

5. **Display the address of the prerecorded buffer memory area and select it. Then click the Modify Value... button.**

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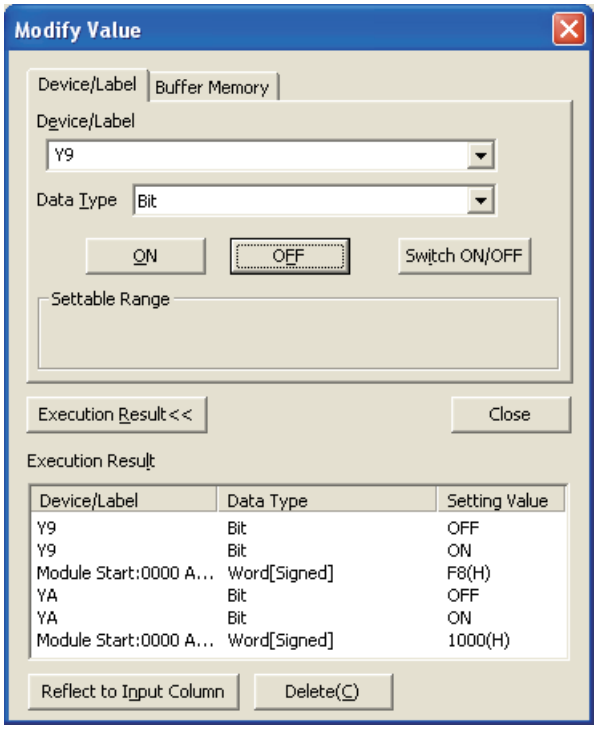


6. **Set the prerecorded data to the buffer memory.**

7. **Turn User range write request (YA) from off to on to restore the offset/gain setting value in the user range to the module.**

8. **After confirming that Offset/gain setting mode flag (XA) is on, turn off User range write request (YA).**

9. **Set Conversion enable/disable setting (Un\G0) to Enable (0) for the channel used.**

10. **Turn on then off Operating condition setting request (Y9).**

11. **Monitor CH☐ Digital output value (Un\G11 to Un\G18) to check if the digital conversion is performed properly.**

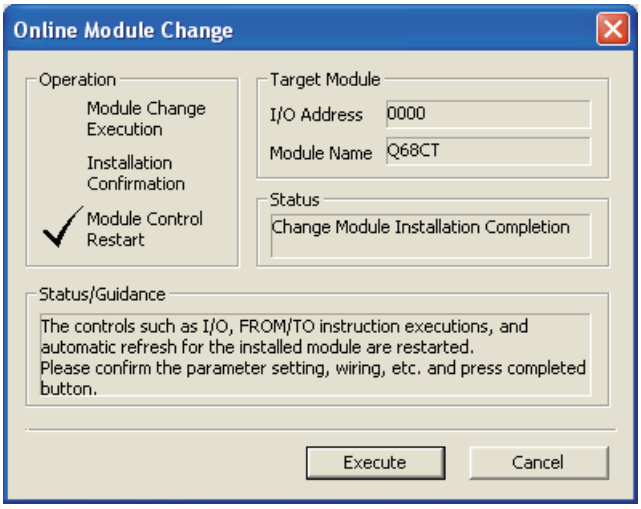
12. **Before starting the control, check the CT input module for the following. If an error occurs, refer to TROUBLESHOOTING (☞ Page 228, CHAPTER 11) and take a corrective action.**

- If the RUN LED is on.
- If the ERR. LED is off.
- If Error flag (XF) is off.

13. **Since the new module is in the default status, initial settings must be configured using a sequence program after the control resumed. Before the initial setting, check if the initial setting program is proper, satisfying the following.**

- Insert a user device where the initial setting will be set at any timing (initial setting request signal) into the sequence program.
- Do not create a sequence program which sets the initial setting only one scan after a data link start of the remote I/O network. In this case, the initial setting is not set.

(5) Resuming operation



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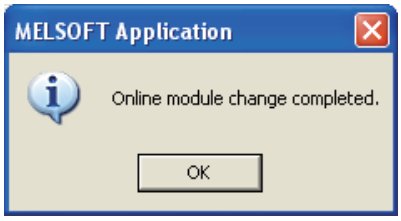


1. **Open the "Online Module Change" window again.**

[Diagnostics] ⇨ [Online Module Change...]

2. **Click the Execute button on the appeared window to resume control. Module READY (X0) turns on.**

3. **The online module change is complete.**

10.11 Range Reference Table

This section lists range reference used for an online module change.

(1) CH1 Factory default setting offset value (Un\G202) to CH8 User range setting gain value (Un\G233)

Address (Decimal)								Description	Reference value (Hexadecimal)
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8		
202	204	206	208	210	212	214	216	Factory default setting offset value	00000000_H
203	205	207	209	211	213	215	217	Factory default setting gain value	00002710_H
218	220	222	224	226	228	230	232	User range setting offset value	00000000_H
219	221	223	225	227	229	231	233	User range setting gain value	00002710_H

CHAPTER 11 TROUBLESHOOTING

This chapter describes errors that may occur in a CT input module and troubleshooting for them.

11.1 Error Code List

This section describes error codes that occur in a CT input module.

(1) Error code checking method

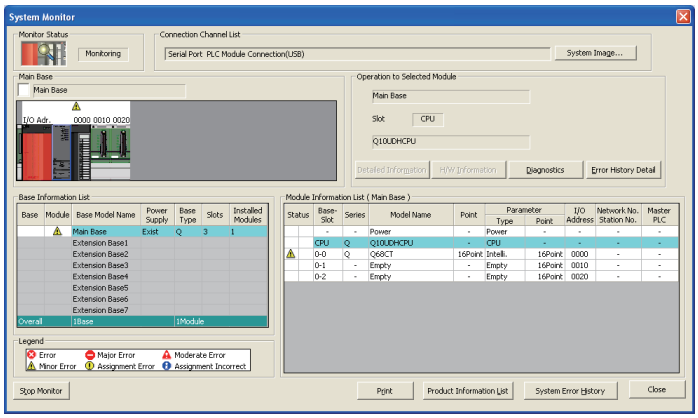
The error codes that occur in a CT input module can be checked by the following.
Choose a method depending on the purpose and application.

- Checking on the "Module's Detailed Information" window (☞Page 229, Section 11.1 (1) (a))
- Checking in Latest error code (Un\G19) (☞Page 229, Section 11.1 (1) (b))
- Checking through the module error collection function (☞Page 230, Section 11.1 (1) (c))

(a) Checking on the "Module's Detailed Information" window

Follow the following procedure.

[Diagnostics] ⇨ [System Monitor...]



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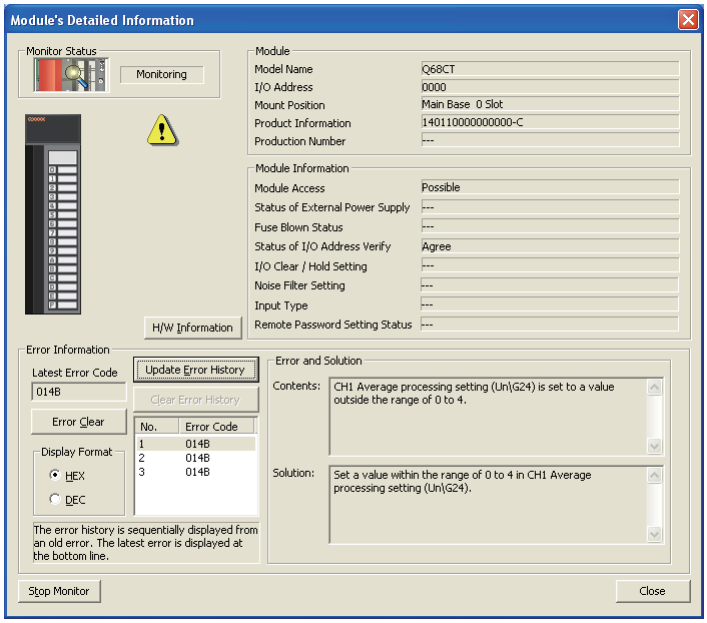


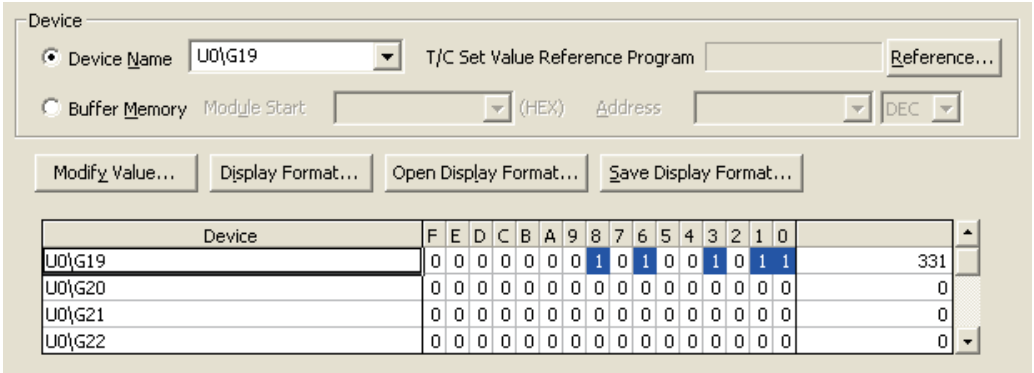
1. **Select the CT input module in "Main Base", and click the** Detailed Information **button.**

2. **"Module's Detailed Information" of the CT input module is displayed.**

(b) Checking in Latest error code (Un\G19)

Follow the following procedure.

[Online] ⇨[Monitor]⇨[Device/Buffer Memory Batch]



(c) Checking through the module error collection function

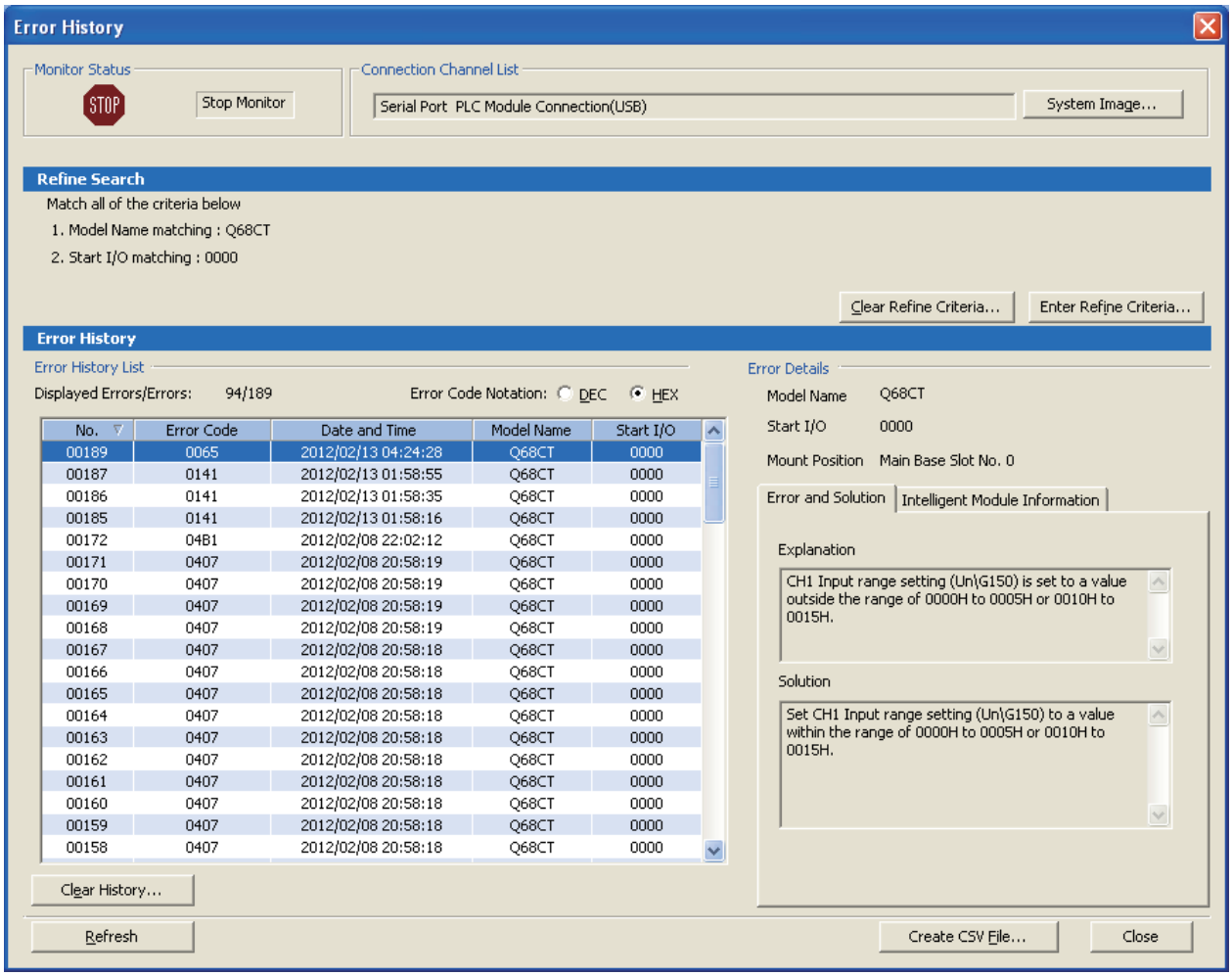
The errors occurred in a CT input module are saved in the CPU module through the module error collection function.

Therefore, the error details are kept unerased even if the power is turned off or the CPU module is reset.

- Checking procedure

  The CT input module's errors that were collected by the CPU module can be checked on the "Error History" window.

  [Diagnostics] ⇨ [System Monitor...] ⇨ Click the Error History Detail button.



- Errors to be collected

  The contents under Error code list (☞Page 231, Section 11.1 (2)) are reported to the CPU module.

(2) Error code list

If the following errors occur on the CT input module while data is written to or read from the CPU module, the corresponding error code below is stored in Latest error code (Un\G19).
The error is reported to the CPU module also.

Error code (decimal)	Description and the error cause	Action
10□[*1]	CH□ Input range setting (Un\G150 to Un\G157) is set to a value outside the range of 0000_H to 0005_H or 0010_H to 0015_H. The channel where the error has occurred fits in □.	Set CH□ Input range setting (Un\G150 to Un\G157) to a value within the range of 0000_H to 0005_H or 0010_H to 0015_H.
111	A hardware failure has occurred on the module.	Turn the power off then on. If the error occurs again, a failure might have occurred on the module. Please consult your local Mitsubishi system service, service center, or representative, explaining a detailed description of the problem.
112	A value other than 0 is set to Switch 5 on the intelligent function module switch setting.	Set 0 to Switch 5 on the intelligent function module switch setting in the parameter setting.
113[*1]	The backup data has a problem.	Check the digital output value. If there is a problem of the digital output value, please consult your local Mitsubishi system service, service center, or representative, explaining a detailed description of the problem.
114[*1]	The writing of backup data went wrong.	Write the backup data. If the error occurs again, a failure might have occurred on the module. Please consult your local Mitsubishi system service, service center, or representative, explaining a detailed description of the problem.
115[*1]	Since Conversion enable/disable setting (Un\G0) has a channel of conversion enable, the backup data cannot be written.	Set Conversion enable/disable setting (Un\G0) to Disable (1) for all channels, then write the backup data.
116[*1]	Since Conversion enable/disable setting (Un\G0) has a channel of conversion enable, the values of buffer memories cannot be restored to default settings.	Set Conversion enable/disable setting (Un\G0) to Disable (1) for all channels, then execute the default setting registration function.
120[*1]	An invalid value is set to the offset/gain setting. The channel where the error has occurred cannot be identified.	Start over the offset/gain setting of all channels where the user range setting is used. If the error occurs again, a failure might have occurred on the module. Please consult your local Mitsubishi system service, service center, or representative, explaining a detailed description of the problem.
12□[*1]	An invalid value is set to offset/gain setting. The channel where the error has occurred fits in □.	Start over the offset/gain setting of the channel where the error has occurred. If the error occurs again, a failure might have occurred on the module. Please consult your local Mitsubishi system service, service center, or representative, explaining a detailed description of the problem.
161[*1*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 has been consecutively executed. • For the offset/gain setting, a setting value has been consecutively written to the non-volatile memory more than 25 times.	• Execute the G(P).OGSTOR instruction only once per module. • Write the setting value into the non-volatile memory only once for each offset/gain setting.

Error code (decimal)	Description and the error cause	Action
163[*1]	• The G(P).OGSTOR instruction has been executed toward a module different from the one on which the G(P).OGLOAD instruction was executed. • The G(P).OGSTOR instruction has been executed ahead of the G(P).OGLOAD instruction.	• Execute the G(P).OGLOAD and G(P).OGSTOR instructions to the same module. • After executing the G(P).OGLOAD instruction on the module from where data is restored, execute the G(P).OGSTOR instruction on the module to where the data is restored.
20□[*1]	• The averaging time value set in CH□ Average time/Average number of times/Moving average/Time constant settings (Un\G1 to Un\G8) is outside the range of 40 to 5000ms. • The averaging time value set in CH□ Average time/Average number of times/Moving average/Time constant settings (Un\G1 to Un\G8) is less than "4 × sampling cycle" (ms). The channel where the error has occurred fits in □.	• Set the averaging time to a value in the range of 40 to 5000ms. • Set the averaging time to a value equal to or more than "4 × sampling cycle" (ms).
30□[*1]	The averaging count value set in CH□ Average time/Average number of times/Moving average/Time constant settings (Un\G1 to Un\G8) is outside the range of 4 to 500. The channel where the error has occurred fits in □.	Set the averaging count to a value in the range of 4 to 500.
31□[*1]	The moving average count value set in CH□ Average time/Average number of times/Moving average/Time constant settings (Un\G1 to Un\G8) is outside the range of 2 to 1000. The channel where the error has occurred fits in □.	Set the moving average count to a value in the range of 2 to 1000.
32□[*1]	• The time constant value set in CH□ Average time/Average number of times/Moving average/Time constant settings (Un\G1 to Un\G8) is outside the range of 10 to 10000ms. • The time constant value set in CH□ Average time/Average number of times/Moving average/Time constant settings (Un\G1 to Un\G8) is less than sampling cycle (ms). The channel where the error has occurred fits in □.	• Set the time constant to a value in the range of 10 to 10000ms. • Set the time constant to a value equal to or more than sampling cycle (ms).
33□[*1]	Averaging process setting (Un\G24, Un\G25) is set to a value outside the range of 0 to 4. The channel where the error has occurred fits in □.	Set a value within the range of 0 to 4 in Averaging process setting (Un\G24, Un\G25).
34□[*1]	In CH1 Rate alarm upper limit value (Un\G126) to CH8 Rate alarm lower limit value (Un\G141), the lower limit is equal to or greater than the upper limit. The channel where the error has occurred fits in □.	Set CH1 Rate alarm upper limit value (Un\G126) to CH8 Rate alarm lower limit value (Un\G141) so that the lower limit value is smaller than the upper limit value.
350[*1]	The value set in Sampling cycle setting (Un\G26) is outside the range of 0 to 3.	Set one of the following values in Sampling cycle setting (Un\G26). • 10ms/8CH (0) • 20ms/8CH (1) • 50ms/8CH (2) • 100ms/8CH (3)
36□[*1]	• CH□ Peak current detection time (Un\G318 to Un\G325) is outside the range of 10 to 10000ms. • CH□ Peak current detection time (Un\G318 to Un\G325) is less than sampling cycle(ms). The channel where the error has occurred fits in □.	• Set CH□ Peak current detection time (Un\G318 to Un\G325) in the range of 10 to 10000ms. • Set CH□ Peak current detection time (Un\G318 to Un\G325) to a value equal to or more than sampling cycle(ms).
37□[*1]	CH□ Peak current detection value (Un\G326 to Un\G333) is outside the range of 0 to 11999. The channel where the error has occurred fits in □.	Set CH□ Peak current detection value in the range of 0 to 11999ms.
38□[*1]	CH□ Peak current detection count reset request (Un\G302 to Un\G309) is set to a value other than 0 and 1. The channel where the error has occurred fits in □.	Set Enable (0) or Disable (1) in CH□ Peak current detection count reset request (Un\G302 to Un\G309).

Error code (decimal)	Description and the error cause	Action
39□[*1]	CH□ Dropout value (Un\G162 to Un\G169) is outside the range of 1 to 10000. The channel where the error has occurred fits in □.	Set CH□ Dropout value (Un\G162 to Un\G169) in the range of 1 to 10000.
40□[*1]	When a user range is set or restored, the offset value is equal to or greater than the gain value. The channel where the error has occurred fits in □.	Set values so that they meet the following condition: Offset value < Gain value
500[*1]	When the offset/gain setting is configured, channels or 0s are set simultaneously in both Offset/gain setting mode Offset specification (Un\G22) and Offset/gain setting mode Gain specification (Un\G23).	Correct the settings in Offset/gain setting mode Offset specification (Un\G22) and Offset/gain setting mode Gain specification (Un\G23).
51□[*1]	When the offset/gain setting is configured, CH□ Input range setting (Un\G150 to Un\G157) is set to a value outside the range of 0010_H to 0015_H. The channel where the error has occurred fits in □.	Set one of the following values in CH□ Input range setting (Un\G150 to Un\G157). • User range 0 to 5AAC (0010_H) • User range 0 to 50AAC (0011_H) • User range 0 to 100AAC (0012_H) • User range 0 to 200AAC (0013_H) • User range 0 to 400AAC (0014_H) • User range 0 to 600AAC (0015_H)
6△□[*1]	The settings in CH1 Process alarm lower lower limit value (Un\G86) to CH8 Process alarm upper upper limit value (Un\G117) are invalid. The channel where the error has occurred fits in □. A value fits in △ indicates that the alarm status is as follows: 2: Process alarm lower lower limit value > Process alarm lower upper limit value 3: Process alarm lower upper limit value > Process alarm upper lower limit value 4: Process alarm upper lower limit value > Process alarm upper upper limit value	Correct the settings in CH1 Process alarm lower lower limit value (Un\G86) to CH8 Process alarm upper upper limit value (Un\G117).
70□[*1]	• CH□ Rate alarm warning detection period (Un\G118 to Un\G125) is outside the range of 10 to 5000ms. • CH□ Rate alarm warning detection period (Un\G118 to Un\G125) is less than conversion cycle of CH□ digital output value (ms). The channel where the error has occurred fits in □.	• Set CH□ Rate alarm warning detection period (Un\G118 to Un\G125) to within 10 to 5000ms. • Set CH□ Rate alarm warning detection period (Un\G118 to Un\G125) to a value equal to or multiple of conversion cycle of CH□ digital output value (ms).
90□[*1]	The values set in CH1 Scaling lower limit value (Un\G62) to CH8 Scaling upper limit value (Un\G77) are outside the range of -32000 to 32000. The channel where the error has occurred fits in □.	Set a value within the range of -32000 to 32000 in CH1 Scaling lower limit value (Un\G62) to CH8 Scaling upper limit value (Un\G77).
200□[*1]	CH□ Logging enable/disable setting (Un\G1000 to Un\G1007) is set to a value other than 0 and 1. The channel where the error has occurred fits in □.	Set Enable (0) or Disable (1) in CH□ Logging enable/disable setting (Un\G1000 to Un\G1007).
201□[*1]	A value outside the setting range is set in one or both of CH□ Logging cycle setting value (Un\G1032 to Un\G1039) or/and CH□ Logging cycle unit setting (Un\G1040 to Un\G1047). The channel where the error has occurred fits in □.	Set a value within the setting range in one or both of CH□ Logging cycle setting value (Un\G1032 to Un\G1039) or/and CH□ Logging cycle unit setting (Un\G1040 to Un\G1047). For the setting procedure of a logging cycle, refer to the following. • Logging Function (☞ Page 60, Section 4.12)

Error code (decimal)	Description and the error cause	Action
202□*1	The set logging cycle is shorter than the update cycle of the logged value (digital output value or scaling value). The channel where the error has occurred fits in □.	Set CH□ Logging cycle setting value (Un\G1032 to Un\G1039) and CH□ Logging cycle unit setting (Un\G1040 to Un\G1047) so that the logging cycle is equal to or longer than the update cycle of the logged value. For the setting procedure of a logging cycle, refer to the following. • Logging Function (☞Page 60, Section 4.12)
203□*1	CH□ Logging data setting (Un\G1024 to Un\G1031) is set to a value other than 0 and 1. The channel where the error has occurred fits in □.	Set Digital output value (0) or Scaling value (1) in CH□ Logging data setting (Un\G1024 to Un\G1031).
204□*1	CH□ Logging points after trigger (Un\G1048 to Un\G1055) is set to a value outside the range of 1 to 5000. The channel where the error has occurred fits in □.	Set a value within the range of 1 to 5000 in CH□ Logging points after trigger (Un\G1048 to Un\G1055).
205□*1	CH□ Level trigger condition setting (Un\G1056 to Un\G1063) is set to a value outside the range of 0 to 3. The channel where the error has occurred fits in □.	Set one of the following values in CH□ Level trigger condition setting (Un\G1056 to Un\G1063). • Disable (0) • Above (1) • Below (2) • Pass through (3)
206□*1	CH□ Trigger data (Un\G1064 to Un\G1071) is set to a value outside the range of 0 to 4999. The channel where the error has occurred fits in □.	Set a value within the range of 0 to 4999 in CH□ Trigger data (Un\G1064 to Un\G1071).
207□*1	CH□ Logging hold request (Un\G1008 to Un\G1015) is set to a value other than 0 and 1. The channel where the error has occurred fits in □.	Set OFF (0) or ON (1) in CH□ Logging hold request (Un\G1008 to Un\G1015).

*1 These error codes can be cleared by turning on then off Error clear request (YF).

*2 This error code is not stored in Latest error code (Un\G19) but in the completion status of the G(P).OGSTOR instruction (Ⓢ + 1).

11.2 Alarm Code List

This section describes alarm codes that occur in a CT input module.

(1) Alarm code checking method

Alarms occurred in the CT input module can be checked by the same methods as those for errors. (☞Page 228, Section 11.1 (1))

(2) Alarm code list

The following table lists alarm codes.

Alarm code (decimal)	Description and the alarm cause	Action
10△□	A process alarm or a rate alarm is occurring. The channel where a process alarm or rate alarm has occurred fits in □. A value fits in △ indicates that the alarm status is as follows: 0: Process alarm upper limit 1: Process alarm lower limit 2: Rate alarm upper limit 3: Rate alarm lower limit	When the digital output value returns to the one within the setting range, the following turns off. • The corresponding bit of Warning output flag (Process alarm) (Un\G50) • The corresponding bit of Warning output flag (Rate alarm) (Un\G51) • Warning output signal (X8) The alarm code can be cleared by turning off, on, and off Error clear request (YF) after the digital output value returns to the one within the setting range.
110□	An input signal error is occurring. The channel where an input signal error has occurred fits in □.	The corresponding bit of Input signal error detection flag (Un\G49) and Input signal error detection signal (XC) turn off by turning off, on, and off Error clear request (YF) after the CT input value returns to the one within the setting range.
120□	A peak current was detected. The channel where the peak current has been detected fits in □.	The corresponding bit of Peak current detection flag (Un\G301) and Peak current detection signal (X7) turn off by turning off, on, and off Error clear request (YF) after the CT input value returns to the one within the setting range.

11.3 Troubleshooting

11.3.1 When the RUN LED flashes or turns off

(1) When flashing

Check item	Action
Is the operation in the offset/gain setting mode?	• Set the operation mode in the intelligent function module switch setting to the normal mode. Or reset the switch 4 in the intelligent function module switch setting to the normal mode. • Set the operation mode to the normal mode by setting Mode switching setting (Un\G158, Un\G159); set Un\G158 to 0964_H, and Un\G159 to 4144_H.

(2) When off

Check item	Action
Is the power supplied?	Check that the supply voltage of the power supply module is within the rated range.
Is the capacity of the power supply module sufficient?	Calculate the current consumption of the modules mounted on the base unit, such as the CPU module, I/O module, and intelligent function module, and check that the power supply capacity is sufficient.
Is there any watchdog timer error?	Reset the CPU module, and check if the RUN LED turns on. If the RUN LED remains off, the CT input module might fail. Please consult a local Mitsubishi representative.
Is the module mounted on the base unit properly?	Check the mounting condition of the module.
Is a module change enabled during an online module change?	Refer to the following and take the corrective action. • ONLINE MODULE CHANGE (☞ Page 182, CHAPTER 10)

11.3.2 When the ERR. LED turns on or flashes

(1) When on

Check item	Action
Is there any error?	Check the error code, and take the action described in the error code list. • Error code list (☞ Page 231, Section 11.1 (2))

(2) When flashing

Check item	Action
Is a value other than 0 set to Switch 5 of the intelligent function module switch setting?	Set 0 to Switch 5 of the intelligent function module switch setting.

11.3.3 When the ALM LED turns on or flashes

(1) When on

Check item	Action
Is there any alarm output?	Check Warning output flag (Process alarm) (Un\G50) or Warning output flag (Rate alarm) (Un\G51).

(2) When flashing

Check item	Action
Is there any input signal error?	Check Input signal error detection flag (Un\G49).
Is there any peak current detection?	Check Peak current detection flag (Un\G301).

11.3.4 When a digital output value cannot be read

Check item	Action
• Are the k terminal and l terminal wired properly? • Is the secondary side of the CT short-circuited?	Refer to the following, and wire the k terminal and l terminal properly. • Wiring (☞ Page 142, Section 7.4)
Is a connection cable disconnected?	Confirm the faulty part by checking them visually or conducting electricity.
Is the CPU module in the STOP status?	Change the status of the CPU module to RUN.
Is the offset/gain setting correct?	Check if the offset/gain setting is correct. When a user range is selected, change the input range to a factory default range and check if digital conversion is performed. If the digital conversion is performed properly, configure the offset/gain setting again.
Is the input range setting correct?	Check CH□ Input range setting (Un\G150 to Un\G157). If the input range setting is incorrect, start over the setting.
Is Conversion enable/disable setting (Un\G0) set to Disable (1) for the channel to be used?	Check Conversion enable/disable setting (Un\G0), and enable the digital conversion in the sequence program or intelligent function module parameter.
Is Operating condition setting request (Y9) performed?	Turn on then off Operating condition setting request (Y9), and check if digital output values are stored in CH□ Digital output value (Un\G11 to Un\G18). If the values are stored properly, review the sequence program so that Operating condition setting request (Y9) is turned on in the program.
Is the set value correct when an averaging process is specified?	When time average is selected, satisfy the following condition. • Set value ≥ "4 (times) × Sampling cycle" If the condition above is not satisfied, 0 is stored in CH□ Digital output value (Un\G11 to Un\G18).

Point

If digital output values cannot be read even after taking the above actions, the module might fail. Please consult a local Mitsubishi representative.

11.3.5 When Conversion completed flag does not turn on in the normal mode

Check item	Action
Is there any input signal error?	Check Input signal error detection flag (Un\G49).

11.4 Checking the CT Input Module Status on GX Works2 System Monitor

To check the LED status or the setting status of the intelligent function module switch setting, select the H/W information of the CT input module on the system monitor of GX Works2.

(1) Hardware LED information

The LED status is displayed.

No.	LED name	Status
1)	RUN LED	0000_H: Indicates that the LED is off. 0001_H: Indicates that the LED is on. Alternating indication of 0000_H and 0001_H: Indicates that the LED is flashing. (When the CT input module in communication, the LED status is displayed on GX Works2. The values0000_H and 0001_H are not always displayed evenly.)
2)	ERR. LED	
3)	ALM LED	

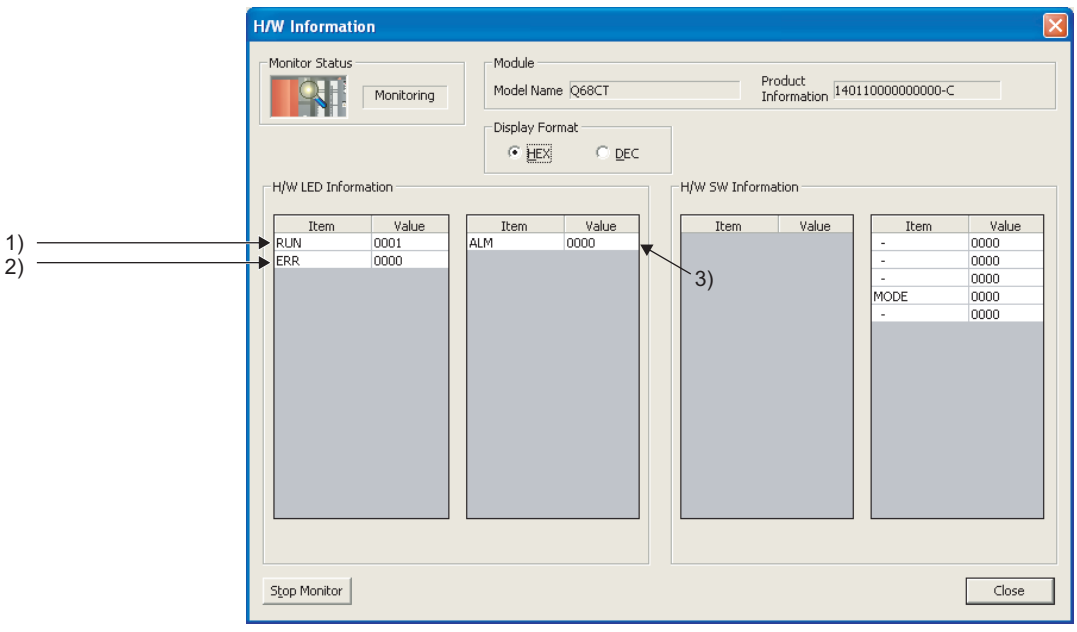
(2) Hardware switch information

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

For details on the setting status, refer to the following.

- Switch Setting (☞Page 145, Section 8.2)

Item	Intelligent function module switch
—	Switch1
—	Switch2
—	Switch3
MODE	Switch4
—	Switch5



APPENDICES

Appendix 1 Dedicated Instruction

(1) Dedicated instruction

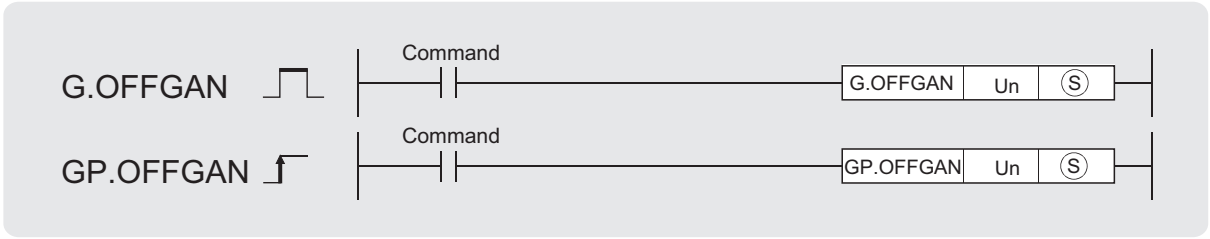
The following table lists dedicated instructions that can be used in a CT input module.

Instruction	Description
G(P).OFFGAN	• This instruction switches the operation mode to the offset/gain setting mode. • This instruction switches the operation mode to the normal mode.
G(P).OGLOAD	This instruction reads out the offset/gain set values in a user range setting to the CPU module.
G(P).OGSTOR	This instruction restores the offset/gain set values in a user range setting to the CT input module.

Point

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

Appendix 1.1 G(P).OFFGAN



Setting data	Internal device		R, ZR	J□\□		U□\G□	Zn	Constant K, H, $	Others
	Bit	Word		Bit	Word				
Ⓢ	—	○		—					

(1) Setting data

Device	Description	Setting range	Data type
Un	Start I/O number of the module	0 to FE_H	BIN 16 bits
Ⓢ	Mode change 0: changed to the normal mode 1: changed to the offset/gain setting mode When a value other than above is set, the mode is changed to the offset/gain setting mode.	0, 1	BIN 16 bits

(2) Functions

This instruction switches the operation mode of the CT input module.

- Normal mode → offset/gain setting mode (Offset/gain setting mode flag (XA) is on)
- Offset/gain setting mode → normal mode (Offset/gain setting mode flag (XA) is off)

Point

- When the mode is switched from the offset/gain setting mode to the normal mode, Module READY (X0) turns on. Note that if a sequence program includes the initial settings to be executed at ON of Module READY (X0), this instruction performs the initial setting process.
- When the mode is switched, the digital conversion stops. To resume the digital conversion, turn on then off Operating condition setting request (Y9) after switching the mode to the normal mode.

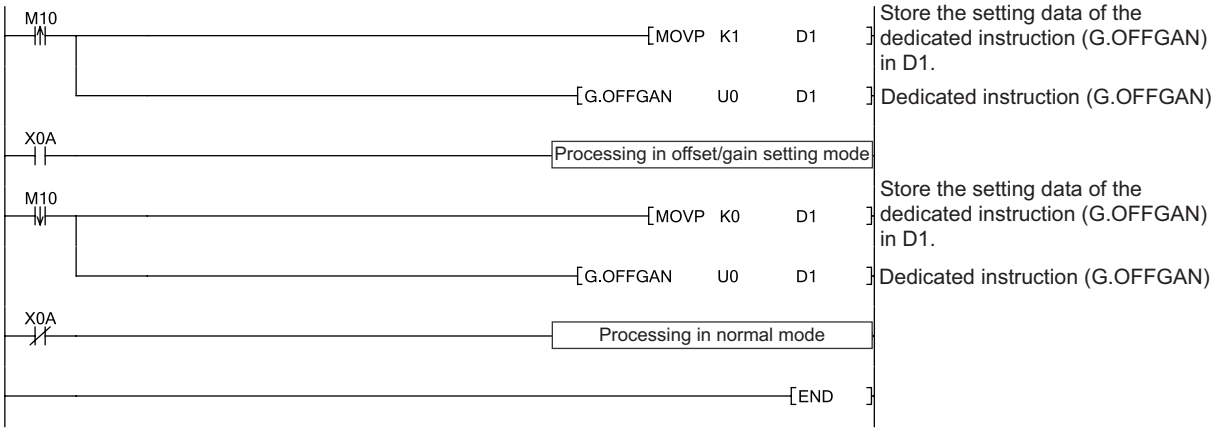
(3) Errors

The instruction has no errors.

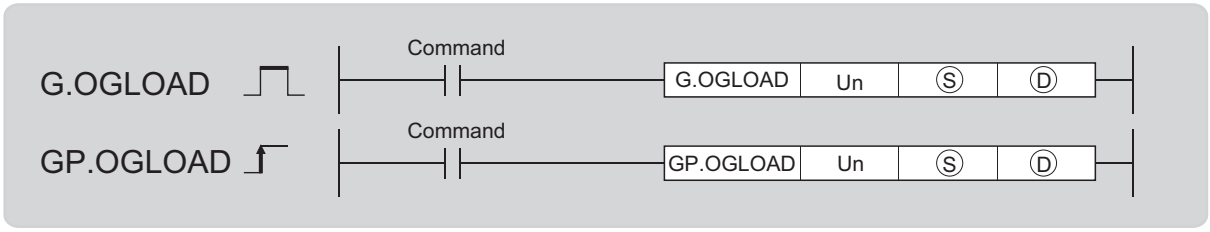
(4) Program example

The following shows the sequence program of the CT input module, installed in I/O number X/Y00 to X/Y0F, with the following conditions.

- Turning on M10 switches the operation mode of the CT input module to the offset/gain setting mode
- Turning off M10 restores the operation mode of the CT input module to the normal mode



Appendix 1.2 G(P).OGLOAD



Setting data	Internal device		R, ZR	J□\□		U□\G□	Zn	Constant K, H, $	Others
	Bit	Word		Bit	Word				
Ⓢ	—	○		—					
Ⓓ		○		—					

(1) Setting data

Device	Description	Setting range	Data type
Un	Start I/O number of the module	0 to FE_H	BIN 16 bits
Ⓢ	Start number of the device where control data is stored	Within the range of the specified device	Device name
Ⓓ	Device which turns on for one scan at the processing completion of the dedicated instruction. In error completion, Ⓓ+1 also turns on.	Within the range of the specified device	Bit

(2) Control data[*1]

Device	Item	Setting data	Setting range	Set by
Ⓢ	System area	—	—	—
Ⓢ+1	Completion status	The status on instruction completion is stored. 0: normal completion Other than 0: error completion (error code)	—	System
Ⓢ+2	System area	—	—	—
Ⓢ+3	System area	—	—	—
Ⓢ+4	CH1 Factory default setting offset value	—	—	System
Ⓢ+5	CH1 Factory default setting gain value	—	—	System
Ⓢ+6	CH2 Factory default setting offset value	—	—	System
Ⓢ+7	CH2 Factory default setting gain value	—	—	System
Ⓢ+8	CH3 Factory default setting offset value	—	—	System
Ⓢ+9	CH3 Factory default setting gain value	—	—	System
Ⓢ+10	CH4 Factory default setting offset value	—	—	System
Ⓢ+11	CH4 Factory default setting gain value	—	—	System
Ⓢ+12	CH5 Factory default setting offset value	—	—	System
Ⓢ+13	CH5 Factory default setting gain value	—	—	System
Ⓢ+14	CH6 Factory default setting offset value	—	—	System
Ⓢ+15	CH6 Factory default setting gain value	—	—	System
Ⓢ+16	CH7 Factory default setting offset value	—	—	System
Ⓢ+17	CH7 Factory default setting gain value	—	—	System
Ⓢ+18	CH8 Factory default setting offset value	—	—	System
Ⓢ+19	CH8 Factory default setting gain value	—	—	System
Ⓢ+20	CH1 User range setting offset value	—	—	System
Ⓢ+21	CH1 User range setting gain value	—	—	System
Ⓢ+22	CH2 User range setting offset value	—	—	System
Ⓢ+23	CH2 User range setting gain value	—	—	System
Ⓢ+24	CH3 User range setting offset value	—	—	System
Ⓢ+25	CH3 User range setting gain value	—	—	System
Ⓢ+26	CH4 User range setting offset value	—	—	System
Ⓢ+27	CH4 User range setting gain value	—	—	System
Ⓢ+28	CH5 User range setting offset value	—	—	System
Ⓢ+29	CH5 User range setting gain value	—	—	System
Ⓢ+30	CH6 User range setting offset value	—	—	System
Ⓢ+31	CH6 User range setting gain value	—	—	System
Ⓢ+32	CH7 User range setting offset value	—	—	System
Ⓢ+33	CH7 User range setting gain value	—	—	System

Device	Item	Setting data	Setting range	Set by
Ⓢ+34	CH8 User range setting offset value	—	—	System
Ⓢ+35	CH8 User range setting gain value	—	—	System

*1 These control data are unnecessary to be set. When they are set, offset/gain setting values are not correctly read out.

(3) Functions

- This instruction reads out the offset/gain set values in a user range setting of the CT input module to the CPU module.
- The interlock signal of G(P).OGLOAD includes a completion device Ⓓ and a completion status indication device Ⓓ+1.

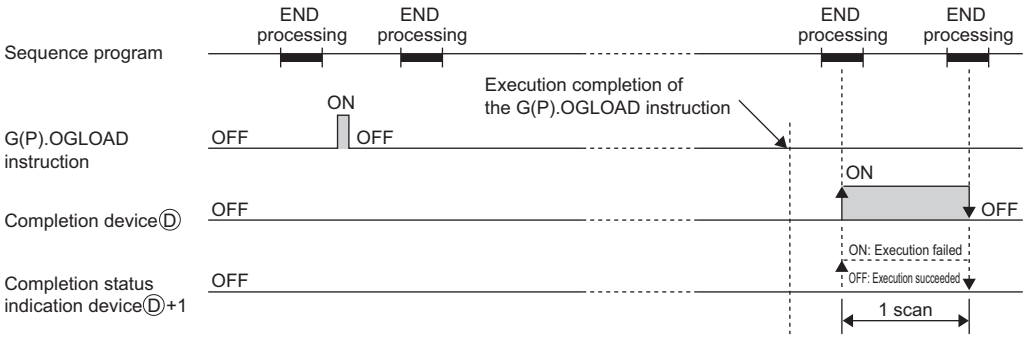
(a) Completion device

The device turns on at the END processing for the scan where the G(P).OGLOAD instruction is completed, and turns off at the next END processing.

(b) Completion status indication device

This device turns on or off depending on the status of the G(P).OGLOAD instruction completion.

- Normal completion: the device remains off.
- Error completion: the device turns on at the END processing for the scan where the G(P).OGLOAD instruction is completed, and turns off at the next END processing.



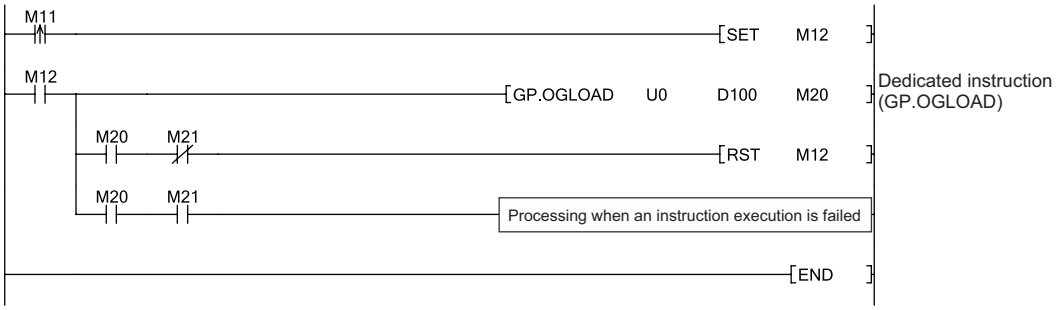
(4) Errors

The instruction has no errors.

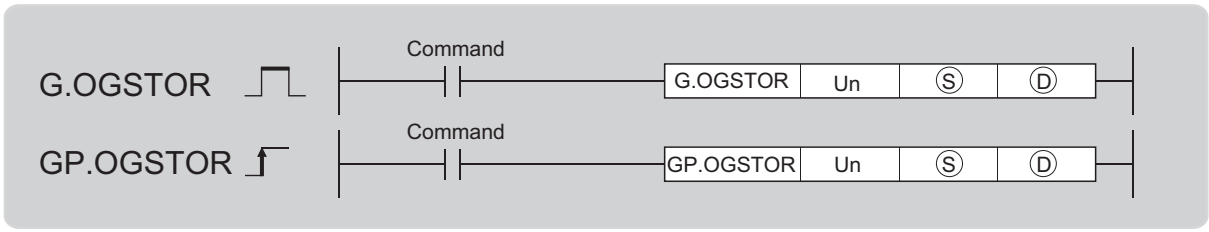
(5) Program example

The following shows the sequence program of the CT input module, installed in I/O number X/Y00 to X/Y0F, with the following conditions.

- Turning on M11 reads out the offset/gain setting value of the CT input module.



Appendix 1.3 G(P).OGSTOR



Setting data	Internal device		R, ZR	J□\□		U□\G□	Zn	Constant K, H, $	Others
	Bit	Word		Bit	Word				
Ⓢ	—	○		—					
Ⓓ	○			—					

(1) Setting data

Device	Description	Setting range	Data type
Un	Start I/O number of the module	0 to FE_H	BIN 16 bits
Ⓢ*1	Start number of the device where control data is stored	Within the range of the specified device	Device name
Ⓓ	Device which turns on for one scan at the processing completion of the dedicated instruction In error completion, Ⓓ+1 also turns on.	Within the range of the specified device	Bit

*1 Specify the device specified to Ⓢ on execution of the G(P).OGLOAD instruction.
Do not change the data which was read out by the G(P).OGLOAD instruction. If the data is changed, the normal operation may not be ensured.

(2) Control data

Device	Item	Setting data	Setting range	Set by
Ⓢ	System area	—	—	—
Ⓢ+1	Completion status	The status on instruction completion is stored. 0: normal completion Other than 0: error completion (error code)	—	System
Ⓢ+2	System area	—	—	—
Ⓢ+3	System area	—	—	—
Ⓢ+4	CH1 Factory default setting offset value	—	—	System
Ⓢ+5	CH1 Factory default setting gain value	—	—	System
Ⓢ+6	CH2 Factory default setting offset value	—	—	System
Ⓢ+7	CH2 Factory default setting gain value	—	—	System
Ⓢ+8	CH3 Factory default setting offset value	—	—	System
Ⓢ+9	CH3 Factory default setting gain value	—	—	System
Ⓢ+10	CH4 Factory default setting offset value	—	—	System
Ⓢ+11	CH4 Factory default setting gain value	—	—	System
Ⓢ+12	CH5 Factory default setting offset value	—	—	System
Ⓢ+13	CH5 Factory default setting gain value	—	—	System
Ⓢ+14	CH6 Factory default setting offset value	—	—	System
Ⓢ+15	CH6 Factory default setting gain value	—	—	System
Ⓢ+16	CH7 Factory default setting offset value	—	—	System
Ⓢ+17	CH7 Factory default setting gain value	—	—	System
Ⓢ+18	CH8 Factory default setting offset value	—	—	System
Ⓢ+19	CH8 Factory default setting gain value	—	—	System
Ⓢ+20	CH1 User range setting offset value	—	—	System
Ⓢ+21	CH1 User range setting gain value	—	—	System
Ⓢ+22	CH2 User range setting offset value	—	—	System
Ⓢ+23	CH2 User range setting gain value	—	—	System
Ⓢ+24	CH3 User range setting offset value	—	—	System
Ⓢ+25	CH3 User range setting gain value	—	—	System
Ⓢ+26	CH4 User range setting offset value	—	—	System
Ⓢ+27	CH4 User range setting gain value	—	—	System
Ⓢ+28	CH5 User range setting offset value	—	—	System
Ⓢ+29	CH5 User range setting gain value	—	—	System
Ⓢ+30	CH6 User range setting offset value	—	—	System
Ⓢ+31	CH6 User range setting gain value	—	—	System
Ⓢ+32	CH7 User range setting offset value	—	—	System
Ⓢ+33	CH7 User range setting gain value	—	—	System

Device	Item	Setting data	Setting range	Set by
Ⓢ+34	CH8 User range setting offset value	—	—	System
Ⓢ+35	CH8 User range setting gain value	—	—	System

(3) Functions

- This instruction restores the offset/gain set values in a user range setting to the CT input module.
- There are two interlock signals of G(P).OGSTOR: a completion device Ⓓ and a completion status indication device Ⓓ+1.
- The accuracy on restoration of the offset/gain setting values (when the ambient temperature is 25±5°C) is within ±1.5% (within ±150 digit).

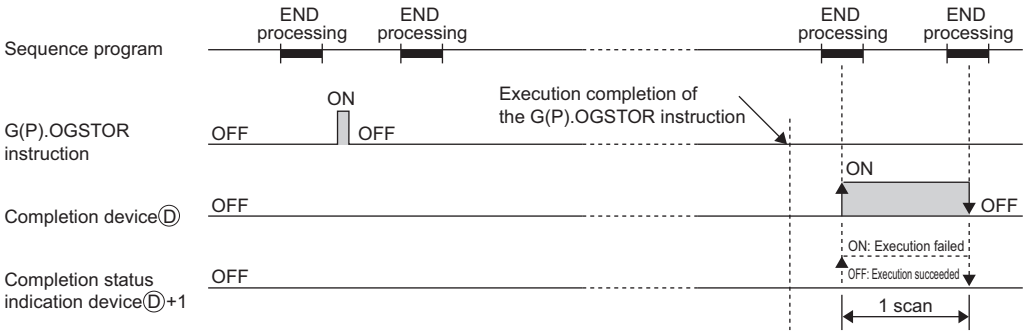
(a) Completion device

The device turns on at the END processing for the scan where the G(P).OGSTOR instruction is completed, and turns off at the next END processing.

(b) Completion status indication device

This device turns on or off depending on the status of the G(P).OGSTOR instruction completion.

- Normal completion: the device remains off.
- Error completion: the device turns on at the END processing for the scan where the G(P).OGSTOR instruction is completed, and turns off at the next END processing.



(4) Errors

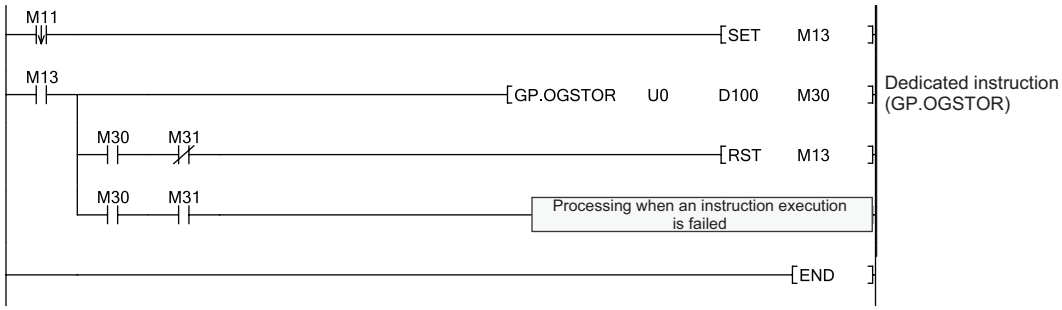
In the following cases, an error occurs and error code is stored in completion status Ⓢ+1.

Error code	Description of operation error
161	G(P).OGSTOR instruction is executed in the offset/gain setting mode.
162	G(P).OGSTOR instruction is continuously executed.
163	• G(P).OGSTOR instruction is executed to the different model from the one to which G(P).OGLOAD instruction is executed. • G(P).OGSTOR instruction has been executed before the execution of G(P).OGLOAD instruction.

(5) Program example

The following shows the sequence program of the CT input module, installed in I/O number X/Y00 to X/Y0F, with the following conditions.

- Turning off M11 writes the offset/gain setting value to the CT input module.



Appendix 2 When Using GX Developer

This chapter describes the operating procedure of GX Developer.

(1) Applicable software packages

For the applicable software version, refer to the following.

Page 22, Section 2.1 (4)

Appendix 2.1 Operation of GX Developer

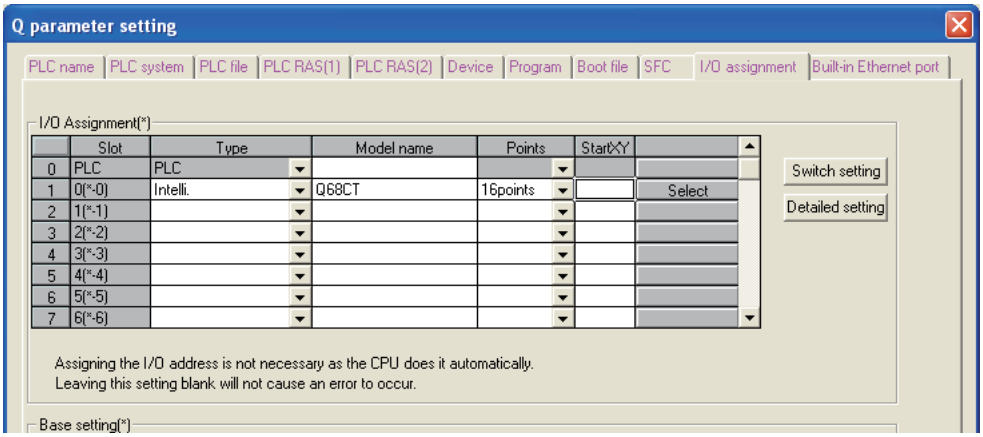
Configure the following settings when using GX Developer.

Window name	Application	Reference
I/O assignment	Set the type of the module to be mounted and the I/O signal range.	Page 251, Appendix 2.1 (1)
Switch setting	Configure the switch setting of an intelligent function module.	Page 252, Appendix 2.1 (2)
Offset/gain setting	Configure the setting when using a user range setting for the input range.	Page 153, Section 8.5.2

(1) I/O assignment

Configure the setting on "I/O assignment" in "PLC parameter".

Parameter ⇨ [PLC parameter] ⇨ [I/O assignment]

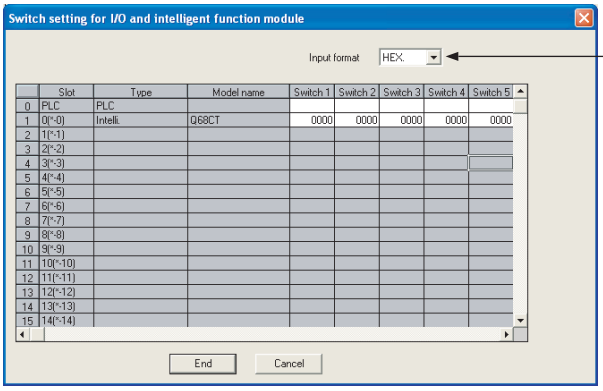


Item	Description
Type	Select "Intelli.".
Model name	Enter the model name of the module.
Points	Select "16points".
StartXY	Enter a desired start I/O number of the CT input module.

(2) Intelligent function module switch setting

Configure the setting on "Switch setting" in "PLC parameter".

Parameter ⇨ [PLC parameter] ⇨ [I/O assignment] ⇨ Click the Switch setting button.



Item	Setting range
Switch 1	0: Fixed (blank)*1
Switch 2	0: Fixed (blank)*1
Switch 3	0: Fixed (blank)*1
Switch 4	□□□□H Fixed to 000H*1 0H : Normal (digital conversion processing) mode 1H to FH (A value other than 0H)*2 : Offset/gain setting mode
Switch 5	0: Fixed

*1 When a value is set, the set value is ignored.

*2 The operation is the same for all values in the setting range.

Appendix 3 Online Module Change Procedure (When Using GX Developer)

This appendix describes the online module change procedure using GX Developer.

When performing an online module change, carefully read the following.

- QCPU User's Manual (Hardware Design, Maintenance and Inspection)

Appendix 3.1 Precautions on online module change

This section lists precautions on an online module change.

- Always perform an online module change in the correct procedure. (Page 256, Appendix 3.4)
  A failure to do so can cause a malfunction or failure.
- Perform an online module change after making sure that the system outside the programmable controller will not malfunction.
- 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. Failure to do so may cause an electric shock and malfunction of operating modules.
- After the module has failed, the buffer memory data may not be saved properly. Prerecord the data to be saved.
- 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.
  For the operational verification, check 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.
- 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) respectively. Exceeding the limit may cause malfunction.

Point

Dedicated instructions cannot be executed during an online module change. Save and restore the offset/gain setting values in the user range using a dedicated instruction in another system.
Precautions for using another system are as follows:

- To change a module mounted on the remote I/O station online, save and restore the offset/gain setting values in the user range using a dedicated instruction, in another system mounted on the main base unit.
- The offset/gain setting values cannot be saved and restored using a dedicated instruction in another system mounted on the remote I/O station.

If there is no other system, restore the values by writing them to the buffer memory.

Appendix 3.2 Conditions for online module change

To perform an online module change, satisfy the following conditions.

Remark

The function version of the first released CT input module is C, and the CT input module supports the online module change.

(1) CPU module

A Process CPU or Redundant CPU is necessary.

For the precautions on the multiple CPU system configuration, refer to the following.

- QCPU User's Manual (Multiple CPU System)

For the precautions on the redundant system configuration, refer to the following.

- QnPRHCPU User's Manual (Redundant System)

(2) Function version of MELSECNET/H remote I/O module

A module of function version D or later is necessary.

(3) Compatible version of GX Developer

GX Developer of Version 7.10L or later is necessary.

To perform an online change on a remote I/O station, GX Developer of Version 8.17T or later is necessary.

The CT input module does not support GX Configurator-AD; therefore, configure initial settings in a sequence program.

(4) Restrictions of base unit

When the module is mounted on any of the following base units, an online module change cannot be performed.

- Slim type main base unit (Q3□SB)
- Extension base unit (Q5□B) which does not require the power supply module (An online module change cannot be performed for all modules on the base unit.)

Appendix 3.3 Online module change operations

The following table explains the operations for an online module change.

○: Executed ×: Not executed

User operation	Operation of the CT input module	Operation of the CPU module			
		X/Y refresh	FROM/TO instructions*1	Dedicated instruction	Device test
(1) Stop the operation. Turn off all of the Y signals turned on using the sequence program.	The module is operating normally.	○	○	○	○
(2) Remove the module. Start the online module change using GX Developer. Click the [Execution] button on GX Developer to enable the module to be removed. Remove the module.	The operation of the module stops. ・The RUN LED turns off. ・Conversion disabled.	×	×	×	×
(3) Mount a new module. Mount a new module. After mounting the module, click the [Execution] button on GX Works2. Check the operation before the control starts.	The X/Y refresh restarts and the module starts up. ・The RUN LED turns on. ・Default operation starts. (Module READY (X0) remains off.) (When there are initial setting parameters, the module starts to operate based on the initial setting parameters at this point.)	○	×	×	×
(4) Check the operation. Click the [Cancel] button on GX Developer to turn off the online mode. On "Device test" on GX Developer, test the operation of the module. (Restore the user range settings by writing of buffer memory addresses at this point.) Operation check is completed.	The module operates based on the test operation.*2	○	×	×	○
(5) Resume the control. Restart the online module change using GX Developer. Click the [Execution] button to resume the control.	Module READY (X0) turns on. ↓ The module operates based on the initial setting sequence program which runs when Module READY (X0) turns on.*2	○	○	○	○

*1 An access to 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.

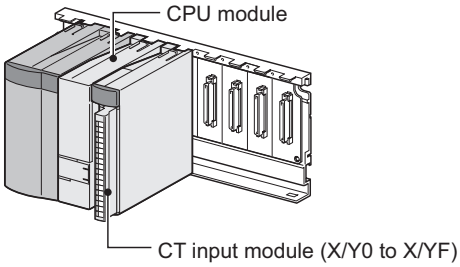
Appendix 3.4 Online module change procedure

This section describes three online module change procedures: factory default setting, user range setting with another system, and user range setting without another system.

Range setting	Initial setting	Another system	Reference
Factory default range	Sequence program	—	Page 257, Appendix 3.5
User range	Sequence program	Present	Page 263, Appendix 3.6
		Absent	Page 269, Appendix 3.7

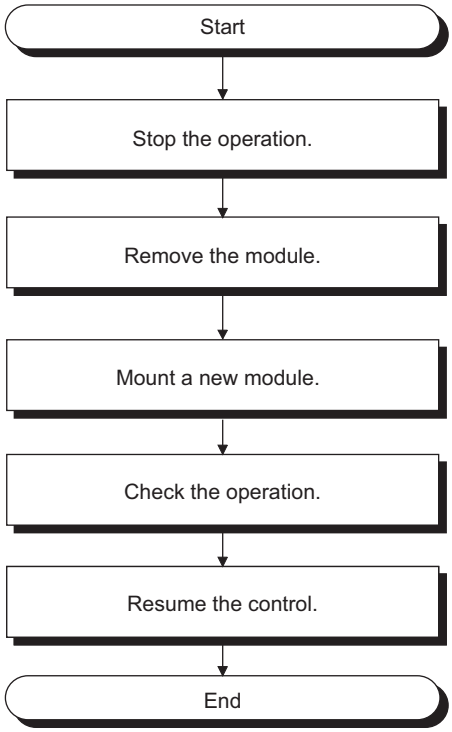
(1) System configuration

The following system is used to explain the online module change procedure.



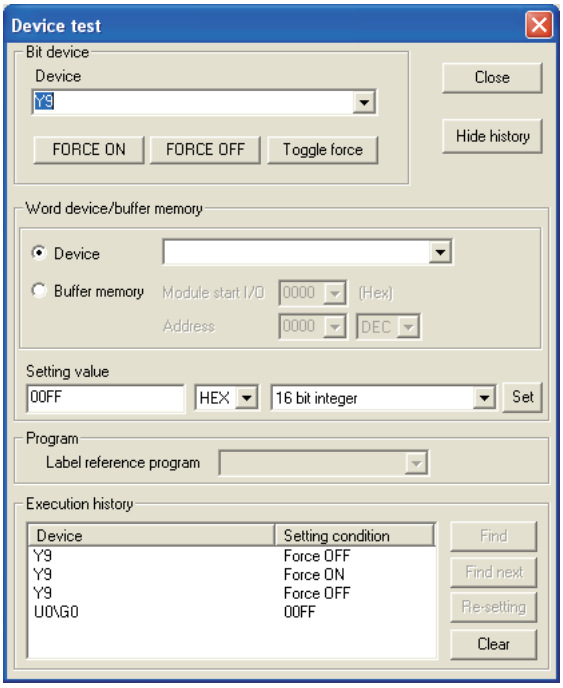
(2) Procedure

The following flow shows the online module change procedure.



Appendix 3.5 When a factory default range is used and initial settings are configured using a sequence program

(1) Stopping operation

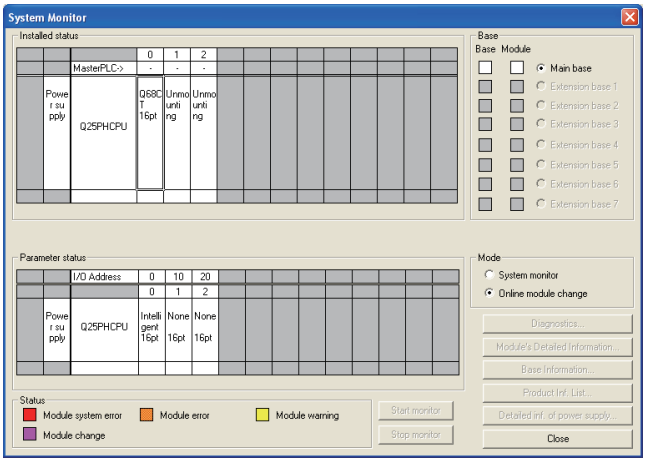


1. **Open the "Device test" window.**

   [Online] ⇨ [Debug] ⇨ [Device test...]

2. **Set Conversion enable/disable setting (Un\G0) to Disable (1) for all channels.**
3. **Turn on then off Operating condition setting request (Y9).**
4. **Confirm that the digital conversion has stopped with Conversion completed flag (Un\G10).**

(2) Removing a module



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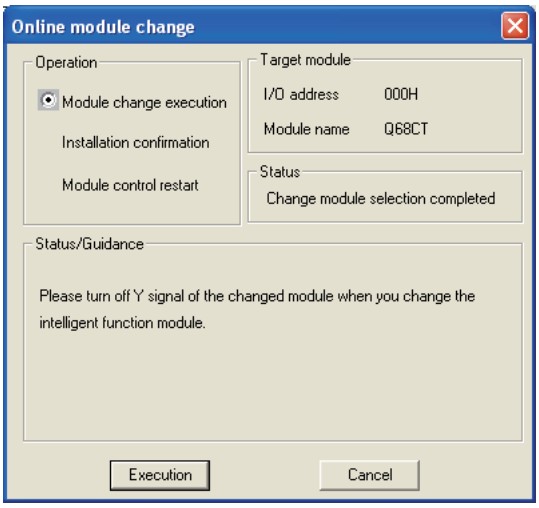


1. **Open the "Online module change" window.**

[Diagnostics] ⇨ [Online Module Change...]

2. **Select "Online module change" under the "Mode" field and double-click the module name to be changed online.**

3. **Click the Execution button to enable a module change.**

4. **When the following error window appears, click the OK button and perform the operation described in**

Page 259, Appendix 3.5 (3).

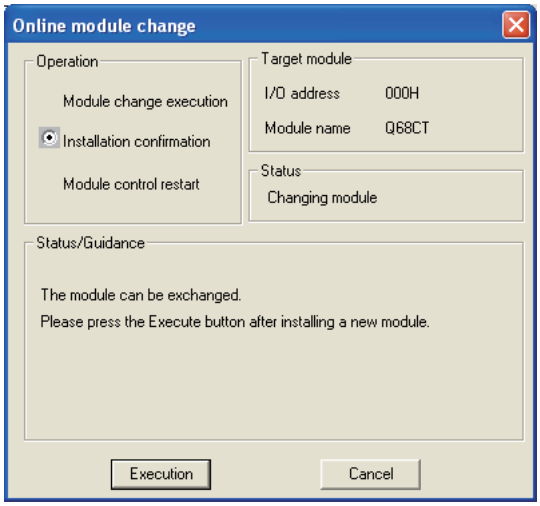
5. **After confirming that the RUN LED of the module has turned off, remove the terminal block.**

6. **Remove the module.**

Point

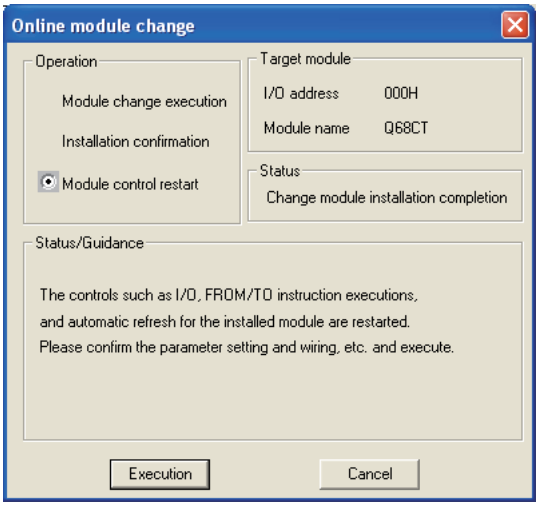
Always remove the module. If mounting confirmation is made without the module being removed, the module will not start properly and the RUN LED will not be lit.

(3) Mounting a new module



1. **Mount a new module in the same slot and install the terminal block.**
2. **After mounting the module, click the Execution button and make sure that the RUN LED is lit. Module READY (X0) remains off.**

(4) Checking operation



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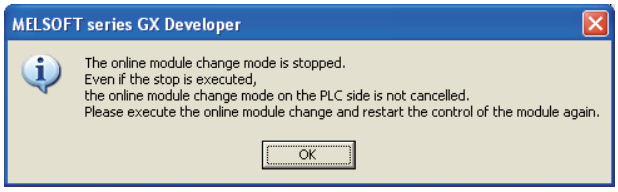

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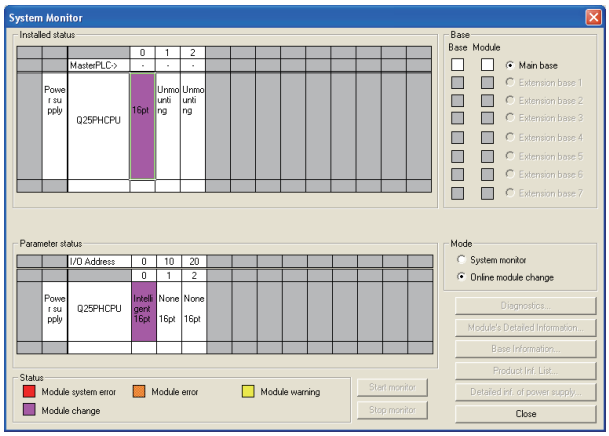

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(To the next page)

1. **To check the operation, click the [Cancel] button to cancel the control start.**

2. **Click the [OK] button to leave the "Online module change" mode.**

3. **Click the [Close] button to close the "System Monitor" window.**

(From the previous page)
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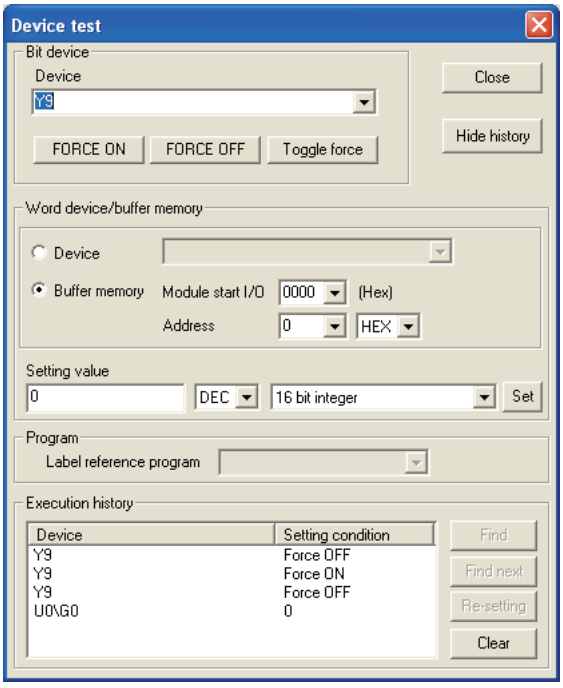


4. **Open the "Device test" window.**

[Online] ⇨ [Debug] ⇨ [Device test...]

5. **Set Conversion enable/disable setting (Un\G0) to Enable (0) for the channel used.**

6. **Turn on then off Operating condition setting request (Y9).**

7. **Monitor CH☐ Digital output value (Un\G11 to Un\G18) to check if the digital conversion is performed properly.**

8. **Before starting the control, check the CT input module for the following. If an error occurs, refer to TROUBLESHOOTING (☞Page 228, CHAPTER 11) and take a corrective action.**

- If the RUN LED is on.
- If the ERR. LED is off.
- If Error flag (XF) is off.

9. **Since the new module is in the default status, initial settings must be configured using a sequence program after the control resumed. Before the initial setting, check if the initial setting program is proper, satisfying the following.**

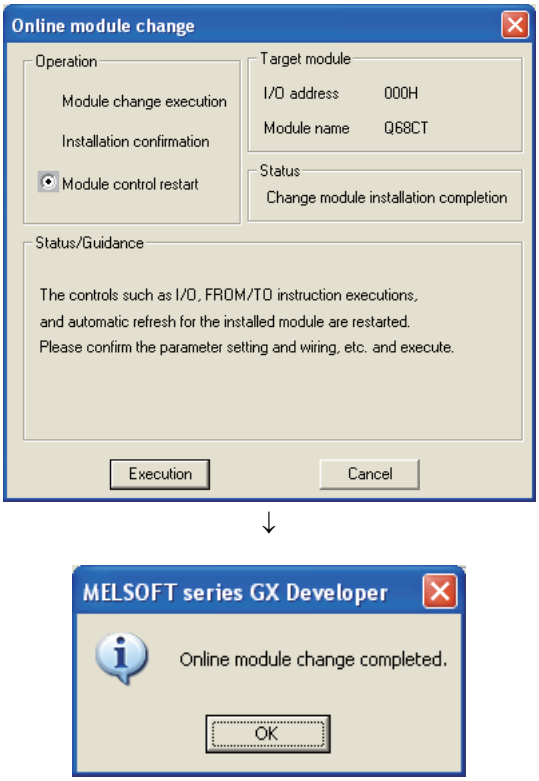
Normal system configuration

- The sequence program should set the initial setting on the leading edge of Module READY (X0) of the CT input module.
- Do not create a sequence program which sets the initial setting only one scan after RUN. In this case, the initial setting is not set.

When used on remote I/O network

- Insert a user device where the initial setting will be set at any timing (initial setting request signal) into the sequence program.
- Do not create a sequence program which sets the initial setting only one scan after a data link start of the remote I/O network. In this case, the initial setting is not set.

(5) Resuming operation



1. **Open the "Online module change" window again.**

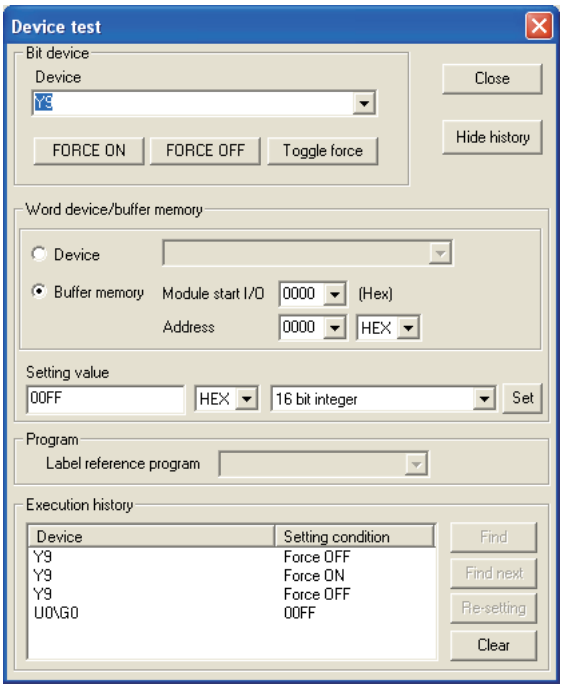
[Diagnostics] ⇨ [Online Module Change...]

2. **Click the** Execution **button on the appeared window to resume control. Module READY (X0) turns on.**

3. **The online module change is complete.**

Appendix 3.6 When a user range is used and initial settings are configured using a sequence program (with another system)

(1) Stopping operation

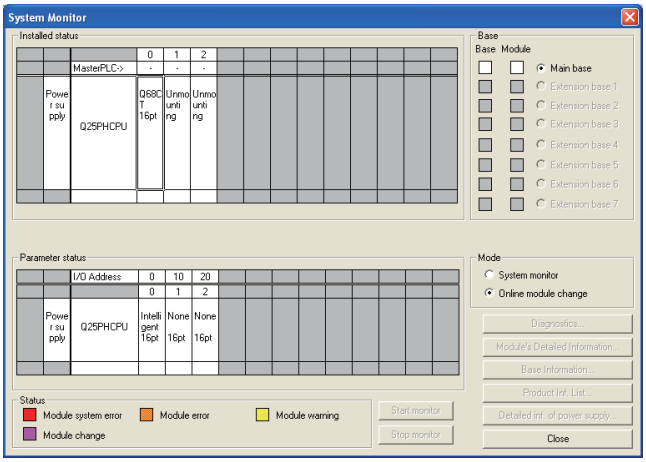


1. **Open the "Device test" window.**

   [Online] ⇨ [Debug] ⇨ [Device test...]

2. **Set Conversion enable/disable setting (Un\G0) to Disable (1) for all channels.**
3. **Turn on then off Operating condition setting request (Y9).**
4. **Confirm that the digital conversion has stopped with Conversion completed flag (Un\G10).**

(2) Removing a module



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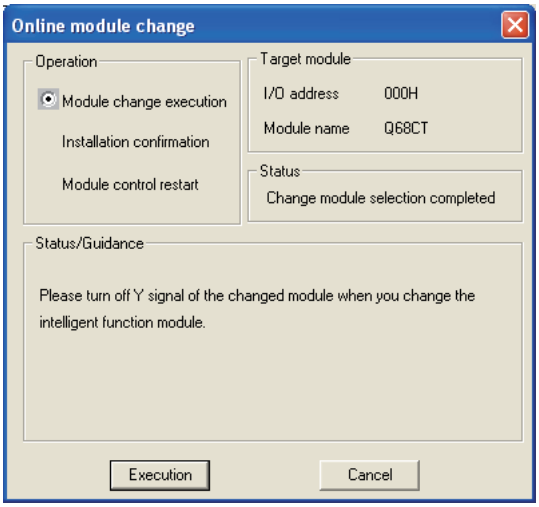


1. **Open the "Online module change" window.**

[Diagnostics] ⇨ [Online Module Change...]

2. **Select "Online module change" under the "Mode" field and double-click the module name to be changed online.**

3. **Click the Execution button to enable a module change.**

4. **When the following error window appears, click the OK button and perform the operation described in**

Page 265, Appendix 3.6 (3).

5. **After confirming that the RUN LED of the module has turned off, remove the terminal block.**

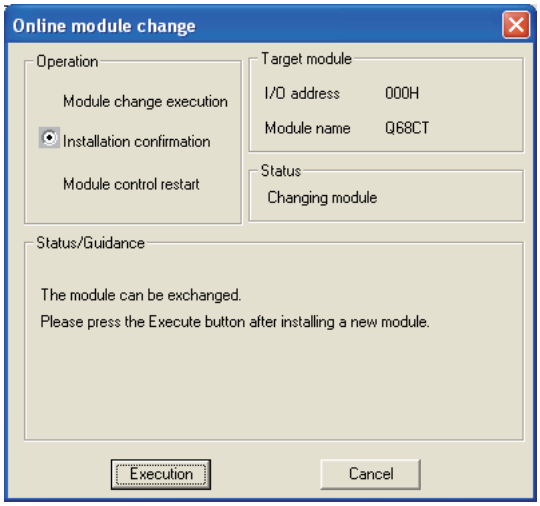
6. **Remove the module.**

Point

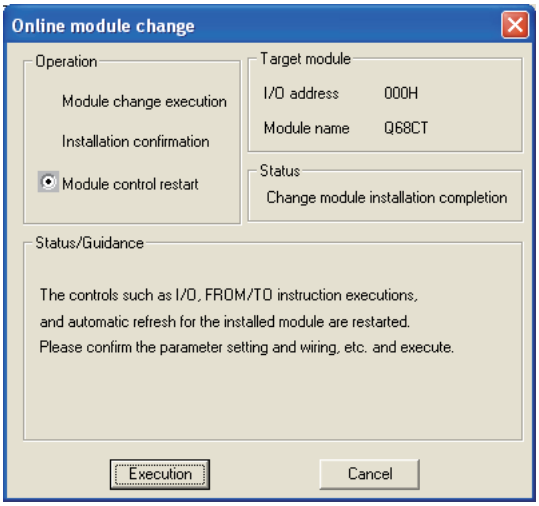
Always remove the module. If mounting confirmation is made without the module being removed, the module will not start properly and the RUN LED will not be lit.

(3) Mounting a new module

1. Mount the removed module and new module to the other system.
2. Using the G(P).OGLOAD instruction, save the offset/gain setting values in the user range from the removed module to the CPU device. Refer to ☞Page 243, Appendix 1.2 for the G(P).OGLOAD instruction.
3. Using the G(P).OGSTOR instruction, restore the offset/gain setting values in the user range to a new module. Refer to ☞Page 247, Appendix 1.3 for the G(P).OGSTOR instruction.
4. Remove the new module from the other system, mount it to the slot from where the old module was removed in the original system, and install the terminal block.
5. After mounting the module, click the [Execution] button and make sure that the RUN LED is lit. Module READY (X0) remains off.



(4) Checking operation



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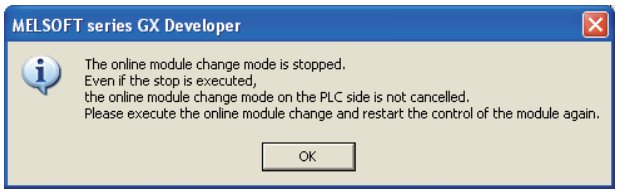

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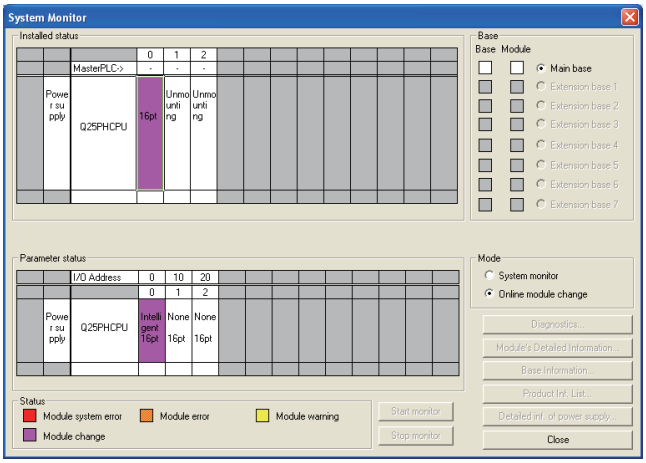

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(To the next page)

1. **To check the operation, click the Cancel button to cancel the control start.**

2. **Click the OK button to leave the "Online module change" mode.**

3. **Click the Close button to close the "System Monitor" window.**

(From the previous page)
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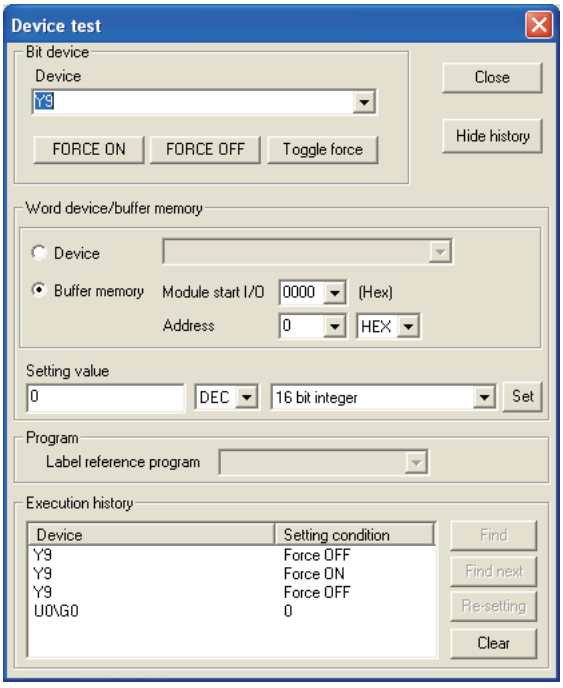


4. **Open the "Device test" window.**

[Online] ⇨ [Debug] ⇨ [Device test...]

5. **Set Conversion enable/disable setting (Un\G0) to Enable (0) for the channel used.**

6. **Turn on then off Operating condition setting request (Y9).**

7. **Monitor CH☐ Digital output value (Un\G11 to Un\G18) to check if the digital conversion is performed properly.**

8. **Before starting the control, check the CT input module for the following. If an error occurs, refer to TROUBLESHOOTING (☞Page 228, CHAPTER 11) and take a corrective action.**

- If the RUN LED is on.
- If the ERR. LED is off.
- If Error flag (XF) is off.

9. **Since the new module is in the default status, initial settings must be configured using a sequence program after the control resumed. Before the initial setting, check if the initial setting program is proper, satisfying the following.**

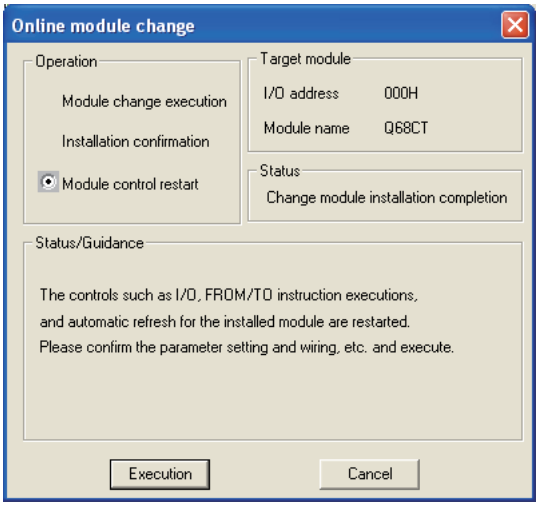
Normal system configuration

- The sequence program should set the initial setting on the leading edge of Module READY (X0) of the CT input module.
- Do not create a sequence program which sets the initial setting only one scan after RUN. In this case, the initial setting is not set.

When used on remote I/O network

- Insert a user device where the initial setting will be set at any timing (initial setting request signal) into the sequence program.
- Do not create a sequence program which sets the initial setting only one scan after a data link start of the remote I/O network. In this case, the initial setting is not set.

(5) Resuming operation



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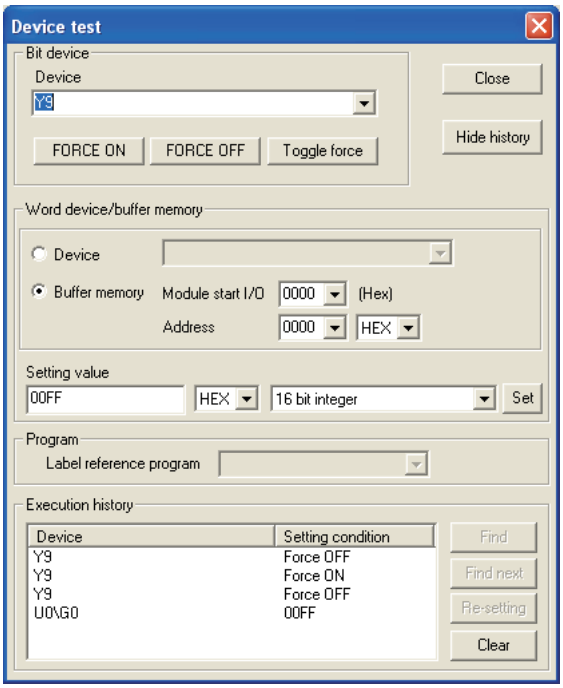
1. **Open the "Online module change" window again.**

2. **Click the [Execution] button on the appeared window to resume control. Module READY (X0) turns on.**

3. **The online module change is complete.**

Appendix 3.7 When a user range is used and initial settings are configured using a sequence program (without another system)

(1) Stopping operation



1. **Open the "Device test" window.**

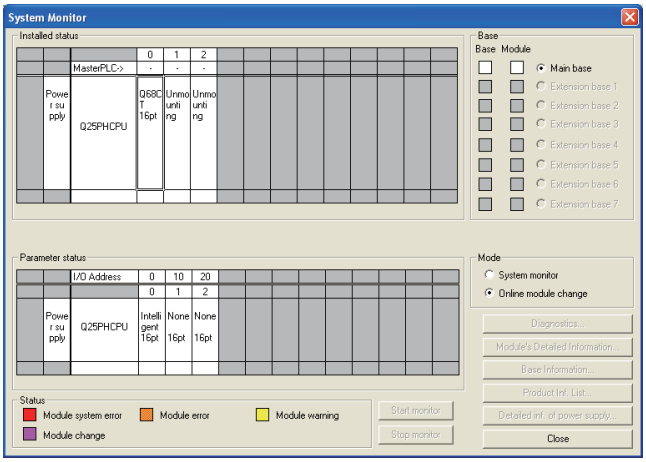
   [Online] ⇨ [Debug] ⇨ [Device test...]

2. **Set Conversion enable/disable setting (Un\G0) to Disable (1) for all channels.**
3. **Turn on then off Operating condition setting request (Y9).**
4. **Confirm that the digital conversion has stopped with Conversion completed flag (Un\G10).**
5. **If the buffer memory data are not recorded yet, follow the procedures 6 and 7.**
6. **Compare the values in CH1 Factory default setting offset value (Un\G202) to CH8 User range setting gain value (Un\G233) with the values in Range Reference Table (☞ Page 227, Section 10.11).**
7. **If the values are proper, save the values in CH1 Factory default setting offset value (Un\G202) to CH8 User range setting gain value (Un\G233).**

Point

- If the buffer memory values are improper compared to the reference table, the offset/gain values cannot be saved and restored. Before resuming the control, configure an offset/gain setting according to the flowchart (☞ Page 153, Section 8.5.2).
  Note that if module control is resumed without offset/gain setting being made, operation will be performed with the default values.
- Switch the mode by setting Mode switching setting (Un\G158, Un\G159) and turning on Operating condition setting request (Y9).

(2) Removing a module



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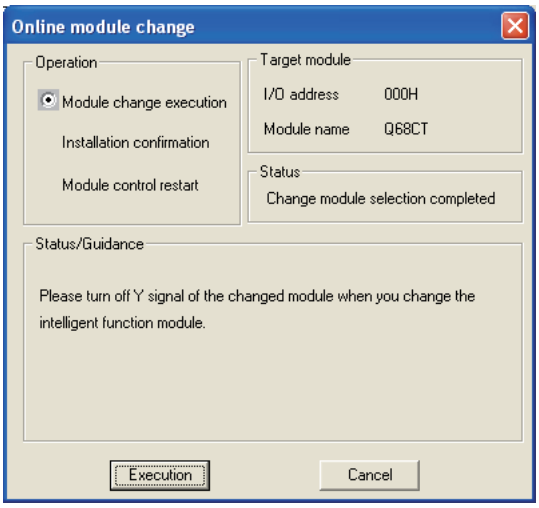


1. **Open the "Online module change" window.**

[Diagnostics] ➪ [Online Module Change...]

2. **Select "Online module change" under the "Mode" field and double-click the module name to be changed online.**

3. **Click the Execution button to enable a module change.**

4. **When the following error window appears, click the OK button and perform the operation described in**

Page 271, Appendix 3.7 (3).

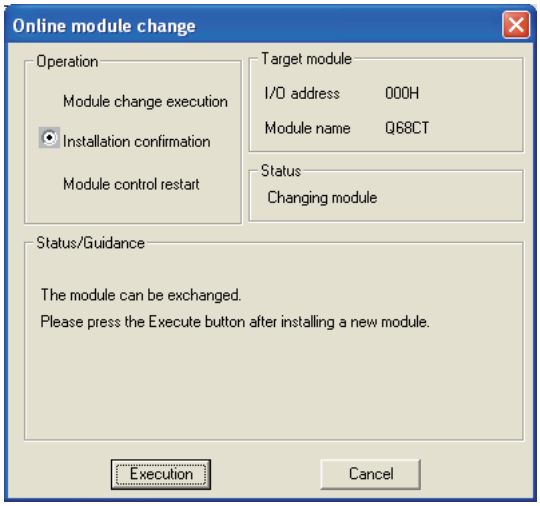
5. **After confirming that the RUN LED of the module has turned off, remove the terminal block.**

6. **Remove the module.**

Point

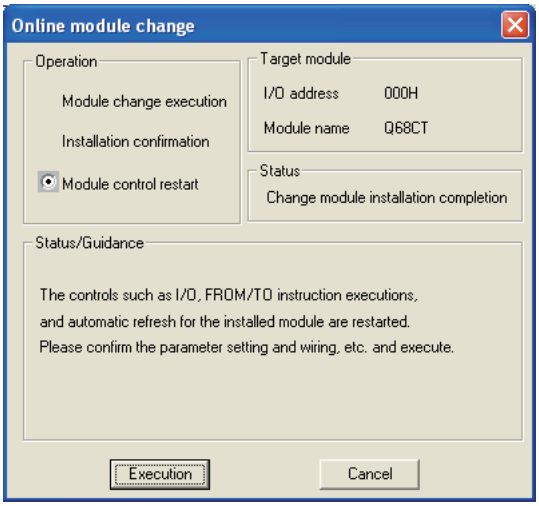
Always remove the module. If mounting confirmation is made without the module being removed, the module will not start properly and the RUN LED will not be lit.

(3) Mounting a new module



1. **Mount a new module in the same slot and install the terminal block.**
2. **After mounting the module, click the [Execution] button and make sure that the RUN LED is lit. Module READY (X0) remains off.**

(4) Checking operation



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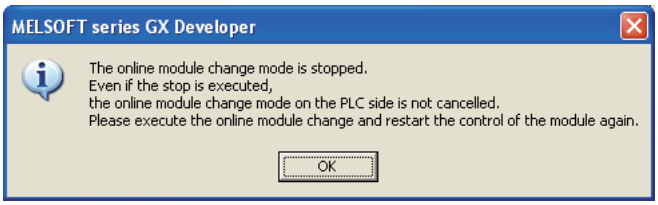

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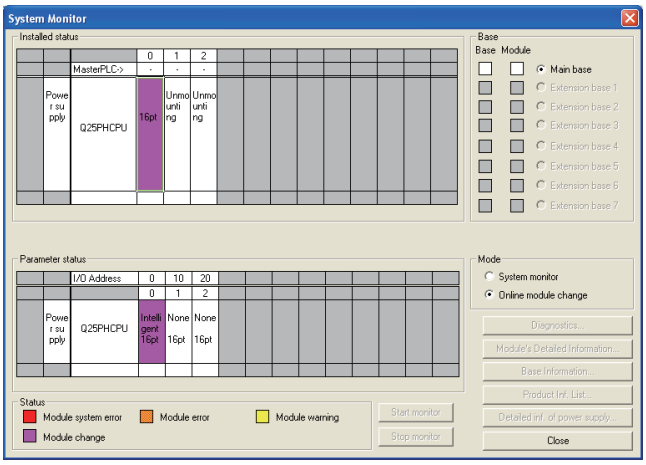

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(To the next page)

1. **To check the operation, click the Cancel button to cancel the control start.**

2. **Click the OK button to leave the "Online module change" mode.**

3. **Click the Close button to close the "System Monitor" window.**

(From the previous page)
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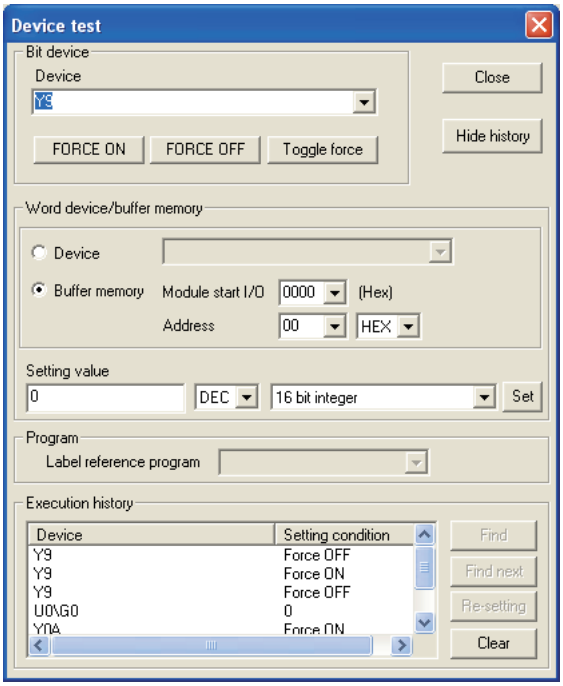


4. **In "Device test", set the prerecorded data to the buffer memory.**

[Online] ⇨ [Debug] ⇨ [Device test...]

5. **Turn User range write request (YA) from off to on to restore the user settings to the module.**

6. **Set Conversion enable/disable setting (Un\G0) to Enable (0) for the channel used.**

7. **Turn on then off Operating condition setting request (Y9).**

8. **Monitor CH☐ Digital output value (Un\G11 to Un\G18) to check if the digital conversion is performed properly.**

9. **Before starting the control, check the CT input module for the following. If an error occurs, refer to TROUBLESHOOTING (☞Page 228, CHAPTER 11) and take a corrective action.**

- If the RUN LED is on.
- If the ERR. LED is off.
- If Error flag (XF) is off.

10. **Since the new module is in the default status, initial settings must be configured using a sequence program after the control resumed. Before the initial setting, check if the initial setting program is proper, satisfying the following.**

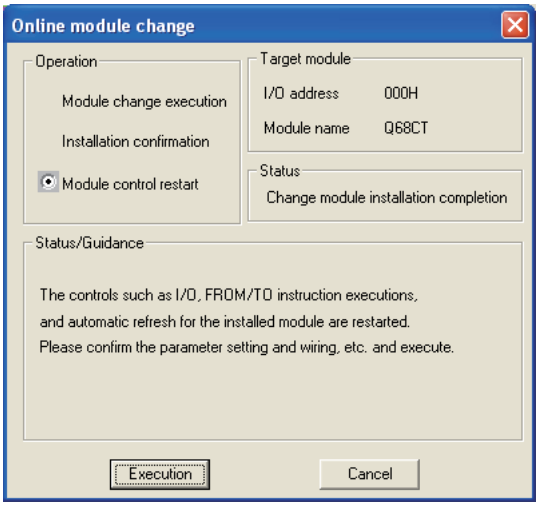
Normal system configuration

- The sequence program should set the initial setting on the leading edge of Module READY (X0) of the CT input module.
- Do not create a sequence program which sets the initial setting only one scan after RUN. In this case, the initial setting is not set.

When used on remote I/O network

- Insert a user device where the initial setting will be set at any timing (initial setting request signal) into the sequence program.
- Do not create a sequence program which sets the initial setting only one scan after a data link start of the remote I/O network. In this case, the initial setting is not set.

(5) Resuming operation



↓

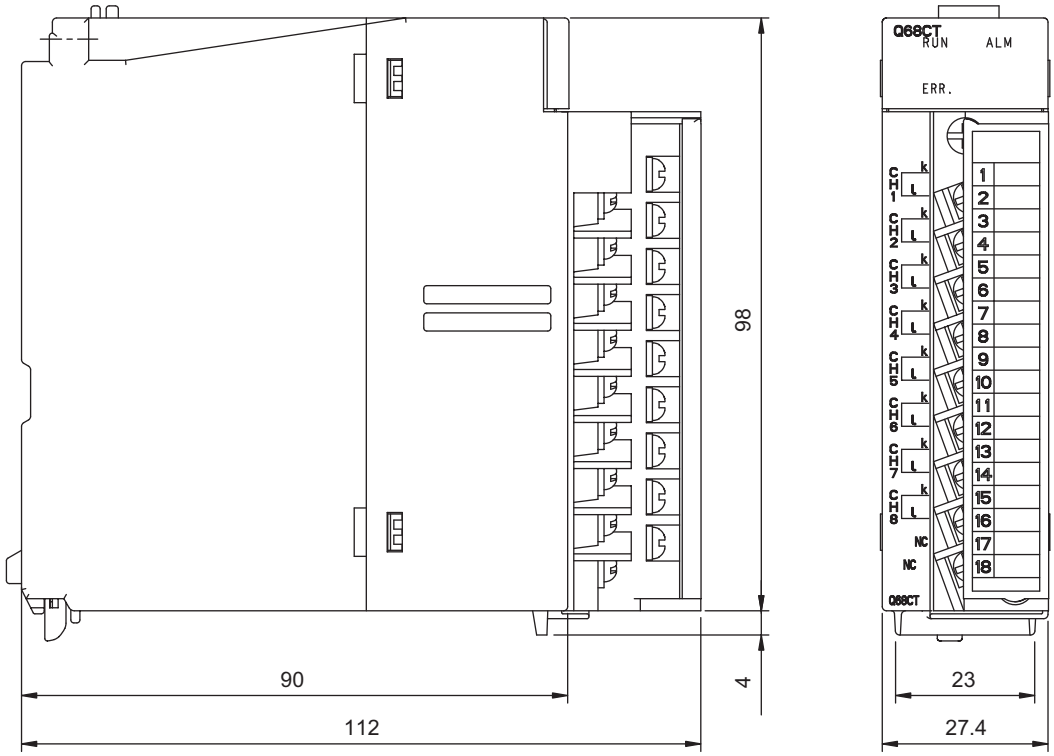
1. **Open the "Online module change" window again.**

2. **Click the [Execution] button on the appeared window to resume control. Module READY (X0) turns on.**

3. **The online module change is complete.**

Appendix 4 External Dimensions

The following figure shows the external dimensions of a CT input module.



(Unit: mm)

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REVISIONS

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

Print date	*Manual number	Revision
March 2012	SH(NA)-081033ENG-A	First edition

Japanese manual version SH-081032-A

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MODEL: Q68CT-U-E
MODEL CODE: 13JZ66

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