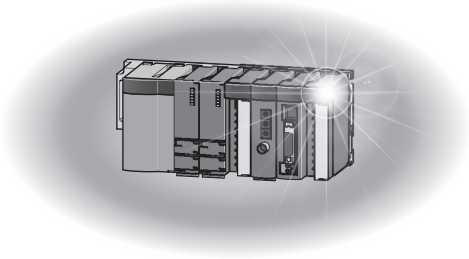
MITSUBISHI ELECTRIC

Programmable Controller

MELSEC Q series

MELSEC-Q High Speed Analog-Digital Converter Module User's Manual

-Q64ADH



●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.

[Design Precautions]

⚠CAUTION

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

[Installation Precautions]

⚠CAUTION

- Use the programmable controller in an environment that meets the general specifications in the user's manual for the CPU module used. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To mount the module, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place. Incorrect mounting may cause malfunction, failure or drop of the module. When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.
- Tighten the screw 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]

⚠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.
- After wiring, attach the included terminal cover to the module before turning it on for operation. Failure to do so may result in electric shock.
- Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
- Tighten the terminal screw 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]

⚠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 may cause malfunction. ● 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 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. ● 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 Precaution]

⚠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 Q64ADH high speed analog-digital converter module (hereafter abbreviated as Q64ADH).

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 the actual system, ensure the applicability and confirm that it will not cause system control problems.

■Relevant module: Q64ADH

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 the Q64ADH.
  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 270, Appendix 3)

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 User's 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 Version 1 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

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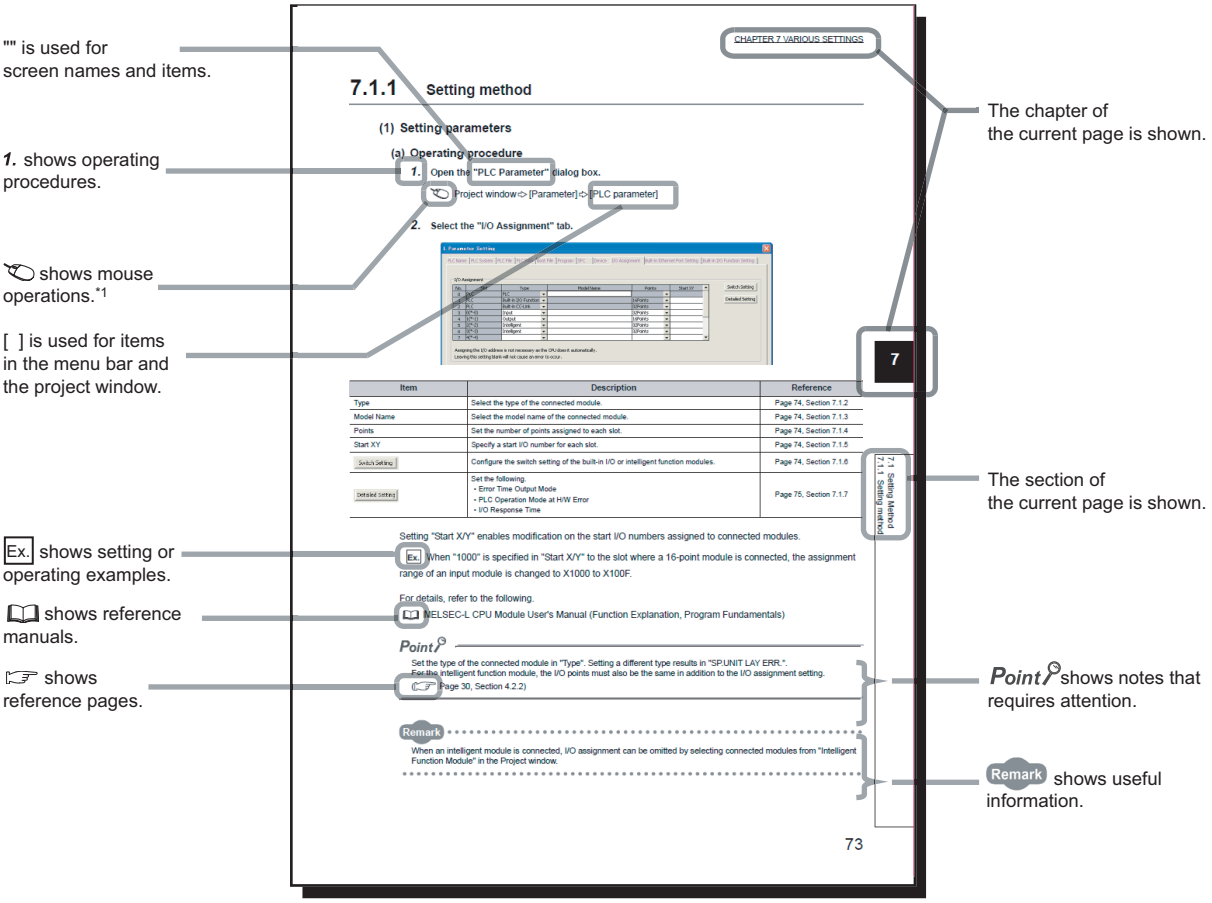
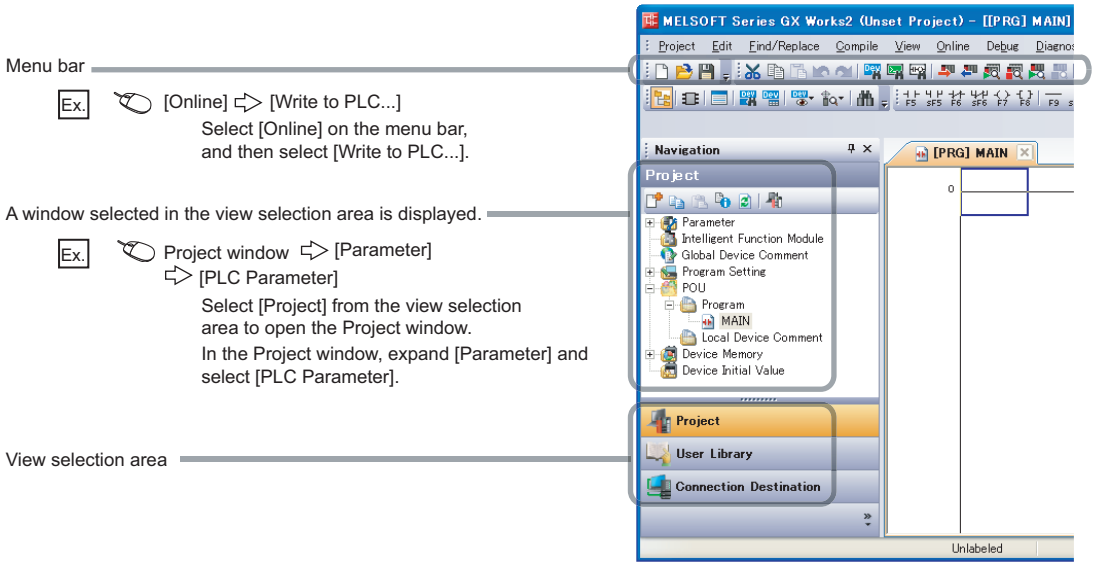
CONTENTS

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.

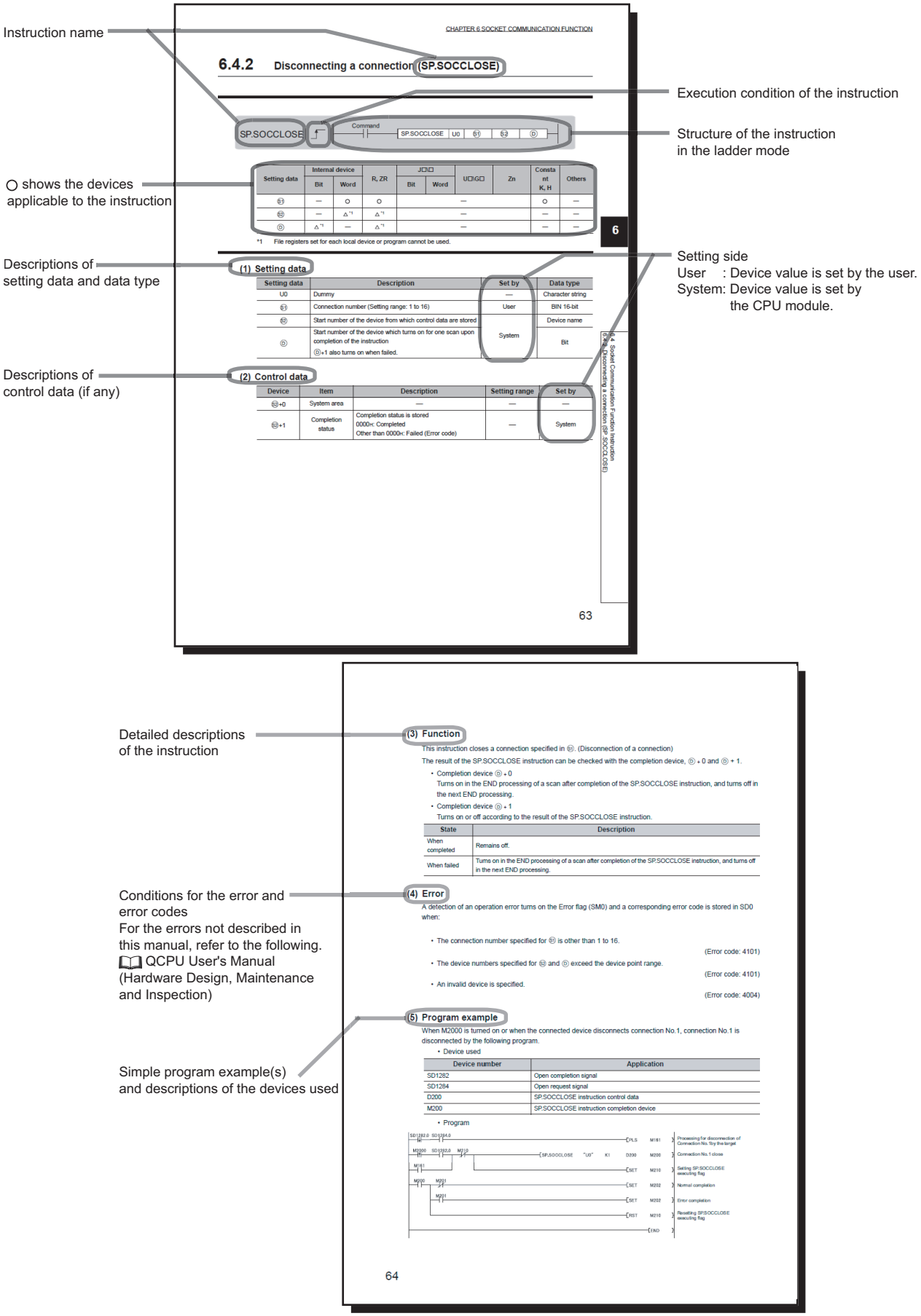


*1 The mouse operation example is provided below.



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 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, DX, 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

TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
Q64ADH	The abbreviation for the Q64ADH high speed analog-digital converter module
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
Factory default setting	A generic term for analog input ranges of 0 to 10V, 0 to 5V, 1 to 5V, -10 to 10V, 0 to 20mA, and 4 to 20mA
GX Works2	The product name of the software package for the MELSEC programmable controllers
GX Developer	
Programming tool	A generic term for GX Works2 and GX Developer
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
Normal mode	"Normal mode" and "Offset/gain setting mode" are the names of operation modes set with the switch setting. However, as a setting item displayed in the programing tool window, "Normal mode" is indicated as "Normal (A/D Converter Processing) Mode".
Offset/gain setting mode	
Normal logging mode	The mode when the following settings are made with the switch setting. • Drive Mode Setting: Normal mode • Logging Mode Setting: Normal Logging Mode
High-speed logging mode	The mode when the following settings are made with the switch setting. • Drive Mode Setting: Normal mode • Logging Mode Setting: High-Speed Logging Mode

PACKING LIST

The product package contains the following.

Model	Product	Quantity
Q64ADH	High speed analog-digital converter module	1
Q64ADH-U-HW	Before Using the Product	1

CHAPTER 1 OVERVIEW

1.1 Features

(1) High-speed conversion

The high-speed conversion of 20μs/channel is achieved.

(2) Detailed control by high resolution

In all analog input ranges, the high resolution of 1/20000 is achieved.

(3) Reliability by high accuracy

The accuracy for the maximum value of the digital output value is ±0.1% (25±5°C), ±0.2% (0 to 55°C).

(4) Operation of digital output value by each function

The scaling function, shift function, digital clipping function and difference conversion function can represent the digital output value in a numeric value easy to understand according to the use environment.

(5) Comparing/monitoring the measurement target

By using the input signal error detection function, input range extended mode function, or warning output function (process alarm), the statuses of connected devices can be monitored easily.

(6) Logging function

An analysis of data collected by logging function increases maintainability of used system.
By using the high-speed logging mode, high-speed data collection at 20μs can be performed.

(7) Flow amount integration function

The flow amount integration function executes the integral processing of input (instantaneous flow amount) from a flow meter and easily calculates the flow amount in a certain period. By registering/outputting the calculated flow amount, system operation can be improved and man-hours for programming can be reduced.

(8) Easy setting with GX Works2

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

(9) Online module change

Modules can be replaced without stopping the system.

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CHAPTER 2 SYSTEM CONFIGURATION

This chapter describes the system configuration of the Q64ADH.

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

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

Note the following when mounting modules with the CPU module.

- The power supply capacity may become insufficient depending on the combination with other modules or the number of mounted modules. Select the power supply capacity according to the modules to be used. If the power supply capacity is insufficient, change the combination of the modules.
- Mount the modules within the number of I/O points range of the CPU module. Modules can be mounted on any slot within the number of available slots.

Remark

To use a C Controller module with the Q64ADH, refer to the C Controller Module User's Manual.

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

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

(2) For multiple CPU system

When using the Q64ADH in a multiple CPU system, refer to the following manual.

- QCPU User's Manual (Multiple CPU System)

(3) For online module change

The Q64ADH supports online module change. For details, refer to the following.

- Online Module Change Procedure (Page 205, CHAPTER 10)

(4) Applicable software packages

The following table lists relation between the system including the Q64ADH and software package.
A programming tool is required to use the Q64ADH.

Item		Software version	
		GX Developer*1	GX Works2
Q00J/Q00/Q01CPU	Single CPU system	Version 7 or later	Refer to the GX Works2 Version 1 Operating Manual (Common).
	Multiple CPU system	Version 8 or later	
Q02/Q02H/Q06H/Q12H/Q25HCPU	Single CPU system	Version 4 or later	
	Multiple CPU system	Version 6 or later	
Q02PH/Q06PHCPU	Single CPU system	Version 8.68W or later	
	Multiple CPU system		
Q12PH/Q25PHCPU	Single CPU system	Version 7.10L or later	
	Multiple CPU system		
Q12PRH/Q25PRHCPU	Redundant system	Version 8.45X or later	
Q00UJ/Q00U/Q01UCPU	Single CPU system	Version 8.76E or later	
	Multiple CPU system		
Q02U/Q03UD/Q04UDH/ Q06UDHCPU	Single CPU system	Version 8.48A or later	
	Multiple CPU system		
Q10UDH/Q20UDHCPU	Single CPU system	Version 8.76E or later	
	Multiple CPU system		
Q13UDH/Q26UDHCPU	Single CPU system	Version 8.62Q or later	
	Multiple CPU system		
Q03UDE/Q04UDEH/Q06UDEH/ Q13UDEH/Q26UDEHCPU	Single CPU system	Version 8.68W or later	
	Multiple CPU system		
Q10UDEH/Q20UDEHCPU	Single CPU system	Version 8.76E or later	
	Multiple CPU system		
CPU module other than the above	Single CPU system	N/A	
	Multiple CPU system		
If installed in a MELSECNET/H remote I/O station		Version 6 or later	

*1 GX Configurator-AD is not supported. When using GX Developer, set initial settings on a sequence program.

Point

When using GX Works2, refer to the following.

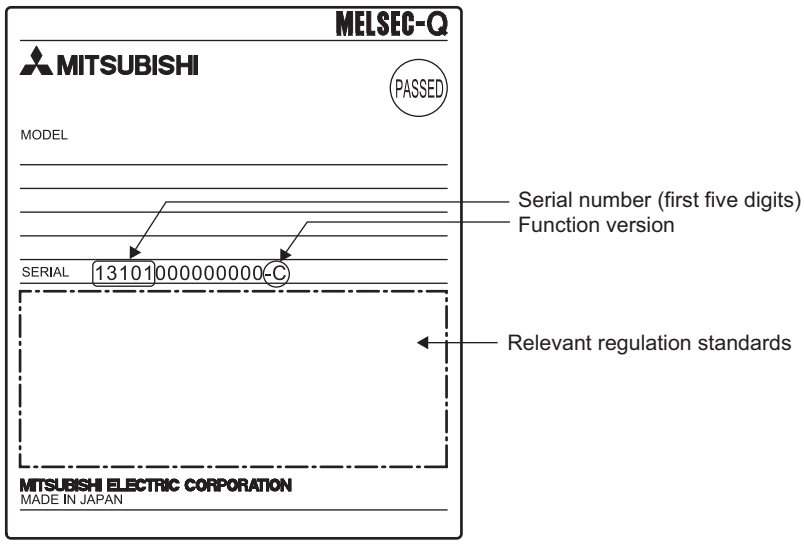
- GX Works2 Version1 Operating Manual (Common)
- GX Works2 Version1 Operating Manual (Intelligent Function Module)

2.2 How to Check the Function Version and Serial Number

The function version and serial number of the Q64ADH can be checked on the rating plate, front part of a module, or system monitor of a programming tool.

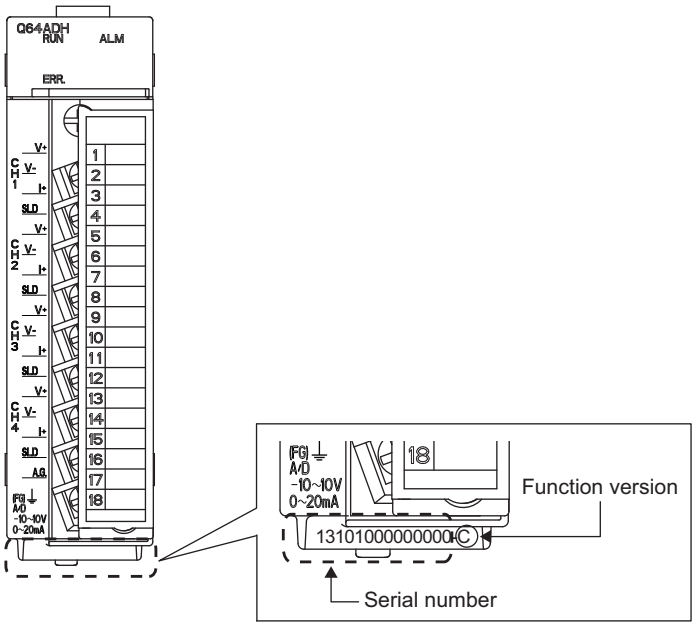
(1) Checking on rating plate

The rating plate is on the side of the Q64ADH.



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

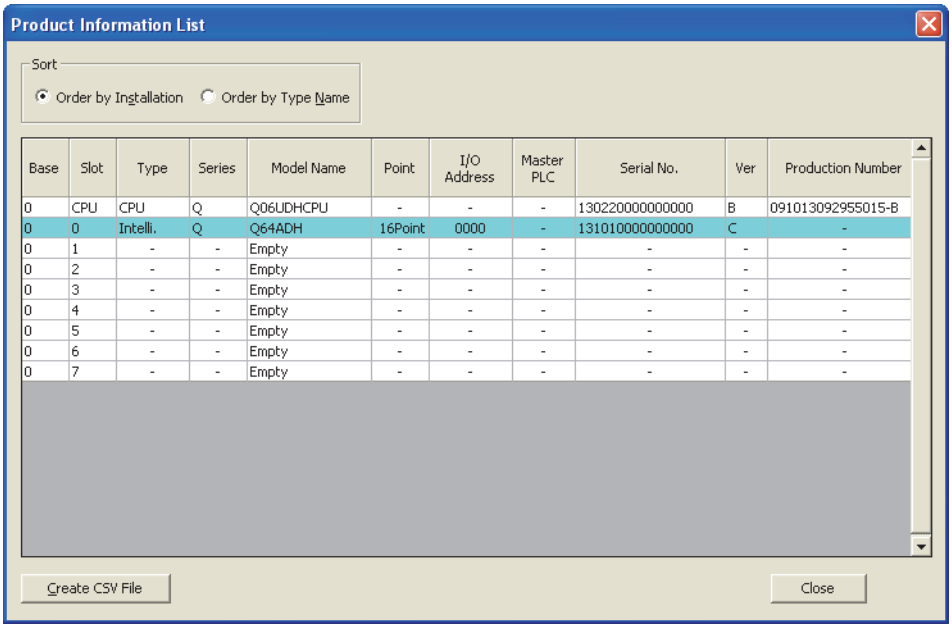
The function version and serial number on the rating plate are also shown on the front part (bottom part) of the module.



(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 Q64ADH, "-" 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 characteristic, accuracy, and function list.

3.1 General Specifications

For the general specifications of the Q64ADH, 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 Q64ADH.

3.2.1 Performance specifications list

The following table shows the performance specifications of the Q64ADH.

<table>
<tr><th colspan="3" rowspan="2">Item</th><th colspan="4">Model</th></tr>
<tr><th colspan="4">Q64ADH</th></tr>
<tr><td colspan="3">Number of analog input channels</td><td colspan="4">4 channels</td></tr>
<tr><td rowspan="2">Analog input</td><td colspan="2">Voltage</td><td colspan="4">-10 to 10VDC (Input resistance 1MΩ)</td></tr>
<tr><td colspan="2">Current</td><td colspan="4">0 to 20mADC (Input resistance 250Ω)</td></tr>
<tr><td rowspan="2" colspan="2">Digital output</td><td colspan="4">-20480 to 20479</td></tr>
<tr><td>When using the scaling function</td><td colspan="4">-32768 to 32767</td></tr>
<tr><td rowspan="10" colspan="3">I/O characteristics, maximum resolution[*1]</td><td colspan="2">Analog input range</td><td>Digital output value</td><td>Maximum resolution</td></tr>
<tr><td rowspan="6">Voltage</td><td>0 to 10V</td><td rowspan="3">0 to 20000</td><td>500μV</td></tr>
<tr><td>0 to 5V</td><td>250μV</td></tr>
<tr><td>1 to 5V</td><td>200μV</td></tr>
<tr><td>-10 to 10V</td><td>-20000 to 20000</td><td>500μV</td></tr>
<tr><td>1 to 5V (Extended mode)</td><td>-5000 to 22500</td><td>200μV</td></tr>
<tr><td>User range setting</td><td>-20000 to 20000</td><td>219μV</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td><td rowspan="2">0 to 20000</td><td>1000nA</td></tr>
<tr><td>4 to 20mA</td><td>800nA</td></tr>
<tr><td>4 to 20mA (Extended mode)</td><td>-5000 to 22500</td><td>800nA</td></tr>
<tr><td>User range setting</td><td>-20000 to 20000</td><td>878nA</td></tr>
<tr><td rowspan="2">Accuracy (accuracy for the maximum value of the digital output value)[*2]</td><td>Ambient temperature 25±5°C</td><td colspan="4">Within ±0.1% (±20digit)</td></tr>
<tr><td>Ambient temperature 0 to 55°C</td><td colspan="4">Within ±0.2% (±40digit)</td></tr>
<tr><td colspan="3">Conversion speed[*3*4*5]</td><td colspan="4">High speed: 20μs/channel
Medium speed: 80μs/channel
Low speed: 1ms/channel</td></tr>
<tr><td colspan="3">Absolute maximum input</td><td colspan="4">Voltage: ±15V, Current: 30mA[*6]</td></tr>
<tr><td colspan="3">Offset/gain setting count[*7]</td><td colspan="4">Up to 50000 times</td></tr>
<tr><td colspan="3">Isolation method</td><td colspan="4">Between I/O terminals and programmable controller power supply: photocoupler isolation
Between input channels: no isolation</td></tr>
<tr><td colspan="3">Dielectric withstand voltage</td><td colspan="4">Between I/O terminals and programmable controller power supply: 500VACrms for 1 minute</td></tr>
<tr><td colspan="3">Insulation resistance</td><td colspan="4">Between I/O terminals and programmable controller power supply: 500VDC 10MΩ or higher</td></tr>
<tr><td colspan="3">Number of occupied I/O points</td><td colspan="4">16 points (I/O assignment: Intelligent 16 points)</td></tr>
<tr><td colspan="3">External interface</td><td colspan="4">18-point terminal block</td></tr>
<tr><td colspan="3">Applicable wire size</td><td colspan="4">0.3 to 0.75mm^2</td></tr>
<tr><td colspan="3">Applicable solderless terminal</td><td colspan="4">R1.25-3 (solderless terminals with sleeve are not usable)</td></tr>
<tr><td colspan="3">Internal current consumption (5VDC)</td><td colspan="4">0.52A</td></tr>
<tr><td colspan="3">Weight</td><td colspan="4">0.18kg</td></tr>
</table>

*1 For details on the I/O conversion characteristics, refer to the following.
I/O conversion characteristic of A/D conversion (☞ Page 24, Section 3.2.2)
*2 Except when receiving noise influence.
*3 The default value is 20μs/channel.
*4 The logging function (normal logging mode) can be used at the medium speed (80μs/channel) or low speed (1ms/channel). The logging function (high-speed logging mode) can be used at the high speed (20μs/channel).
*5 The flow amount integration function can be used only in the low speed (1ms/channel).
*6 This is a momentary current value which does not cause damage to internal resistors of the module. The maximum input current value for constant application is 24mA.
*7 If the number of offset/gain settings exceeds 50000 times, an error occurs.

3.2.2 I/O conversion characteristic of A/D conversion

I/O conversion characteristic of the Q64ADH means the slope of the line connected between the offset value and gain value when converting the analog signal (voltage or current input) from outside of programmable controller to digital value.

(1) Offset value

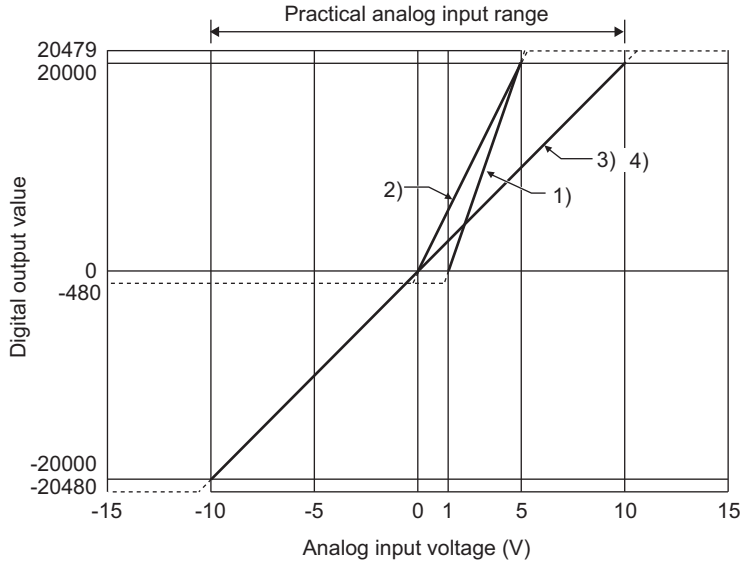
This is the analog input value (voltage or current) when the digital output value becomes 0.

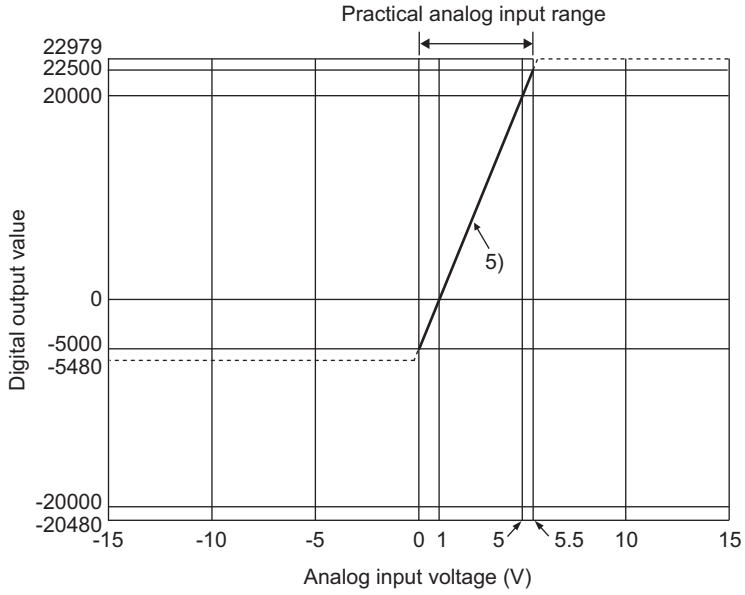
(2) Gain value

This is the analog input value (voltage or current) when the digital output value becomes 20000.

(3) Voltage input characteristic

The following graph shows the voltage input characteristic.





No.	Input range setting	Offset value	Gain value	Digital output value*2	Maximum resolution
1)	1 to 5V	1V	5V	0 to 20000	200μV
2)	0 to 5V	0V	5V		250μV
3)	-10 to 10V	0V	10V	-20000 to 20000	500μV
4)	0 to 10V	0V	10V	0 to 20000	
5)	1 to 5V (Extended mode)	1V	5V	-5000 to 22500	200μV
—	User range setting	*1	*1	-20000 to 20000	219μV

*1 Set the offset value and gain value in the user range setting within the range satisfying the following conditions. If the following conditions are not satisfied, A/D conversion may not be properly performed.
• Setting range for offset value and gain value: -10 to 10V
• ((gain value) - (offset value)) ≥ 4.0V

*2 When analog input is performed exceeding the range of digital output value, the digital output value is fixed to the maximum or minimum.

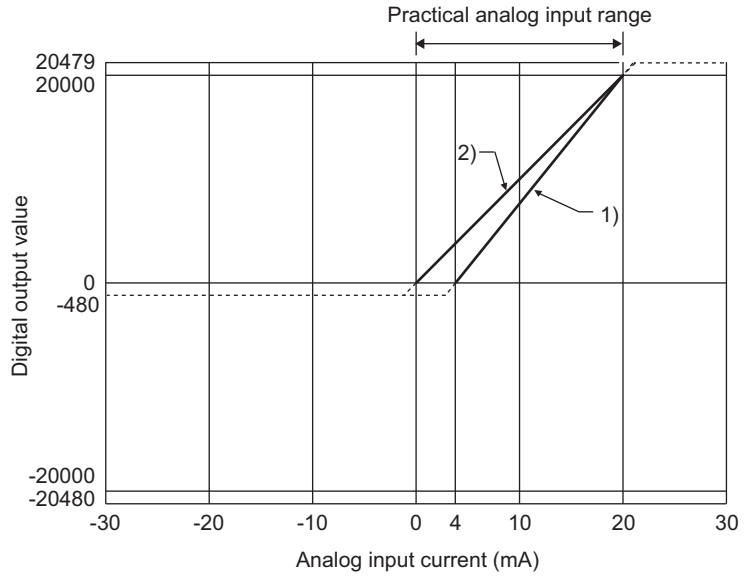
Input range setting	Digital output value	
	Minimum	Maximum
1 to 5V	-480	20479
0 to 5V		
-10 to 10V	-20480	
0 to 10V	-480	
1 to 5V (Extended mode)	-5480	22979
User range setting	-20480	20479

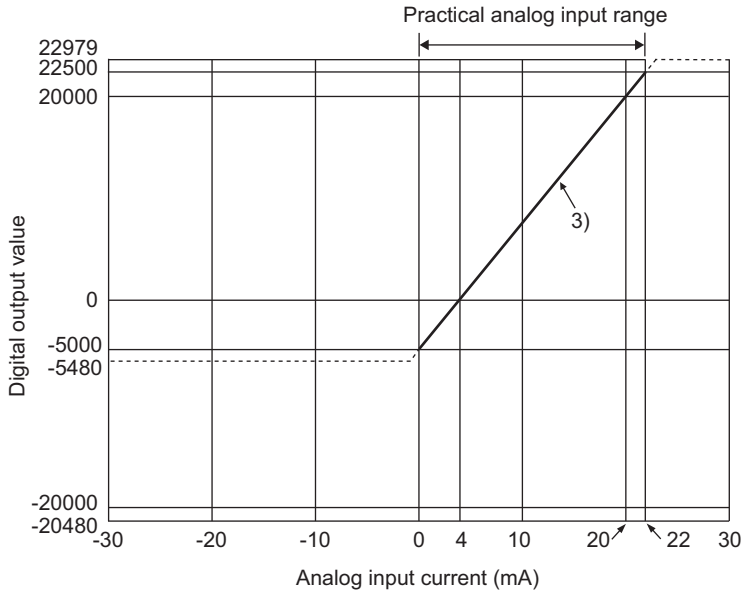
Point

- Use the value within the practical analog input range and practical digital output range. If a value is out of the range, the maximum resolution and accuracy may not fall within the range of performance specifications. (Do not use the value in the dotted line region in the graph of voltage input characteristic.)
- Do not input ±15V or more. This may damage the elements.

(4) Current input characteristic

The following graph shows the current input characteristic.





No.	Input range setting	Offset value	Gain value	Digital output value*2	Maximum resolution
1)	4 to 20mA	4mA	20mA	0 to 20000	800nA
2)	0 to 20mA	0mA	20mA		1000nA
3)	4 to 20mA (Extended mode)	4mA	20mA	-5000 to 22500	800nA
—	User range setting	*1	*1	-20000 to 20000	878nA

*1 Set the offset value and gain value in the user range setting within the range satisfying the following conditions. If the following conditions are not satisfied, A/D conversion may not be properly performed.
• gain value ≤ 20mA, offset value ≥ 0mA
• ((gain value) - (offset value)) ≥ 16.0mA

*2 When analog input is performed exceeding the range of digital output value, the digital output value is fixed to the maximum or minimum.

Input range setting	Digital output value	
	Minimum	Maximum
4 to 20mA	-480	20479
0 to 20mA		
4 to 20mA (Extended mode)	-5480	22979
User range setting	-20480	20479

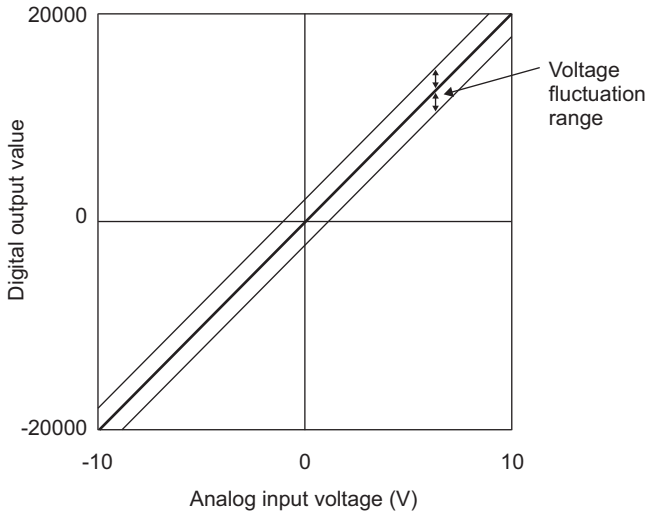
Point

- Use the value within the practical analog input range and practical digital output range. If a value is out of the range, the maximum resolution and accuracy may not fall within the range of performance specifications. (Do not use the value in the dotted line region in the graph of current input characteristic.)
- Do not input a value of ±30mA or more. This may damage the elements.

3.2.3 A/D conversion accuracy

The A/D conversion accuracy of the Q64ADH is the accuracy for the maximum value of digital output value.
Even when changing the offset/gain setting and input range to change the input characteristics, the accuracy does not change and is kept within the range of described performance specifications.

The following graph shows the fluctuation range of accuracy when the range of -10 to 10V is selected.
The accuracy is ±0.1% (±20 digit) when the ambient temperature is 25 ±5°C and ±0.2% (±40 digit) when the ambient temperature is 0 to 55°C. (Excluding the case under noise effect.)



3.2.4 Number of parameter settings

Set the initial setting of the Q64ADH and the parameter setting of auto refresh setting so that the number of parameters, including these 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 (maximum number of parameter settings), refer to the following.

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

(1) Number of Q64ADH parameters

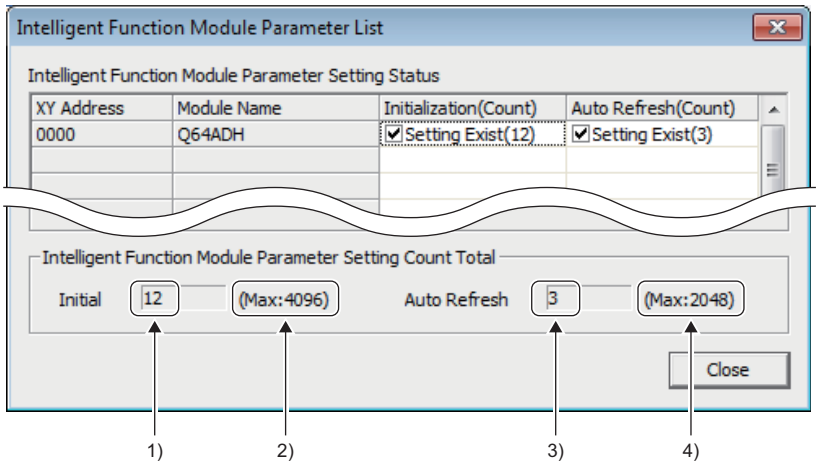
For the Q64ADH, the following number of parameters can be set per module.

Target module	Initial setting	Auto refresh setting
Q64ADH	12	75 (maximum number of settings)

(2) Checking method

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

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



No.	Description
1)	The total number of parameters in the initial settings selected on the dialog box
2)	The maximum number of parameter settings in the initial settings
3)	The total number of parameters in the auto refresh settings selected on the dialog box
4)	The maximum number of parameter settings in the auto refresh settings

3.3 Function List

The following is the function list of the Q64ADH.

Item			Description	Reference
A/D conversion enable/disable function			Sets whether to enable or disable A/D conversion for each channel. Disabling the A/D conversion for unused channels reduces the conversion cycles.	Page 38, Section 4.3
A/D conversion method	Sampling processing		The Q64ADH executes the A/D conversion of the analog input value sequentially and stores the digital output value to the buffer memory.	Page 38, Section 4.4 (1)
	Averaging processing	Time average	The Q64ADH executes the A/D conversion for set time, and stores the average of the total value excluding the maximum and the minimum values to the buffer memory. The number of processing time within the setting time changes depending on the number of channels used (the number of channels set to A/D conversion enabled).	Page 39, Section 4.4 (2) (a)
		Count average	The Q64ADH executes the A/D conversion for set time, and stores the average of the total value excluding the maximum and the minimum values to the buffer memory. Time for the count average value stored in the buffer memory changes depending on the used channel numbers (the number of channels specified to A/D conversion enable).	Page 39, Section 4.4 (2) (b)
		Moving average	The Q64ADH averages digital output values of set number of times which are measured every sampling cycle, and stores them in the buffer memory. Since the averaging processing is performed on a moving set of sampling processing, the most current digital output values can be obtained.	Page 40, Section 4.4 (2) (c)
Range switching function			The input range to use can be selected from the following ranges: • Factory default range (4 to 20mA, 0 to 20mA, 1 to 5V, 0 to 5V, -10 to 10V, 0 to 10V) • User range (User range setting) • Extended mode range (4 to 20mA (Extended mode), 1 to 5V (Extended mode))	Page 170, Section 8.2
Offset/gain setting function			This function compensates for errors in digital output values.	Page 175, Section 8.5
Input range extended mode function			The input range can be extended. By combining this function with the input signal error detection function, simple disconnection detection can be executed.	Page 42, Section 4.5
Conversion speed switch function			The conversion speed can be selected from 20μs, 80μs or 1ms.	Page 43, Section 4.6
Maximum value/minimum value hold function			The Q64ADH stores the maximum and minimum values of the digital operation values for each channel to the buffer memory.	Page 43, Section 4.7
Input signal error detection function			This function detects the analog input value which exceeds the setting range.	Page 44, Section 4.8
Warning output function (process alarm)			This function outputs alarm when a digital operation value is in the range set in advance.	Page 50, Section 4.9
Scaling function			The Q64ADH scale-converts the digital output value to the set range of the scaling upper limit value and scaling lower limit value. This omits the sequence programming of the scale conversion.	Page 52, Section 4.10
Shift function			The Q64ADH adds the set shifting amount to conversion value to the digital operation value and stores in the buffer memory. Fine adjustment can be performed easily when the system starts.	Page 56, Section 4.11
Digital clipping function			When the input voltage or current exceeds the input range, the maximum value of the digital operation value can be set to 20000, and the minimum value can be set to 0 or -20000.	Page 59, Section 4.12
Difference conversion function			This function subtracts the difference conversion reference value from the digital operation value and stores the acquired value in the buffer memory.	Page 62, Section 4.13

Item		Description	Reference
Logging function	Normal logging mode	This function logs the digital output value or digital operation value. 10000 point data sets can be logged for each channel. (Note that the function can be used only when the conversion speed is 80μs or 1ms.)	Page 66, Section 4.14
	High-speed logging mode	High-speed logging (recording) can be performed at a conversion speed of 20μs.	Page 82, Section 4.15
Flow amount integration function		This function performs the A/D conversion of analog input value (voltage or current) from a source such as a flow meter and integrates the digital operation value.	Page 95, Section 4.16
Error log function		The function stores up to latest 16 records of errors and alarms occurred in the Q64ADH to the buffer memory.	Page 104, Section 4.17
Module error collection function		This function collects errors and alarms occurred in the Q64ADH and stores to the CPU module.	Page 107, Section 4.18
Error clear function		Clearing the error from the system monitor at error occurrence is possible.	Page 108, Section 4.19
Online module change		Modules can be replaced without stopping the system.	Page 205, CHAPTER 10

(1) Function availability in normal logging mode and in high-speed logging mode

Available functions differ in between normal logging mode and high-speed logging mode. The table below lists the availability of functions.

○: Available, △: Available with condition, ×: Not available

Item			Normal logging mode	High-speed logging mode
A/D conversion enable/disable function			○	○
A/D conversion method	Sampling processing		○	○
	Averaging processing	Time average	○	×
		Count average	○	×
		Moving average	○	×
Range switching function			○	○
Offset/gain setting function			○	○
Input range extended mode function			○	○
Conversion speed switch function			○	△ (Fixed to 20μs)
Maximum value/minimum value hold function			○	×
Input signal error detection function			○	×
Warning output function (process alarm)			○	×
Scaling function			○	×
Shift function			○	×
Digital clipping function			○	×
Difference conversion function			○	×
Logging function			△ (Conversion speed: 80μs or 1ms)	△ (Conversion speed: 20μs only)
Flow amount integration function			△ (Conversion speed: 1ms only)	×
Error log function			○	○
Module error collection function			○	○
Error clear function			○	○
Online module change			○	○

CHAPTER 4 FUNCTIONS

This chapter describes the details of the functions available in the Q64ADH, and the setting procedures for those functions.

For details on I/O signals and buffer memory, refer to the following.

- Details of I/O Signals (☞Page 110, Section 5.2)
- Details of Buffer Memory Addresses (☞Page 131, Section 6.2)

4.1 Modes

The Q64ADH provides the normal mode and offset/gain setting mode. Change the mode according to the function used.

Each mode is explained as follows:

(1) Normal mode

The normal mode has the normal logging mode and high-speed logging mode. The term "normal mode" used in this manual covers the normal logging mode and high-speed logging mode.

(a) Normal logging mode

This mode is for normal A/D conversion. The logging function whose conversion speed is 80μs or 1ms can be used.

(b) High-speed logging mode

This mode is for using the high-speed logging function whose conversion speed is 20μs.

(2) Offset/gain setting mode

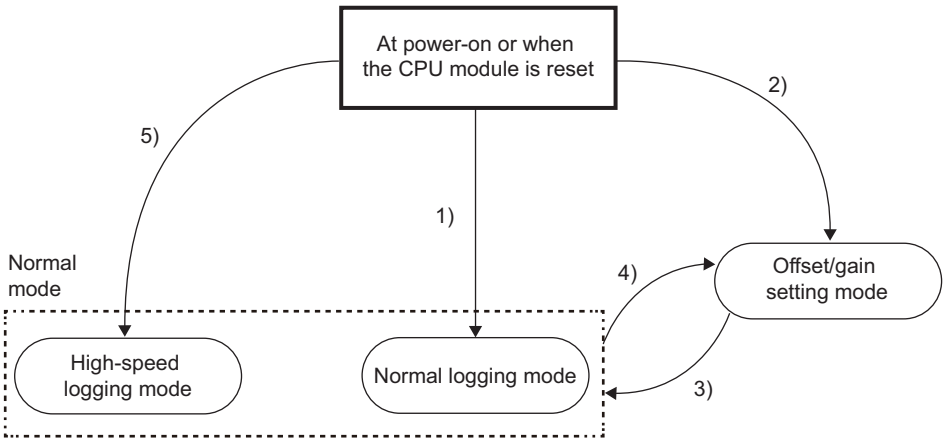
This mode is for configuring the offset/gain setting.

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

- Offset/gain setting (☞Page 175, Section 8.5)

(3) Mode transition

The following figure and table describe the transition condition for each mode.



No.	Transition condition	
1)	In "Switch Setting" of GX Works2, set "Normal (A/D Converter Processing) Mode" for "Drive Mode Setting", and set "Normal Logging Mode" for "Logging Mode Setting".	
2)	In "Switch Setting" of GX Works2, set "Offset-Gain Setting Mode" for "Drive Mode Setting".	
3)	Change the mode with one of the following methods.	
	Method 1	Execute the G(P).OFFGAN (argument Ⓢ: 0: Shifting to the normal mode).
	Method 2	Set the following values for Mode switching setting (Un\G158, Un\G159) and turn on and off Operating condition setting request (Y9). Un\G158: 0964_H Un\G159: 4144_H
4)	Change the mode with one of the following methods.	
	Method 1	Execute the G(P).OFFGAN (argument Ⓢ: 1: Shifting to the offset/gain setting mode).
	Method 2	Set the following values for Mode switching setting (Un\G158, Un\G159) and turn on and off Operating condition setting request (Y9). Un\G158: 4144_H Un\G159: 0964_H
5)	In "Switch Setting" of GX Works2, set "Normal (A/D Converter Processing) Mode" for "Drive Mode Setting", and set "High-Speed Logging Mode" for "Logging Mode Setting".	

Point

- In the state of startup in the offset/gain setting mode (above 2)), when the mode switches to the normal mode, the normal logging mode will start. To configure the offset/gain setting in the high-speed logging mode, start up in the high-speed logging mode by performing step 5) above, and switch to the offset/gain setting mode.
- If the mode switches from the normal logging mode to the offset/gain setting mode (above 4)) and then switches again, the normal logging mode will start. If the mode switches from the high-speed logging mode to the offset/gain setting mode (above 4)) and then switches again, the high-speed logging mode will start.

(4) Checking method

The current mode can be checked with the following items.

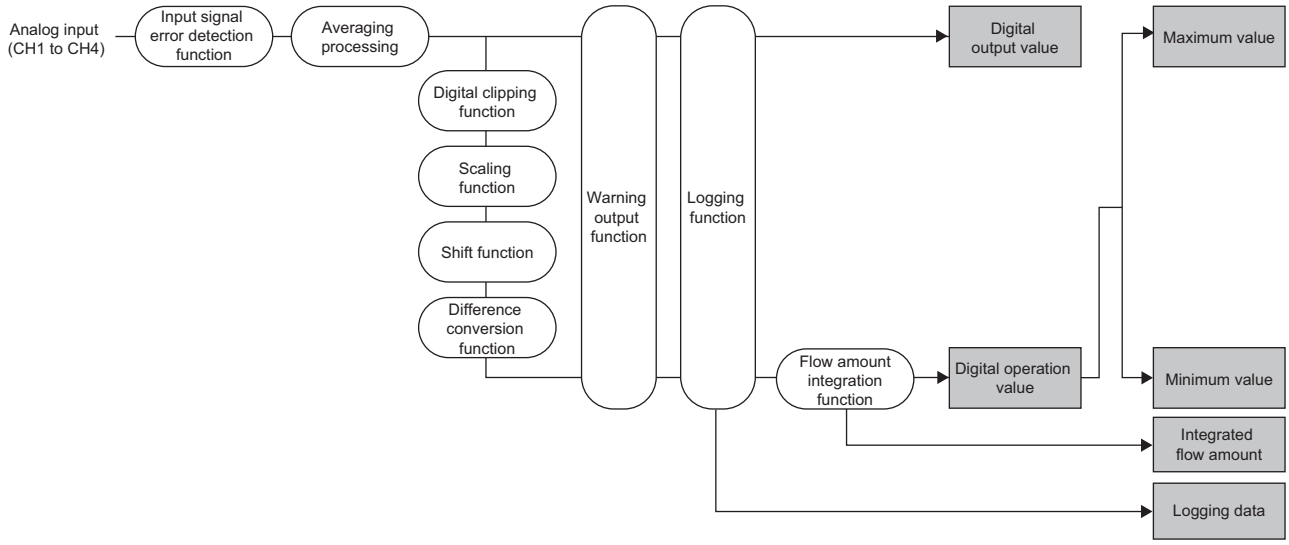
Mode		RUN LED status	Stored value for Logging mode Monitor (Un\G1199)	Offset/gain setting mode flag (XA)
Normal mode	Normal logging mode	On	0	OFF*1
	High-speed logging mode	On	1	OFF*1
Offset/gain setting mode		Flashing	—	ON*1

*1 Status when User range write request (YA) is off

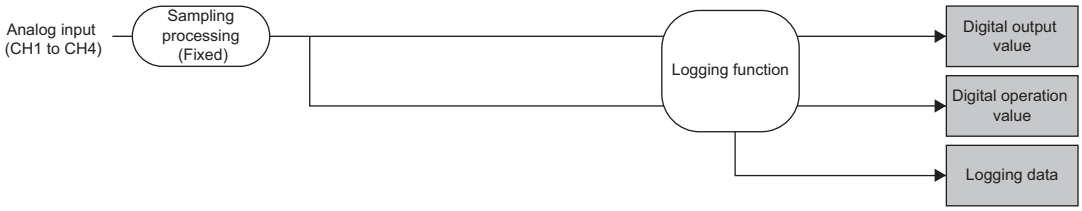
4.2 Processing Each Function

Analog input values and digital values from (1) to (5) are processed in the following orders. If multiple functions are enabled, the output of the first processed function is used as the input of the next function.

- Normal logging mode



- High-speed logging mode



(1) Digital output values

Digital value obtained after sampling processing or averaging processing is stored.

(2) Digital operation values

- In the normal logging mode, values obtained by computing digital output values using the digital clipping function, scaling function, shift function, or difference conversion function are stored. When none of these functions is used, the same values as digital output values are stored.
- In the high-speed logging mode, the same values as digital output values are stored.

(3) Maximum and minimum values

- In the normal logging mode, the maximum and minimum digital operation values are stored.
- In the high-speed logging mode, the value is fixed to 0.

(4) Logging data

When the logging function is used, digital output values or digital operation values are collected.
For details on the logging function, refer to the following.

- Logging function (normal logging mode) (☞Page 66, Section 4.14)
- Logging function (high-speed logging mode) (☞Page 82, Section 4.15)

(5) Integrated flow amount

When the flow amount integration function is used, an integrated flow amount is obtained through integration of digital operation values.

For details on the flow amount integration function, refer to the following.

• Flow amount integration function (☞Page 95, Section 4.16)

Point

- Digital output values, digital operation values, and maximum and minimum values that are obtained through average processing (time average/count average) are stored by the average process cycle.
- When the input signal error detection function is used, the A/D conversion process is suspended if an input signal error occurs. In this case, the digital output values, digital operation values, and maximum and minimum values are not updated, and the values immediately before the input signal error is detected are held.
  When the analog input signal returns to its normal value, the A/D conversion process restarts.
  For details, refer to the following.
  • Input signal error detection function (☞Page 44, Section 4.8)

4.3 A/D Conversion Enable/Disable Function

Sets whether to enable or disable A/D conversion for each channel.
By disabling A/D conversion for the channels you are not using, the conversion cycle can be reduced.

(1) Setting procedure

1. **Set A/D conversion enable/disable setting (Un\G0) to Enabled (0).**
2. **Turn Operating condition setting request (Y9) OFF → ON → OFF.**

4.4 A/D Conversion Method

Sets whether to perform sampling processing or averaging processing for each channel.

(1) Sampling processing

Sequentially performs A/D conversion on the analog input values and stores the digital output values to the buffer memory.

Point

The conversion cycle is calculated by "Conversion speed × Number of used channels".
Conversion can be enabled or disabled per channel, allowing you to reduce the conversion cycle by disabling A/D conversion for the channels that are not used.

Ex. Conversion cycle in the following settings

- Number of used channels (where A/D conversion is enabled): CH1 to CH3 (three channels in total)
- Conversion speed: 80μs (middle speed)

80 × 3 = 240 (μs)
The conversion cycle is calculated to be 240(μs).

For details on conversion speed setting, refer to the following.

- Conversion Speed Switch Function (☞ Page 43, Section 4.6)

(2) Averaging processing

Performs averaging processing on the digital output values for each channel, and stores the average values to the buffer memory.
There are three processes in averaging processing, as follows:

- Time average
- Count average
- Moving average

(a) Time average

Performs A/D conversion for a set time, averages the total without the maximum and minimum values, and stores the average value to the buffer memory.
The processing count within the setting time varies depending on the number of channels used (number of channels for which A/D conversion is enabled).

$$\text{Number of processing times} = \frac{\text{Set period of time}}{(\text{Number of channels used} \times \text{Conversion speed})}$$

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

Item	Setting
Number of channels used (number of channels for which A/D conversion is enabled)	4 channels (CH1 to CH4)
Conversion speed	20 μs
Set period of time	15 ms

$$\frac{15}{(4 \times 0.02)} = 187.5 \text{ (times)} \cdots \text{Drop the fractional part}$$

→ Time is measured 187 times and the averaged value is output.

Point

The valid lower limit setting value for the time average is calculated by "(minimum processing count of 4) × (conversion speed) × (number of channels used)".

Ex. If a maximum of 4 channels are used (conversion speed: low speed):
4 × 1.0 × 4 = 16 ms

If the processing count becomes less than 4 due to the setting time, an error occurs, and a digital output value comes out to 0 (zero).

(b) Count average

Performs A/D conversion a set number of times, averages the total without the maximum and minimum values, and stores the average value to the buffer memory.
The time it takes for the count average value to be stored to the buffer memory varies depending on the number of channels used (number of channels for which A/D conversion is enabled).

Processing time = Set number of times × (Number of channels used × Conversion speed)

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

Item	Setting
Number of channels used (number of channels for which A/D conversion is enabled)	4 channels (CH1 to CH4)
Conversion speed	80 μs
Set number of times	20 times

20 × (4 × 0.08) = 6.4 (ms) → An average value is output every 6.4 ms.

Point

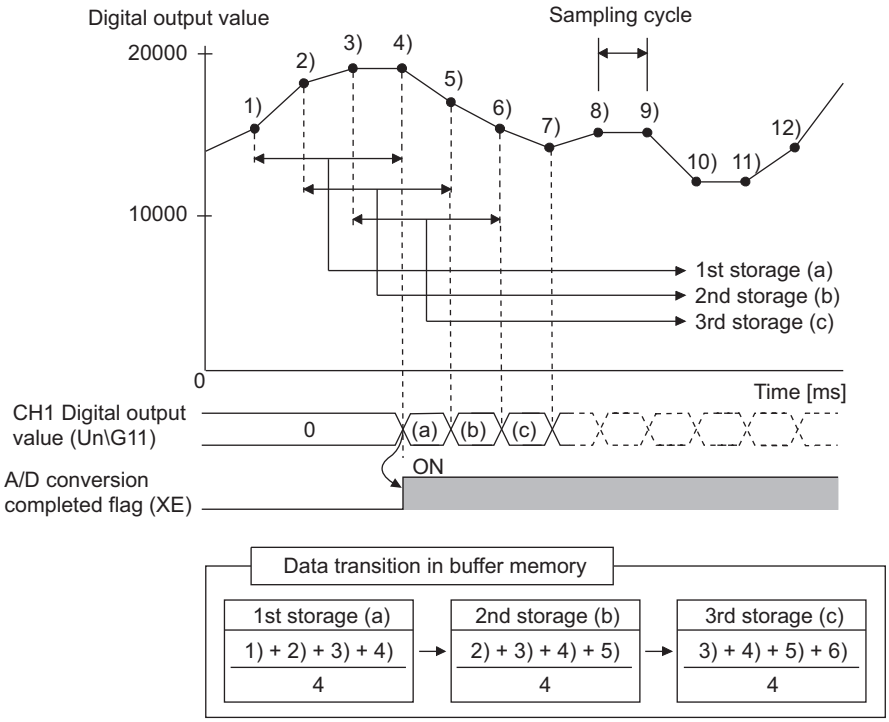
Because the count average requires a sum of at least two counts, not counting the maximum and minimum values, the set number of times should be set to 4 or more.

(c) Moving average

Takes the average of digital output values sampled over a set number of sampling cycles, and stores it to the buffer memory.

Since the averaging processing is performed on a moving set of sampling processing, the most current digital output values can be obtained.

The moving average processing for a set number of times of 4 is shown below:



(3) Setting procedure

(a) Sampling processing

1. **Set A/D conversion enable/disable setting (Un\G0) to Enabled (0).**
2. **Set Averaging process setting (Un\G24) to Sampling processing (0).**
3. **Turn Operating condition setting request (Y9) OFF → ON → OFF.**

(b) Averaging processing

1. **Set A/D conversion enable/disable setting (Un\G0) to Enabled (0).**
2. **Set the averaging process method in Averaging process setting (Un\G24).**

Item	Setting
Averaging process setting (Un\G24)	• Time average (1) • Count average (2) • Moving average (3)

3. **Set CH□ Time Average/ Count Average/Moving Average (Un\G1 to Un\G4) to the average processing value.**

Item	Processing	Setting range
CH□ Time Average/ Count Average/Moving Average (Un\G1 to Un\G4)	Time average	2 to 5000
	Count average	4 to 62500
	Moving average	2 to 1000

4. **Turn Operating condition setting request (Y9) OFF → ON → OFF.**

Point

- The following table shows the conversion cycle of each A/D conversion method.

A/D conversion method	Conversion cycle
Sampling processing	Conversion speed × Number of used channels
Time average	$\left(\frac{\text{Time set in "Time Average/Count Average/Moving Average"}}{\text{Conversion speed} \times \text{Number of used channels}}\right)^{*1} \times \text{Conversion speed} \times \text{Number of used channels}$
Count average	Number of times set in "Time Average/Count Average/Moving Average" × Conversion speed × Number of used channels
Moving average	Conversion speed × Number of used channels

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

- In the high-speed logging mode, only sampling processing can be used. Averaging processing cannot be used.

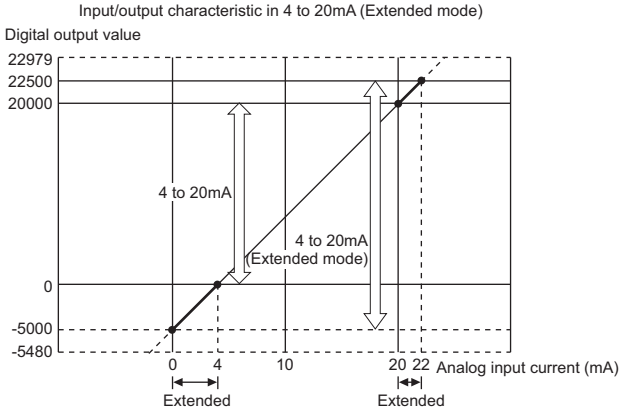
4.5 Input Range Extended Mode Function

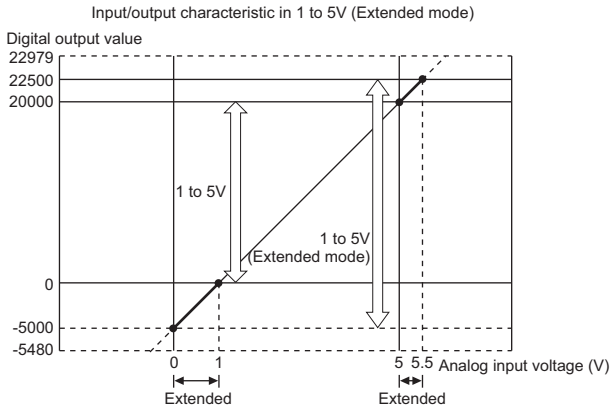
Using this function, the available input range in 4 to 20mA and 1 to 5V can be extended.

Normal mode				Extended mode		
Input range setting	Input range	Digital output value	⟷	Input range setting	Input range	Digital output value
4 to 20mA	4 to 20mA	0 to 20000		4 to 20mA (Extended mode)	0.0 to 22.0mA	-5000 to 22500
1 to 5V	1 to 5V			1 to 5V (Extended mode)	0.0 to 5.5V	

(1) Overview

- The analog input value can be monitored in the extended mode even if errors vary depending on sensors and the analog input value is less than 4mA or 1V in the input range of 4 to 20mA and 1 to 5V.
- The slope of Input/output characteristic of the extended mode is the same as that of the normal mode. However, the upper limit value and the lower limit value of the input range and the digital output value are extended.
- The maximum resolution is the same between the extended input range and the input range of 4 to 20mA and 1 to 5V. This enables the A/D conversion with higher resolution compared to the use of the input range of 0 to 20mA and 0 to 5V.





For details on the current input characteristic and voltage input characteristic, refer to the following.

- I/O conversion characteristic of A/D conversion (☞Page 24, Section 3.2.2)

(2) Setting procedure

Set the input range into the extended mode in the input range setting of the switch setting.

- Switch Setting (☞Page 170, Section 8.2)

Point

If the input range extended mode function, scaling function, shift function, and difference conversion function are simultaneously used, the digital output value may exceed the range of -32768 to 32767.
In this case, a value fixed at the upper limit value (32767) or at the lower limit value (-32768) is stored as a digital operation value.

- Processing Each Function (☞ Page 36, Section 4.2)

4.6 Conversion Speed Switch Function

You can select from three conversion speeds:

- High speed: 20 μs/channel
- Medium speed: 80 μs/channel
- Low speed: 1 ms/channel

(1) Setting procedure

1. **Set A/D conversion enable/disable setting (Un\G0) to Enabled (0).**
2. **Set Conversion speed setting (Un\G26) to the appropriate conversion speed.**

Item	Setting speed
Conversion speed setting (Un\G26)	• 20μs (0) • 80μs (1) • 1ms (2)

3. **Turn Operating condition setting request (Y9) OFF → ON → OFF.**

Point

In the high-speed logging mode, the conversion speed is fixed to 20μs (0).

4.7 Maximum Value/Minimum Value Hold Function

Using this function, the maximum and minimum digital operation values can be stored to the buffer memory for each channel.

If averaging processing is specified, the values are updated per averaging process cycle. Otherwise they are updated per sampling cycle.

For a list of buffer memory addresses to which the values are stored, refer to the following.

- List of Buffer Memory Addresses (☞ Page 118, Section 6.1)

(1) Resetting maximum and minimum values

Switching Maximum value/minimum value reset request (YD) or Operating condition setting request (Y9) from OFF → ON → OFF updates the maximum and minimum values with the current values.

(2) Targets of the maximum and minimum values

The maximum and minimum digital operation values are stored to the buffer memory.

For details, refer to the following.

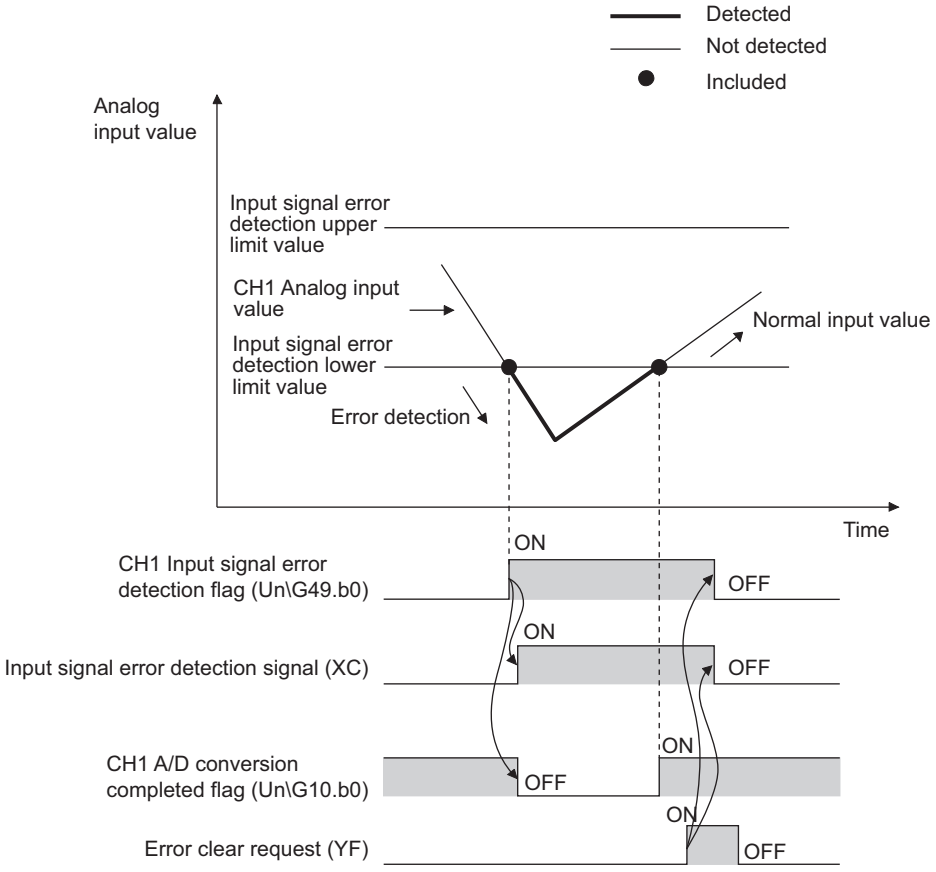
- Processing Each Function (☞ Page 36, Section 4.2)

Point

In the high-speed logging mode, the maximum and minimum values are not updated.

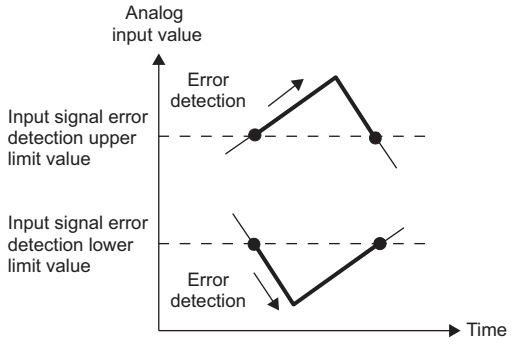
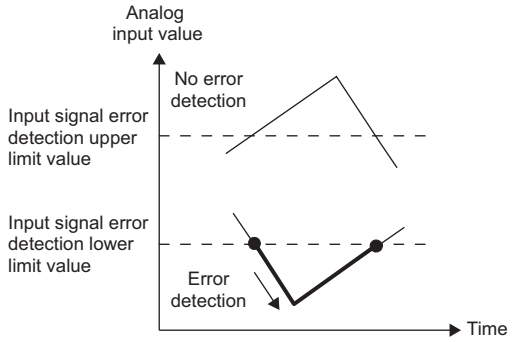
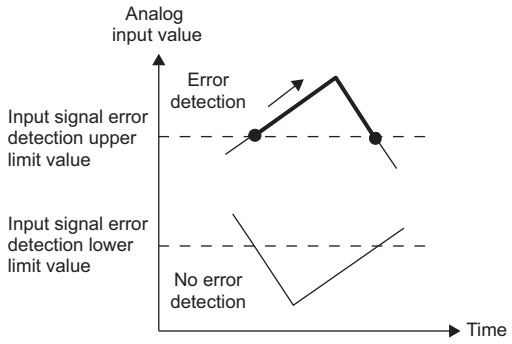
4.8 Input Signal Error Detection Function

Detects any analog input value that is outside the setting range.



(1) Detection method

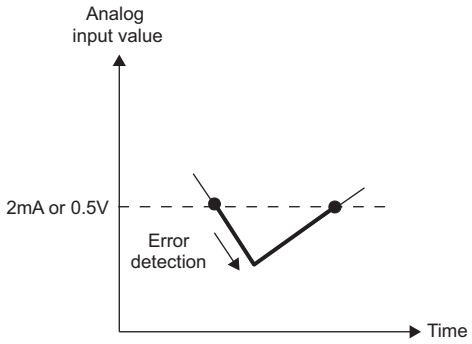
The detection method can be selected from the following list:

Detection method	Detection condition	
Lower upper limit detection	An error is detected above the input signal error detection upper limit value or below the input signal error detection lower limit value.	
Lower limit detection	An error is detected below the input signal error detection lower limit value.	
Upper limit detection	An error is detected above the input signal error detection upper limit value.	
Disconnection detection	Disconnection detection is performed. For details, refer to the following. • Disconnection detection (☞Page 46, Section 4.8 (1) (a))	

(a) Disconnection detection

By combining this detection method with the input range extended mode function, simple disconnection detection can be performed. When either of following conditions is satisfied, Input signal error detection flag (Un\G49) turns on and a disconnection occurs.

Input range	Disconnection detection condition
4 to 20mA (Extended mode)	Input analog value ≤ 2mA
1 to 5V (Extended mode)	Input analog value ≤ 0.5V

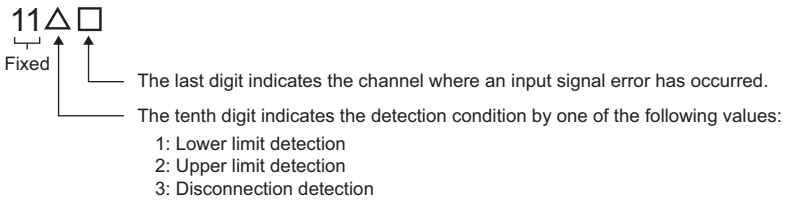


The setting for CH☐ Input signal error detection setting value (Un\G142 to Un\G145) is ignored.

(2) Notification of input signal error

If the analog input value satisfies the detection condition of the set detection method, the error is notified by Input signal error detection flag (Un\G49), Input signal error detection signal (XC), and the flashing ALM LED. In addition, alarm code 11△☐ gets stored in Latest error code (Un\G19). The value of the alarm code to be stored varies depending on the condition (upper limit, lower limit, or disconnection detection) under which an error of the analog input value is detected.

The following shows the alarm code to be stored.



(3) Operation of the input signal error detection function

The digital output value on the channel on which the error was detected is held at the value just before the error was detected, and A/D conversion completed flag (Un\G10) and A/D conversion completed flag (XE) are turned OFF.

In addition, once the analog input value returns within the setting range, A/D conversion resumes regardless of the reset of Input signal error detection flag (Un\G49) and Input signal error detection signal (XC). After the first update, A/D conversion completed flag (Un\G10) for this channel turns back ON. (ALM LED remains flashing.)

(4) Detection cycle

This function is executed per sampling cycle.

(5) Clearing the input signal error detection

After the analog input value returns within the setting range, turn Error clear request (YF) OFF → ON → OFF.
When the disconnection detection is set, after the analog input value exceeds 2.0mA or 0.5V, turn Error clear request (YF) OFF → ON → OFF.
When the input signal error is cleared, the Q64ADH results in the following state:

- Input signal error detection flag (Un\G49) is cleared.
- Input signal error detection signal (XC) turns OFF.
- ALM LED turns off.
- The alarm code 11△□, which is stored in Latest error code (Un\G19), is cleared.

(6) Setting the input signal error detection upper and lower limit values

Set the input signal error detection upper and lower limit values based on the input signal error detection setting value. (Set the values in increments of 1 (0.1%).)
Input signal error detection setting value is reflected in both the input signal error detection upper and lower limit values.

(a) Input signal error detection upper limit value

Add the gain value to "Input range width (gain value - offset value) multiplied by input signal error detection setting value". The input signal error detection setting value is calculated by the following formula:

$$\text{Input signal error detection setting value} = \frac{\text{Input signal error detection upper limit value} - \text{Gain value of each range}}{\text{Gain value of each range} - \text{Offset value of each range}} \times 1000$$

(b) Subtract the gain value from Input signal error detection lower limit value

This value is calculated by subtracting "Input range width (gain value - offset value) multiplied by input signal error detection setting value" from the lower limit value of the input range. The input signal error detection setting value is calculated by the following formula:

$$\text{Input signal error detection setting value} = \frac{\text{Lower limit value of each range} - \text{Input signal error detection lower limit value}}{\text{Gain value of each range} - \text{Offset value of each range}} \times 1000$$

Remark

The following table lists the lower limit value, offset value, or gain value for each range.

Analog input range		Lower limit value	Offset value	Gain value
Voltage	0 to 10V	0V		10V
	0 to 5V	0V		5V
	1 to 5V	1V		5V
	-10 to 10V	-10V	0V	10V
	1 to 5V (Extended mode)	1V		5V
	User range setting	Analog input value when the digital output value is -20000	Analog input value set as an offset value by the user	Analog input value set as a gain value by the user
Current	0 to 20mA	0mA		20mA
	4 to 20mA	4mA		20mA
	4 to 20mA (Extended mode)	4mA		20mA
	User range setting	Analog input value when the digital output value is -20000	Analog input value set as an offset value by the user	Analog input value set as a gain value by the user

(7) Setting procedure

1. **Set A/D conversion enable/disable setting (Un\G0) to Enabled (0).**

2. **Set the detection method in Input signal error detection setting (Un\G27).**

Item	Setting value
Input signal error detection setting (Un\G27)	• Upper and Lower Detection (1) • Lower Detection (2) • Upper Detection (3) • Disconnection Detection (4)

3. **Set a value for CH□ Input signal error detection setting value (Un\G142 to Un\G145).**

Item	Setting range
CH□ Input signal error detection setting value (Un\G142 to Un\G145)	0 to 25.0% (0 to 250)

4. **Turn Operating condition setting request (Y9) OFF → ON → OFF.**

Point

- If Disconnection Detection (4) is set to a channel whose input range is not 4 to 20mA (Extended mode) or 1 to 5V (Extended mode), an error occurs.
- In the high-speed logging mode, the input signal error detection function cannot be used.

(8) Example of input signal error detection

Ex. To detect an error when the analog input value becomes lower than 2.4mA for a channel with an input range of 4mA to 20mA:

1. **Set Input signal error detection setting (Un\G27) to Lower Detection (2).**

2. **Substitute the following values into the input signal error detection lower limit value.**

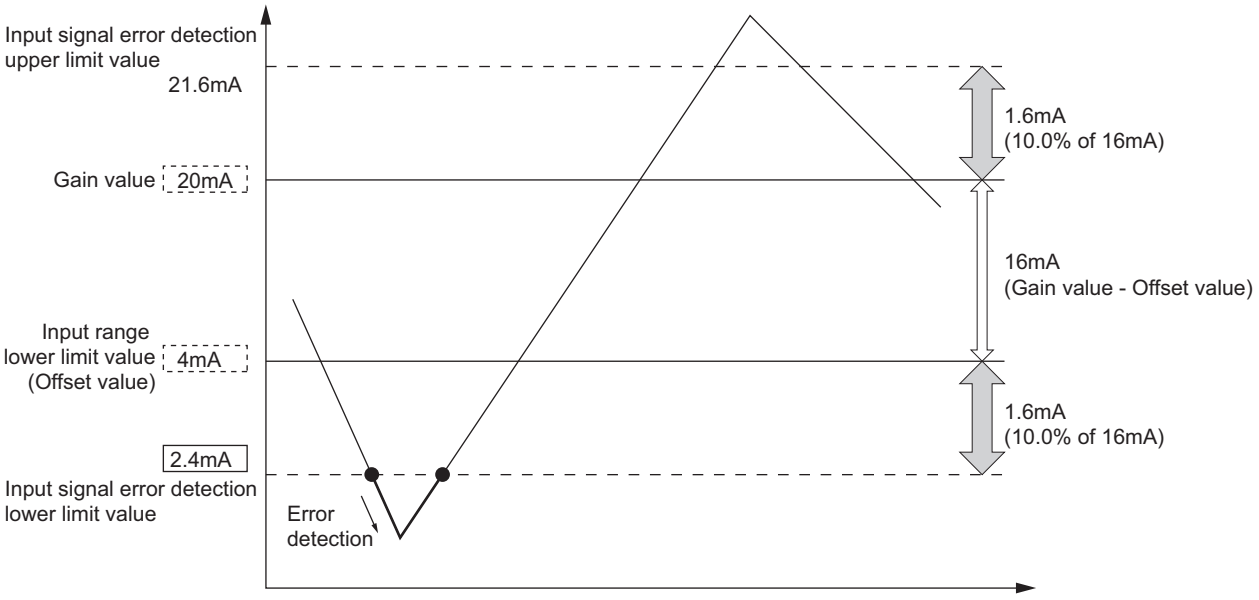
- Input signal error detection lower limit value: 2.4mA
- Input range lower limit value (Offset value): 4.0mA
- Gain value: 20.0mA

$$\text{Input signal error detection setting value} = \frac{4.0 - 2.4}{20.0 - 4.0} \times 1000$$

$$= 100(10.0\%)$$

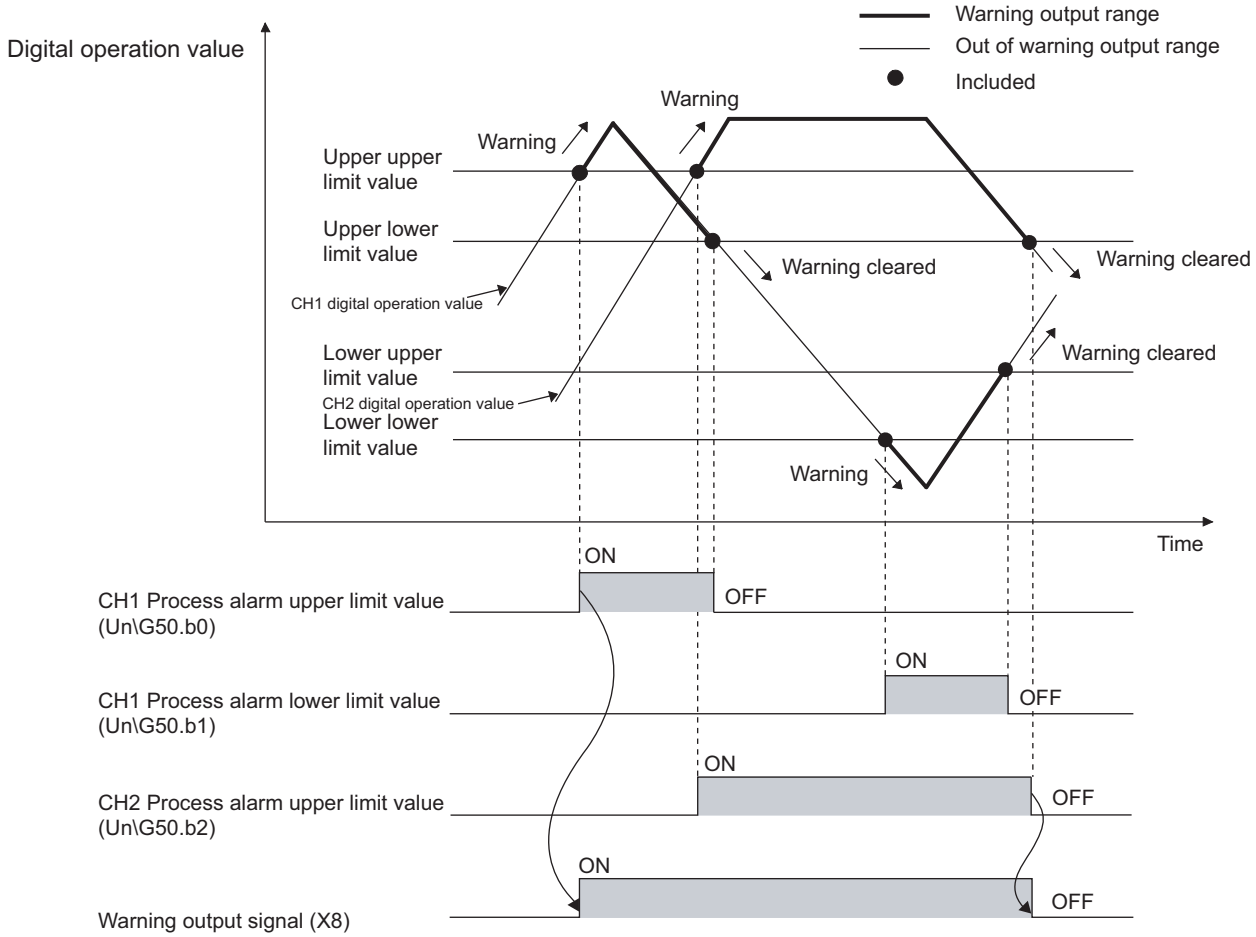
Therefore, set the input signal error detection setting value to 100 (10.0%).

In this case, the input signal error detection value behaves as follows. (The detection is not performed at the input signal error detection upper limit value by Input signal error detection setting (Un\G27))



4.9 Warning Output Function (Process Alarm)

Outputs an alarm when the digital operation value enters a preset range.

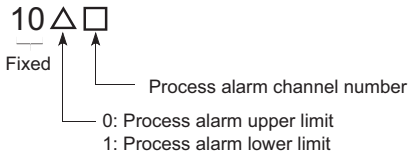


(1) Process alarm notification

When the digital operation value moves above the process alarm upper upper limit value, or below the process alarm lower lower limit value, thus entering the alarm output range, alarm notifications are made by Warning output flag (Process alarm) (Un\G50), Warning output signal (X8), and the ALM LED turning ON.

In addition, alarm code 10△□ gets stored in Latest error code (Un\G19).

The alarm code that is stored is shown below:



(2) Operation of the Warning output function (Process alarm)

After the alarm is output, once the digital operation value returns within the setting range, below the process alarm upper lower limit value and above the process alarm lower upper limit value, a "0" (zero) is stored in the bit position corresponding to the channel number for Warning output flag (Process alarm) (Un\G50).

Once all channels are within the setting range, Warning output signal (X8) and the ALM LED turn OFF.

(3) Detection cycle

When time average is specified, the function is executed per set time (for averaging). When count average is specified, the function is executed per set count (for averaging).
In addition, when sampling processing and moving average are specified, the function is executed per sampling cycle.

(4) Clearing the alarm code

After the digital operation value returns within the setting range, turn Error clear request (YF) OFF → ON → OFF.
This clears the alarm code 10△□, which was stored in Latest error code (Un\G19).

(5) Alarm output target

Alarm output target is CH□ Digital operation value (Un\G54 to Un\G57).
For CH1 Process alarm lower lower limit value (Un\86) through CH4 Process alarm upper upper limit value (Un\G101), set values considering digital clipping, scale conversion, shift conversion, and difference conversion.

(6) Setting procedure

1. **Set A/D conversion enable/disable setting (Un\G0) to Enabled (0).**
2. **Set Warning output setting (Un\G48) to Enabled (0).**
3. **Specify the values for CH1 Process alarm lower lower limit value (Un\G86) to CH4 Process alarm upper upper limit value (Un\G101).**

Item	Setting range
CH□ Process alarm upper upper limit value (Un\G89, Un\G93, Un\G97, Un\G101)	-32768 to 32767
CH□ Process alarm upper lower limit value (Un\G88, Un\G92, Un\G96, Un\G100)	
CH□ Process alarm lower upper limit value (Un\G87, Un\G91, Un\G95, Un\G99)	
CH□ Process alarm lower lower limit value (Un\G86, Un\G90, Un\G94, Un\G98)	

4. **Turn Operating condition setting request (Y9) OFF → ON → OFF.**

Point

- Process alarm output settings must meet 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 high-speed logging mode, the warning output function (process alarm) cannot be used.

4.10 Scaling Function

Performs scale conversion on the digital values that are output. The values are converted in the range between the scaling upper limit value and the scaling lower limit value.
The converted values are stored to CH□ Digital operation value (Un\G54 to Un\G57).

(1) Concept of scaling setting

Ex. If the input range is set to -10 to 10V:
For the scaling lower limit value, set it to a value corresponding to the lower limit of the input range (-20000), and for the scaling upper limit value, set it to a value corresponding to the upper limit of the input range (20000).

(2) Calculation of the digital operation value

For A/D conversion, use the values produced by the following formulas.
(Values after the decimal point are rounded off during scale conversion.)

- When the voltage and current are as follows:

  Voltage: 0 to 10V, 0 to 5V, 1 to 5V, 1 to 5V (Extended mode)*1, user range setting

  Current: 0 to 20mA, 4 to 20mA, 4 to 20mA (Extended mode)*1, user range setting

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

- When voltage is -10 to 10V

$$\text{Digital operation value} = \frac{D_X \times (S_H - S_L)}{D_{Max} - D_{Min}} + \frac{(S_H + S_L)}{2}$$

Item	Description
D_X	Digital output value
D_{Max}	Maximum digital output value of the input range used
D_{Min}	Minimum digital output value of the input range used
S_H	Scaling upper limit value
S_L	Scaling lower limit value

*1 Although the digital output value range in the extended mode is -5000 to 22500, this function scales digital output values that are within the range of 0 to 20000. For the setting example of scaling using the extended mode, refer to the following.

- Example of scaling setting (☞ Page 53, Section 4.10 (4))

(3) Setting procedure

1. **Set A/D conversion enable/disable setting (Un\G0) to Enabled (0).**
2. **Set Scaling enable/disable setting (Un\G53) to Enabled (0).**
3. **Set the values for CH1 Scaling lower limit value (Un\G62) to CH4 Scaling upper limit value (Un\G69).**
4. **Turn Operating condition setting request (Y9) OFF → ON → OFF.**

Point

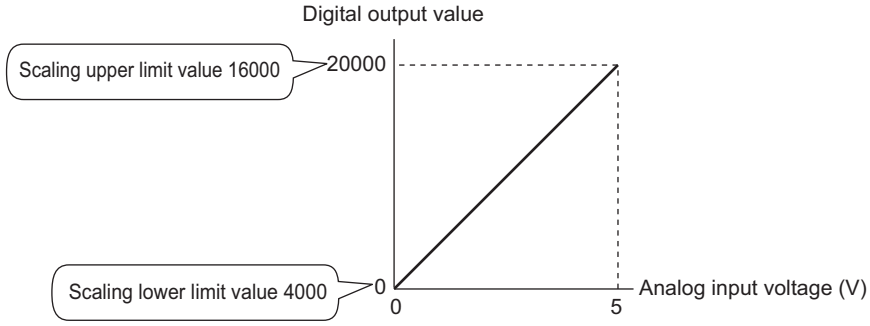
- Even if you set the scaling upper limit value and the scaling lower limit value in such a way that the change is larger than the maximum resolution, the maximum resolution will not increase.
- Your scaling settings must meet the following condition:
  Scaling upper limit value > Scaling lower limit value
- In the high-speed logging mode, the scaling function cannot be used.

(4) Example of scaling setting

Ex. 1: When values are set for a channel with input range of 0 to 5V as follows:

- CH□ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69): 16000
- CH□ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68): 4000

The digital output values and digital operation values are as follows:

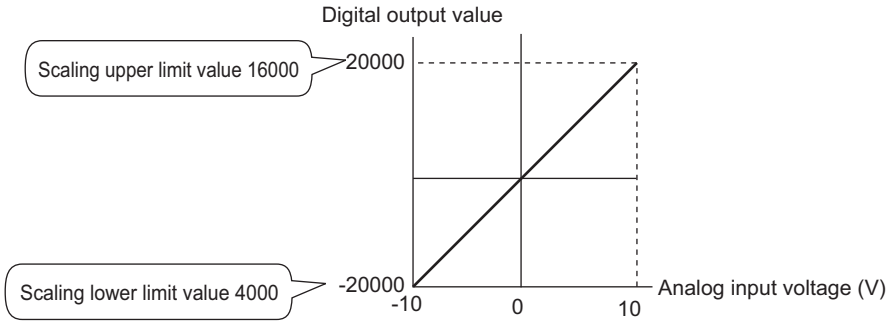


Analog input voltage (V)	Digital output value	Digital operation value
0	0	4000
1	4000	6400
2	8000	8800
3	12000	11200
4	16000	13600
5	20000	16000

Ex. 2: When values are set for a channel with input range of -10 to 10V as follows:

- CH☐ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69): 16000
- CH☐ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68): 4000

The digital output values and digital operation values are as follows:

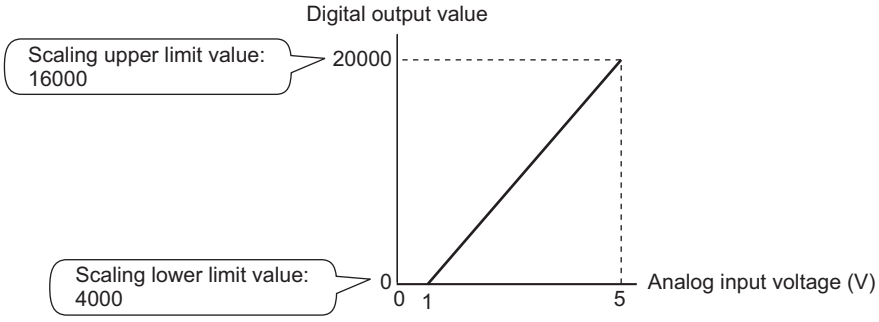


Analog input voltage (V)	Digital output value	Digital operation value
-10	-20000	4000
-5	-10000	7000
0	0	10000
5	10000	13000
10	20000	16000

Ex. 3: When values are set for a channel with input range of 1 to 5V (Extended mode) as follows:

- CH☐ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69): 16000
- CH☐ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68): 4000

The digital output values and digital operation values are as follows:

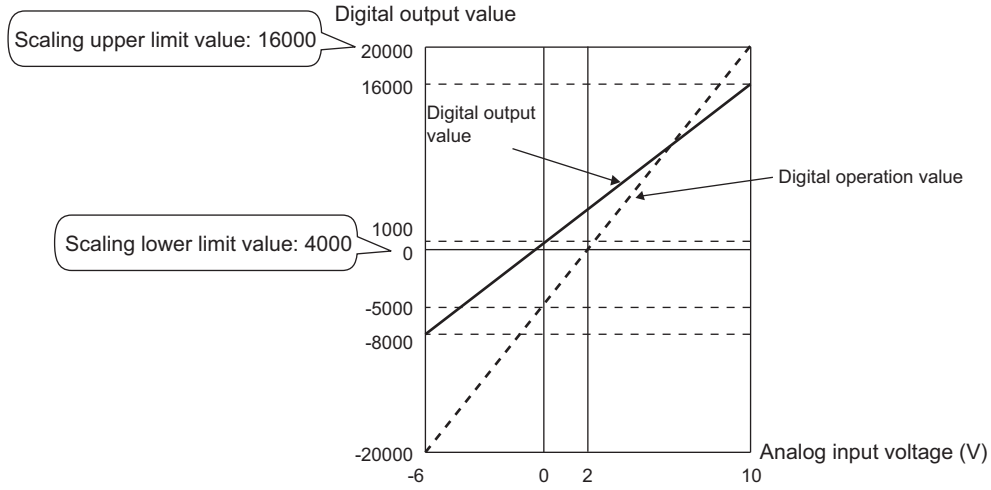


Analog input voltage (V)	Digital output value	Digital operation value
0	-5000	1000
1	0	4000
2	5000	7000
3	10000	10000
4	15000	13000
5	20000	16000
5.5	22500	17500

Ex. 4: When values are set for a channel with user range of 2 to 10V as follows:

- CH□ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69): 16000
- CH□ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68): 4000

The digital output values and digital operation values are as follows:



Analog input voltage (V)	Digital output value	Digital operation value
-6	-20000	-8000
-4	-15000	-5000
-2	-10000	-2000
0	-5000	1000
2	0	4000
4	5000	7000
6	10000	10000
8	15000	13000
10	20000	16000

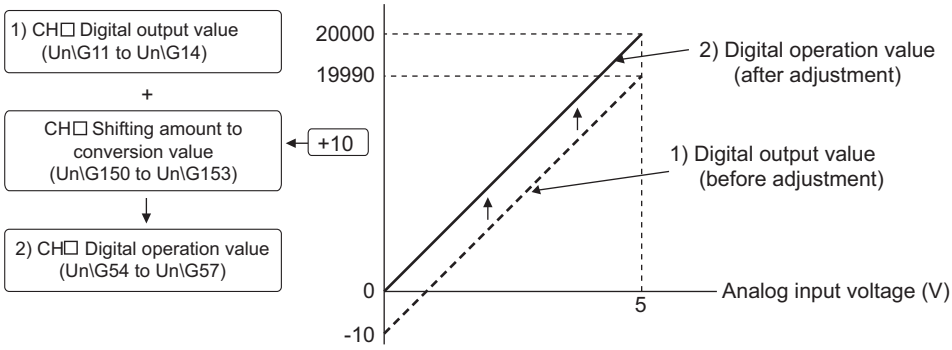
Point

When the scaling function is used with the digital clipping function, the digital operation value after the digital clipping is scale-converted. For details, refer to the following.

- Processing Each Function (☞ Page 36, Section 4.2)

4.11 Shift Function

Using this function, the set shifting amount to conversion value can be added (shifted) to the digital output value and it can be stored in the buffer memory. When the shifting amount to conversion value is changed, it is reflected to the digital operation value in real time. Therefore, fine adjustment can be easily performed when the system starts.



Input voltage (V)	CH☐ Digital output value (Un\G11 to Un\G14)
0	-10
5	11990

Input voltage (V)	CH☐ Digital operation value (Un\G54 to Un\G57)
0	0
5	20000

(1) Operation of the shift function

The set shifting amount to conversion value is added to the digital operation value. The digital operation value with shift addition is stored in CH☐ Digital operation value (Un\G54 to Un\G57). The shift amount is added in every sampling cycle for sampling processing, while it is added in every averaging process cycle for averaging processing. Then, those added values are stored in CH☐ Digital operation value (Un\G54 to Un\G57).
If some value is set to the shifting amount to conversion value, the shifting amount to conversion value is added regardless of the status change (OFF → ON → OFF) of Operating condition setting request (Y9).

(2) Setting procedure

1. **Set A/D conversion enable/disable setting (Un\G0) to Enabled (0).**
2. **Set a value for CH☐ Shifting amount to conversion value (Un\G150 to Un\G153). The initial value of the shifting amount to conversion value is 0.**

Item	Setting range
CH☐ Shifting amount to conversion value (Un\G150 to Un\G153)	-32768 to 32767

Point

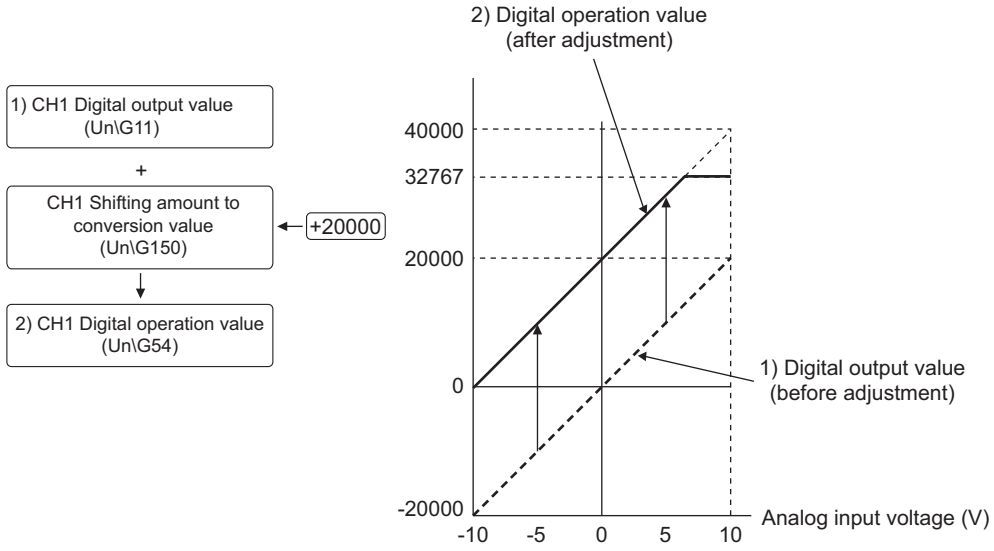
- If the digital output value exceeds the range of -32768 to 32767 as a result of shift addition, the digital output value is fixed to the lower limit value (-32768) or the upper limit value (32767).
- In the high-speed logging mode, the shift function cannot be used.

(3) Setting example

Ex. When the following settings are used for a channel with input range of -10 to 10V:

- CH□ Shifting amount to conversion value (Un\G150 to Un\G153): 20000

  The following figure and table show CH1 Digital output value (Un\G11) and CH1 Digital operation value (Un\G54).



Input voltage (V)	CH1 Digital output value (Un\G11)	CH1 Digital operation value (Un\G54)
-10	-20000	0
-5	-10000	10000
0	0	20000
5	10000	30000
10	20000	32767*1

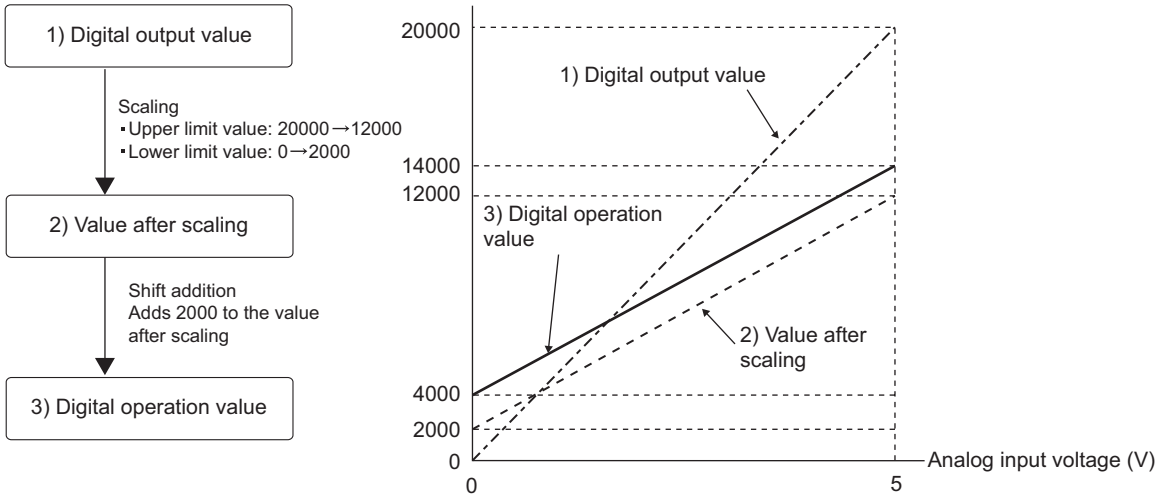
*1 Since the value exceeds the range of -32768 to 32767, it is fixed to 32767 (the upper limit value).

(4) Setting example of when both the scaling function and shift function are used

Ex. When the following settings are used for the Q64ADH with input range of 0 to 5V:

- CH☐ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69): 12000
- CH☐ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68): 2000
- CH☐ Shifting amount to conversion value (Un\G150 to Un\G153): 2000

1. **Set A/D conversion enable/disable setting (Un\G0) to Enabled (0).**
2. **Set Scaling enable/disable setting (Un\G53) to Enabled (0).**
3. **Set CH☐ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68) to 2000.**
4. **Set CH☐ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69) to 12000.**
5. **Set Ch☐ Shifting amount to conversion value (Un\G150 to Un\G153) to 2000.**
6. **Turn Operating condition setting request (Y9) OFF → ON → OFF.**



Input voltage (V)	Digital output value	Value after scaling	Digital operation value
0	0	2000	4000
1	4000	4000	6000
2	8000	6000	8000
3	12000	8000	10000
4	16000	10000	12000
5	20000	12000	14000

Point

When the shift function is used with the digital clipping function and scaling function, shift addition is executed on the value after digital clipping and scale conversion. Therefore, the range of the digital operation value is determined as -32768 to 32767.

For a setting example of when the digital clipping function, scaling function, and shift function are used together, refer to the following.

- Setting example of when the digital clipping function, scaling function, and shift function are used together (☞ Page 60, Section 4.12 (4))

4.12 Digital Clipping Function

The range of the digital operation value for voltage or current over the input range is fixed between the maximum digital output value and the minimum digital output value.

(1) Concept of digital clipping setting

The following table lists the output range of the digital operation value when the digital clipping function is enabled for each range.

Input range	Output range of the digital operation value	
	Digital clipping function enabled	Digital clipping function disabled
4 to 20mA	0 to 20000	-480 to 20479
0 to 20mA		
1 to 5V		
0 to 5V		
0 to 10V		
-10 to 10V	-20000 to 20000	-20480 to 20479
User range setting		
4 to 20mA (Extended mode) 1 to 5V (Extended mode)	-5000 to 22500	-5480 to 22979

(2) Setting procedure

1. **Set A/D conversion enable/disable setting (Un\G0) to Enabled (0).**
2. **Set Digital clipping enable/disable setting (Un\G29) to Enabled (0).**
3. **Turn Operating condition setting request (Y9) OFF → ON → OFF.**

Point

In the high-speed logging mode, the digital clipping function cannot be used.

(3) Setting example of when both the digital clipping function and scaling function are used

Ex. When setting as follows for the Q64ADH with input range of 0 to 5V:

- CH☐ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69): 32000
- CH☐ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68): 0
- Digital clipping enable/disable setting (Un\G29): Enabled (0)

1. **Set A/D conversion enable/disable setting (Un\G0) to Enabled (0).**
2. **Set Scaling enable/disable setting (Un\G53) to Enabled (0).**
3. **Set CH☐ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68) to 0.**
4. **Set CH☐ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69) to 32000.**
5. **Set Digital clipping enable/disable setting (Un\G29) to Enabled (0).**
6. **Turn Operating condition setting request (Y9) OFF → ON → OFF.**

In this case, scale conversion is performed on the digital-clipped digital operation value. Therefore, the digital output range of the digital operation value is determined as 0 to 32000.

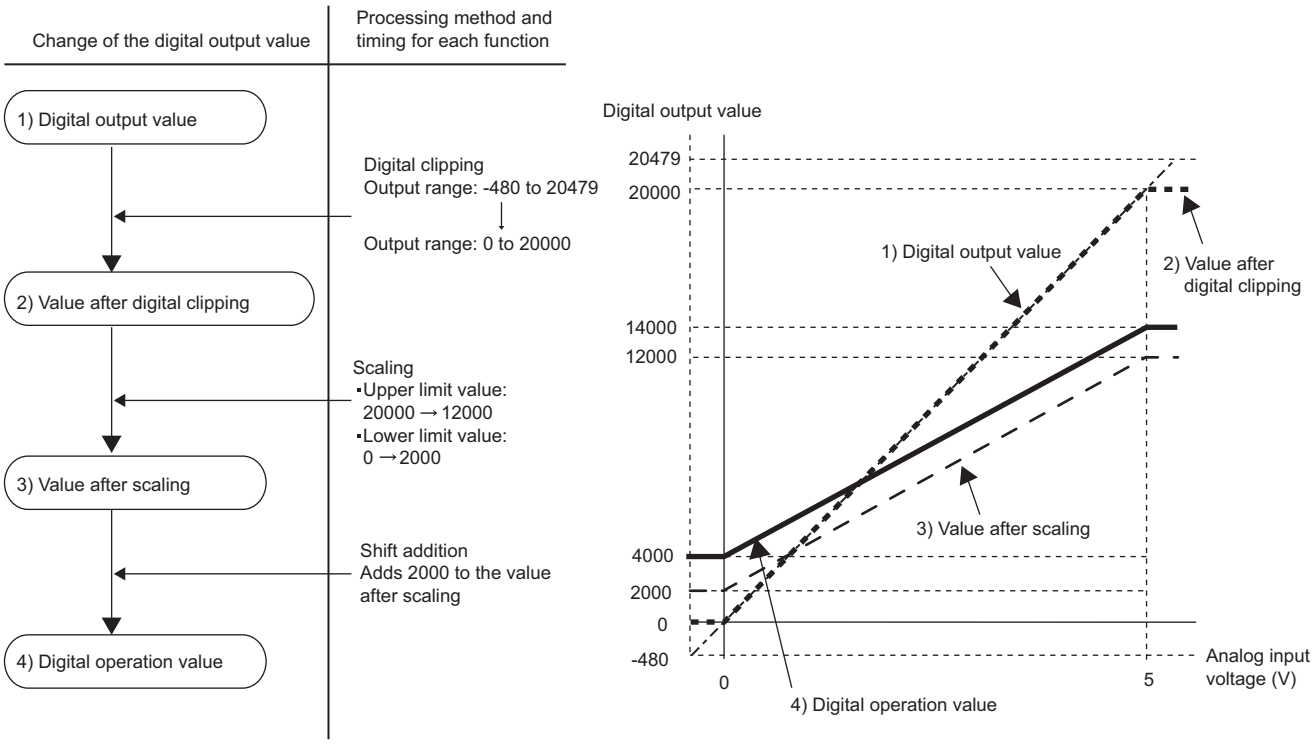
(4) Setting example of when the digital clipping function, scaling function, and shift function are used together

Ex. When setting as follows for the Q64ADH with input range of 0 to 5V:

- CH☐ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69): 12000
- CH☐ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68): 2000
- CH☐ Shifting amount to conversion value (Un\G150 to Un\G153): 2000
- Digital clipping enable/disable setting (Un\G29): Enabled (0)

1. **Set A/D conversion enable/disable setting (Un\G0) to Enabled (0).**
2. **Set Scaling enable/disable setting (Un\G53) to Enabled (0).**
3. **Set CH☐ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68) to 2000.**
4. **Set CH☐ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69) to 12000.**
5. **Set Ch☐ Shifting amount to conversion value (Un\G150 to Un\G153) to 2000.**
6. **Set Digital clipping enable/disable setting (Un\G29) to Enabled (0).**
7. **Turn Operating condition setting request (Y9) OFF → ON → OFF.**

Digital output values are processed in the order of 1) to 4) below and stored as digital operation values.



Input voltage (V)	Digital output value	Digital operation value
-0.12	-480	4000
0	0	4000
1	4000	6000
2	8000	8000
3	12000	10000
4	16000	12000
5	20000	14000
5.12	20479	14000

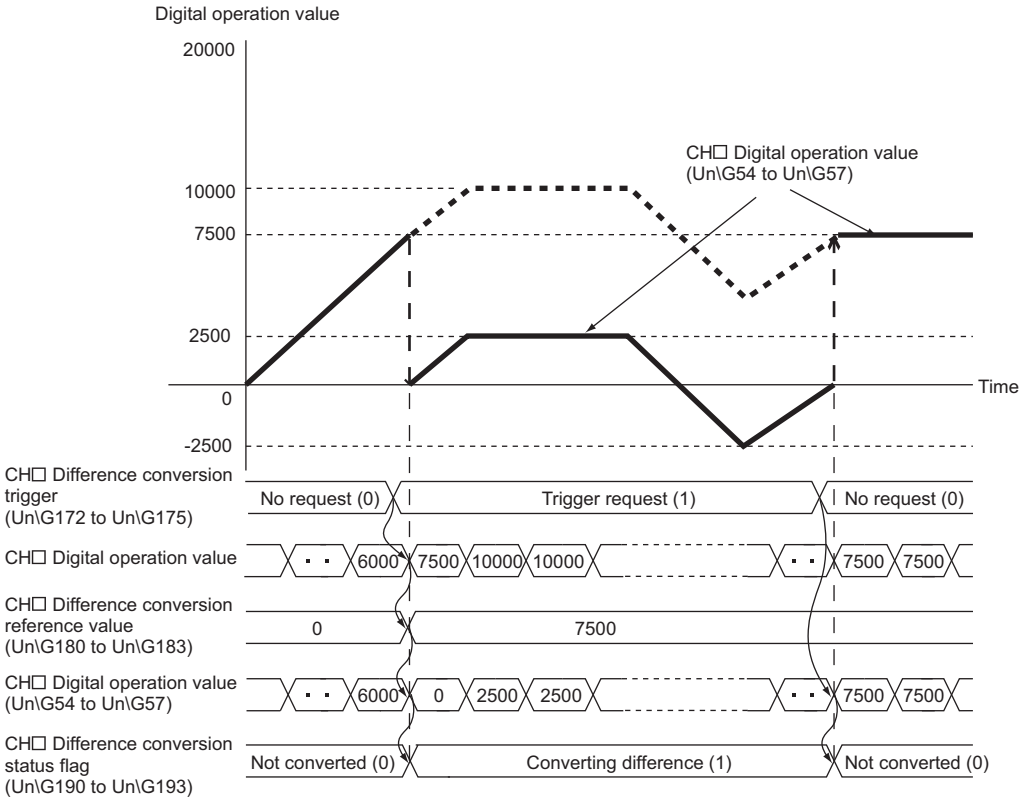
Point

When the digital clipping function is used with the scaling function, shift function, and difference conversion function, the scale conversion, shift addition, and difference conversion are executed on the value after digital clipping.
For details, refer to the following.

- Processing Each Function (☞ Page 36, Section 4.2)

4.13 Difference Conversion Function

The digital operation value at the start of this function is treated as 0 (reference value). Thereafter, values that increase or decrease from the reference value are stored in the buffer memory.



(1) Operation of the difference conversion function

When the difference conversion starts, the digital operation value at that time (the data stored inside the Q64ADH before difference conversion) is determined as the difference conversion reference value. The value acquired by subtracting the difference conversion reference value from the digital operation value is stored in CH□ Digital operation value (Un\G54 to Un\G57). Therefore, CH□ Digital operation value (Un\G54 to Un\G57) at the start of this function is 0. (since the digital operation value equals to the difference conversion reference value at the start)

Digital operation value after difference conversion = Digital operation value - Difference conversion reference value

(2) How to use difference conversion

(a) Starting difference conversion

1. **Change CH□ Difference conversion trigger (Un\G172 to Un\G175) from No request (0) to Trigger request (1).**

The rise of No request (0) → Trigger request (1) is detected as a trigger. When the trigger is detected, the digital operation value at the start is output to the difference conversion reference value. The value acquired by subtracting the difference conversion reference value from the digital operation value is stored in CH□ Digital operation value (Un\G54 to Un\G57). After the value is stored, CH□ Difference conversion status flag (Un\G190 to Un\G193) changes to Converting difference (1).

(b) Stopping difference conversion

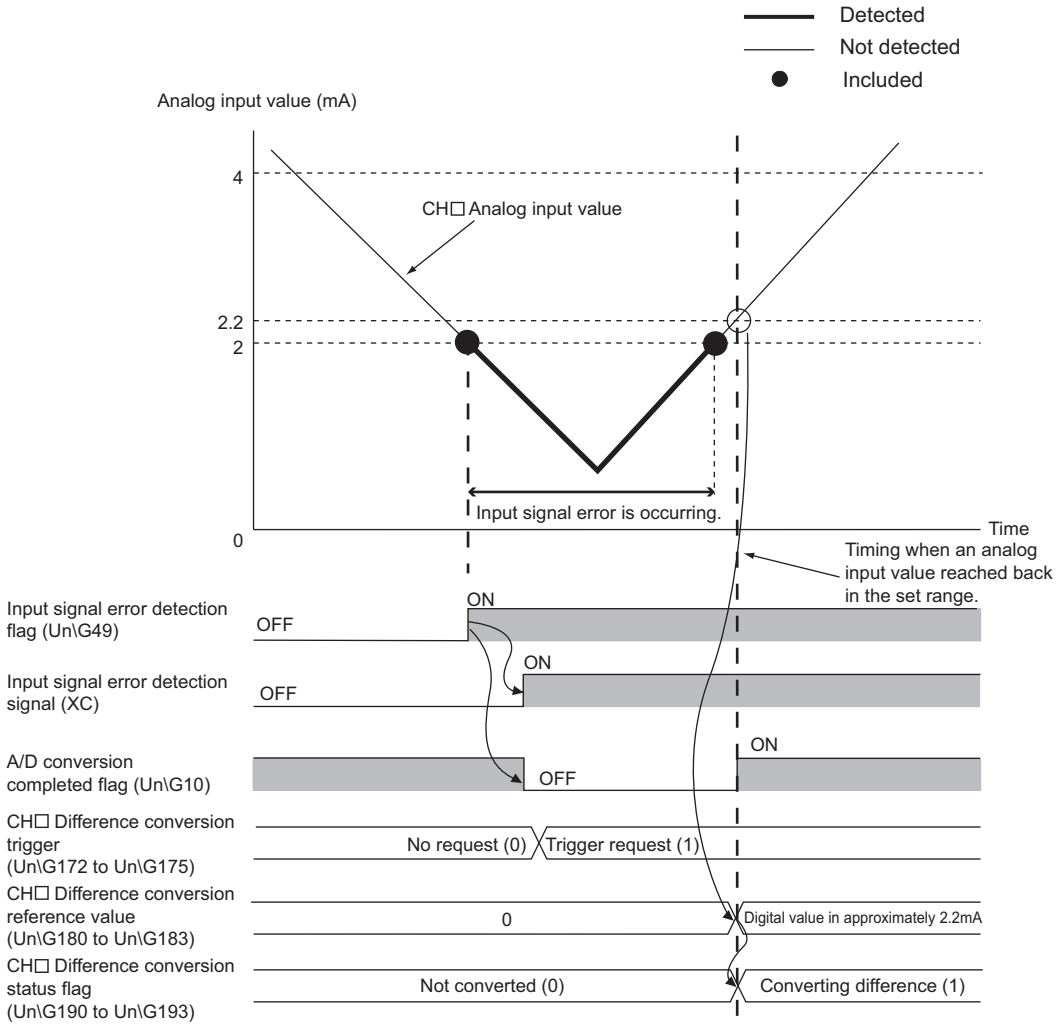
1. **Change CH☐ Difference conversion trigger (Un\G172 to Un\G175) from Trigger request (1) to No request (0).**

The fall of Trigger request (1) → No request (0) is detected as a trigger. When the trigger is detected, the difference conversion stops, and CH☐ Difference conversion status flag (Un\G190 to Un\G193) changes to Not converted (0). After that, the digital operation value is stored as it is in CH☐ Digital operation value (Un\G54 to Un\G57).

(3) Points for the use of the difference conversion function

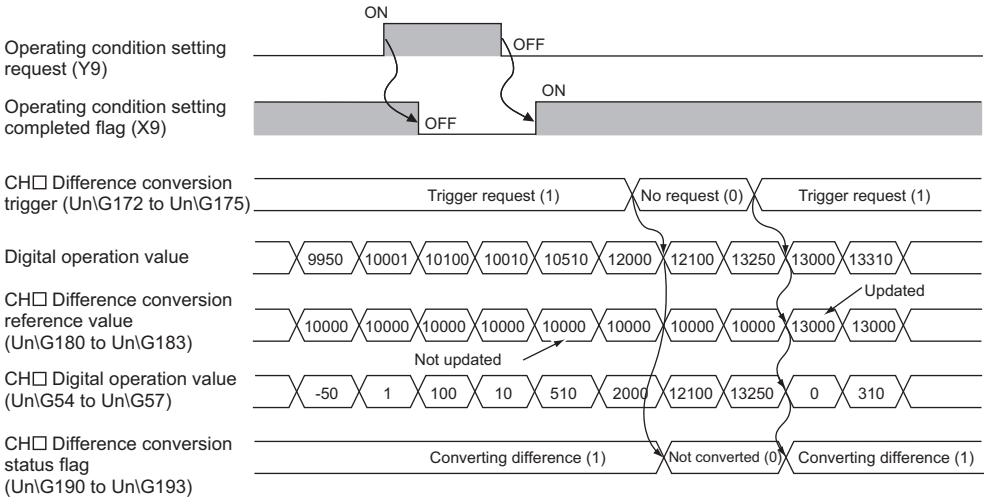
(a) Operation of when an input signal error occurs

While an input signal error is occurring, even if CH☐ Difference conversion trigger (Un\G172 to Un\G175) changes No request (0) → Trigger request (1), the difference conversion does not start. After the analog input value returns within the setting range, change CH☐ Difference conversion trigger (Un\G172 to Un\G175) from No request (0) to Trigger request (1) again. If an input signal error occurs in the status of Trigger request (1), the difference conversion starts just when the analog input value returns within the setting value, treating the digital operation value as the difference conversion reference value.



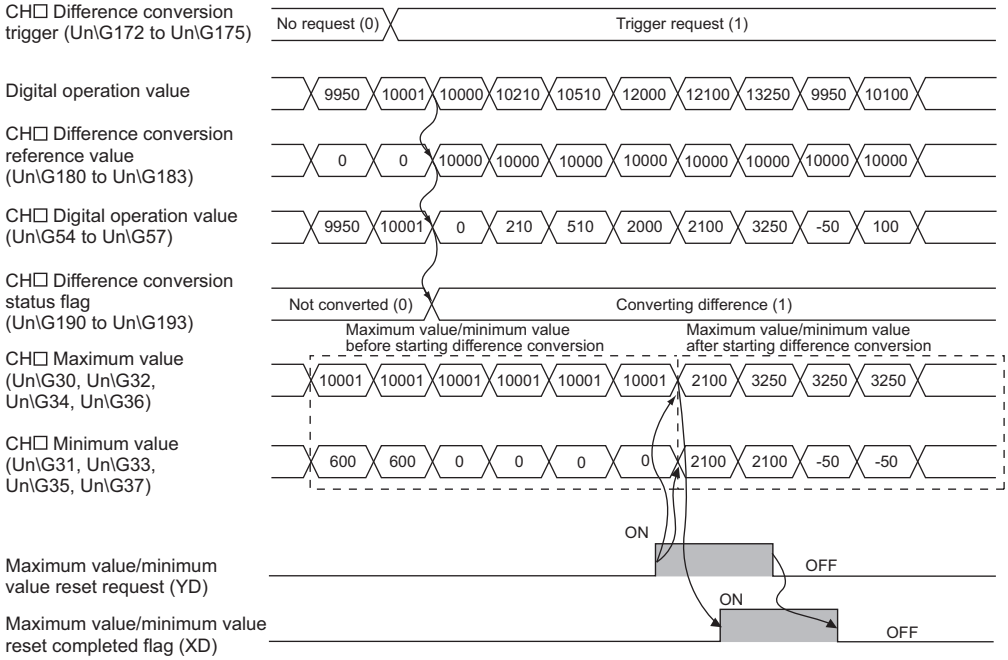
(b) Operation of when Operating condition setting request (Y9) is turned OFF → ON → OFF during difference conversion

During the difference conversion, even if Operating condition setting request (Y9) is turned OFF → ON → OFF, the difference conversion before Operating condition setting request (Y9) continues and the difference conversion reference value is not updated. To update the difference conversion reference value, restart the difference conversion by changing CH□ Difference conversion trigger (Un\G172 to Un\G175) Trigger request (1) → No request (0) → Trigger request (1) again.



(c) Operation of the maximum value and the minimum value

When the difference conversion starts, the maximum value and the minimum value of the values acquired by the difference conversion are stored in CH□ Maximum value and CH□ Minimum value. By turning on Maximum value/minimum value reset request (YD), the maximum value and the minimum value after the start of the difference conversion can be checked.



(d) Operation of when the averaging processing is set

If the difference conversion starts while the averaging processing is set, the digital operation value at the completion of the averaging processing is determined as the difference conversion reference value. In addition, CH□ Difference conversion status flag (Un\G190 to Un\G193) changes to Converting difference (1).

Point

- The difference conversion function can be started at any timing.
- When the difference conversion function is used with the digital clipping function, scaling function, and shift function, each digital operation value is determined as a difference conversion reference value.
- If other than No request (0) or Trigger request (1) is set in CH□ Difference conversion trigger (Un\G172 to Un\G175) during the difference conversion, an error occurs. Though the difference conversion continues.
- Even if the digital clipping function, scaling function, and shift function are set valid, the difference conversion reference value is not updated. To update the difference conversion reference value, stop the difference conversion and restart it.
- In the high-speed logging mode, the difference conversion function cannot be used.

4.14 Logging Function (Normal Logging Mode)

Using this function, for each channel, 10000 point digital output values or digital operation values are stored in the buffer memory. In addition, the data collection can be stopped by using the data status change as a trigger. This function facilitates analysis of an error because the data before and after the error occurrence is held.
Using the function block (FB), the data stored in the buffer memory can be saved into a CSV file. Data in a CSV file can be graphically displayed by GX LogViewer.
The logging function in the normal logging mode can be used when the conversion speed is set to 80μs or 1ms.

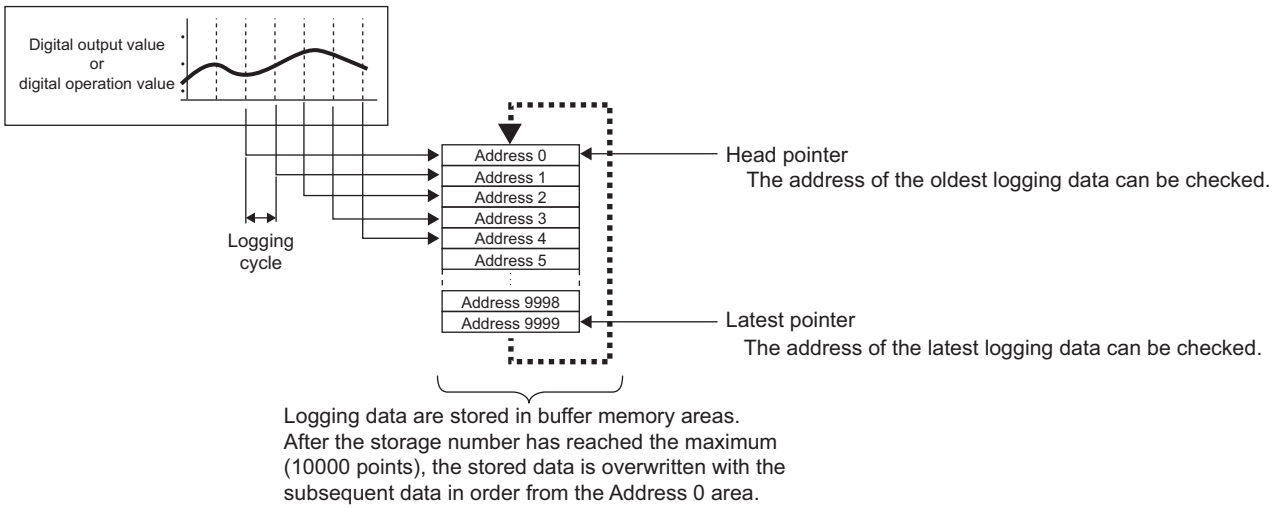
(1) Logging function

(a) Collecting logging data

Logging data is collected as follows.

- The latest 10000 digital output values or digital operation values can be always collected for each channel.
- The data can be collected at intervals of 80μs minimum and of 3600s maximum.

An address where the latest/oldest data is stored can be checked with the latest/head pointer.

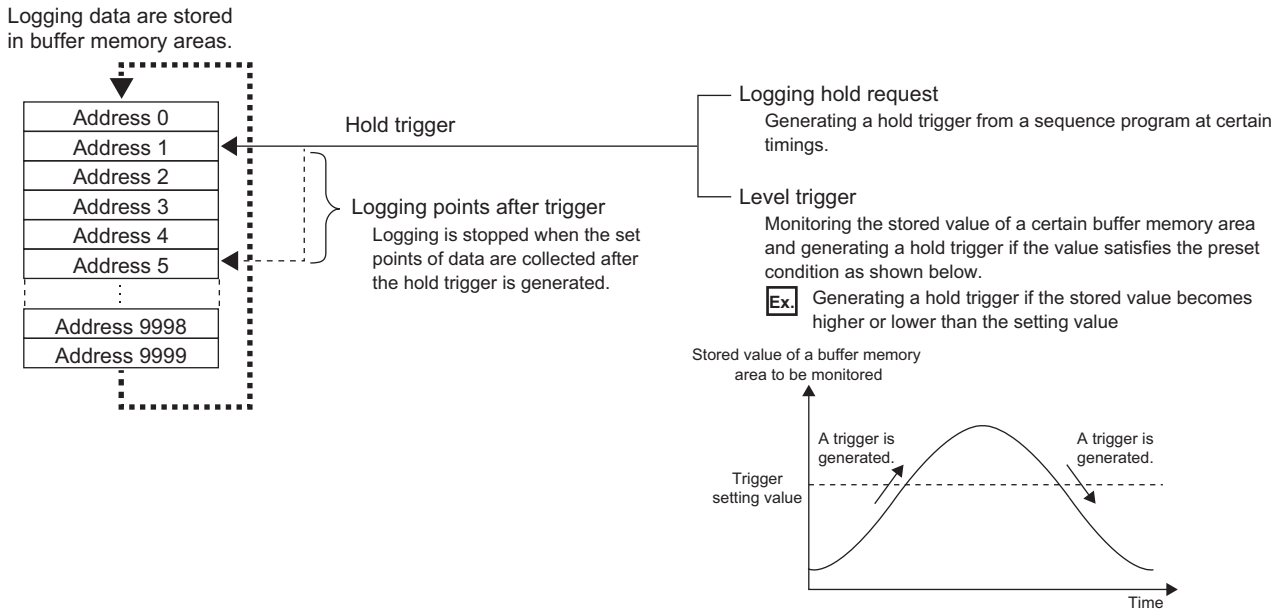


(b) Stopping the logging operation

Logging data is updated at a high speed during logging. Stop logging when the logging data needs to be referred to regardless of the updating cycle.

Logging can be stopped by the hold trigger. (☞Page 73, Section 4.14.1)

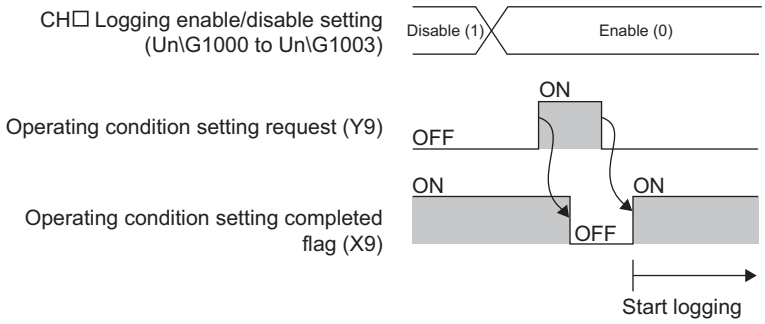
- Two types of hold trigger are available: "logging hold request" and "level trigger".
- The number of data points to be collected after a hold trigger occurs can be set.



(2) Operation of logging

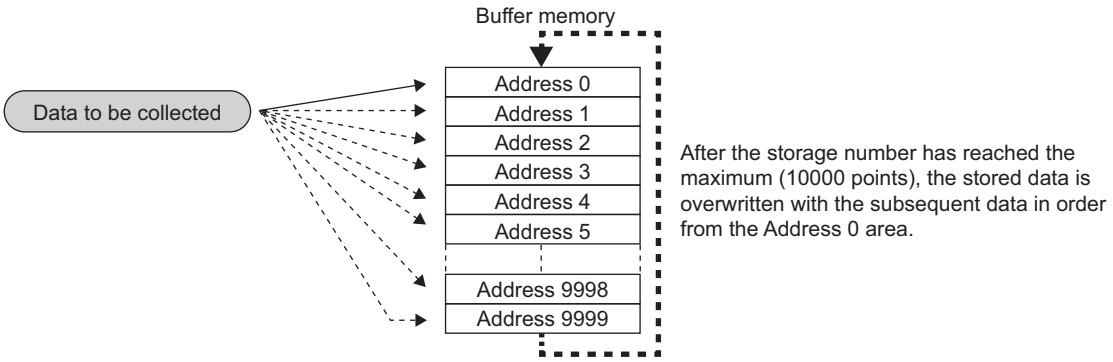
(a) Starting logging data collection

Logging data collection starts when CH□ Logging enable/disable setting (Un\G1000 to Un\G1003) is set to Enable (0) and Operating condition setting request (Y9) is turned on and off. Collecting is performed at the preset logging cycle.



(b) Logging data

Logging data are stored in the following buffer memory areas.



Channel	Storing destination of logging data
CH1	CH1 Logging data (Un\G5000 to Un\G14999)
CH2	CH2 Logging data (Un\G15000 to Un\G24999)
CH3	CH3 Logging data (Un\G25000 to Un\G34999)
CH4	CH4 Logging data (Un\G35000 to Un\G44999)

If logging has been performed even once, CH□ Logging data (Un\G5000 to Un\G44999) is all cleared to 0 in the timing when Operating condition setting request (Y9) is turned on.

(3) Logging data setting

Select a type of the data to be collected with CH□ Logging data setting (Un\G1024 to Un\G1027).

- Digital output value (0)
- Digital operation value (1)

(4) Logging cycle

(a) Logging cycle setting

Set the logging cycle with CH□ Logging cycle setting value (Un\G1032 to Un\G1035) and CH□ Logging cycle unit setting (Un\G1040 to Un\G1043).

Set a data collection cycle for CH□ Logging cycle setting value (Un\G1032 to Un\G1035).

Set the unit of data collection cycle for CH□ Logging cycle unit setting (Un\G1040 to Un\G1043).

Setting value of CH□ Logging cycle unit setting (Un\G1040 to Un\G1043)	Setting range of CH□ Logging cycle setting value (Un\G1032 to Un\G1035)
μs (0)	80 to 32767
ms (1)	1 to 32767
s (2)	1 to 3600

The logging cycle must be an integral multiple of the conversion cycle. Even if the setting is not an integral multiple, the actual logging cycle is adjusted to an integral multiple of the conversion cycle with the set logging cycle as its upper limit.

The following table lists the conversion cycles in each A/D conversion method.

Conversion method	Conversion cycle
Sampling processing	Conversion speed × Number of channels where A/D conversion is enabled
Time average	$\left(\frac{\text{Time set in "Time Average/ Count Average/Moving Average"}}{\text{Conversion speed} \times \text{Number of channels where A/D conversion is enabled}}\right)^{*1} \times \text{Conversion speed} \times \text{Number of channels where A/D conversion is enabled}$ *1 Values after the decimal point are omitted.
Count average	Number of times set in Average time/Average number of times/Move average setting × Conversion speed × Number of channels where A/D conversion is enabled
Moving average	Conversion speed × Number of channels where A/D conversion is enabled

Ex. With the settings below, the conversion cycle is 160μs and the actual logging is performed every 6880μs (an integral multiple of 160μs). Values are stored in CH1 Logging cycle monitor value (Un\G1122 to Un\G1124) as shown in the table below.

- A/D conversion-enabled channel: CH1, CH2
- CH1 Averaging process setting: Sampling processing
- CH1 Logging cycle setting value: 7000
- CH1 Logging cycle unit setting: μs

Buffer memory address	Item		Value to be stored
1122	CH1 Logging cycle monitor value	s	0
1123		ms	6
1124		μs	880

(b) When the logging function turns disabled

Logging operation is not performed if one of the following errors occurs after the normal logging function is enabled and Operating condition setting request (Y9) is turned on and off.

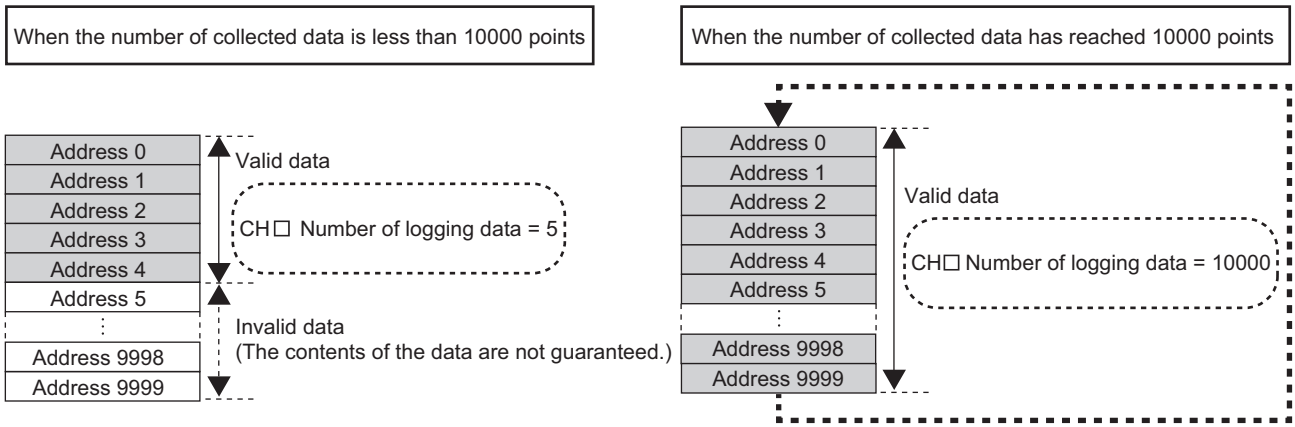
- Error code (20☐): Setting error of CH☐ Time Average/ Count Average/Moving Average (Un\G1 to Un\G4)
- Error code (30☐): Setting error of CH☐ Time Average/ Count Average/Moving Average (Un\G1 to Un\G4)
- Error code (31☐): Setting error of CH☐ Time Average/ Count Average/Moving Average (Un\G1 to Un\G4)
- Error code (360): Setting error of Conversion speed setting (Un\G26)
- Error code (200☐ to 208☐): Setting error of a parameter setting item of the logging function

Point

- When the logging cycle set in CH☐ Logging cycle setting value (Un\G1032 to Un\G1035) and CH☐ Logging cycle unit setting (Un\G1040 to Un\G1043) is shorter than the conversion cycle, if Operating condition setting request (Y9) is turned on and off, an error occurs and logging operation will not be performed. In such a case, an error code (202☐) is stored in Latest error code (Un\G19), Error flag (XF) turns on, and the ERR. LED turns on.
- When 20μs(0) is set for "conversion speed" and CH☐ Logging enable/disable setting (Un\G1000 to Un\G1003) is set to Enable (0), an error occurs and logging operation will not be performed. In such a case, an error code (200☐) is stored in Latest error code (Un\G19), Error flag (XF) turns on, and the ERR. LED turns on.
- When the input signal error detection function is set and CH☐ Logging enable/disable setting (Un\G1000 to Un\G1003) is set to Enable (0), an error occurs and logging operation will not be performed. In such a case, an error code (208☐) is stored in Latest error code (Un\G19), Error flag (XF) turns on, and the ERR. LED turns on.

(5) Number of logging data

Using CH☐ Number of logging data (Un\G1106 to Un\G1109), the number of valid data in CH☐ Logging data (Un\G5000 to Un\G44999) can be checked.

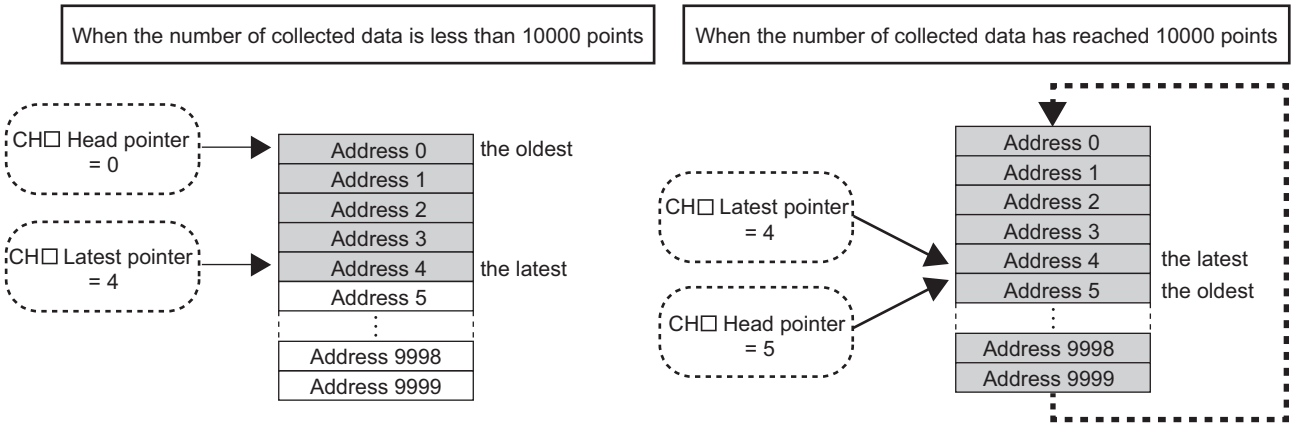


The number of logging data sets increases by one every time a new data set is stored.
When CH☐ Logging data (Un\G5000 to Un\G44999) becomes full (Number of logging data sets = 10000), the logging operation continues by starting again from the start address of CH☐ Logging data (Un\G5000 to Un\G44999) and overwrites the previous data to store new data. In this case, the number of logging data sets is fixed to 10000.

(6) Head pointer and latest pointer

The storage locations of the oldest data and the latest data in CH☐ Logging data (Un\G5000 to Un\G44999) can be checked with the following buffer memory areas.

Buffer memory	Description
CH☐ Head pointer (Un\G1090 to Un\G1093)	The buffer memory address of the oldest data in CH☐ Logging data (Un\G5000 to Un\G44999) can be checked with this buffer memory area. The offset value (0 to 9999) from the start address (Un\G5000, Un\G15000, Un\G25000, Un\G35000) of CH☐ Logging data (Un\G5000 to Un\G44999) is stored.
CH☐ Latest pointer (Un\G1098 to Un\G1101)	The buffer memory address of the latest data in CH☐ Logging data (Un\G5000 to Un\G44999) can be checked with this buffer memory area. The offset value (0 to 9999) from the start address (Un\G5000, Un\G15000, Un\G25000, Un\G35000) of CH☐ Logging data (Un\G5000 to Un\G44999) is stored.



Immediately after logging operation starts until CH☐ Logging data (Un\G5000 to Un\G44999) becomes full, the head pointer does not change (fixed to 0). When CH☐ Logging data (Un\G5000 to Un\G44999) becomes full, and data starts to be overwritten from the start address of CH☐ Logging data (Un\G5000 to Un\G44999), the head pointer is shifted by one.

(7) Checking logging data without stopping the logging operation

Logging data can be checked without stopping the logging operation by referring to CH☐ Head pointer (Un\G1090 to Un\G1093), CH☐ Latest pointer (Un\G1098 to Un\G1101), and CH☐ Number of logging data (Un\G1106 to Un\G1109).

To check logging data without stopping logging, take the following precautions because logging data may be updated while data is being read.

- Set CH☐ Logging cycle setting value (Un\G1032 to Un\G1035) to the cycle that confirmation and read of data surely complete before logging data is updated. If the logging cycle is short, logging data may be updated while confirming and reading data.
- After obtaining a desired number of logging data sets to be checked, monitor any change in the head pointer or number of logging data sets, and obtain logging data just after the stored value changes.
- If the updated data and the data being checked do not synchronize due to the relationship between the logging cycle and the scan time of the CPU module, adjust the logging cycle.

Stop logging when the logging data needs to be checked without bothering about the logging cycle. (☞Page 73, Section 4.14.1)

4.14.1 Stopping the logging operation

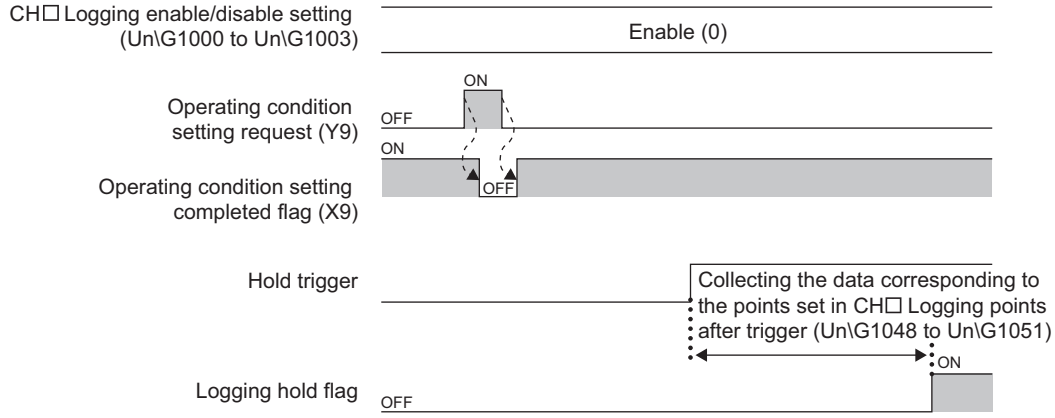
Logging operation stops (holds) when the preset trigger condition is satisfied and data is collected for the set number of data points.

A trigger to be generated when the condition is satisfied is called a hold trigger.

To generate a hold trigger, the following two methods are available.

- Logging hold request (☞Page 76, Section 4.14.2)
- Level trigger (☞Page 77, Section 4.14.3)

When a hold trigger is detected during data collection, the logging operation stops after data is collected for the number of data points set in CH☐ Logging points after trigger (Un\G1048 to Un\G1051).



(1) Post-trigger logging points

Set the number of data sets to be collected from when a hold trigger is detected until the logging operation stops in CH☐ Logging points after trigger (Un\G1048 to Un\G1051).

(2) Checking that the logging has stopped

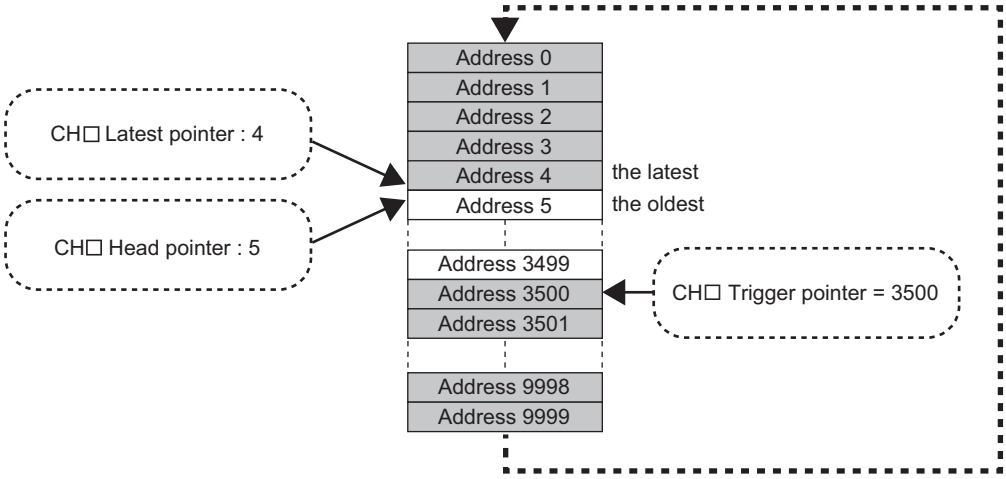
Check that CH☐ Logging hold flag (Un\G1016 to Un\G1019) has changed to ON (1).

(3) Checking data when a hold trigger has occurred

The data storage location when a hold trigger has occurred can be checked with CH☐ Trigger pointer (Un\G1114 to Un\G1117). The offset value (0 to 9999) from the start address (Un\G5000, Un\G15000, Un\G25000, Un\G35000) of CH☐ Logging data (Un\G5000 to Un\G44999) is stored in CH☐ Trigger pointer (Un\G1114 to Un\G1117).

Ex. The value to be stored when the logging operation stops under the following conditions.

- CH1 Logging points after trigger (Un\G1048): 6505 points
- The data location where a hold trigger has occurred: 3500th data



(a) Checking the trigger generation time

The trigger detection time can be checked with CH☐ Trigger detection time (Un\G1154 to Un\G1169).
Even when the logging cycle is set as less than 1s, the minimum time unit recorded in the Trigger detection time (Un\G1154 to Un\G1157) is second. Use the trigger detection time just for your information when referring to the logging data.

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

- The first two digits of the year, last two digits of the year, month, day, hour, minute, and second are stored in BCD code.
- The values in the following table are stored for the days of the week in BCD code.

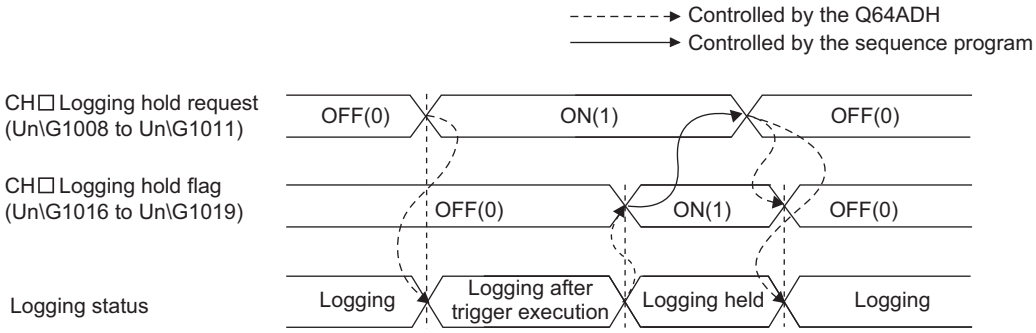
Storage data			
Sunday: 00H	Monday: 01H	Tuesday: 02H	Wednesday: 03H
Thursday: 04H	Friday: 05H	Saturday: 06H	

Point

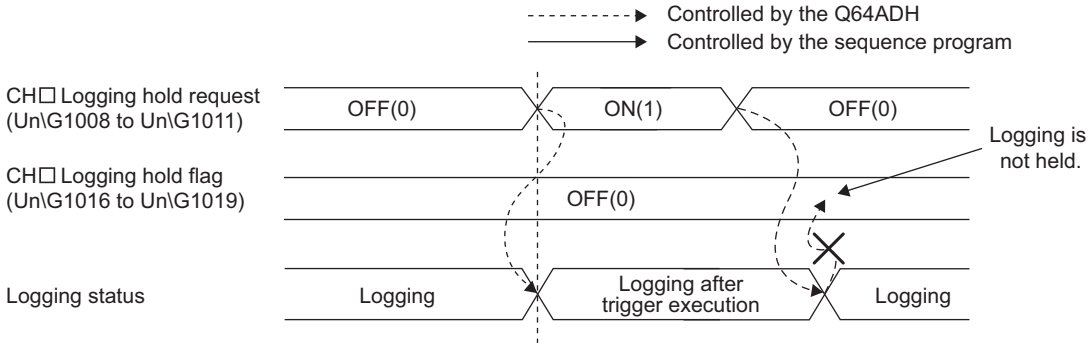
Trigger detection time is obtained from the CPU module's clock data. For this reason, if a hold trigger is generated immediately after the power-on of the programmable controller system, the Q64ADH may be unable to obtain the CPU module's clock data. In such a case, "00:00:00, January 1, 2000" is recorded as the trigger detection time.

(4) Restarting logging

To restart logging, set CH□ Logging hold request (Un\G1008 to Un\G1011) to OFF (0) from ON (1). After the logging operation is restarted, values are stored into the buffer memory, starting from the start address of CH□ Logging data (Un\G5000 to Un\G44999).
In addition, OFF (0) is stored in CH□ Logging hold flag (Un\G1016 to Un\G1019).
It may take time until ON (1) is stored in CH□ Logging hold flag (Un\G1016 to Un\G1019) after CH□ Logging hold request (Un\G1008 to Un\G1011) is set to ON (1) from OFF (0). To restart logging, check that ON (1) is stored in CH□ Logging hold flag (Un\G1016 to Un\G1019) and change CH□ Logging hold request (Un\G1008 to Un\G1011) from ON(1) to OFF(0).



- Logging does not stop when CH□ Logging hold request (Un\G1008 to Un\G1011) is set from ON (1) to OFF (0) before ON (1) is stored in CH□ Logging hold flag (Un\G1016 to Un\G1019).



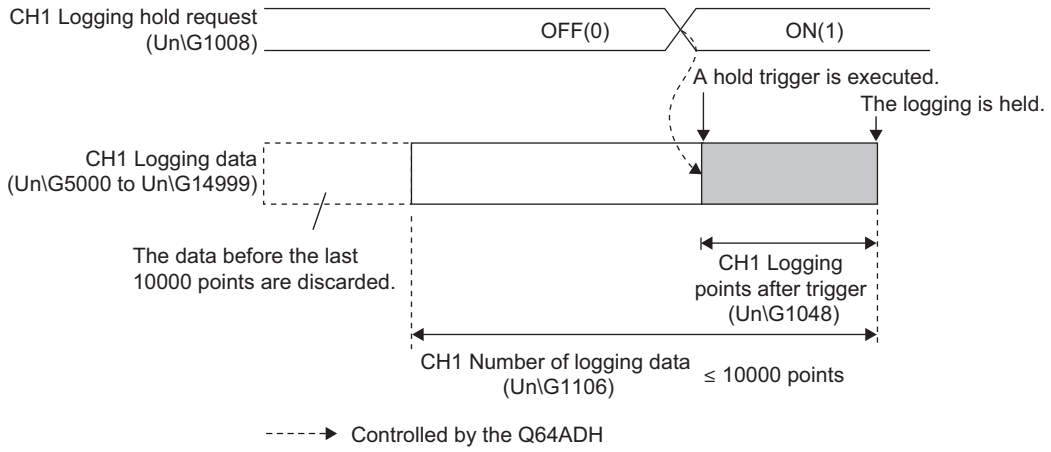
(a) Each buffer memory when logging is restarted

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

Buffer memory	Value status
CH□ Head pointer (Un\G1090 to Un\G1093)	Values are initialized. (Initial value: 0)
CH□ Latest pointer (Un\G1098 to Un\G1101)	
CH□ Number of logging data (Un\G1106 to Un\G1109)	
CH□ Trigger pointer (Un\G1114 to Un\G1117)	
CH□ Trigger detection time (Un\G1154 to Un\G1169)	
CH□ Logging data (Un\G5000 to Un\G44999)	The values before logging is restarted are not initialized. After the logging operation is restarted, values are stored into the buffer memory, starting from the start address (Un\G5000, Un\G15000, Un\G25000, Un\G35000) of CH□ Logging data (Un\G5000 to Un\G44999). To refer to logging data, check for valid data with CH□ Number of logging data (Un\G1106 to Un\G1109).

4.14.2 Logging hold request

A hold trigger is generated from a sequence program in any timing.
When CH□ Logging hold request (Un\G1008 to Un\G1011) is turned ON (1), data for the preset number of logging points is collected and logging stops.



Point

- The following delay time occurs until the Q64ADH receives a hold trigger after CH□ Logging hold request (Un\G1008 to Un\G1011) is set to ON (1) from OFF (0).
  Trigger delay = Logging cycle (Cycle at which logging is actually performed) + Scan time of the CPU module
- Check that CH□ Logging hold flag (Un\G1016 to Un\G1019) turns ON (1) before setting CH□ Logging hold request (Un\G1008 to Un\G1011) to OFF (0) from ON (1). Logging does not stop when CH□ Logging hold request (Un\G1008 to Un\G1011) is set from ON (1) to OFF (0) before logging stops.
- If a value other than OFF (0) and ON (1) is set to CH□ Logging hold request (Un\G1008 to Un\G1011), an error occurs. In such a case, an error code (207□) is stored in Latest error code (Un\G19), Error flag (XF) turns on, and the ERR. LED turns on.

(1) Checking that the logging has stopped

Check that CH□ Logging hold flag (Un\G1016 to Un\G1019) has changed to ON (1).

4.14.3 Level trigger

When a value in the monitored buffer memory area of the Q64ADH satisfies a preset condition, a hold trigger is generated.
A level trigger performs monitoring based on the updating cycle of a digital output value or a digital operation value.

(1) Initial setting of a level trigger

(a) Setting a target to be monitored

As a condition to generate a hold trigger, set the buffer memory address to be monitored in CH☐ Trigger data (Un\G1064 to Un\G1067).

Item	Setting range
CH☐ Trigger data (Un\G1064 to Un\G1067)	0 to 4999

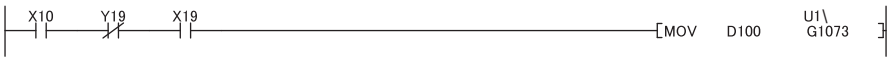
To monitor a device value of a module other than the Q64ADH such as a device of the CPU module, set as follows.

- Set a value between 1072 and 1081 (Level data ☐ (Un\G1072 to Un\G1081)) in CH☐ Trigger data (Un\G1064 to Un\G1067).
- Write a value of the device to be monitored in Level data ☐ (Un\G1072 to Un\G1081) with the MOV instruction.

Item	Setting range
Level data ☐ (Un\G1072 to Un\G1081)	-32768 to 32767

Ex. Application example of Level data ☐ (Un\G1072 to Un\G1081)
To monitor the data register D100 in the CPU module and operate the level trigger in CH1, create a sequence program as follows.

1. **Set 1073 (Level data 1) for CH1 Trigger data (Un\G1064). (When Level data 1 is used)**
2. **Store the storage data of D100 using a sequence program in Level data 1 (Un\G1073) as needed. (The start I/O number is set to 10H in the following program example.)**

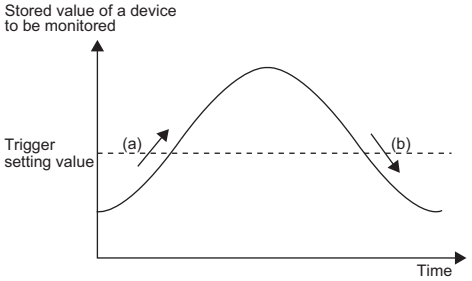


Point

Specify appropriate monitor data such as CH☐ Digital output value (Un\G11 to Un\G14), CH☐ Digital operation value (Un\G54 to Un\G57), and Level data ☐ (Un\G1072 to Un\G1081) in CH☐ Trigger data (Un\G1064 to Un\G1067). When a setting area or a system area is specified, the normal operation is not guaranteed.

(b) Setting the condition to be monitored

• Set a condition to generate a hold trigger in CH☐ Level trigger condition setting (Un\G1056 to Un\G1059).

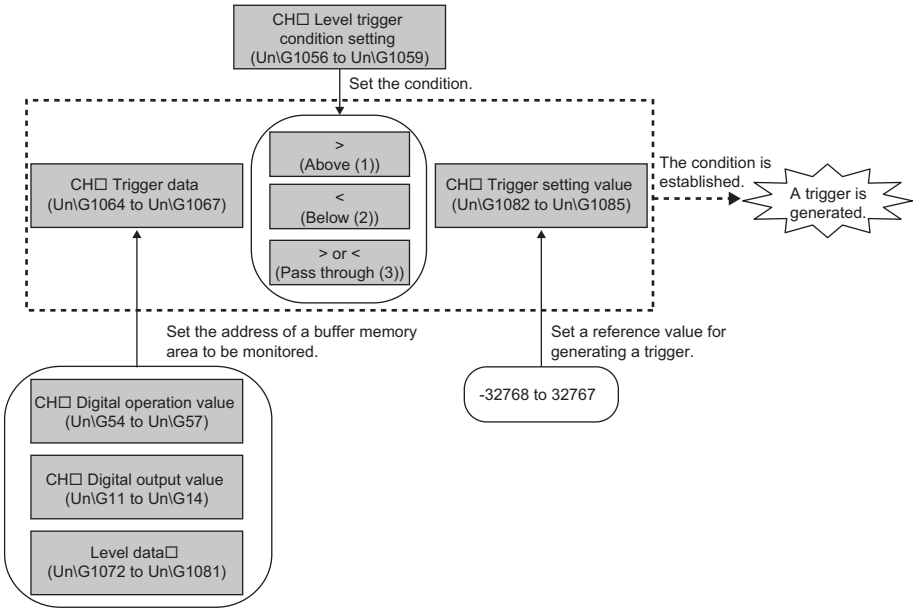
Setting value	Description	
Above (1)		A hold trigger is generated under the condition (a).
Below (2)		A hold trigger is generated under the condition (b).
Pass through (3)	(a) A hold trigger is generated when the relation between the values changes from "Stored value of a buffer memory area to be monitored ≤ Trigger setting value" to "Stored value of a buffer memory area to be monitored > Trigger setting value". (b) A hold trigger is generated when the relation between the values changes from "Stored value of a buffer memory area to be monitored ≥ Trigger setting value" to "Stored value of a buffer memory area to be monitored < Trigger setting value".	A hold trigger is generated under the condition (a) or (b).

• Set a value to generate a hold trigger in CH☐ Trigger setting value (Un\G1082 to Un\G1085).

Item	Setting range
CH☐ Trigger setting value (Un\G1082 to Un\G1085)	-32768 to 32767

Point

The following figure shows the relation between items to be set in the initial setting of a level trigger.

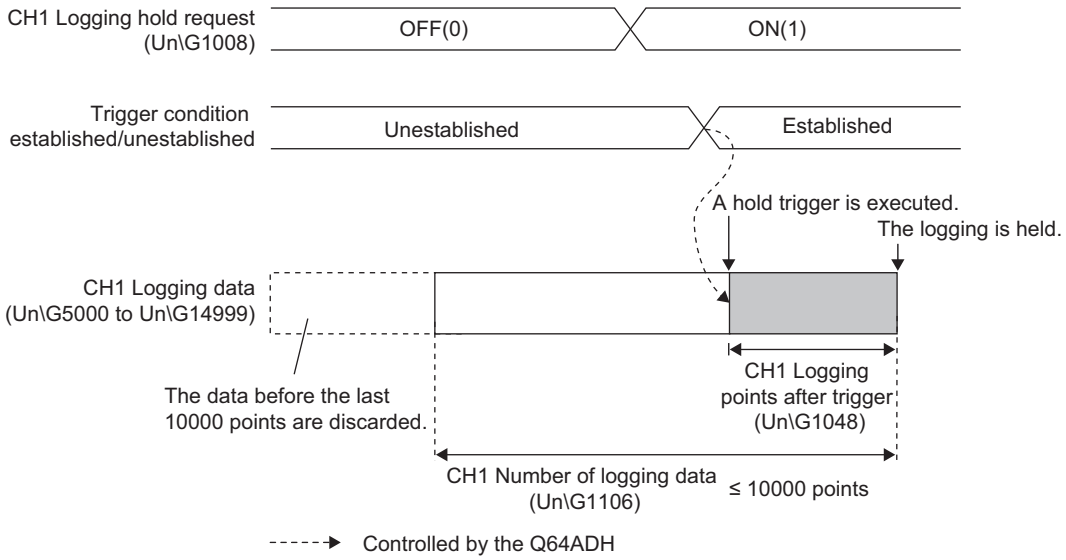


For example, to generate a hold trigger when a value in CH1 Digital output value becomes greater than 10000, set as follows.

- CH1 Level trigger condition setting (Un\G1056): Above (1)
- CH1 Trigger data (Un\G1064): 11
- CH1 Trigger setting value (Un\G1082): 10000

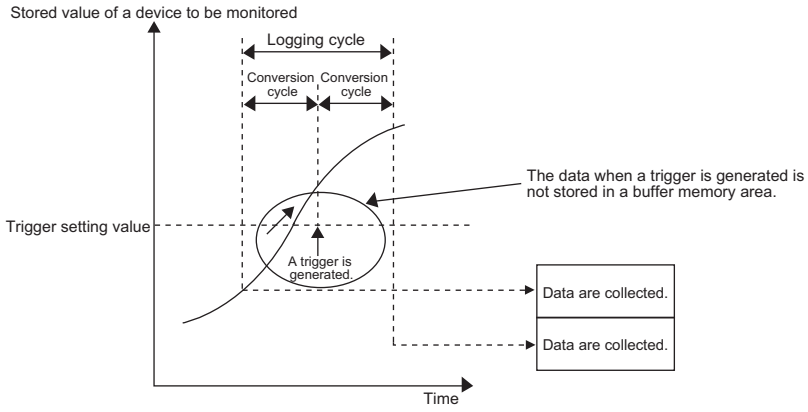
(2) Operation of a level trigger

To use a level trigger, set CH□ Logging hold request (Un\G1008 to Un\G1011) to ON (1) in advance. At the time CH□ Logging hold request (Un\G1008 to Un\G1011) is set to ON (1), the trigger condition wait status arises. When trigger condition is satisfied, data is collected for the set number of data points and logging stops.



Point

A level trigger is detected based on the updating cycle of a digital output value or digital operation value. Therefore, the data when a hold trigger is generated may not be stored in CH□ Logging data (Un\G5000 to Un\G44999) depending on the setting of the logging cycle. To store the data when a hold trigger is generated in CH□ Logging data (Un\G5000 to Un\G44999), configure settings so that the conversion cycle of the target value to be monitored (trigger data) and the logging cycle (actual logging cycle) become the same.



(a) Checking that the logging operation has stopped

Check that CH□ Logging hold flag (Un\G1016 to Un\G1019) has changed to ON (1).

4.14.4 Initial settings of the logging function

The following describes the initial setting procedure to use the logging function.

(1) Setting procedure

1. **Set A/D conversion enable/disable setting (Un\G0) to Enable (0).**
2. **Set Conversion speed setting (Un\G26) to 80μs (1) or 1ms (2).**
3. **Set CH☐ Logging enable/disable setting (Un\G1000 to Un\G1003) to Enable (0).**
4. **Set the target data to be logged in CH☐ Logging data setting (Un\G1024 to Un\G1027).**

Item	Setting value
CH☐ Logging data setting (Un\G1024 to Un\G1027)	• Digital output value (0) • Digital operation value (1)

5. **Set the logging cycle with CH☐ Logging cycle setting value (Un\G1032 to Un\G1035) and CH☐ Logging cycle unit setting (Un\G1040 to Un\G1043).**

Setting value of CH☐ Logging cycle unit setting (Un\G1040 to Un\G1043)	Setting range of CH☐ Logging cycle setting value (Un\G1032 to Un\G1035)
μs (0)	80 to 32767
ms (1)	1 to 32767
s (2)	1 to 3600

6. **Set the number of data points for data to be collected from when a hold trigger occurs until logging stops in CH☐ Logging points after trigger (Un\G1048 to Un\G1051).**

Item	Setting range
CH☐ Logging points after trigger (Un\G1048 to Un\G1051)	1 to 10000

7. **Set a condition to generate a hold trigger in CH☐ Level trigger condition setting (Un\G1056 to Un\G1059). When Disabled (0) is set in CH☐ Level trigger condition setting (Un\G1056 to Un\G1059), skip procedures 8 to 9.**

Item	Setting value
CH☐ Level trigger condition setting (Un\G1056 to Un\G1059)	• Disable (0) • Above (1) • Below (2) • Pass through (3)

8. **Set a buffer memory address to be monitored by a level trigger in CH☐ Trigger data (Un\G1064 to Un\G1067).**

Item	Setting range
CH☐ Trigger data (Un\G1064 to Un\G1067)	0 to 4999

9. **Set a level at which a level trigger operates in CH☐ Trigger setting value (Un\G1082 to Un\G1085).**

Item	Setting range
CH☐ Trigger setting value (Un\G1082 to Un\G1085)	-32768 to 32767

10. **Turn on and off Operating condition setting request (Y9).**

4.15 Logging Function (High-speed Logging Mode)

High-speed logging operation at a conversion speed of 20μs can be performed on digital output values obtained after sampling processing. This function can be used for such an operation as a test that requires 10000 or more point data sets to be logged without stopping logging.

(1) Application

(a) Storing 10000 or more point data sets without stopping logging

Without stopping logging, 10000 or more point data sets can be stored by transferring logging data stored in the buffer memory of the Q64ADH to the file register of the CPU module.

This function reduces the tact time in a test demanding high-speed conversion speed. (☞Page 84, Section 4.15.1)

(b) Saving data before and after error occurrence by stopping logging to investigate the cause

Like the normal logging mode, data before and after a hold trigger is generated (error occurrence) can be saved, so that the data that causes an error can be identified quickly. (☞Page 73, Section 4.14.1)

(2) Normal logging mode and availability of other functions

Available functions differ in between normal logging mode and high-speed logging mode.

For details, refer to the following.

- Function availability in normal logging mode and in high-speed logging mode (☞Page 32, Section 3.3 (1))

(3) Operation of logging

(a) Starting logging data collection

Same as when in normal logging mode. (☞Page 68, Section 4.14 (2) (a))

(b) Logging data

Like the normal logging mode, data is collected in CH□ Logging data (Un\G5000 to Un\G44999).

In addition, by using logging data storing notification, 10000 or more point logging data sets can be stored. This process notifies the CPU module about the timing of reading logging data so that logging data can be saved in the file register of the CPU module.

(4) Logging data setting

Select a type of the data to be collected with CH□ Logging data setting (Un\G1024 to Un\G1027).

- Digital output value (0)
- Digital operation value (1)

For the high-speed logging mode, the same value as the one in CH□ Digital output value (Un\G11 to Un\G14) is stored in CH□ Digital operation value (Un\G54 to Un\G57). Therefore, there is no difference if any of them is selected as a collection target.

(5) Logging cycle

(a) Logging cycle setting

Same as when in normal logging mode. (☞Page 69, Section 4.14 (4))
However, when μs (0) is set for CH□ Logging cycle unit setting (Un\G1040 to Un\G1043), the setting range of CH□ Logging cycle setting value (Un\G1032 to Un\G1035) is not the same.

Setting value of CH□ Logging cycle unit setting (Un\G1040 to Un\G1043)	Setting range of CH□ Logging cycle setting value (Un\G1032 to Un\G1035)
μs (0)	20 to 32767
ms (1)	1 to 32767
s (2)	1 to 3600

(b) When the logging function becomes disabled

Logging operation is not performed if one of the following errors occurs after the high-speed logging function is enabled and Operating condition setting request (Y9) is turned on and off.

- Error code (200□ to 208□, 250□): Logging function parameter setting item setting error

Point

When the logging cycle set in CH□ Logging cycle setting value (Un\G1032 to Un\G1035) and CH□ Logging cycle unit setting (Un\G1040 to Un\G1043) is shorter than the conversion cycle, if Operating condition setting request (Y9) is turned on and off, an error occurs and logging operation will not be performed. In such a case, an error code (202□) is stored in Latest error code (Un\G19), Error flag (XF) turns on, and the ERR. LED turns on.

(6) Number of logging data, head pointer, latest pointer

Same as when in normal logging mode. (☞Page 71, Section 4.14 (5), Page 72, Section 4.14 (6))

(7) Stopping the logging operation

Same as the operation when logging stops (holds) in the normal logging mode. (☞Page 73, Section 4.14.1)

4.15.1 Logging data storing notification

Without stopping logging, 10000 or more point data sets can be stored by transferring device data stored in the buffer memory of the Q64ADH to the file register of the CPU module. This function reduces the tact time in a test demanding high-speed conversion speed.

(1) Overview of logging data storing notification

After logging operation starts, each time 5000 point data sets are logged, the following is executed and an interrupt program starts up.

- Stored (1) is stored in CH1 Logging data storing to Side A completed flag (Un\G1208) to CH4 Logging data storing to Side B completed flag (Un\G1215).
- An interrupt request is made to the CPU module.

The Q64ADH has 4 points of interrupt factors (SI) and can perform the above operation for each channel.

(a) Logging data storing to Side A/B completed flag

- When the first half of 5000 point logging data sets are stored in A-Side, Stored (1) is stored in CH□ Logging data storing to Side A completed flag (Un\G1208, Un\G1210, Un\G1212, Un\G1214).
- When the last half of 5000 point logging data sets are stored in B-side, Stored (1) is stored in CH□ Logging data storing to Side B completed flag (Un\G1209, Un\G1211, Un\G1213, Un\G1215).
- By using these flags when transferring logging data to the file register of the CPU module, whether the transfer source logging data is 5000 point logging data sets in the first half (A-side) or in the last half (B-side) can be judged. At the same time, whether some data fails to be transferred during logging data transfer can be checked.

(2) Setting interrupt pointers

Assign interrupt factors (SI) of the Q64ADH and interrupt pointers of the CPU module in the intelligent function module interrupt pointer setting of the programming tool.

- For "Interrupt Pointer Start No.", set the start number of the interrupt pointer to be used.
- For "Interrupt Pointer Count", set the maximum value for the number of channels in which logging data storing notification is enabled.

The following table lists interrupt factors.

SI No.	Interrupt factor
0	CH1 Logging data storing to A/B-side completed pointer detection
1	CH2 Logging data storing to A/B-side completed pointer detection
2	CH3 Logging data storing to A/B-side completed pointer detection
3	CH4 Logging data storing to A/B-side completed pointer detection

Point

Be sure to assign the interrupt factor to be used, to an interrupt pointer of the CPU module. Otherwise, an error may occur in the CPU module.

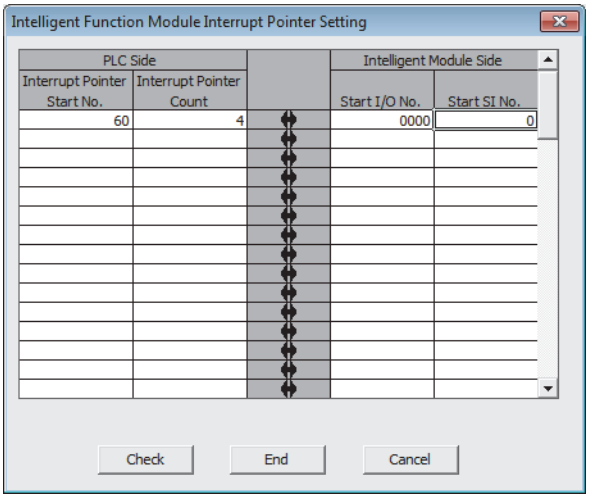
(a) Setting procedure

Set CH1 to CH4 Logging data storing to A/B-side completed pointer detection (SI0 to SI3) to an interrupt pointer of the CPU module.

Ex. To assign SI0 to SI3 to interrupt pointers of the CPU module (I60 and later)

Project window ⇨[Parameter]⇨[PLC Parameter]⇨[PLC System]⇨

Interrupt Pointer Setting button



Point

To use a specific SI number only, the following methods are available.

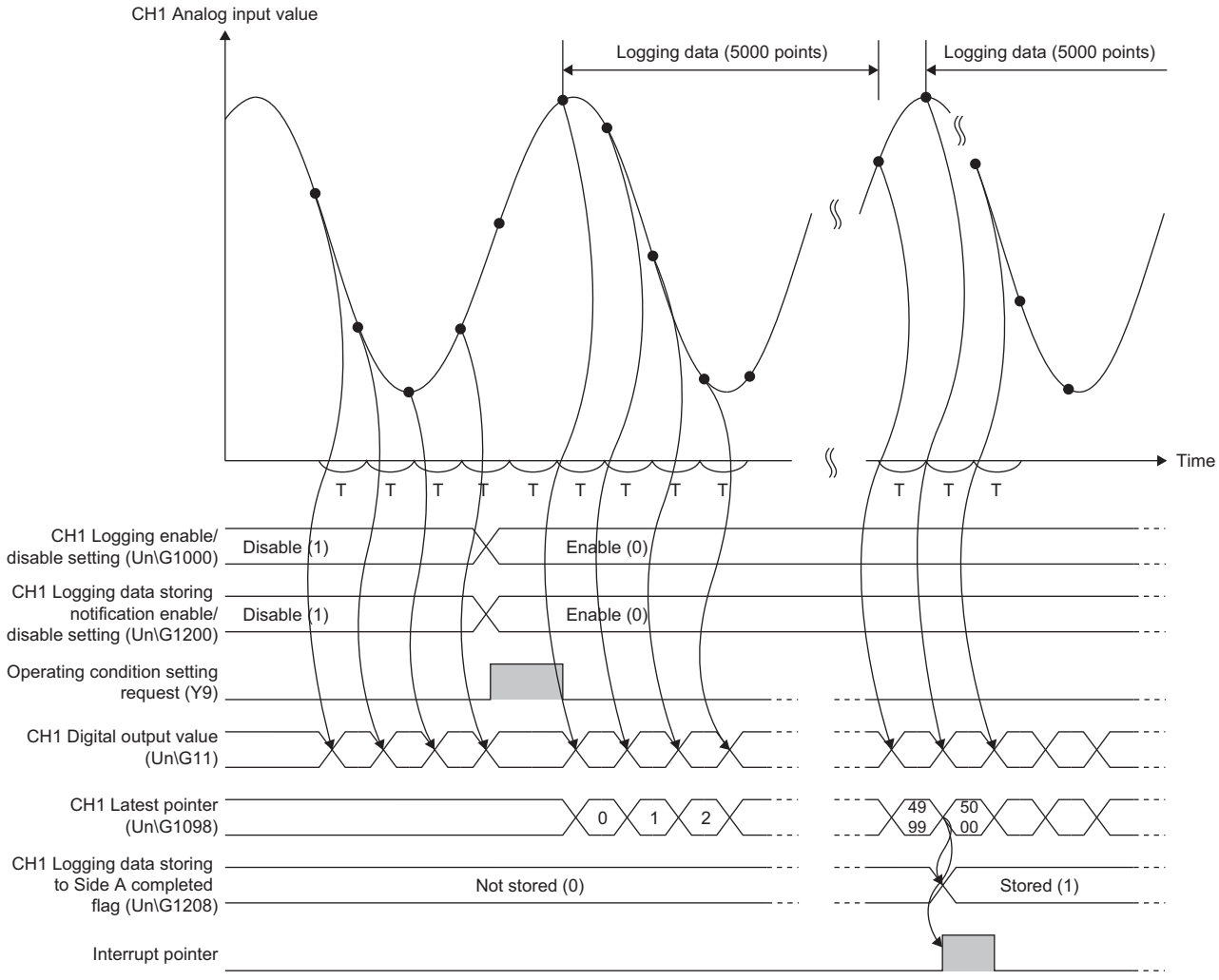
- Method with the PLC parameter "Intelligent Function Module Interrupt Pointer Setting"
  In "Intelligent Function Module Interrupt Pointer Setting", as many interrupt factors as specified for the number of pointers are used, starting from the first SI No. For example, set 1 for the first SI number and 2 for the number of pointers, and only SI1 and SI2 will be used.
- Method with the IMASK instructions from a sequence program
  By using the IMASK instructions, whether to allow or prohibit an interrupt program (interrupt mask) can be set for each interrupt pointer number.
  For details on the IMASK instructions, refer to the following.
  MELSEC-Q/L Programming Manual (Common Instructions)

(3) Starting logging data storing notification

Logging data storing notification starts when CH□ Logging data storing notification enable/disable setting (Un\G1200 to Un\G1203) is set to Enable (0) and Operating condition setting request (Y9) is turned on and off.

(4) Operation of logging data storing notification

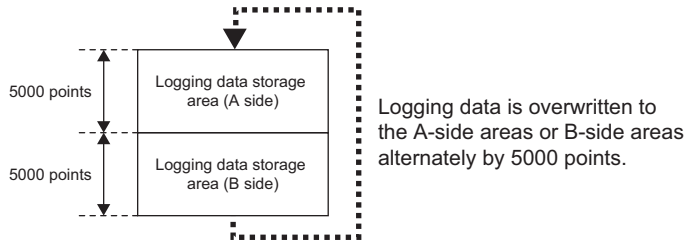
After logging operation starts, when 5000 point data sets are completely logged (when 4999 is stored in CH□ Latest pointer (Un\G1098 to Un\G1101)), Stored (1) is stored in CH□ Logging data storing to Side A completed flag (Un\G1208, Un\G1210, Un\G1212, Un\G1214), and an interrupt occurs.



T: Conversion speed

Then, when the next 5000 point data sets are completely logged (when 9999 is stored in CH□ Latest pointer (Un\G1098 to Un\G1101)), Stored (1) is stored in CH□ Logging data storing to Side B completed flag (Un\G1209, Un\G1211, Un\G1213, Un\G1215), and an interrupt occurs.

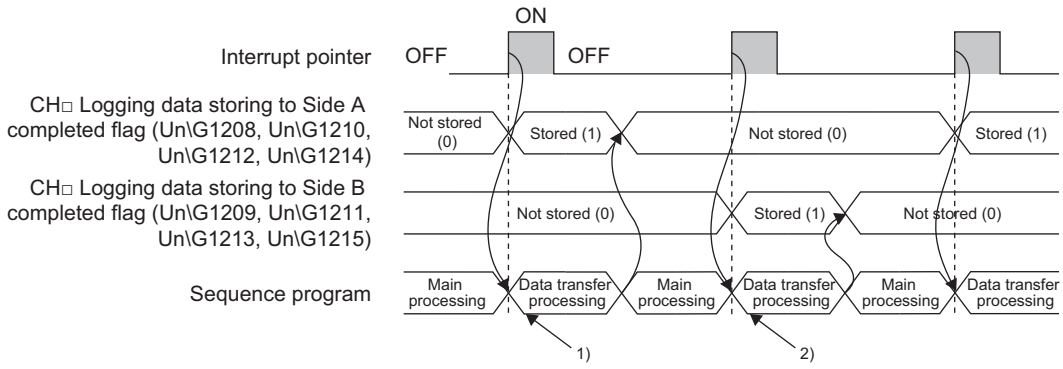
After that, each time 5000 point data sets are logged (A-side to B-side, B-side to A-side, and so on), logging data storing notification is repeated.
Note that the interrupt pointer for each channel is common to both A-side and B-side.



(a) Clearing the Logging data storing to Side A/B completed flag

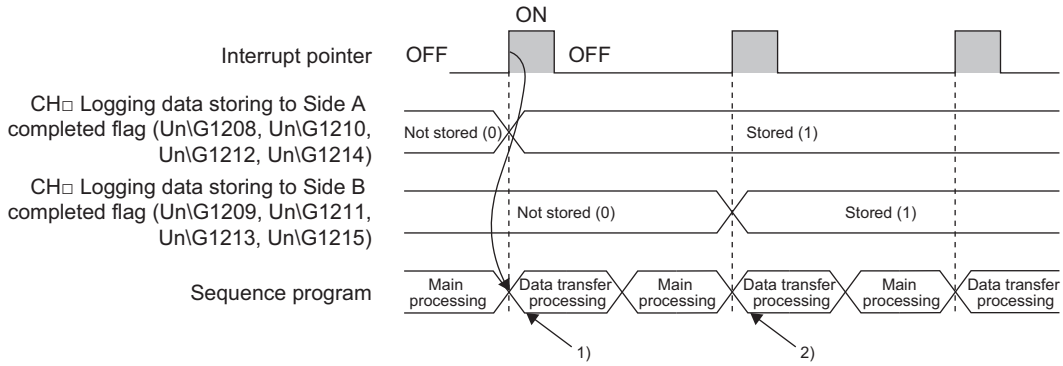
When logging data is completely transferred, with a sequence program, clear (set 0 for) CH1 Logging data storing to Side A completed flag (Un\G1208) to CH4 Logging data storing to Side B completed flag (Un\G1215).
If 0 is not set for CH1 Logging data storing to Side A completed flag (Un\G1208) to CH4 Logging data storing to Side B completed flag (Un\G1215), at the time of data transfer caused by the next interrupt, the storage flags for both A-side and B-side are set by the Q64ADH, and the side in which the transfer source data exists cannot be identified.
The following shows the operation when CH1 Logging data storing to Side A completed flag (Un\G1208) to CH4 Logging data storing to Side B completed flag (Un\G1215) are cleared and the operation when they are not cleared.

- When CH1 Logging data storing to Side A completed flag (Un\G1208) to CH4 Logging data storing to Side B completed flag (Un\G1215) are cleared



No.	Description
1)	• Since only CH☐ Logging data storing to Side A completed flag (Un\G1208, Un\G1210, Un\G1212, Un\G1214) is set to Stored (1), Un\G5000 to Un\G9999 data (for CH1) is transferred. • When the transfer operation is completed, CH☐ Logging data storing to Side A completed flag (Un\G1208, Un\G1210, Un\G1212, Un\G1214) is set to Not stored (0).
2)	• Since only CH☐ Logging data storing to Side B completed flag (Un\G1209, Un\G1211, Un\G1213, Un\G1215) is set to Stored (1), Un\G10000 to Un\G14999 data (for CH1) is transferred. • When the transfer operation is completed, CH☐ Logging data storing to Side B completed flag (Un\G1209, Un\G1211, Un\G1213, Un\G1215) is set to Not stored (0).

- When CH1 Logging data storing to Side A completed flag (Un\G1208) to CH4 Logging data storing to Side B completed flag (Un\G1215) are not cleared



No.	Description
1)	• Since only CH☐ Logging data storing to Side A completed flag (Un\G1208, Un\G1210, Un\G1212, Un\G1214) is set to Stored (1), Un\G5000 to Un\G9999 data is transferred. • After the data is transferred, CH☐ Logging data storing to Side A completed flag (Un\G1208, Un\G1210, Un\G1212, Un\G1214) is left as Stored (1).
2)	Since Not stored (0) is not set for CH☐ Logging data storing to Side A completed flag (Un\G1208, Un\G1210, Un\G1212, Un\G1214), Stored (1) remains valid for both flags, and which side data (A-side or B-side) to be transferred cannot be identified.

(5) Setting procedure

The following describes the initial setting procedure to use the logging function.

1. **Set interrupt pointers.**

Assign interrupt factors (SI) of the Q64ADH and interrupt pointers of the CPU module in the intelligent function module interrupt pointer setting of the programming tool. (☞Page 84, Section 4.15.1 (2))

2. **Set A/D conversion enable/disable setting (Un\G0) to Enable (0).**

3. **Set CH□ Logging enable/disable setting (Un\G1000 to Un\G1003) to Enable (0).**

4. **Set CH□ Logging data storing notification enable/disable setting (Un\G1200 to Un\G1203) to Enable (0).**

5. **Set the target data to be logged in CH□ Logging data setting (Un\G1024 to Un\G1027).**

Item	Setting value
CH□ Logging data setting (Un\G1024 to Un\G1027)	• Digital output value (0) • Digital operation value (1)

6. **Set the logging cycle with CH□ Logging cycle setting value (Un\G1032 to Un\G1035) and CH□ Logging cycle unit setting (Un\G1040 to Un\G1043). If not using the function to stop logging (hold), skip procedures 7 to 10.**

Setting value of CH□ Logging cycle unit setting (Un\G1040 to Un\G1043)	Setting range of CH□ Logging cycle setting value (Un\G1032 to Un\G1035)
μs (0)	20 to 32767
ms (1)	1 to 32767
s (2)	1 to 3600

7. **Set the number of data points for data to be collected from when a hold trigger occurs until logging stops in CH□ Logging points after trigger (Un\G1048 to Un\G1051).**

Item	Setting range
CH□ Logging points after trigger (Un\G1048 to Un\G1051)	1 to 10000

8. **Set a condition to generate a hold trigger in CH□ Level trigger condition setting (Un\G1056 to Un\G1059). When Disable (0) is set in CH□ Level trigger condition setting (Un\G1056 to Un\G1059), skip procedures 9 to 10.**

Item	Setting value
CH□ Level trigger condition setting (Un\G1056 to Un\G1059)	• Disable (0) • Above (1) • Below (2) • Pass through (3)

9. **Set a buffer memory address to be monitored by a level trigger in CH□ Trigger data (Un\G1064 to Un\G1067).**

Item	Setting range
CH□ Trigger data (Un\G1064 to Un\G1067)	0 to 4999

10. **Set a level at which a level trigger operates in CH□ Trigger setting value (Un\G1082 to Un\G1085).**

Item	Setting range
CH□ Trigger setting value (Un\G1082 to Un\G1085)	-32768 to 32767

11. **Turn on and off Operating condition setting request (Y9).**

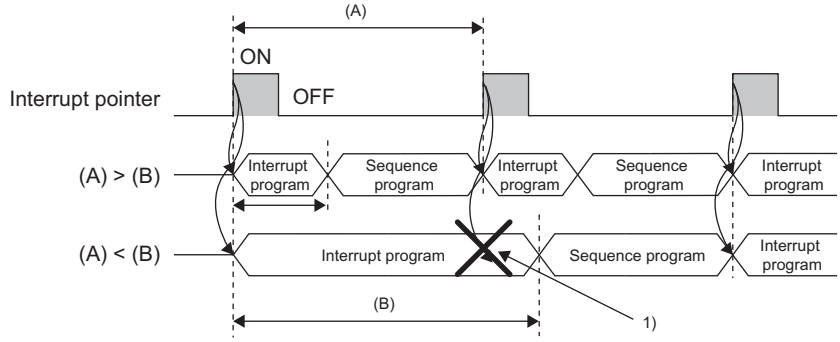
(6) Precautions when using logging data storing notification

To generate a Logging data storing to A/B-side completed pointer detection interrupt, consider the processing time of the interrupt program set to the interrupt pointer.
Scan time becomes longer due to the processing time of the interrupt program.

Ex. For a sequence program whose scan time is 1000ms, when the processing time of the interrupt program is 5ms and logging data storing notification is used, the interrupt program (5ms) is processed once every 100ms (20μs × 5000 points).

(a) Processing time of the interrupt program

If (B) is longer than (A) in the figure below, the CPU module fails to detect a Logging data storing to A/B-side completed pointer detection interrupt. If the CPU module fails to detect a Logging data storing to A/B-side completed pointer detection interrupt, the not-detected interrupt program will not be processed.
To prevent such detection failure, for (A) and (B) below, set (B) shorter than (A).



(A) and (B) in the figure are as follows:

Symbol	Item	Description
(A)	Interval at which Logging data storing to A/B-side completed pointer detection interrupts occur	Logging points (5000 points) × Logging cycle
(B)	Processing time of interrupt program	A sum of the overhead time periods before the startup of the interrupt program and after the end of the interrupt program, and the scan time of the interrupt program in the CPU module. QnUCPU User's Manual (Function Explanation, Program Fundamentals) Qn(H)/QnPH/QnPRHCPU User's Manual (Function Explanation, Program Fundamentals)

1) in the figure is as follows:

No.	Description
1)	Because the previous interrupt is being processed, the CPU module fails to detect a Logging data storing to A/B-side completed pointer detection interrupt, and the interrupt program will not be processed.

(7) Application example of logging data storing notification

The following shows a program example of using logging data storing notification.

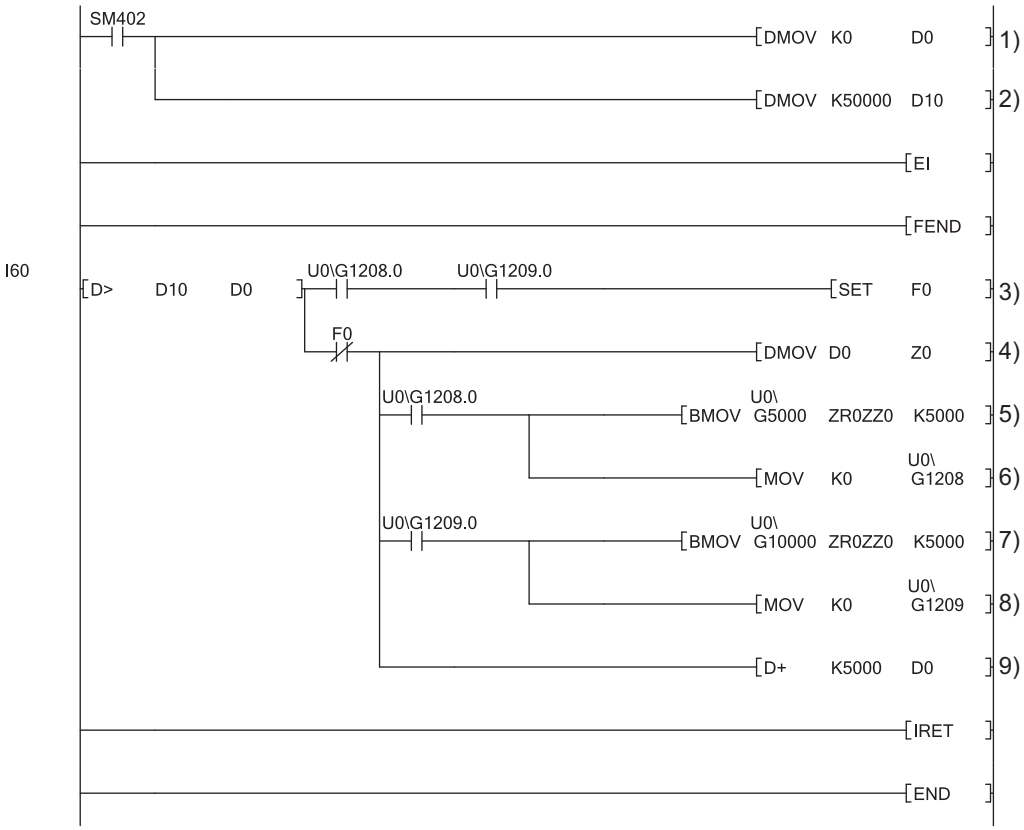
(a) Program example of detecting failure to detect a Logging data storing to A/B-side completed pointer detection interrupt

When the interrupt program starts, if both Logging data storing to Side A completed flag and Logging data storing to Side B completed flag are turned on, this sequence program determines that a detection failure occurs.

This program is used for configuring a sequence system, and others.

Ex. When storing logging data in the file register of the CPU module under the following conditions

- The I/O number of the Q64ADH is X/Y0 to X/YF.
- Target channel: CH1
- Interrupt pointer's start number: 60
- Number of interrupt pointers: 1



No.	Description
1)	Initialize the write position of the save destination file register.
2)	Set the maximum number of storage data points of the save destination file register.
3)	Determine logging data detection failure.
4)	Set the write position of the save destination file register in an index register.
5)	Store 5000 point data sets on the logging data A-side into the save destination file register.
6)	Clear Logging data storing to Side A completed flag.
7)	Store 5000 point data sets on the logging data B-side into the save destination file register.
8)	Clear Logging data storing to Side B completed flag.
9)	Add a 5000 point value to the write position of the save destination file register to set the next write position.

In this program example, when a detection failure occurs, the annunciator (F0) is turned on to terminate the interrupt processing operation.
In addition, when the Q02UCPU is used, Logging data storing to A/B-side completed pointer detection interrupt processing in this program takes, at a maximum, a sum of the time periods listed in the following table (1.976ms).

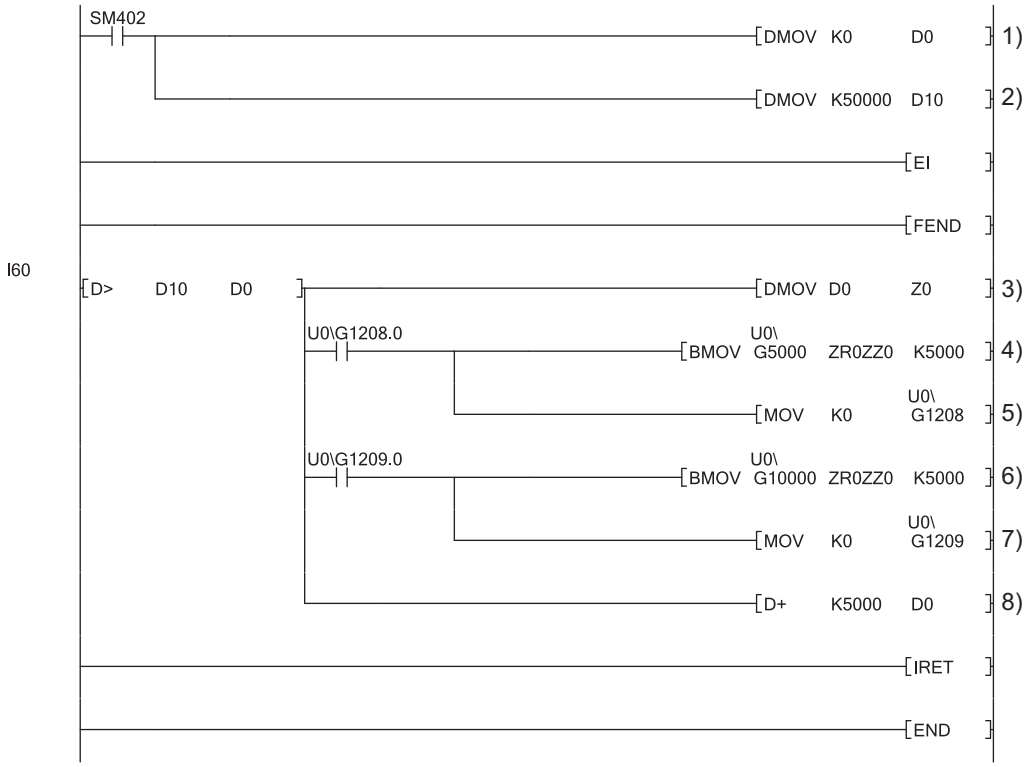
Item	Processing time
Overhead time before interrupt program startup	60.0μs
Overhead time at interrupt program end	26.0μs
Interrupt program sequence scan time	1.89ms

(b) Program example of not detecting failure to detect a Logging data storing to A/B-side completed pointer detection interrupt

This program is used when giving priority to logging data collection processing and others.

Ex. When storing logging data in the file register of the CPU module under the following conditions

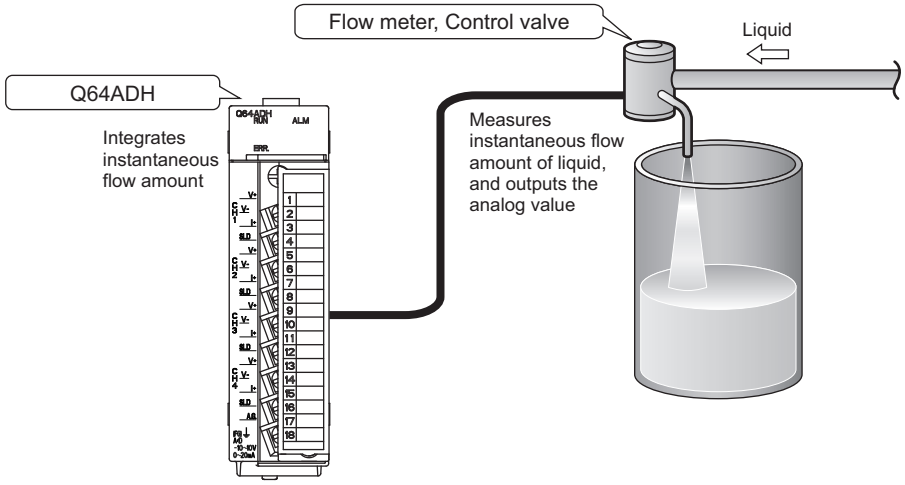
- The I/O number of the Q64ADH is X/Y0 to X/YF.
- Target channel: CH1
- Interrupt pointer's start number: 60
- Number of interrupt pointers: 1

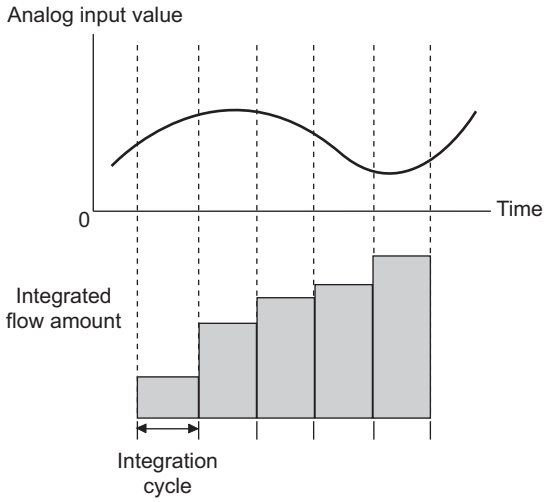


No.	Description
1)	Initialize the write position of the save destination file register.
2)	Set the maximum number of storage data points of the save destination file register.
3)	Set the write position of the save destination file register in an index register.
4)	Store 5000 point data sets on the logging data A-side into the save destination file register.
5)	Clear Logging data storing to Side A completed flag.
6)	Store 5000 point data sets on the logging data B-side into the save destination file register.
7)	Clear Logging data storing to Side B completed flag.
8)	Add a 5000 point value to the write position of the save destination file register to set the next write position.

4.16 Flow Amount Integration Function

This function performs the A/D conversion of analog input value (voltage or current) from a flow meter and others, and integrates the digital operation value by every integration cycle. In this function, integral processing is performed regarding the digital operation value as the instantaneous flow amount.
The flow amount integration function can be used when in normal logging mode, and when the conversion speed is set to 1ms.





(1) Concept of integral processing

With this function, integral processing is performed using the following formula.

$$\text{Integrated flow amount} = (\text{Instantaneous flow amount} \times \frac{\Delta T}{T} \times \text{Unit scaling}) + \text{Previous amount}$$

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Integrated flow amount</td><td>This is a result of the integral processing. The integrated flow amount is stored in CH☐ Integrated flow amount (Un\G1332 to Un\G1339) in the range of 0 to 2147483647.</td></tr>
<tr><td>Instantaneous flow amount</td><td>This is an instantaneous flow amount value output in analog from the flow meter. In this function, the value stored in CH☐ Digital operation value (Un\G54 to Un\G57) as the instantaneous flow amount.</td></tr>
<tr><td>△T</td><td>This is an integration cycle (ms) set in CH☐ Integration cycle setting (Un\G1308 to Un\G1311). Set this cycle according to the output cycle of the flow meter connected to the Q64ADH.
Ex. When the flow meter outputs instantaneous flow amount in analog at intervals of 500ms, set 500.</td></tr>
<tr><td>T</td><td>This is a conversion value to convert the time unit of instantaneous flow amount to ms. Set this value in CH☐ Flow amount time unit setting (Un\G1316 to Un\G1319). Set this cycle according to the range of the flow meter connected to the Q64ADH.
The following table lists the values of T for CH☐ Flow amount time unit setting (Un\G1316 to Un\G1319).
<table>
<tr><th>Range of flow meter</th><th>Setting value of CH☐ Flow amount time unit setting (Un\G1316 to Un\G1319)</th><th>T (ms)</th></tr>
<tr><td>/s</td><td>0</td><td>1000</td></tr>
<tr><td>/min</td><td>1</td><td>60000</td></tr>
<tr><td>/h</td><td>2</td><td>3600000</td></tr>
</table>
Ex. When the range of the flow meter is cm^3/s, set /s (0).</td></tr>
<tr><td>Unit scaling</td><td>This is unit scaling of the integrated flow amount. Set this value in CH☐ Unit scaling setting (Un\G1324 to Un\G1327).
This is used when the value of instantaneous flow amount × △T/T is 0 to 1.
The following table lists the values of unit scaling for CH☐ Unit scaling setting (Un\G1324 to Un\G1327).
<table>
<tr><th>Setting value of CH☐ Unit scaling setting (Un\G1324 to Un\G1327)</th><th>Unit scaling</th></tr>
<tr><td>0</td><td>1</td></tr>
<tr><td>1</td><td>10</td></tr>
<tr><td>2</td><td>100</td></tr>
<tr><td>3</td><td>1000</td></tr>
<tr><td>4</td><td>10000</td></tr>
</table>
Ex. When the value of △T/T is 0.0083 ... (△T=500(ms), T=60000(ms))
Set × 1000 (3) or × 10000 (4).</td></tr>
<tr><td>Previous amount</td><td>This is a value stored in CH☐ Integrated flow amount (Un\G1332 to Un\G1339) before integral processing.</td></tr>
</table>

Point

- If the instantaneous flow amount is less than 0, integral processing is not performed.
- The value acquired by rounding off the part after the decimal point is stored in CH☐ Integrated flow amount (Un\G1332 to Un\G1339). (Inside the Q64ADH, calculation is performed including the value after the decimal point in integral processing.)
- The value within the range of 0 to 2147483647 is stored in CH☐ Integrated flow amount (Un\G1332 to Un\G1339). If the value exceeds the upper limit (2147483647), the excessive part is stored in CH☐ Integrated flow amount (Un\G1332 to Un\G1339).

  Ex. When the previous amount is 2147483000 and the present amount (Instantaneous flow amount × Unit scaling × △T/T) is 5000,
  (2147483000 + 5000) - 2147483647 = 4353 is stored in CH☐ Integrated flow amount (Un\G1332 to Un\G1339).

(2) Concept of integration cycle

Set the integration cycle according to the analog output cycle of the flow meter connected to the Q64ADH. In addition, set this cycle as an integral multiple of the updating cycle of CH□ Digital operation value (Un\G54 to Un\G57).

The updating cycle of CH□ Digital operation value (Un\G54 to Un\G57) equals to the conversion cycle of the specified A/D conversion method. The following table lists the conversion cycle of each A/D conversion method.

A/D conversion method	Conversion cycle
Sampling processing	Conversion speed*1 × Number of used channels (ms)
Count average processing	$\left(\frac{\text{Time set in "Time Average/Count Average/Moving Average"}}{\text{Number of used channels}}\right)^{*2} \times \text{Conversion speed}^{*1} \times \text{Number of used channels (ms)}$
Time average processing	Number of times set in "Time Average/ Count Average/Moving Average" × Conversion speed*1 × Number of used channels (ms)
Moving average processing	Conversion speed*1 × Number of used channels (ms)

*1 In the flow amount integration function, the conversion speed can be set in 1ms. Therefore, the conversion speed is 1ms.

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

If the setting value of CH□ Integration cycle setting (Un\G1308 to Un\G1311) is not an integral multiple of the updating cycle of CH□ Digital operation value (Un\G54 to Un\G57), the maximum value of an integral multiple less than the value set in CH□ Integration cycle setting (Un\G1308 to Un\G1311) is calculated as the integration cycle.

Check the calculated integration cycle, which is stored in CH□ Integration cycle monitor value (Un\G1348 to Un\G1351).

Ex. When the integration cycle is calculated with the following settings

- A/D conversion enable in CH1 to CH3
- Averaging process setting (Un\G24) is Sampling processing (0)
- CH□ Integration cycle setting (Un\G1308 to Un\G1311) is 5000

  Since the updating cycle of CH□ Digital operation value (Un\G54 to Un\G57) is 3ms, the integration cycle is determined as 4998ms (the maximum cycle of an integral multiple of 3ms).

Point

If CH□ Integration cycle setting (Un\G1308 to Un\G1311) is less than the updating cycle of CH□ Digital operation value (Un\G54 to Un\G57), the flow amount integration function turns disabled and an error (error code: 212□) occurs.

(3) Concept of unit scaling

Unit scaling adjusts the number of digits of the integrated flow amount by multiplying "instantaneous flow amount × △T/T" by a multiple of 10.

Set the unit scaling to store the value after the decimal point of "instantaneous flow amount × △T/T" in CH☐ Integrated flow amount (Un\G1332 to Un\G1339).

Ex. When the value of "instantaneous flow amount × △T/T" is 123.45

By setting 100 as a unit scaling, the value of "instantaneous flow amount × △T/T" turns 12345 and the value after the decimal point can be stored in CH☐ Integrated flow amount (Un\G1332 to Un\G1339).

The following table lists the indications of the calculated value of △T/T acquired by the combination of CH☐ Flow amount time unit setting (Un\G1316 to Un\G1319) and CH☐ Integration cycle setting (Un\G1308 to Un\G1311) and the value set in CH☐ Unit scaling setting (Un\G1324 to Un\G1327).

Setting value of CH☐ Flow amount time unit setting (Un\G1316 to Un\G1319) (T)	Setting value of CH☐ Integration cycle setting (Un\G1308 to Un\G1311) (△T)	△T/T	Indication of unit scaling
0 (T = 1000)	1	0.001	× 1000
	500	0.5	× 10
	1000	1	× 1
	5000	5	× 1
1 (T = 60000)	1	0.000016666	× 10000
	500	0.008333333	× 10000
	1000	0.016666666	× 1000
	5000	0.083333333	× 1000
2 (T = 3600000)	1	0.000000277	× 10000
	500	0.000138888	× 10000
	1000	0.000277777	× 10000
	5000	0.001388888	× 10000

(4) Setting procedure

1. **Set A/D conversion enable/disable setting (Un\G0) to Enabled (0).**

2. **Set Conversion speed setting (Un\G26) to 1ms (2).**

3. **Set CH☐ Flow amount integration enable/disable setting (Un\G1300 to Un\G1303) to Enable (0).**

4. **Set a value for CH☐ Integration cycle setting (Un\G1308 to Un\GG1311).**

Item	Setting range
CH☐ Integration cycle setting (Un\G1308 to Un\G1311)	1 to 5000ms

5. **Set a value for CH☐ Flow amount time unit setting (Un\G1316 to Un\G1319).**

Item	Range of flow meter	Setting value
CH☐ Flow amount time unit setting (Un\G1316 to Un\G1319)	/s	0
	/min	1
	/h	2

6. **Set a value for CH☐ Unit scaling setting (Un\G1324 to Un\G1327).**

Item	Unit scaling	Setting value
CH☐ Unit scaling setting (Un\G1324 to Un\G1327)	× 1	0
	× 10	1
	× 100	2
	× 1000	3
	× 10000	4

7. **Turn Operating condition setting request (Y9) OFF → ON → OFF.**

Ex. When the flow meter connected to the Q64ADH outputs the instantaneous flow amount (range: cm^3/min) in analog at intervals of 500ms

- CH☐ Integration cycle setting (Un\G1308 to Un\G1311): 500ms
- CH☐ Flow amount time unit setting (Un\G1316 to Un\G1319): /min (1)
- CH☐ Unit scaling setting (Un\G1324 to Un\G1327): × 100 (2)
- Value in CH☐ Digital operation value (Un\G54 to Un\G57) when integral processing is performed: 5000
- Previous amount: 11000 (Maintained amount inside the Q64ADH: 11000.127)

The following formulation shows the integrated flow amount with the above settings.

$$\text{Integrated flow amount} = \left(\text{Instantaneous flow amount} \times \frac{\Delta T}{T} \times \text{Unit scaling}\right) + \text{Previous amount}$$

$$= \left(5000 \times \frac{500}{60000} \times 100\right) + 11000.127$$

$$= 4166.666\cdots + 11000.127$$

$$= 15166.7936\cdots$$

"15166" acquired by rounding off the value after the decimal point is stored in CH☐ Integrated flow amount (Un\G1332 to Un\G1339).

(5) Flow amount integration temporary stop

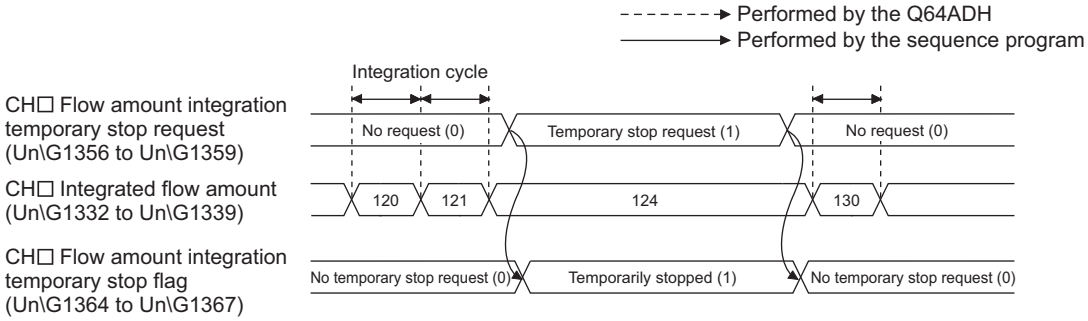
The flow amount integration can be stopped temporarily through a sequence program. Flow amount integration function can be temporarily stopped by changing the value of CH☐ Flow amount integration temporary stop request (Un\G1356 to Un\G1359) during its operation. CH☐ Flow amount integration temporary stop request (Un\G1356 to Un\G1359) operates only when the flow amount integration function is enabled.

(a) Operation procedure to stop the flow amount integration temporarily

1. **While the flow amount integration function is operating, change the CH☐ Flow amount integration temporary stop request (Un\G1356 to Un\G1359) of the channel to be stopped temporarily No request (0) → Temporary stop request (1).**
2. **When the rise of No request (0) → Temporary stop request (1) is detected, the flow amount integration function is temporarily stopped, and CH☐ Flow amount integration temporary stop flag (Un\G1364 to Un\G1367) of the corresponding channel turns Temporary stopping (1).**

(b) Operation procedure to restart the flow amount integration (to cancel temporary stop)

1. **While the flow amount integration function is temporarily stopped, change the CH☐ Flow amount integration temporary stop request (Un\G1356 to Un\G1359) of the stopped channel Temporary stop request (1) → No request (0).**
2. **When the fall of Temporary stop request (1) → No request (0) is detected, the flow amount integration function is restarted, and CH☐ Flow amount integration temporary stop flag (Un\G1364 to Un\G1367) of the corresponding channel turns No temporary stop request (0).**

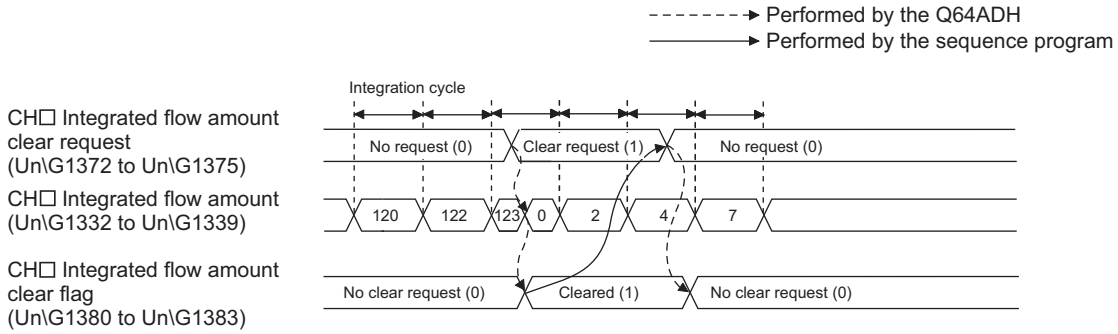


(6) Clearing the integrated flow amount

The integrated flow amount can be cleared in a sequence program. The integrated flow amount can be cleared by changing the value of CH☐ Integrated flow amount clear request (Un\G1372 to Un\G1375) while the flow amount integration function is operating. CH☐ Integrated flow amount clear request (Un\G1372 to Un\G1375) operates only when the flow amount integration function is enabled.

(a) Operation procedure to clear the integrated flow amount

1. **While the flow amount integration function is operating, change the CH☐ Integrated flow amount clear request (Un\G1372 to Un\G1375) of the channel to be cleared No request (0) → Clear request (1).**
2. **When the rise of No request (0) → Clear request (1) is detected, the value of CH☐ Integrated flow amount (Un\G1332 to Un\G1339) of the corresponding channel is cleared to zero.**
3. **After it is cleared, CH☐ Integrated flow amount clear flag (Un\G1380 to Un\G1383) of the cleared channel turns Cleared (1)**
4. **Confirm CH☐ Integrated flow amount clear flag (Un\G1380 to Un\G1383) is Cleared (1) and change CH☐ Integrated flow amount clear request (Un\G1372 to Un\G1375) Clear request (1) → No request (0).**
5. **When the fall of Clear request (1) → No request (0) is detected, CH☐ Integrated flow amount clear flag (Un\G1380 to Un\G1383) turns No clear request (0).**



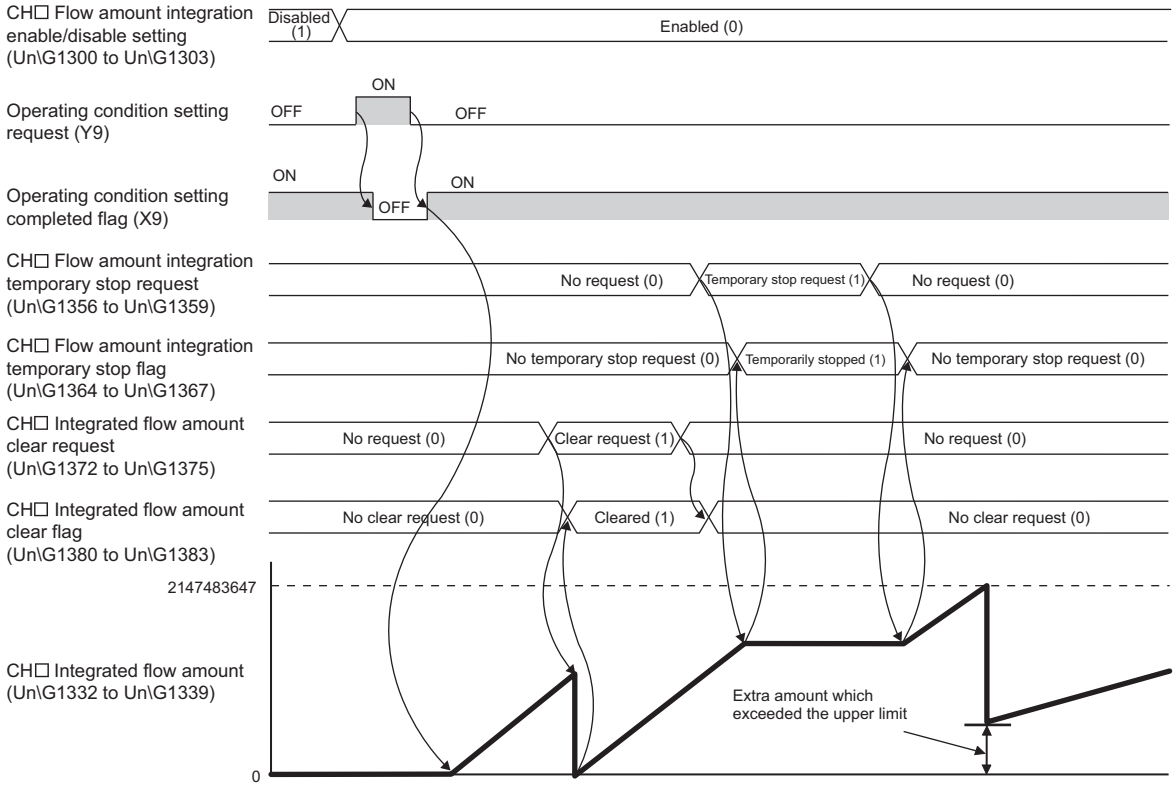
Point

CH☐ Integrated flow amount (Un\G1332 to Un\G1339) is also cleared to zero in the following case.

- Set CH☐ Flow amount integration enable/disable setting (Un\G1300 to Un\G1303) to Enable (0) and turn Operating condition setting request (Y9) OFF → ON → OFF.

(7) Change of the integrated flow amount

The following timing chart shows the timings that the integrated flow amount changes.



(8) Operation when an input signal error occurs

The integral processing cannot be performed while an input signal error is occurring. When the analog input value returns within the setting range and the A/D conversion is restarted, the integral processing is performed.

(9) Operation when Operating condition setting request (Y9) is turned OFF → ON → OFF

The following processing is performed by changing the settings in the following buffer memory areas and turning Operating condition setting request (Y9) OFF → ON → OFF. When a parameter of the integral processing or the integration cycle is changed by this processing, CH□ Integrated flow amount (Un\G1332 to Un\G1339) is cleared to zero, and the flow amount integration function is performed with the changed settings.
For details on the parameters of integral processing and integration cycle, refer to the following.

- Concept of integral processing (☞Page 96, Section 4.16 (1))
- Concept of integration cycle (☞Page 97, Section 4.16 (2))

Buffer memory	Processing after changing setting
A/D conversion enable/disable setting (Un\G0)	• In the changed channel The integration cycle is changed. The integral processing stops in the channel in which A/D conversion enable/disable setting (Un\G0) was changed from Enabled (0) to Disabled (1). CH□ Integrated flow amount (Un\G1332 to Un\G1339) maintains the value before changing. • In the unchanged channel The integration cycle is changed.
CH□ Time Average/ Count Average/Moving Average (Un\G1 to Un\G4)	• In the changed channel The integration cycle is changed. When the integration cycle is the same as before, CH□ Integrated flow amount (Un\G1332 to Un\G1339) of the changed channel is not cleared, and the integral processing continues. • In the unchanged channel The integration processing continues.
Averaging process setting (used to replace Q64AD) (Un\G9)	
Averaging process setting (Un\G24)	
CH□ Integration cycle setting (Un\G1308 to Un\G1311)	
CH□ Flow amount time unit setting (Un\G1316 to Un\G1319)	• In the changed channel The integration processing parameters are changed. • In the unchanged channel The integration processing continues.
CH□ Unit scaling setting (Un\G1324 to Un\G1327)	

Point

If Operating condition setting request (Y9) is turned OFF → ON → OFF and one of the following error occurs, the flow amount integration function turns disabled.

- Setting error of CH□ Time Average/ Count Average/Moving Average (Un\G1 to Un\G4) (error code: 20□, error code: 30□, error code: 31□)
- Setting error of Conversion speed setting (Un\G26) (error code: 360, error code: 210□)
- Setting error of CH□ Flow amount integration enable/disable setting (Un\G1300 to Un\G1303) (error code: 210□)
- Setting error of CH□ Integration cycle setting (Un\G1308 to Un\G1311) (error code: 211□, error code: 212□)
- Setting error of CH□ Flow amount time unit setting (Un\G1316 to Un\G1319) (error code: 213□)
- Setting error of CH□ Unit scaling setting (Un\G1324 to Un\G1327) (error code: 214□)

For details on the error contents, refer to the following.

- Error code list (☞Page 248, Section 11.1 (2))

4.17 Error Log Function

Stores a history of errors and alarms that occurred in the Q64ADH to the buffer memory (Un\G1810 to Un\G1969). A maximum of 16 errors and alarms can be stored.

(1) Process of the error log function

The error code and the time of error occurrence are stored in the buffer memory address, starting from error history No.1 (start address Un\G1810) and sequentially thereafter. Error occurrence 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 to Un\G1819	System area	

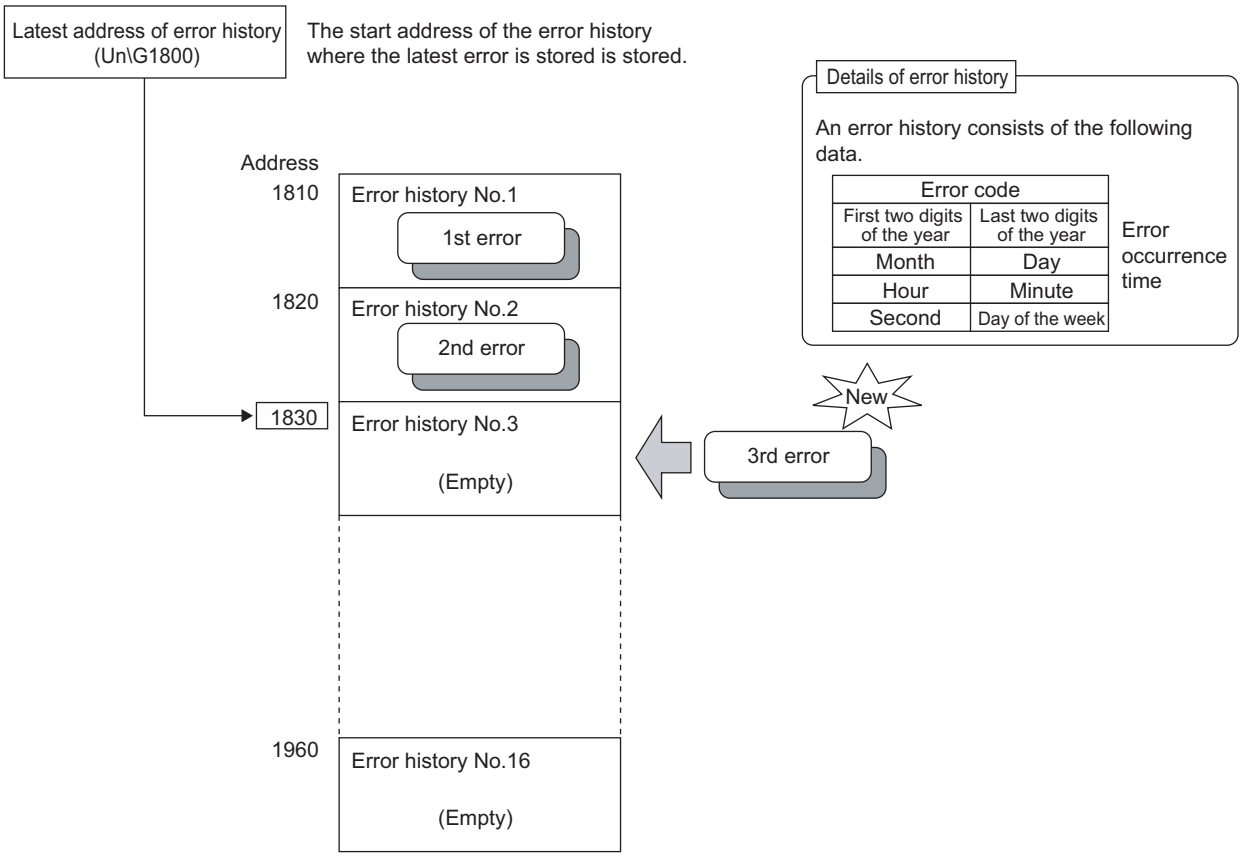
Item	Storage contents	Storage example*1
First two digits of the year/ Last two digits of the year	Stored in BCD code.	2011_H
Month/Day		329_H
Hour/Minute		1035_H
Second		40_H
Day of the week	One of the following values is stored for each day of the week in BCD code. • Sunday: 0 • Monday: 1 • Tuesday: 2 • Wednesday: 3 • Thursday: 4 • Friday: 5 • Saturday: 6	2_H

*1 Those are values when an error occurs at 10:35:40 on Tuesday, March 29th, 2011.

(2) Checking error history

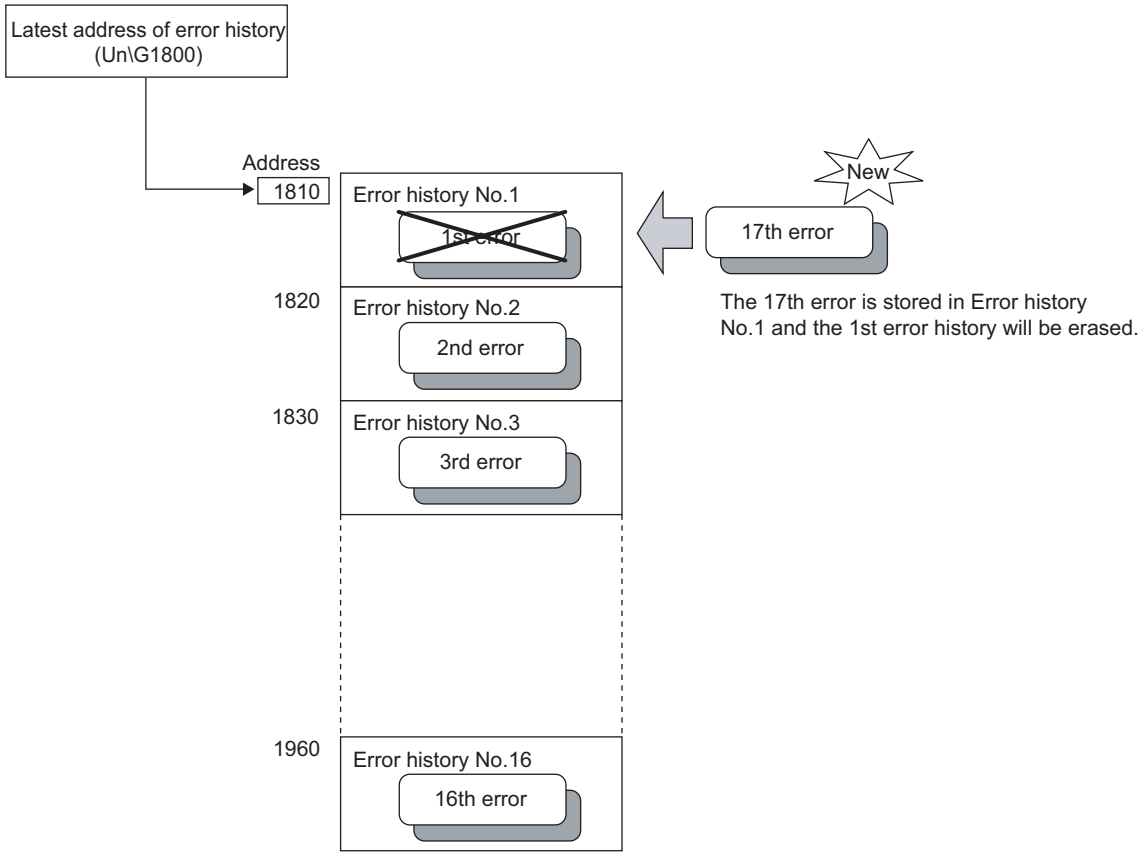
You can check the start address of the latest stored error at Latest address of error history (Un\G1800).

Ex. 1: When the third error occurs:
The third error is stored in error history No.3, and the value "1830" (start address of error history No.3) is stored to Latest address of error history (Un\G1800).



Ex. 2: When the 17th error occurs

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

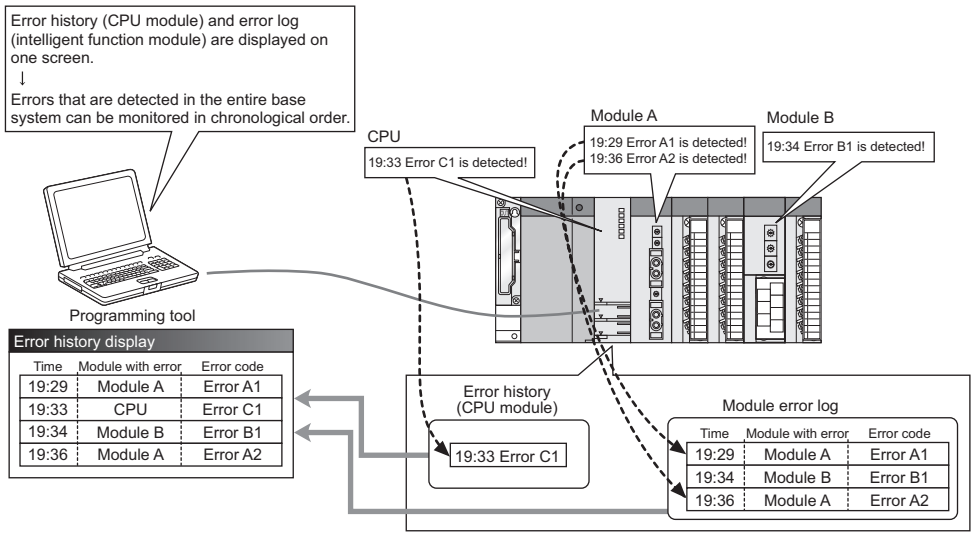


Point

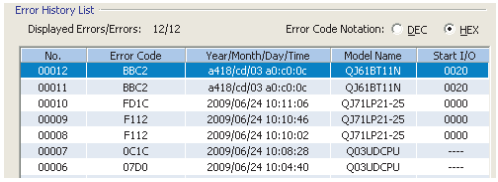
- The same process for errors is used when an alarm occurs.
- Once the error history storage area becomes full, subsequent errors will overwrite the previous errors, starting from error history No.1, and continues sequentially thereafter (Un\G1810 to Un\G1819). (The overwritten history is deleted.)
- The stored error history is cleared when power supply is turned OFF, or when the CPU module is reset.

4.18 Module Error Collection Function

Collects the errors and alarms that occurred in the Q64ADH, into the CPU module.
By holding the module errors in a memory that can hold data in the event of power failure, the errors can be held even after powering off or resetting the CPU module.



[Example of screen display]



(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 whose serial number (first five digits) is 11043 or later
GX Works2	Version 1.09K or later

Point

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

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

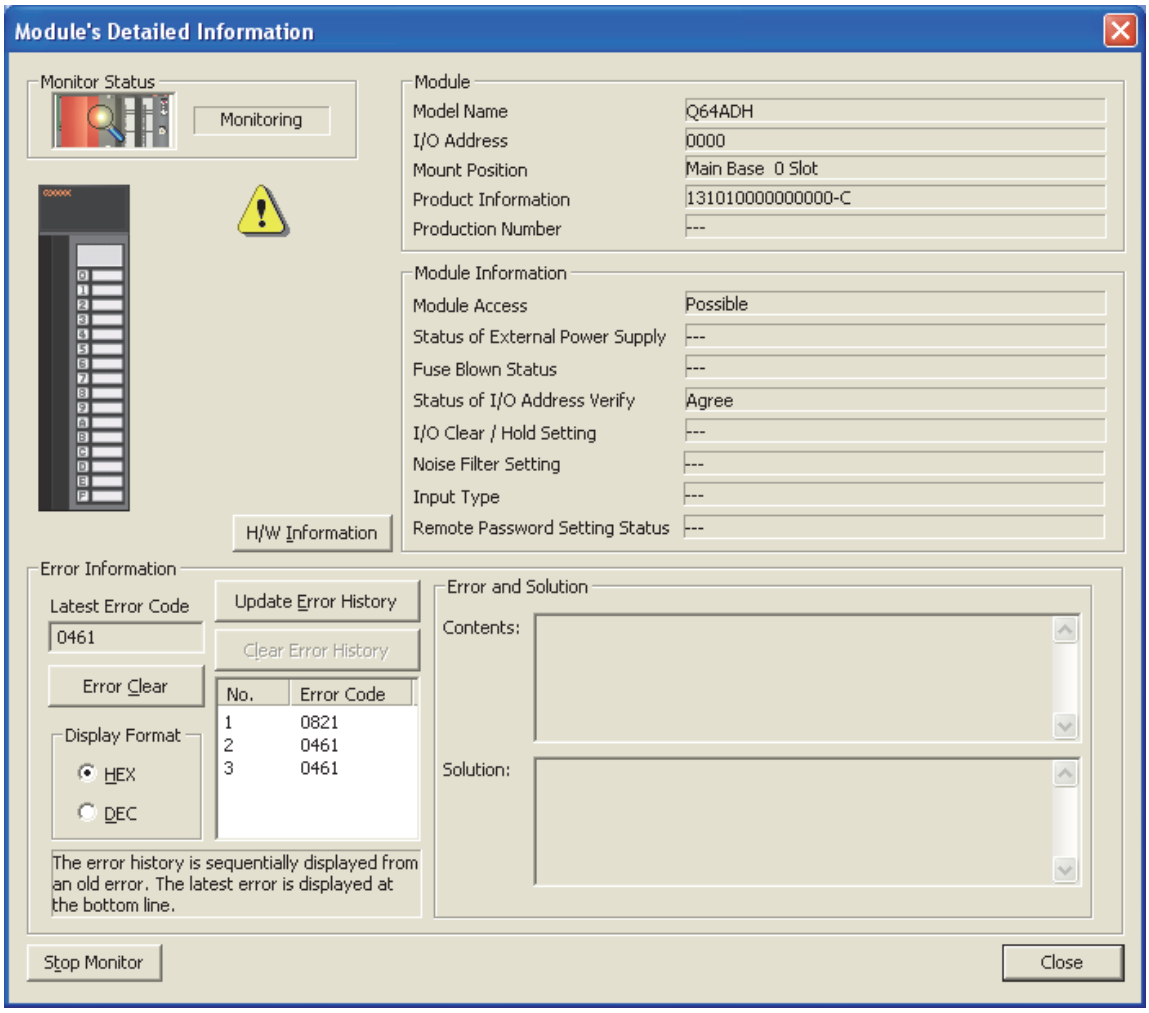
4.19 Error Clear Function

When an error occurs, you can clear the error from 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 is also turned off. The operation is the same as Error clear request (YF) as well as executing error clear from the display unit.
However, error history cannot be cleared.
For instructions on Error clear request (YF) and executing error clear from the display unit, refer to the following.

- Error clear request (YF) (☞ Page 110, Section 5.2)

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



CHAPTER 5 I/O SIGNALS ASSIGNED TO THE CPU MODULE

This chapter describes the Q64ADH I/O signals assigned to the CPU module.

5.1 I/O Signal List

The following shows the list of the Q64ADH I/O signals.
For the details of I/O signals, refer to the followings.

- Details of I/O Signals (☞Page 110, 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		Y5	
X6		Y6	
X7		Y7	
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	A/D conversion completed flag	YE	Use prohibited
XF	Error flag	YF	Error clear request

Point

The I/O number (X/Y) described above shows the case that the start I/O number of the Q64ADH is set to 0.

5.2 Details of I/O Signals

The following describes the details of the Q64ADH I/O signals assigned to the CPU modules.
The I/O number (X/Y) described below shows the case that the start I/O number of the Q64ADH is set to 0.

5.2.1 Input signal

(1) Module READY (X0)

Module READY (X0) turns ON to indicate the preparation for the A/D conversion is completed after the power-on or after the reset operation of the CPU module, and then the A/D conversion is proceeded.
In the following cases, Module READY (X0) turns off.

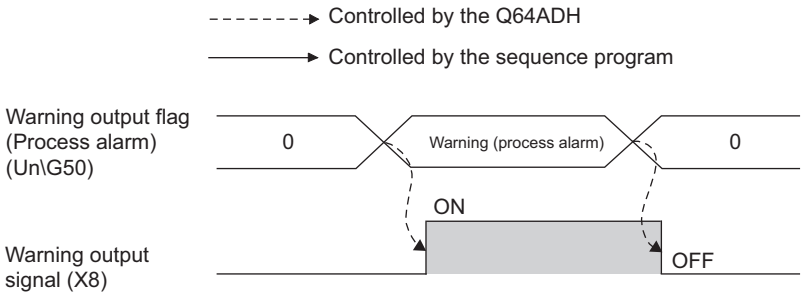
- In the offset/gain setting mode (In this case, the A/D conversion processing is executed)
- When a watchdog timer error occurs to the Q64ADH (In this case, the A/D conversion processing is not executed)

(2) Warning output signal (X8)

Warning output signal (X8) turns ON when the process alarm has been detected.

(a) Process alarm

- Warning output signal (X8) turns ON when digital operation values of the A/D conversion enabled channels exceed the ranges set for CH1 Process alarm lower lower limit value (Un\G86) to CH4 Process alarm upper upper limit value (Un\G101) after validating the warning output setting (process alarm).
  The ALM LED also turns on along with the on of the signal.
- Warning output signal (X8) turns OFF when the digital operation values fall within the setting range for all the A/D conversion enabled channels.
  The ALM LED also turns off along with the off of the signal.



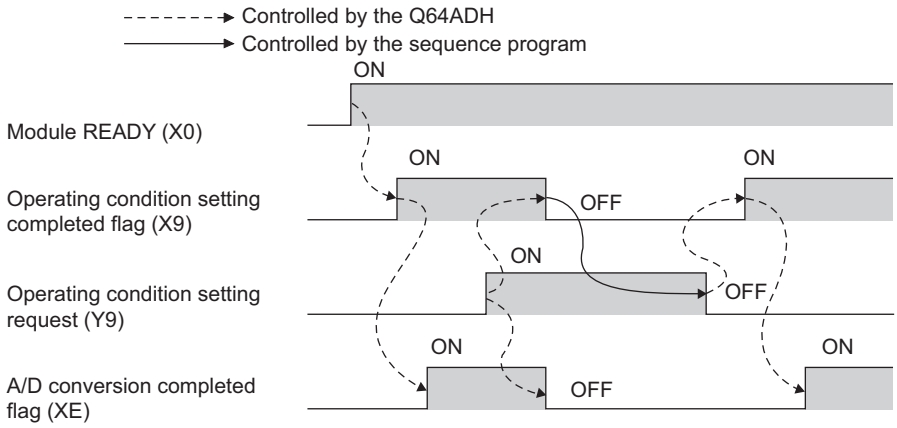
(3) Operating condition setting completed flag (X9)

When changing the following settings, use Operating condition setting completed flag (X9) as an interlock condition to turn Operating condition setting request (Y9) OFF → ON → OFF.

- A/D conversion enable/disable setting (Un\G0)
- CH☐ Time Average/ Count Average/Moving Average (Un\G1 to Un\G4)
- Averaging process setting (used to replace Q64AD) (Un\G9)
- Averaging process setting (Un\G24)
- Conversion speed setting (Un\G26)
- Input signal error detection setting (Un\G27)
- Digital clipping enable/disable setting (Un\G29)
- Warning output setting (Un\G48)
- Scaling enable/disable setting (Un\G53)
- CH☐ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68)
- CH☐ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69)
- CH☐ Process alarm lower lower limit value (Un\G86, Un\G90, Un\G94, Un\G98)
- CH☐ Process alarm lower upper limit value (Un\G87, Un\G91, Un\G95, Un\G99)
- CH☐ Process alarm upper lower limit value (Un\G88, Un\G92, Un\G96, Un\G100)
- CH☐ Process alarm upper upper limit value (Un\G89, Un\G93, Un\G97, Un\G101)
- CH☐ Input signal error detection setting value (Un\G142 to Un\G145)
- CH☐ Logging enable/disable setting (Un\G1000 to Un\G1003)
- CH☐ Logging data setting (Un\G1024 to Un\G1027)
- CH☐ Logging cycle setting value (Un\G1032 to Un\G1035)
- CH☐ Logging cycle unit setting (Un\G1040 to Un\G1043)
- CH☐ Logging points after trigger (Un\G1048 to Un\G1051)
- CH☐ Level trigger condition setting (Un\G1056 to Un\G1059)
- CH☐ Trigger data (Un\G1064 to Un\G1067)
- CH☐ Trigger setting value (Un\G1082 to Un\G1085)
- CH☐ Logging data storing notification enable/disable setting (Un\G1200 to Un\G1203)
- CH☐ Flow amount integration enable/disable setting (Un\G1300 to Un\G1303)
- CH☐ Integration cycle setting (Un\G1308 to Un\G1311)
- CH☐ Flow amount time unit setting (Un\G1316 to Un\G1319)
- CH☐ Unit scaling setting (Un\G1324 to Un\G1327)

When Operating condition setting completed flag (X9) is OFF, the A/D conversion processing is not executed.
In the case of the following status, Operating condition setting completed flag (X9) turns OFF.

- When Operating condition setting request (Y9) is ON

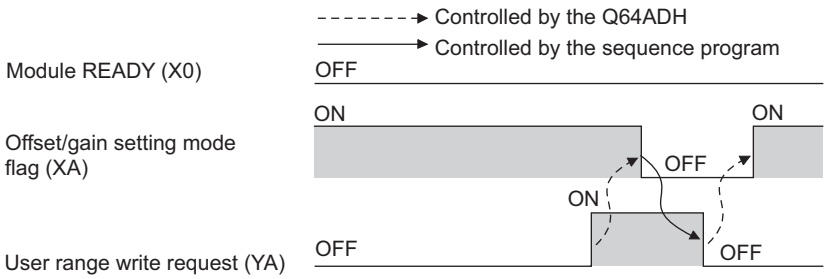


(4) Offset/gain setting mode flag (XA)

(a) Offset/gain setting mode

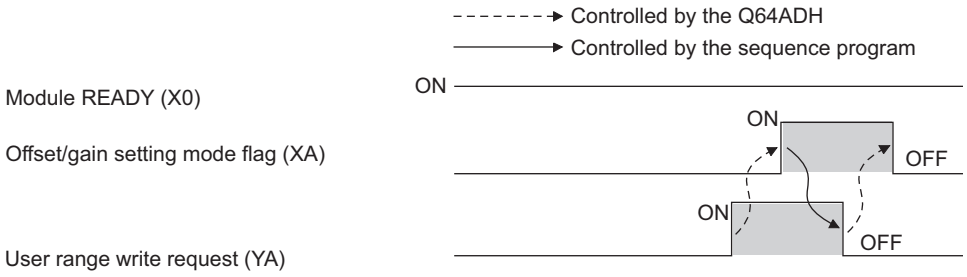
When registering the value, which was adjusted with the offset/gain setting, to the module, use Offset/gain setting mode flag (XA) as an interlock condition to turn User range write request (YA) OFF → ON → OFF.
For the offset/gain setting, refer to the following.

- Offset/gain Setting (☞ Page 175, Section 8.5)



(b) Normal mode

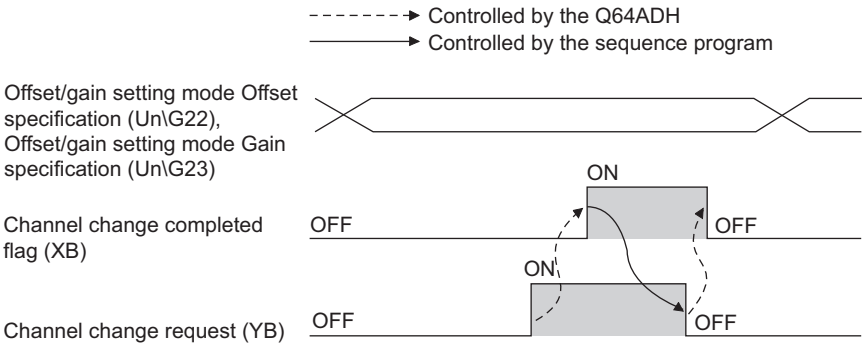
In the user range restoration, use Offset/gain setting mode flag (XA) as an interlock condition to turn User range write request (YA) OFF → ON → OFF.



(5) 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 Channel change request (YB) OFF → ON → OFF.
For the offset/gain setting, refer to the following.

- Offset/gain Setting (☞ Page 175, Section 8.5)



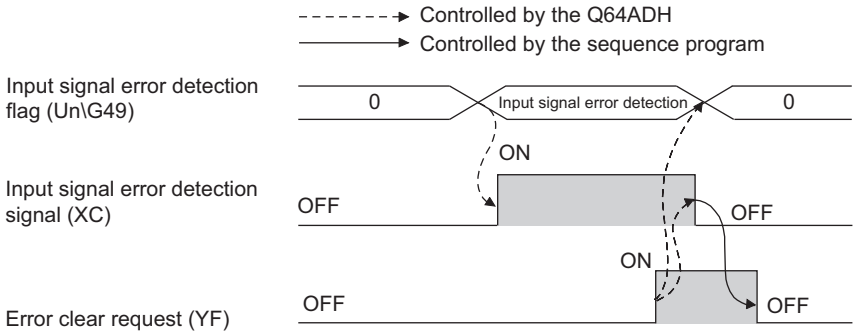
(6) Input signal error detection signal (XC)

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

Input signal error detection signal (XC) turns to ON when an analog input value exceeds the range set with CH□ Input signal error detection setting value (Un\G142 to Un\G145) in any channel which has been A/D conversion-enabled, after setting the detection condition in Input signal error detection setting (Un\G27). When the disconnection detection is set, the signal ignores the setting for CH□ Input signal error detection setting value (Un\G142 to Un\G145), and turns to ON at the disconnection detection.

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

After setting the analog input value within the range set, turn Error clear request (YF) OFF → ON → OFF to turn OFF Input signal error detection signal (XC).



(c) When Input signal error detection signal (XC) turns ON

- A/D conversion completed flag (Un\G10) for the corresponding channels turns OFF.
- For the error detected channel, the digital output value immediately before the error detection is held in the buffer memory.
- ALM LED flashes.

(d) When Input signal error detection signal (XC) turns OFF

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

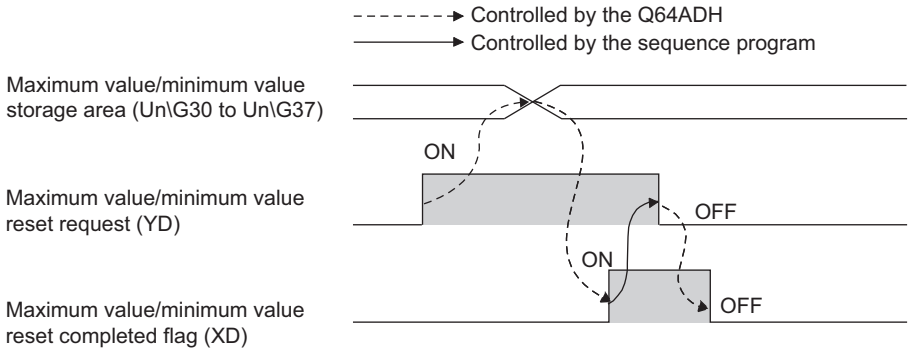
Point

When the analog input value falls within the range set, A/D conversion resumes regardless of Input signal error detection signal (XC) reset. When the first A/D conversion after the resumption is completed, A/D conversion completed flag (Un\G10) is turned to A/D conversion completion (1).
Averaging processing starts over after the A/D conversion resumed.

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

(a) Normal logging mode

Maximum value/minimum value reset completed flag (XD) turns ON after resetting the maximum or minimum values stored in CH□ Maximum value (Un\G30, Un\G32, Un\G34, Un\G36) and CH□ Minimum value (Un\G31, Un\G33, Un\G35, Un\G37) by turning Maximum value/minimum value reset request (YD) OFF → ON → OFF.



(b) High-speed logging mode

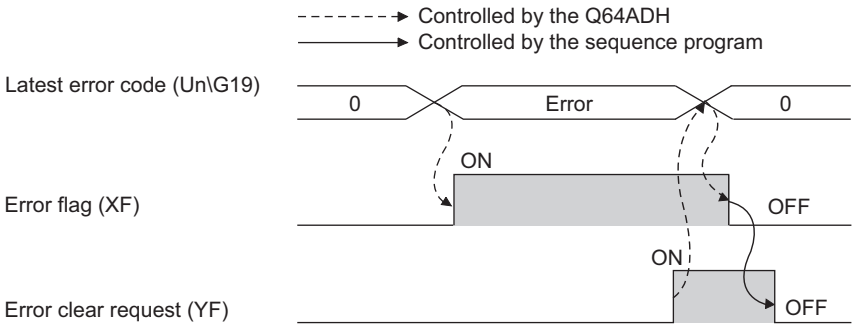
Maximum value/minimum value reset completed flag (XD) is always OFF.

(8) A/D conversion completed flag (XE)

A/D conversion completed flag (XE) turns ON when all A/D conversion-enabled channels are converted.

(9) Error flag (XF)

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



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

Turn Error clear request (YF) OFF → ON → OFF.

5.2.2 Output signal

(1) Operating condition setting request (Y9)

To validate the following settings, turn Operating condition setting request (Y9) OFF → ON → OFF.

- A/D conversion enable/disable setting (Un\G0)
- CH☐ Time Average/ Count Average/Moving Average (Un\G1 to Un\G4)
- Averaging process setting (used to replace Q64AD) (Un\G9)
- Averaging process setting (Un\G24)
- Conversion speed setting (Un\G26)
- Input signal error detection setting (Un\G27)
- Digital clipping enable/disable setting (Un\G29)
- Warning output setting (Un\G48)
- Scaling enable/disable setting (Un\G53)
- CH☐ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68)
- CH☐ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69)
- CH☐ Process alarm lower lower limit value (Un\G86, Un\G90, Un\G94, Un\G98)
- CH☐ Process alarm lower upper limit value (Un\G87, Un\G91, Un\G95, Un\G99)
- CH☐ Process alarm upper lower limit value (Un\G88, Un\G92, Un\G96, Un\G100)
- CH☐ Process alarm upper upper limit value (Un\G89, Un\G93, Un\G97, Un\G101)
- CH☐ Input signal error detection setting value (Un\G142 to Un\G145)
- CH☐ Logging enable/disable setting (Un\G1000 to Un\G1003)
- CH☐ Logging data setting (Un\G1024 to Un\G1027)
- CH☐ Logging cycle setting value (Un\G1032 to Un\G1035)
- CH☐ Logging cycle unit setting (Un\G1040 to Un\G1043)
- CH☐ Logging points after trigger (Un\G1048 to Un\G1051)
- CH☐ Level trigger condition setting (Un\G1056 to Un\G1059)
- CH☐ Trigger data (Un\G1064 to Un\G1067)
- CH☐ Trigger setting value (Un\G1082 to Un\G1085)
- CH☐ Logging data storing notification enable/disable setting (Un\G1200 to Un\G1203)
- CH☐ Flow amount integration enable/disable setting (Un\G1300 to Un\G1303)
- CH☐ Integration cycle setting (Un\G1308 to Un\G1311)
- CH☐ Flow amount time unit setting (Un\G1316 to Un\G1319)
- CH☐ Unit scaling setting (Un\G1324 to Un\G1327)

For the timing of turning the signal OFF → ON → OFF, refer to the following.

- Operating condition setting completed flag (X9) (☞Page 111, Section 5.2.1 (3))

(2) User range write request (YA)

(a) Offset/gain setting mode

Turn User range write request (YA) OFF → ON → OFF to register the adjusted offset/gain values in the Q64ADH.

The data is written to the flash memory at the timing when this signal is turned on from off.

For the timing of turning the signal OFF → ON → OFF, refer to the following.

- Offset/gain setting mode flag (XA) (☞Page 113, Section 5.2.1 (4))

(b) Normal mode

Turn User range write request (YA) OFF → ON → OFF to perform the user range restoration.

For the timing of turning the signal OFF → ON → OFF, refer to the following.

- Offset/gain setting mode flag (XA) (☞Page 113, Section 5.2.1 (4))

(3) Channel change request (YB)

Turn Channel change request (YB) OFF → ON → OFF to change a channel to perform the offset/gain setting.

For the timing of turning the signal OFF → ON → OFF, refer to the following.

- Channel change completed flag (XB) (☞Page 113, Section 5.2.1 (5))

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

Turn Maximum value/minimum value reset request (YD) OFF → ON → OFF to clear the maximum or minimum values stored in CH□ Maximum value (Un\G30, Un\G32, Un\G34, Un\G36) and CH□ Minimum value (Un\G31, Un\G33, Un\G35, Un\G37).

For the timing of turning the signal OFF → ON → OFF, refer to the following.

- Maximum value/minimum value reset completed flag (XD) (☞Page 115, Section 5.2.1 (7))

(5) Error clear request (YF)

To clear Error flag (XF), Input signal error detection signal (XC), and Latest error code (Un\G19), turn Error clear request (YF) OFF → ON → OFF.

For the timing of turning the signal OFF → ON → OFF, refer to the following.

- Input signal error detection signal (XC) (☞Page 114, Section 5.2.1 (6))
- Error flag (XF) (☞Page 115, Section 5.2.1 (9))

CHAPTER 6 BUFFER MEMORY

This section describes the Q64ADH buffer memory.

6.1 List of Buffer Memory Addresses

The following shows the list of the Q64ADH buffer memory.

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

- Details of Buffer Memory Addresses (☞Page 131, 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 these areas may lead the module to malfunction.

(1) Un\G0 to Un\G1799

Address (decimal)	Address (hexadecimal)	Name	Default*1	Read/Write*2
0	0_H	A/D conversion enable/disable setting	0000_H	R/W
1	1_H	CH1 Time Average/ Count Average/Moving Average	0	R/W
2	2_H	CH2 Time Average/ Count Average/Moving Average	0	R/W
3	3_H	CH3 Time Average/ Count Average/Moving Average	0	R/W
4	4_H	CH4 Time Average/ Count Average/Moving Average	0	R/W
5 to 8	5_H to 8_H	System area	—	—
9	9_H	Averaging process setting (used to replace Q64AD)	0000_H	R/W
10	A_H	A/D 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 to 18	F_H to 12_H	System area	—	—
19	13_H	Latest error code	0	R
20	14_H	Setting range	0000_H	R
21	15_H	System area	—	—
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	0000_H	R/W
25	19_H	System area	—	—
26	$1A_H$	Conversion speed setting	0000_H	R/W

Address (decimal)	Address (hexadecimal)	Name	Default*1	Read/Write*2
27	$1B_H$	Input signal error detection setting	0000_H	R/W
28	$1C_H$	System area	—	—
29	$1D_H$	Digital clipping enable/disable setting	$000F_H$	R/W
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 to 47	26_H to $2F_H$	System area	—	—
48	30_H	Warning output setting	$000F_H$	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	System area	—	—
52	34_H			
53	35_H	Scaling enable/disable setting	$000F_H$	R/W
54	36_H	CH1 Digital operation value	0	R
55	37_H	CH2 Digital operation value	0	R
56	38_H	CH3 Digital operation value	0	R
57	39_H	CH4 Digital operation value	0	R
58 to 61	$3A_H$ to $3D_H$	System area	—	—
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 to 85	46_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

Address (decimal)	Address (hexadecimal)	Name	Default[*1]	Read/Write[*2]
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 to 141	66_H to $8D_H$	System area	—	—
142	$8E_H$	CH1 Input signal error detection setting value	50	R/W
143	$8F_H$	CH2 Input signal error detection setting value	50	R/W
144	90_H	CH3 Input signal error detection setting value	50	R/W
145	91_H	CH4 Input signal error detection setting value	50	R/W
146 to 149	92_H to 95_H	System area	—	—
150	96_H	CH1 Shifting amount to conversion value	0	R/W
151	97_H	CH2 Shifting amount to conversion value	0	R/W
152	98_H	CH3 Shifting amount to conversion value	0	R/W
153	99_H	CH4 Shifting amount to conversion value	0	R/W
154 to 157	$9A_H$ to $9D_H$	System area	—	—
158	$9E_H$	Mode switching setting	0	R/W
159	$9F_H$			
160 to 171	$A0_H$ to AB_H	System area	—	—
172	AC_H	CH1 Difference conversion trigger	0	R/W
173	AD_H	CH2 Difference conversion trigger	0	R/W
174	AE_H	CH3 Difference conversion trigger	0	R/W
175	AF_H	CH4 Difference conversion trigger	0	R/W
176 to 179	$B0_H$ to $B3_H$	System area	—	—
180	$B4_H$	CH1 Difference conversion reference value	0	R
181	$B5_H$	CH2 Difference conversion reference value	0	R
182	$B6_H$	CH3 Difference conversion reference value	0	R
183	$B7_H$	CH4 Difference conversion reference value	0	R

Address (decimal)	Address (hexadecimal)	Name	Default*1	Read/Write*2
184 to 189	$B8_H$ to BD_H	System area	—	—
190	BE_H	CH1 Difference conversion status flag	0	R
191	BF_H	CH2 Difference conversion status flag	0	R
192	$C0_H$	CH3 Difference conversion status flag	0	R
193	$C1_H$	CH4 Difference conversion status flag	0	R
194 to 199	$C2_H$ to $C7_H$	System area	—	—
200	$C8_H$	Pass data classification setting	0	R/W
201	$C9_H$	System area	—	—
202	CA_H	CH1 Industrial shipment settings offset value (L)	0	R/W
203	CB_H	CH1 Industrial shipment settings offset value (H)	0	R/W
204	CC_H	CH1 Industrial shipment settings gain value (L)	0	R/W
205	CD_H	CH1 Industrial shipment settings gain value (H)	0	R/W
206	CE_H	CH2 Industrial shipment settings offset value (L)	0	R/W
207	CF_H	CH2 Industrial shipment settings offset value (H)	0	R/W
208	$D0_H$	CH2 Industrial shipment settings gain value (L)	0	R/W
209	$D1_H$	CH2 Industrial shipment settings gain value (H)	0	R/W
210	$D2_H$	CH3 Industrial shipment settings offset value (L)	0	R/W
211	$D3_H$	CH3 Industrial shipment settings offset value (H)	0	R/W
212	$D4_H$	CH3 Industrial shipment settings gain value (L)	0	R/W
213	$D5_H$	CH3 Industrial shipment settings gain value (H)	0	R/W
214	$D6_H$	CH4 Industrial shipment settings offset value (L)	0	R/W
215	$D7_H$	CH4 Industrial shipment settings offset value (H)	0	R/W
216	$D8_H$	CH4 Industrial shipment settings gain value (L)	0	R/W
217	$D9_H$	CH4 Industrial shipment settings gain value (H)	0	R/W
218	DA_H	CH1 User range settings offset value (L)	0	R/W
219	DB_H	CH1 User range settings offset value (H)	0	R/W
220	DC_H	CH1 User range settings gain value (L)	0	R/W
221	DD_H	CH1 User range settings gain value (H)	0	R/W
222	DE_H	CH2 User range settings offset value (L)	0	R/W
223	DF_H	CH2 User range settings offset value (H)	0	R/W
224	$E0_H$	CH2 User range settings gain value (L)	0	R/W
225	$E1_H$	CH2 User range settings gain value (H)	0	R/W
226	$E2_H$	CH3 User range settings offset value (L)	0	R/W
227	$E3_H$	CH3 User range settings offset value (H)	0	R/W
228	$E4_H$	CH3 User range settings gain value (L)	0	R/W
229	$E5_H$	CH3 User range settings gain value (H)	0	R/W
230	$E6_H$	CH4 User range settings offset value (L)	0	R/W
231	$E7_H$	CH4 User range settings offset value (H)	0	R/W
232	$E8_H$	CH4 User range settings gain value (L)	0	R/W
233	$E9_H$	CH4 User range settings gain value (H)	0	R/W

Address (decimal)	Address (hexadecimal)	Name	Default[*1]	Read/Write[*2]
234 to 999	EA_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 to 1007	$3EC_H$ to $3EF_H$	System area	—	—
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 to 1015	$3F4_H$ to $3F7_H$	System area	—	—
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 to 1023	$3FC_H$ to $3FF_H$	System area	—	—
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 to 1031	404_H to 407_H	System area	—	—
1032	408_H	CH1 Logging cycle setting value	4	R/W
1033	409_H	CH2 Logging cycle setting value	4	R/W
1034	$40A_H$	CH3 Logging cycle setting value	4	R/W
1035	$40B_H$	CH4 Logging cycle setting value	4	R/W
1036 to 1039	$40C_H$ to $40F_H$	System area	—	—
1040	410_H	CH1 Logging cycle unit setting	1	R/W
1041	411_H	CH2 Logging cycle unit setting	1	R/W
1042	412_H	CH3 Logging cycle unit setting	1	R/W
1043	413_H	CH4 Logging cycle unit setting	1	R/W

Address (decimal)	Address (hexadecimal)	Name	Default*1	Read/Write*2
1044 to 1047	414_H to 417_H	System area	—	—
1048	418_H	CH1 Logging points after trigger	5000	R/W
1049	419_H	CH2 Logging points after trigger	5000	R/W
1050	$41A_H$	CH3 Logging points after trigger	5000	R/W
1051	$41B_H$	CH4 Logging points after trigger	5000	R/W
1052 to 1055	$41C_H$ to $41F_H$	System area	—	—
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 to 1063	424_H to 427_H	System area	—	—
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 to 1071	$42C_H$ to $42F_H$	System area	—	—
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 to 1089	$43E_H$ to 441_H	System area	—	—
1090	442_H	CH1 Head pointer	0	R
1091	443_H	CH2 Head pointer	0	R
1092	444_H	CH3 Head pointer	0	R

Address (decimal)	Address (hexadecimal)	Name		Default[*1]	Read/Write[*2]
1093	445_H	CH4 Head pointer		0	R
1094 to 1097	446_H to 449_H	System area		—	—
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
1102 to 1105	$44E_H$ to 451_H	System area		—	—
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 to 1113	456_H to 459_H	System area		—	—
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 to 1121	$45E_H$ to 461_H	System area		—	—
1122	462_H	CH1 Logging cycle monitor value	(s)	0	R
1123	463_H		(ms)	0	R
1124	464_H		(μs)	0	R
1125	465_H	CH2 Logging cycle monitor value	(s)	0	R
1126	466_H		(ms)	0	R
1127	467_H		(μs)	0	R
1128	468_H	CH3 Logging cycle monitor value	(s)	0	R
1129	469_H		(ms)	0	R
1130	$46A_H$		(μs)	0	R
1131	$46B_H$	CH4 Logging cycle monitor value	(s)	0	R
1132	$46C_H$		(ms)	0	R
1133	$46D_H$		(μs)	0	R
1134 to 1153	$46E_H$ to 481_H	System area		—	—

Address (decimal)	Address (hexadecimal)	Name			Default*1	Read/Write*2
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 to 1198	492_H to $4AE_H$	System area			—	—
1199	$4AF_H$	Logging mode Monitor			0	R
1200	$4B0_H$	CH1 Logging data storing notification enable/disable setting			1	R/W
1201	$4B1_H$	CH2 Logging data storing notification enable/disable setting			1	R/W
1202	$4B2_H$	CH3 Logging data storing notification enable/disable setting			1	R/W
1203	$4B3_H$	CH4 Logging data storing notification enable/disable setting			1	R/W
1204 to 1207	$4B4_H$ to $4B7_H$	System area			—	—
1208	$4B8_H$	CH1 Logging data storing to Side A completed flag			0	R/W
1209	$4B9_H$	CH1 Logging data storing to Side B completed flag			0	R/W
1210	$4BA_H$	CH2 Logging data storing to Side A completed flag			0	R/W
1211	$4BB_H$	CH2 Logging data storing to Side B completed flag			0	R/W
1212	$4BC_H$	CH3 Logging data storing to Side A completed flag			0	R/W
1213	$4BD_H$	CH3 Logging data storing to Side B completed flag			0	R/W
1214	$4BE_H$	CH4 Logging data storing to Side A completed flag			0	R/W
1215	$4BF_H$	CH4 Logging data storing to Side B completed flag			0	R/W

Address (decimal)	Address (hexadecimal)	Name	Default[*1]	Read/Write[*2]
1216 to 1299	$4C0_H$ to 513_H	System area	—	—
1300	514_H	CH1 Flow amount integration enable/disable setting	1	R/W
1301	515_H	CH2 Flow amount integration enable/disable setting	1	R/W
1302	516_H	CH3 Flow amount integration enable/disable setting	1	R/W
1303	517_H	CH4 Flow amount integration enable/disable setting	1	R/W
1304 to 1307	518_H to $51B_H$	System area	—	—
1308	$51C_H$	CH1 Integration cycle setting	4	R/W
1309	$51D_H$	CH2 Integration cycle setting	4	R/W
1310	$51E_H$	CH3 Integration cycle setting	4	R/W
1311	$51F_H$	CH4 Integration cycle setting	4	R/W
1312 to 1315	520_H to 523_H	System area	—	—
1316	524_H	CH1 Flow amount time unit setting	0	R/W
1317	525_H	CH2 Flow amount time unit setting	0	R/W
1318	526_H	CH3 Flow amount time unit setting	0	R/W
1319	527_H	CH4 Flow amount time unit setting	0	R/W
1320 to 1323	528_H to $52B_H$	System area	—	—
1324	$52C_H$	CH1 Unit scaling setting	0	R/W
1325	$52D_H$	CH2 Unit scaling setting	0	R/W
1326	$52E_H$	CH3 Unit scaling setting	0	R/W
1327	$52F_H$	CH4 Unit scaling setting	0	R/W
1328 to 1331	530_H to 533_H	System area	—	—
1332	534_H	CH1 Integrated flow amount (L)	0	R
1333	535_H	CH1 Integrated flow amount (H)	0	R
1334	536_H	CH2 Integrated flow amount (L)	0	R
1335	537_H	CH2 Integrated flow amount (H)	0	R
1336	538_H	CH3 Integrated flow amount (L)	0	R
1337	539_H	CH3 Integrated flow amount (H)	0	R
1338	$53A_H$	CH4 Integrated flow amount (L)	0	R
1339	$53B_H$	CH4 Integrated flow amount (H)	0	R
1340 to 1347	$53C_H$ to 543_H	System area	—	—
1348	544_H	CH1 Integration cycle monitor value	0	R
1349	545_H	CH2 Integration cycle monitor value	0	R

Address (decimal)	Address (hexadecimal)	Name	Default*1	Read/Write*2
1350	546_H	CH3 Integration cycle monitor value	0	R
1351	547_H	CH4 Integration cycle monitor value	0	R
1352 to 1355	548_H to $54B_H$	System area	—	—
1356	$54C_H$	CH1 Flow amount integration temporary stop request	0	R/W
1357	$54D_H$	CH2 Flow amount integration temporary stop request	0	R/W
1358	$54E_H$	CH3 Flow amount integration temporary stop request	0	R/W
1359	$54F_H$	CH4 Flow amount integration temporary stop request	0	R/W
1360 to 1363	550_H to 553_H	System area	—	—
1364	554_H	CH1 Flow amount integration temporary stop flag	0	R
1365	555_H	CH2 Flow amount integration temporary stop flag	0	R
1366	556_H	CH3 Flow amount integration temporary stop flag	0	R
1367	557_H	CH4 Flow amount integration temporary stop flag	0	R
1368 to 1371	558_H to $55B_H$	System area	—	—
1372	$55C_H$	CH1 Integrated flow amount clear request	0	R/W
1373	$55D_H$	CH2 Integrated flow amount clear request	0	R/W
1374	$55E_H$	CH3 Integrated flow amount clear request	0	R/W
1375	$55F_H$	CH4 Integrated flow amount clear request	0	R/W
1376 to 1379	560_H to 563_H	System area	—	—
1380	564_H	CH1 Integrated flow amount clear flag	0	R
1381	565_H	CH2 Integrated flow amount clear flag	0	R
1382	566_H	CH3 Integrated flow amount clear flag	0	R
1383	567_H	CH4 Integrated flow amount clear flag	0	R
1384 to 1799	568_H to 707_H	System area	—	—

*1 The default value is a value set after power-on or after resetting the CPU module.
*2 This shows whether read or write from sequence program is possible.
R: Readable
W: Writable

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

Address (decimal)	Address (hexadecimal)	Name	Default*1	Read/Write*2
1800	708_H	Latest address of error history	0	R
1801 to 1809	709_H to 711_H	System area	—	—

Address (decimal)	Address (hexadecimal)	Name				Default[*1]	Read/Write[*2]
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				
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				

Address (decimal)	Address (hexadecimal)	Name		Default*1	Read/Write*2
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 The default value is a value set after power-on or after resetting the CPU module.

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

(3) Logging section (Un\G5000 to Un\G49999)

Address (decimal)	Address (hexadecimal)	Name	Default*1	Read/Write*2
5000 to 14999	1388_H to $3A97_H$	CH1 Logging data	0	R
15000 to 24999	$3A98_H$ to $61A7_H$	CH2 Logging data	0	R
25000 to 34999	$61A8_H$ to $88B7_H$	CH3 Logging data	0	R
35000 to 44999	$88B8_H$ to $AFC7_H$	CH4 Logging data	0	R
45000 to 49999	$AFC8_H$ to $C34F_H$	System area	—	—

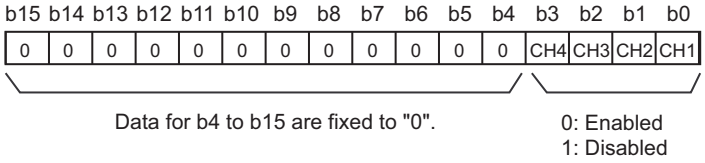
*1 The default value is a value set after power-on or after resetting the CPU module.
*2 This shows whether read or write from sequence program is possible.
R: Readable
W: Writable

6.2 Details of Buffer Memory Addresses

The following describes the details of buffer memory address.

(1) A/D conversion enable/disable setting (Un\G0)

Set if the A/D conversion is enabled or disabled for each channel.



(a) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(b) Default value

All channels are set to Enabled (0).

(2) CH□ Time Average/ Count Average/Moving Average (Un\G1 to Un\G4)

Configure the time/count/moving average setting for each channel to which the averaging processing is specified.
The following shows the setting range.

Processing method	Conversion speed setting	Setting range
Time average	20μs, 80μs, 1ms	2 to 5000 (ms)
Count average	20μs, 80μs, 1ms	4 to 62500 (times)*1
Moving average	20μs, 80μs, 1ms	2 to 1000 (times)

*1 When specifying a setting between 32768 and 62500 (times) in the sequence program, configure the setting in hexadecimal.

Ex. When specifying a setting of 62500 (times), set $F424_H$.

(a) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(b) Default value

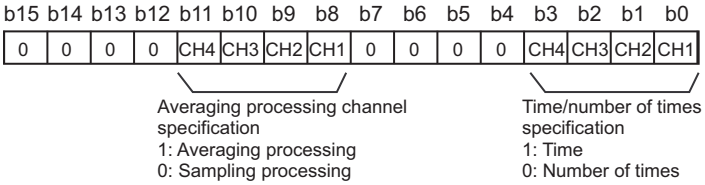
All channels are set to 0.

Point

- When the value out of the setting range above is written, an error occurs in the channel to which the value is written, the error code is stored in Latest error code (Un\G19) and Error flag (XF) is turned ON. The A/D conversion is processed in the setting configured before the error occurrence.
- 0 is set as default value, so change the value according to the processing method.
- When the sampling is set to the channel to which the setting value has been set, the setting value is ignored.
- In the high-speed logging mode, averaging processing cannot be used. The set value is ignored.

(3) Averaging process setting (used to replace Q64AD) (Un\G9)

Write the setting for averaging processing when using the sequence program for initial setting of the Q64AD.



(a) Enabling the setting

To enable the setting, turn OFF → ON → OFF Operating condition setting request (Y9) after setting Averaging process setting (Un\G24) to sampling processing (0).

Point

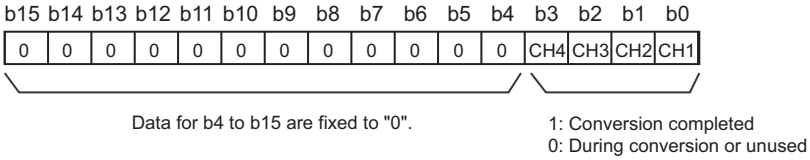
- When selecting the moving average, it is necessary to write 0 to Averaging process setting (used to replace Q64AD) (Un\G9), and write the moving average to Averaging process setting (Un\G24).
- In the high-speed logging mode, averaging processing cannot be used. The set value is ignored.

(b) Default value

All channels are set to sampling processing (0).

(4) A/D conversion completed flag (Un\G10)

A/D conversion status can be checked with this flag.



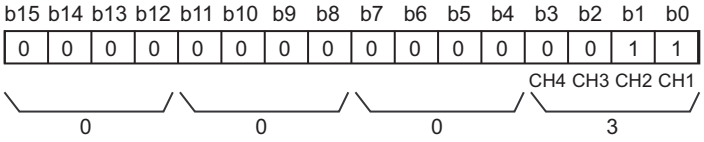
(a) A/D conversion completion

When the first A/D conversion is completed in the channel where the A/D conversion is enabled, the flag is turned to Conversion completed (1).

A/D conversion completed flag (XE) is turned to ON when the conversion of all the channels where the A/D conversion is enabled are completed.

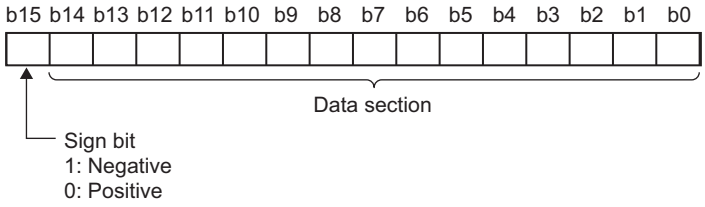
Turning OFF → ON → OFF Operating condition setting request (Y9) turns the flag to 0 (default value), and the flag is turned to Conversion completed (1) when the first A/D conversion is completed.

Ex. When A/D conversion enable is set to CH1 and CH2 and all the A/D conversions in CH1 and CH2 are completed, 0003_H(3) is stored in A/D conversion completed flag (Un\G10), as shown below.



(5) CH□ Digital output value (Un\G11 to Un\G14)

The A/D-converted digital output value is stored as a signed 16-bit binary.



(a) Updating cycle

When performing the average processing, 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.

(6) Latest error code (Un\G19)

Error codes or alarm codes detected in the Q64ADH are stored.

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

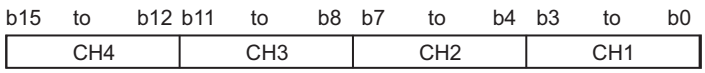
- Error Code List (☞Page 246, Section 11.1)
- Alarm Code List (☞Page 253, Section 11.2)

(a) Clearing an error

Turn OFF → ON → OFF Error clear request (YF).

(7) Setting range (Un\G20)

The setting content for input range can be checked.



Input range	Setting value
4 to 20mA	0_H
0 to 20mA	1_H
1 to 5V	2_H
0 to 5V	3_H
-10 to 10V	4_H
0 to 10V	5_H
4 to 20mA (Extended mode)	A_H
1 to 5V (Extended mode)	B_H
User range setting	F_H

Point

Input range cannot be changed in Setting range (Un\G20).

For changing the setting, refer to the following.

- Switch Setting (☞Page 170, Section 8.2)

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

Specify the channel to perform the offset/gain setting adjustment.

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	0	0	0	0	CH4	CH3	CH2	CH1
Offset/gain setting mode Gain specification (Un\G23)	0	0	0	0	0	0	0	0	0	0	0	0	CH4	CH3	CH2	CH1

Data for b4 to b15 are fixed to "0".

1: Setting-target channel
0: Disabled

Point

- The settings for multiple channels can be configured at the same time. However, set either of Offset/gain setting mode Offset specification (Un\G22) or Offset/gain setting mode Gain specification (Un\G23) to be disabled (0).
  When the settings for both of them are configured at the same time, an offset/gain setting mode error (error code: 500) occurs.
- For details on offset/gain setting, refer to the following.
  - Offset/gain Setting (Page 175, Section 8.5)

(9) Averaging process setting (Un\G24)

Configure the setting when selecting sampling or averaging processing for each channel.

Averaging processing includes time average, count average and moving average.

b15 to b12	b11 to b8	b7 to b4	b3 to b0
CH4	CH3	CH2	CH1

Processing method	Setting value
Sampling processing	0_H
Time average	1_H
Count average	2_H
Moving average	3_H

(a) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(b) Default value

All channels are set to sampling processing (0_H).

Point

- When using Averaging process setting (used to replace Q64AD) (Un\G9), the value set in Averaging process setting (Un\G24) is ignored.
  (The operation is performed in the averaging process setting in Averaging process setting (used to replace Q64AD) (Un\G9).)
- The channel to which a value out of the above setting range is written performs the operation in the sampling processing.
- In the high-speed logging mode, the value is fixed to Sampling processing (0_H). Even if a value other than Sampling processing (0_H) is set, the set value is ignored.

(10)Conversion speed setting (Un\G26)

Set the conversion speed for all channels.

When the value of 0003_H to $FFFF_H$ is set, an error occurs and the operation is performed in the previous setting.

Conversion speed	Setting value
20μs	0_H
80μs	1_H
1ms	2_H

(a) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(b) Default value

20 μs (0) is set as the default value.

Point

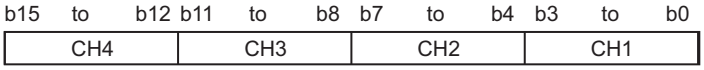
In the high-speed logging mode, the value is fixed to 20μs (0_H). Even if a value other than 20μs (0_H) is set, the set value is ignored.

(11)Input signal error detection setting (Un\G27)

In the input signal error detection function, set the error detection method for each channel. When Input signal error detection setting (Un\G27) is set to other than Disable (0), the input signal error detection function turns enabled.

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

- Input Signal Error Detection Function (☞Page 44, Section 4.8)



Input signal error detection condition	Setting value
Disable	0_H
Lower upper limit detection	1_H
Lower limit detection	2_H
Upper limit detection	3_H
Disconnection detection	4_H

(a) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(b) Default value

All channels are set to Disable (0).

Point

- When a value out of the setting range above is set to a channel, an error occurs in the channel, an error code is stored in Latest error code (Un\G19) and Error flag (XF) is turned to ON. The operation is performed in the setting configured before the error occurrence.
- Disconnection detection (4) is valid only when the input range is set as 4 to 20mA (extended mode) or 1 to 5V (extended mode). When the channel with another range is set to Disconnection detection (4), an error occurs.
- In the high-speed logging mode, the input signal error detection function cannot be used. The set value is ignored.

(12)Digital clipping enable/disable setting (Un\G29)

Set whether the digital clipping function is enabled or disabled, for each channel.

For details on the digital clipping function, refer to the following.

- Digital Clipping Function (☞Page 59, Section 4.12)

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

Data for b4 to b15 are fixed to "0".

0: Enabled
1: Disabled

(a) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(b) Default value

All channels are set to Disabled (1).

Point

In the high-speed logging mode, the digital clipping function cannot be used. The set value is ignored.

(13)CH□ Maximum value (Un\G30, Un\G32, Un\G34, Un\G36), CH□ Minimum value (Un\G31, Un\G33, Un\G35, Un\G37)

The maximum and minimum values of digital operation value are stored as signed 16-bit binary.

In the following cases, CH□ Maximum value (Un\G30, Un\G32, Un\G34, Un\G36) and CH□ Minimum value (Un\G31, Un\G33, Un\G35, Un\G37) are updated with the current value.

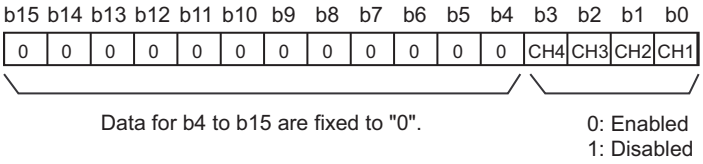
- When turning OFF → ON → OFF Operating condition setting request (Y9) changes the setting
- When Maximum value/minimum value reset request (YD) is turned OFF → ON → OFF

Point

- For the channel to which the averaging processing is specified, the maximum and minimum values are stored at averaging processing time intervals.
- In CH□ Maximum value (Un\G30, Un\G32, Un\G34, Un\G36) and CH□ Minimum value (Un\G31, Un\G33, Un\G35, Un\G37), the values calculated by each function is stored using the following functions:
  - Digital clipping function
  - Scaling function
  - Shift function
  - Difference conversion function
- In the high-speed logging mode, the value is not updated. The value is fixed to 0.

(14)Warning output setting (Un\G48)

Set whether the alarm output of process alarm is enabled or disabled for each channel.



(a) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(b) Default value

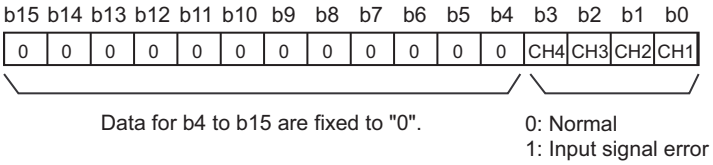
All channels are set to Disabled (1).

Point

In the high-speed logging mode, the warning output function cannot be used. The set value is ignored.

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

Input signal status can be checked with this flag.



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

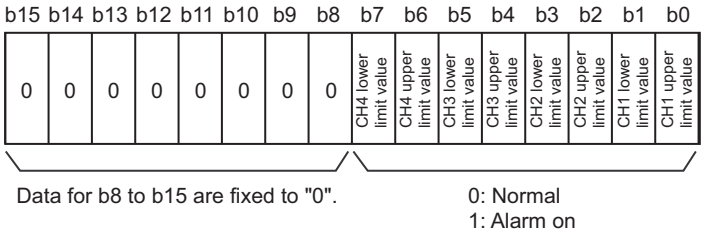
- When the analog input value out of the setting range for CH□ Input signal error detection setting value (Un\G142 to Un\G145) is detected according to the set condition of detection method, Input signal error detection flag (Un\G49) corresponding to each channel is turned to Input signal error (1).
- When an error is detected in any A/D conversion enable or input signal error detection enable channels, Input signal error detection signal (XC) is turned to ON.

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

- Turn OFF → ON → OFF Operating condition setting request (Y9)
- Turn OFF → ON → OFF Error clear request (YF)

(16)Warning output flag (Process alarm) (Un\G50)

Alarms can be checked if the alarm is the upper limit alarm or lower limit alarm, for each channel.



(a) Warning output flag (Process alarm) (Un\G50) status

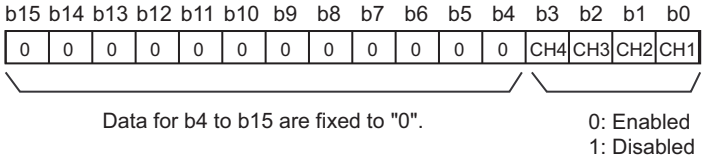
- When the value is out of the range specified in CH1 Process alarm lower lower limit value (Un\G86) to CH4 Process alarm upper upper limit value (Un\G101), Warning output flag (Process alarm) (Un\G50) corresponding to each channel is turned to Alarm ON (1).
- When an error is detected in any A/D conversion enable or alarm output enable channels, Warning output signal (X8) is also turned to ON.

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

- When the digital operation value returns within the setting range, the flag is automatically cleared.
- When Operating condition setting request (Y9) is turned OFF → ON → OFF, it is cleared.

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

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



(a) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(b) Default value

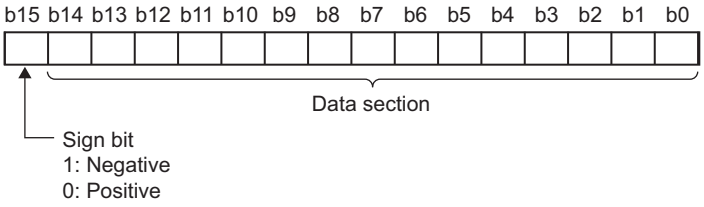
All channels are set to Disabled (1).

Point

In the high-speed logging mode, the scaling function cannot be used. The set value is ignored.

(18)CH□ Digital operation value (Un\G54 to Un\G57)

The digital operation value which is obtained by the scaling function, shift function, digital clipping function, and difference conversion function is stored as signed 16-bit binary.



Point

When the digital clipping function, scaling function, shift function, or difference conversion function is not used, the same value as the one in CH□ Digital output value (Un\G11 to Un\G14) is stored.

(19)CH□ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68), CH□ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69)

Set the range of scale conversion for each channel.

For details on scaling function, refer to the following.

- Scaling Function (☞Page 52, Section 4.10)

(a) Setting range

Setting range: -32000 to 32000 (scaling upper limit value > scaling lower limit value)

(b) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(c) Default value

All channels are set to 0.

Point

- When a value set to a channel is out of the setting range above or a value does not satisfy "scaling upper limit value > scaling lower limit value", an error occurs in the channel. Then, an error code is stored in Latest error code (Un\G19) and Error flag (XF) is turned ON and the operation is performed in the setting configured before the error occurrence.
- Change the setting value, since 0 is set as the default value.
- When Scaling enable/disable setting (Un\G53) is set to Disabled (1), the setting for CH□ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68) and CH□ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69) are ignored.

(20)CH☐ Process alarm lower lower limit value (Un\G86, Un\G90, Un\G94, Un\G98), CH☐ Process alarm lower upper limit value (Un\G87, Un\G91, Un\G95, Un\G99), CH☐ Process alarm upper lower limit value (Un\G88, Un\G92, Un\G96, Un\G100), CH☐ Process alarm upper upper limit value (Un\G89, Un\G93, Un\G97, Un\G101)

Set the digital output value range for each channel.

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

- Warning Output Function (Process Alarm) (☞Page 50, Section 4.9)

(a) Setting range

- Setting range is -32768 to 32767.
- 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.

(b) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(c) Default value

All channels are set to 0.

Point

- When a value out of the setting range above or a value which does not satisfy the formula of process alarm upper upper limit value ≥ process alarm upper lower limit value ≥ process alarm lower upper limit value ≥ process alarm lower lower limit value is set to a channel, an error occurs in the channel. The error code is stored in Latest error code (Un\G19), and Error flag (XF) is turned to ON. The operation is performed in the setting configured before the error occurrence.
- Change the setting value, since 0 is set as the default value.
- When the following functions are used, warning targets are digital operation values that reflect the operations of each function. Set values considering operation results of each function.
  - Scaling function
  - Shift function
  - Digital clipping function
  - Difference conversion function

(21)CH□ Input signal error detection setting value (Un\G142 to Un\G145)

Set the setting value to detect an input analog value error for each channel.

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

- Input Signal Error Detection Function (☞Page 44, Section 4.8)

(a) Setting procedure

- Setting range is 0 to 250 (0 to 25.0%). Set in increments of 1 (0.1%).
- The input signal error detection upper and lower limit values are calculated as follows based on the input signal error detection setting value. The calculating input signal error detection upper and lower limit values will be different depending on the input range to be used.

[Input signal error detection upper limit value]

$$\text{Gain value of each range} + \left(\text{Gain value of each range} - \text{Offset value of each range}\right) \times \frac{\text{Input signal error detection setting value}}{1000}$$

[Input signal error detection lower limit value]

$$\text{Lower limit value of each range} - \left(\text{Gain value of each range} - \text{Offset value of each range}\right) \times \frac{\text{Input signal error detection setting value}}{1000}$$

Ex. When the input signal error detection setting value is set to 100 (10%)

Range to be used: 4 to 20mA

The upper and lower limit values of input signal error detection are as follows:

$$\text{Input signal error detection upper limit value} = 20 + (20 - 4) \times \frac{100}{1000} = 21.6\text{mA}$$

$$\text{Input signal error detection lower limit value} = 4 - (20 - 4) \times \frac{100}{1000} = 2.4\text{mA}$$

- Conditions vary as follows depending on the setting in Input signal error detection setting (Un\G27).

Input signal error detection setting (Un\G27)	Detection condition
Lower upper limit detection (1)	At the input signal error detection upper limit value or the input signal error detection lower limit value
Lower limit detection (2)	At the input signal error detection lower limit value
Upper limit detection (3)	At the input signal error detection upper limit value
Disconnection detection (4)	• In 2mA or less, or 0.5V or less • The setting for CH□ Input signal error detection setting value (Un\G142 to Un\G145) is ignored. • Input range other than 4 to 20mA (extended mode) or 1 to 5V (extended mode) cannot be used.

(b) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(c) Default value

All channels are set to 5% (50).

Point

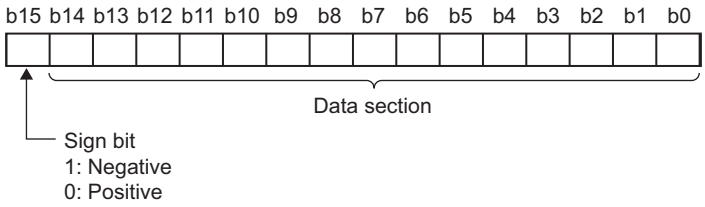
When a value out of the setting range above is set to a channel, an error occurs in the channel, an error code is stored in Latest error code (Un\G19) and Error flag (XF) is turned to ON. The operation is performed in the setting configured before the error occurrence.

(22)CH□ Shifting amount to conversion value (Un\G150 to Un\G153)

Set the shifting amount to conversion value that is to be used for the shift function.

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

- Shift Function (☞Page 56, Section 4.11)



(a) Setting range

Setting range is -32768 to 32767.

(b) Enabling the setting

When the value is set, set shifting amount to conversion value turns valid regardless of turning Operating condition setting request (Y9) OFF → ON → OFF.

(c) Default value

All channels are set to 0.

Point

In the high-speed logging mode, the shift function cannot be used. The set value is ignored.

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

Set the setting value for the mode to be switched to.

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

(a) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(b) After the mode is switched

When the mode is switched, this area is cleared to zero and Operating condition setting completed flag (X9) is turned to OFF.

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

Point

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

(24)CH□ Difference conversion trigger (Un\G172 to Un\G175)

Use this buffer memory as a trigger to start/stop the difference conversion.

For details on the difference conversion function, refer to the following.

- Difference Conversion Function (☞Page 62, Section 4.13)

Difference conversion trigger	Setting value
No request	0
Trigger request	1

(a) Starting/Stopping the difference conversion

- When the setting value is turned No request (0) → Trigger request (1), the difference conversion starts.
- When the setting value is turned Trigger request (0) → No request (1), the difference conversion stops.

(b) Default value

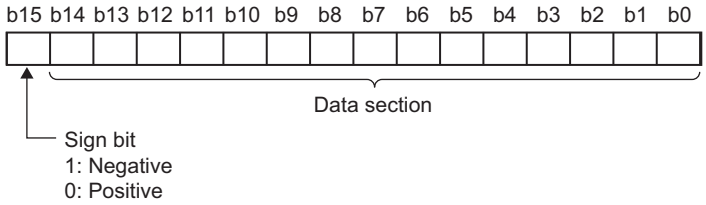
All channels are set to No request (0).

Point

- In the channel where a setting value other than the above is set, an error occurs. The error code is stored in Latest error code (Un\G19) and Error flag (XF) turns on. However, the difference conversion continues.
- In the high-speed logging mode, the difference conversion function cannot be used. The set value is ignored.

(25)CH□ Difference conversion reference value (Un\G180 to Un\G183)

This is the area for storing the digital operation value at the start of the difference conversion as the difference conversion reference value.



(a) Setting range

Setting range is -32768 to 32767.

Point

- The difference conversion reference value is updated when CH□ Difference conversion trigger (Un\G172 to Un\G175) is turned No request (0) → Trigger request (1).
- Even if CH□ Difference conversion status flag (Un\G190 to Un\G193) is turned Converting difference (1) → Not converted (0), CH□ Difference conversion reference value (Un\G180 to Un\G183) is not cleared.

(26)CH□ Difference conversion status flag (Un\G190 to Un\G193)

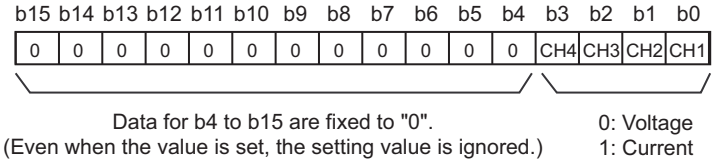
Difference conversion status for each channel can be checked with this flag.

Difference conversion status	CH□ Difference conversion status flag (Un\G190 to Un\G193)
Not converted	0
Converting difference	1

- When CH□ Difference conversion trigger (Un\G172 to Un\G175) is turned No request (0) → Trigger request (1), CH□ Difference conversion status flag (Un\G190 to Un\G193) is turned to Converting difference (1).
- When CH□ Difference conversion trigger (Un\G172 to Un\G175) is turned Trigger request (1) → No request (0), CH□ Difference conversion status flag (Un\G190 to Un\G193) is turned Converting difference (1) → Not converted (0).

(27)Pass data classification setting (Un\G200)

This is the area for saving and restoring the offset/gain setting value in user range setting.
Specify in the offset/gain setting value to be saved or restored is either voltage or current.



(28)CH1 Industrial shipment settings offset value (L) (Un\G202) to CH4 User range settings gain value (H) (Un\G233)

This is the area for restoring the offset/gain setting value in user range setting.
When the offset/gain setting of the user range setting is restored, the data to be used is stored with the following operation.

- Writing the initial setting by utility
- Turning OFF → ON Operating condition setting request (Y9)*1
- Turning OFF → 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 user range setting, set the data saved in this area to the same area in the Q64ADH where the data is restored.

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

1. **Set Pass data classification setting (Un\G200).**
2. **Turn OFF → ON Operating condition setting request (Y9).**
3. **Compare the values in CH1 Industrial shipment settings offset value (L) (Un\G202) to CH4 User range settings gain value (H) (Un\G233) to the values in the range reference table. For the range reference table, refer to the following.**
   • Range Reference Table (☞Page 245, Section 10.11)
4. **If the values are proper, save the values in Pass data classification setting (Un\G200) and CH1 Industrial shipment settings offset value (L) (Un\G202) to CH4 User range setting gain value (H) (Un\G233).**

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

- Offset/gain Setting (☞Page 175, Section 8.5)

(29)CH□ Logging enable/disable setting (Un\G1000 to Un\G1003)

Set whether the logging is enabled or disabled.

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

- Logging function (normal logging mode) (☞Page 66, Section 4.14)
- Logging function (high-speed logging mode) (☞Page 82, Section 4.15)

Logging enable/disable setting	Setting value
Enable	0
Disable	1

(a) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(b) Default value

All channels are set to Disable (1).

Point

- Enabling the setting starts the logging.
- In the channel where the following conditions are set, an error occurs. Then, the error code is stored in Latest error code (Un\G19), Error flag (XF) is turned to ON and logging cannot be performed.
  - When a value other than the above setting values is set
  - When in normal logging mode, Conversion speed setting (Un\G26) is set to 20μs (0), and CH□ Logging enable/disable setting (Un\G1000 to Un\G1003) is set to Enable (0)
  - When in normal logging mode, Input signal error detection setting (Un\G27) is set to any value other than Disable (0), and CH□ Logging enable/disable setting (Un\G1000 to Un\G1003) is set to Enable (0)

(30)CH□ Logging hold request (Un\G1008 to Un\G1011)

Use Logging hold request (Un\G1008 to Un\G1011) as a trigger to hold (stop) the logging at any timing during the logging.

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

- Logging function (normal logging mode) (☞Page 66, Section 4.14)
- Logging function (high-speed logging mode) (☞Page 82, Section 4.15)

Logging hold request	Setting value
OFF	0
ON	1

(a) Operation of the logging hold processing

- In the case that CH□ Level trigger condition setting (Un\G1056 to Un\G1059) is set to Disable (0), when CH□ Logging hold request (Un\G1008 to Un\G1011) changes from OFF (0) to ON (1), the logging hold processing starts.
- In the case that CH□ Level trigger condition setting (Un\G1056 to Un\G1059) is set to other than Disable (0), when the trigger condition is satisfied after CH□ Logging hold request (Un\G1008 to Un\G1011) changes from OFF (0) to ON (1), the logging hold processing starts.
  When the level trigger is enabled, use Logging hold request (Un\G1008 to Un\G1011) as an interlock to operate the level trigger.
- If CH□ Logging hold request (Un\G1008 to Un\G1011) is turned to ON (1) → OFF (0), the hold status (stop) is cleared and the logging restarts.

(b) Default value

All channels are set to OFF (0).

Point

- In the channel where a value other than the above setting values is set, an error occurs. Then, the error code is stored in Latest error code (Un\G19) and Error flag (XF) is turned to ON. However, the logging continues.
- When CH□ Logging enable/disable setting (Un\G1000 to Un\G1003) is set to Disable (1), the setting for CH□ Logging hold request (Un\G1008 to Un\G1011) is ignored.

(31)CH□ Logging hold flag (Un\G1016 to Un\G1019)

Hold status of logging can be checked with this flag.

Hold status of logging	Stored value
OFF	0
ON	1

- Logging hold flag (Un\G1016 to Un\G1019) is turned to ON (1) when the status of logging changes to the hold (stop) from the status where the logging is recording data in the logging data storage area.

(32)CH□ Logging data setting (Un\G1024 to Un\G1027)

When the logging function is used, set whether the logging data type is digital output value or digital operation value.

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

- Logging function (normal logging mode) (☞Page 66, Section 4.14)
- Logging function (high-speed logging mode) (☞Page 82, Section 4.15)

Target of logging	Setting value
Digital output value	0
Digital operation value	1

(a) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(b) Default value

All channels are set to Digital operation value (1).

Point

- In the channel where a value other than the above setting values is set, an error occurs. Then, the error code is stored in Latest error code (Un\G19), Error flag (XF) is turned to ON and logging cannot be performed.
- When CH□ Logging enable/disable setting (Un\G1000 to Un\G1003) is set to Disable (1), the setting for CH□ Logging data setting (Un\G1024 to Un\G1027) is ignored.

(33)CH□ Logging cycle setting value (Un\G1032 to Un\G1035), CH□ Logging cycle unit setting (Un\G1040 to Un\G1043)

Set the cycle of storing the logging data.

Set a value for 1 cycle in CH□ Logging cycle setting value (Un\G1032 to Un\G1035).

Set a unit of cycle in CH□ Logging cycle unit setting (Un\G1040 to Un\G1043).

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

- Logging function (normal logging mode) (☞Page 66, Section 4.14)
- Logging function (high-speed logging mode) (☞Page 82, Section 4.15)

(a) Setting range

The available setting range of CH□ Logging cycle setting value (Un\G1032 to Un\G1035) depends on the setting for CH□ Logging cycle unit setting (Un\G1040 to Un\G1043).

Logging cycle unit	Setting value of CH□ Logging cycle unit setting (Un\G1040 to Un\G1043)	Available setting range of CH□ Logging cycle setting value (Un\G1032 to Un\G1035)
μs	0	80 to 32767 (Normal logging mode) 20 to 32767 (High-speed logging mode)
ms	1	1 to 32767
s	2	1 to 3600

(b) Actual logging cycle

The actual logging cycle is an integral multiple of the conversion cycle of digital output value or digital operation value.

Ex. When the conversion cycle is set to 80μs and the A/D conversion is performed for CH1 to CH3 with the sampling processing

→ The actual logging cycle is an integral multiple of 240μs (80μs × 3) with the value set in CH□ Logging cycle setting value (Un\G1032 to Un\G1035) and CH□ Logging cycle unit setting (Un\G1040 to Un\G1043) as the upper limit value.

(c) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(d) Default value

- For CH□ Logging cycle setting value (Un\G1032 to Un\G1035), all channels are set to 4.
- For CH□ Logging cycle unit setting (Un\G1040 to Un\G1043), all channels are set to ms (1).

Point

- In the channel where the following conditions are set, an error occurs. Then, the error code is stored in Latest error code (Un\G19), Error flag (XF) is turned to ON and logging cannot be performed.
  - When a value out of the above setting range is set in either of CH□ Logging cycle setting value (Un\G1032 to Un\G1035) or CH□ Logging cycle unit setting (Un\G1040 to Un\G1043)
  - When the set logging cycle is below the update cycle of data to be logged
- When CH□ Logging enable/disable setting (Un\G1000 to Un\G1003) is set to Disable (1), the setting for CH□ Logging cycle setting value (Un\G1032 to Un\G1035) and CH□ Logging cycle unit setting (Un\G1040 to Un\G1043) are ignored.

(34)CH□ Logging points after trigger (Un\G1048 to Un\G1051)

When the logging function is used, set the data points recorded from hold trigger occurs until logging holds (stops).

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

- Logging function (normal logging mode) (☞Page 66, Section 4.14)
- Logging function (high-speed logging mode) (☞Page 82, Section 4.15)

(a) Setting range

Setting range is 1 to 10000.

(b) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(c) Default value

All channels are set to 5000.

Point

- In the channel where a value out of the above setting range is set, an error occurs. Then, the error code is stored in Latest error code (Un\G19), Error flag (XF) is turned to ON and logging cannot be performed.
- When CH□ Logging enable/disable setting (Un\G1000 to Un\G1003) is set to Disable (1), the setting for CH□ Logging points after trigger (Un\G1048 to Un\G1051) is ignored.

(35)CH□ Level trigger condition setting (Un\G1056 to Un\G1059)

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

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

- Logging function (normal logging mode) (☞Page 66, Section 4.14)
- Logging function (high-speed logging mode) (☞Page 82, Section 4.15)

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

(a) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(b) Default value

All channels are set to Disable (0).

Point

In the channel where a value other than the above setting values is set, an error occurs. Then, the error code is stored in Latest error code (Un\G19), Error flag (XF) is turned to ON and logging cannot be performed.

(36)CH□ Trigger data (Un\G1064 to Un\G1067)

When the logging function is used, set the buffer memory address monitored for the occurrence condition of level trigger.

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

- Logging function (normal logging mode) (☞Page 66, Section 4.14)
- Logging function (high-speed logging mode) (☞Page 82, Section 4.15)

(a) Setting range

Setting range is 0 to 4999.

(b) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(c) Default value

Channel	Default value	Buffer memory to be monitored
CH1	54	CH1 Digital operation value (Un\G54)
CH2	55	CH2 Digital operation value (Un\G55)
CH3	56	CH3 Digital operation value (Un\G56)
CH4	57	CH4 Digital operation value (Un\G57)

Point

- In the channel where a value out of the above setting range is set, an error occurs. Then, the error code is stored in Latest error code (Un\G19), Error flag (XF) is turned to ON and logging cannot be performed.
- Set CH□ Digital output value (Un\G11 to Un\G14), CH□ Digital operation value (Un\G54 to Un\G57), Level data □ (Un\G1072 to Un\G1081), or a buffer memory address with "R" in List of Buffer Memory Addresses to the trigger data. Do not set the buffer memory addresses described in the following example.

Ex. Buffer memory address, system area, etc. with "R/W" or "W" in List of Buffer Memory Addresses
For details on the buffer memory address, refer to the following.
- List of Buffer Memory Addresses (☞Page 118, Section 6.1)

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

This is the area 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 0 (Un\G1072 to Un\G1081) to monitor device values in other than the Q64ADH and generate triggers.

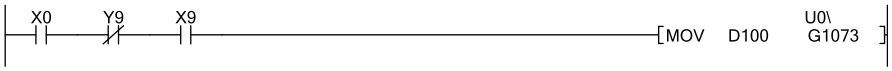
For details on the logging function, refer to the following.

- Logging function (normal logging mode) (☞Page 66, Section 4.14)
- Logging function (high-speed logging mode) (☞Page 82, Section 4.15)

(a) Application example

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

1. **Set 1073 (Level data 1) for CH1 Trigger data (Un\G1064). (When Level data 1 is used)**
2. **Store the storage data which is 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.)**



(b) Setting range

Setting range is -32768 to 32767.

(c) Default value

All are set to 0.

(38)CH□ Trigger setting value (Un\G1082 to Un\G1085)

Set a level 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 (normal logging mode) (☞Page 66, Section 4.14)
- Logging function (high-speed logging mode) (☞Page 82, Section 4.15)

(a) Setting range

Setting range is -32768 to 32767.

(b) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

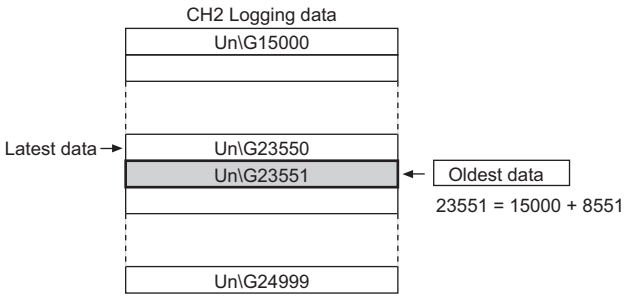
(c) Default value

All channels are set to 0.

(39)CH□ Head pointer (Un\G1090 to Un\G1093)

The buffer memory address where the oldest data is stored can be checked in CH□ Logging data (Un\G5000 to Un\G44999). 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.

Ex. When the value of CH2 Head pointer (Un\G1091) is 8551



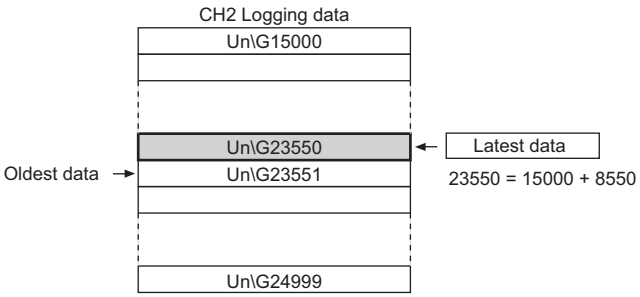
Point

- The value in CH□ Head pointer (Un\G1090 to Un\G1093) is fixed to 0 since the oldest data is stored in the start address of CH□ Logging data (Un\G5000 to Un\G44999) while the data of first 10000 points is logged from the logging is started. After the 10001st data, the place of CH□ Head pointer (Un\G1090 to Un\G1093) increases one by one.
- When CH□ Logging hold request (Un\G1008 to Un\G1011) is turned ON (1) → OFF (0), CH□ Head pointer (Un\G1090 to Un\G1093) is cleared to zero.

(40)CH□ Latest pointer (Un\G1098 to Un\G1101)

The buffer memory address where the latest data is stored can be checked in CH□ Logging data (Un\G5000 to Un\G44999). 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.

Ex. When the value of CH2 Latest pointer (Un\G1099) is 8550



Point

- CH□ Latest pointer (Un\G1098 to Un\G1101) increases one by one each time data is stored from the logging starts.
- When CH□ Logging hold request (Un\G1008 to Un\G1011) is turned ON (1) → OFF (0), CH□ Latest pointer (Un\G1098 to Un\G1101) is cleared to zero.

(41)CH□ Number of logging data (Un\G1106 to Un\G1109)

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

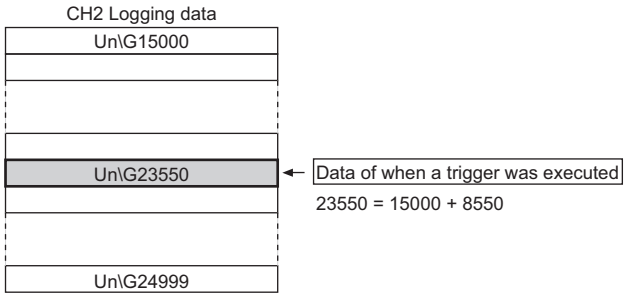
Point

- The number of logging data increases one by one each time data is stored from the logging starts.
- When the value in the logging data storage area reaches 10000, CH□ Number of logging data (Un\G1106 to Un\G1109) is fixed to 10000 since the value is overwritten from the head again.
- When CH□ Logging hold request (Un\G1008 to Un\G1011) is turned ON (1) → OFF (0), CH□ Number of logging data (Un\G1106 to Un\G1109) is cleared to zero.

(42)CH□ Trigger pointer (Un\G1114 to Un\G1117)

The address of buffer memory which stores the data of when a hold trigger was executed can be checked in CH□ Logging data (Un\G5000 to Un\G44999).
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.

Ex. When the value of CH2 Trigger pointer (Un\G1115) is 8550



Point

When CH□ Logging hold request (Un\G1008 to Un\G1011) is turned ON (1) → OFF (0), CH□ Trigger pointer (Un\G1114 to Un\G1117) is cleared to zero.

(43)CH□ Logging cycle monitor value (Un\G1122 to Un\G1133)

This is the area for storing the actual logging cycle which is calculated from the update cycle of data to be logged. When Operating condition setting request (Y9) is turned OFF → ON → OFF, the logging cycle is stored in CH□ Logging cycle monitor value (Un\G1122 to Un\G1133) in the corresponding channel where the logging function is enabled.

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

- Logging function (normal logging mode) (☞Page 66, Section 4.14)
- Logging function (high-speed logging mode) (☞Page 82, Section 4.15)

	b15 to b0
Un\G1122	s
Un\G1123	ms
Un\G1124	μs

Ex. When the calculated value of logging cycle in CH1 is 6960μs

Buffer memory address	Stored value
Un\G1122	0 (s)
Un\G1123	6 (ms)
Un\G1124	960 (μs)

(44)CH□ Trigger detection time (Un\G1154 to Un\G1169)

The time that the hold trigger occurred is recorded.

	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: 0 • Monday: 1 • Tuesday: 2 • Wednesday: 3 • Thursday: 4 • Friday: 5 • Saturday: 6	2_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\G1011) is turned ON (1) → OFF (0), CH□ Trigger detection time (Un\G1154 to Un\G1169) is cleared to zero.

(45)Logging mode Monitor (Un\G1199)

The setting for the logging mode setting can be checked.

Logging mode setting	Setting value
Normal logging mode	0_H
High-speed logging mode	1_H

Point

The logging mode cannot be changed with Logging mode Monitor (Un\G1199).
To change the logging mode, refer to the following.

- Switch setting (☞Page 170, Section 8.2)

(46)CH□ Logging data storing notification enable/disable setting (Un\G1200 to Un\G1203)

In the high-speed logging mode, this setting specifies whether to enable or disable logging data storing notification.

For details on the logging function (high-speed logging mode), refer to the following.

- Logging function (high-speed logging mode) (☞Page 82, Section 4.15)

Logging data storing notification enable/disable setting	Setting value
Enable	0
Disable	1

When Enable (0) is set, each time 5000 point data sets are logged, Stored (1) is stored in CH1 Logging data storing to Side A completed flag (Un\G1208) to CH4 Logging data storing to Side B completed flag (Un\G1215), and an interrupt into the CPU module occurs.

The interrupt pointer to be used for this interrupt is determined in advance, but it can be changed. To change the pointer, with "PLC Parameter" of GX Works2, set the corresponding interrupt pointer.

(a) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(b) Default value

All channels are set to Disable (1).

Point

- An error occurs in a channel where a value other than the above setting values is set, the error code is stored in Latest error code (Un\G19), Error flag (XF) turns on, and logging operation is not performed.
- In the normal logging mode, the set value in this area is ignored.

(47)CH□ Logging data storing to Side A completed flag (Un\G1208, Un\G1210, Un\G1212, Un\G1214), CH□ Logging data storing to Side B completed flag (Un\G1209, Un\G1211, Un\G1213, Un\G1215)

When in high-speed logging mode, and when CH□ Logging data storing notification enable/disable setting (Un\G1200 to Un\G1203) is set to Enable (0), the storage of 5000 point data sets can be checked in Logging data area of each channel.

This area has two flags: CH□ Logging data storing to Side A completed flag (Un\G1208, Un\G1210, Un\G1212, Un\G1214) for checking that data is stored in the first 5000 point area (A-side) of Logging data area and CH□ Logging data storing to Side B completed flag (Un\G1209, Un\G1211, Un\G1213, Un\G1215) for checking that data is stored in the last 5000 point area (B-side) of Logging data area.

For details on the logging function (high-speed logging mode), refer to the following.

• Logging function (high-speed logging mode) (☞Page 82, Section 4.15)

Setting details	Setting value
• Logging data storage in A side not completed • Logging data storage in B side not completed	0
• Logging data storage in A side completed • Logging data storage in B side completed	1

- Stored (1) is stored every time logging data for the first 5000 points (A-side) or the last 5000 points (B-side) has been stored.
- When logging data storage in the file registers of the CPU module is completed, Not stored (0) is stored, which makes it possible to receive the next storage flag.

(48)CH□ Flow amount integration enable/disable setting (Un\G1300 to Un\G1303)

Set whether the flow amount integration function is enabled or disabled.

For details on the flow amount integration function, refer to the following.

- Flow Amount Integration Function (☞Page 95, Section 4.16)

Flow amount integration enable/disable setting	Setting value
Enable	0
Disable	1

(a) Enabling the setting

Turn OFF → ON → OFF Operating condition setting request (Y9) to enable the setting.

(b) Default value

All channels are set to Disable (1).

Point

- In the channel where a setting value other than the above is set, an error occurs. The error code is stored in Latest error code (Un\G19) and Error flag (XF) is turned to ON.
- In the channel where the conversion speed is set to 20μs or 80μs and CH□ Flow amount integration enable/disable setting (Un\G1300 to Un\G1303) is Enable (0), an error occurs. The error code is stored in Latest error code (Un\G19), Error flag (XF) is turned to ON, and the flow amount integration function is not enabled.
- In the high-speed logging mode, the flow amount integration function cannot be used. The set value is ignored.

(49)CH□ Integration cycle setting (Un\G1308 to Un\G1311)

Set the integration cycle of flow amount integration in each channel.

For details on the flow amount integration function, refer to the following.

- Flow Amount Integration Function (☞Page 95, Section 4.16)

(a) Setting range

Setting range is 1 to 5000 (ms).

(b) Default value

All channels are set to 4 (ms).

Point

In the channel where the following conditions are set, an error occurs. Then, the error code is stored in Latest error code (Un\G19), Error flag (XF) is turned to ON and the flow amount integration function cannot be performed.

- When a value other than the above is set
- When the calculated integration cycle is below the data updated cycle of CH□ Digital operation value (Un\G54 to Un\G57)

(50)CH□ Flow amount time unit setting (Un\G1316 to Un\G1319)

Set a conversion value to convert the time unit of instantaneous flow amount to ms.

Set CH□ Flow amount time unit setting (Un\G1316 to Un\G1319) to the range of the flow meter connected to the Q64ADH.

For details on the flow amount integration function, refer to the following.

- Flow Amount Integration Function (☞Page 95, Section 4.16)

Flow amount time unit	Setting value
/s	0
/min	1
/h	2

Ex. When the range of the flow meter is "cm^3/s", set /s (0).

(a) Default value

All channels are set to /s (0).

Point

In the channel where a setting value other than the above is set, an error occurs. The error code is stored in Latest error code (Un\G19), Error flag (XF) is turned to ON, and the flow amount integration function is not enabled.

(51)CH□ Unit scaling setting (Un\G1324 to Un\G1327)

Set the unit scaling that is used for the flow amount integration function.

For details on the flow amount integration function, refer to the following.

- Flow Amount Integration Function (☞Page 95, Section 4.16)

Unit scaling	Setting value
× 1	0
× 10	1
× 100	2
× 1000	3
× 10000	4

(a) Default value

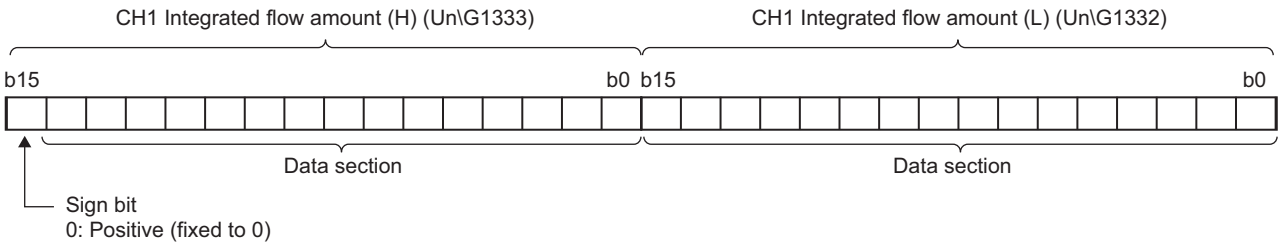
All channels are set to × 1 (0).

Point

In the channel where a setting value other than the above is set, an error occurs. The error code is stored in Latest error code (Un\G19), Error flag (XF) is turned to ON, and the flow amount integration function is not enabled.

(52)CH☐ Integrated flow amount (Un\G1332 to Un\G1339)

This is the area for storing the result of the integral processing performed by the flow amount integration function.
The integrated flow amount is stored with signed 32-bit binary.



(a) Storage range

The value is stored within the range of 0 to 2147483647.

(53)CH☐ Integration cycle monitor value (Un\G1348 to Un\G1351)

This is the area for storing the integration cycle which is calculated from the update cycle of CH☐ Digital operation value (Un\G54 to Un\G57).
For details on the flow amount integration function, refer to the following.

- Flow Amount Integration Function (☞Page 95, Section 4.16)

(a) Storage range

When CH☐ Flow amount integration enable/disable setting (Un\G1300 to Un\G1303) is Enable (0), the value is stored within the range of 1 to 5000. When it is Disable (1), the value is fixed to 0.

(54)CH☐ Flow amount integration temporary stop request (Un\G1356 to Un\G1359)

Stops the integral processing temporarily while the flow amount integration function is operating.
For details on the flow amount integration function, refer to the following.

- Flow Amount Integration Function (☞Page 95, Section 4.16)

Flow amount integration temporary stop request	Setting value
No request	0
Temporary stop request	1

- When CH☐ Flow amount integration temporary stop request (Un\G1356 to Un\G1359) is turned No request (0) → Temporary stop request (1) while the flow amount integration function is operating, the flow amount integration function temporarily stops.
- When CH☐ Flow amount integration temporary stop request (Un\G1356 to Un\G1359) is turned Temporary stop request (1) → No request (0) while the flow amount integration function temporarily stops, the flow amount integration function restarts.

(a) Default value

All channels are set to No request (0).

Point

In the channel where a setting value other than the above is set, an error occurs. The error code is stored in Latest error code (Un\G19), Error flag (XF) is turned to ON, and the setting is ignored.

(55)CH☐ Flow amount integration temporary stop flag (Un\G1364 to Un\G1367)

Flow amount integration temporary stop request status can be checked with this flag.

Flow amount integration temporary stop request status	Stored value
No temporary stop request	0
Temporary stopping	1

- While the flow amount integration function temporarily stops by CH☐ Flow amount integration temporary stop request (Un\G1356 to Un\G1359) being turned No request (0) → Temporary stop request (1), CH☐ Flow amount integration temporary stop flag (Un\G1364 to Un\G1367) is turned to Temporary stopping (1).
- When the flow amount integration function restarts by CH☐ Flow amount integration temporary stop request (Un\G1356 to Un\G1359) being turned Temporary stop request (1) → No request (0), CH☐ Flow amount integration temporary stop flag (Un\G1364 to Un\G1367) is turned to No temporary stop request (0).

(56)CH☐ Integrated flow amount clear request (Un\G1372 to Un\G1375)

When the flow amount integration function is enabled, the value of CH☐ Integrated flow amount (Un\G1332 to Un\G1339) can be cleared to zero.

For details on the flow amount integration function, refer to the following.

- Flow Amount Integration Function (☞Page 95, Section 4.16)

Integrated flow amount clear request	Setting value
No request	0
Clear request	1

When CH☐ Integrated flow amount clear request (Un\G1372 to Un\G1375) is turned to No request (0) → Clear request (1) while the flow amount integration function is operating, the value of CH☐ Integrated flow amount (Un\G1332 to Un\G1339) in the corresponding channel is cleared to zero.

(a) Default value

All channels are set to No request (0).

Point

In the channel where a setting value other than the above is set, an error occurs. The error code is stored in Latest error code (Un\G19), Error flag (XF) is turned to ON, and the value of CH☐ Integrated flow amount (Un\G1332 to Un\G1339) is not cleared.

(57)CH☐ Integrated flow amount clear flag (Un\G1380 to Un\G1383)

Integrated flow amount clear request status can be checked with this flag.

Integrated flow amount clear flag	Setting value
No clear request	0
Cleared	1

- When CH☐ Integrated flow amount clear request (Un\G1372 to Un\G1375) is turned No request (0) → Clear request (1) and the value of CH☐ Integrated flow amount (Un\G1332 to Un\G1339) is cleared, CH☐ Integrated flow amount clear flag (Un\G1380 to Un\G1383) is turned to Cleared (1).
- When CH☐ Integrated flow amount clear request (Un\G1372 to Un\G1375) is turned to Clear request (1) → No request (0), CH☐ Integrated flow amount clear flag (Un\G1380 to Un\G1383) is turned to No clear request (0).

(58)Latest address of error history (Un\G1800)

The latest address of error log is stored.

(59)Error history No.☐ (Un\G1810 to Un\G1969)

Up to 16 errors occurred in the module are recorded.

	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: 0 • Monday: 1 • Tuesday: 2 • Wednesday: 3 • Thursday: 4 • Friday: 5 • Saturday: 6	2_H

*1 Those are values when an error occurs at 10:35:40 on Tuesday, March 29th, 2011.

(60)CH☐ Logging data (Un\G5000 to Un\G44999)

This is an area for storing the logged data. Up to 10000 data can be stored per channel. After the 10001st data for CH☐ Logging data (Un\G5000 to Un\G44999) for each channel, the logging is continued overwriting the data from the head.

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

- Logging function (normal logging mode) (☞Page 66, Section 4.14)
- Logging function (high-speed logging mode) (☞Page 82, Section 4.15)

Point

- When Operating condition setting request (Y9) is turned OFF → ON → OFF, the logging data in all the channels are cleared to 0.
- Even if CH☐ Logging hold request (Un\G1008 to Un\G1011) is turned ON (1) → OFF (0) and the logging restarts, the logged data is not cleared to zero.

CHAPTER 7 SETTINGS AND THE PROCEDURE BEFORE OPERATION

This chapter describes the procedure prior to the Q64ADH operation, the name of each part of the Q64ADH, and wiring method.

7.1 Handling Precautions

This section describes the handling precautions for the Q64ADH.

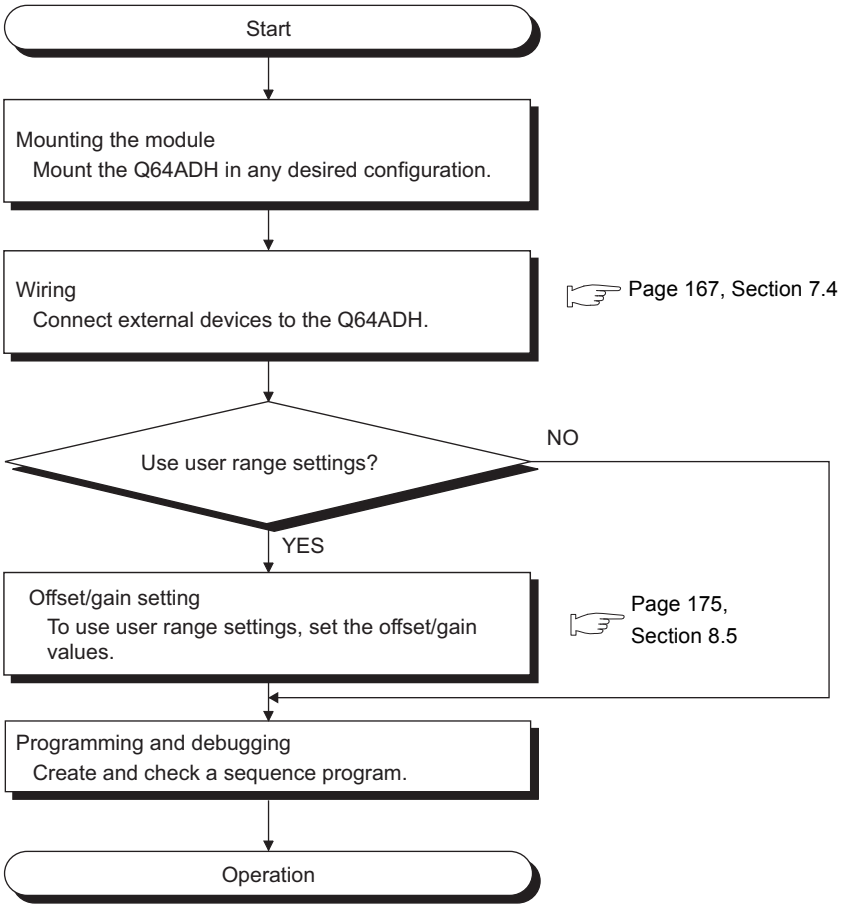
- Do not drop the module case, or do not subject it to strong impact.
- Do not remove the printed-circuit board from the case.
  Doing so can cause module failure.
- Do not disassemble the module. Doing so can cause module failure.
- Prevent foreign matter such as dust or wire chips from entering the 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 terminal 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 screw (M3 screw)	0.42 to 0.58N • m
Terminal block mounting screw (M3.5 screw)	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.

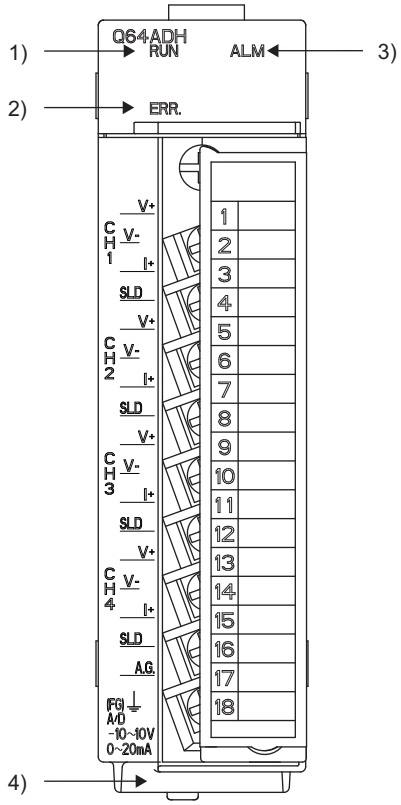
- To mount the module, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection into the hole in the base unit and press the module until it snaps into place.
  Incorrect mounting may cause malfunction, failure or drop of the module.
- 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 the Q64ADH.



(1) Part names

The following table lists the part names of the Q64ADH.

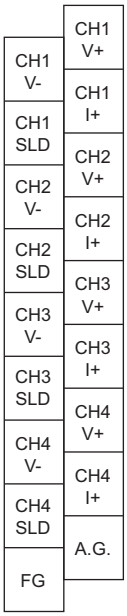
Number	Name	Description
1)	RUN LED (green)	Displays the operating status of the Q64ADH. On: The module is operating normally. Flashing: In the offset/gain setting mode Off: The 5V power off or watchdog timer error has occurred, or online module change enabled.
2)	ERR. LED (red)	Displays the errors and status of the Q64ADH. On: An error has occurred except for error code: 112[*1] Flashing: Error code: 112 has occurred.[*1] Off: The module is operating normally.
3)	ALM LED (red)	Displays the alarm status of the Q64ADH. On: Alarm (process alarm) is occurring[*2] Flashing: Input signal error 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 246, Section 11.1)

*2 Alarm Code List (☞ Page 253, 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	V+
2		V-
3		I+
4		SLD
5	CH2	V+
6		V-
7		I+
8		SLD
9	CH3	V+
10		V-
11		I+
12		SLD
13	CH4	V+
14		V-
15		I+
16		SLD
17	A.G.	
18	FG	

7.4 Wiring

This section describes the wiring precautions and module connection examples of the Q64ADH.

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 Q64ADH.
This section describes the precautions on external wiring.

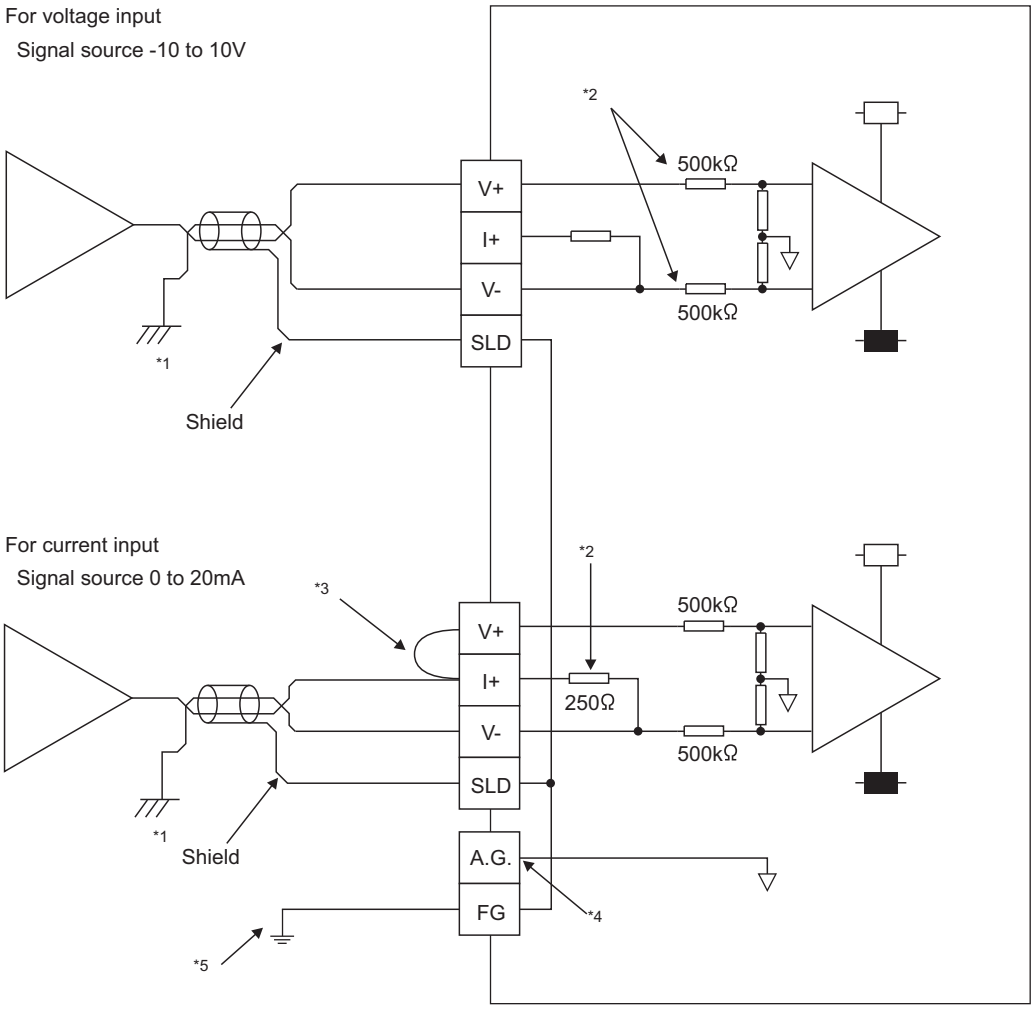
- Use separate cables for the AC control circuit and the Q64ADH's external I/O signals to avoid influence of AC side surges and induction.
- Do not locate external wires near the main circuit line, high-voltage circuit lines, and load circuit lines of devices other than programmable controllers. Also, 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.

(1) For voltage input

Signal source -10 to 10V



(2) For current input

Signal source 0 to 20mA

*1 For the wire, use the shielded twisted pair cable.

*2 This indicates the input resistance of the Q64ADH.

*3 To input current, connect the V+ and I+ terminals.

*4 Connect the A.G. terminal to the GND of external device in the following cases.

- There are potential differences between the A.G. terminal and the GND of external device.
- All channels are connected to the same GND of external device.

When the A.G. terminal is connected to the GND of external device, an error may occur in the I/O conversion characteristics. If an error occurs, configure the offset/gain setting and adjust the I/O conversion characteristics. For the setting procedure, refer to the following.

- Offset/gain Setting (☞ Page 175, Section 8.5)

*5 Connect the shield part of the cable for each channel to each shield terminal, and ground the FG terminal. Also, ground the FG terminal of the power supply module.

Point

In unused channels, if the circuit between two terminals is kept open, an undefined digital value may be output. To prevent this phenomenon, perform any of the following measures.

- Set the A/D conversion enable/disable setting in the unused channel to disable. Note that changing the A/D conversion enable/disable setting from A/D conversion enable to A/D conversion disable reduces the conversion cycle.
- Short-circuit the input terminal (V+) and (V-) of the unused channel.

CHAPTER 8 VARIOUS SETTINGS

This chapter describes the setting procedures of the Q64ADH.

Point

- After writing the contents of new module, 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.
- After writing the contents of switch settings into the CPU module, reset the CPU module or switch on the power supply, to validate the setting contents.

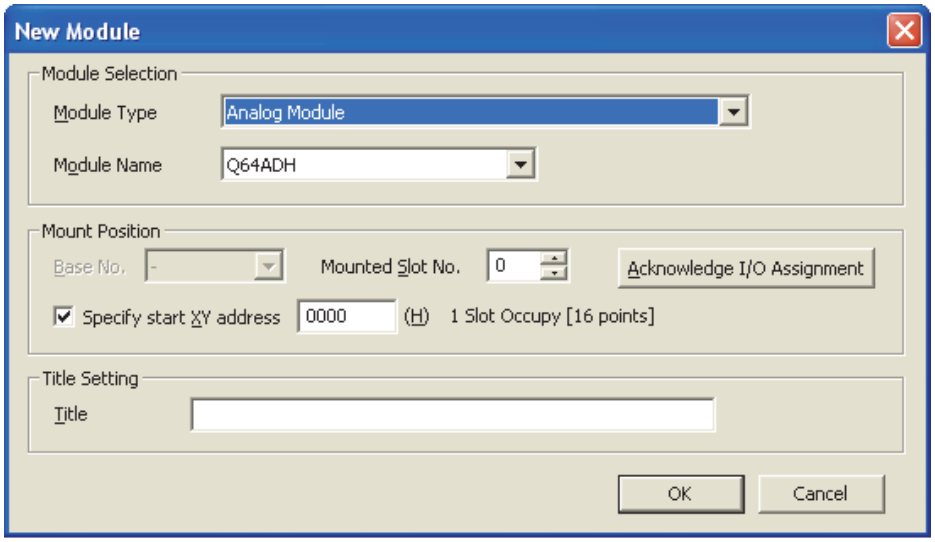
8.1 Addition of Modules

Add the model name of the Q64ADH to use on the project.

(1) Addition procedure

Open the "New Module" dialog box.

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



Item		Description
Module Selection	Module Type	Set "Analog Module".
	Module Name	Select 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 X/Y address	The start I/O number (hexadecimal) of the target module is set, according to the slot No. Setting any start I/O number is also possible.
Title Setting	Title	Set any title.

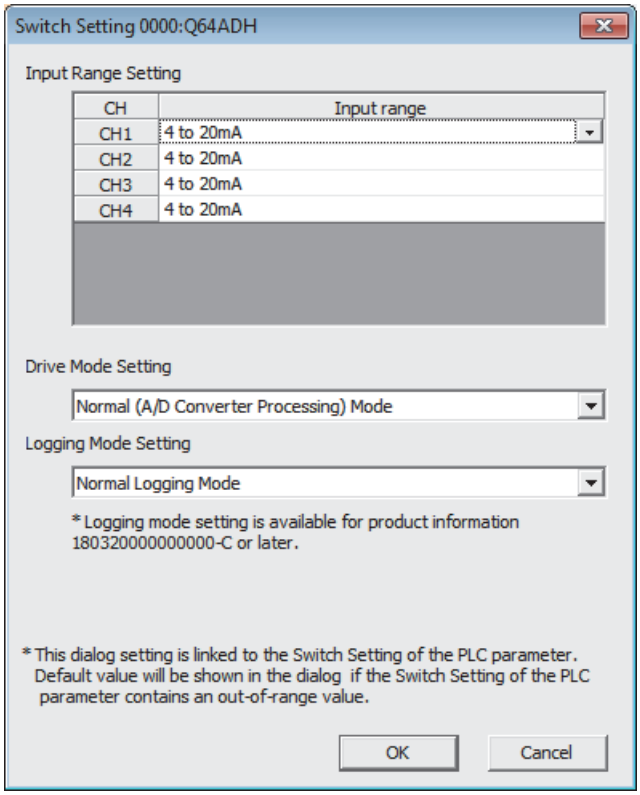
8.2 Switch Setting

Set the input range, logging mode, and operation mode to be used in each channel.

(1) Setting procedure

Open the "Switch Setting" dialog box.

Project window ⇨ [Intelligent Function Module] ⇨ module name ⇨ [Switch Setting]



Item	Description	Setting value
Input Range Setting	Set the input range used in each CH.	• 4 to 20mA (default value) • 0 to 20mA • 1 to 5V • 0 to 5V • -10 to 10V • 0 to 10V • 4 to 20mA (Extended mode) • 1 to 5V (Extended mode) • User range setting
Drive Mode Setting	Set the operation mode of the Q64ADH.	• Normal (A/D Converter Processing) Mode (default value) • Offset/gain setting mode
Logging Mode Setting	Set the logging mode for the Q64ADH.	• Normal Logging Mode (default value) • High-Speed Logging Mode

8.3 Parameter Setting

Set the parameters of each CH.

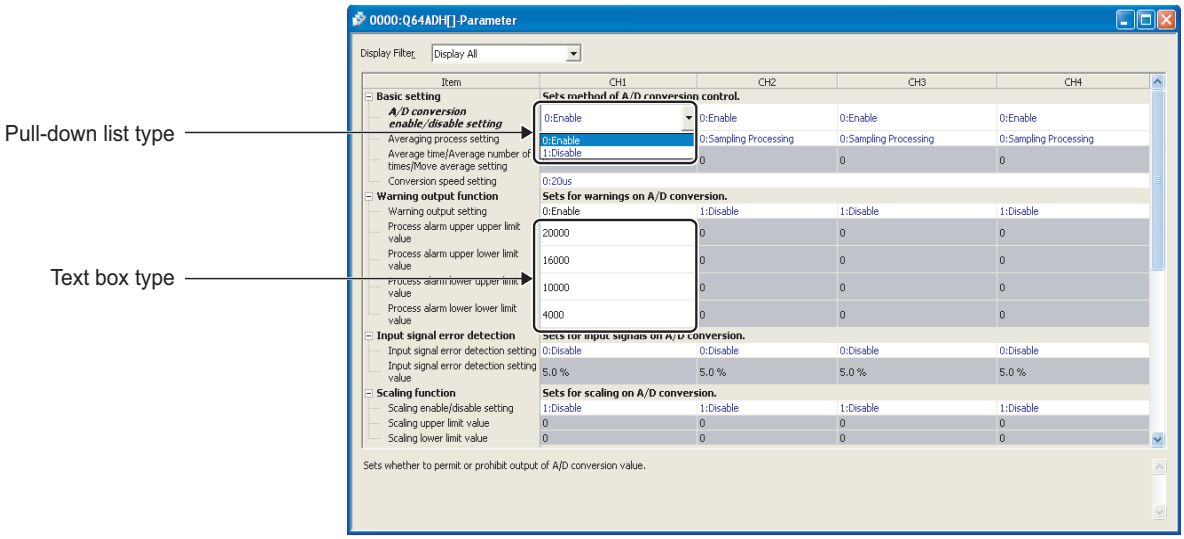
By setting the parameters, the setting by programming is unnecessary.

(1) Setting procedure

Open the "Parameter" dialog box.

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 CH4, follow the operation of step 2.**

Item		Setting value		Reference
Basic setting	A/D conversion enable/disable setting	0: Enable (default value) 1: Disable		Page 38, Section 4.3
	Averaging process setting	0: Sampling Processing (default value) 1: Time Average 2: Count Average 3: Moving Average		Page 38, Section 4.4
	Average time/Average number of times/Move average setting	Time Average	2 to 5000ms (default value: 0)	
		Count Average	4 to 62500 times (default value: 0)	
		Moving Average	2 to 1000 times (default value: 0)	
	Conversion speed setting	0: 20μs (default value) 1: 80μs 2: 1ms		Page 43, Section 4.6
Warning output function	Warning output setting	0: Enable 1: Disable (default value)		Page 50, Section 4.9
	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)		
Input signal error detection	Input signal error detection setting	0: Disable (default value) 1: Upper and Lower Detection 2: Upper Detection 3: Lower Detection 4: Disconnection Detection		Page 44, Section 4.8
	Input signal error detection setting value	0 to 25.0% (default value: 5.0%)		
Scaling function	Scaling enable/disable setting	0: Enable 1: Disable (default value)		Page 52, Section 4.10
	Scaling upper limit value	-32000 to 32000 (default value: 0)		
	Scaling lower limit value	-32000 to 32000 (default value: 0)		
Shift function	Shifting amount to conversion value	-32768 to 32767 (default value: 0)		Page 56, Section 4.11
Digital clipping function	Digital clipping function enable/ disable setting	0: Enable 1: Disable (default value)		Page 59, Section 4.12

Item		Setting value	Reference
Logging function	Logging enable/disable setting	0: Enable 1: Disable (default value)	Page 66, Section 4.14 Page 82, Section 4.15
	Logging data setting	0: Digital Output Value 1: Digital Operation Value (default value)	
	Logging cycle setting value	μs for the normal logging mode: 80 to 32767 (default value: 4) μs for the high-speed logging mode: 20 to 32767 (default value: 4) ms: 1 to 32767 (default value: 4) s: 1 to 3600 (default value: 4)	
	Logging cycle unit specification	0: μs 1: ms (default value) 2: s	
	Logging points after trigger	1 to 10000 (default value: 5000)	
	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)	
	Trigger setting value	-32768 to 32767 (default value: 0)	
	Logging data storing notification enable/disable setting	0: Enable 1: Disabled (default value)	Page 82, Section 4.15
Flow amount integration function	Flow amount integration enable/ disable setting	0: Enabled 1: Disabled (default value)	Page 95, Section 4.16
	Integration cycle setting	1 to 5000ms (default value: 4ms)	
	Flow amount time unit setting	0: /s (default value) 1: /min 2: /h	
	Unit scaling setting	0: × 1 (default value) 1: × 10 2: × 100 3: × 1000 4: × 10000	

8.4 Auto Refresh

This function transfers data in the buffer memory to specified devices.
By the auto refresh setting, reading/writing data by programming is unnecessary.

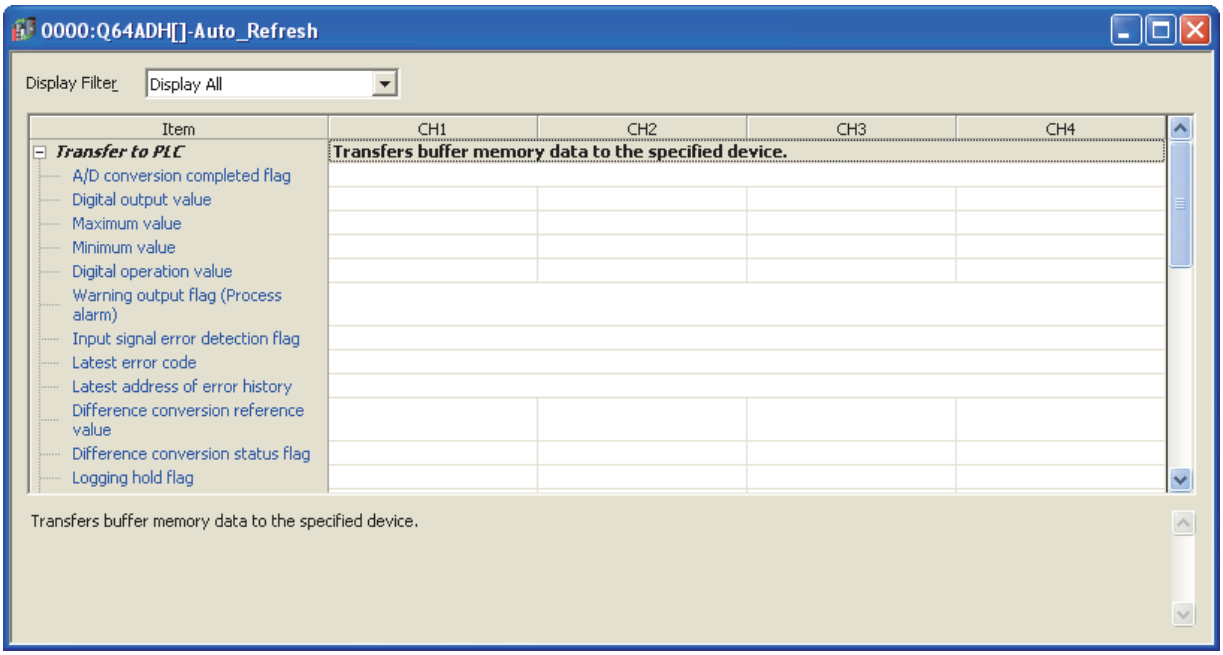
(1) Setting procedure

Open the "Auto_Refresh" dialog box.

1. Start "Auto_Refresh".

Project window ⇨ [Intelligent Function Module] ⇨ module name ⇨ [Auto_Refresh]

2. Click the item to setup, and input the auto refresh target device.



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 the number that is divisible by 16 points (example: X10, Y120, M16).
Data in the buffer memory are stored in 16 points of devices 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 the user range setting, configure the offset/gain setting with the following operations.
When using factory default settings, the offset/gain is not required.
The offset/gain setting can be configured from the following two types of operations.

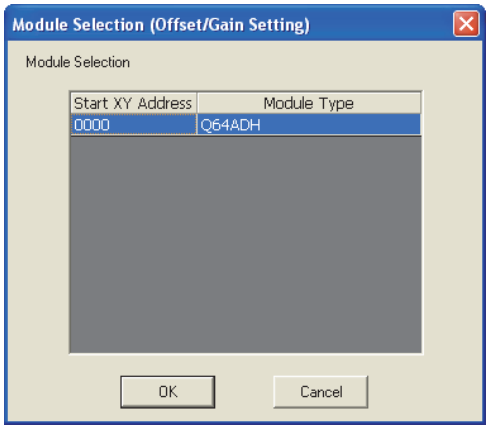
- Setting from "Offset/Gain Setting" of GX Works2
- Setting from a program

8.5.1 Setting from GX Works2 "Offset/Gain Setting"

(1) Setting procedure

Open the "Offset/Gain Setting" dialog box.

[Tool] ⇨ [Intelligent Function Module Tool] ⇨ [Analog Module] ⇨ [Offset/gain Setting...]



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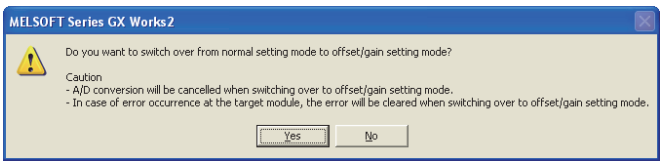
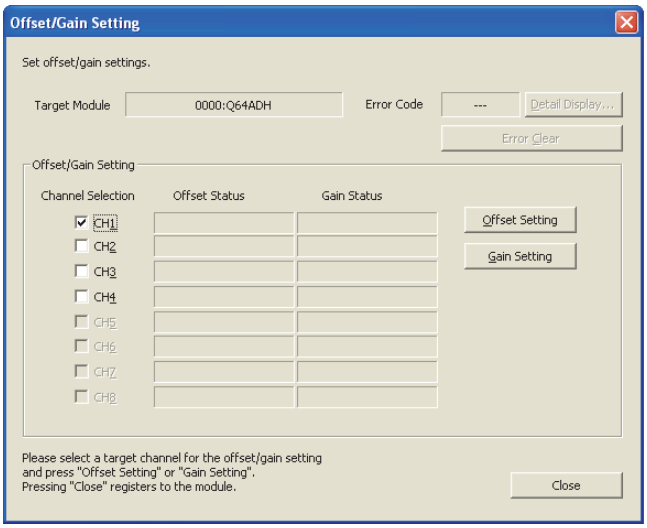


↓

1. **Select the module to configure the offset/gain setting, and click the** OK **button.**

2. **Click the** Yes **button.**



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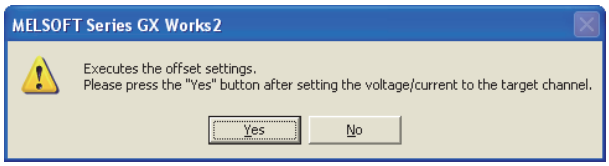

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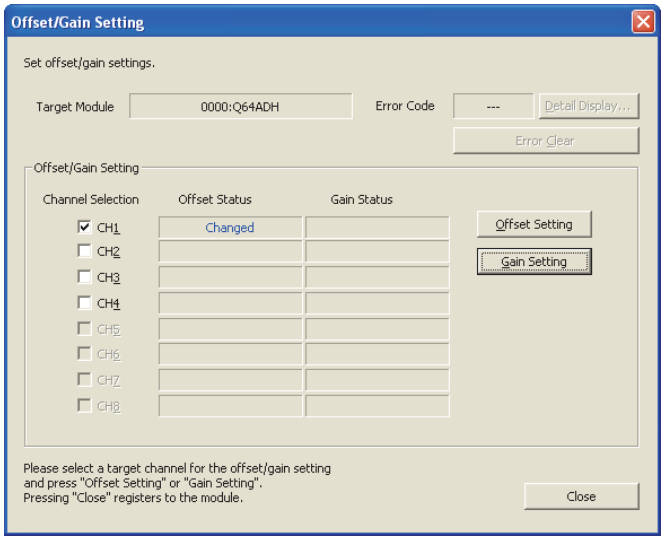

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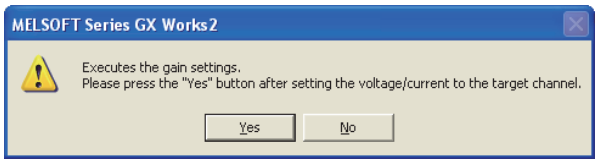


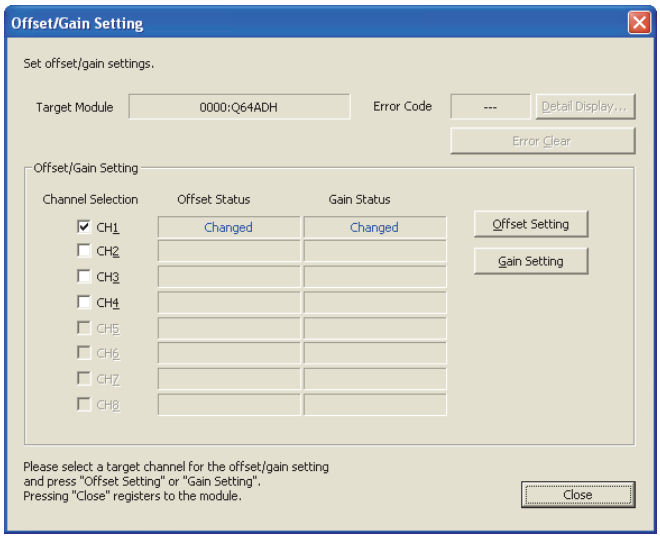
↓

3. **Select the channel to use the offset/gain setting, and click the** Offset Setting **button.**

4. **Input the offset value voltage or current in the target channel terminal, and click the** Yes **button.**

5. **Check if "Offset Status" is changed to "Changed", and click the** Gain Setting **button.**

6. **Input the gain value voltage or current in the target channel terminal, and click the** Yes **button.**



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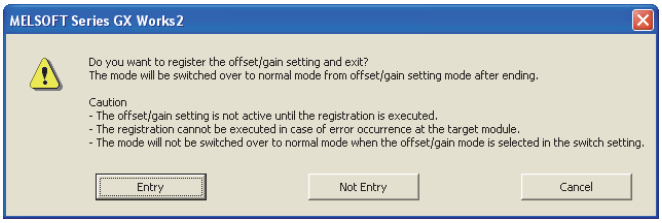


↓

End

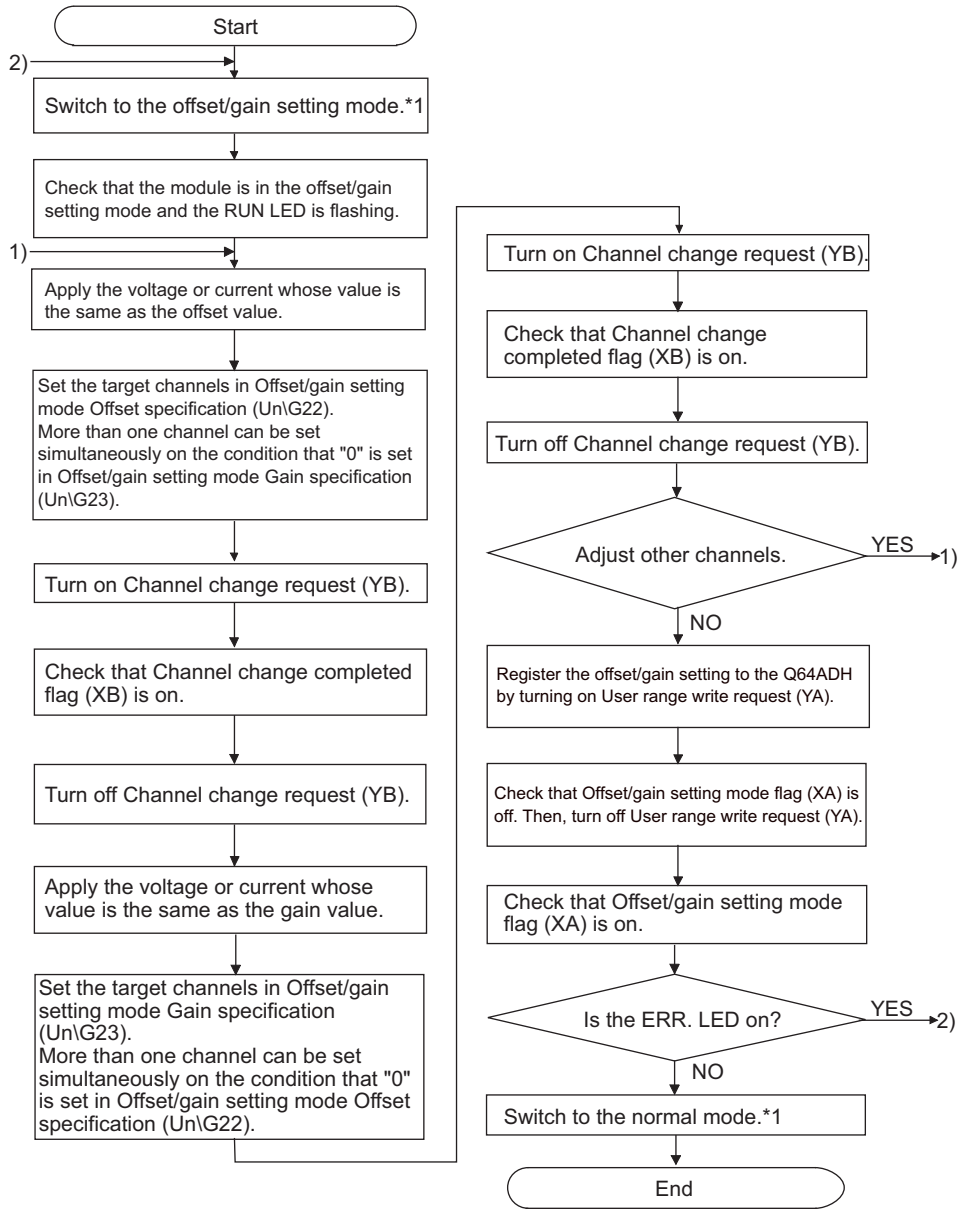
7. **Check if "Gain Status" is changed to "Changed", and click the Close button.**

8. **Click the Entry button.**

8.5.2 Setting from a program

(1) Setting procedure

The following describes the procedures when setting the offset/gain from a sequence program.



*1 The following shows the procedure for switching the mode (normal mode → offset/gain setting mode → normal mode).

- Dedicated instruction (G(P).OFFGAN) (☞ Page 259, Appendix 1.1)
- Setting for Mode switching setting (Un\G158, Un\G159) and OFF → ON → OFF of Operating condition setting request (Y9) (☞ Page 143, Section 6.2 (23))
- Intelligent Function Module Switch Setting (☞ Page 170, Section 8.2)

Point

- Configure the offset/gain setting in accordance with the actual use situation.
- Offset and gain values are recorded in the flash memory in the Q64ADH by turning OFF → ON → OFF User range write request (YA). Once recorded, the values are not deleted even after turning the power off.
  When the values are written 26 times in succession, an error occurs and the error code is stored in Latest error code (Un\G19) to prevent an improper write to flash memory.
- Configure the offset/gain setting in the range satisfying the following condition.
  When the setting value out of the range is configured, the maximum resolution and accuracy of the module may not fall within the range shown in the following performance specifications.
  - I/O conversion characteristic of A/D conversion (☞ Page 24, Section 3.2.2)
- Offset/gain setting can be configured for multiple channels at the same time, however, the setting must be configured for offset and gain channels separately.
  When configuring the setting for offset and gain channels at the same time, an error occurs and ERR. LED turns on.
- When turning ON User range write request (YA), the integrity between the offset values and gain values is checked.
  When error occurs even in one channel, offset/gain value is not written to the module.
  Check the value in Latest error code (Un\G19) and perform the following procedures to reconfigure the offset/gain setting from the beginning.
  - Error Code List (☞ Page 246, 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 from OFF to ON.
  Note the initial setting process is executed at the switching of the mode if the sequence program executes the initial setting at Module READY (X0) ON.
- To validate the intelligent function module switch setting after writing the setting to the CPU module, reset the CPU module or turn the power supply from OFF to ON.

(2) Program example

(a) Device

Ex. I/O number of the Q64ADH is X/Y00 to 0F.
The following shows the devices used in the program example.

Device	Functions
M0	Channel selection
M1	Offset/gain setting
M2	Gain setting
M3	Channel change command
M4	Write command to module of offset/gain setting value
M5	Mode switching
D0	Channel-specified storage device
D1	Storage device for the setting value of the dedicated instruction (G(P).OFFGAN)

(b) Switching the mode by the dedicated instruction (G(P).OFFGAN)

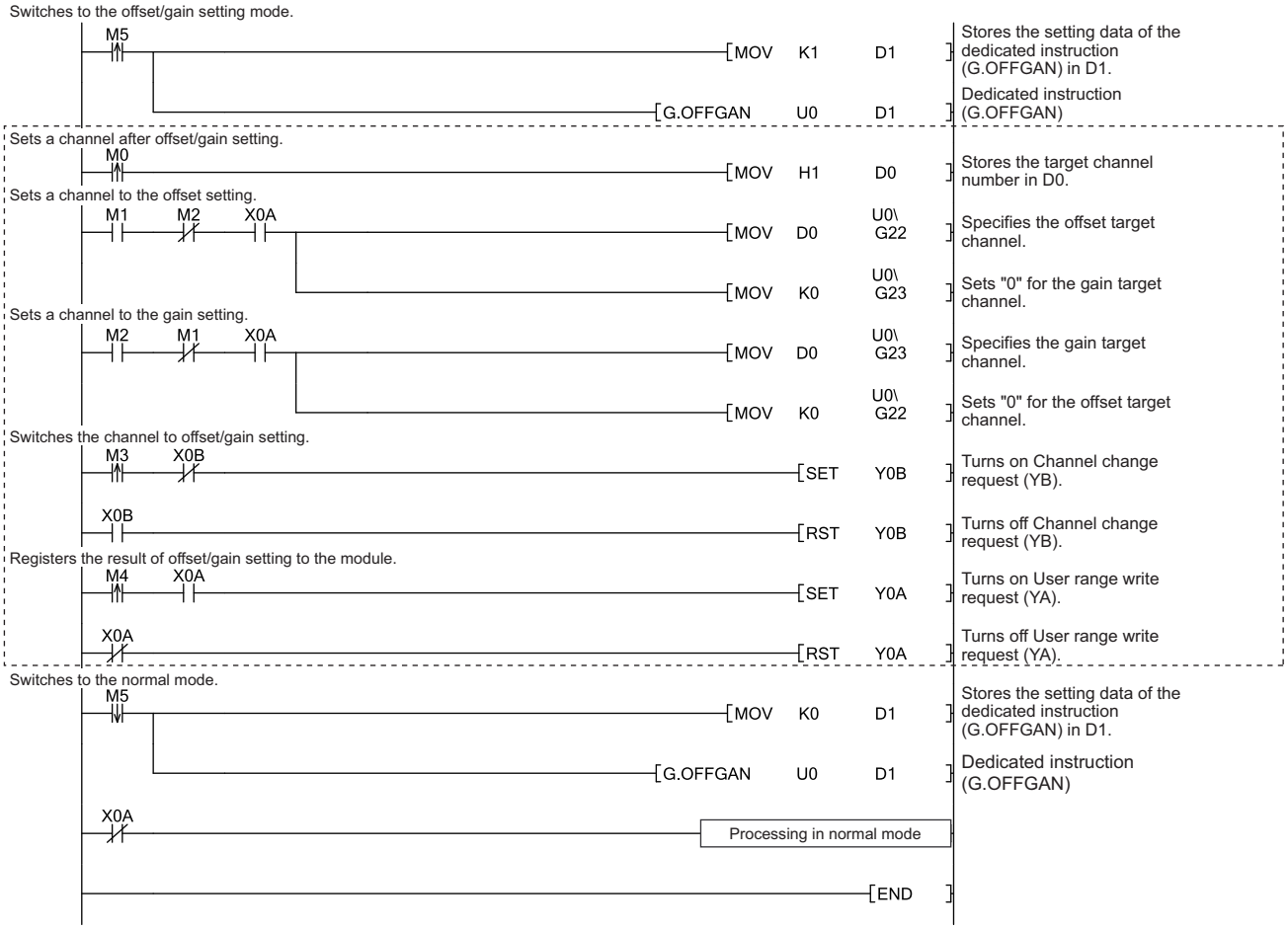
This program performs the followings:

• first, switches the mode to the offset/gain setting mode by the dedicated instruction (G(P).OFFGAN),

• second, switches the channels for which the offset/gain settings are configured,

• third, writes the offset/gain value to the Q64ADH,

• finally, switches the mode back to the normal mode.

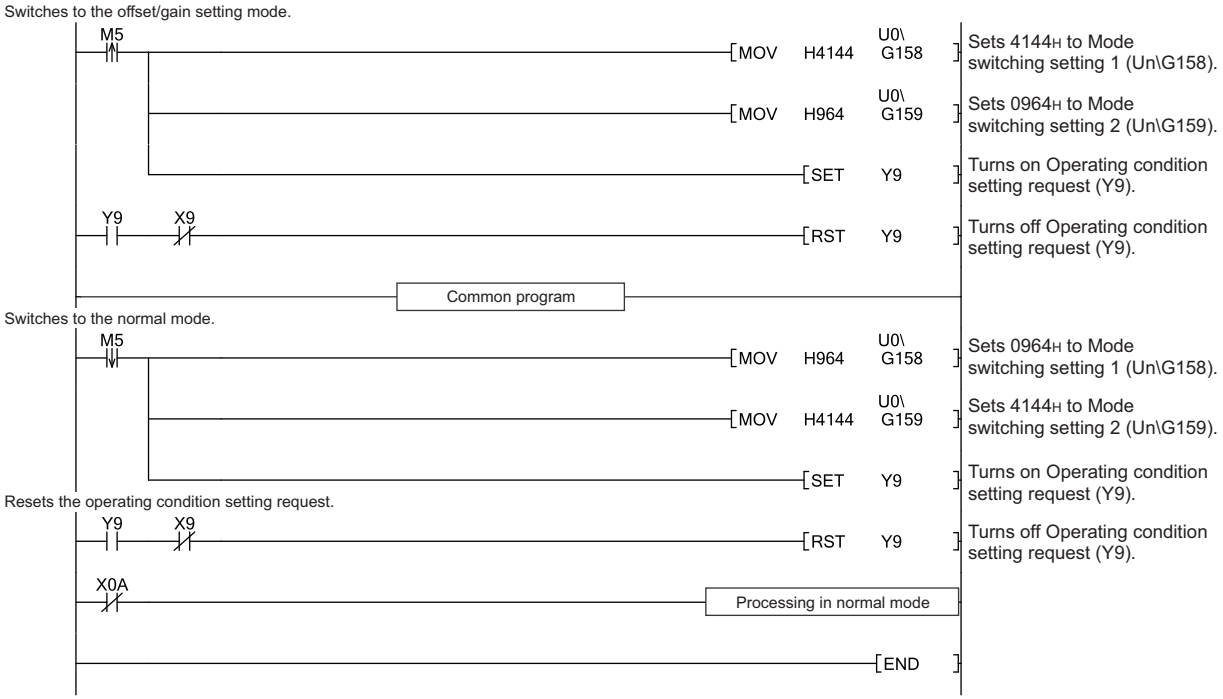


Point

The program enclosed by the dotted line is the common programs among the following three programs.

- Switching the mode by the dedicated instruction (G(P).OFFGAN)
- Switching the mode by setting Mode switching setting (Un\G158, Un\G159) and by Operating condition setting request (Y9)
- Switching the mode by the intelligent function module switch setting

(c) Switching the mode by Mode switching setting (Un\G158, Un\G159) and Operating condition setting request (Y9)



(d) Switching the mode by the intelligent function module switch setting

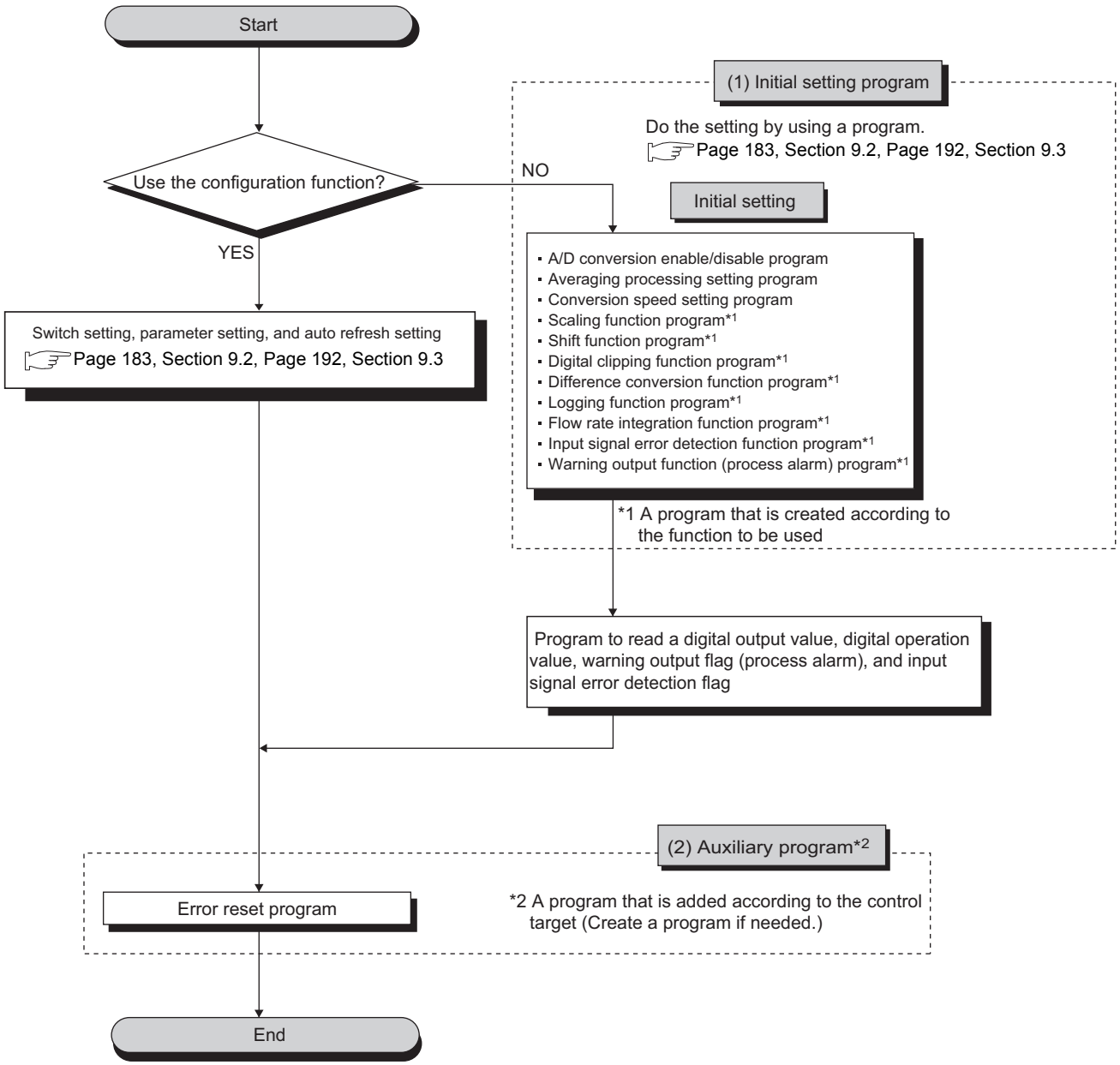
The programs other than the common program are not necessary.

CHAPTER 9 PROGRAMMING

This chapter describes the procedure for programming and the basic program of the Q64ADH.

9.1 Procedure for Programming

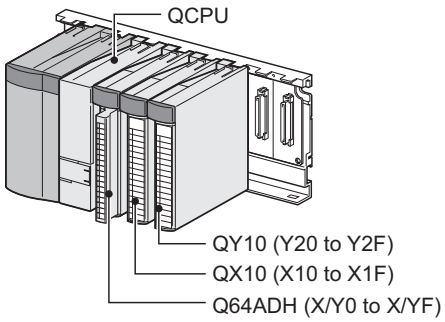
Create a program to execute A/D conversion, according to the following procedure.



9.2 When Using the Module in a Standard System Configuration

The following shows program examples for the system configuration and usage conditions of the Q64ADH.

(1) System configuration



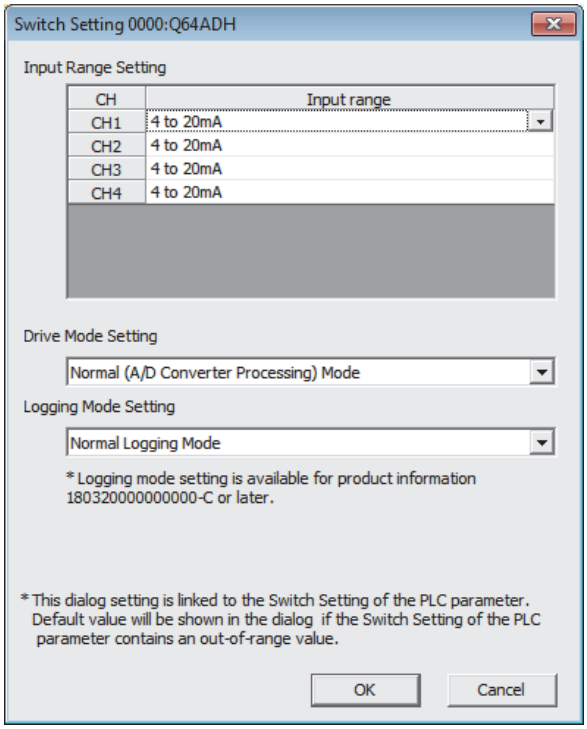
(2) Programming condition

This program reads digital output values enabled for A/D conversion at CH1 to CH3 in the Q64ADH.
CH1 executes sampling processing, CH2 executes averaging processing every 50 times and CH3 executes A/D conversion every 10 moving averages. If an error occurs in the module, an error code is displayed in BCD notation.

(3) Switch setting

Set the input range, operation mode, and logging mode.

Project window ⇨ [Intelligent Function Module] ⇨ [Q64ADH] ⇨ [Switch Setting]



(4) Initial setting description

(a) Channel setting

Item	Description			
	CH1	CH2	CH3	CH4
A/D conversion enable/ disable setting	Enable	Enable	Enable	Disable
Averaging process setting	Sampling processing	Count average	Moving average	Sampling processing
Average time/Average number of times/Move average setting	0	50 times	10 times	0
Conversion speed setting	20μs			
Warning output setting	Disable	Enable	Disable	Disable
Process alarm upper upper limit value	0	20000	0	0
Process alarm upper lower limit value	0	18000	0	0
Process alarm lower upper limit value	0	3000	0	0
Process alarm lower lower limit value	0	0	0	0
Input signal error detection setting	Upper and Lower Detection	Disable	Disable	Disable
Input signal error detection setting value	10.0%	5.0%	5.0%	5.0%
Scaling enable/disable setting	Disable	Disable	Enable	Disable
Scaling upper limit value	0	0	32000	0
Scaling lower limit value	0	0	0	0
Shifting amount to conversion value	0	0	10000	0
Digital clipping function enable/ disable setting	Disable	Disable	Enable	Disable

9.2.1 Program example when using the parameter of intelligent function module

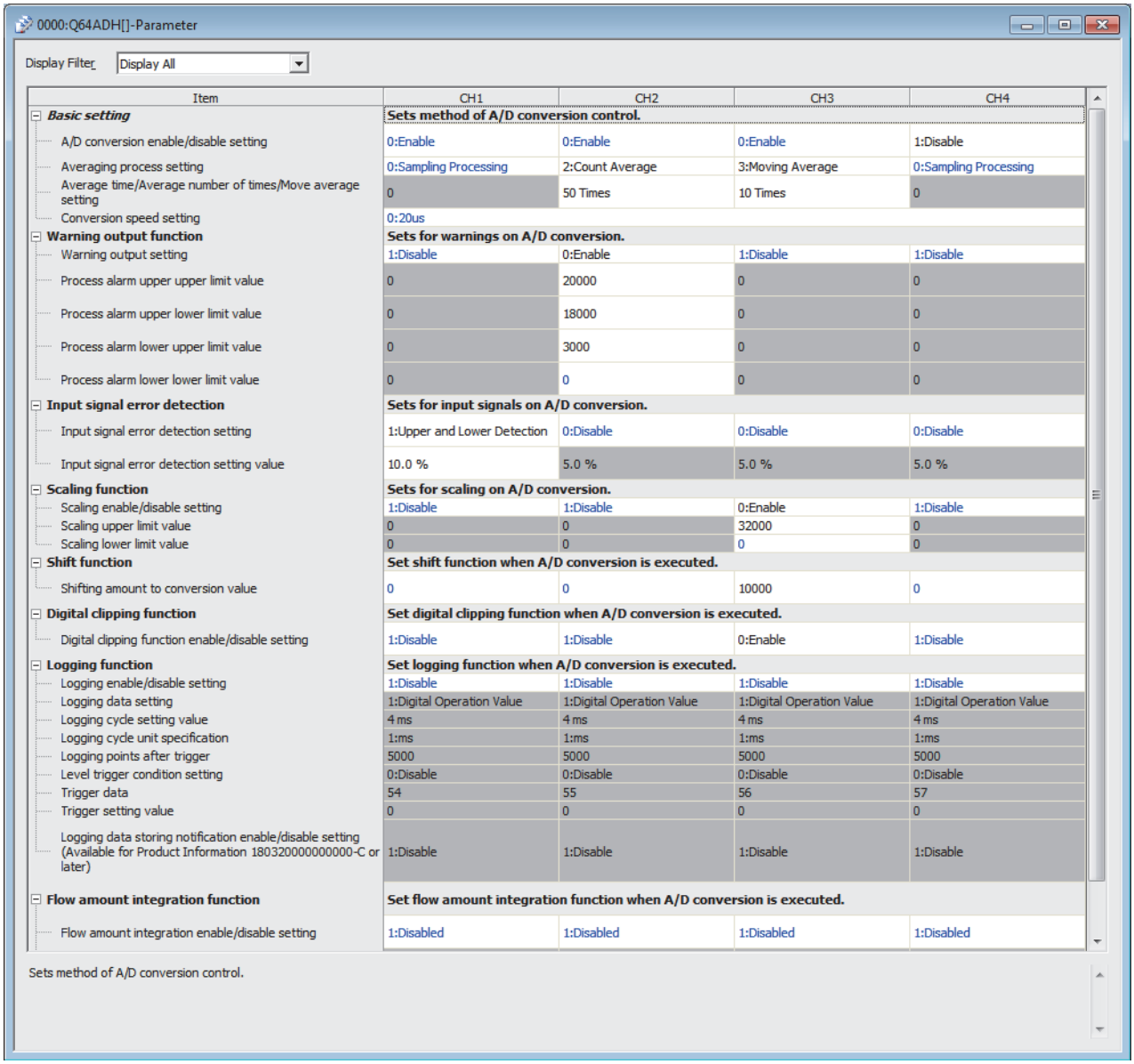
(1) Device for user

Device	Description	
D1 (D11)	CH1 Digital output value	
D2 (D12)	CH2 Digital output value	
D8	Input signal error detection flag	
D10	Error code	
D18	Warning output flag (Process alarm)	
D28 (D13)	CH3 Digital operation value	
M0	CH1 A/D conversion completed flag	
M1	CH2 A/D conversion completed flag	
M2	CH3 A/D conversion completed flag	
M20 to M27	Warning output flag (Process alarm)	
M50 to M53	Input signal error detection flag	
M100	Module READY checking flag	
X0	Module READY	Q64ADH (X/Y0 to X/YF)
X9	Operating condition setting completed flag	
XC	Input signal error detection signal	
XE	A/D 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 in the parameter.

Project window ⇨ [Intelligent Function Module] ⇨ [Q64ADH] ⇨ [Parameter]

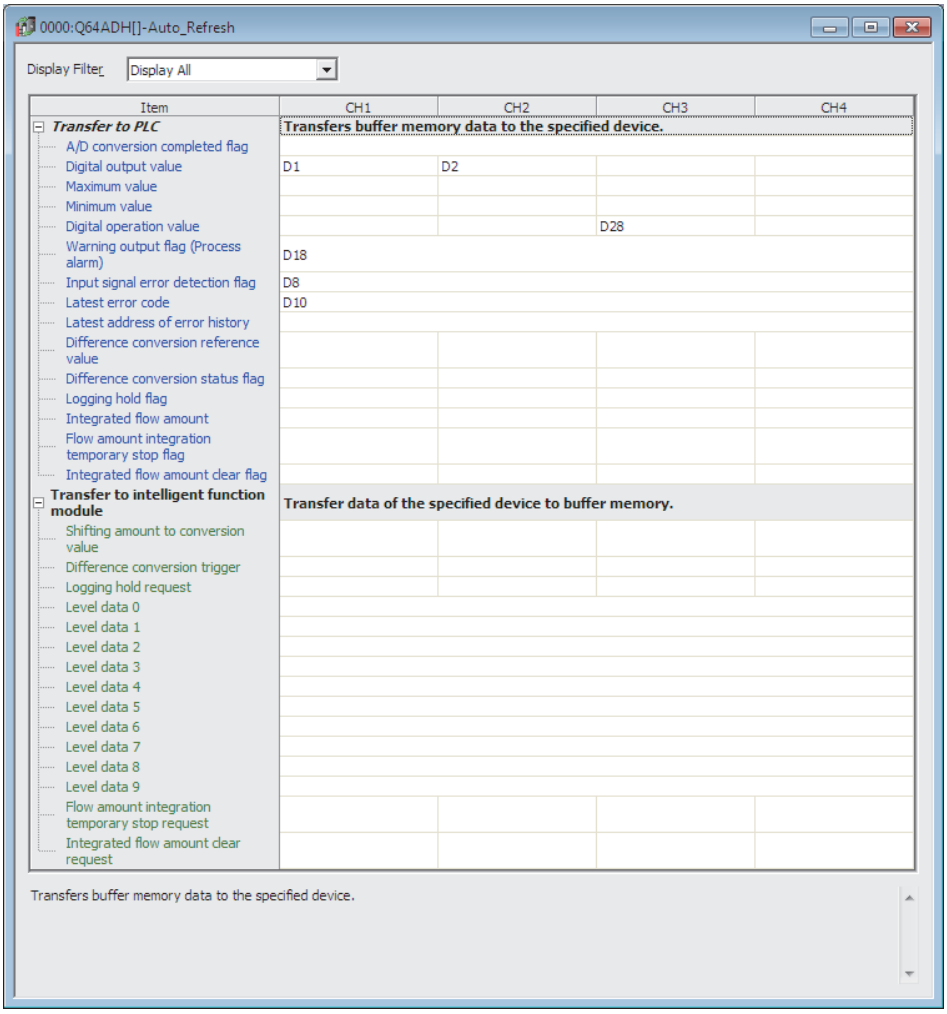


Item	CH1	CH2	CH3	CH4
Basic setting	**Sets method of A/D conversion control.**			
A/D conversion enable/disable setting	0:Enable	0:Enable	0:Enable	1:Disable
Averaging process setting	0:Sampling Processing	2:Count Average	3:Moving Average	0:Sampling Processing
Average time/Average number of times/Move average setting	0	50 Times	10 Times	0
Conversion speed setting	0:20us			
Warning output function	**Sets for warnings on A/D conversion.**			
Warning output setting	1:Disable	0:Enable	1:Disable	1:Disable
Process alarm upper upper limit value	0	20000	0	0
Process alarm upper lower limit value	0	18000	0	0
Process alarm lower upper limit value	0	3000	0	0
Process alarm lower lower limit value	0	0	0	0
Input signal error detection	**Sets for input signals on A/D conversion.**			
Input signal error detection setting	1:Upper and Lower Detection	0:Disable	0:Disable	0:Disable
Input signal error detection setting value	10.0 %	5.0 %	5.0 %	5.0 %
Scaling function	**Sets for scaling on A/D conversion.**			
Scaling enable/disable setting	1:Disable	1:Disable	0:Enable	1:Disable
Scaling upper limit value	0	0	32000	0
Scaling lower limit value	0	0	0	0
Shift function	**Set shift function when A/D conversion is executed.**			
Shifting amount to conversion value	0	0	10000	0
Digital clipping function	**Set digital clipping function when A/D conversion is executed.**			
Digital clipping function enable/disable setting	1:Disable	1:Disable	0:Enable	1:Disable
Logging function	**Set logging function when A/D conversion is executed.**			
Logging enable/disable setting	1:Disable	1:Disable	1:Disable	1:Disable
Logging data setting	1:Digital Operation Value	1:Digital Operation Value	1:Digital Operation Value	1:Digital Operation Value
Logging cycle setting value	4 ms	4 ms	4 ms	4 ms
Logging cycle unit specification	1:ms	1:ms	1:ms	1:ms
Logging points after trigger	5000	5000	5000	5000
Level trigger condition setting	0:Disable	0:Disable	0:Disable	0:Disable
Trigger data	54	55	56	57
Trigger setting value	0	0	0	0
Logging data storing notification enable/disable setting (Available for Product Information 180320000000000-C or later)	1:Disable	1:Disable	1:Disable	1:Disable
Flow amount integration function	**Set flow amount integration function when A/D conversion is executed.**			
Flow amount integration enable/disable setting	1:Disabled	1:Disabled	1:Disabled	1:Disabled

Sets method of A/D conversion control.

(3) Auto refresh setting

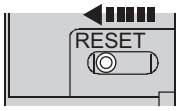
Project window ⇨ [Intelligent Function Module] ⇨ [Q64ADH] ⇨ [Auto_Refresh]



(4) Writing parameter of intelligent function module

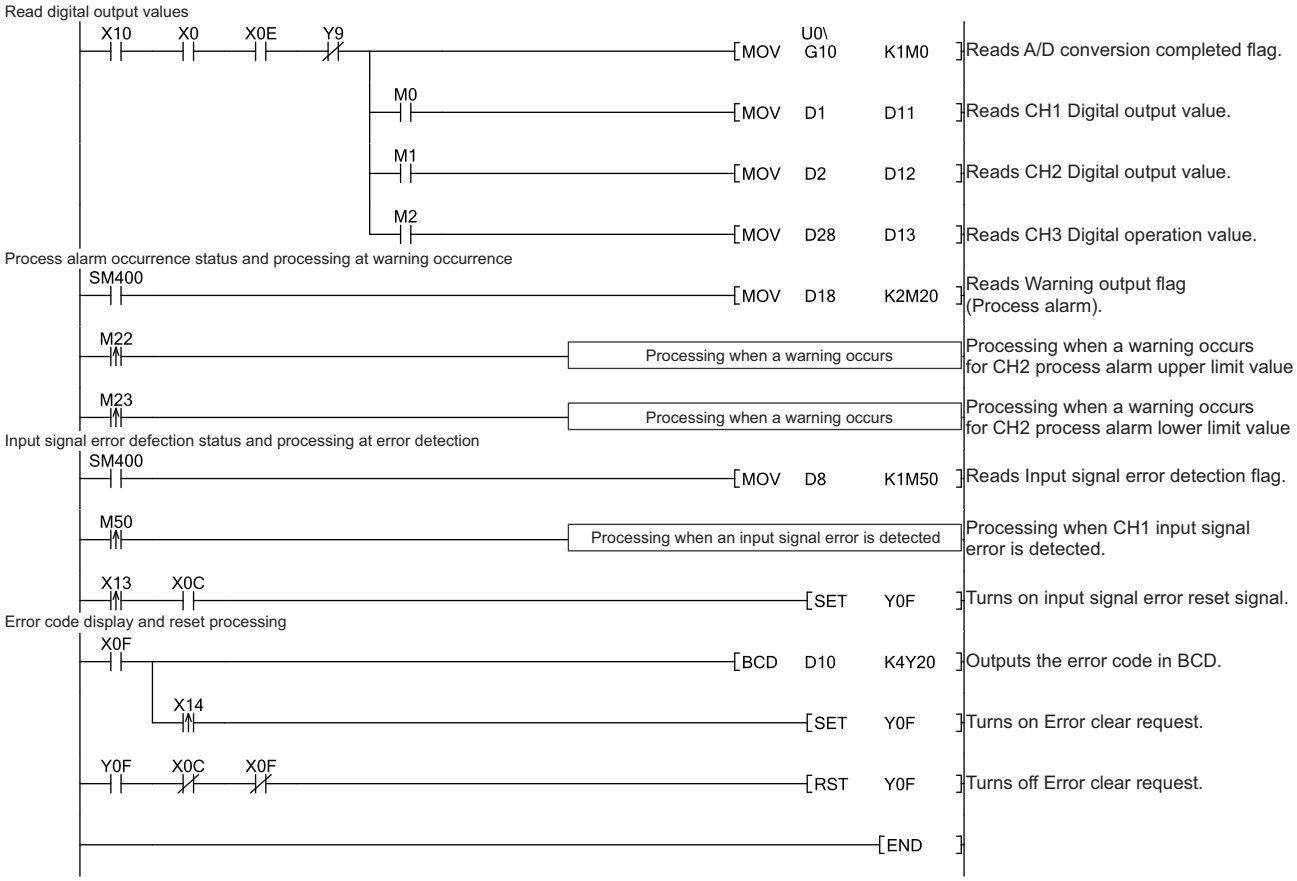
Write the set parameter to the CPU module and reset the CPU module, or then off and then on the programmable controller power supply.

[Online] ⇨ [Write to PLC...]



or Power OFF → ON

(5) Program example

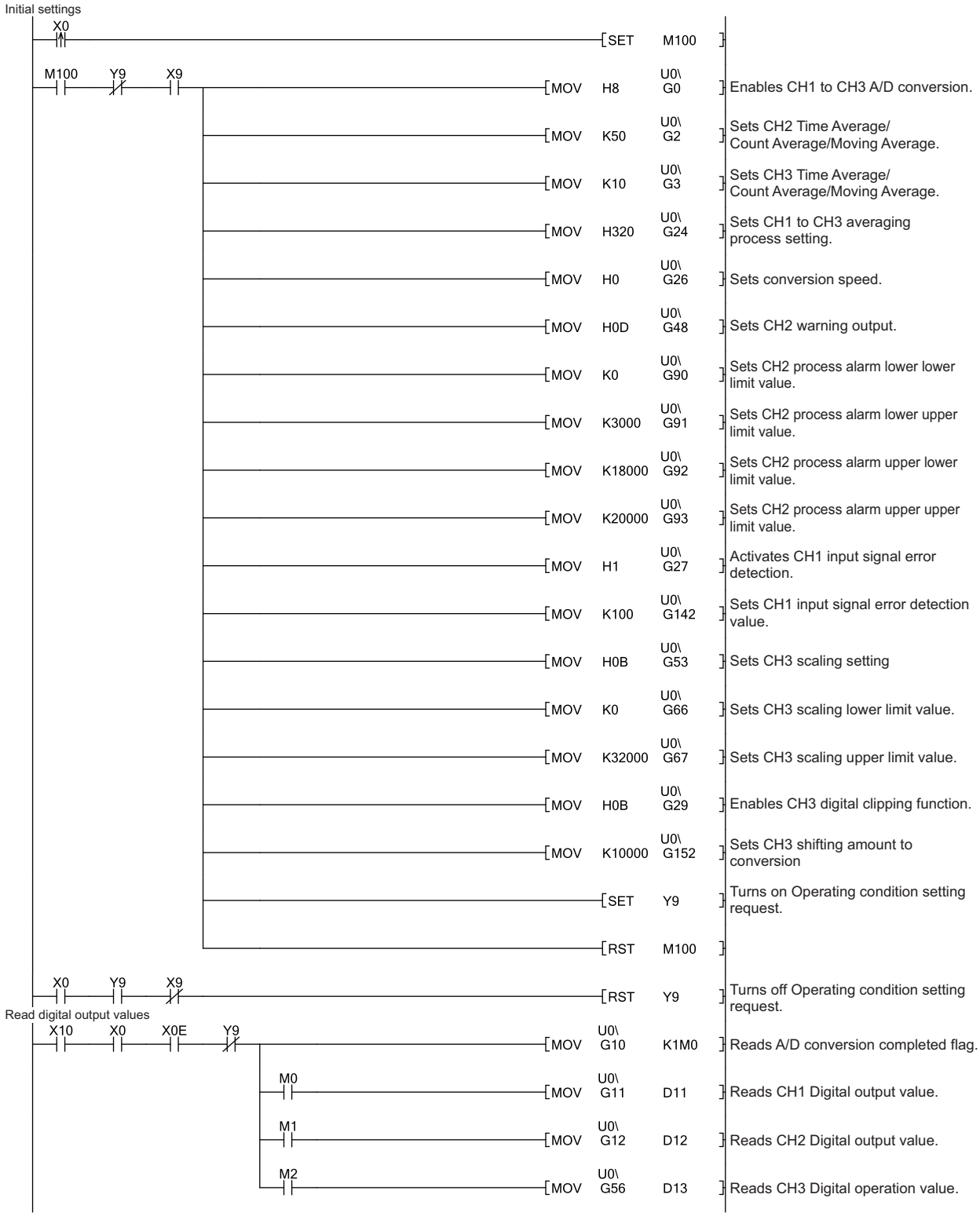


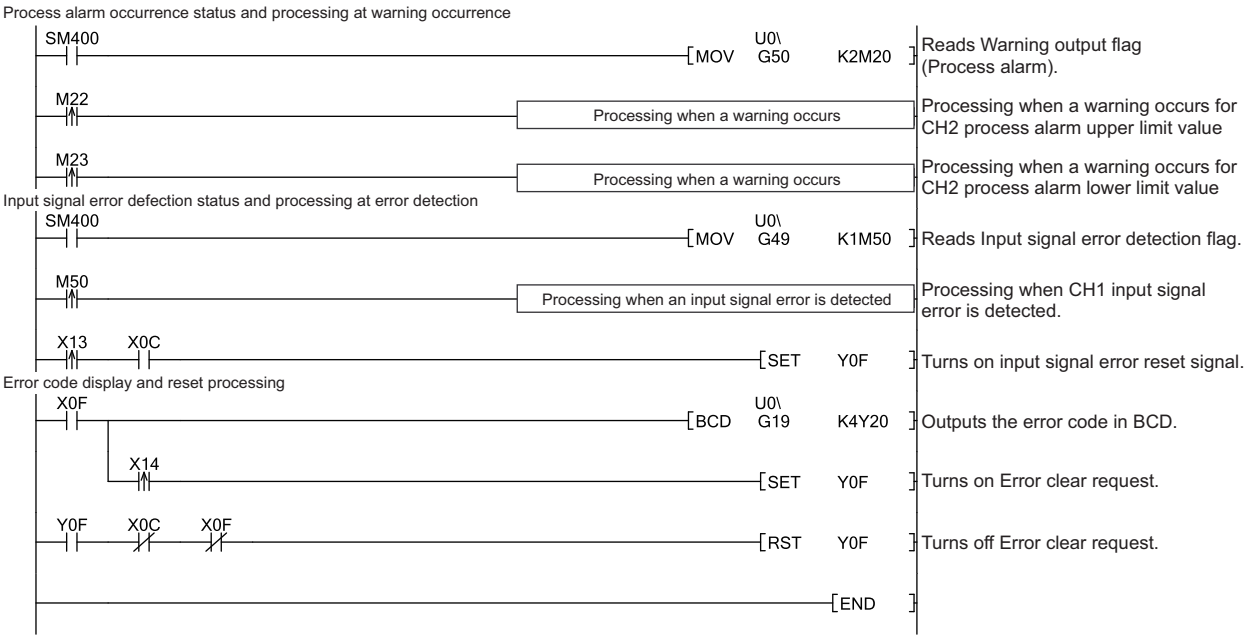
9.2.2 Program example when not using the parameter of intelligent function module

(1) Device for user

Device	Description	
D11	CH1 Digital output value	
D12	CH2 Digital output value	
D13	CH3 Digital operation value	
M0	CH1 A/D conversion completed flag	
M1	CH2 A/D conversion completed flag	
M2	CH3 A/D conversion completed flag	
M20 to M27	Warning output flag (Process alarm)	
M50 to M53	Input signal error detection flag	
M100	Module READY checking flag	
X0	Module READY	Q64ADH (X/Y0 to X/YF)
X9	Operating condition setting completed flag	
XC	Input signal error detection signal	
XE	A/D 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




Process alarm occurrence status and processing at warning occurrence
SM400
MOV U0\G50 K2M20
Reads Warning output flag (Process alarm).
M22
Processing when a warning occurs
Processing when a warning occurs for CH2 process alarm upper limit value
M23
Processing when a warning occurs
Processing when a warning occurs for CH2 process alarm lower limit value
Input signal error defection status and processing at error detection
SM400
MOV U0\G49 K1M50
Reads Input signal error detection flag.
M50
Processing when an input signal error is detected
Processing when CH1 input signal error is detected.
X13 X0C
SET Y0F
Turns on input signal error reset signal.
Error code display and reset processing
X0F
BCD U0\G19 K4Y20
Outputs the error code in BCD.
X14
SET Y0F
Turns on Error clear request.
Y0F X0C X0F
RST Y0F
Turns off Error clear request.
END

9.3 When Using the Module on the Remote I/O Net

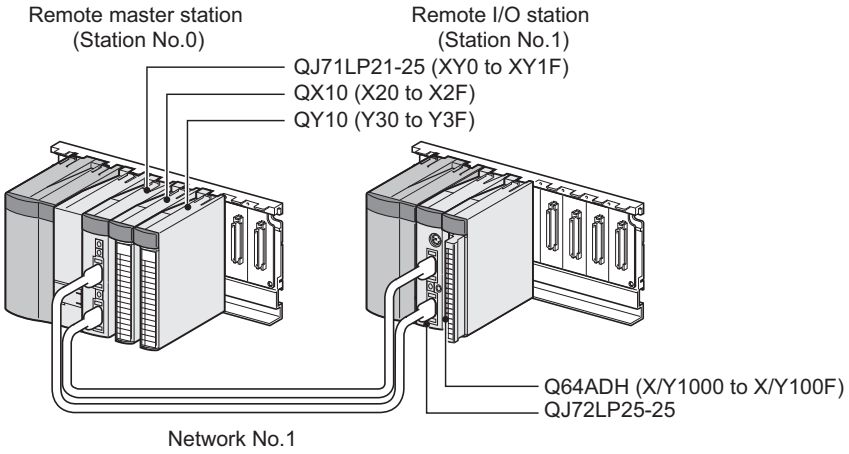
This section describes the system configuration and program example of when the Q64ADH is used on a remote I/O network.

Point

For details on the MELSECNET/H remote I/O network, refer to the following manual.

- Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O network)

(1) System configuration



(2) Programming condition

This program reads digital output values enabled for A/D conversion at CH1 to CH3 in the Q64ADH.
CH1 executes sampling processing, CH2 executes averaging processing every 50 times and CH3 executes A/D conversion every 10 moving averages. 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 195, Section 9.3 (6)

(4) Initial setting description

(a) Channel setting

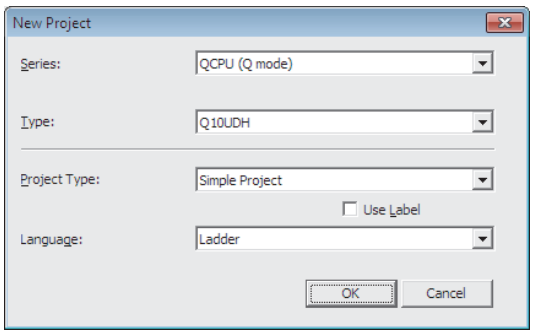
Item	Description			
	CH1	CH2	CH3	CH4
A/D conversion enable/ disable setting	Enable	Enable	Enable	Disable
Averaging process setting	Sampling processing	Count average	Moving average	Sampling processing
Average time/Average number of times/Move average setting	0	50 times	10 times	0
Conversion speed setting	20μs			
Warning output setting	Disable	Enable	Disable	Disable
Process alarm upper upper limit value	0	20000	0	0
Process alarm upper lower limit value	0	18000	0	0
Process alarm lower upper limit value	0	3000	0	0
Process alarm lower lower limit value	0	0	0	0
Input signal error detection setting	Upper and Lower Detection	Disable	Disable	Disable
Input signal error detection setting value	10.0%	5.0%	5.0%	5.0%
Scaling enable/disable setting	Disable	Disable	Enable	Disable
Scaling upper limit value	0	0	32000	0
Scaling lower limit value	0	0	0	0
Shifting amount to conversion value	0	0	10000	0
Digital clipping function enable/ disable setting	Disable	Disable	Enable	Disable

(5) Setting on master station

1. **Create a project on GX Works2.**

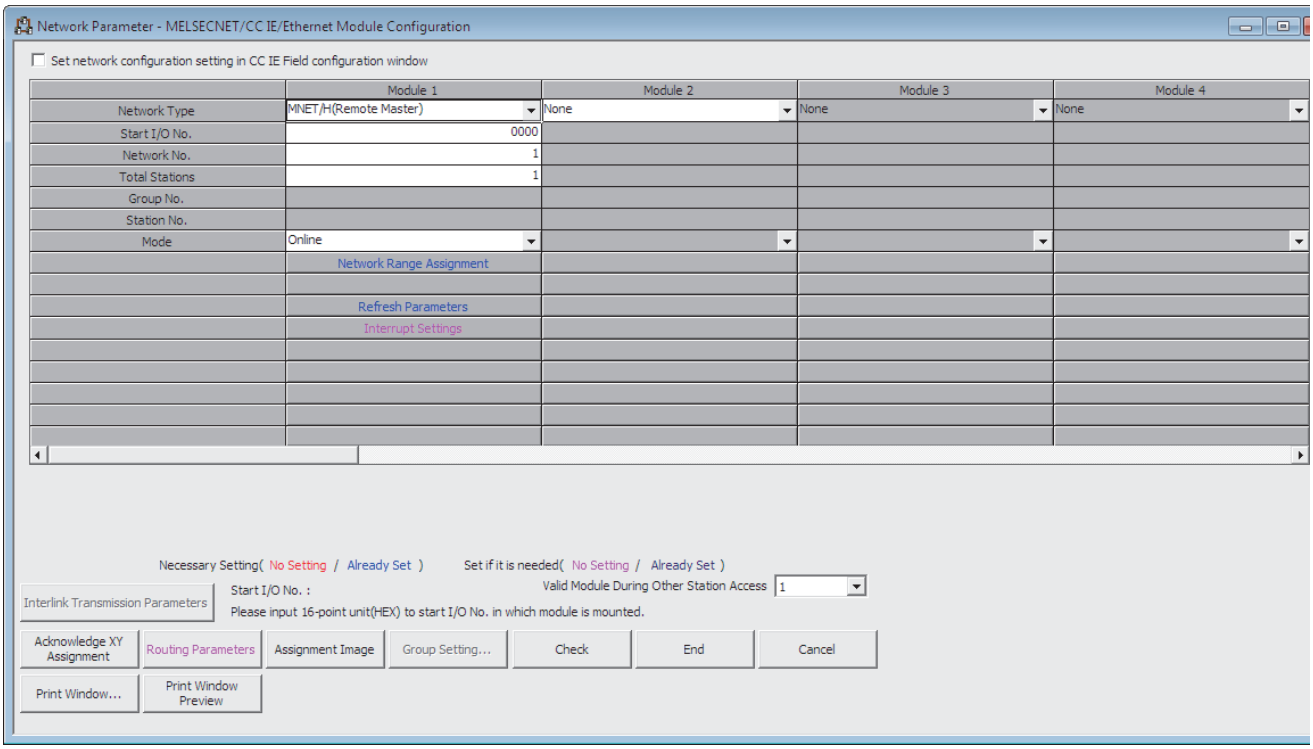
Select "QCPU (Q mode)" for "Series" and select the CPU module used for "Type".

[Project] ⇨ [New...]



2. Display the network parameter setting window and configure the setting as follows.

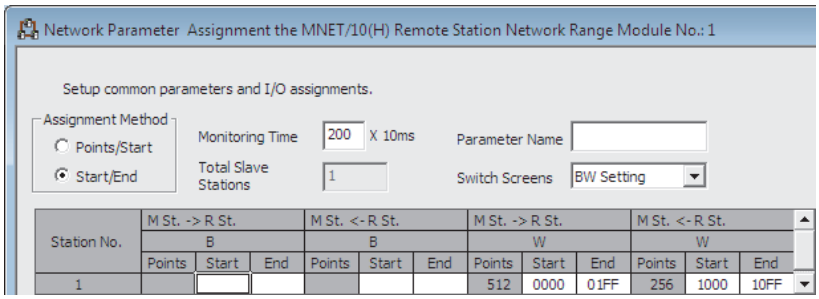
Project window ⇨ [Parameter] ⇨ [Network Parameter] ⇨ [Ethernet/CC IE/MELSECNET]



3. Display the network range assignment setting window and configure the setting as follows.

Project window ⇨ [Parameter] ⇨ [Network Parameter]

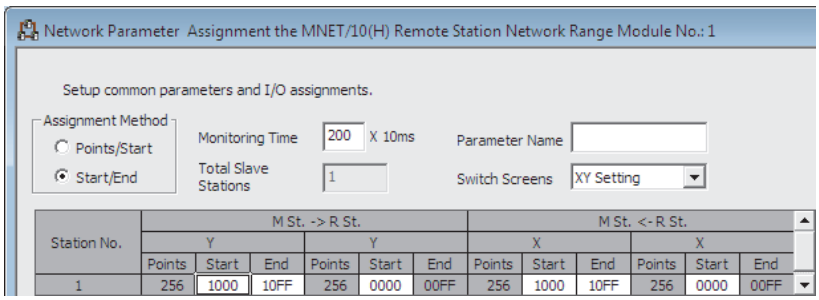
⇨ [Ethernet/CC IE/MELSECNET] ⇨ Network Range Assignment button.



Project window ⇨ [Parameter] ⇨ [Network Parameter]

⇨ [Ethernet/CC IE/MELSECNET] ⇨ Network Range Assignment button.

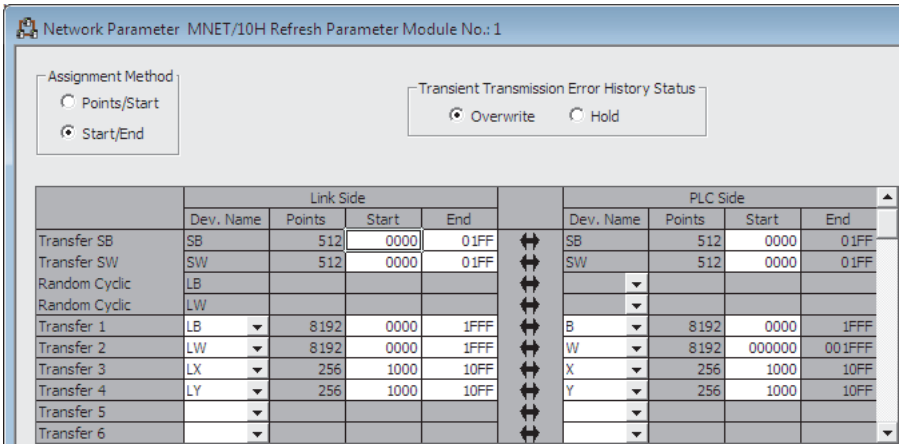
⇨ "Switch Screens" ⇨ "XY Setting"



4. Display the refresh parameter setting window and configure the setting as follows.

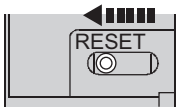
Project window ⇨ [Parameter] ⇨ [Network Parameter]

⇨ [Ethernet/CC IE/MELSECNET] ⇨ Refresh Parameters button



5. Write the set parameter 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...]



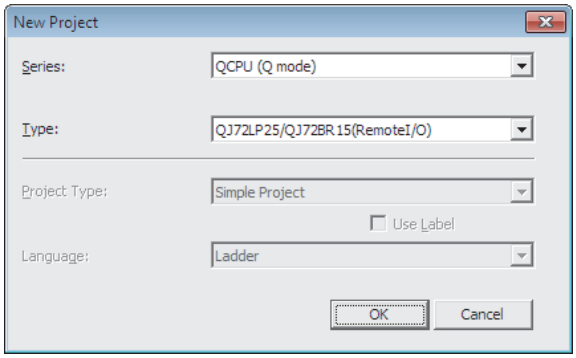
or Power OFF → ON

(6) Setting on remote I/O station

1. Create a project on GX Works2.

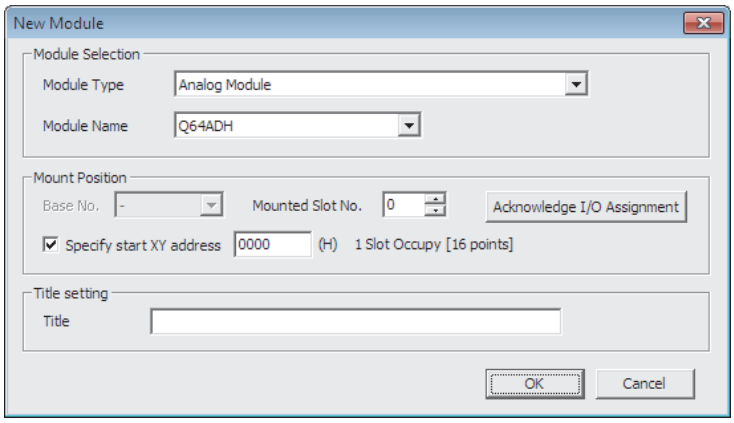
Select "QCPU (Q mode)" for "Series" and select "QJ72LP25/QJ72BR15(RemoteI/O)" for "Type".

[Project] ⇨ [New...]



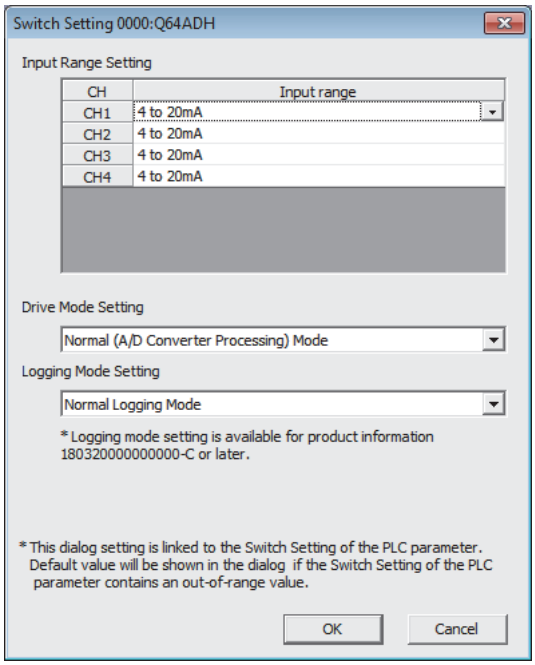
2. Add the Q64ADH to the project on GX Works2.

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



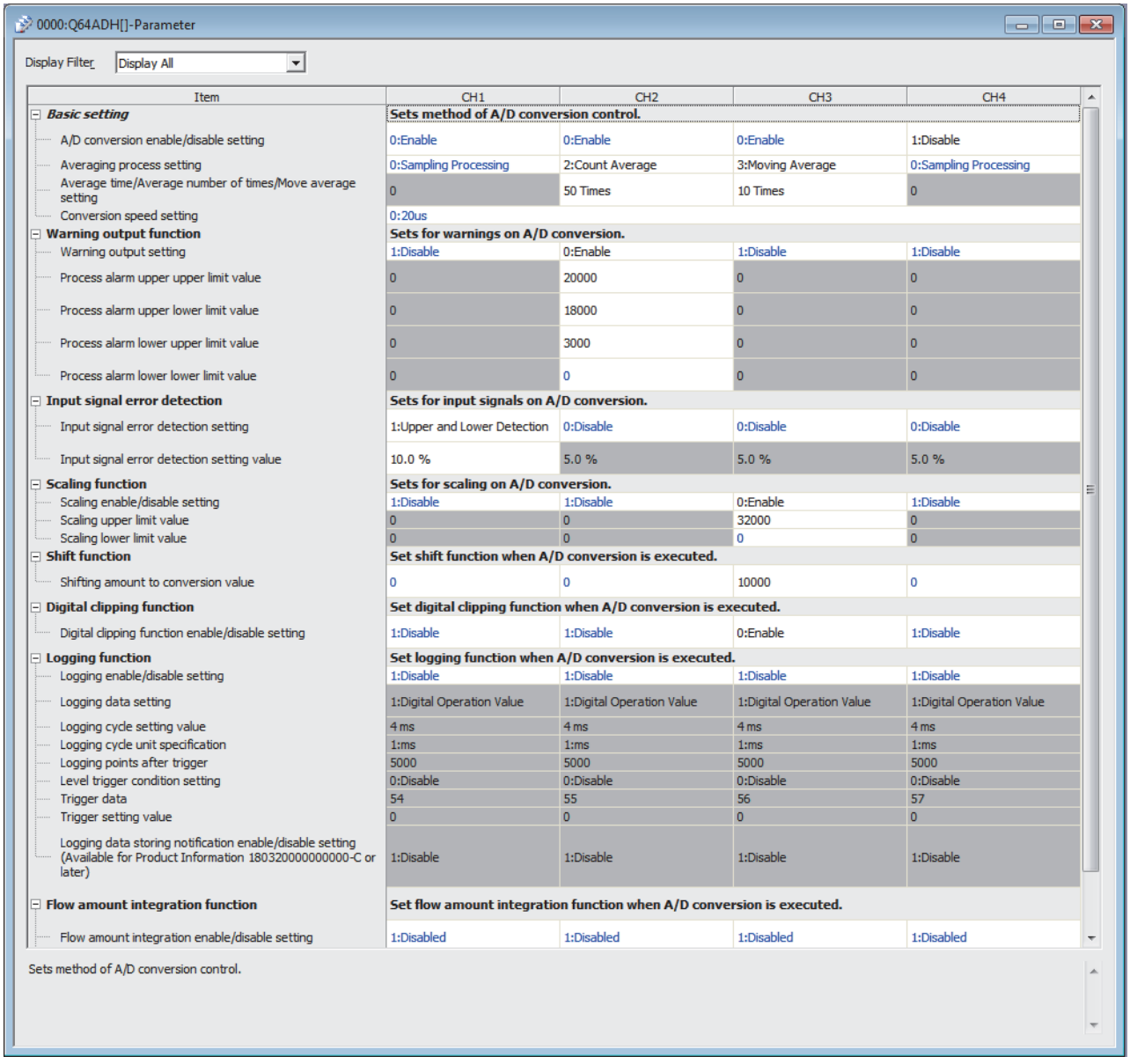
3. Display the setting window for the Q64ADH switch setting and set the input range, operation mode, and logging mode.

Project window ⇨ [Intelligent Function Module] ⇨ [Q64ADH] ⇨ [Switch Setting]



4. **Display the Q64ADH initial setting window, and configure the setting as follows.**
When creating a program without using the parameter of an intelligent function module, skip the following procedure.

Project window ⇨ [Intelligent Function Module] ⇨ [Q64ADH] ⇨ [Parameter]

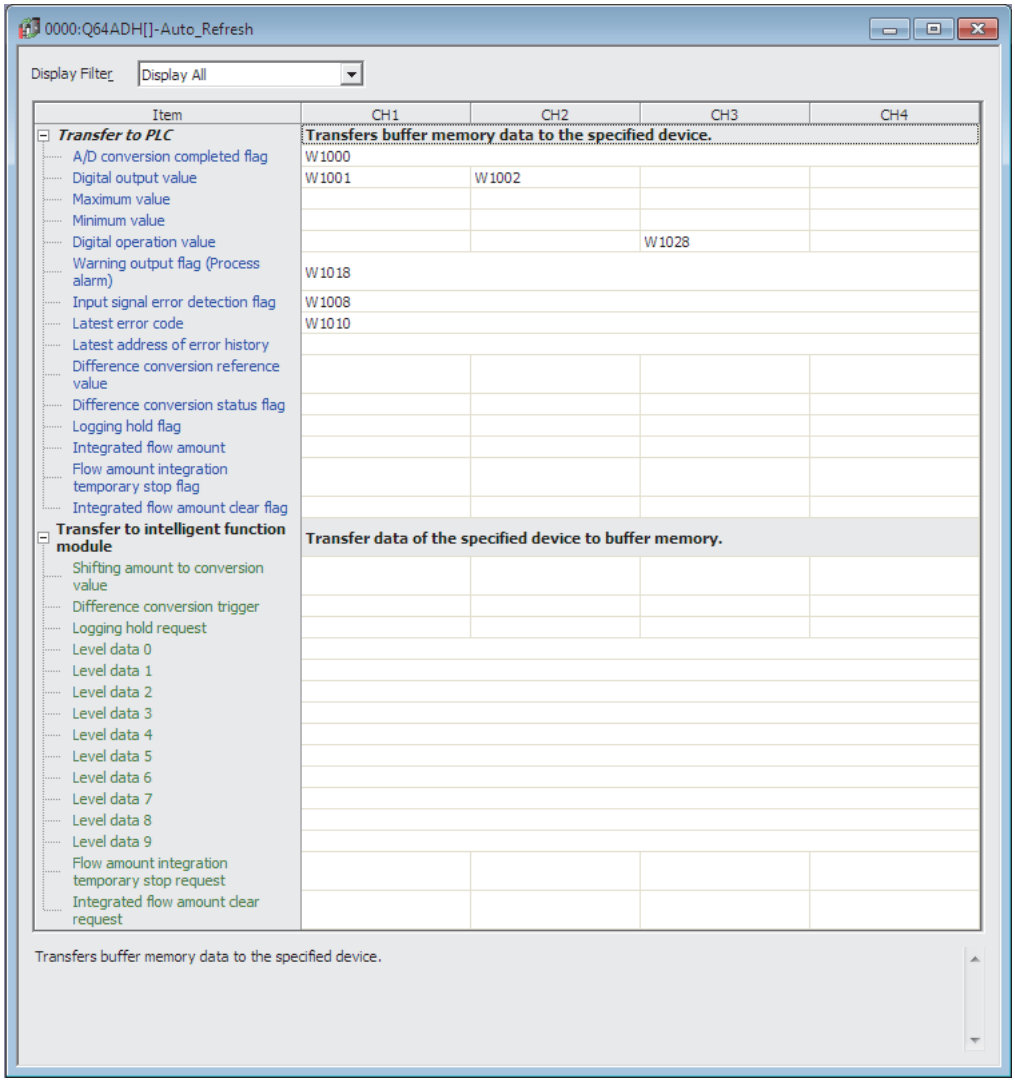


Item	CH1	CH2	CH3	CH4
Basic setting	**Sets method of A/D conversion control.**			
A/D conversion enable/disable setting	0:Enable	0:Enable	0:Enable	1:Disable
Averaging process setting	0:Sampling Processing	2:Count Average	3:Moving Average	0:Sampling Processing
Average time/Average number of times/Move average setting	0	50 Times	10 Times	0
Conversion speed setting	0:20us			
Warning output function	**Sets for warnings on A/D conversion.**			
Warning output setting	1:Disable	0:Enable	1:Disable	1:Disable
Process alarm upper upper limit value	0	20000	0	0
Process alarm upper lower limit value	0	18000	0	0
Process alarm lower upper limit value	0	3000	0	0
Process alarm lower lower limit value	0	0	0	0
Input signal error detection	**Sets for input signals on A/D conversion.**			
Input signal error detection setting	1:Upper and Lower Detection	0:Disable	0:Disable	0:Disable
Input signal error detection setting value	10.0 %	5.0 %	5.0 %	5.0 %
Scaling function	**Sets for scaling on A/D conversion.**			
Scaling enable/disable setting	1:Disable	1:Disable	0:Enable	1:Disable
Scaling upper limit value	0	0	32000	0
Scaling lower limit value	0	0	0	0
Shift function	**Set shift function when A/D conversion is executed.**			
Shifting amount to conversion value	0	0	10000	0
Digital clipping function	**Set digital clipping function when A/D conversion is executed.**			
Digital clipping function enable/disable setting	1:Disable	1:Disable	0:Enable	1:Disable
Logging function	**Set logging function when A/D conversion is executed.**			
Logging enable/disable setting	1:Disable	1:Disable	1:Disable	1:Disable
Logging data setting	1:Digital Operation Value	1:Digital Operation Value	1:Digital Operation Value	1:Digital Operation Value
Logging cycle setting value	4 ms	4 ms	4 ms	4 ms
Logging cycle unit specification	1:ms	1:ms	1:ms	1:ms
Logging points after trigger	5000	5000	5000	5000
Level trigger condition setting	0:Disable	0:Disable	0:Disable	0:Disable
Trigger data	54	55	56	57
Trigger setting value	0	0	0	0
Logging data storing notification enable/disable setting (Available for Product Information 180320000000000-C or later)	1:Disable	1:Disable	1:Disable	1:Disable
Flow amount integration function	**Set flow amount integration function when A/D conversion is executed.**			
Flow amount integration enable/disable setting	1:Disabled	1:Disabled	1:Disabled	1:Disabled

Sets method of A/D conversion control.

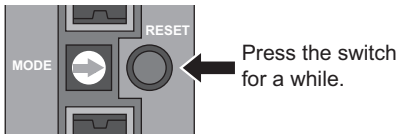
5. **Display the Q64ADH auto refresh setting window and configure the setting as follows.**
When creating a program without using the parameter of an intelligent function module, skip the following procedure.

Project window ⇨ [Intelligent Function Module] ⇨ [Q64ADH] ⇨ [Auto_Refresh]



6. **Write the set parameter to the remote I/O module and reset the remote I/O module.**

[Online] ⇨ [Write to PLC...]

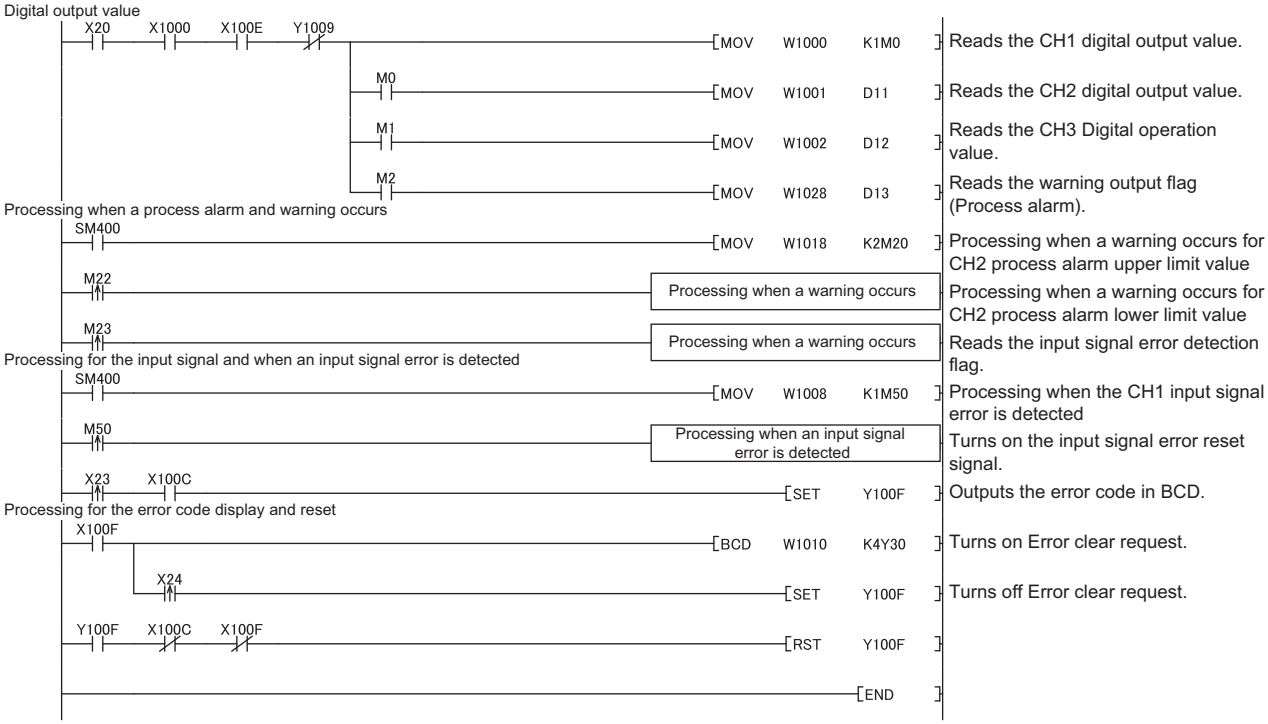


9.3.1 Program example when using the parameter of intelligent function module

(1) Device for user

Device	Description	
W1000	A/D conversion completed flag	
W1001 (D11)	CH1 Digital output value	
W1002 (D12)	CH2 Digital output value	
W1008	Input signal error detection flag	
W1010	Latest error code	
W1018	Warning output flag (Process alarm)	
W1028 (D13)	CH3 Digital operation value	
M0	CH1 A/D conversion completed flag	
M1	CH2 A/D conversion completed flag	
M2	CH3 A/D conversion completed flag	
M20 to M27	Warning output flag (Process alarm)	
M50 to M53	Input signal error detection flag	
X1000	Module READY	Q64ADH (X/Y1000 to X/Y100F)
X100C	Input signal error detection signal	
X100E	A/D 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)
SB49	Data link status (own station)	
SWB0.0	Data link status (each station) (station number 1)	
N0	Nesting (station number 1)	
M100	Flag for meeting the communication condition (station number 1)	

(2) Program example

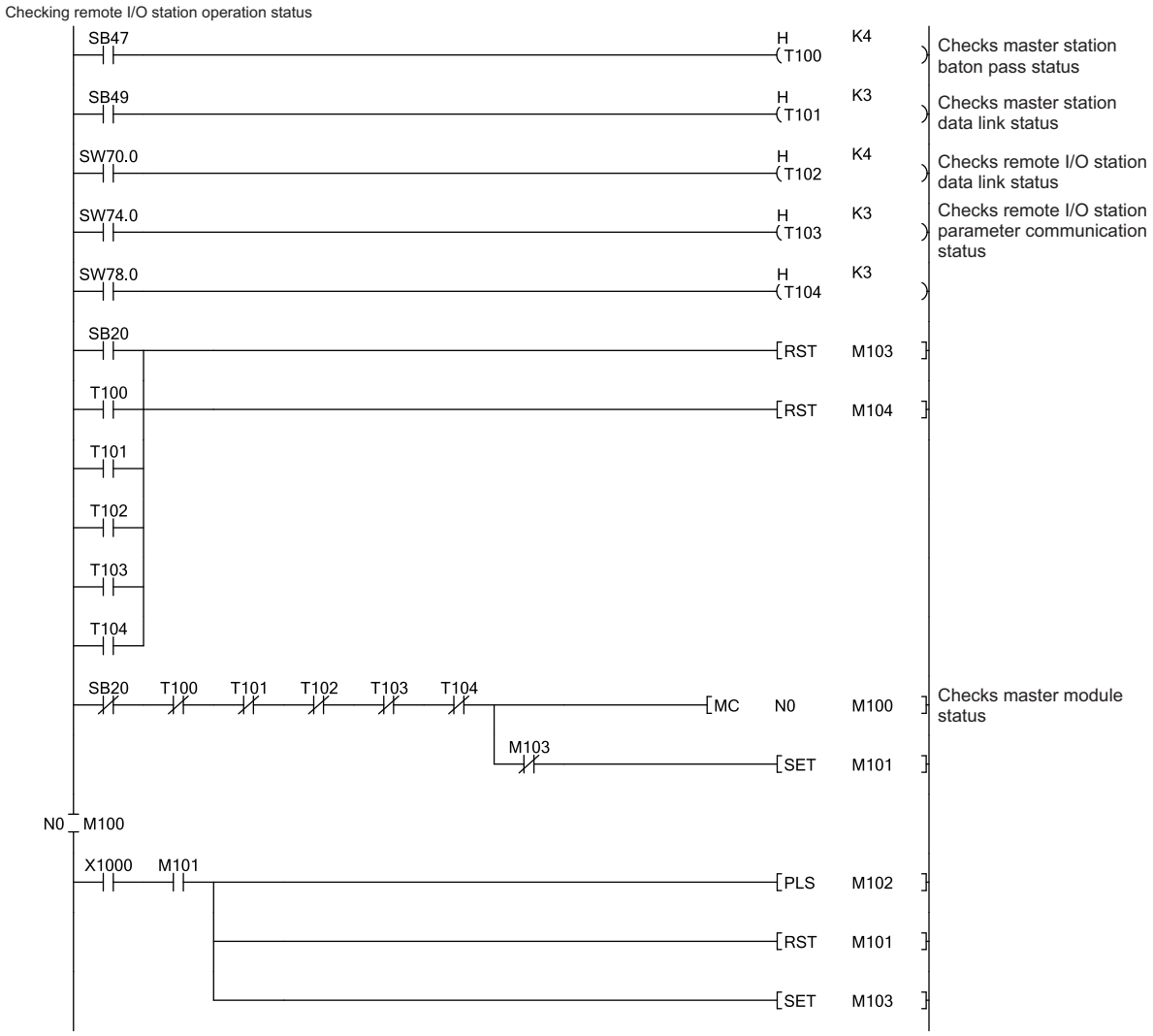


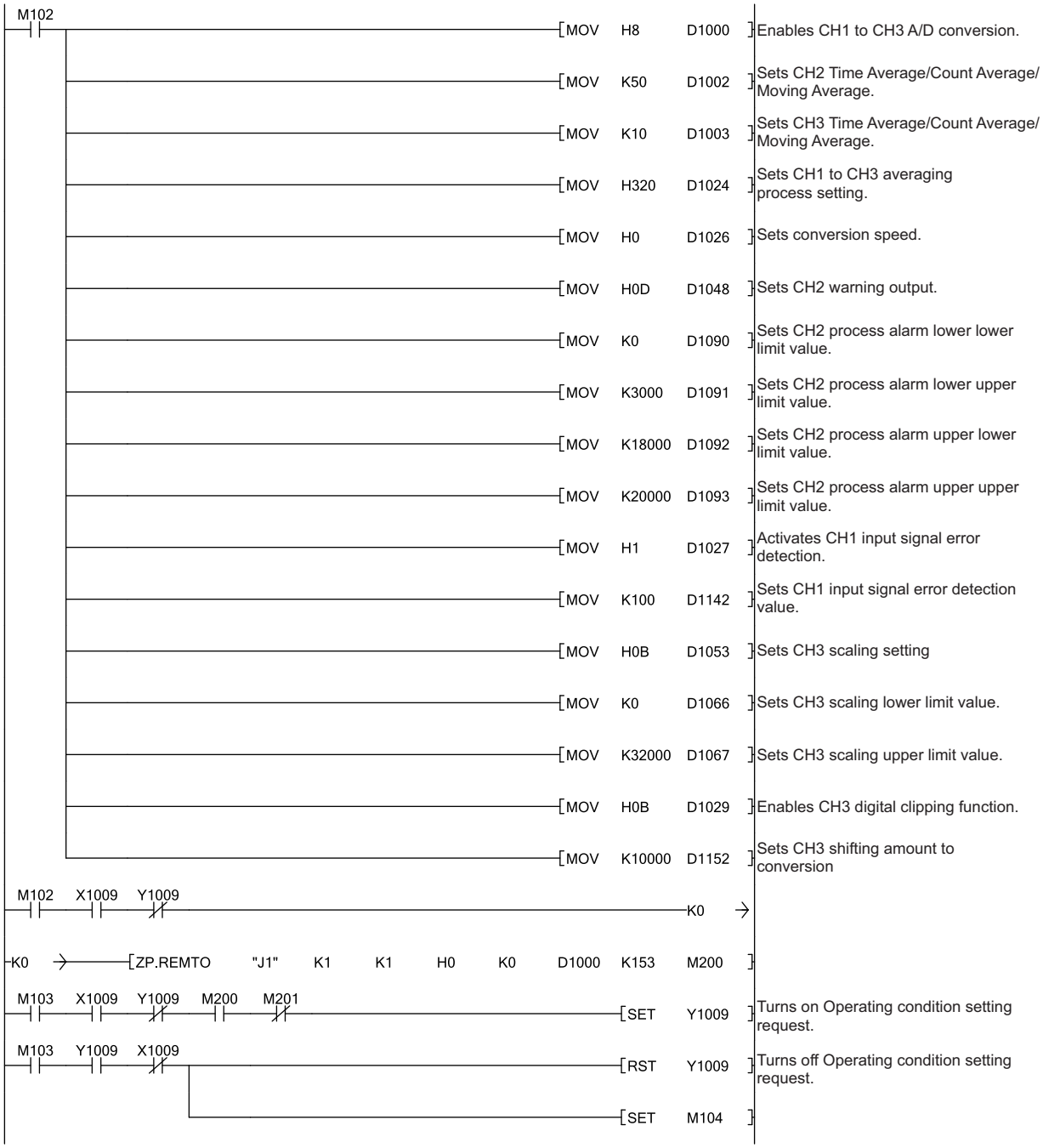
9.3.2 Program example when not using the parameter of intelligent function module

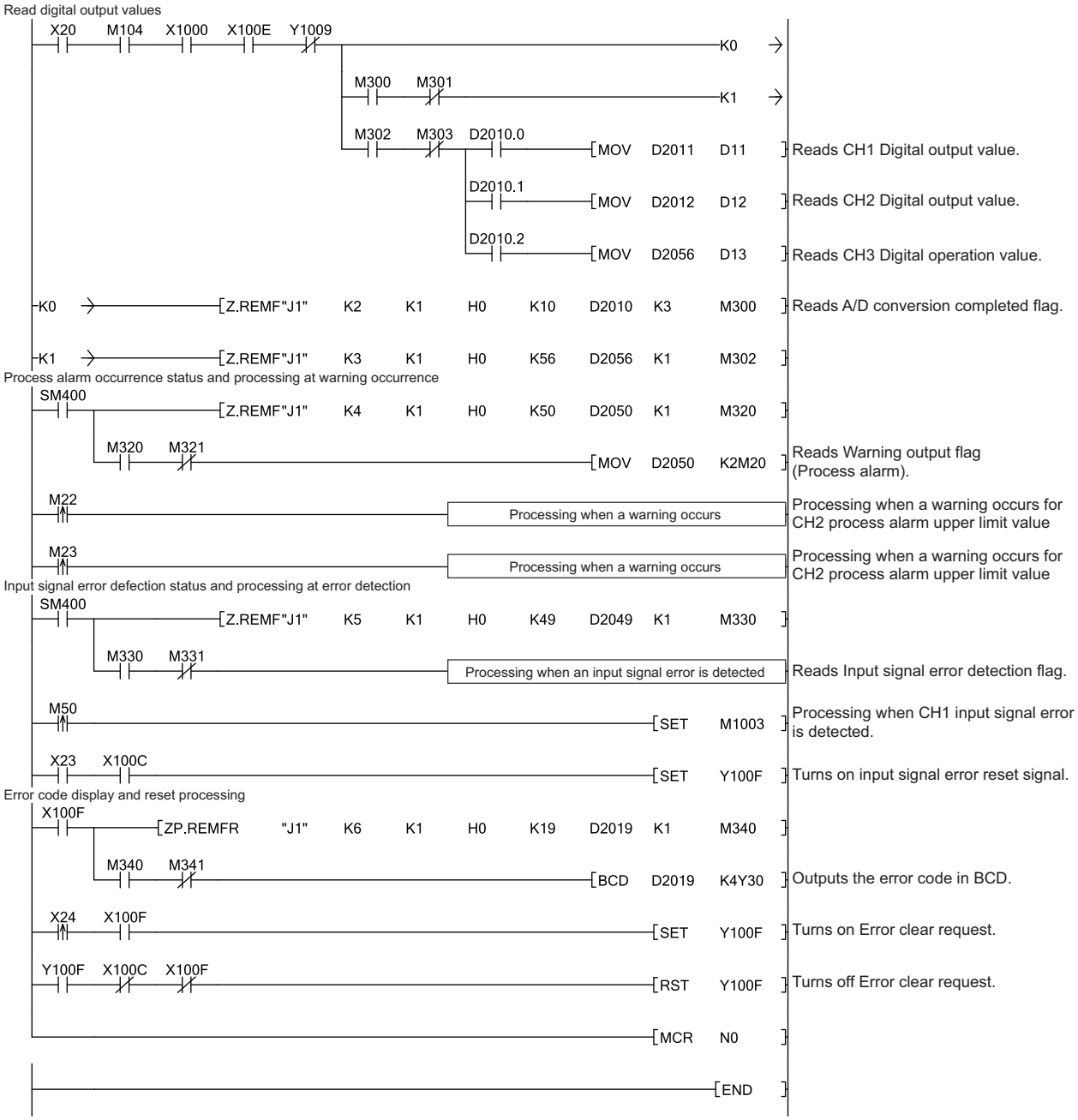
(1) Device for user

Device	Description	
D1000 to D1152	Device for initial value setting	
D2010	A/D conversion completed flag	
D2011 (D11)	CH1 Digital output value	
D2012 (D12)	CH2 Digital output value	
D2049	Input signal error detection flag	
D2019	Latest error code	
D2050	Warning output flag (Process alarm)	
D2056 (D13)	CH3 Digital operation value	
M20 to M27	Warning output flag (Process alarm)	
M50 to M53	Input signal error 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, M201	Z(P).REMTO and Z(P).REMFR instructions completion/result device	
M300 to M303		
M320, M321		
M330, M331		
M340, M341		
X1000	Module READY	Q64ADH (X/Y1000 to X/Y100F)
X1009	Operating condition setting completed flag	
X100C	Input signal error detection signal	
X100E	A/D 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	
SW78	Parameter communication status of each station	
T100 to T104	Interlock for own station and other stations	

(2) Program example




M102
MOV H8 D1000
Enables CH1 to CH3 A/D conversion.
MOV K50 D1002
Sets CH2 Time Average/Count Average/ Moving Average.
MOV K10 D1003
Sets CH3 Time Average/Count Average/ Moving Average.
MOV H320 D1024
Sets CH1 to CH3 averaging process setting.
MOV H0 D1026
Sets conversion speed.
MOV H0D D1048
Sets CH2 warning output.
MOV K0 D1090
Sets CH2 process alarm lower lower limit value.
MOV K3000 D1091
Sets CH2 process alarm lower upper limit value.
MOV K18000 D1092
Sets CH2 process alarm upper lower limit value.
MOV K20000 D1093
Sets CH2 process alarm upper upper limit value.
MOV H1 D1027
Activates CH1 input signal error detection.
MOV K100 D1142
Sets CH1 input signal error detection value.
MOV H0B D1053
Sets CH3 scaling setting
MOV K0 D1066
Sets CH3 scaling lower limit value.
MOV K32000 D1067
Sets CH3 scaling upper limit value.
MOV H0B D1029
Enables CH3 digital clipping function.
MOV K10000 D1152
Sets CH3 shifting amount to conversion
M102 X1009 Y1009
K0
K0 ZP.REMTO "J1" K1 K1 H0 K0 D1000 K153 M200
M103 X1009 Y1009 M200 M201
SET Y1009
Turns on Operating condition setting request.
M103 Y1009 X1009
RST Y1009
Turns off Operating condition setting request.
SET M104


Read digital output values
X20 M104 X1000 X100E Y1009
K0
M300 M301
K1
M302 M303 D2010.0
MOV D2011 D11
Reads CH1 Digital output value.
D2010.1
MOV D2012 D12
Reads CH2 Digital output value.
D2010.2
MOV D2056 D13
Reads CH3 Digital operation value.
K0
Z.REMF"J1" K2 K1 H0 K10 D2010 K3 M300
Reads A/D conversion completed flag.
K1
Z.REMF"J1" K3 K1 H0 K56 D2056 K1 M302
Process alarm occurrence status and processing at warning occurrence
SM400
Z.REMF"J1" K4 K1 H0 K50 D2050 K1 M320
M320 M321
MOV D2050 K2M20
Reads Warning output flag (Process alarm).
M22
Processing when a warning occurs
Processing when a warning occurs for CH2 process alarm upper limit value
M23
Processing when a warning occurs
Processing when a warning occurs for CH2 process alarm upper limit value
Input signal error defection status and processing at error detection
SM400
Z.REMF"J1" K5 K1 H0 K49 D2049 K1 M330
M330 M331
Processing when an input signal error is detected
Reads Input signal error detection flag.
M50
SET M1003
Processing when CH1 input signal error is detected.
X23 X100C
SET Y100F
Turns on input signal error reset signal.
Error code display and reset processing
X100F
ZP.REMFR "J1" K6 K1 H0 K19 D2019 K1 M340
M340 M341
BCD D2019 K4Y30
Outputs the error code in BCD.
X24 X100F
SET Y100F
Turns on Error clear request.
Y100F X100C X100F
RST Y100F
Turns off Error clear request.
MCR N0
END

CHAPTER 10 ONLINE MODULE CHANGE

This chapter describes the online module change procedure. In this manual, the online module change procedure is explained using GX Works2.

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 208, 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 check 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 other systems 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 no other systems are available, restore the values by writing them to the buffer memory.

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 Q64ADH is C, and the Q64ADH supports the online module change.

(1) CPU module

A Process CPU or Redundant CPU is required.

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 required.

(3) Compatible version of programming tools

Programming tool	System configuration	Software version
GX Works2	Normal system	Version 1.87R or later
	Remote I/O station	Version 1.40S or later
GX Developer*1	Normal system	Version 7.10L or later
	Remote I/O station	Version 8.17T or later

*1 The Q64ADH does not support GX Configurator-AD; therefore, configure parameter settings in a sequence program when using GX Developer.

(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.)

10.3 Online Module Change Operations

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

○: Executed ×: Not executed

User operation	Operation of the Q64ADH	Operation of the CPU module				
		X/Y refresh	FROM/TO instructions *1	Dedicated instruction	Device test	Parameter setting
(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 replaced 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 mode 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

This section and the following sections describe two online module change procedures: setting parameters using the configuration function and setting parameters using a sequence program. The same procedures are applied to GX Developer.

- When using GX Works2

Range setting	Parameter setting	Other system *1	Reference
Industrial shipment setting	Configuration function	—	Page 210, Section 10.5
	Sequence program	—	Page 215, Section 10.6
User range setting	Configuration function	Present	Page 221, Section 10.7
		Absent	Page 232, Section 10.9
	Sequence program	Present	Page 226, Section 10.8
		Absent	Page 238, Section 10.10

- When using GX Developer

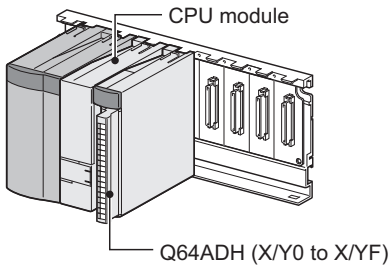
Range setting	Other system*1	Reference
Industrial shipment setting	—	Page 215, Section 10.6
User range setting	Present	Page 226, Section 10.8
	Absent	Page 238, Section 10.10

*1 "Other system" is a programmable controller system which does not have the Q64ADH to be replaced, and is composed of modules such as a power supply module and a CPU module. For "Other system", a power supply can be turned on and off and modules can be removed and mounted.

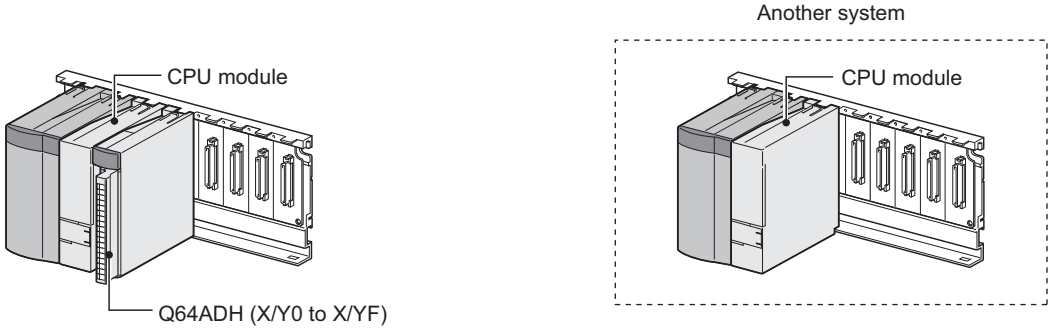
(1) System configuration

The following system configuration is used to explain the online module change procedure.

(a) Without another system

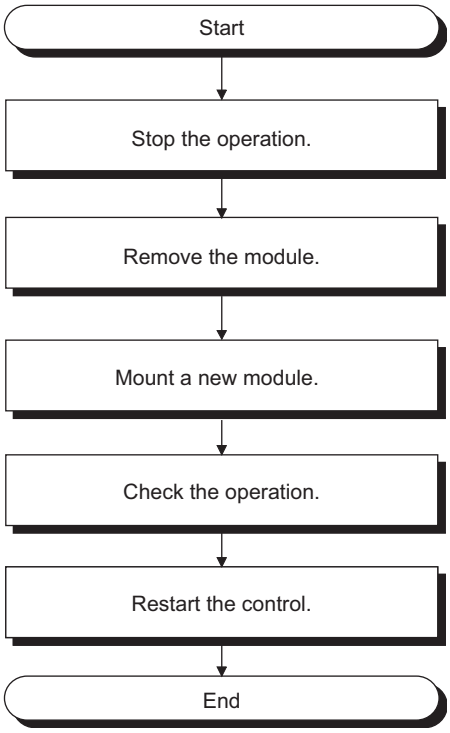


(b) With another system



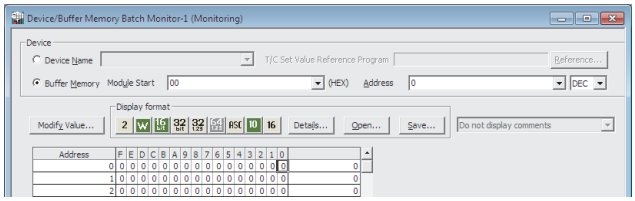
(2) Procedure

The following flow shows the online module change procedure.

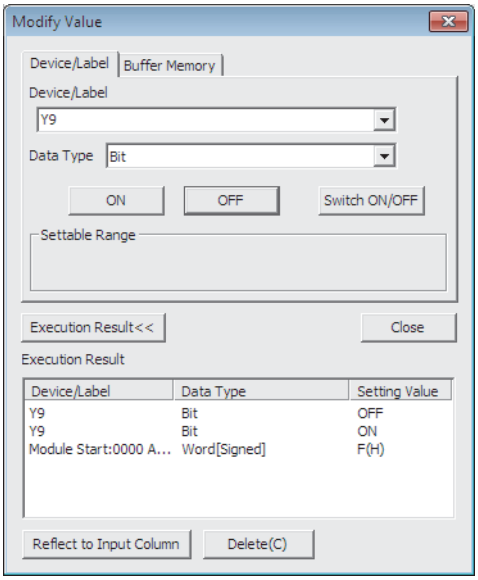


10.5 When Industrial Shipment Range Setting is Used and Parameter Setting was Made with the Configuration Function

(1) Stopping operation



↓



1. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

2. **Enter and display the buffer memory address of A/D conversion enable/disable setting (Un\G0).**

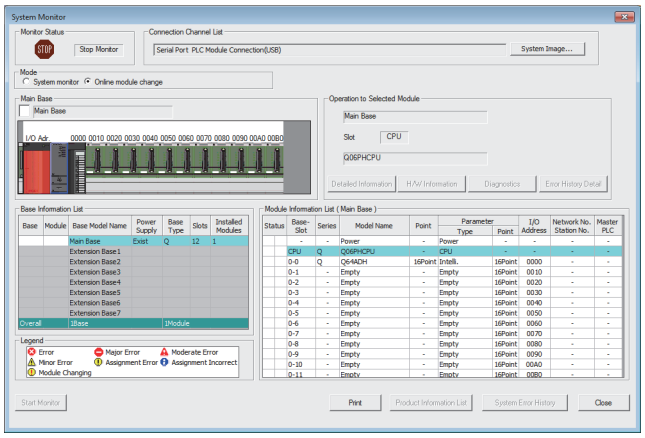
3. **Set A/D conversion enable/disable setting (Un\G0) to Disabled (1) for all channels.**

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

5. **Confirm that conversion has stopped with A/D conversion completed flag (Un\G10).**

6. **After checking A/D conversion completed flag (Un\G10), check that Operating condition setting completed flag (X9) has turned off, then turn off Operating condition setting request (Y9).**

(2) Removing a module



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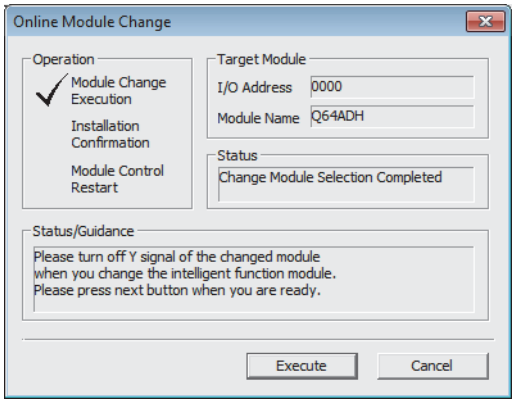


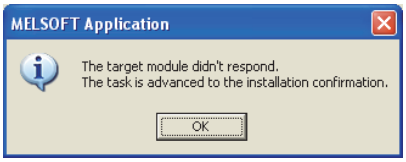
1. **Open the "System Monitor" window.**

[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 212, Section 10.5 (3).**



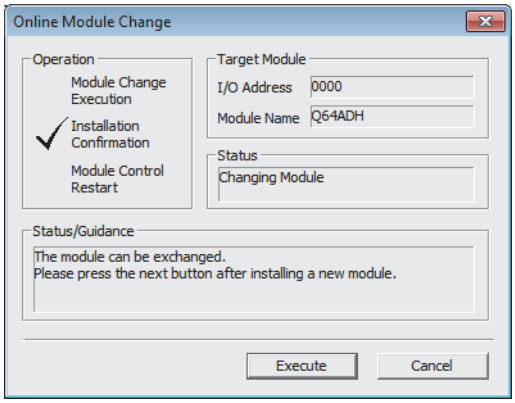
5. **After checking that the RUN LED of the module has turned off, remove the terminal block.**

6. **Remove the module.**

Point

Make sure to remove the module. If mounting confirmation is made without the module being removed, the module does not start properly and the RUN LED does not turn on.

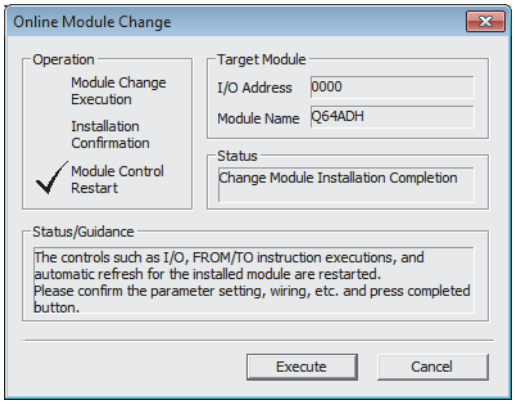
(3) Mounting a new module



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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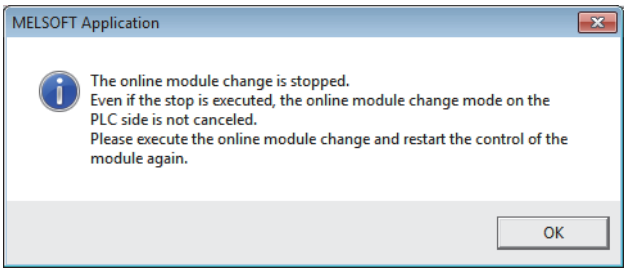

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1. **To make an operation check, click the** Cancel **button to cancel the control start.**

2. **Click the** OK **button to leave the "Online Module Change" mode.**

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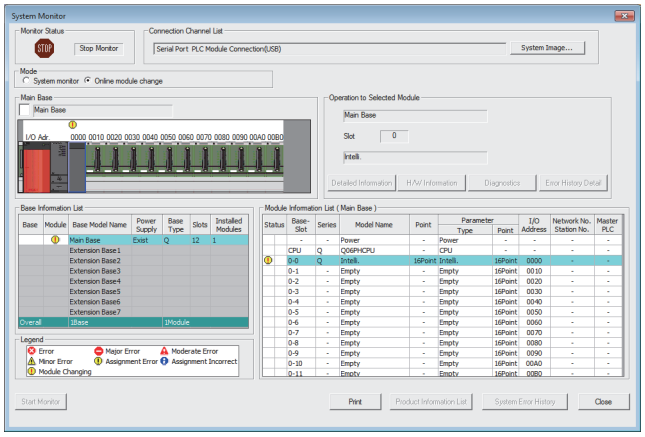

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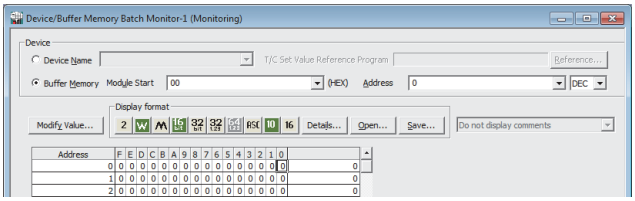


3. **Click the Close button to close the "System Monitor" window.**

4. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

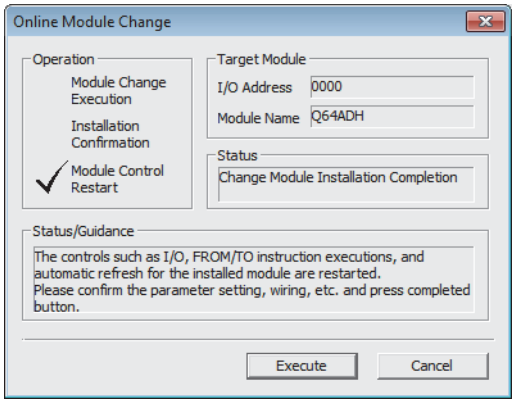
5. **Monitor A/D conversion enable/disable setting (Un\G0) to check that the channel used is set to Enabled (0).**

6. **Monitor CH☐ Digital output value (Un\G11 to Un\G14) to check whether proper conversion has been made or not.**

7. **Before starting control, check the Q64ADH for the following. If an error occurs, refer to TROUBLESHOOTING (☞ Page 246, CHAPTER 11) and take 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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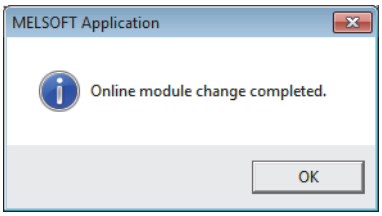


1. **Open the "Online Module Change" window again.**

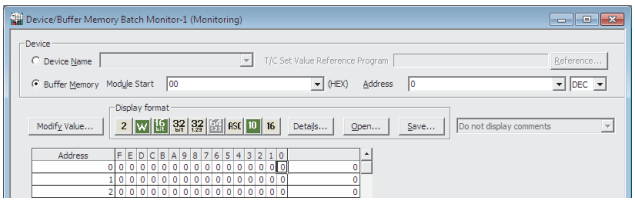
[Diagnostics] ⇨ [Online Module Change...]

2. **Click the** Execute **button on the appeared window to resume control. Module READY (X0) turns on.**

3. **The online module change is complete.**

10.6 When Industrial Shipment Range Setting is Used and Parameter Setting was Made with Sequence Program

(1) Stopping operation



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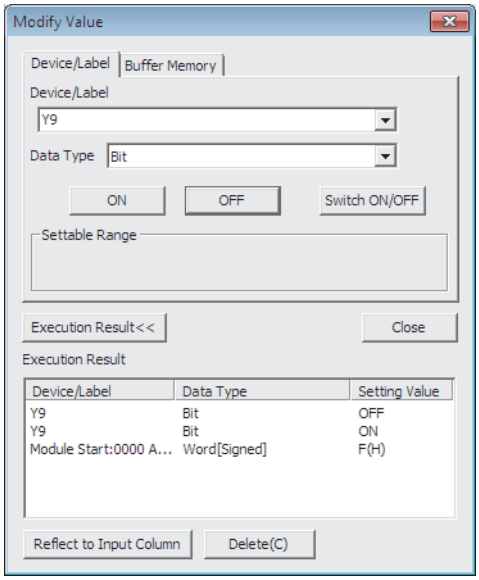


1. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

When using GX Developer, open the "Device test" window.

[Online] ⇨ [Debug] ⇨ [Device test...]

2. **Enter and display the buffer memory address of A/D conversion enable/disable setting (Un\G0).**

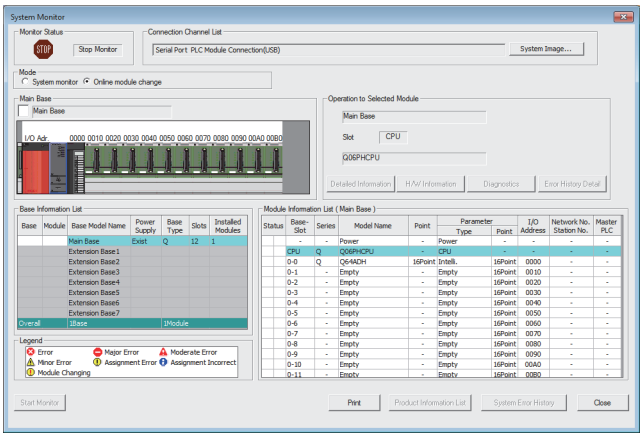
3. **Set A/D conversion enable/disable setting (Un\G0) to Disabled (1) for all channels.**

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

5. **Confirm that conversion has stopped with A/D conversion completed flag (Un\G10).**

6. **After checking A/D conversion completed flag (Un\G10), check that Operating condition setting completed flag (X9) has turned off, then turn off Operating condition setting request (Y9).**

(2) Removing a module



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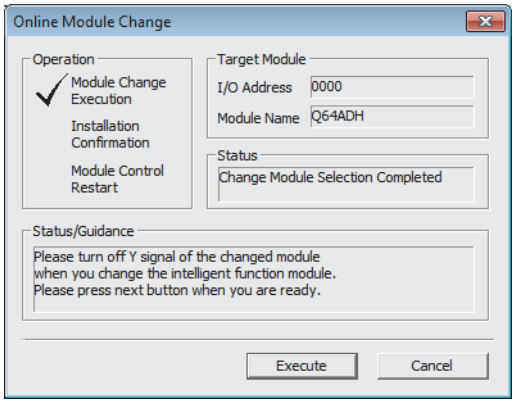


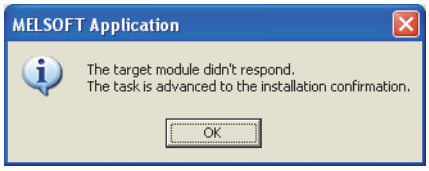
1. **Open the "System Monitor" window.**

[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 217, Section 10.6 (3).**



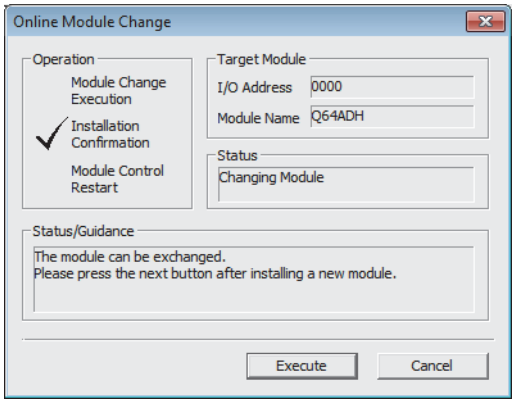
5. **After checking that the RUN LED of the module has turned off, remove the terminal block.**

6. **Remove the module.**

Point

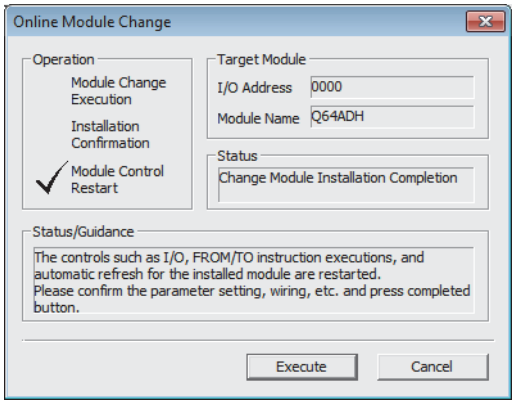
Make sure to remove the module. If mounting confirmation is made without the module being removed, the module does not start properly and the RUN LED does not turn on.

(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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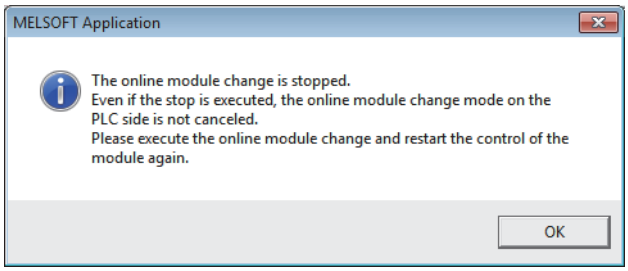

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1. **To make an operation check, click the** Cancel **button to cancel the control start.**
2. **Click the** OK **button to leave the "Online Module Change" mode.**

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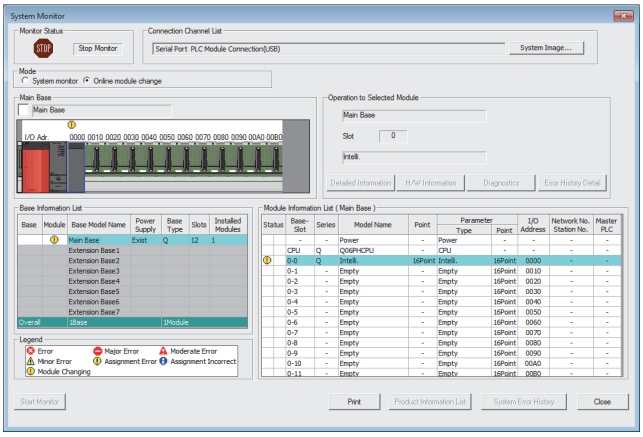

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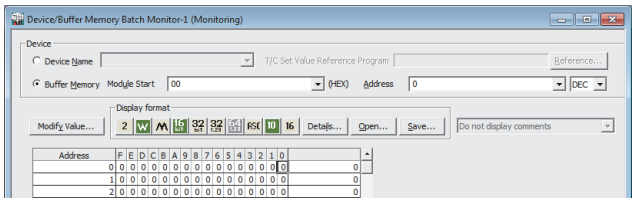

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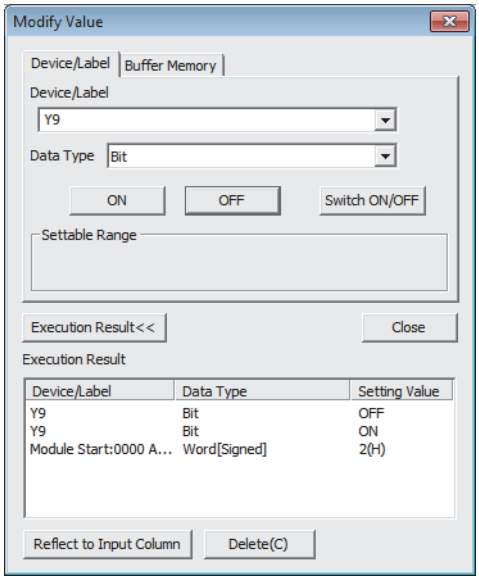

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3. **Click the Close button to close the "System Monitor" window.**

4. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ➪ [Monitor] ➪ [Device/Buffer Memory Batch]

When using GX Developer, open the "Device test" window.

[Online] ➪ [Debug] ➪ [Device test...]

5. **Enter and display the buffer memory address of A/D conversion enable/disable setting (Un\G0).**

6. **Set A/D conversion enable/disable setting (Un\G0) to Enabled (0) for the channel used.**

7. **Turn on Operating condition setting request (Y9).**

8. **Check that Operating condition setting completed flag (X9) has turned off, and turn off Operating condition setting request (Y9).**

9. **Monitor CH☐ Digital output value (Un\G11 to Un\G14) to check whether proper conversion has been made or not.**

(From the previous page)
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10. **Before starting control, check the Q64ADH for the following. If an error occurs, refer to TROUBLESHOOTING (☞ Page 246, CHAPTER 11) and take corrective action.**

- If the RUN LED is on.
- If the ERR. LED is off.
- If Error flag (XF) is off.

11. **Since the new module is in the default status, initial settings must be configured using a sequence program after the control resumed. Before configuring the initial settings, check that the initial setting program is proper, satisfying the following.**

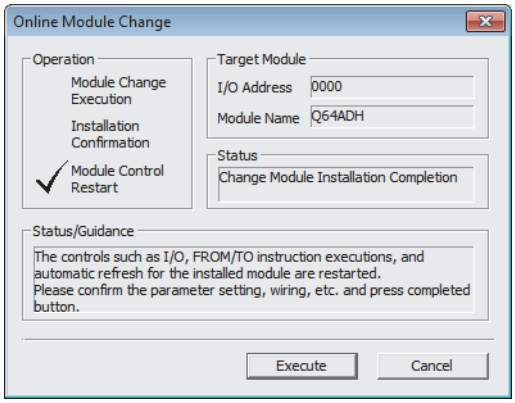
Normal system configuration

- Create a sequence program that sets the initial settings when Module READY (X0) of the Q64ADH turns on.
- Do not create a sequence program that sets the initial settings for only one scan after RUN. In this case, the initial settings are not set.

When used on remote I/O network

- Insert a user device where the initial settings will be set at any timing (initial setting request signal) into the sequence program.
- Do not create a sequence program that sets the initial settings for only one scan after a data link start of the remote I/O network. In this case, the initial settings are not set.

(5) Resuming operation



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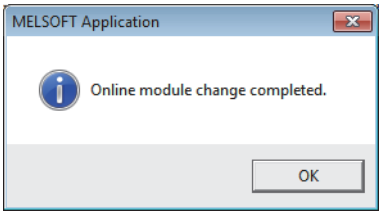


1. **Open the "Online Module Change" window again.**

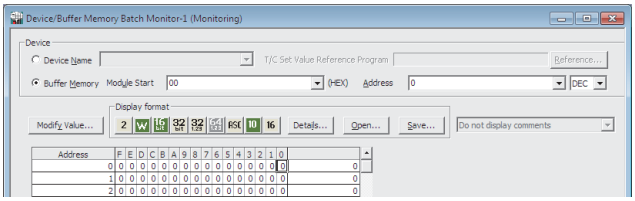
[Diagnostics] ⇨ [Online Module Change...]

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 User Range Setting is Used and Parameter Setting was Made with the Configuration Function (Other System is Available)

(1) Stopping operation



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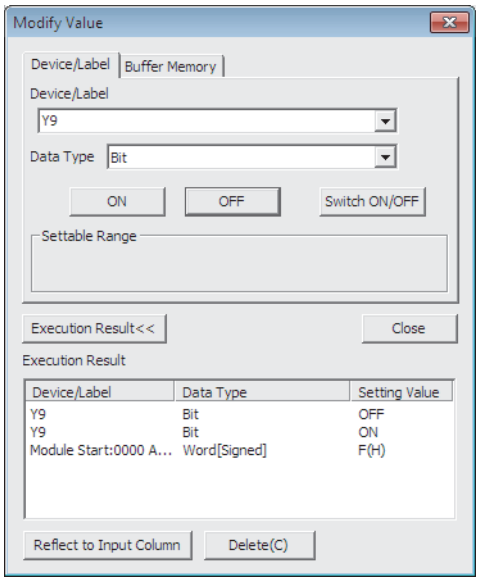


1. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

2. **Enter and display the buffer memory address of A/D conversion enable/disable setting (Un\G0).**

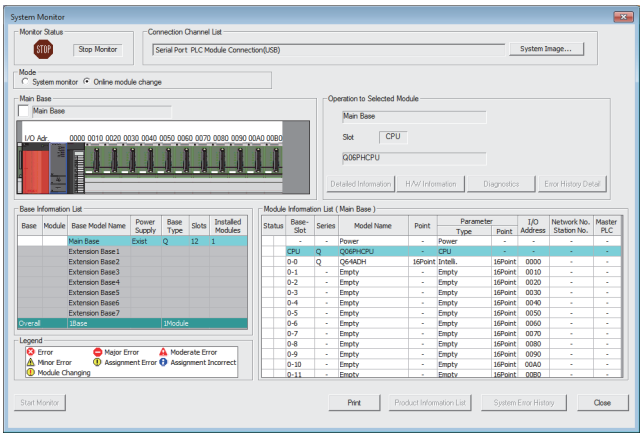
3. **Set A/D conversion enable/disable setting (Un\G0) to Disabled (1) for all channels.**

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

5. **Confirm that conversion has stopped with A/D conversion completed flag (Un\G10).**

6. **After checking A/D conversion completed flag (Un\G10), check that Operating condition setting completed flag (X9) has turned off, then turn off Operating condition setting request (Y9).**

(2) Removing a module



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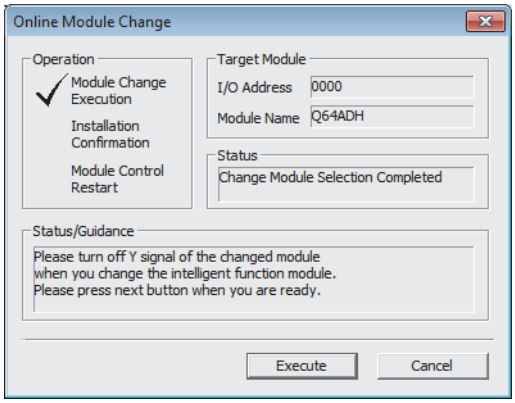


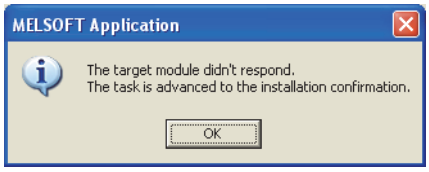
1. **Open the "System Monitor" window.**

[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 10.7 (3).**



5. **After checking that the RUN LED of the module has turned off, remove the terminal block.**

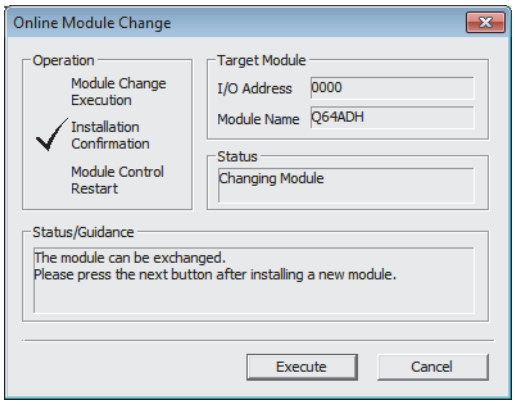
6. **Remove the module.**

Point

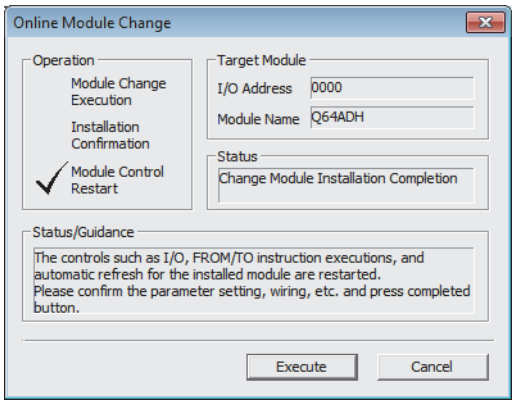
Make sure to remove the module. If mounting confirmation is made without the module being removed, the module does not start properly and the RUN LED does not turn on.

(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. For the G(P).OGLOAD instruction, refer to Page 261, Appendix 1.2.
3. Using the G(P).OGSTOR instruction, restore the offset/gain setting values in the user range to a new module. For the G(P).OGSTOR instruction, refer to Page 265, Appendix 1.3.
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



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1. To make an operation check, click the Cancel button to cancel the control start.

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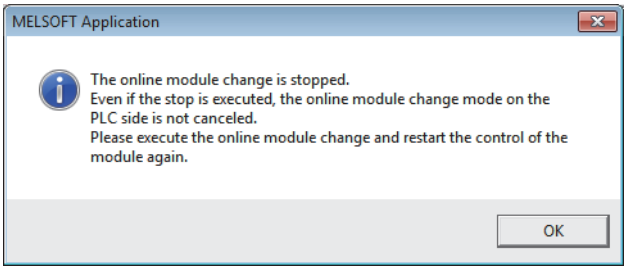
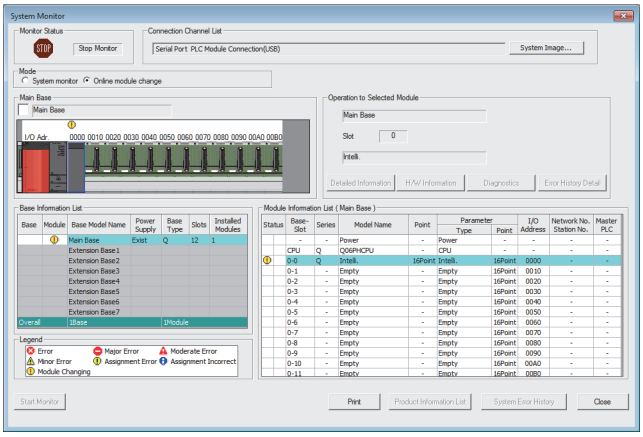


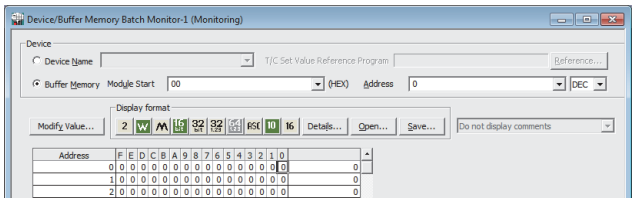
2. **Click the OK button to leave the "Online Module Change" mode.**

↓



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]

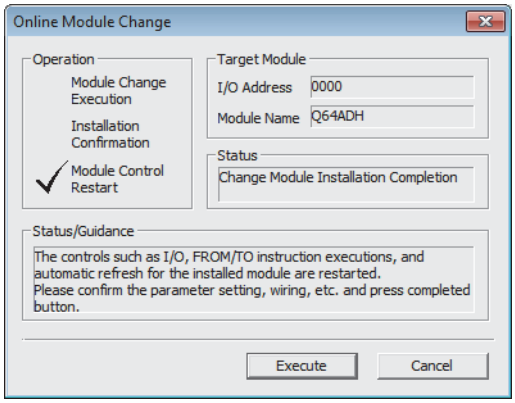
5. **Monitor A/D conversion enable/disable setting (Un\G0) to check that the channel used is set to Enabled (0).**

6. **Monitor CH☐ Digital output value (Un\G11 to Un\G14) to check whether proper conversion has been made or not.**

7. **Before starting control, check the Q64ADH for the following. If an error occurs, refer to TROUBLESHOOTING (☞Page 246, CHAPTER 11) and take 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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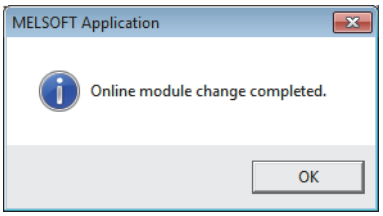


1. **Open the "Online Module Change" window again.**

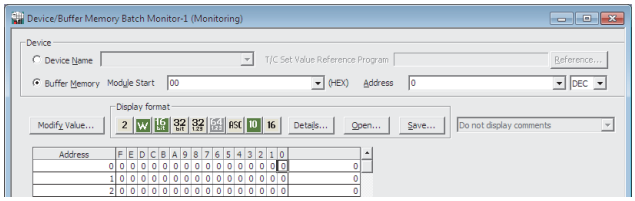
[Diagnostics] ⇨ [Online Module Change...]

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 User Range Setting is Used and Parameter Setting was Made with Sequence Program (Other System is Available)

(1) Stopping operation



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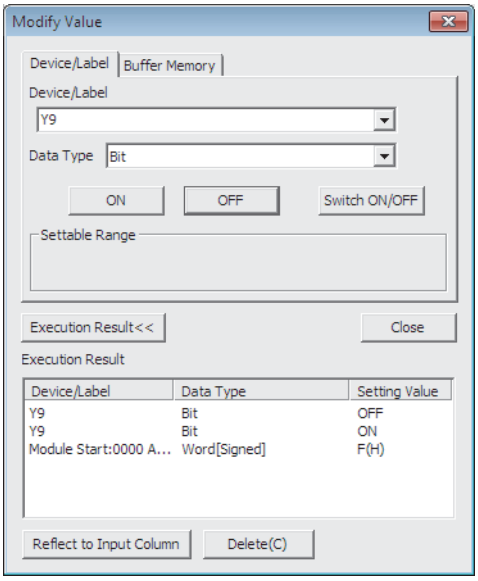


1. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

When using GX Developer, open the "Device test" window.

[Online] ⇨ [Debug] ⇨ [Device test...]

2. **Enter and display the buffer memory address of A/D conversion enable/disable setting (Un\G0).**

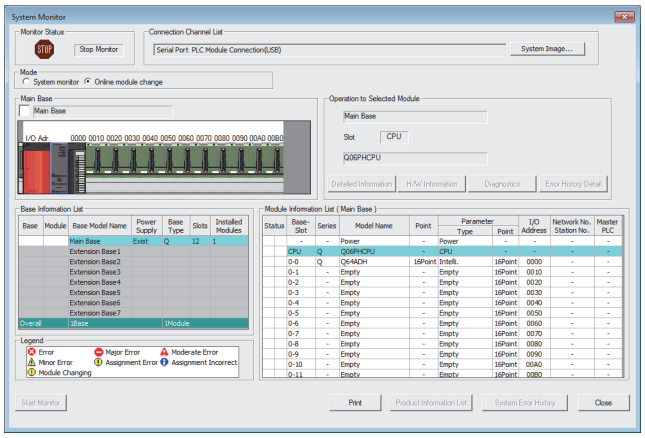
3. **Set A/D conversion enable/disable setting (Un\G0) to Disabled (1) for all channels.**

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

5. **Confirm that conversion has stopped with A/D conversion completed flag (Un\G10).**

6. **After checking A/D conversion completed flag (Un\G10), check that Operating condition setting completed flag (X9) has turned off, then turn off Operating condition setting request (Y9).**

(2) Removing a module



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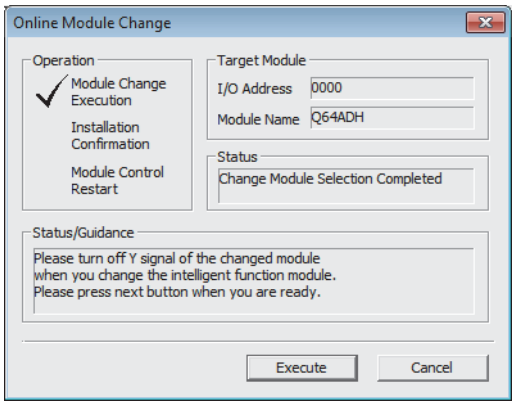


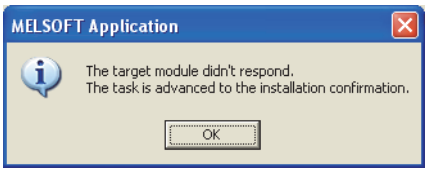
1. **Open the "System Monitor" window.**

[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 228, Section 10.8 (3).**



5. **After checking that the RUN LED of the module has turned off, remove the terminal block.**

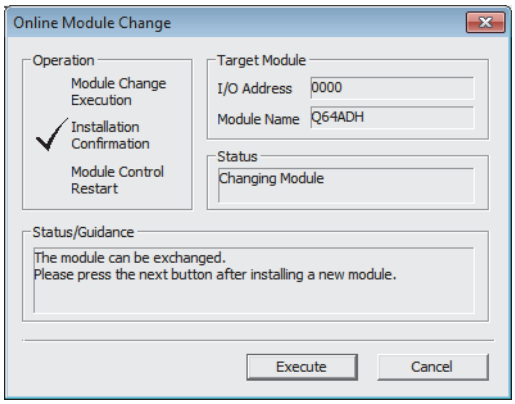
6. **Remove the module.**

Point

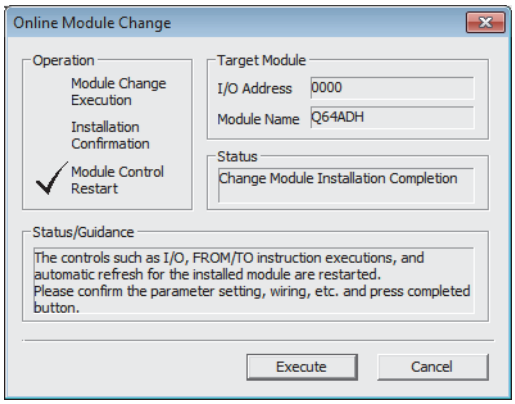
Make sure to remove the module. If mounting confirmation is made without the module being removed, the module does not start properly and the RUN LED does not turn on.

(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. For the G(P).OGLOAD instruction, refer to Page 261, Appendix 1.2.
3. Using the G(P).OGSTOR instruction, restore the offset/gain setting values in the user range to a new module. For the G(P).OGSTOR instruction, refer to Page 265, Appendix 1.3.
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



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1. To make an operation check, click the Cancel button to cancel the control start.

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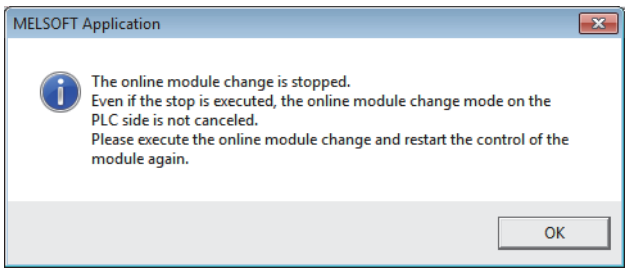

2. **Click the OK button to leave the "Online Module Change" mode.**

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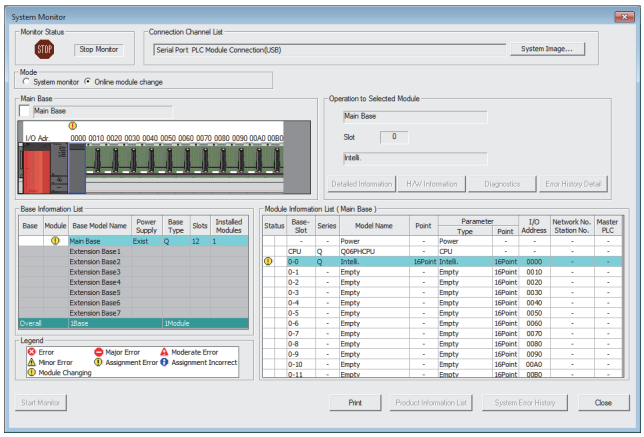
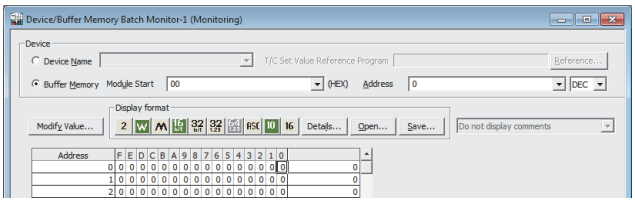


3. **Click the Close button to close the "System Monitor" window.**

↓



4. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

When using GX Developer, open the "Device test" window.

[Online] ⇨ [Debug] ⇨ [Device test...]

5. **Enter and display the buffer memory address of A/D conversion enable/disable setting (Un\G0).**

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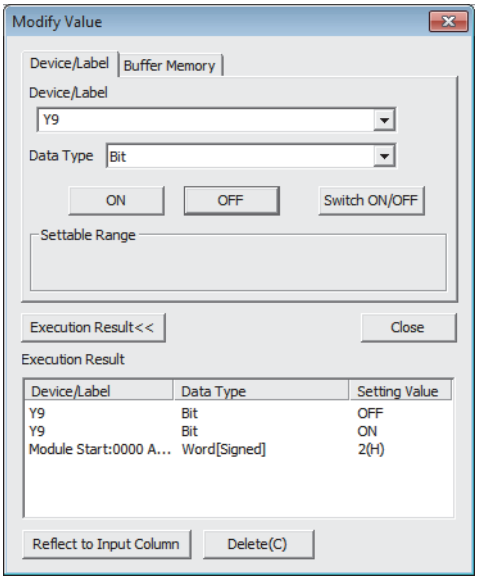


6. **Set A/D conversion enable/disable setting (Un\G0) to Enabled (0) for the channel used.**

7. **Turn on Operating condition setting request (Y9).**

8. **Check that Operating condition setting completed flag (X9) has turned off, and turn off Operating condition setting request (Y9).**

9. **Monitor CH□ Digital output value (Un\G11 to Un\G14) to check whether proper conversion has been made or not.**

10. **Before starting control, check the Q64ADH for the following. If an error occurs, refer to TROUBLESHOOTING (☞ Page 246, CHAPTER 11) and take corrective action.**

- If the RUN LED is on.
- If the ERR. LED is off.
- If Error flag (XF) is off.

11. **Since the new module is in the default status, initial settings must be configured using a sequence program after the control resumed. Before configuring the initial settings, check that the initial setting program is proper, satisfying the following.**

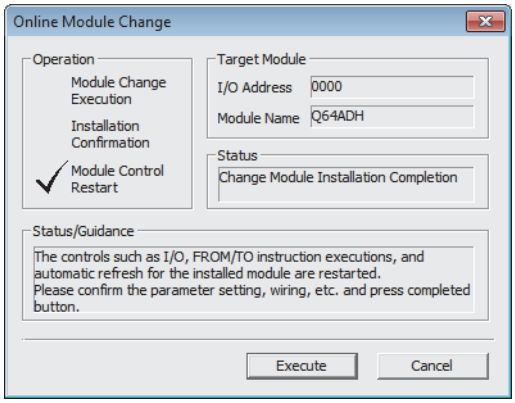
Normal system configuration

- Create a sequence program that sets the initial settings when Module READY (X0) of the Q64ADH turns on.
- Do not create a sequence program that sets the initial settings for only one scan after RUN. In this case, the initial settings are not set.

When used on remote I/O network

- Insert a user device where the initial settings will be set at any timing (initial setting request signal) into the sequence program.
- Do not create a sequence program that sets the initial settings for only one scan after a data link start of the remote I/O network. In this case, the initial settings are not set.

(5) Resuming operation



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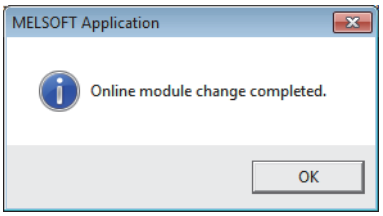


1. **Open the "Online Module Change" window again.**

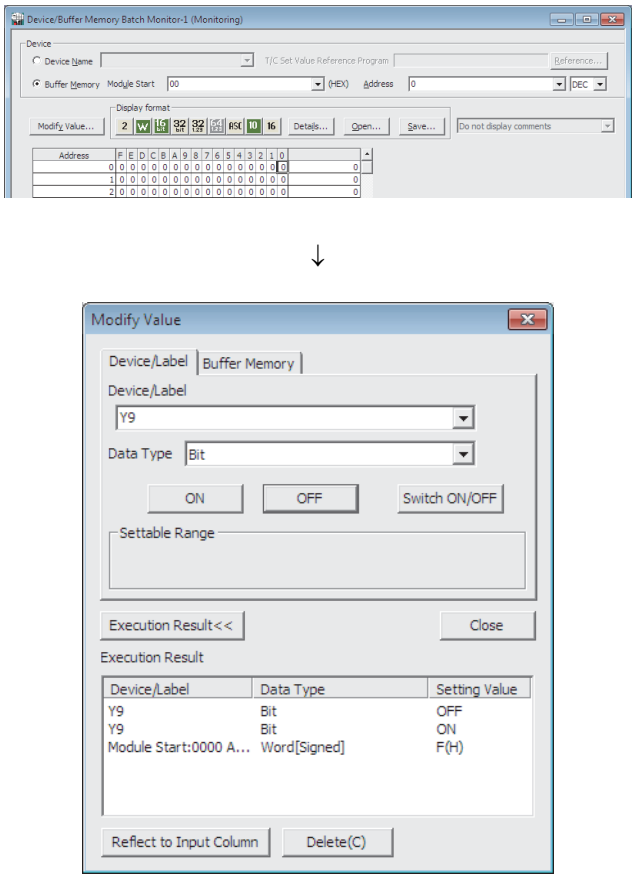
[Diagnostics] ⇨ [Online Module Change...]

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 User Range Setting is Used and Parameter Setting was Made with the Configuration Function (Other System is Unavailable)

(1) Stopping operation



1. **Open the "Device/Buffer Memory Batch Monitor" window.**

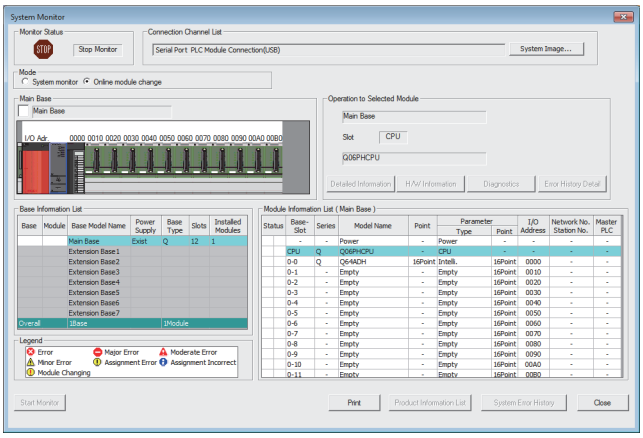
   [Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

2. **Enter and display the buffer memory address of A/D conversion enable/disable setting (Un\G0).**
3. **Set A/D conversion enable/disable setting (Un\G0) to Disabled (1) for all channels.**
4. **Turn on Operating condition setting request (Y9).**
5. **Confirm that conversion has stopped with A/D conversion completed flag (Un\G10).**
6. **After checking A/D conversion completed flag (Un\G10), check that Operating condition setting completed flag (X9) has turned off, then turn off Operating condition setting request (Y9).**
7. **If the buffer memory data are not recorded yet, follow the procedures 8 to 12.**
8. **Set Pass data classification setting (Un\G200).**
9. **Turn on Operating condition setting request (Y9).**
10. **Check that Operating condition setting completed flag (X9) has turned off, and turn off Operating condition setting request (Y9).**
11. **Compare the values in CH1 Industrial shipment settings offset value (L) (Un\G202) to CH4 User range settings gain value (H) (Un\G233) with the values in the range reference table. (☞ Page 245, Section 10.11)**
12. **If the values are proper, save the values in Pass data classification setting (Un\G200) and CH1 Industrial shipment settings offset value (L) (Un\G202) to CH4 User range setting gain value (H) (Un\G233).**

Point

- If the buffer memory values are improper compared to the reference tables, the offset/gain setting values in the user range cannot be saved and restored. Before resuming the control, configure an offset/gain setting according to the flowchart (☞ Page 178, 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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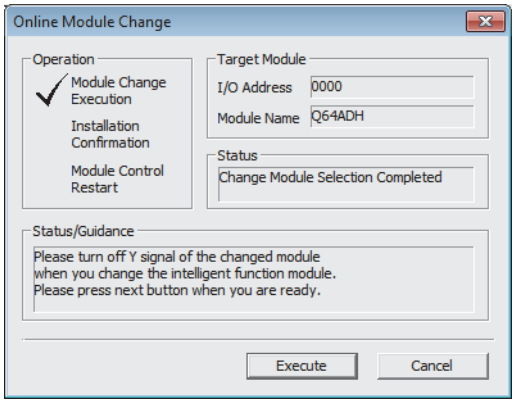


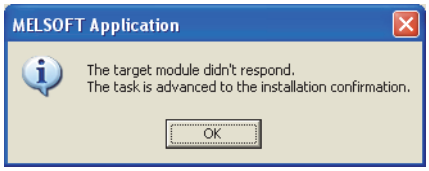
1. **Open the "System Monitor" window.**

[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 235, Section 10.9 (3).**



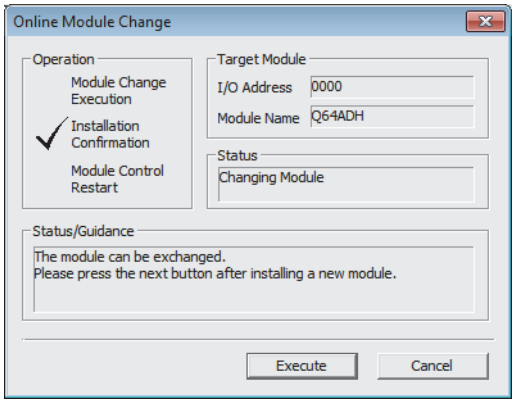
5. **After checking that the RUN LED of the module has turned off, remove the terminal block.**

6. **Remove the module.**

Point

Make sure to remove the module. If mounting confirmation is made without the module being removed, the module does not start properly and the RUN LED does not turn on.

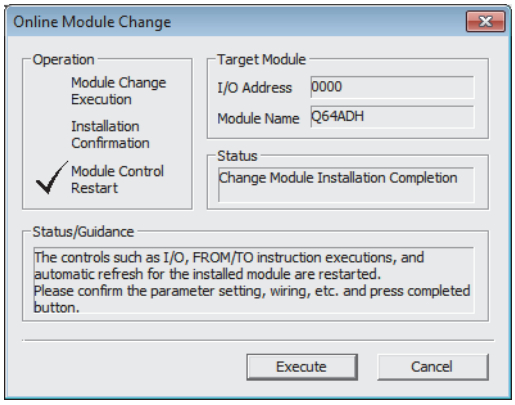
(3) Mounting a new module



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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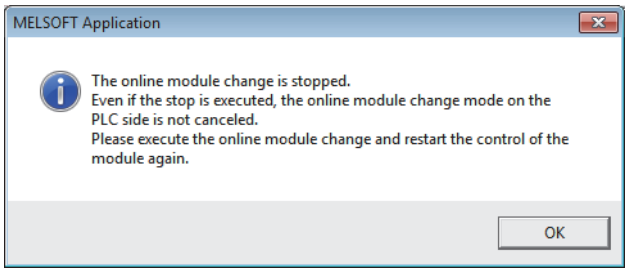

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1. **To make an operation check, click the** Cancel **button to cancel the control start.**

2. **Click the** OK **button to leave the "Online Module Change" mode.**

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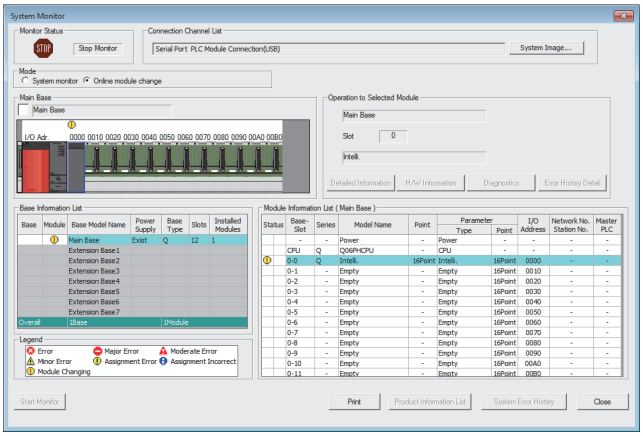

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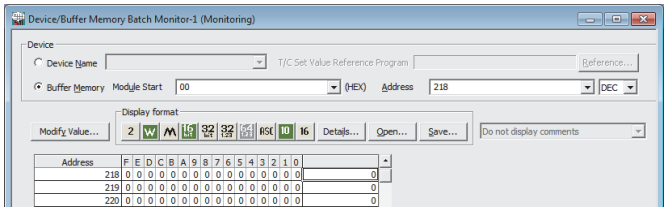
3. **Click the Close button to close the "System Monitor" window.**



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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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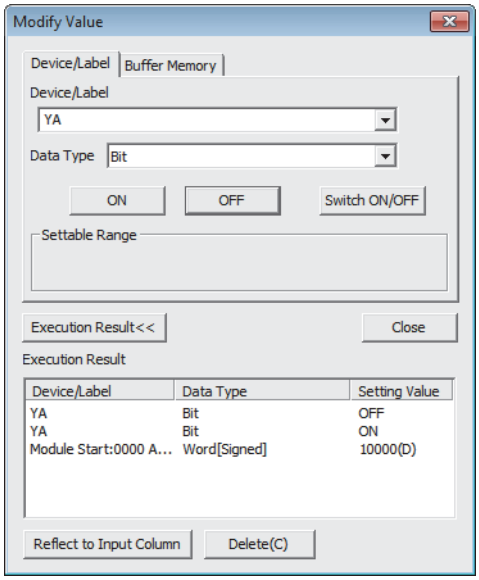


6. **Set the prerecorded data to the buffer memory.**

7. **Turn on User range write request (YA) to restore the offset/gain setting value in the user range to the module.**

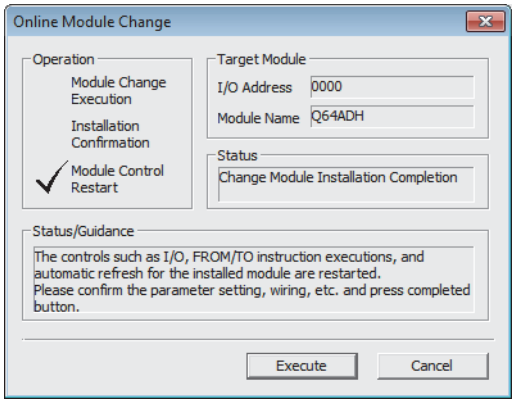
8. **After checking that Offset/gain setting mode flag (XA) is on, turn off User range write request (YA).**

9. **Monitor CH☐ Digital output value (Un\G11 to Un\G14) to check whether proper conversion has been made or not.**

10. **Before starting control, check the Q64ADH for the following. If an error occurs, refer to TROUBLESHOOTING (☞ Page 246, CHAPTER 11) and take 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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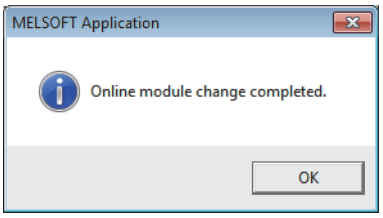


1. **Open the "Online Module Change" window again.**

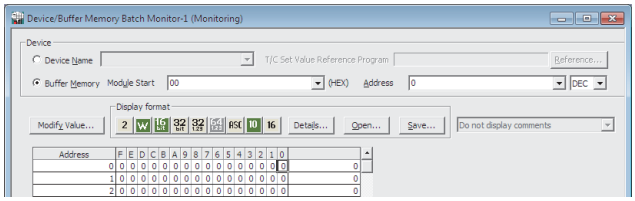
[Diagnostics] ⇨ [Online Module Change...]

2. **Click the Execute button on the appeared window to resume control. Module READY (X0) turns on.**

3. **The online module change is complete.**

10.10 When User Range Setting is Used and Parameter Setting was Made with Sequence Program (Other System is Unavailable)

(1) Stopping operation



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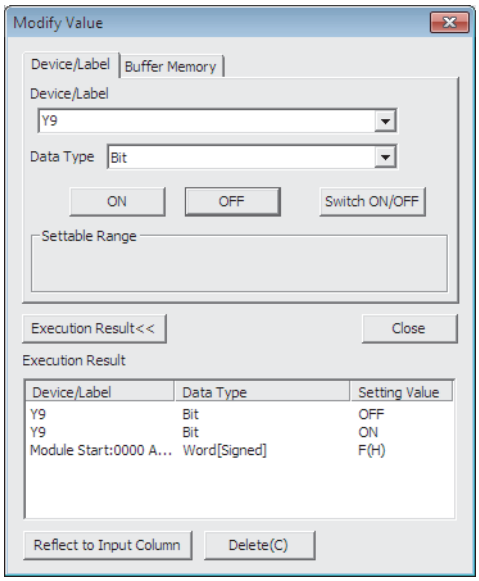


1. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

When using GX Developer, open the "Device test" window.

[Online] ⇨ [Debug] ⇨ [Device test...]

2. **Enter and display the buffer memory address of A/D conversion enable/disable setting (Un\G0).**

3. **Set A/D conversion enable/disable setting (Un\G0) to Disabled (1) for all channels.**

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

5. **Confirm that conversion has stopped with A/D conversion completed flag (Un\G10).**

6. **After checking A/D conversion completed flag (Un\G10), check that Operating condition setting completed flag (X9) has turned off, then turn off Operating condition setting request (Y9).**

7. **If the buffer memory data are not recorded yet, follow the procedures 8 to 12.**

8. **Set Pass data classification setting (Un\G200).**

9. **Turn on Operating condition setting request (Y9).**

10. **Check that Operating condition setting completed flag (X9) has turned off, and turn off Operating condition setting request (Y9).**

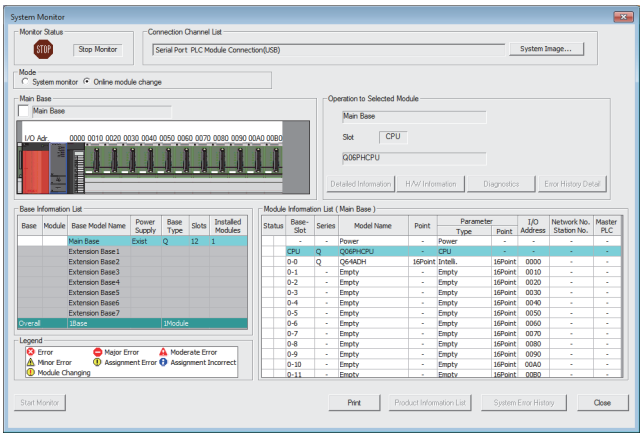
11. **Compare the values in CH1 Industrial shipment settings offset value (L) (Un\G202) to CH4 User range settings gain value (H) (Un\G233) with the values in the range reference table. (☞ Page 245, Section 10.11)**

12. **If the values are proper, save the values in Pass data classification setting (Un\G200) and CH1 Industrial shipment settings offset value (L) (Un\G202) to CH4 User range setting gain value (H) (Un\G233).**

Point

- If the buffer memory values are improper compared to the reference tables, the offset/gain setting values in the user range cannot be saved and restored. Before resuming the control, configure an offset/gain setting according to the flowchart (☞ Page 178, 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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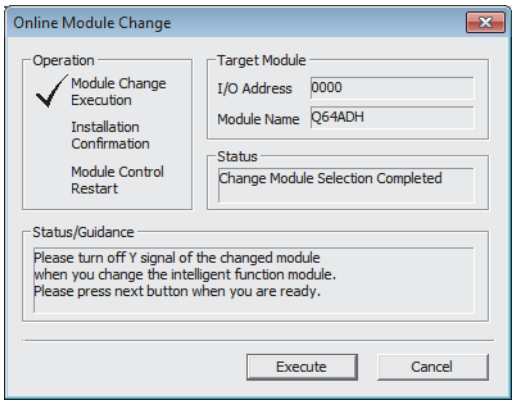


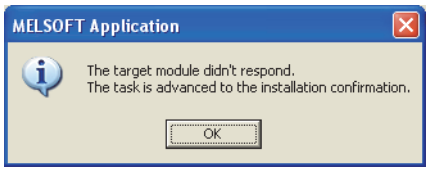
1. **Open the "System Monitor" window.**

[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 241, Section 10.10 (3).**



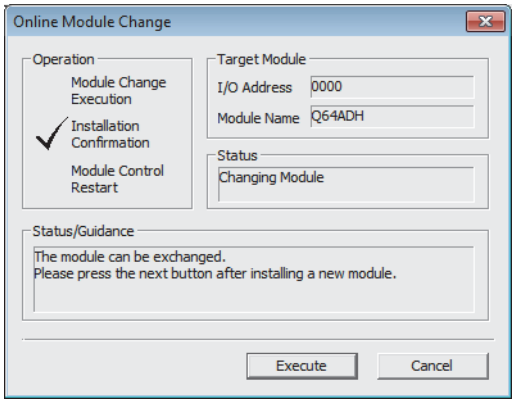
5. **After checking that the RUN LED of the module has turned off, remove the terminal block.**

6. **Remove the module.**

Point

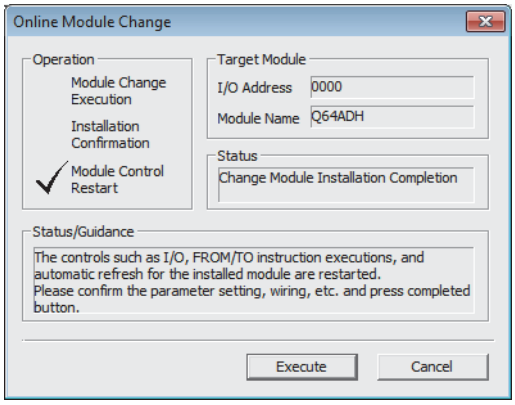
Make sure to remove the module. If mounting confirmation is made without the module being removed, the module does not start properly and the RUN LED does not turn on.

(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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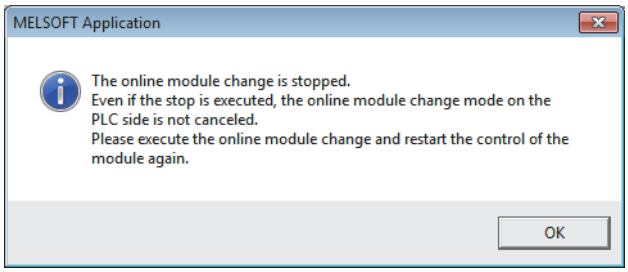

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1. **To make an operation check, click the** Cancel **button to cancel the control start.**
2. **Click the** OK **button to leave the "Online Module Change" mode.**

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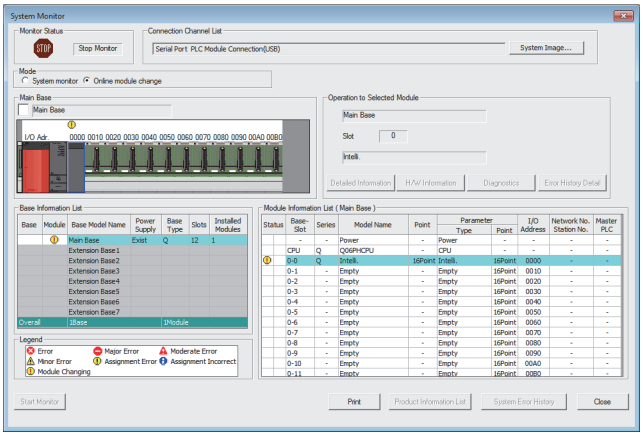

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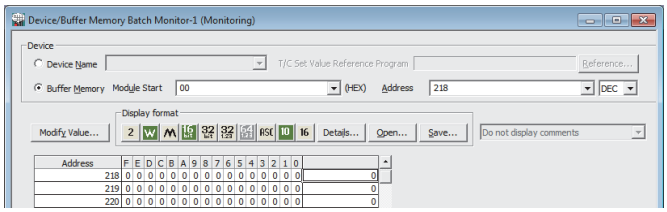

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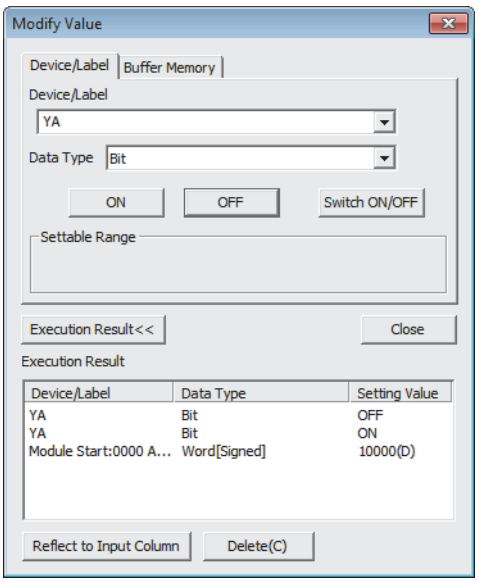

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3. **Click the Close button to close the "System Monitor" window.**

4. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ➪ [Monitor] ➪ [Device/Buffer Memory Batch]

When using GX Developer, open the "Device test" window.

[Online] ➪ [Debug] ➪ [Device test...]

5. **Display the address of the prerecorded buffer memory area and select it. Then click the Modify Value... button.**

6. **Set the prerecorded data to the buffer memory.**

7. **Turn on User range write request (YA) to restore the offset/gain setting value in the user range to the module.**

8. **After checking 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\G14) to check whether proper conversion has been made or not.**

(From the previous page)
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10. **Before starting control, check the Q64ADH for the following. If an error occurs, refer to TROUBLESHOOTING (☞Page 246, CHAPTER 11) and take corrective action.**

- If the RUN LED is on.
- If the ERR. LED is off.
- If Error flag (XF) is off.

11. **Since the new module is in the default status, initial settings must be configured using a sequence program after the control resumed. Before configuring the initial settings, check that the initial setting program is proper, satisfying the following.**

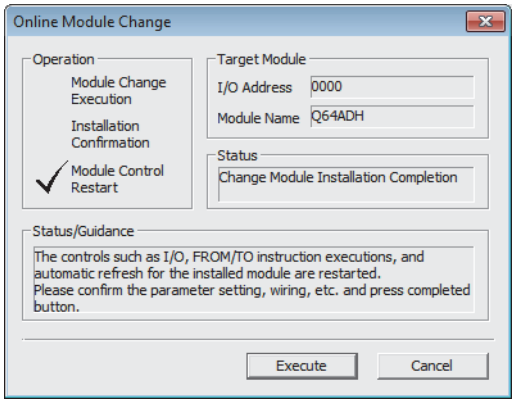
Normal system configuration

- Create a sequence program that sets the initial settings when Module READY (X0) of the Q64ADH turns on.
- Do not create a sequence program that sets the initial settings for only one scan after RUN. In this case, the initial settings are not set.

When used on remote I/O network

- Insert a user device where the initial settings will be set at any timing (initial setting request signal) into the sequence program.
- Do not create a sequence program that sets the initial settings for only one scan after a data link start of the remote I/O network. In this case, the initial settings are not set.

(5) Resuming operation



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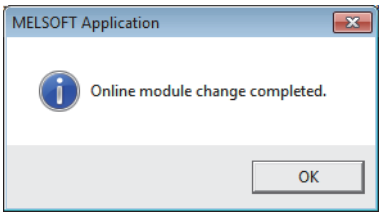


1. **Open the "Online Module Change" window again.**

[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) Reference table for CH1 Industrial shipment offset value (L) (Un\G202) to CH4 Industrial shipment gain value (H) (Un\G217)

The reference values change depending on the setting (voltage or current) of the Pass data classification setting (Un\G200).

Address (Decimal)				Description	Pass data classification setting	Reference value (Hexadecimal)
CH1	CH2	CH3	CH4			
202, 203	206, 207	210, 211	214, 215	Industrial shipment settings offset value	Voltage specified	Approx. 00000000_H
					Current specified	Approx. 00000000_H
204, 205	208, 209	212, 213	216, 217	Industrial shipment settings gain value	Voltage specified	Approx. $0000B2C7_H$
					Current specified	Approx. $0000B2C7_H$

(2) Reference table for CH1 User range settings offset value (L) (Un\G218) to CH4 User range settings gain value (H) (Un\G233)

Offset/gain value		Reference value (Hexadecimal)
Voltage	0V	Approx. 00000000_H
	1V	Approx. $000011E0_H$
	5V	Approx. 00005963_H
	10V	Approx. $0000B2C7_H$
Current	0mA	Approx. 00000000_H
	4mA*1	Approx. $000011E0_H$
	20mA*2	Approx. 00005963_H

*1 This is the value that is stored in user range offset value at the time of shipping.
*2 This is the value that is stored in user range gain value at the time of shipping.

CHAPTER 11 TROUBLESHOOTING

This chapter describes error contents that may occur while the use of the Q64ADH, those troubleshooting.

11.1 Error Code List

This section explains error codes of the Q64ADH.

(1) How to check error codes

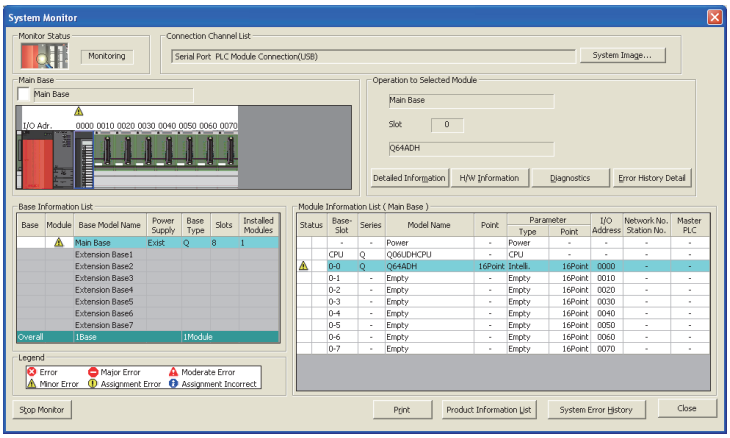
Errors occurred in the Q64ADH can be checked by any of the following methods.
Choose a checking method for the purpose and application.

- Checking on the module detailed Information (☞Page 247, Section 11.1 (1) (a))
- Checking by Latest Error Code (Un\G19) (☞Page 247, Section 11.1 (1) (b))
- Checking on the module error collection function (☞Page 248, Section 11.1 (1) (c))

(a) Checking on the module detailed Information

The following describes how to check errors on the module detailed information.

[Diagnostics] ⇨ [System Monitor…]



1. **Select the Q64ADH in "Main Base" and click the Detailed Information button.**

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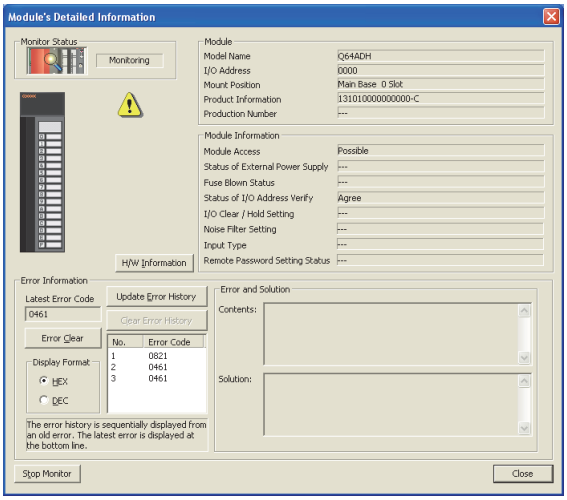
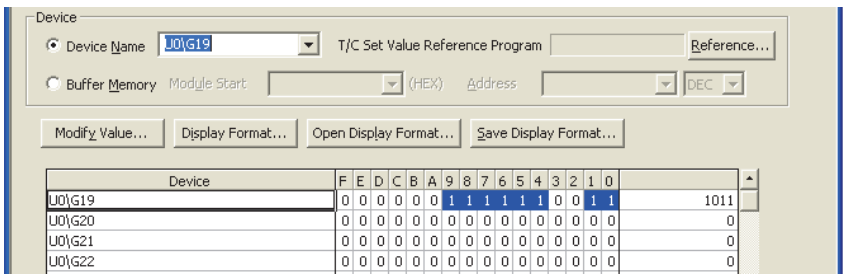


2. **"Module's Detailed Information" of the Q64ADH is displayed.**

(b) Checking by Latest Error Code (Un\G19)

The following describes how to check error codes in Latest error code (Un\G19).

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]



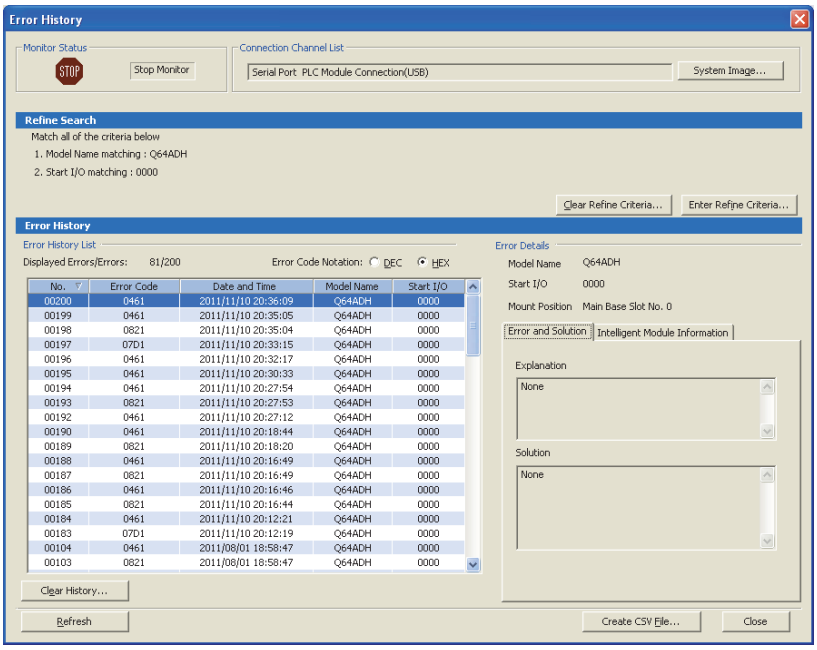
(c) Checking on the module error collection function

Using the module error collection function stores the errors occurred in the Q64ADH to the CPU module. Once being stored, the errors remain even after powering off or resetting the CPU module.

- How to check the errors by the module error collection function

  To check the errors of the Q64ADH collected by the CPU module, open the "Error History" window.

  [Diagnostics] ⇨ [System Monitor…] ⇨ click the Error History Detail button



- Errors to be collected

  The Q64ADH reports the contents under Error code list (☞Page 248, Section 11.1 (2)) to the CPU module.

(2) Error code list

If the following errors occur on the Q64ADH 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 cause of error	Action
10□	The input range is set with a value outside the setting range for Switch 1 of the intelligent function module switch setting. The channel with the invalid setting fits in □.	Set a valid value on the intelligent function module switch setting in the parameter setting.
111	A hardware failure has occurred on the module.	Power off and on the module. If the error occurs again, a failure might have occurred on the module. Please consult a local Mitsubishi representative.
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 data in the flash memory has a problem.	Check the digital output value. If there is a problem of the digital output value, please consult a local Mitsubishi representative.

Error code (decimal)	Description and cause of error	Action
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 a local Mitsubishi representative.
12□[*1]	An invalid value is set to the 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 a local Mitsubishi representative.
161[*2]	The G(P).OGSTOR instruction was executed in the offset/gain setting mode.	Do not execute the G(P).OGSTOR instruction in the offset/gain setting mode.
162[*1]	• The G(P).OGSTOR instruction has been consecutively executed. • For the offset/gain setting, a setting value has been consecutively written to the flash memory more than 25 times.	• Execute the G(P).OGSTOR instruction only once per module. • Write the setting value into the flash memory only once for each offset/gain setting.
163[*1]	• The G(P).OGSTOR instruction has been executed on 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.
170[*1]	The offset/gain setting was configured exceeding the maximum number of times.	No more offset/gain setting is reflected on the operation successfully.
20□[*1]	• The averaging time value set in CH□ Time Average/Count Average/Moving Average (Un\G1 to Un\G4) is outside the range of 2 to 1500ms. • The averaging time value set in CH□ Time Average/Count Average/Moving Average (Un\G1 to Un\G4) is less than "4 × Number of used channels × Conversion speed" (ms). The channel where the error has occurred fits in □.	• Set the averaging time to a value in the range of 2 to 5000ms. • Set the averaging time to a value equal to or more than "4 × Number of used channels × Conversion speed" (ms).
30□[*1]	The averaging count value set in CH□ Time Average/Count Average/Moving Average (Un\G1 to Un\G4) is outside the range of 4 to 62500. The channel where the error has occurred fits in □.	Set the averaging count to a value in the range of 4 to 62500.
31□[*1]	The moving average count value set in CH□ Time Average/Count Average/Moving Average (Un\G1 to Un\G4) 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.
360[*1]	The value set in Conversion speed setting (Un\G26) is outside the range of 0 to 2.	Set one of the following values in Conversion speed setting (Un\G26). • 20μs (0) • 80μs (1) • 1ms (2)
37□[*1]	The value set in CH□ Difference conversion trigger (Un\G172 to Un\G175) is other than 0 and 1. The channel where the error has occurred fits in □.	Set the value in CH□ Difference conversion trigger (Un\G172 to Un\G175) to No request (0) or Trigger request (1).
40□[*1]	When the user range is set or restored, values are as follows: Offset value ≥ Gain value The channel where the error has occurred fits in □.	Set values so that they meet the following condition: Offset value < Gain value

Error code (decimal)	Description and cause of error	Action
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 setting in Offset/gain setting mode Offset specification (Un\G22) and/or the Offset/gain setting mode Gain specification (Un\G23).
6△□[*1]	The settings in CH1 Process alarm lower lower limit value (Un\G86) to CH4 Process alarm upper upper limit value (Un\G101) are invalid. The channel with the invalid setting 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 CH4 Process alarm upper upper limit value (Un\G101).
80□[*1]	The value set in CH□ Input signal error detection setting value (Un\G142 to Un\G145) is outside the range of 0 to 250. The channel where the error has occurred fits in □.	Set a value within the range of 0 to 250 in CH□ Input signal error detection setting value (Un\G142 to Un\G145).
81□[*1]	The value set in Input signal error detection setting (Un\G27) is outside the range of 0 to 4. The channel where the error has occurred fits in □.	Set one of the following values in Input signal error detection setting (Un\G27) for the channel where the error has occurred. • Disable (0) • Upper/lower limit detection (1) • Lower limit detection (2) • Upper limit detection (3) • Disconnection detection (4)
82□[*1]	A value set in Input signal error detection setting (Un\G27) is Disconnection detection (4), besides the set input range for the same channel is other than the following. • 4 to 20mA (Extended mode) • 1 to 5V (Extended mode) The channel where the error has occurred fits in □.	• To perform disconnection detection using the input signal error detection function, set the input range of the corresponding channel to 4 to 20mA (Extended mode) or 1 to 5V (Extended mode). • Not to perform disconnection detection using the input signal error detection function, set Input signal error detection setting (Un\G27) of the corresponding channel to the value other than Disconnection detection (4).
90□[*1]	The values set in CH1 Scaling lower limit value (Un\G62) to CH4 Scaling upper limit value (Un\G69) 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 CH4 Scaling upper limit value (Un\G69).
91□[*1]	The values set in CH1 Scaling lower limit value (Un\G62) to CH4 Scaling upper limit value (Un\G69) are as follows: Scaling lower limit value ≥ Scaling upper limit value. The channel where the error has occurred fits in □.	Set the values in CH1 Scaling lower limit value (Un\G62) to CH4 Scaling upper limit value (Un\G69) so that they meet the following condition: Scaling upper limit value > Scaling lower limit value
200□[*1]	CH□ Logging enable/disable setting (Un\G1000 to Un\G1003) 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\G1003).
	When in normal logging mode, the conversion speed is set to 20μs, and CH□ Logging enable/disable setting (Un\G1000 to Un\G1003) is set to Enable (0). The channel where the error has occurred fits in □.	To use the logging function in normal logging mode, change the conversion speed setting to 80μs.

Error code (decimal)	Description and cause of error	Action
201□[*1]	A value outside the setting range is set in one or both of CH□ Logging cycle setting value (Un\G1032 to Un\G1035) or/and CH□ Logging cycle unit setting (Un\G1040 to Un\G1043). 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\G1035) or/and CH□ Logging cycle unit setting (Un\G1040 to Un\G1043). For the setting method of the logging cycle, refer to the following. • Logging function (normal logging mode) (☞ Page 66, Section 4.14) • Logging function (high-speed logging mode) (☞ Page 82, Section 4.15)
202□[*1]	The set logging cycle is shorter than the update cycle of the logged value (digital output value or digital operation value). The channel where the error has occurred fits in □.	Set CH□ Logging cycle setting value (Un\G1032 to Un\G1035) and CH□ Logging cycle unit setting (Un\G1040 to Un\G1043) so that the logging cycle is equal to or longer than the update cycle of the logged value. For the setting method of the logging cycle, refer to the following. • Logging function (normal logging mode) (☞ Page 66, Section 4.14) • Logging function (high-speed logging mode) (☞ Page 82, Section 4.15)
203□[*1]	CH□ Logging data setting (Un\G1024 to Un\G1027) 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 Digital operation value (1) in CH□ Logging data setting (Un\G1024 to Un\G1027).
204□[*1]	CH□ Logging points after trigger (Un\G1048 to Un\G1051) is set to a value outside the range of 1 to 10000. The channel where the error has occurred fits in □.	Set a value within the range of 1 to 10000 in CH□ Logging points after trigger (Un\G1048 to Un\G1051).
205□[*1]	CH□ Level trigger condition setting (Un\G1056 to Un\G1059) 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\G1059). • Disable (0) • Above (1) • Below (2) • Pass through (3)
206□[*1]	CH□ Trigger data (Un\G1064 to Un\G1067) 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\G1067).
207□[*1]	CH□ Logging hold request (Un\G1008 to Un\G1011) 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\G1011).
208□[*1]	In normal logging mode, CH□ Logging enable/disable setting (Un\G1000 to Un\G1003) is set to Enable (0), and the input signal error detection function is enabled. The channel where the error has occurred fits in □.	To use the logging function in normal logging mode, change Input signal error detection setting (Un\G27) to Disable (0).
210□[*1]	CH□ Flow amount integration enable/disable setting (Un\G1300 to Un\G1303) 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□ Flow amount integration enable/disable setting (Un\G1300 to Un\G1303).
	Conversion speed is set to 20μs or 80μs, and besides CH□ Flow amount integration enable/disable setting (Un\G1300 to Un\G1303) is set to Enable (0). The channel where the error has occurred fits in □.	To use the flow amount integration function, set the conversion speed to 1ms.
211□[*1]	CH□ Integration cycle setting (Un\G1308 to Un\G1311) 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□ Integration cycle setting (Un\G1308 to Un\G1311).

Error code (decimal)	Description and cause of error	Action
212□*1	The set value in CH□ Integration cycle setting (Un\G1308 to Un\G1311) is shorter than the update cycle of CH□ Digital operation value (Un\G54 to Un\G57). The channel where the error has occurred fits in □.	Set CH□ Integration cycle setting (Un\G1308 to Un\G1311) so that the integration cycle is equal to or longer than the update cycle of CH□ Digital operation value) (Un\G54 to Un\G57). For the setting method of the integration cycle, refer to the following. • Flow amount integration function (☞Page 95, Section 4.16)
213□*1	CH□ Flow amount time unit setting (Un\G1316 to Un\G1319) is set to a value outside the range of 0 to 2. The channel where the error has occurred fits in □.	Set one of the following values in CH□ Flow amount time unit setting (Un\G1316 to Un\G1319). • /s (0) • /min (1) • /h (2)
214□*1	CH□ Unit scaling setting (Un\G1324 to Un\G1327) is set to a value outside the range of 0 to 4. The channel where the error has occurred fits in □.	Set one of the following values in CH□ Unit scaling setting (Un\G1324 to Un\G1327). • × 1 (0) • × 10 (1) • × 100 (2) • × 1000 (3) • × 10000 (4)
215□*1	CH□ Flow amount integration temporary stop request (Un\G1356 to Un\G1359) is set to a value other than 0 and 1. The channel where the error has occurred fits in □.	Set No request (0) or Temporary stop request (1) in CH□ Flow amount integration temporary stop request (Un\G1356 to Un\G1359).
216□*1	CH□ Integrated flow amount clear request (Un\G1372 to Un\G1375) is set to a value other than 0 and 1. The channel where the error has occurred fits in □.	Set No request (0) or Clear request (1) in CH□ Integrated flow amount clear request (Un\G1372 to Un\G1375).
250□*1	CH□ Logging data storing notification enable/disable setting (Un\G1200 to Un\G1203) is set to a value other than 0 and 1. The channel where the error has occurred fits in □.	Set CH□ Logging data storing notification enable/disable setting (Un\G1200 to Un\G1203) to Enable (0) or Disable (1).

*1 This error code can be cleared by turning off, on, and then off Error clear request (YF).

*2 An 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 explains alarm codes of the Q64ADH.

(1) How to check alarm codes

Alarms occurred in the Q64ADH can be checked by the same methods as those for errors. (☞Page 246, Section 11.1 (1))

(2) Alarm code list

The following shows an alarm code list.

Alarm code (decimal)	Description and cause of alarm	Action
10△□	A process alarm is occurring. The channel where the process alarm has occurred fits in □. A value fits in △ indicates that the alarm status is as follows: 0: Upper limit of a process alarm 1: Lower limit of a process alarm	When the digital operation value returns to the one within the setting range, the corresponding bit of Warning output flag (Process alarm) (Un\G50) and Warning output signal (X8) turn off. The alarm code can be cleared by turning off, on, and off Error clear request (YF) after the digital operation value returns to the one within the setting range.
11△□	An input signal error is occurring. The channel where the input signal error has occurred fits in □. A value fits in △ indicates that the detection status is as follows: 1: Upper limit detection 2: Lower limit detection 3: Disconnection detection	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 analog 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 mode setting in the offset/gain setting mode?	Take the either of the following actions: • Switch the operation mode setting in the intelligent function module switch setting to the normal mode, or • Correct Switch4 in the intelligent function module switch setting to switch the operation mode setting to the normal mode.

(2) When turning off

Check item	Action
Is the power supplied?	Check that the supply voltage of power supply modules is within the rated range.
Is the capacity of power supply module enough?	Make sure that the power capacity is enough by calculating the current consumption such as a CPU module, an I/O module, and an intelligent function module mounted on the base unit.
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 Q64ADH may be failed. Please consult a local Mitsubishi representative.
Is the module mounted to 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 205, CHAPTER 10)

11.3.2 When the ERR. LED turns on or flashes

(1) When turning on

Check item	Action
Does any error occur?	Check the error code, and take the action described in the error code list. • Error code list (☞ Page 248, Section 11.1 (2))

(2) When flashing

Check item	Action
Is the value other than 0 set for Switch 5 of the intelligent function module switch setting?	With the parameter setting, set 0 for Switch 5 in the intelligent function module switch setting.

11.3.3 When the ALM LED turns on or flashes

(1) When turning on

Check item	Action
Is there any alarm output?	Check Warning output flag (Process alarm) (Un\G50).

(2) When flashing

Check item	Action
Is there any input signal error?	Check Input signal error detection flag (Un\G49).

11.3.4 When the digital output value cannot be read

Check item	Action
Is there any problem with wiring, such as off or disconnection of analog signal lines?	Check the faulty area by checking signal line visually or conductively.
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 the user range setting is selected, change the input range to the factory default setting. Then check if the A/D conversion executes. If the A/D conversion is properly executed, configure the offset/gain setting again.
Is the input range setting correct?	Check Setting range (Un\G20). When the setting range is wrong, perform the intelligent function module switch setting again.
Of the channels to input the analog value, is there any channel, whose A/D conversion enable/disable setting (Un\G0) set to the A/D conversion disable?	Check A/D conversion enable/disable setting (Un\G0). Then, set the A/D conversion enable for Un\G0 with the sequence program or the parameter of the intelligent function module.
Is Operating condition setting request (Y9) performed?	Check if the digital output value is stored in the CH☐ Digital output value (Un\G11 to Un\G14) after turning Operating condition setting request (Y9) from OFF to ON, then to OFF. When the problem has been solved, check the sequence program again.
Are the (V+) and (I+) terminals connected if the input source is current?	Make sure to connect the (V+) and (I+) terminals while inputting current as shown in the external wiring.
Are the setting values correct when the average processing is specified?	When selecting the time average processing, set the values satisfy the following condition. • Setting value ≥ "4 (times) × conversion speed × Number of used channels" If the condition above is not met, CH☐ Digital output value (Un\G11 to Un\G14) remain 0.
Is there any potential difference between the AG terminal and the external device GND?	Connect the AG terminal and the GND

Point

If digital output value cannot be read even after taking the above actions, the module may be failed. Please consult a local Mitsubishi representative.

11.3.5 When an A/D 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 Status of the Q64ADH by the 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 Q64ADH on the system monitor of GX Works2.

(1) Hardware LED information

LED status is displayed.

No.	LED name	Status
1)	RUN LED	0000_H: Indicates the LED off. 0001_H: Indicates the LED on. Alternating indication between 0000_H and 0001_H: Indicates the LED flashing. (GX Works2 displays the communication status with the Q64ADH, so that the displaying intervals of 0000_H and 0001_H are not always even.)
2)	ERR. LED	
3)	ALM LED	

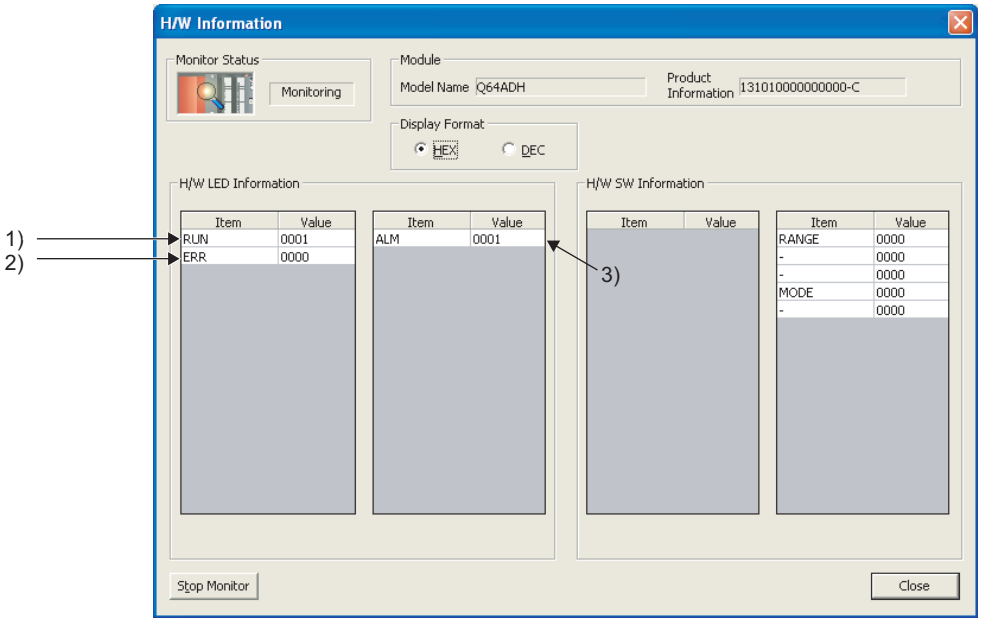
(2) Hardware switch information

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

For details on the setting status, refer to the following.

- Intelligent function module switch setting (Page 170, Section 8.2)

Item	Intelligent function module switch
RANGE	Switch1
-	Switch2
-	Switch3
MODE	Switch4
-	Switch5



APPENDICES

Appendix 1 Dedicated Instruction

(1) Dedicated instruction

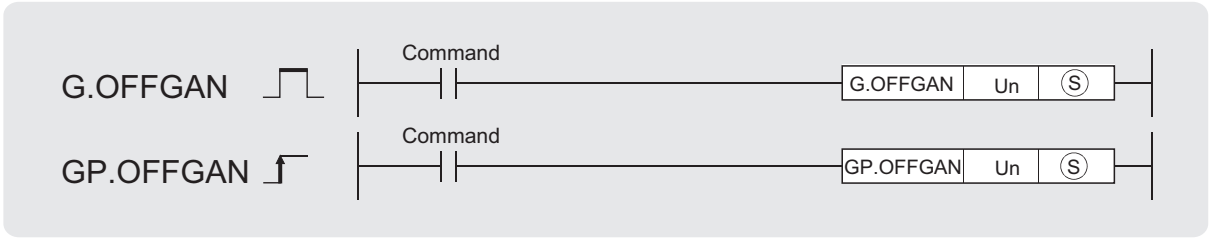
The following shows the dedicated instructions that can be used in the Q64ADH.

Instruction	Description
G(P).OFFGAN	• The operation mode is changed to the offset/gain setting mode. • The operation mode is changed to the normal mode.
G(P).OGLOAD	The offset/gain set value in the user range setting is read out to the CPU module.
G(P).OGSTOR	The offset/gain set value in the user range setting stored in the CPU module is restored to the Q64ADH.

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 module	0 to FEH	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 Q64ADH.

- 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 from OFF to 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 from the offset/gain setting mode to the normal mode, the Q64ADH operates under the previous operating condition.
  In addition, for the logging mode setting, the previous setting will be taken over.
- In the state of startup in the offset/gain setting mode, when the mode switches to the normal mode, the normal logging mode will start.

(3) Errors

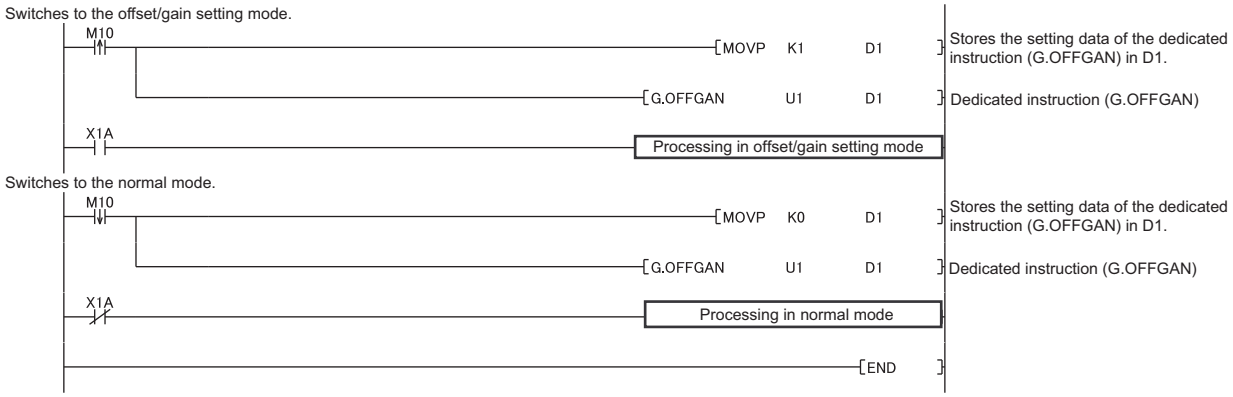
The instruction has no errors.

(4) Program example

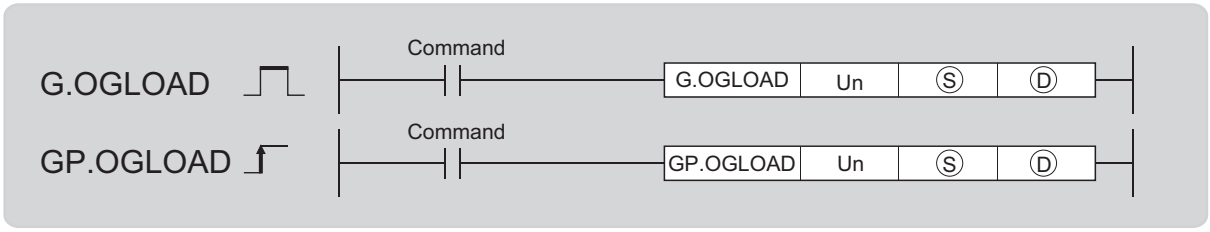
The following shows the sequence program of the Q64ADH, installed in I/O number X/Y10 to X/Y1F, with the following conditions:

• Turning ON M10 switches the operation mode to the offset/gain setting mode, and

• Turning OFF M10 restores the operation mode 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 module	0 to FE_H	BIN 16 bits
Ⓢ	Start number of device where the control data is stored	Within the range of 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 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	Pass data classification setting	Specify the type of offset/gain setting value to read out. 0: voltage 1: current b15 b8 b7 b6 b5 b4 b3 b2 b1 b0 0 ~ ~ ~ ~ ~ 0 CH4 CH3 CH2 CH1	0000_H to $000F_H$	User
Ⓢ+3	System area	—	—	—
Ⓢ+4	CH1 Industrial shipment settings offset value (L)	—	—	System
Ⓢ+5	CH1 Industrial shipment settings offset value (H)	—	—	System
Ⓢ+6	CH1 Industrial shipment settings gain value (L)	—	—	System
Ⓢ+7	CH1 Industrial shipment settings gain value (H)	—	—	System
Ⓢ+8	CH2 Industrial shipment settings offset value (L)	—	—	System
Ⓢ+9	CH2 Industrial shipment settings offset value (H)	—	—	System
Ⓢ+10	CH2 Industrial shipment settings gain value (L)	—	—	System
Ⓢ+11	CH2 Industrial shipment settings gain value (H)	—	—	System
Ⓢ+12	CH3 Industrial shipment settings offset value (L)	—	—	System
Ⓢ+13	CH3 Industrial shipment settings offset value (H)	—	—	System
Ⓢ+14	CH3 Industrial shipment settings gain value (L)	—	—	System
Ⓢ+15	CH3 Industrial shipment settings gain value (H)	—	—	System
Ⓢ+16	CH4 Industrial shipment settings offset value (L)	—	—	System
Ⓢ+17	CH4 Industrial shipment settings offset value (H)	—	—	System
Ⓢ+18	CH4 Industrial shipment settings gain value (L)	—	—	System
Ⓢ+19	CH4 Industrial shipment settings gain value (H)	—	—	System
Ⓢ+20	CH1 User range settings offset value (L)	—	—	System
Ⓢ+21	CH1 User range settings offset value (H)	—	—	System
Ⓢ+22	CH1 User range settings gain value (L)	—	—	System
Ⓢ+23	CH1 User range settings gain value (H)	—	—	System
Ⓢ+24	CH2 User range settings offset value (L)	—	—	System
Ⓢ+25	CH2 User range settings offset value (H)	—	—	System
Ⓢ+26	CH2 User range settings gain value (L)	—	—	System
Ⓢ+27	CH2 User range settings gain value (H)	—	—	System

Device	Item	Setting data	Setting range	Set by
Ⓢ+28	CH3 User range settings offset value (L)	—	—	System
Ⓢ+29	CH3 User range settings offset value (H)	—	—	System
Ⓢ+30	CH3 User range settings gain value (L)	—	—	System
Ⓢ+31	CH3 User range settings gain value (H)	—	—	System
Ⓢ+32	CH4 User range settings offset value (L)	—	—	System
Ⓢ+33	CH4 User range settings offset value (H)	—	—	System
Ⓢ+34	CH4 User range settings gain value (L)	—	—	System
Ⓢ+35	CH4 User range settings gain value (H)	—	—	System

*1 Configure the setting of Pass data classification setting Ⓢ+2 only.
When the data is written to the area to be set by system, offset/gain setting value is not correctly read out.

(3) Functions

- This instruction reads out the offset/gain set value in the user range setting of the Q64ADH to the CPU module.
- The interlock signal of G(P).OGLOAD includes a completion device Ⓓ and a completion status indication device Ⓓ+1.

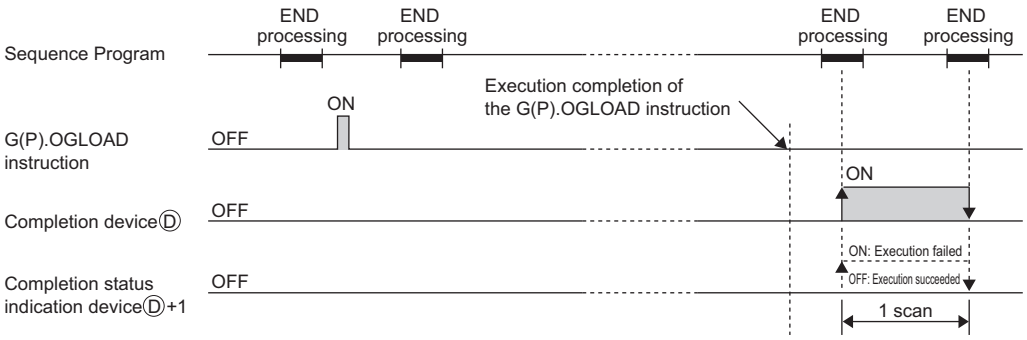
(a) Completion device

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

- Normal completion: the device is kept to be 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.

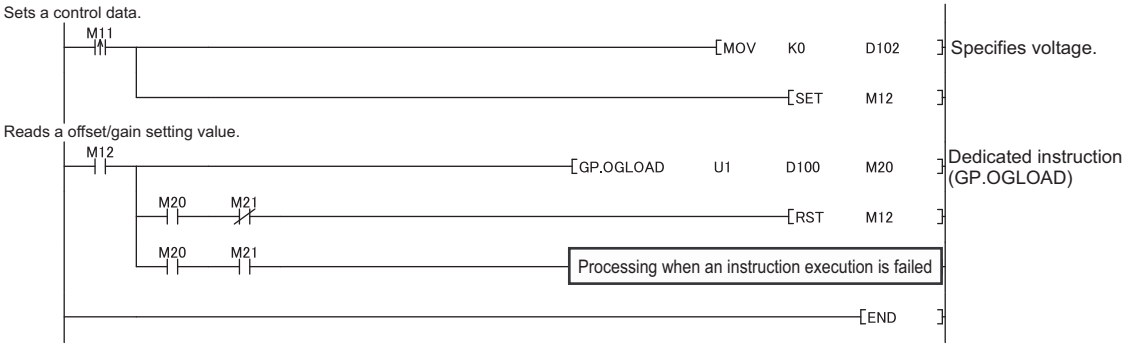


(4) Errors

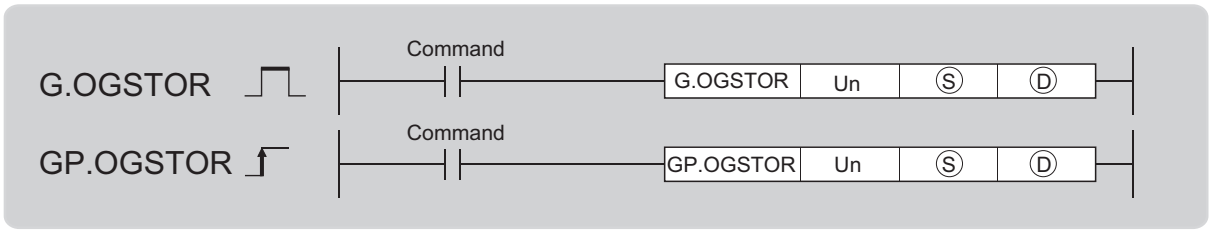
The instruction has no errors.

(5) Program example

The following shows the sequence program to read out the offset/gain setting value of the Q64ADH, installed in I/O number X/Y10 to X/Y1F, by turning ON M11.



Appendix 1.3 G(P).OGSTOR



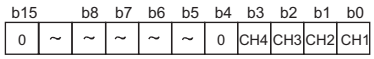
Setting data	Internal device		R, ZR	J□\□		U□\G□	Zn	Constant K, H, $	Others
	Bit	Word		Bit	Word				
Ⓢ	—	○		—					
Ⓓ	○			—					

(1) Setting data

Device	Description	Setting range	Data type
Un	Start I/O number of module	0 to FEH	BIN 16 bits
Ⓢ*1	Start number of device where the control data is stored	Within the range of 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 specified device	Bit

*1 Specify the device specified to Ⓢ on execution of the G(P).OGLOAD instruction.
Do not change the data which is 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	Pass data classification setting	The value which is set for Pass data classification setting Ⓢ+2 by G(P).OGLOAD instruction is stored. 0: voltage 1: current 	0000_H to $000F_H$	System
Ⓢ+3	System area	—	—	—
Ⓢ+4	CH1 Industrial shipment settings offset value (L)	—	—	System
Ⓢ+5	CH1 Industrial shipment settings offset value (H)	—	—	System
Ⓢ+6	CH1 Industrial shipment settings gain value (L)	—	—	System
Ⓢ+7	CH1 Industrial shipment settings gain value (H)	—	—	System
Ⓢ+8	CH2 Industrial shipment settings offset value (L)	—	—	System
Ⓢ+9	CH2 Industrial shipment settings offset value (H)	—	—	System
Ⓢ+10	CH2 Industrial shipment settings gain value (L)	—	—	System
Ⓢ+11	CH2 Industrial shipment settings gain value (H)	—	—	System
Ⓢ+12	CH3 Industrial shipment settings offset value (L)	—	—	System
Ⓢ+13	CH3 Industrial shipment settings offset value (H)	—	—	System
Ⓢ+14	CH3 Industrial shipment settings gain value (L)	—	—	System
Ⓢ+15	CH3 Industrial shipment settings gain value (H)	—	—	System
Ⓢ+16	CH4 Industrial shipment settings offset value (L)	—	—	System
Ⓢ+17	CH4 Industrial shipment settings offset value (H)	—	—	System
Ⓢ+18	CH4 Industrial shipment settings gain value (L)	—	—	System
Ⓢ+19	CH4 Industrial shipment settings gain value (H)	—	—	System
Ⓢ+20	CH1 User range settings offset value (L)	—	—	System
Ⓢ+21	CH1 User range settings offset value (H)	—	—	System
Ⓢ+22	CH1 User range settings gain value (L)	—	—	System
Ⓢ+23	CH1 User range settings gain value (H)	—	—	System
Ⓢ+24	CH2 User range settings offset value (L)	—	—	System
Ⓢ+25	CH2 User range settings offset value (H)	—	—	System
Ⓢ+26	CH2 User range settings gain value (L)	—	—	System

Device	Item	Setting data	Setting range	Set by
Ⓢ+27	CH2 User range settings gain value (H)	—	—	System
Ⓢ+28	CH3 User range settings offset value (L)	—	—	System
Ⓢ+29	CH3 User range settings offset value (H)	—	—	System
Ⓢ+30	CH3 User range settings gain value (L)	—	—	System
Ⓢ+31	CH3 User range settings gain value (H)	—	—	System
Ⓢ+32	CH4 User range settings offset value (L)	—	—	System
Ⓢ+33	CH4 User range settings offset value (H)	—	—	System
Ⓢ+34	CH4 User range settings gain value (L)	—	—	System
Ⓢ+35	CH4 User range settings gain value (H)	—	—	System

(3) Functions

- The offset/gain set value in the user range setting stored in the CPU module is restored to the Q64ADH.
- There are two interlock signals of G(P).OGSTOR: a completion device Ⓓ and a completion status indication device Ⓓ+1.
- The reference accuracy on restoration of offset/gain setting value is lowered three times or less of that of before the restoration.

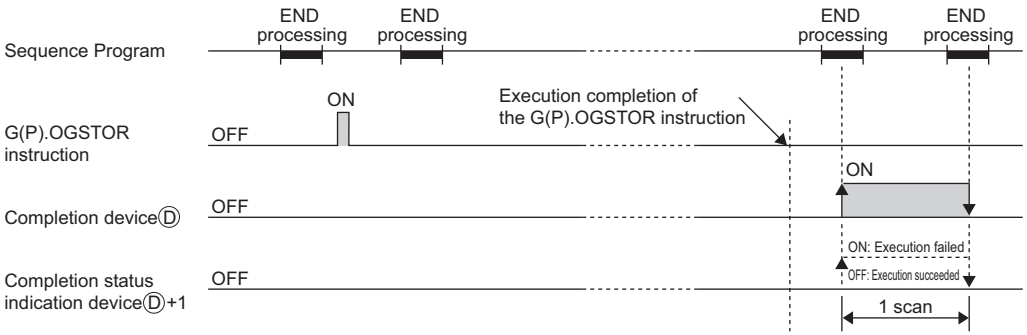
(a) Completion device

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

- Normal completion: the device is kept to be 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.



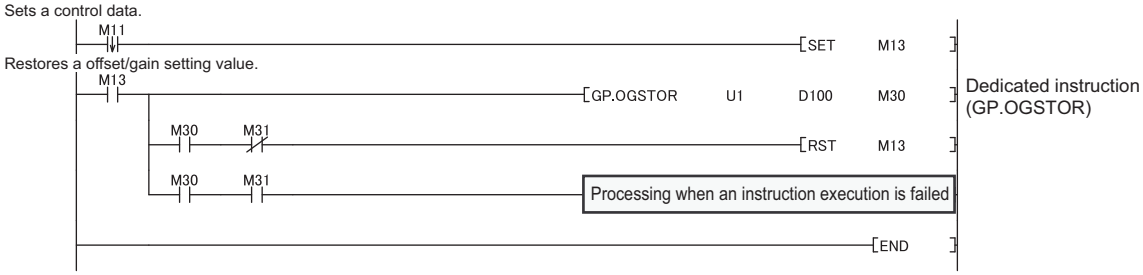
(4) Errors

In the following cases, an error occurs and error code is stored in completion status area Ⓢ+1.

Error code	Description of operation error
161	G(P).OGSTOR instruction is executed in 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 programs to write the offset/gain setting value to the Q64ADH, installed in I/O number X/Y10 to X/Y1F, by turning OFF M11.



Appendix 2 Added and Modified Functions

Appendix 2.1 Added function

The following table shows the function added to the Q64ADH and GX Works2, and product information on the Q64ADH and GX Wroks2 software versions supporting the added function.

Added function	First five digits of the product information on the Q64ADH that supports the function	GX Works2 version that supports the function	Reference
Logging function in the high-speed logging mode	18031 or later*1	1.545T or later	Page 82, Section 4.15

*1 The Q64ADH with the production information (first five digits) of 18032 or later supports the function.

Appendix 2.2 Modified function

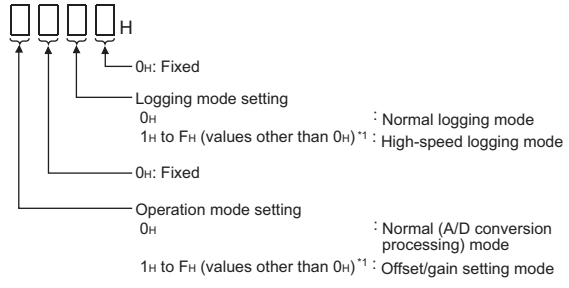
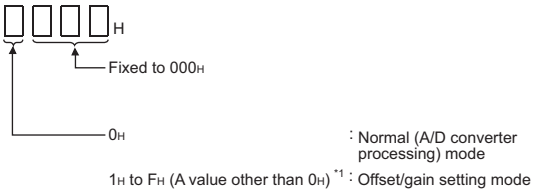
The following table shows the function modified in the Q64ADH and GX Works2, and product information on the Q64ADH and GX Wroks2 software versions supporting the modified function.

Modified function	First five digits of the product information on the Q64ADH that supports the function	GX Works2 version that supports the function	Reference
Intelligent function module switch setting switch 4	18031 or later*1	1.545T or later	Page 269, Appendix 2.2 (1)

*1 The Q64ADH with the production information (first five digits) of 18032 or later supports the function.

(1) Intelligent function module switch setting switch 4

Logging mode setting is added.

The Q64ADH with the product information whose first five digits is 18031 or later	The Q64ADH with the product information whose first five digits is 18030 or earlier
	

(a) When using the Q64ADH not supporting the function

Logging mode setting cannot be made. To use a version of the Q64ADH not supporting the function, do not change the setting for the 2nd digit from the right end of switch 4 from the default value.

Appendix 3 When Using GX Developer

This chapter describes the operating procedure when using GX Developer.

When using GX Developer, configure the initial settings and the auto refresh settings with the sequence program.

- Program example when not using the parameter of intelligent function module (☞Page 189, Section 9.2.2, Page 201, Section 9.3.2)

(1) Compatible software version

For compatible software version, refer to the following.

- Applicable software packages (☞Page 18, Section 2.1 (4))

Appendix 3.1 Operation of GX Developer

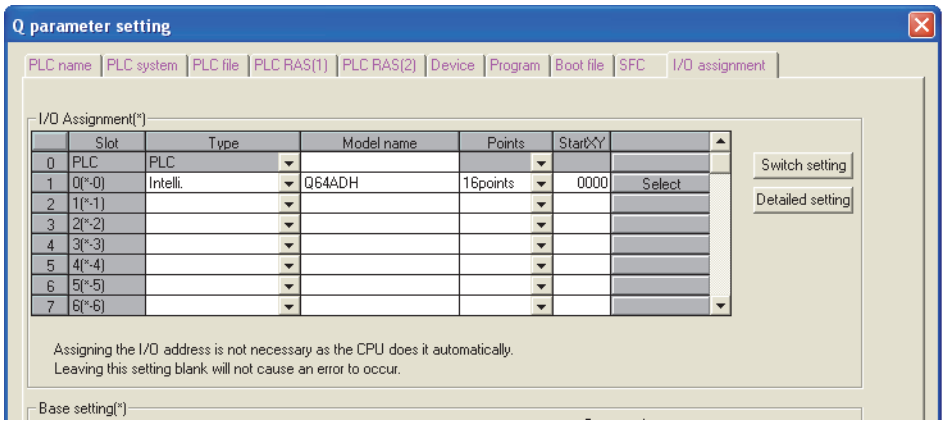
Configure the setting on the following screen when using GX Developer.

Screen name	Application	Reference
I/O assignment	Set the type of module to be installed and the range of I/O signal.	Page 270, Appendix 3.1 (1)
Switch setting	Configure the switch setting of an intelligent function module.	Page 271, Appendix 3.1 (2)
Offset/gain setting	Configure the setting when using the user range setting for the input range.	Page 178, Section 8.5.2

(1) I/O assignment

Configure the setting from "I/O assignment" in "PLC parameter".

Parameter ⇨ [PLC parameter] ⇨ [I/O assignment]

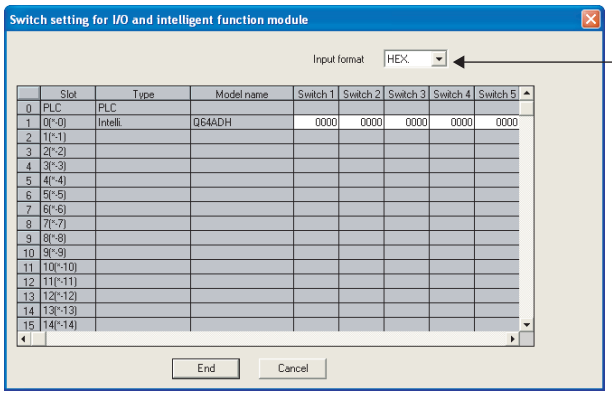


Item	Description
Type	Select "Intelli.".
Model name	Enter the model name of the module.
Points	Select "16points".
Start XY	Enter a desired start I/O number of the Q64ADH.

(2) Intelligent function module switch setting

Configure the setting from "Switch setting" in "PLC parameter".

Parameter ⇨ [PLC parameter] ⇨ [I/O assignment] ⇨ Click the Switch setting button.

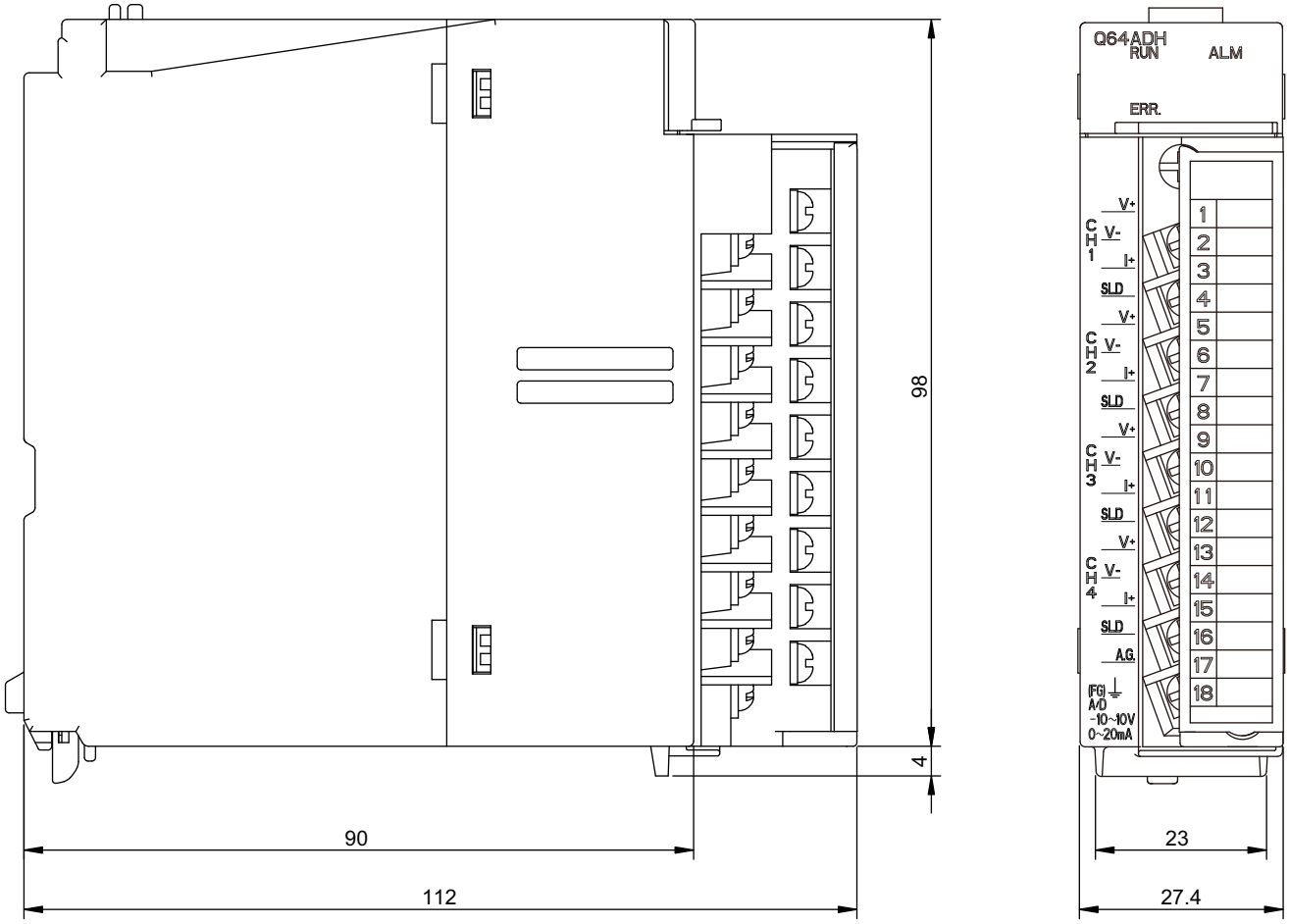


Item	Setting range		
Switch1	Input range setting (CH1 to CH4) □ □ □ □ H CH4 CH3 CH2 CH1	**Analog input range**	**Input range setting**
		4 to 20mA	0_H
		0 to 20mA	1_H
		1 to 5V	2_H
		0 to 5V	3_H
		-10 to 10V	4_H
		0 to 10V	5_H
		4 to 20mA (Extended mode)	A_H
		1 to 5V (Extended mode)	B_H
		User range setting	F_H
Switch2	0: Fixed (blank)		
Switch3	0: Fixed (blank)		
Switch4	□ □ □ □ H 0H:Fixed Logging mode setting 0H :Normal logging mode 1H to FH (values other than 0H)*1 :High-speed logging mode 0H:Fixed Operation mode setting 0H :Normal (A/D conversion processing) mode 1H to FH (values other than 0H)*1 :Offset/gain setting mode		
Switch5	0: Fixed (blank)		

*1 The operation is the same when any value within the setting range is set.

Appendix 4 External Dimensions

The following shows the external dimensions of the Q64ADH.



(Unit: mm)

Memo

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A

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REVISIONS

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

Print date	*Manual number	Revision
December 2011	SH(NA)-080987ENG-A	First edition
March 2016	SH(NA)-080987ENG-B	Correction COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES, Section 2.1, 2.2, 3.2.1, 4.7, 4.11, 4.12, 4.14, 7.3, Chapter 8, Section 8.3, 9.2, 9.2.1, 9.3, 9.3.1, Chapter 10, Section 10.1 to 10.10, Appendix 2, Appendix 4 Deletion Appendix 3
July 2016	SH(NA)-080987ENG-C	Correction TERMS, Section 1.1, 3.2.1, 3.2.4, 3.3, 4.2, 4.4, 4.6 to 4.14, 4.16, 5.2.1, 5.2.2, 6.1, 6.2, 8.2, 8.3, 9.2, 9.2.1, 9.3, 11.1, Appendix 1.1, Appendix 3.1 Addition Section 4.1, 4.15, Appendix 2
November 2016	SH(NA)-080987ENG-D	Correction Appendix 2.1, Appendix 2.2

Japanese manual version SH-080986-D

WARRANTY

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

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

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

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.

1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

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

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

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

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

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

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

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

5. Changes in product specifications

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

TRADEMARKS

The company names, system names and product names mentioned in this manual are either registered trademarks or trademarks of their respective companies.
In some cases, trademark symbols such as '™' or '®' are not specified in this manual.

SH(NA)-080987ENG-D(1611)MEE
MODEL: Q64ADH-U-E
MODEL CODE: 13JZ59

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS : 1-14 , YADA-MINAMI 5-CHOME , HIGASHI-KU, NAGOYA , JAPAN