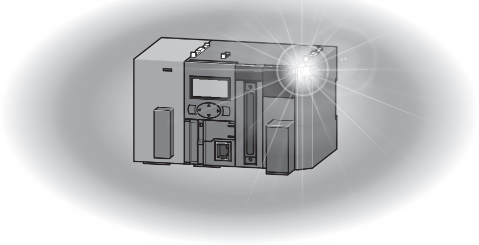
Mitsubishi Programmable Controller

MELSEC-L Multiple Input (Voltage/Current/Temperature) Module User's Manual

-L60MD4-G



●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" (R) of the buffer memory in the intelligent function module.
  Also, do not use any "use prohibited" signals as an output signal from the programmable controller CPU to the intelligent function module.
  Doing so may cause malfunction of the programmable controller system.

[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]

⚠WARNING

- Shut off the external power supply (all phases) used in the system before mounting or removing a module. Failure to do so may result in electric shock or cause the module to fail or malfunction.

[Installation Precautions]

⚠CAUTION

- Use the programmable controller in an environment that meets the general specifications in the Safety Guidelines provided with the CPU module or head module. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To interconnect modules, engage the respective connectors and securely lock the module joint levers until they click. Incorrect interconnection may cause malfunction, failure, or drop of the module.
- Tighten the screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Do not directly touch any conductive parts and electronic components of the module. Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠WARNING

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

[Wiring Precautions]

⚠CAUTION

- Tighten the terminal block screws within the specified torque range. Undertightening can cause short circuit, fire, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Prevent foreign matter such as dust or wire chips from entering the module. Such foreign matter can cause a fire, failure, or malfunction.
- A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring. Do not remove the film during wiring. Remove it for heat dissipation before system operation.
- Mitsubishi programmable controllers must be installed in control panels. Connect the main power supply to the power supply module in the control panel through a relay terminal block. Wiring and replacement of a power supply module must be performed by qualified maintenance personnel with knowledge of protection against electric shock. For wiring methods, refer to the MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection).

[Startup and Maintenance Precautions]

⚠WARNING

- Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
- Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal block screws. Failure to do so may result in electric shock.

[Startup and Maintenance Precautions]

⚠CAUTION

- Do not disassemble or modify the module. 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 a module. Failure to do so may cause the module to fail or malfunction.
- Tighten the terminal block screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- After the first use of the product (module, display unit, and terminal block), do not connect/disconnect the product more than 50 times (in accordance with IEC 61131-2). Exceeding the limit may cause malfunction.
- Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Failure to do so may cause the module to fail or malfunction.

[Disposal Precautions]

⚠CAUTION

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

●CONDITIONS OF USE FOR THE PRODUCT●

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

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries. MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT. ("Prohibited Application")

- 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-L series programmable controllers.
This manual describes the functions and programming of the multiple input (voltage/current/temperature) module.

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

Relevant module: L60MD4-G

Remark

- Unless otherwise specified, this manual describes the program examples in which the I/O numbers of X/Y00 to X/Y0F are assigned for a multiple input module.
  For I/O number assignment, refer to the following.
  📖MELSEC-L CPU Module 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 171, Appendix 6)

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.

- 📖MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)
- 📖MELSEC-L CC-Link IE Field Network Head Module User's Manual
- Safety Guidelines (This manual is included with the CPU module or head module.)

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 the EMC and Low Voltage Directives.

RELEVANT MANUALS

(1) CPU module user's manual

Manual name manual number (model code)	Description
MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection) SH-080890ENG, 13JZ36	Specifications of the CPU modules, power supply modules, display unit, branch module, extension module, SD memory cards, and batteries, information on how to establish a system, maintenance and inspection, and troubleshooting
MELSEC-L CPU Module User's Manual (Function Explanation, Program Fundamentals) SH-080889ENG, 13JZ35	Functions and devices of the CPU module, and programming

(2) Head module User's Manual

Manual name manual number (model code)	Description
MELSEC-L CC-Link IE Field Network Head Module User's Manual SH-080919ENG, 13JZ48	Specifications, procedures before operation, system configuration, installation, wiring, settings, and troubleshooting of the head module

(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 of GX Works2, which are common to Simple projects and Structured projects
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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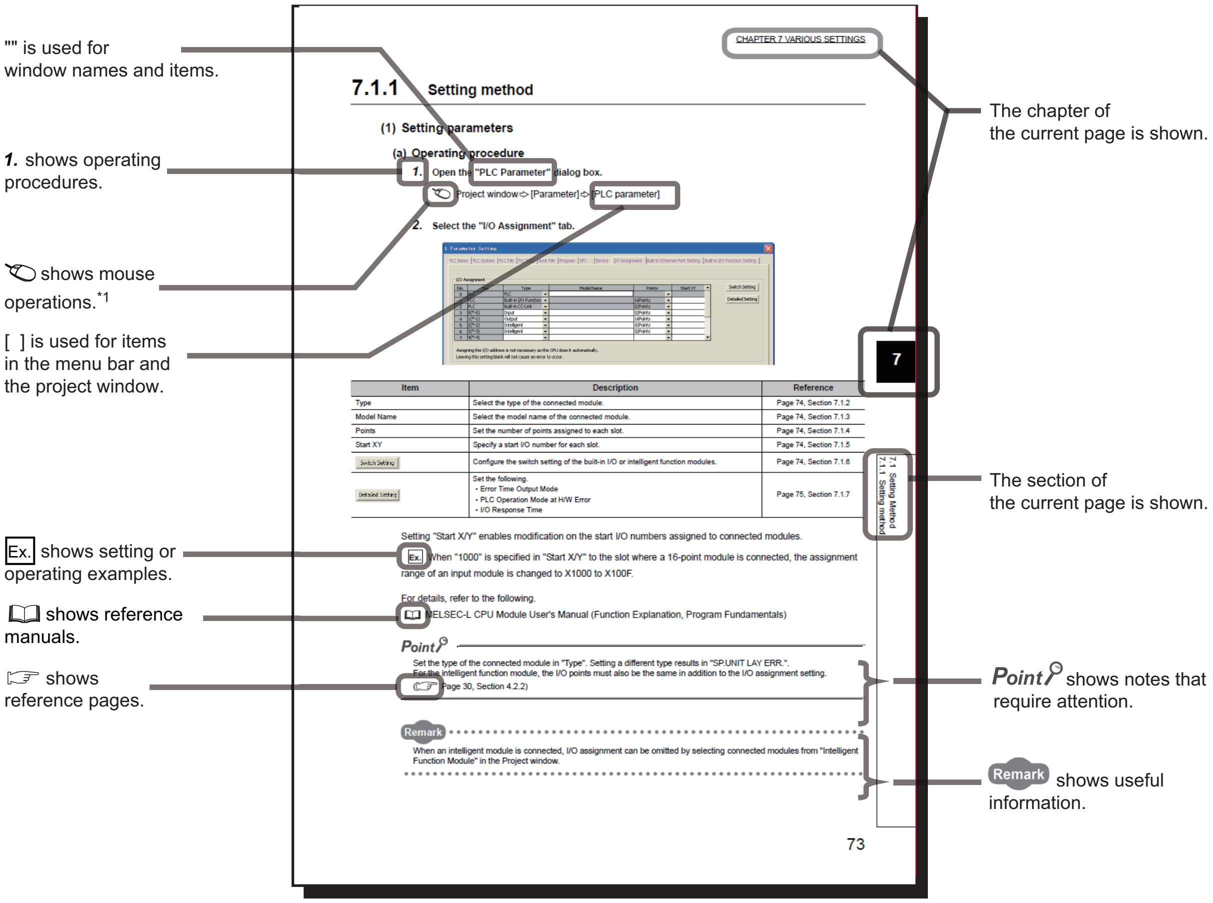
MANUAL PAGE ORGANIZATION

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.



"" is used for window names and items.

1. shows operating procedures.

🖱 shows mouse operations.[*1]

[ ] is used for items in the menu bar and the project window.

Ex. shows setting or operating examples.

📖 shows reference manuals.

☞ shows reference pages.

The chapter of the current page is shown.

The section of the current page is shown.

Point shows notes that require attention.

Remark shows useful information.

CHAPTER 7 VARIOUS SETTINGS

7.1.1 Setting method

(1) Setting parameters

(a) Operating procedure

1. Open the "PLC Parameter" dialog box.

🖱 Project window ⇨ [Parameter] ⇨ [PLC parameter]

2. Select the "I/O Assignment" tab.

Assigning the I/O address is not necessary as the CPU does it automatically.
Leaving this setting blank will not cause an error to occur.

Item	Description	Reference
Type	Select the type of the connected module.	Page 74, Section 7.1.2
Model Name	Select the model name of the connected module.	Page 74, Section 7.1.3
Points	Set the number of points assigned to each slot.	Page 74, Section 7.1.4
Start XY	Specify a start I/O number for each slot.	Page 74, Section 7.1.5
Switch Setting	Configure the switch setting of the built-in I/O or intelligent function modules.	Page 74, Section 7.1.6
Detailed Setting	Set the following. • Error Time Output Mode • PLC Operation Mode at H/W Error • I/O Response Time	Page 75, Section 7.1.7

Setting "Start X/Y" enables modification on the start I/O numbers assigned to connected modules.

Ex. When "1000" is specified in "Start X/Y" to the slot where a 16-point module is connected, the assignment range of an input module is changed to X1000 to X100F.

For details, refer to the following.

📖 MELSEC-L CPU Module User's Manual (Function Explanation, Program Fundamentals)

Point

Set the type of the connected module in "Type". Setting a different type results in "SP.UNIT LAY ERR.".
For the intelligent function module, the I/O points must also be the same in addition to the I/O assignment setting.
(☞ Page 30, Section 4.2.2)

Remark

When an intelligent module is connected, I/O assignment can be omitted by selecting connected modules from "Intelligent Function Module" in the Project window.

7.1 Setting Method
7.1.1 Setting method

7

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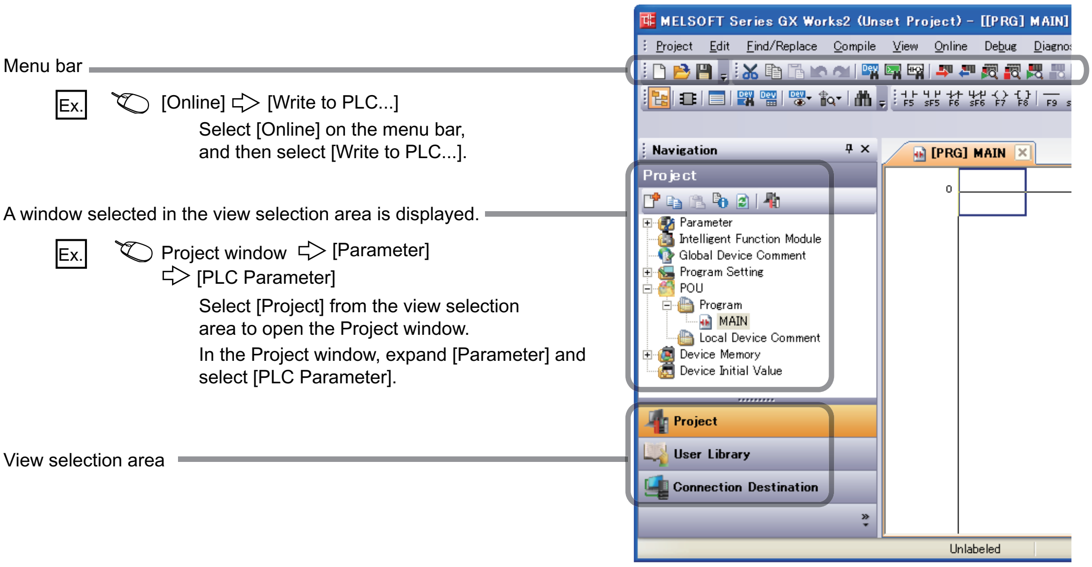
Parameter Setting
PLC Name
PLC System
PLC File
Boot File
Program
SFC
Device
I/O Assignment
Built-in Ethernet Port Setting
Built-in I/O Function Setting
No.
Slot
Type
Model Name
Points
Start XY
Switch Setting
Detailed Setting

[*1] The mouse operation example (for GX Works2) is provided below.



Menu bar

Ex. 🖱 [Online] ⇨ [Write to PLC...]
Select [Online] on the menu bar, and then select [Write to PLC...].

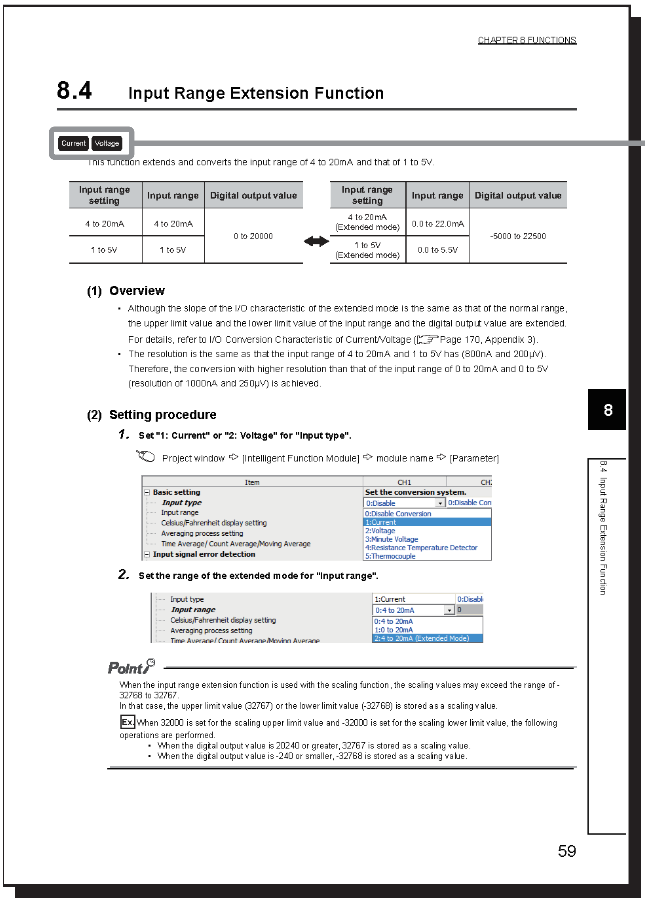
A window selected in the view selection area is displayed.

Ex. 🖱 Project window ⇨ [Parameter] ⇨ [PLC Parameter]
Select [Project] from the view selection area to open the Project window.
In the Project window, expand [Parameter] and select [PLC Parameter].

View selection area

MELSOFT Series GX Works2 (Unset Project) - [[PRG] MAIN]
Project
Edit
Find/Replace
Compile
View
Online
Debug
Diagno
Navigation
Project
Parameter
Intelligent Function Module
Global Device Comment
Program Setting
POU
Program
MAIN
Local Device Comment
Device Memory
Device Initial Value
Project
User Library
Connection Destination
[PRG] MAIN
0
Unlabeled

Pages describing the functions, I/O signals, and buffer memory areas are organized as shown below.
The following illustration is for explanation purpose only, and should not be referred to as an actual documentation.



CHAPTER 8 FUNCTIONS

8.4 Input Range Extension Function

Current Voltage

This function extends and converts the input range of 4 to 20mA and that of 1 to 5V.

Input range setting	Input range	Digital output value
4 to 20mA	4 to 20mA	0 to 20000
1 to 5V	1 to 5V	

↔

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

(1) Overview

- Although the slope of the I/O characteristic of the extended mode is the same as that of the normal range, the upper limit value and the lower limit value of the input range and the digital output value are extended. For details, refer to I/O Conversion Characteristic of Current/Voltage (☞ Page 170, Appendix 3).
- The resolution is the same as that the input range of 4 to 20mA and 1 to 5V has (800nA and 200μV). Therefore, the conversion with higher resolution than that of the input range of 0 to 20mA and 0 to 5V (resolution of 1000nA and 250μV) is achieved.

(2) Setting procedure

1. Set "1: Current" or "2: Voltage" for "Input type".

Project window ➪ [Intelligent Function Module] ➪ module name ➪ [Parameter]

Item
CH1
Basic setting
Set the conversion system.
Input type
0:Disable
Input range
Celsius/Fahrenheit display setting
Averaging process setting
Time Average/ Count Average/Moving Average
Input signal error detection
0:Disable Conversion
1:Current
2:Voltage
3:Minute Voltage
4:Resistance Temperature Detector
5:Thermocouple

2. Set the range of the extended mode for "Input range".

Input type
1:Current
Input range
0:4 to 20mA
Celsius/Fahrenheit display setting
Averaging process setting
0:4 to 20mA
1:0 to 20mA
2:4 to 20mA (Extended Mode)

Point

When the input range extension function is used with the scaling function, the scaling values may exceed the range of -32768 to 32767.
In that case, the upper limit value (32767) or the lower limit value (-32768) is stored as a scaling value.

Ex. When 32000 is set for the scaling upper limit value and -32000 is set for the scaling lower limit value, the following operations are performed.

- When the digital output value is 20240 or greater, 32767 is stored as a scaling value.
- When the digital output value is -240 or smaller, -32768 is stored as a scaling value.

8

8.4 Input Range Extension Function

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Each icon indicates the available input type.

Most of the functions in this module are commonly available regardless of the input type, but some of them may not be available depending on the input type.
Each icon indicates an input type that allows the use of the function, I/O signal, and buffer memory area.

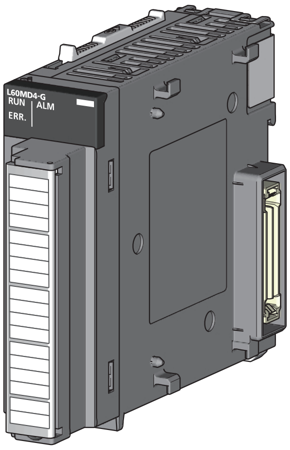
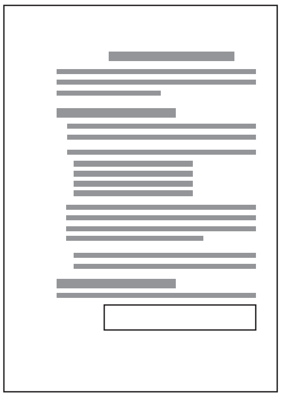
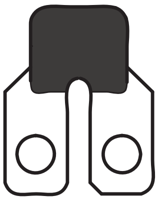
TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
Multiple input	A capability to input analog signals by different input types (voltage, current, micro voltage, resistance temperature detector, and thermocouple) for one channel
Multiple input module	Abbreviation for the MELSEC-L series multiple input (voltage/current/temperature) module
Head module	Abbreviation for the LJ72GF15-T2 CC-Link IE Field Network head module
Display unit	A liquid crystal display to be attached to the CPU module
Programming tool	A generic term for GX Works2 and GX Developer
GX Works2	The product name of the software package for the MELSEC programmable controllers
GX Developer	
Input type	A type of analog signals (voltage, current, and a sensor such as a thermocouple and a resistance temperature detector) to be input to the multiple input module from the outside
Input range	A property that indicates the range of input value when the input type is set to the voltage, current, or micro voltage; indicates the type of resistance temperature detector when the input type is set to the resistance temperature detector; indicates the type of thermocouple when the input type is set to the thermocouple
Conversion	A generic term for processing of converting an analog signal, such as voltage and current, into a digital value, and processing of converting a resistance value and thermoelectromotive force value, which are measured by the resistance temperature detector and thermocouple respectively, into a temperature measured value
Digital output value	A generic term for digital values and temperature measured values converted from analog signals which have been input from the outside
Conversion disabled	The state that Disable Conversion (0000_H) is set in CH□ Input type/range setting (Un\G500 to Un\G503). In this state, the conversion is not performed on the corresponding channel.
Conversion enabled	The state that the input type and input range suitable to the type of sensor connected (value other than Disable conversion (0000_H)) are set in CH□ Input type/range setting (Un\G500 to Un\G503). In this state, the conversion is performed on the corresponding channel.
Buffer memory	A memory in an intelligent function module, where data (such as setting values and monitoring values) exchanged with a CPU module are stored
Watchdog timer error	An error that occurs if the internal processing of the multiple input module fails. The module monitors its own internal processing by using the watchdog timer.

PACKING LIST

The following items are included in the package of this product. Before use, check that all the items are included.

L60MD4-G	
 L60MD4-G	 Before Using the Product
 Cold junction compensation resistor	

CHAPTER 1 MULTIPLE INPUT MODULE

This chapter describes the applications and features of the multiple input module.

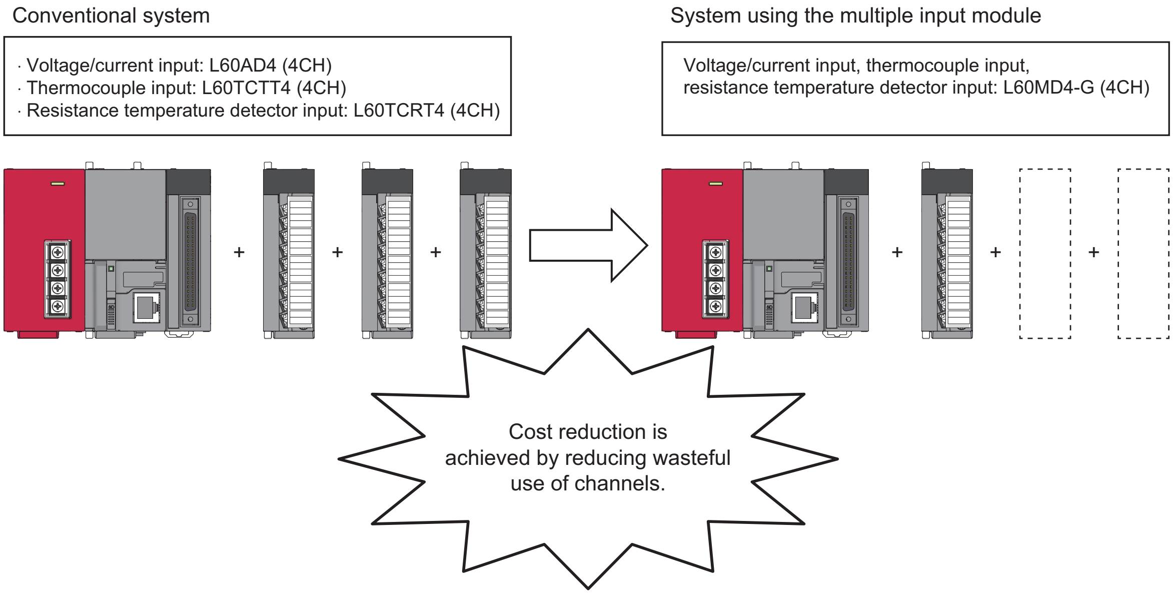
1.1 Application

With the multiple input module, analog signals can be input in five input types: voltage, current, micro voltage, resistance temperature detector, and thermocouple. Also, an input type can be selected for each channel depending on the type of the object to be measured.
With the multiple input module, the following applications are possible.

(1) Reducing the cost for the system

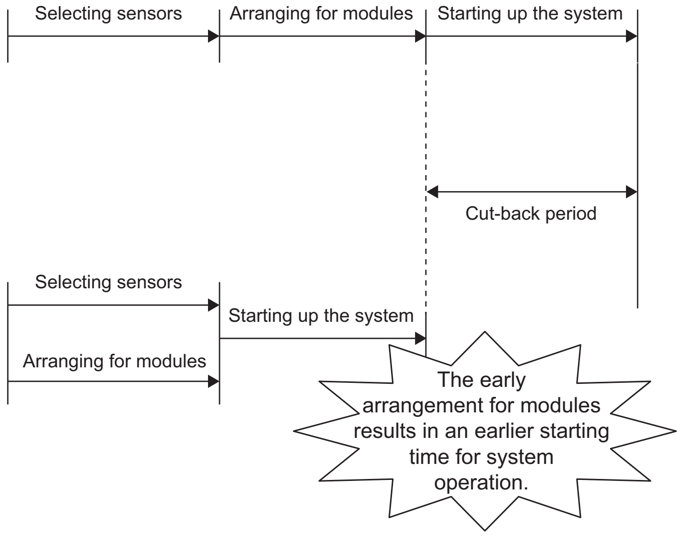
Since different types of sensors can be connected to each channel individually, dedicated modules prepared for each type of sensors can be integrated in one module. Thus, the space and cost for the system can be saved. In addition, the types and quantity of spare items used for module failures can be reduced, reducing the maintenance cost.

Ex. For the system in which the number of channels used for the analog input and temperature input is four channels or less


Conventional system
· Voltage/current input: L60AD4 (4CH)
· Thermocouple input: L60TCTT4 (4CH)
· Resistance temperature detector input: L60TCRT4 (4CH)
System using the multiple input module
Voltage/current input, thermocouple input, resistance temperature detector input: L60MD4-G (4CH)
+
+
+
+
+
+
Cost reduction is achieved by reducing wasteful use of channels.

(2) Shortening the system development period

Since the multiple input module can be connected to sensors of different types, the module can be prepared before sensors are selected. Since the system can be started earlier than before, the time required for the system operation can be shortened.


Selecting sensors
Arranging for modules
Starting up the system
Cut-back period
Selecting sensors
Starting up the system
Arranging for modules
The early arrangement for modules results in an earlier starting time for system operation.

(3) Supporting conventional standard sensors

The multiple input module supports Pt50 and JPt100. Thus, when the equipment using the sensors of Pt50 and JPt100 is updated, the sensors do not need to be changed.

1.2 Features

(1) Scale conversion

This function converts a digital output value to the ratio value (%) in any width to represent the digital value in a numeric value easy to understand.

(2) Comparing and monitoring an object

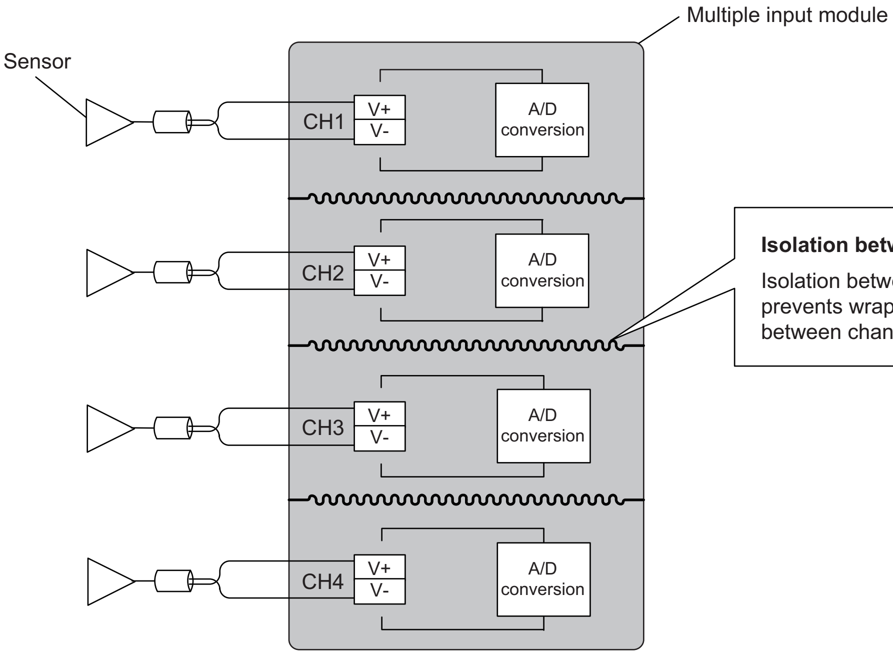
The status of the connected device can be easily monitored by using the disconnection detection function (or input signal error detection function), input range extension function, and warning output function (process alarms and rate alarms).

(3) Switching the Celsius/Fahrenheit display

For the temperature input (thermocouples and resistance temperature detectors), the Celsius/Fahrenheit display of the temperature measured value can be easily switched.

(4) Stable measurement due to the isolation between channels

Channels are isolated, and this eliminates noises from other channels to stable the measurement.


Multiple input module
Sensor
CH1
CH2
CH3
CH4
V+
V-
A/D conversion

Isolation between channels

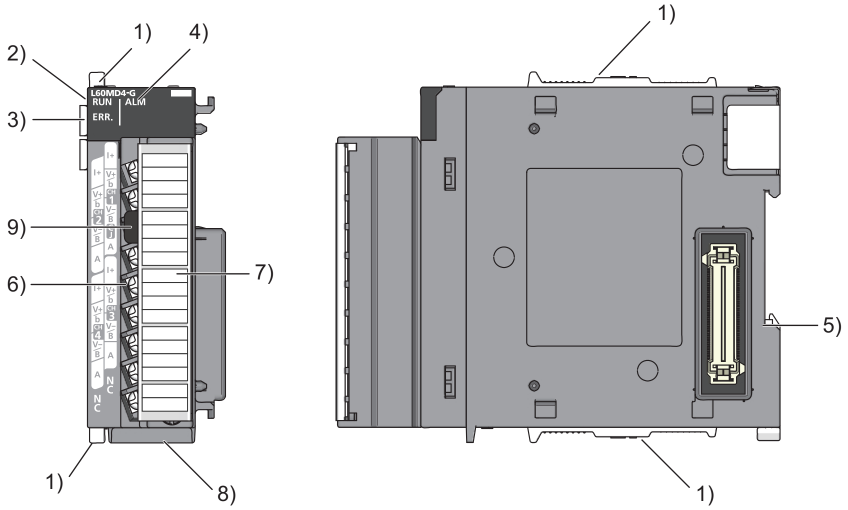
Isolation between channels prevents wrap-around noise between channels.

(5) Easy setting with GX Works2

Programming is reduced because the initial settings or auto refresh settings can be set on the screen. In addition, setting status and operating status of modules can be checked easily.

CHAPTER 2 PART NAMES

The following table shows part names of the multiple input module.



No.	Name	Description
1)	Module joint levers	Levers for connecting modules
2)	RUN LED (green)	Indicates the operating status of the multiple input module. On: The module is operating normally. Off: The 5V power off or watchdog timer error has occurred.
3)	ERR. LED (red)	Indicates the error status of the multiple input module. On: An error has occurred.*1 Off: The module is operating normally.
4)	ALM LED (red)	Indicates the alarm occurrence of the multiple input module. On: A warning (process alarm, rate alarm) has occurred.*2 Flashing: Indicates either of the following statuses. • A disconnection is detected.*2 • An input signal error has been detected.*2 • The thermocouple is selected for the input type and the cold junction compensation resistor (CJ) is not connected to CH1.*4 Off: The module is operating normally.
5)	DIN rail hook	A hook used to mount the module to a DIN rail
6)	Terminal block*3	A 18-point screw terminal block for connecting input signal lines of external devices
7)	Terminal block cover	A cover for preventing electric shock while the power is on
8)	Serial number display	Displays the serial number printed on the rating plate.
9)	Cold junction compensation resistor	A resistance temperature detector used for the cold junction compensation. Connect this resister to CH1 when the thermocouple is selected for the input type.

*1 For details on the list of error codes, refer to the following. (☞ Page 124, Section 11.4)

*2 For details on the list of alarm codes, refer to the following. (☞ Page 126, Section 11.5)

*3 For the signal assignment for the terminal block, refer to the following. (☞ Page 36, Section 6.2 (2))

*4 For details on wiring, refer to the following. (☞ Page 38, Section 6.3)

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CHAPTER 3 SPECIFICATIONS

This chapter describes general specifications, performance specifications, function list, list of I/O signals, and list of buffer memory addresses.

3.1 General Specifications

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

📖The manual "Safety Guidelines" included with the CPU module or head module

3.2 Performance Specifications

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

Item		Model		
		L60MD4-G		
Number of analog input channels		4 channels		
Analog input	Voltage	-10 to 10VDC (input resistance 1MΩ)		
	Current	0 to 20mADC (input resistance 250Ω)		
	Micro voltage	-100 to 100mVDC		
	Thermocouple	Available type	12 types K, J, T, E, N, R, S, B, U, L, PLII, W5Re/W26Re	
		Cold junction compensation resistor	Use the included cold junction compensation resistor (CJ).	
	Resistance temperature detector	Available type	4 types Pt1000, Pt100, JPt100, Pt50	
		Measurement method	3-wire system	
Digital output	Digital output value	Voltage, current, micro voltage	-20480 to 20479	
		Resistance temperature detector Pt100 (-20 to 120℃), JPt100 (-20 to 120℃)	• For Celsius: -2000 to 12000*1 • For Fahrenheit: 0 to 20000 Value rounded off to two decimal places × 100 times	
		Thermocouple, Resistance temperature detector (other than the above)	• For Celsius: -2700 to 23000*1 • For Fahrenheit: -4000 to 32000 Value rounded off to one decimal place × 10 times	
	When using the scaling function	-32768 to 32767		
Resolution	Voltage	Analog input range	Digital output value	Resolution
		0 to 10V	0 to 20000	500µV
		0 to 5V	0 to 20000	250µV
		1 to 5V	0 to 20000	200µV
		-10 to 10V	-20000 to 20000	500µV
		1 to 5V (extended mode)	-5000 to 22500	200µV
	Current	0 to 20mA	0 to 20000	1000nA
		4 to 20mA		800nA
		4 to 20mA (extended mode)	-5000 to 22500	800nA
	Micro voltage	-100 to 100mV	-20000 to 20000	5µV
	Thermocouple*2	B, R, S, N, PLII, W5Re/W26Re: 0.3℃ K, E, J, T, U, L: 0.1℃		
	Resistance temperature detector*3	Pt100 (-20 to 120℃), JPt100 (-20 to 120℃): 0.03℃ Pt100 (-200 to 850℃), JPt100 (-200 to 600℃), Pt1000, Pt50: 0.1℃		
Accuracy *4*7	Voltage/current/micro voltage	Ambient temperature 25±5℃	Maximum value of the measurement range × (±0.3%) (±60 digits)	
		Ambient temperature 0 to 55℃	Maximum value of the measurement range × (±0.9%) (±180 digits)	
	Thermocouple (For details, refer to the following. (☞ Page 165, Appendix 4 (2)))	Ambient temperature 25±5℃	Full scale × (±0.15%)	
		Ambient temperature 0 to 55℃	Full scale × (±0.3%)*8	
	Cold junction compensation resistor*9	Temperature measured value: -100℃ or higher	Within ±1.0℃	
		Temperature measured value: -150℃ to -100℃	Within ±2.0℃	
		Temperature measured value: -200℃ to -150℃	Within ±3.0℃	
	Resistance temperature detector	☞ Page 168, Appendix 4 (3)		
Conversion speed		50ms/channel		

Item	Model
	L60MD4-G
Temperature detecting output current	Pt100, JPt100, Pt50: 1mA, Pt1000: 0.2mA
Absolute maximum input	Voltage: ±15V, Current: 30mA*5
Insulation method	Between input terminals and programmable controller power supply: Photocoupler Between input channels: Transformer
Dielectric withstand voltage	Between input terminals and programmable controller power supply: 500VACrms for 1 minute Between input channels: 500VACrms for 1 minute
Insulation resistance	Between input terminals and programmable controller power supply: 500VDC 10MΩ or higher Between input channels: 500VDC 10MΩ or higher
Disconnection detection	Available*6
Number of occupied I/O points	16 points (I/O assignment: Intelligent 16 points)
External interface	18-point terminal block
Applicable wire size	0.3 to 0.75mm^2
Applicable solderless terminal	R1.25-3 (solderless terminals with sleeve are not usable)
Internal current consumption (5VDC)	0.49A
Weight	0.19kg

*1 This manual describes the temperature in Celsius. To read the temperature in Fahrenheit, refer to the following.
- Accuracy for when a thermocouple is connected (☞ Page 165, Appendix 4 (2))
- Accuracy for when a resistance temperature detector is connected (☞ Page 168, Appendix 4 (3))

*2 For the temperature measuring range of each thermocouple, refer to the following.
- Accuracy for when a thermocouple is connected (☞ Page 165, Appendix 4 (2))

*3 For the temperature measuring range of each resistance temperature detector, refer to the following.
- Accuracy for when a resistance temperature detector is connected (☞ Page 168, Appendix 4 (3))

*4 Except when receiving noise influence.

*5 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.

*6 When the input type in CH□ Input type/range setting (Un\G500 to Un\G503) is a resistance temperature detector, thermocouple, or micro voltage, a disconnection of the connected signal line can be detected. Also, when the input range is 4 to 20mA (extended mode) or 1 to 5V (extended mode), the simple disconnection detection can be executed using the input signal error detection function.
For details on the disconnection detection function and input signal error detection function, refer to the following.
- Disconnection Detection Function (☞ Page 58, Section 8.6)
- Input Signal Error Detection Function (☞ Page 62, Section 8.7)

*7 To acquire sufficient accuracy, a warm-up (conduction) for 15 minutes is required.

*8 The accuracy for when the measured temperature of the type W5Re/W26Re thermocouple is 2000℃ or higher is ±0.5%.

*9 The following table shows the accuracy of the cold junction compensation for when the type T thermocouple or type U thermocouple is used.

Measured temperature	Type T thermocouple	Type U thermocouple
0℃ or higher	±1.0℃	
-100℃ to 0℃	±2.0℃	
-150℃ to -100℃	±3.0℃	
-200℃ to -150℃	±5.0℃	±4.0℃

3.2.1 Number of parameter settings

Set the initial settings of the multiple input module and the parameter settings of the auto refresh setting so that the number of parameters, including those of other intelligent function modules, does not exceed the number of parameters that can be set in a CPU module.

For the maximum number of parameters that can be set in a CPU module (maximum number of parameter settings), refer to the following.

📖MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)

📖MELSEC-L CC-Link IE Field Network Head Module User's Manual

(1) Number of parameters of the multiple input module

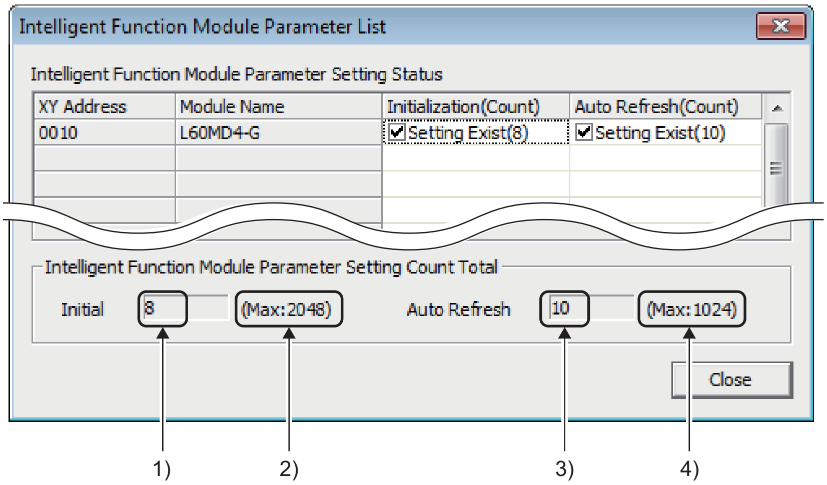
The following number of parameters can be set in a single multiple input module.

Target module	Initial setting	Auto refresh setting
L60MD4-G	8	23 (maximum)

(2) Checking method

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

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



Intelligent Function Module Parameter List

Intelligent Function Module Parameter Setting Status

XY Address	Module Name	Initialization(Count)	Auto Refresh(Count)
0010	L60MD4-G	☑Setting Exist(8)	☑Setting Exist(10)

Intelligent Function Module Parameter Setting Count Total

Initial 8 (Max:2048)

Auto Refresh 10 (Max:1024)

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

3.3 Function List

The following table lists the functions of the multiple input module.

Item			Description	Reference
Temperature conversion function			By connecting a thermocouple or resistance temperature detector, the temperature data can be imported.	-
Celsius/Fahrenheit display switching function			Celsius or Fahrenheit can be selected as the display unit of the temperature measured value imported using the temperature conversion function.	Page 156, Appendix 2 (22)
Voltage/current/micro voltage conversion function			A voltage of -10 to 10V, current of 0 to 20mA, and micro voltage of -100 to 100mV are converted and stored in the buffer memory.	-
Input type/range setting			The input type and input range that are to be used can be selected for each channel. Disabling the conversion for unused channels reduces the conversion cycles.	Page 49, Section 8.2
Conversion method	Sampling processing		Analog input values and temperature input values are converted at every sampling cycle and stored in the buffer memory as digital output values.	Page 52, Section 8.3 (1)
	Averaging processing	Time average	The conversion is performed for a set period of time and averaging processing is performed on the total value excluding the maximum and minimum values. The values obtained in averaging processing are stored in the buffer memory. The number of processing times within a set period of time changes depending on the number of channels where the conversion is enabled.	Page 52, Section 8.3 (2) (a)
		Count average	The conversion is performed a set number of times and averaging processing is performed on the total value excluding the maximum and minimum values. The values obtained in averaging processing are stored in the buffer memory. The time taken to store the average value obtained by the average processing in the buffer memory area changes depending on the number of channels where the conversion is enabled.	Page 53, Section 8.3 (2) (b)
		Moving average	The average of a specified number of digital output values is calculated at every sampling cycle and is stored in the buffer memory. Because the target range for averaging processing is moved in response to every sampling processing, the latest digital output value can be obtained.	Page 54, Section 8.3 (2) (c)
Input range extension function			This function extends the input range of 4 to 20mA and that of 1 to 5V. In combination with the input signal error detection function, this function allows a simple disconnection detection.	Page 56, Section 8.4
Maximum value/minimum value hold function			This function stores the maximum digital value and minimum digital output value in the buffer memory for each channel. When the scaling function is used, the maximum scaling value and minimum scaling value are stored.	Page 57, Section 8.5
Disconnection detection function			This function outputs an alarm at disconnection detection of the external wiring, provided that the input type is a thermocouple, resistance temperature detector, or micro voltage. The digital output value at the disconnection detection can be selected from the following values. • Value just before disconnection • Up scale • Down scale • Optional value	Page 58, Section 8.6
Input signal error detection function			This function outputs an alarm at the time when an analog input value exceeds a preset range, provided that the input type is voltage or current.	Page 62, Section 8.7
Warning output function	Process alarm		When a digital output value falls within a preset warning output range, a warning is output. With the scaling function used, the scaling value is the warning detection target.	Page 69, Section 8.8 (1)
	Rate alarm		When the change rate of a digital output value is larger than the rate alarm upper limit value or smaller than the rate alarm lower limit value, a warning is output.	Page 71, Section 8.8 (2)
Scaling function			This function performs the scale conversion on digital output values. The values are converted within the range between a specified scaling upper limit value and scaling lower limit value. This function reduces the time and effort to create a program of the scale conversion.	Page 77, Section 8.9
Error log function			This function stores the errors and alarms that occurred in the multiple input module in the buffer memory area. A total of 16 errors and alarms can be stored.	Page 83, Section 8.10
Module error collection function			This function collects the errors and alarms that occurred in the multiple input module and stores them in the CPU module.	Page 86, Section 8.11
Error clear function			This function allows clearing of errors through the system monitor at the occurrence of an error.	Page 87, Section 8.12

(1) Correspondence between the disconnection detection function/input signal error detection function and each input type/input range

Depending on the input type and input range used, the disconnection detection function or input signal error detection function can be used.

Input type	Input range	Disconnection detection function	Input signal error detection function			
			Upper and lower detection	Lower detection	Upper detection	Simple disconnection detection
Current	4 to 20mA	×	○	○	○	×
	0 to 20mA					
	4 to 20mA (extended mode)					○
Voltage	1 to 5V	×	○	○	○	×
	0 to 5V					
	-10 to 10V					
	0 to 10V					
	1 to 5V (extended mode)					○
Micro voltage	-100 to 100mV	○	×			
Resistance temperature detector	Common to all input ranges	○	×			
Thermocouple	Common to all input ranges	○	×			

3.4 List of I/O Signals

The following table lists the I/O signals of the multiple input module.

For details of the I/O signals, refer to the following.

- Details of I/O Signals (☞ Page 133, Appendix 1)

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	Disconnection detection signal	Y6	
X7	Use prohibited	Y7	
X8	Warning output signal	Y8	
X9	Operating condition setting completed flag	Y9	Operating condition setting request
XA	Use prohibited	YA	Use prohibited
XB		YB	
XC	Input signal error detection signal	YC	
XD	Maximum value/minimum value reset completed flag	YD	Maximum value/minimum value reset request
XE	Conversion completed flag	YE	Use prohibited
XF	Error flag	YF	Error clear request

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- The I/O number (X/Y) described above shows the case that the start I/O number of the multiple input module is set to "0".
- Do not use the "Use prohibited" signals shown above because the system uses them.
  If users use (turn on) the signals, the functions of the multiple input module cannot be guaranteed.

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3.5 List of Buffer Memory Addresses

The following table lists the buffer memory addresses of the multiple input module.

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

- Details of Buffer Memory Addresses (☞ Page 139, Appendix 2)

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Do not write data to the system areas and read-only areas in the buffer memory.
Writing data to these areas may cause malfunction of the module.

(1) Un\G0 to Un\G1799

Address (decimal)	Address (hexadecimal)	Name	Default value*1	Read/Write*2	Item enabled by turning on and off Operating condition setting request (Y9)
0	0_H	System area	-	-	-
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 9	5_H to 9_H	System area	-	-	-
10	A_H	Conversion completed flag	0000_H	R	-
11	B_H	CH1 Digital output value	0	R	-
12	C_H	CH2 Digital output value	0	R	-
13	D_H	CH3 Digital output value	0	R	-
14	E_H	CH4 Digital output value	0	R	-
15 to 18	F_H to 12_H	System area	-	-	-
19	13_H	Latest error code	0	R	-
20 to 23	14_H to 17_H	System area	-	-	-
24	18_H	Averaging process setting	0000_H	R/W	○
25 to 29	19_H to $1D_H$	System area	-	-	-
30	$1E_H$	CH1 Maximum value	0	R	-
31	$1F_H$	CH1 Minimum value	0	R	-
32	20_H	CH2 Maximum value	0	R	-
33	21_H	CH2 Minimum value	0	R	-
34	22_H	CH3 Maximum value	0	R	-
35	23_H	CH3 Minimum value	0	R	-
36	24_H	CH4 Maximum value	0	R	-
37	25_H	CH4 Minimum value	0	R	-
38 to 46	26_H to $2E_H$	System area	-	-	-
47	$2F_H$	Disconnection detection flag	0000_H	R	-
48	30_H	Warning output setting	$0F0F_H$	R/W	○
49	31_H	Input signal error detection flag	0000_H	R	-
50	32_H	Warning output flag (process alarm)	0000_H	R	-
51	33_H	Warning output flag (rate alarm)	0000_H	R	-
52	34_H	System area	-	-	-
53	35_H	Scaling enable/disable setting	$000F_H$	R/W	○

Address (decimal)	Address (hexadecimal)	Name	Default value[*1]	Read/Write[*2]	Item enabled by turning on and off Operating condition setting request (Y9)
54	36_H	CH1 Scaling value	0	R	-
55	37_H	CH2 Scaling value	0	R	-
56	38_H	CH3 Scaling value	0	R	-
57	39_H	CH4 Scaling value	0	R	-
58 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	○
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 117	66_H to 75_H	System area	-	-	-
118	76_H	CH1 Rate alarm detection cycle	0	R/W	○
119	77_H	CH2 Rate alarm detection cycle	0	R/W	○
120	78_H	CH3 Rate alarm detection cycle	0	R/W	○
121	79_H	CH4 Rate alarm detection cycle	0	R/W	○
122 to 125	$7A_H$ to $7D_H$	System area	-	-	-
126	$7E_H$	CH1 Rate alarm upper limit value	0	R/W	○
127	$7F_H$	CH1 Rate alarm lower limit value	0	R/W	○
128	80_H	CH2 Rate alarm upper limit value	0	R/W	○
129	81_H	CH2 Rate alarm lower limit value	0	R/W	○
130	82_H	CH3 Rate alarm upper limit value	0	R/W	○
131	83_H	CH3 Rate alarm lower limit value	0	R/W	○
132	84_H	CH4 Rate alarm upper limit value	0	R/W	○
133	85_H	CH4 Rate alarm lower limit value	0	R/W	○
134 to 399	86_H to $18F_H$	System area	-	-	-

Address (decimal)	Address (hexadecimal)	Name	Default value[*1]	Read/Write[*2]	Item enabled by turning on and off Operating condition setting request (Y9)
400	190_H	Conversion setting at disconnection detection	0000_H	R/W	○
401	191_H	System area	-	-	-
402	192_H	Input signal error detection setting	0000_H	R/W	○
403	193_H	System area	-	-	-
404	194_H	CH1 Conversion setting value at disconnection detection	0	R/W	○
405	195_H	CH2 Conversion setting value at disconnection detection	0	R/W	○
406	196_H	CH3 Conversion setting value at disconnection detection	0	R/W	○
407	197_H	CH4 Conversion setting value at disconnection detection	0	R/W	○
408 to 411	198_H to $19B_H$	System area	-	-	-
412	$19C_H$	CH1 Input signal error detection setting value	50	R/W	○
413	$19D_H$	CH2 Input signal error detection setting value	50	R/W	○
414	$19E_H$	CH3 Input signal error detection setting value	50	R/W	○
415	$19F_H$	CH4 Input signal error detection setting value	50	R/W	○
416 to 499	$1A0_H$ to $1F3_H$	System area	-	-	-
500	$1F4_H$	CH1 Input type/range setting	0000_H	R/W	○
501	$1F5_H$	CH2 Input type/range setting	0000_H	R/W	○
502	$1F6_H$	CH3 Input type/range setting	0000_H	R/W	○
503	$1F7_H$	CH4 Input type/range setting	0000_H	R/W	○
504 to 507	$1F8_H$ to $1FB_H$	System area	-	-	-
508	$1FC_H$	CH1 Celsius/Fahrenheit display setting	0	R/W	○
509	$1FD_H$	CH2 Celsius/Fahrenheit display setting	0	R/W	○
510	$1FE_H$	CH3 Celsius/Fahrenheit display setting	0	R/W	○
511	$1FF_H$	CH4 Celsius/Fahrenheit display setting	0	R/W	○
512 to 515	200_H to 203_H	System area	-	-	-
516	204_H	CH1 Input type/range monitor	0000_H	R	-
517	205_H	CH2 Input type/range monitor	0000_H	R	-
518	206_H	CH3 Input type/range monitor	0000_H	R	-
519	207_H	CH4 Input type/range monitor	0000_H	R	-
520 to 523	208_H to $20B_H$	System area	-	-	-
524	$20C_H$	CH1 Celsius/Fahrenheit monitor	0	R	-
525	$20D_H$	CH2 Celsius/Fahrenheit monitor	0	R	-
526	$20E_H$	CH3 Celsius/Fahrenheit monitor	0	R	-
527	$20F_H$	CH4 Celsius/Fahrenheit monitor	0	R	-
528 to 1699	210_H to $6A3_H$	System area	-	-	-
1700	$6A4_H$	CH1 Conversion status	0	R	-
1701	$6A5_H$	CH2 Conversion status	0	R	-
1702	$6A6_H$	CH3 Conversion status	0	R	-
1703	$6A7_H$	CH4 Conversion status	0	R	-
1704 to 1799	$6A8_H$ to 707_H	System area	-	-	-

[*1] The default value is a value to be set after power-on or after resetting the CPU module.

[*2] This column shows whether or not data can be read or written through programs.
R: Readable
W: Writable

(2) Error history (Un\G1800 to Un\G61439)

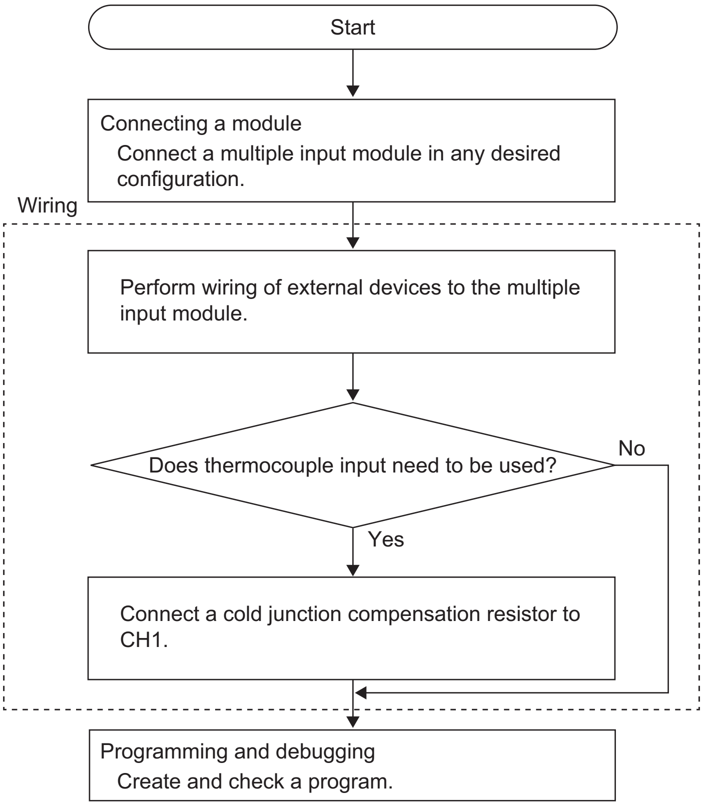
Address (decimal)	Address (hexadecimal)	Name				Default value[*1]	Read/Write[*2]	Item enabled by turning on and off Operating condition setting request (Y9)
1800	708_H	Latest address of error history				0	R	-
1801 to 1809	709_H to 711_H	System area				-	-	-
1810	712_H	No.1	Error code			0	R	-
1811	713_H		Error time	First two digits of the year	Last two digits of the year	0	R	-
1812	714_H			Month	Day	0	R	-
1813	715_H			Hour	Minute	0	R	-
1814	716_H			Second	Day of the week	0	R	-
1815 to 1819	717_H to $71B_H$		System area			-	-	-
1820 to 1829	$71C_H$ to 725_H	No.2	Same as No. 1					-
1830 to 1839	726_H to $72F_H$	No.3	Same as No. 1					-
1840 to 1849	730_H to 739_H	No.4	Same as No. 1					-
1850 to 1859	$73A_H$ to 743_H	No.5	Same as No. 1					-
1860 to 1869	744_H to $74D_H$	No.6	Same as No. 1					-
1870 to 1879	$74E_H$ to 757_H	No.7	Same as No. 1					-
1880 to 1889	758_H to 761_H	No.8	Same as No. 1					-
1890 to 1899	762_H to $76B_H$	No.9	Same as No. 1					-
1900 to 1909	$76C_H$ to 775_H	No.10	Same as No. 1					-
1910 to 1919	776_H to $77F_H$	No.11	Same as No. 1					-
1920 to 1929	780_H to 789_H	No.12	Same as No. 1					-
1930 to 1939	$78A_H$ to 793_H	No.13	Same as No. 1					-
1940 to 1949	794_H to $79D_H$	No.14	Same as No. 1					-
1950 to 1959	$79E_H$ to $7A7_H$	No.15	Same as No. 1					-
1960 to 1969	$7A8_H$ to $7B1_H$	No.16	Same as No. 1					-
1970 to 61439	$7B2_H$ to $EFFF_H$	System area				-	-	-

[*1] The default value is a value to be set after power-on or after resetting the CPU module.

[*2] This column shows whether or not data can be read or written through programs.
R: Readable
W: Writable

CHAPTER 4 PROCEDURES BEFORE OPERATION

This chapter describes the procedures before operation.


Start
Connecting a module
Connect a multiple input module in any desired configuration.
Wiring
Perform wiring of external devices to the multiple input module.
Does thermocouple input need to be used?
No
Yes
Connect a cold junction compensation resistor to CH1.
Programming and debugging
Create and check a program.

For details on the connection of modules, refer to the following.

- ☞ Page 33, Section 5.1

For wiring, refer to the following.

- ☞ Page 40, Section 6.4

Memo

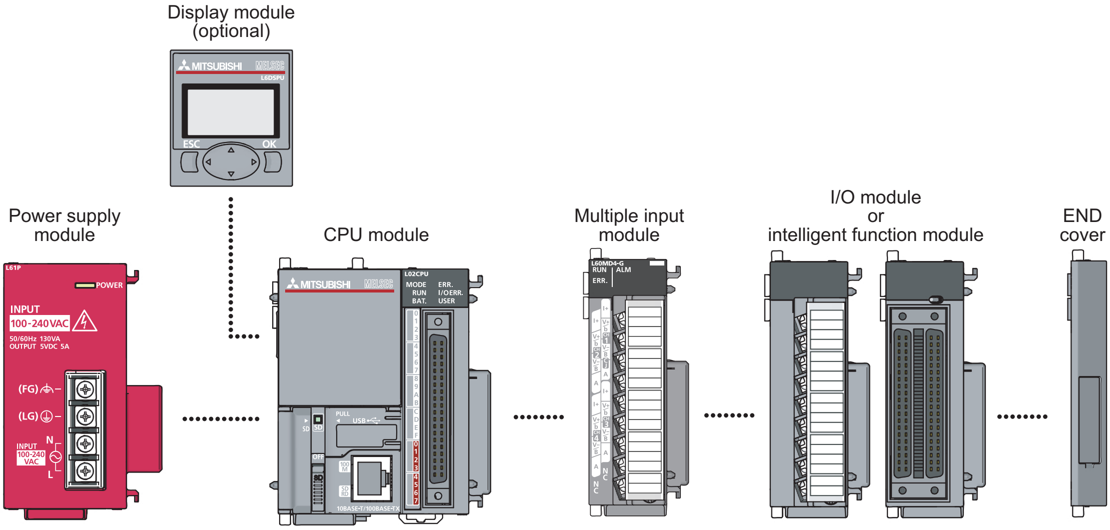
CHAPTER 5 SYSTEM CONFIGURATION

This chapter describes the overall configuration, number of connectable modules, and compatible software version of the multiple input module.

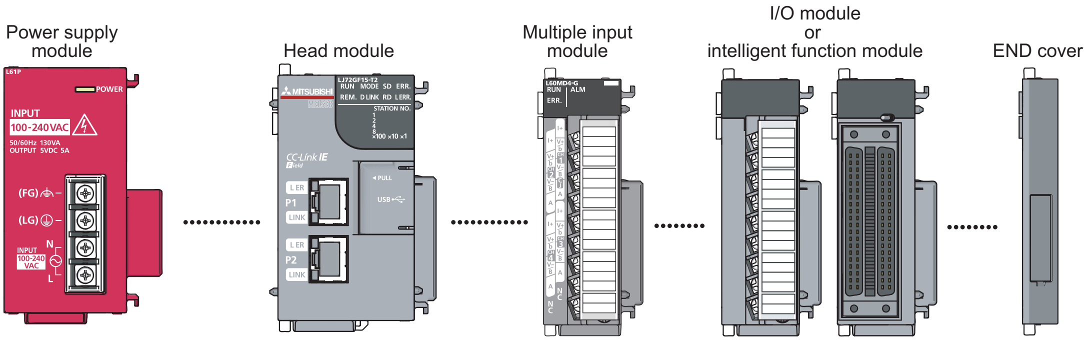
5.1 Overall System Configuration

The following figure shows system configuration examples for using the multiple input module.

(1) When connected to a CPU module


Display module
(optional)
Power supply
module
CPU module
Multiple input
module
I/O module
or
intelligent function module
END
cover

(2) When connected to a head module


Power supply
module
Head module
Multiple input
module
I/O module
or
intelligent function module
END cover

5.2 Applicable System

(1) Number of connectable modules

For the number of connectable modules, refer to the following.

📖MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)

📖MELSEC-L CC-Link IE Field Network Head Module User's Manual

(2) Compatible software version

The following table shows the compatible software versions.

Software	Version
GX Works2	Version 1.513K or later
GX Developer	Version 8.88S or later

(3) Temperature sensor

For available temperature sensors, refer to the following.

☞Page 21, Section 3.2

5.3 Restrictions When Connected to a Head Module

When the multiple input module is used with the head module, function blocks (FBs) in MELSOFT Library cannot be used.

CHAPTER 6 INSTALLATION AND WIRING

6.1 Installation Environment and Installation Position

For precautions for the installation environment and installation position, refer to the following.
📖MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)
📖MELSEC-L CC-Link IE Field Network Head Module User's Manual

6.2 Terminal Block

(1) Precautions

Tighten the terminal block screws within the following specified torque range.

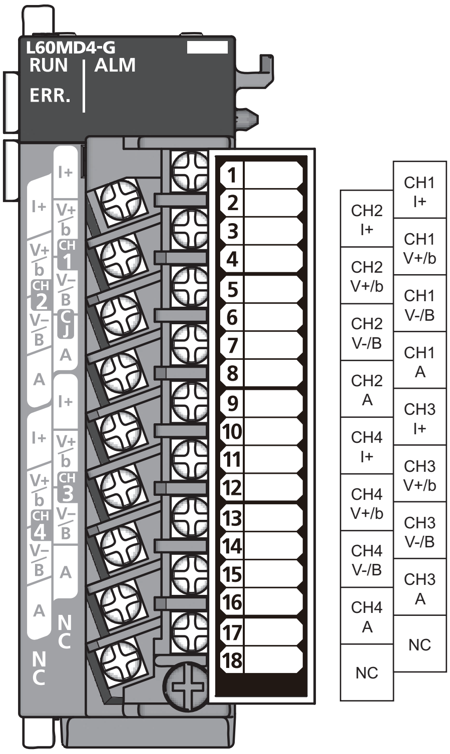
Screw type	Tightening torque range
Terminal screw (M3 screw)	0.42 to 0.58N·m
Terminal block mounting screw (M3.5 screw)	0.66 to 0.89N·m

The following table lists applicable solderless terminals to be connected to the terminal block. When wiring, use applicable wires and an appropriate tightening torque. Use UL-listed solderless terminals and, for processing, use a tool recommended by their manufacturer. A solderless terminal with an insulation sleeve cannot be used.

Solderless terminal		Wire			
Model	Tightening torque	Diameter	Type	Material	Temperature rating
R1.25-3	0.42 to 0.58N·m	22 to 18 AWG	Stranded	Copper	75℃ or higher

(2) Signal names of the terminal block

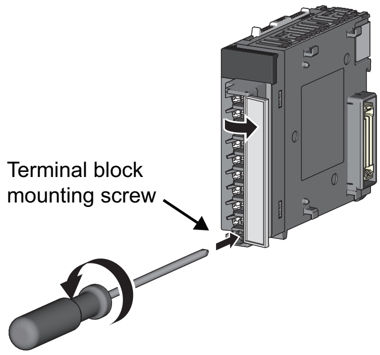
The following table shows signal names of the terminal block.

Terminal block	Pin number	Signal name		Input type			
				Voltage, micro voltage	Current	Thermocouple	Resistance temperature detector
 L60MD4-G RUN ALM ERR. I+ V+ b CH 1 V- B CJ A CH 2 CH 3 CH 4 NC 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 CH1 I+ CH2 I+ CH1 V+/b CH2 V+/b CH1 V-/B CH2 V-/B CH1 A CH2 A CH3 I+ CH4 I+ CH3 V+/b CH4 V+/b CH3 V-/B CH4 V-/B CH3 A CH4 A NC NC	1	CH1	I+	Not used	I+	Not used	Not used
	2	CH2	I+	Not used	I+	Not used	Not used
	3	CH1	V+/b	V+	V+	+	b
	4	CH2	V+/b	V+	V+	+	b
	5	CH1	V-/B	V-	V-	- CJ	B
	6	CH2	V-/B	V-	V-	-	B
	7	CH1	A	Not used	Not used	CJ	A
	8	CH2	A	Not used	Not used	Not used	A
	9	CH3	I+	Not used	I+	Not used	Not used
	10	CH4	I+	Not used	I+	Not used	Not used
	11	CH3	V+/b	V+	V+	+	b
	12	CH4	V+/b	V+	V+	+	b
	13	CH3	V-/B	V-	V-	-	B
	14	CH4	V-/B	V-	V-	-	B
	15	CH3	A	Not used	Not used	Not used	A
	16	CH4	A	Not used	Not used	Not used	A
	17	NC		Not used			
	18	NC		Not used			

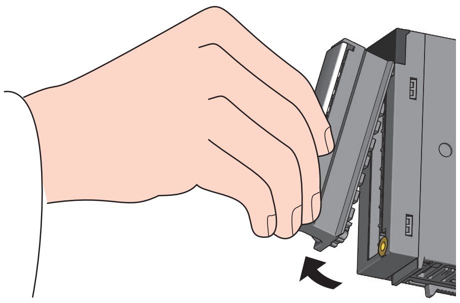
(3) Removing and installing the terminal block

The following procedures show how to remove and install the terminal block.

(a) Removal procedure

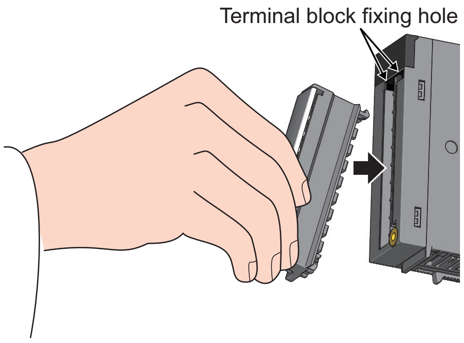

Terminal block
mounting screw

1. **Open the terminal cover and loosen the terminal block mounting screw.**

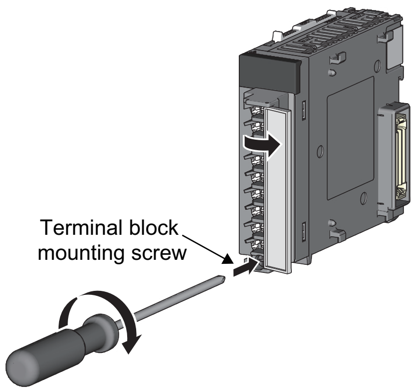


2. **Use the terminal block fixing holes as a fulcrum and remove the terminal block.**

(b) Installation procedure


Terminal block fixing hole

1. **Fully insert the projections on the top of the terminal block into the terminal block fixing holes and press the terminal block until it snaps into place.**

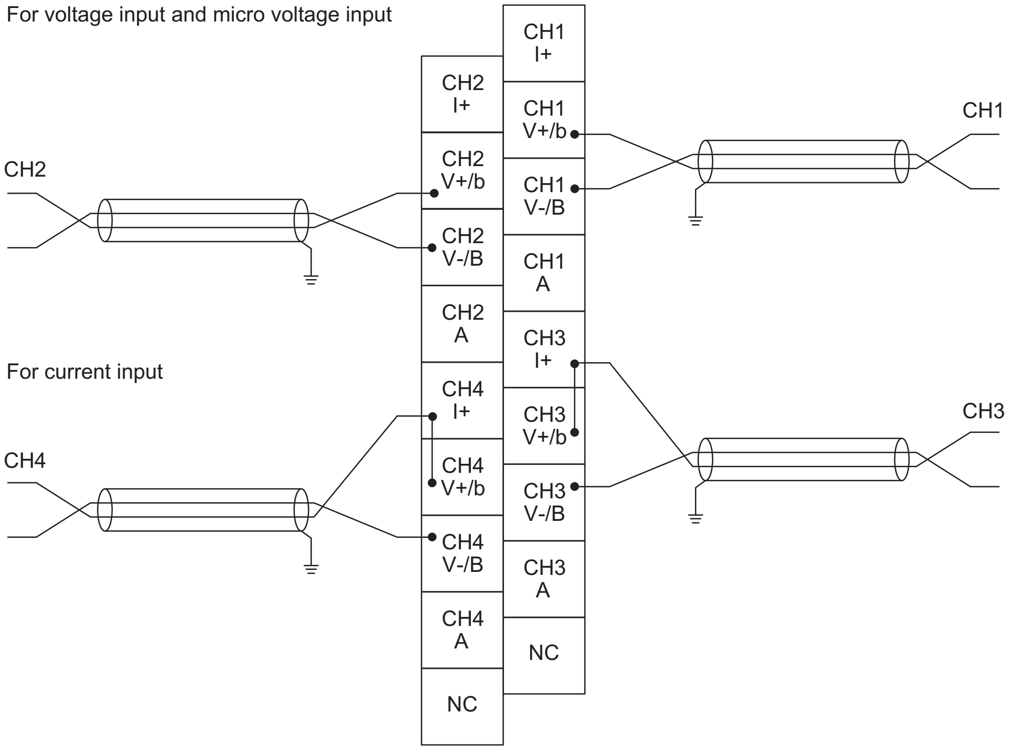

Terminal block
mounting screw

2. **Open the terminal cover and tighten the terminal block mounting screw.**

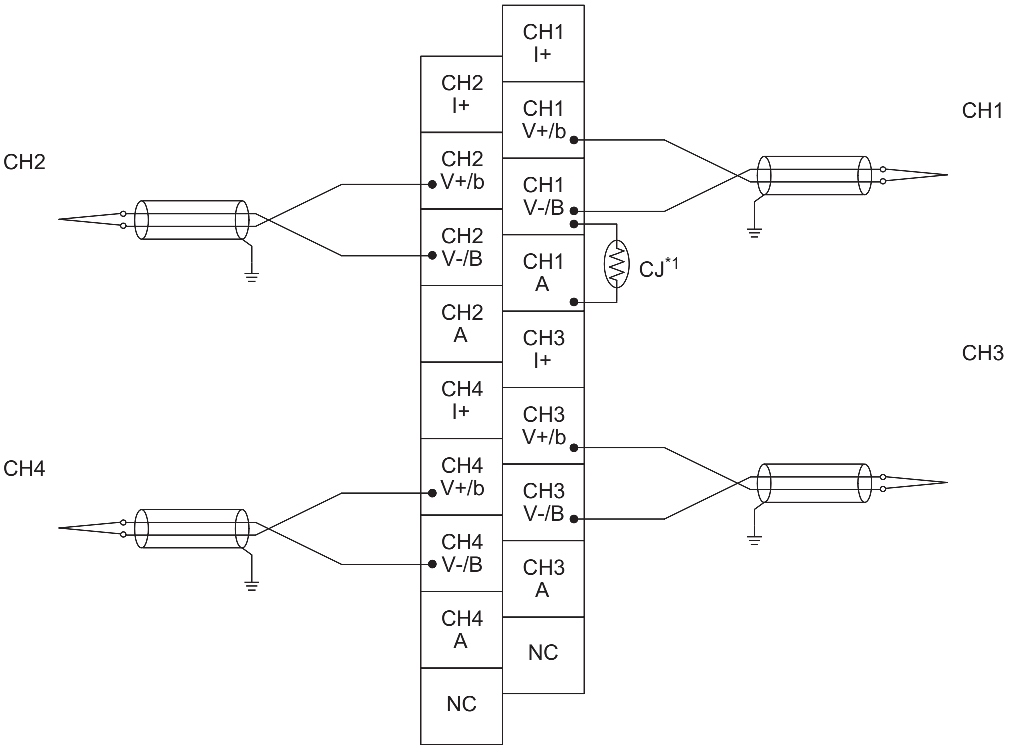
6.3 Wiring

The following figures show wiring to the terminal block.

(1) Voltage input, current input, and micro voltage input

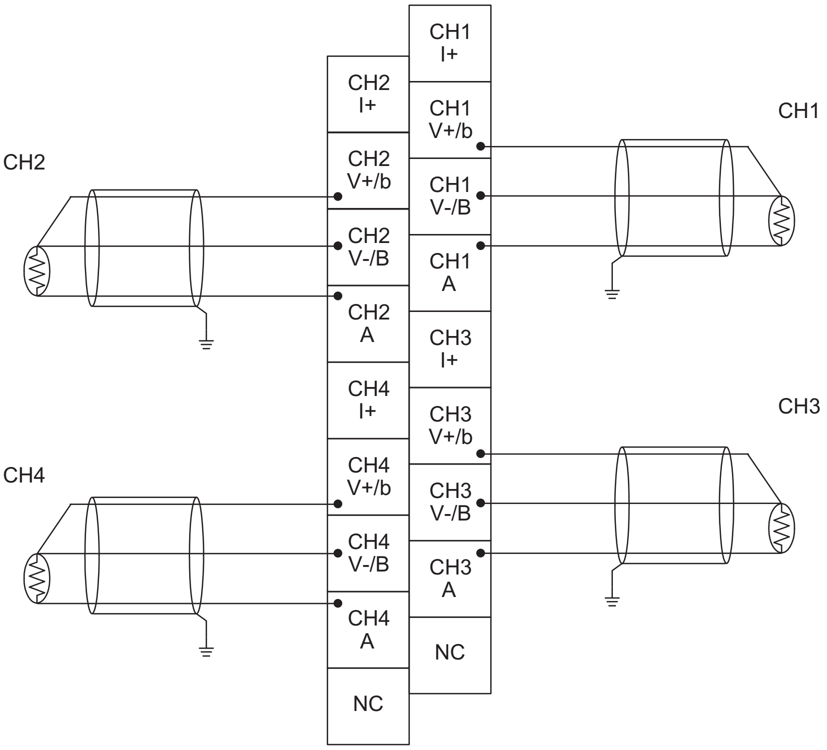

For voltage input and micro voltage input
For current input
CH1
CH2
CH3
CH4
CH1 I+
CH1 V+/b
CH1 V-/B
CH1 A
CH3 I+
CH3 V+/b
CH3 V-/B
CH3 A
NC
CH2 I+
CH2 V+/b
CH2 V-/B
CH2 A
CH4 I+
CH4 V+/b
CH4 V-/B
CH4 A
NC

(2) Thermocouple input


CH1
I+
CH2
I+
CH1
V+/b
CH1
CH2
CH2
V+/b
CH1
V-/B
CH2
V-/B
CH1
A
CJ*1
CH2
A
CH3
I+
CH3
CH4
I+
CH3
V+/b
CH4
CH4
V+/b
CH3
V-/B
CH4
V-/B
CH3
A
CH4
A
NC
NC

*1 To use the thermocouple input, always connect the cold junction compensation resistor (CJ) supplied with the module between the CH1 V-/B terminal (pin number 5) and the CH1 A terminal (pin number 7).

(3) Resistance temperature detector input


CH1
I+
CH2
I+
CH1
V+/b
CH1
CH2
CH2
V+/b
CH1
V-/B
CH2
V-/B
CH1
A
CH2
A
CH3
I+
CH4
I+
CH3
CH3
V+/b
CH4
CH4
V+/b
CH3
V-/B
CH4
V-/B
CH3
A
CH4
A
NC
NC

6.4 External Wiring

The following figures show the external wiring.

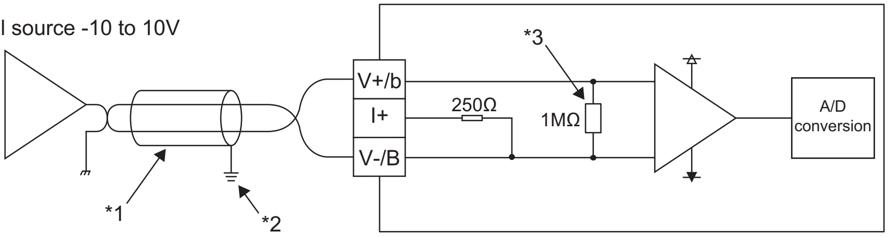
Point

If the circuit between the terminals of unused channels is kept open and the conversion is enabled, an undefined digital value may be output. To avoid this phenomenon, set CH□ Input type/range setting (Un\G500 to Un\G503) of the unused channels to Conversion disable. Note that changing the value in CH□ Input type/range setting (Un\G500 to Un\G503) from Conversion enable to Conversion disable reduces the conversion cycle.

(1) Voltage input, current input, and micro voltage input

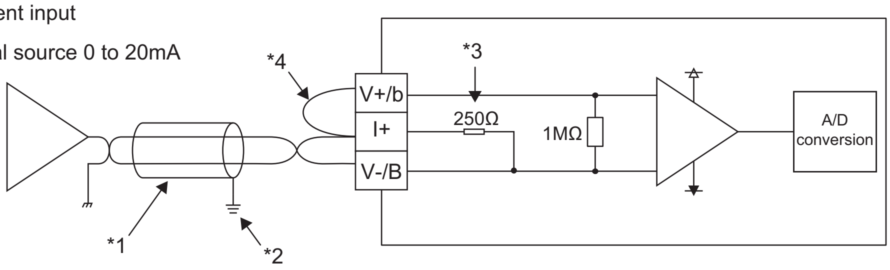
· For voltage input

Signal source -10 to 10V



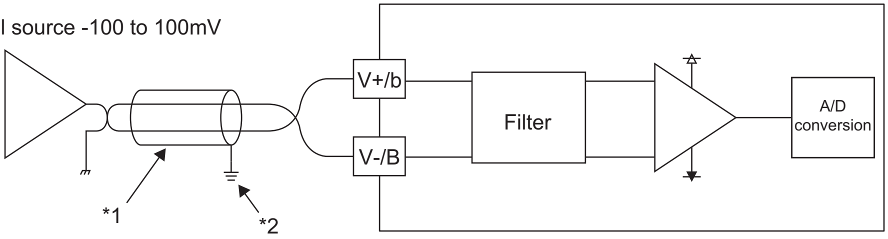
· For current input

Signal source 0 to 20mA



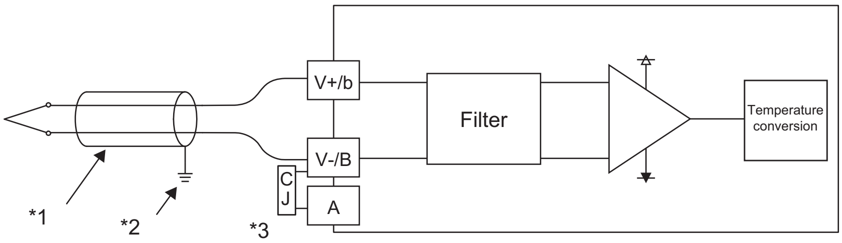
· For micro voltage input

Signal source -100 to 100mV



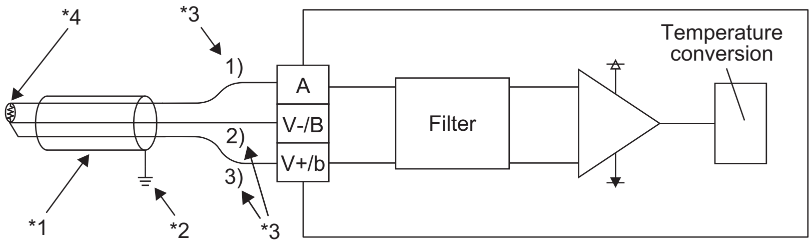
*1 For the wire, use the 2-core shielded twisted pair cable.
*2 Always ground the shield wire of the wire in each channel.
*3 Indicates the input resistance of the multiple input module.
*4 For the current input, always connect the (V+/b) terminal and (I+) terminal.

(2) Thermocouple input

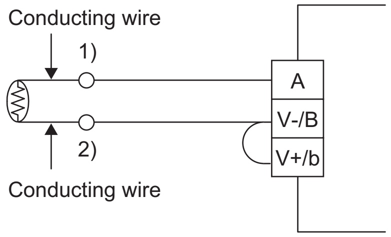


*1 Always use the shielded compensation lead wire.
*2 Always ground the shield wire of the compensation lead wire in each channel.
*3 To use the thermocouple input, always connect the cold junction compensation resistor (CJ) supplied with the module between the CH1 V-/B terminal (pin number 5) and the CH1 A terminal (pin number 7).

(3) Resistance temperature detector input



*1 Always use a shielded cable.
*2 Always ground the shield wire of the wire in each channel.
*3 Adjust the conductor resistance values of 1) Conducting wire between the resistance temperature detector and A terminal and 2) Conducting wire between the resistance temperature detector and V-/B terminal so that the difference between the values is 10Ω or less. In addition, adjust the conductor resistance values of 1) Conducting wire between the resistance temperature detector and A terminal, 2) Conducting wire between the resistance temperature detector and V-/B terminal, and 3) Conducting wire between the resistance temperature detector and V+/b terminal to be 100Ω or less. If the above conditions are not met, the accuracy described on the following page may not be satisfied. (☞ Page 168, Appendix 4 (3)).
*4 To connect a 2-wire resistance temperature detector, connect it between the A terminal and V-/B terminal and short-circuit the V-/B terminal and V+/b terminal.
Note that the 2-wire connection is affected by a conductor resistance, and this can cause an error of the temperature measured value. (Depending on the wiring condition, the conductor resistance value, the total of 1) + 2) in the following figure, may become high.)



CHAPTER 7 VARIOUS SETTINGS

This chapter describes the setting procedures of the multiple input module.

Point

After writing the settings of a new module, parameters, and auto refresh into the CPU module, reset the CPU module, switch STOP → RUN → STOP → RUN, or power off and on the module to validate the setting.

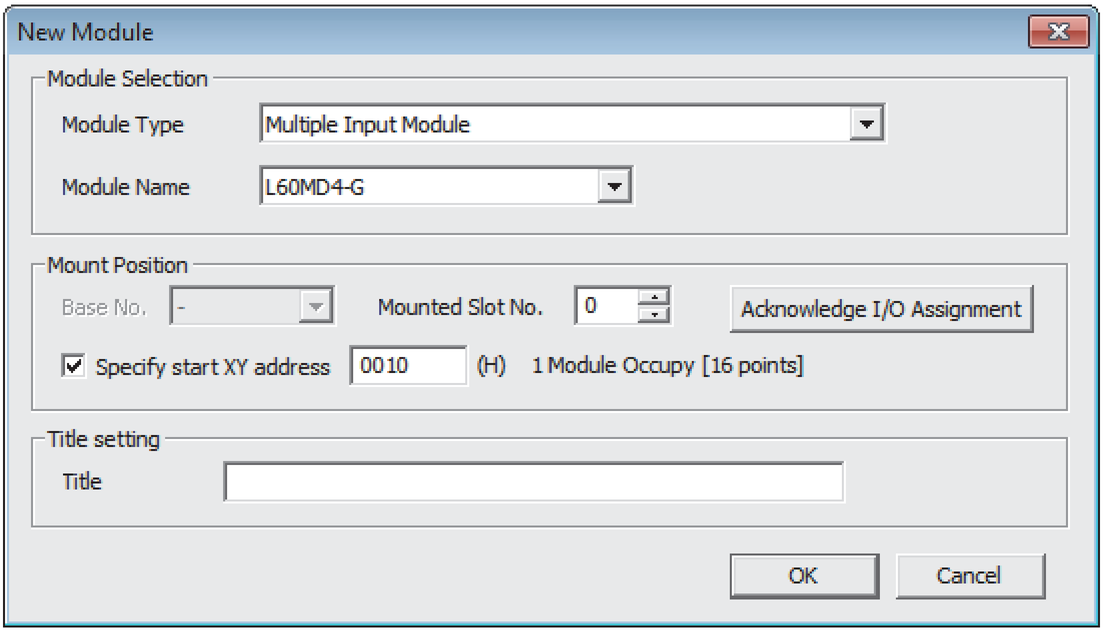
7.1 Adding a Module

Add the module name of a multiple input module to use on the project.

(1) Addition procedure

Open the "New Module" window.

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


New Module

Module Selection

Module Type: Multiple Input Module

Module Name: L60MD4-G

Mount Position

Base No.: -

Mounted Slot No.: 0

☑ Specify start XY address: 0010 (H) 1 Module Occupy [16 points]

Title setting

Title:

Item		Description
Module Selection	Module Type	Set "Multiple Input Module".
	Module Name	Select the name of the module to be connected.
Mount Position	Mounted Slot No.	Set the slot No. where the module is connected.
	Specify start XY address	The start I/O number (hexadecimal) of the module is set according to the mounted slot No. Setting any start I/O number is also possible.
Title setting	Title	Set any title.

7.2 Parameter Settings

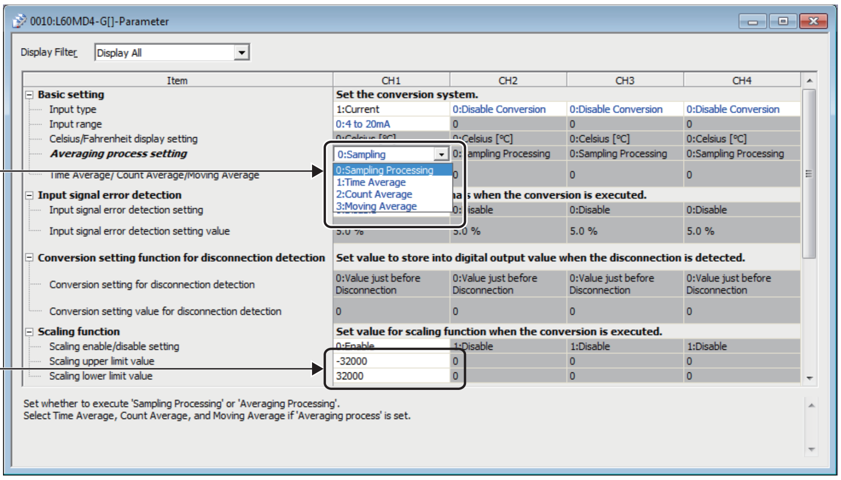
Set the parameters of each channel.
By setting the parameters, the setting by programming becomes unnecessary.

(1) Setting procedure

Open the "Parameter" window.

1. **Start "Parameter".**

Project window ⇨ [Intelligent Function Module] ⇨ module name ⇨ [Parameter]



0010:L60MD4-G[]-Parameter

Display Filter: Display All

Item	CH1	CH2	CH3	CH4
Basic setting	**Set the conversion system.**			
Input type	1:Current	0:Disable Conversion	0:Disable Conversion	0:Disable Conversion
Input range	0:4 to 20mA	0	0	0
Celsius/Fahrenheit display setting	0:Celsius [°C]	0:Celsius [°C]	0:Celsius [°C]	0:Celsius [°C]
Averaging process setting	0:Sampling	0:Sampling Processing	0:Sampling Processing	0:Sampling Processing
Time Average/ Count Average/Moving Average	0:Sampling Processing 1:Time Average 2:Count Average 3:Moving Average	0	0	0
Input signal error detection		**s when the conversion is executed.**		
Input signal error detection setting		0:Disable	0:Disable	0:Disable
Input signal error detection setting value	5.0 %	5.0 %	5.0 %	5.0 %
Conversion setting function for disconnection detection	**Set value to store into digital output value when the disconnection is detected.**			
Conversion setting for disconnection detection	0:Value just before Disconnection	0:Value just before Disconnection	0:Value just before Disconnection	0:Value just before Disconnection
Conversion setting value for disconnection detection	0	0	0	0
Scaling function	**Set value for scaling function when the conversion is executed.**			
Scaling enable/disable setting	0:Enable	1:Disable	1:Disable	1:Disable
Scaling upper limit value	-32000	0	0	0
Scaling lower limit value	32000	0	0	0

Set whether to execute 'Sampling Processing' or 'Averaging Processing'.
Select Time Average, Count Average, and Moving Average if 'Averaging process' is set.

Select an item from the pull-down list.

Enter a value in the text box.

2. **Double-click the item to change the setting, and enter the setting value.**

- Items to be selected from the pull-down list: Double-click the item to be set to display the pull-down list. Select the item.
- Items to be entered in the text box: Double-click the item to be set and enter a numerical value.

3. **For setting CH2 to CH4, follow the operation of step 2.**

Item		Setting value		Reference
Basic setting	Input type	0: Disable Conversion (default value) 1: Current 2: Voltage 3: Minute voltage 4: Resistance Temperature Detector 5: Thermocouple		Page 49, Section 8.2
	Input range	Current	0: 4 to 20mA (default value) 1: 0 to 20mA 2: 4 to 20mA (Extended Mode)	
		Voltage	0: 1 to 5V (default value) 1: 0 to 5V 2: -10 to 10V 3: 0 to 10V 4: 1 to 5V (Extended Mode)	
		Minute Voltage	0: -100 to 100mV (default value)	
		Resistance Temperature Detector	0: Pt100 (-20 to 120℃) (default value) 1: Pt100 (-200 to 850℃) 2: JPt100 (-20 to 120℃) 3: JPt100 (-200 to 600℃) 4: Pt1000 (-200 to 850℃) 5: Pt50 (-200 to 650℃)	
		Thermocouple	0: B Thermocouple (default value) 1: R Thermocouple 2: S Thermocouple 3: K Thermocouple 4: E Thermocouple 5: J Thermocouple 6: T Thermocouple 7: N Thermocouple 8: U thermocouple 9: L Thermocouple 10: PLII Thermocouple 11: W5Re/W26Re Thermocouple	
	Celsius/Fahrenheit display setting	0: Celsius [℃] (default value) 1: Fahrenheit [℉]		Page 156, Appendix 2 (22)
	Averaging process setting	0: Sampling Processing (default value) 1: Time Average 2: Count Average 3: Moving Average		Page 52, Section 8.3
	Time Average/Count Average/Moving Average	Time average	8 to 18000 (×100ms) (default value: 0)	
		Count average	4 to 36000 Times (default value: 0)	
		Moving average	2 to 1000 Times (default value: 0)	
Input signal error detection function	Input signal error detection setting	0: Disable (default value) 1: Upper and Lower Detection 2: Lower Detection 3: Upper Detection 4: Simple Disconnection Detection*1		Page 62, Section 8.7
	Input signal error detection setting value	0 to 25.0% (default value: 5.0%)		
Disconnection detection function	Conversion setting for disconnection detection	0: Value just before disconnection (default value) 1: Up Scale 2: Down scale 3: Optional value		Page 58, Section 8.6
	Conversion setting value for disconnection detection	-32768 to 32767 (default value: 0)		
Scaling function	Scaling enable/disable setting	0: Enable 1: Disable (default value)		Page 77, Section 8.9
	Scaling upper limit value	-32000 to 32000 (default value: 0)		
	Scaling lower limit value	-32000 to 32000 (default value: 0)		

Item		Setting value	Reference
Warning output function	Process alarm output setting	0: Enable 1: Disable (default value)	Page 69, Section 8.8 (1)
	Process alarm upper upper limit value	-32768 to 32767 (default value: 0)	
	Process alarm upper lower limit value	-32768 to 32767 (default value: 0)	
	Process alarm lower upper limit value	-32768 to 32767 (default value: 0)	
	Process alarm lower lower limit value	-32768 to 32767 (default value: 0)	
	Rate alarm output setting	0: Enable 1: Disable (default value)	Page 71, Section 8.8 (2)
	Rate alarm detection cycle	1 to 36000 Times (default value: 0)	
	Rate alarm upper limit value	-3276.8 to 3276.7% (default value: 0)	
	Rate alarm lower limit value	-3276.8 to 3276.7% (default value: 0)	

*1 This item can be set only when "2: 4 to 20mA (Extended Mode)" or "4: 1 to 5V (Extended Mode)" is selected for "Input range".

Point

- Changing "Input type" automatically changes "Input range" to its default value.
- For "Conversion setting value for disconnection detection", "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", the setting method differs depending on each input type/input range.
  Changing "Input type", "Input range", "Celsius/Fahrenheit display setting", or "Scaling enable/disable setting" after the setting of the above items automatically changes the location of the decimal point or unit.

Input type/input range	Setting procedure
• Resistance temperature detector: Pt100 (-20 to 120℃) • Resistance temperature detector: JPt100 (-20 to 120℃)	Set the temperature in increments of 0.01℃ (or 0.01℉).
• Resistance temperature detector input range other than the above • Thermocouple input range	Set the temperature in increments of 0.1℃ (or 0.1℉).

7.3 Auto Refresh

Set the buffer memory of the multiple input module to be refreshed automatically.
By the auto refresh setting, reading data using a program becomes unnecessary.

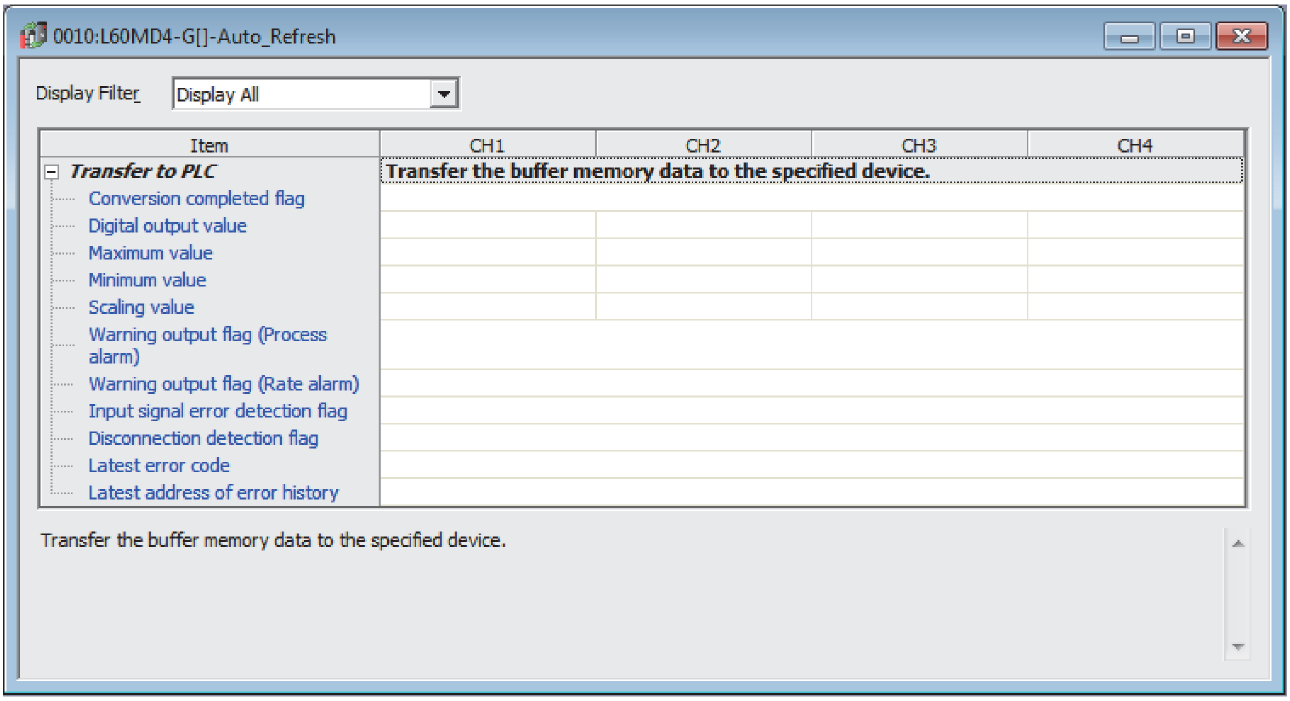
(1) Setting procedure

Open the "Auto_Refresh" window.

1. **Start "Auto_Refresh".**

Project window ⇨ [Intelligent Function Module] ⇨ module name ⇨ [Auto_Refresh]

2. **Click the item to be set, and enter the auto refresh target device.**



Display Filter: Display All

Item	CH1	CH2	CH3	CH4
Transfer to PLC	**Transfer the buffer memory data to the specified device.**			
Conversion completed flag				
Digital output value				
Maximum value				
Minimum value				
Scaling value				
Warning output flag (Process alarm)				
Warning output flag (Rate alarm)				
Input signal error detection flag				
Disconnection detection flag				
Latest error code				
Latest address of error history				

Transfer the buffer memory data to the specified 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: If X10 is set, the data are stored in X10 to X1F.)

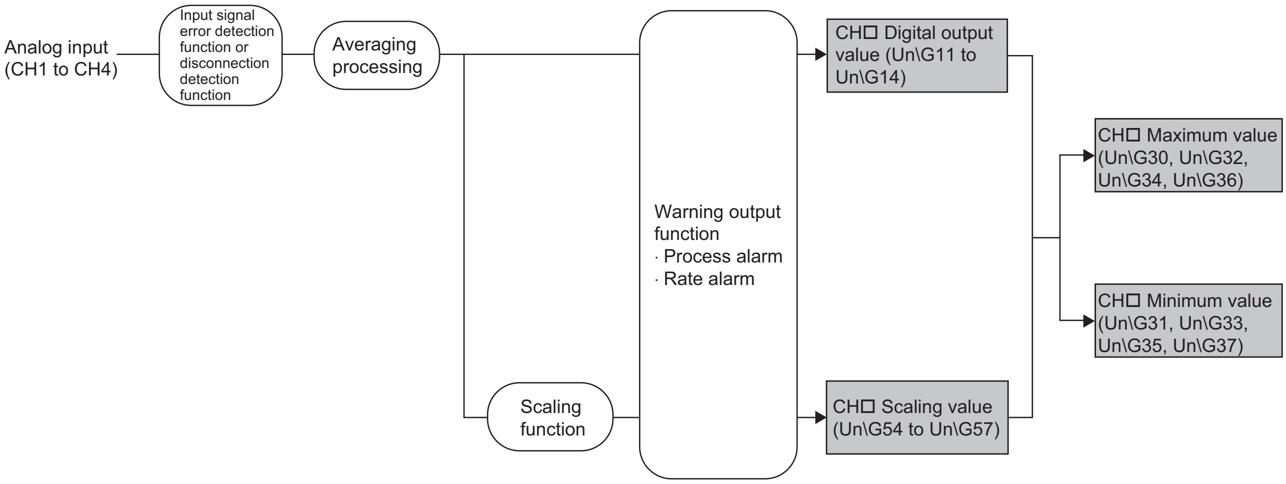
CHAPTER 8 FUNCTIONS

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

- Details of I/O Signals (☞ Page 133, Appendix 1)
- Details of Buffer Memory Addresses (☞ Page 139, Appendix 2)

8.1 Processing Order of Each Function

Analog input values and the digital values of the following (1) to (3) are processed in the order shown below. If multiple functions are enabled, the output of the first processed function is used as the input of the next function.


Analog input (CH1 to CH4)
Input signal error detection function or disconnection detection function
Averaging processing
Scaling function
Warning output function
· Process alarm
· Rate alarm
CH☐ Digital output value (Un\G11 to Un\G14)
CH☐ Scaling value (Un\G54 to Un\G57)
CH☐ Maximum value (Un\G30, Un\G32, Un\G34, Un\G36)
CH☐ Minimum value (Un\G31, Un\G33, Un\G35, Un\G37)

(1) Digital output value

The digital values obtained in sampling processing or averaging processing are stored.

(2) Scaling value

The values obtained in scale conversion of digital output values by the scaling function are stored. When the scaling function is not used, the values same as the digital output values are stored.

(3) Maximum and minimum values

The maximum digital output value and minimum digital output value are stored. When the scaling function is used, the maximum scaling value and minimum scaling value are stored.

Point

- When averaging processing (time average/count average) is performed on digital output values, scaling values, and maximum and minimum values, the values are stored at every averaging process cycle.
- For the micro voltage input range, resistance temperature detector input range, or thermocouple input range, the conversion is stopped when a disconnection is detected.
  The digital values in this case are as follows:
  - Digital output value: The values are stored according to the setting in Conversion setting at disconnection detection (Un\G400).
  - Scaling value: The values obtained in scale conversion of digital output values by the scaling function are stored.
  - Maximum value/Minimum value: The values are updated based on the settings in Conversion setting at disconnection detection (Un\G400).

  The conversion restarts when the disconnected wiring is reconnected.
  For details on the disconnection detection function, refer to the following.
  - Disconnection Detection Function (☞ Page 58, Section 8.6)
- In the use of the input signal error detection function, conversion is stopped if an input signal error is detected.
  In this case, the digital output values, scaling values, and maximum and minimum values are not updated. The values obtained before the input signal error is detected are held.
  When the analog input signal returns to a normal value, conversion resumes.
  For details on the input signal error detection function, refer to the following.
  - Input Signal Error Detection Function (☞ Page 62, Section 8.7)

8.2 Input Type/Range Setting

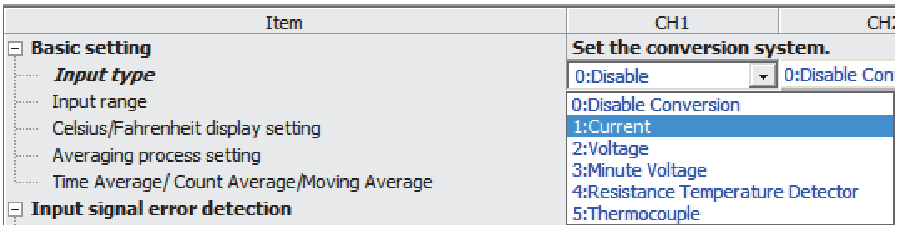
The input type and input range that are to be used can be selected for each channel.

(1) Setting procedure

Set "Input type" and "Input range" depending on the sensor type to be connected.

1. **Set "Input type".**

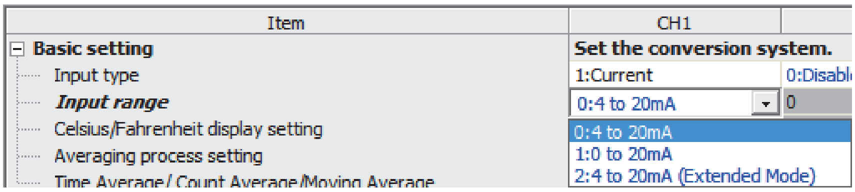
Project window ⇨ [Intelligent Function Module] ⇨ module name ⇨ [Parameter]



Item	CH1	CH
Basic setting	Set the conversion system.	
Input type	0:Disable	0:Disable Con
Input range		
Celsius/Fahrenheit display setting		
Averaging process setting		
Time Average/ Count Average/Moving Average		
Input signal error detection		

0:Disable Conversion
1:Current
2:Voltage
3:Minute Voltage
4:Resistance Temperature Detector
5:Thermocouple

2. **Set "Input range".**



Item	CH1	
Basic setting	Set the conversion system.	
Input type	1:Current	0:Disabl
Input range	0:4 to 20mA	0
Celsius/Fahrenheit display setting		
Averaging process setting		
Time Average/ Count Average/Moving Average		

0:4 to 20mA
1:0 to 20mA
2:4 to 20mA (Extended Mode)

Input type	Input range		Input type	Input range
0: Disable Conversion (default value)	-		5: Thermocouple	0: B Thermocouple
1: Current	0: 4 to 20mA			1: R Thermocouple
	1: 0 to 20mA			2: S Thermocouple
	2: 4 to 20mA (Extended Mode)			3: K Thermocouple
2: Voltage	0: 1 to 5V			4: E Thermocouple
	1: 0 to 5V			5: J Thermocouple
	2: -10 to 10V			6: T thermocouple
	3: 0 to 10V			7: N Thermocouple
	4: 1 to 5V (Extended Mode)			8: U Thermocouple
3: Minute voltage	0: -100 to 100mV			9: L Thermocouple
4: Resistance Temperature Detector	0: Pt100 (-20 to 120℃)			10: PLII Thermocouple
	1: Pt100 (-200 to 850℃)			11: W5Re/W26Re Thermocouple
	2: JPt100 (-20 to 120℃)			
	3: JPt100 (-200 to 600℃)			
	4: Pt1000 (-200 to 850℃)			
	5: Pt50 (-200 to 650℃)			

Point

The default setting is "Disable Conversion". Change the setting depending on the sensor type to be connected.

(2) Precautions for the thermocouple input

(a) Input type

When the thermocouple input is used, the thermocouple input range must be set for CH1. If the input type of CH1 is set to a type other than the thermocouple input range and the input type of any of CH2 to CH4 is set to the thermocouple input range, an error (error code: 15□) occurs in the channel where the thermocouple input range is set and the conversion is not performed.

The following table lists setting examples.

Setting example	Input type/Input range				Result	
	CH1	CH2	CH3	CH4		
When only one channel is used for the thermocouple input	5: Thermocouple 0: B Thermocouple	1: Current 0: 4 to 20mA	2: Voltage 3: 0 to 10V	4: Resistance Temperature Detector 0: Pt100 (-20 to 120℃)	○	Since the thermocouple input is used only for CH1, the conversion is performed with no errors.
When three channels are used for the thermocouple input (An input type other than the thermocouple input is used for the one channel left.)	5: Thermocouple 0: B Thermocouple	2: Voltage 3: 0 to 10V	5: Thermocouple 1: R Thermocouple	5: Thermocouple 2: S Thermocouple	○	Since the thermocouple input is used for CH1, the conversion is performed with no errors. Two channels of CH2 to CH4 are available for the thermocouple input.
When three channels are used for the thermocouple input (A setting error occurs.)	2: Voltage 3: 0 to 10V	5: Thermocouple 0: B Thermocouple	5: Thermocouple 1: R Thermocouple	5: Thermocouple 2: S Thermocouple	×	Since an input type other than the thermocouple input is used for CH1, an error (error code: 152, 153, 154) occurs and the conversion is not performed.

(b) Cold junction compensation resistor (CJ)

Connect the cold junction compensation resistor (CJ) supplied with the module between the CH1 V-/B terminal (pin number 5) and the CH1 A terminal (pin number 7).

When the cold junction compensation resistor (CJ) is not connected, all the channels for the thermocouple input are in the disconnection detection state.

For details on the disconnection detection function, refer to the following.

☞ Page 58, Section 8.6

(3) Enabling conversion and disabling conversion

Whether to enable or disable the conversion for each channel can be set in "Input type" and "Input range". In this manual, the enabled conversion and disabled conversion are defined as follows.

(a) Conversion disabled

The state generated by selecting "0: Disable Conversion" in "Input type". In this case, the conversion is not performed in the target channel.

"0: Disable Conversion" is set to all the channels in the multiple input module by default. Thus, change the setting values of "Input type" and "Input range" depending on the connected sensor type.

(b) Conversion enabled

The state generated by selecting values for "Input type" and "Input range" based on the connected sensor type (values other than "0: Disable Conversion" for "Input type"). In this case, the conversion is performed in the target channel.

(4) Conversion cycle

The conversion cycle varies depending on the number of channels where the conversion is enabled.
For details, refer to the following.
☞ Page 52, Section 8.3 (1)

(5) When the value in CH☐ Input type/range setting (Un\G500 to Un\G503) is changed during module operations

The stored values in the following buffer memory areas are cleared to 0.
When the first conversion in the changed input type/range is finished, the first conversion value is stored in the following buffer memory areas. However, when CH☐ Input type/range setting (Un\G500 to Un\G503) is set to Disable conversion (0000_H) or set to a value out of the setting range, the conversion is stopped and the stored values in the following buffer memory remain 0.

- CH☐ Digital output value (Un\G11 to Un\G14)
- CH☐ Maximum value (Un\G30, Un\G32, Un\G34, Un\G36)
- CH☐ Minimum value (Un\G31, Un\G33, Un\G35, Un\G37)
- CH☐ Scaling value (Un\G54 to Un\G57)

8.3 Conversion Method

Set sampling processing or averaging processing for each channel.

(1) Sampling processing

Analog input values and temperature input values are converted at every sampling cycle and stored in the buffer memory as digital output values.

Point

The conversion cycle is "Conversion cycle (50ms) × Number of channels where conversion is enabled".
Whether to enable or disable can be set for each channel. Disabling the conversion for unused channels reduces the conversion cycles.
For example, when the conversion is enabled in two channels (CH1, CH2), the conversion cycle is 100ms (50ms × 2).

(2) Averaging processing

Averaging processing is performed on digital output values for each channel. The values obtained in averaging processing are stored in the buffer memory area.
The following three types of averaging processing are provided.

- Time average
- Count average
- Moving average

(a) Time average

The conversion is performed for a set period of time and averaging processing is performed on the total value excluding the maximum and the minimum values. The values obtained in averaging processing are stored in the buffer memory area.
The number of processing times within a set period of time changes depending on the number of channels where the conversion is enabled.
The setting range of the time (for averaging) is from 8 to 18000 (set in increments of 100ms; 800ms to 1800000ms).

$$\text{Number of processing (times)} = \frac{\text{Setting time (value)} \times 100\text{ms}}{50\text{ms} \times \text{Number of channels where conversion is enabled}}$$

Ex. Processing count with the following settings

Item	Setting
Number of channels where conversion is enabled	2 channels (CH1, CH2)
Set period of time	22 (2200ms)

$$\frac{2200}{50 \times 2} = 22 \text{ (times)} \cdots \text{Numbers after the decimal point are rounded down.}$$

→ The processing is performed 22 times and its average value is output.

(b) Count average

The conversion is performed a set number of times and averaging processing is performed on the total value excluding the maximum and the minimum values. The values obtained in averaging processing are stored in the buffer memory area.

The time taken to store the average value, obtained by the average processing, into the buffer memory area changes depending on the number of channels where the conversion is enabled.

The setting range of the count (for averaging) is from 4 to 36000.

Processing time (ms) = Number of settings × (50ms × Number of channels where conversion is enabled)

Ex. Processing time with the following settings

Item	Setting
Number of channels where conversion is enabled	2 channels (CH1, CH2)
Set number of times	20 times

20 × (50 × 2) = 2000 (ms) → An average value is output every 2000ms.

Point

Because the count average requires a sum of at least two counts excluding the maximum and minimum values, set four or larger number of counts.

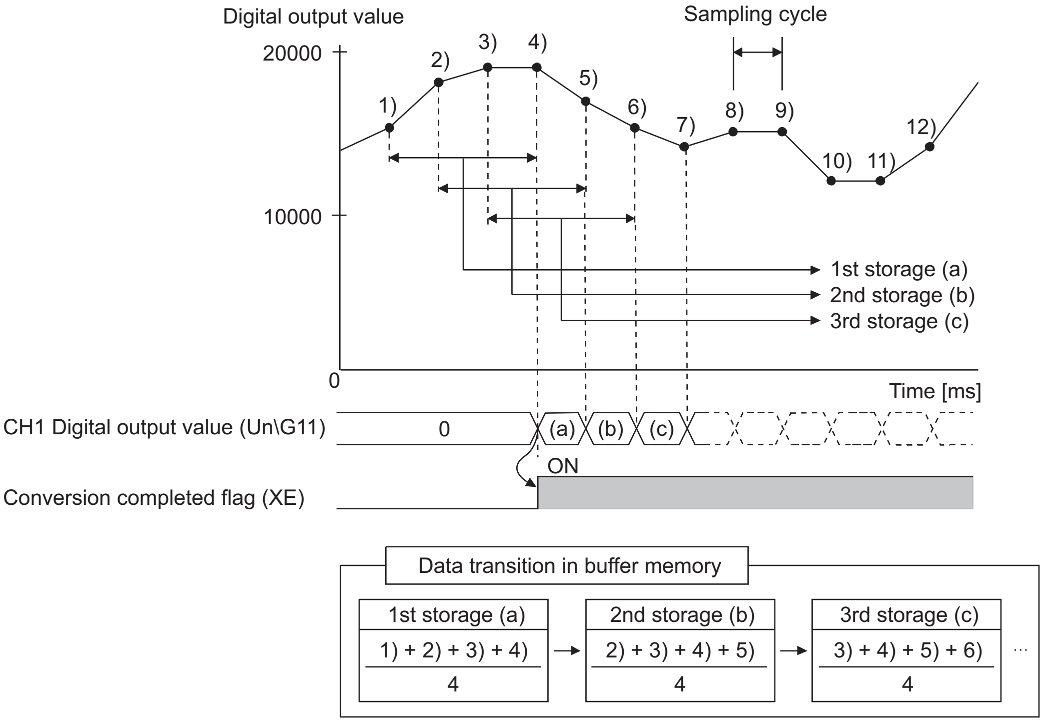
(c) Moving average

The average of a specified number of digital output values is calculated at every sampling cycle and is stored in the buffer memory area.

Because the target range for averaging processing is moved in response to every sampling processing, the latest digital output value can be constantly obtained.

The setting range of the count (for averaging) is from 2 to 1000.

The following figure shows the moving average processing of when the current input range is set to 4 to 20mA and the set number of times is four.

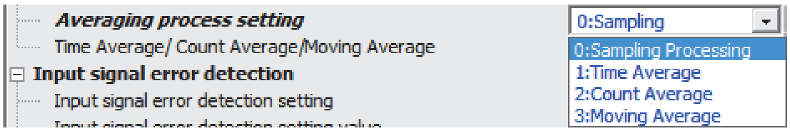

Digital output value
Sampling cycle
20000
10000
0
1)
2)
3)
4)
5)
6)
7)
8)
9)
10)
11)
12)
1st storage (a)
2nd storage (b)
3rd storage (c)
Time [ms]
CH1 Digital output value (Un\G11)
0
(a)
(b)
(c)
ON
Conversion completed flag (XE)
Data transition in buffer memory
1st storage (a)
1) + 2) + 3) + 4)
4
2nd storage (b)
2) + 3) + 4) + 5)
4
3rd storage (c)
3) + 4) + 5) + 6)
4
...

(3) Setting procedure

(a) Sampling processing

1. **Set "Averaging process setting" to "0: Sampling Processing".**

Project window ⇨ [Intelligent Function Module] ⇨ module name ⇨ [Parameter]



Averaging process setting: 0:Sampling

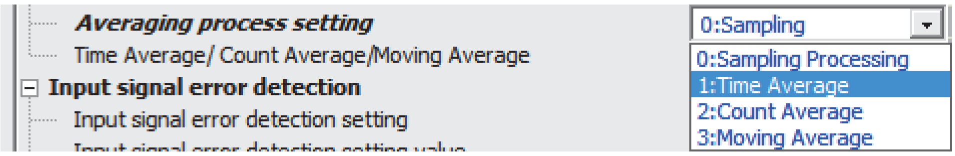
Time Average/ Count Average/Moving Average
Input signal error detection
Input signal error detection setting
Input signal error detection setting value
0:Sampling Processing
1:Time Average
2:Count Average
3:Moving Average

(b) Averaging processing

Ex. When "1: Time Average" is set to "Averaging process setting"

1. **Set "Averaging process setting" to "1: Time Average".**

Project window ⇨ [Intelligent Function Module] ⇨ module name ⇨ [Parameter]



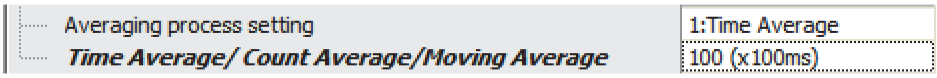
Averaging process setting: 0:Sampling

Time Average/ Count Average/Moving Average

Input signal error detection

Input signal error detection setting

2. **Set an averaging processing value for "Time Average/Count Average/Moving Average".**



Averaging process setting: 1:Time Average

Time Average/ Count Average/Moving Average: 100 (x100ms)

Setting item	Setting range
Time Average	8 to 18000 (800ms to 1800000ms)
Count Average	4 to 36000 times
Moving Average	2 to 1000 times

8.4 Input Range Extension Function

Current **Voltage**

This function extends and converts the input range of 4 to 20mA and that of 1 to 5V.

Input range setting	Input range	Digital output value
4 to 20mA	4 to 20mA	0 to 20000
1 to 5V	1 to 5V	

⇔

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

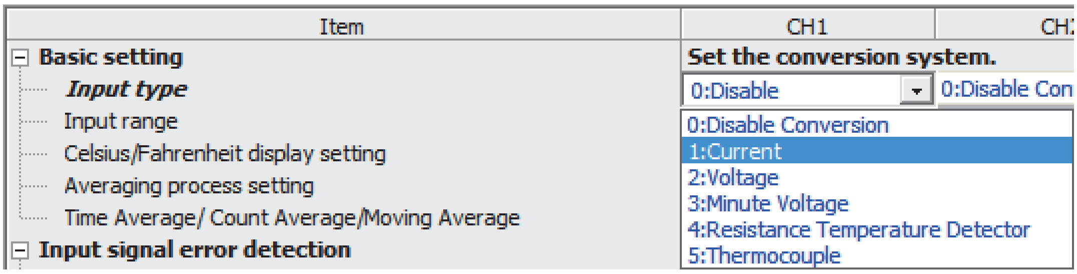
(1) Overview

- Although the slope of the I/O characteristic of the extended mode is the same as that of the normal range, the upper limit value and the lower limit value of the input range and the digital output value are extended. For details, refer to I/O Conversion Characteristic of Current/Voltage (☞ Page 160, Appendix 3).
- The resolution is the same as that the input range of 4 to 20mA and 1 to 5V has (800nA and 200µV). Therefore, the conversion with higher resolution than that of the input range of 0 to 20mA and 0 to 5V (resolution of 1000nA and 250µV) is achieved.

(2) Setting procedure

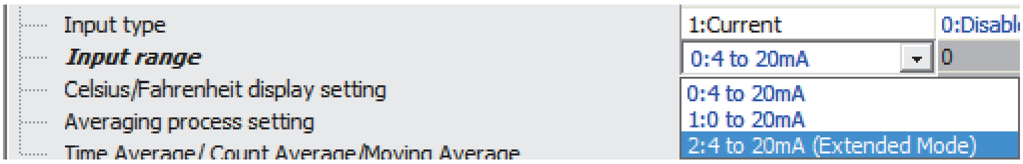
1. Set "1: Current" or "2: Voltage" for "Input type".

Project window ⇨ [Intelligent Function Module] ⇨ module name ⇨ [Parameter]



Item	CH1	CH
Basic setting	**Set the conversion system.**	
Input type	0:Disable	0:Disable Con
Input range		
Celsius/Fahrenheit display setting		
Averaging process setting		
Time Average/ Count Average/Moving Average		
Input signal error detection		

2. Set the range of the extended mode for "Input range".



Input type	1:Current	0:Disabl
Input range	0:4 to 20mA	0
Celsius/Fahrenheit display setting		
Averaging process setting		

Point

When the input range extension function is used simultaneously with the scaling function, the scaling values may exceed the range of -32768 to 32767.
In that case, the upper limit value (32767) or the lower limit value (-32768) is stored as a scaling value.

Ex. When 32000 is set for the scaling upper limit value and -32000 is set for the scaling lower limit value, the following operations are performed.

- When the digital output value is 20240 or greater, 32767 is stored as a scaling value.
- When the digital output value is -240 or smaller, -32768 is stored as a scaling value.

AbN automation

8.5 Maximum Value/Minimum Value Hold Function

This function stores the maximum digital value and minimum digital output value in the buffer memory area for each channel.

Values are updated at every averaging process cycle if averaging processing is selected, otherwise updated at every sampling cycle.

For the buffer memory address where the values are stored, refer to the following.

- List of Buffer Memory Addresses (☞ Page 27, Section 3.5)

(1) Resetting the maximum value and the minimum value

When one of the following operations is performed, the maximum value and the minimum value are replaced with the current digital output value.

- Turning on and off Maximum value/minimum value reset request (YD)
- Turning on and off Operating condition setting request (Y9)

When the input type/range setting is changed and Operating condition setting request (Y9) is turned on and off, the maximum value and the minimum value are cleared to 0.

(2) Target value for the maximum value/minimum value hold function

The maximum digital output value and minimum digital output value are stored.

If the scaling function is enabled, the maximum scaling value and minimum scaling value are stored.

8.6 Disconnection Detection Function

Micro voltage **Thermocouple** **RTD**

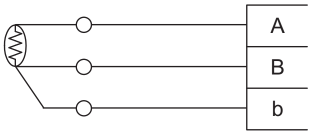
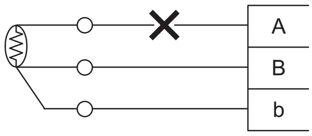
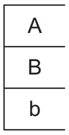
This function detects a disconnection of the external wiring (resistance temperature detector, conducting wire, thermocouple, cold junction compensation resistor (CJ), or compensation lead wire) when the input type is micro voltage, resistance temperature detector, or thermocouple.

(1) Notifying disconnections

- Disconnection (1) is stored in the bit of Disconnection detection flag (Un\G47) corresponding to the channel number.
- Disconnection detection signal (X6) turns on.
- The ALM LED flashes.
- The alarm code (130□) is stored in Latest error code (Un\G19).
- One of "Value just before disconnection", "Up scale", "Down scale", or "Optional value" specified in Conversion setting at disconnection detection (Un\G400) is stored in CH□ Digital output value (Un\G11 to Un\G14).

(2) Relation between disconnection detection and conversion enable/disable setting

Disconnection detection is executed only in the channel where the conversion is enabled.
The following table shows the relation between the disconnection detection and conversion enable/disable setting. (The conversion enable/disable setting can be performed in CH□ Input type/range setting (Un\G500 to Un\G503).)

Connection status	Status of the conversion enable/disable setting	Disconnection detection flag
 No disconnection	Conversion enabled	Off
	Conversion disabled	
 Disconnection	Conversion enabled	On
	Conversion disabled	Off
 No connection	Conversion enabled	On
	Conversion disabled	Off

Point

- When a disconnection and warning output (process alarm or rate alarm) occur simultaneously, the ALM LED flashes. For details on the warning output function, refer to the following.
    - Warning Output Function (☞ Page 69, Section 8.8)
- For Disconnection detection flag (Un\G47), Disconnection detection signal (X6), the ALM LED, and Latest error code, the status at a disconnection detection is held even after the disconnected wiring is reconnected. Turn on and off Error clear request (YF) to clear the error.
- To use the thermocouple input, always connect the cold junction compensation resistor (CJ) supplied with the module between the CH1 V-/B terminal (pin number 5) and the CH1 A terminal (pin number 7). When the cold junction compensation resistor (CJ) is not connected, the disconnection is detected in all the channels for which the thermocouple input range is set.
  When a disconnection of the cold junction compensation resistor (CJ) is detected, a disconnection is also detected in all the channels for which the thermocouple input range is set.

(3) Conversion setting at disconnection detection

Setting Conversion setting at disconnection detection (Un\G400) allows specifying the value to be stored in CH□ Digital output value (Un\G11 to Un\G14). Thus, the disconnection detection is enabled only by checking CH□ Digital output value (Un\G11 to Un\G14) without monitoring Disconnection detection signal (X6).

By default, Value just before disconnection (0) is set in Conversion setting at disconnection detection (Un\G400). Change the setting value as needed.

Conversion setting at disconnection detection	Processing in disconnection detection
Value just before disconnection (0)	The value immediately before a disconnection detection is held in CH□ Digital output value (Un\G11 to Un\G14).
Up Scale (1)	The up-scale value (upper limit value + 5% of the input range) of the input range currently set is stored in CH□ Digital output value (Un\G11 to Un\G14).
Down Scale (2)	The down-scale value (lower limit value - 5% of the input range) of the input range currently set is stored in CH□ Digital output value (Un\G11 to Un\G14).
Optional Value (3)	The value set in CH□ Conversion setting value at disconnection detection (Un\G404 to Un\G407) is stored in CH□ Digital output value (Un\G11 to Un\G14).

Point

With the scaling function enabled, a value obtained by performing the scale conversion on the set value in Conversion setting at disconnection detection (Un\G400) is stored in CH□ Scaling value (Un\G54 to Un\G57) when a disconnection is detected.

(a) Up scale and down scale

The up-scale value (upper limit value + 5% of the input range) and down-scale value (lower limit value - 5% of the input range) of the input range currently set is stored in CH☐ Digital output value (Un\G11 to Un\G14) when a disconnection is detected.

If the value of "upper limit value + 5% of the input range" exceeds 32767 when the up scale is selected, 32767 is stored in CH☐ Digital output value (Un\G11 to Un\G14).

If the up scale or down scale is selected, the following values are stored in CH☐ Digital output value (Un\G11 to Un\G14) when a disconnection is detected.

- Micro voltage

Input range	Output range of digital output value	Up scale	Down scale
-100 to 100mV	-20000 to 20000	22000	-22000

- Resistance temperature detector

Input range	Celsius			Fahrenheit		
	Output range of digital output value	Up scale	Down scale	Output range of digital output value	Up scale	Down scale
Pt100 (-20 to 120℃)	-2000 to 12000	12700	-2700	0 to 20000	21000	-1000
Pt100 (-200 to 850℃)	-2000 to 8500	9025	-2525	-3000 to 15000	15900	-3900
JPt100 (-20 to 120℃)	-2000 to 12000	12700	-2700	0 to 20000	21000	-1000
JPt100 (-200 to 600℃)	-2000 to 6000	6400	-2400	-3000 to 11000	11700	-3700
Pt1000 (-200 to 850℃)	-2000 to 8500	9025	-2525	-3000 to 15000	15900	-3900
Pt50 (-200 to 650℃)	-2000 to 6500	6925	-2425	-3000 to 12000	12750	-3750

- Thermocouple

Input range	Celsius			Fahrenheit		
	Output range of digital output value	Up scale	Down scale	Output range of digital output value	Up scale	Down scale
Type B thermocouple	0 to 18200	19110	-910	320 to 32000	32767[*1]	-1264
Type R thermocouple	-500 to 17600	18505	-1405	0 to 32000	32767[*1]	-1600
Type S thermocouple	-500 to 17600	18505	-1405	0 to 32000	32767[*1]	-1600
Type K thermocouple	-2700 to 13700	14520	-3520	-4000 to 24000	25400	-5400
Type E thermocouple	-2700 to 10000	10635	-3335	-4000 to 18000	19100	-5100
Type J thermocouple	-2100 to 12000	12705	-2805	-3000 to 21000	22200	-4200
Type T thermocouple	-2700 to 4000	4335	-3035	-3000 to 6000	6450	-3450
Type N thermocouple	-2700 to 13000	13785	-3485	-4000 to 23000	24350	-5350
Type U thermocouple	-2000 to 6000	6400	-2400	-3000 to 11000	11700	-3700
Type L thermocouple	-2000 to 9000	9550	-2550	-3000 to 16000	16950	-3950
Type PL II thermocouple	0 to 13900	14595	-695	320 to 25000	26234	-914
Type W5Re/W26Re thermocouple	0 to 23000	24150	-1150	320 to 32000	32767[*1]	-1264

[*1] Because the up-scale value exceeds 32767, 32767 is stored.

(b) Optional value

The value set in CH☐ Conversion setting value at disconnection detection (Un\G404 to Un\G407) is stored in CH☐ Digital output value (Un\G11 to Un\G14) when a disconnection is detected.

The default value of CH☐ Conversion setting value at disconnection detection (Un\G404 to Un\G407) is 0. The disconnection detection function is available with 0. However, the value can be changed to any value.

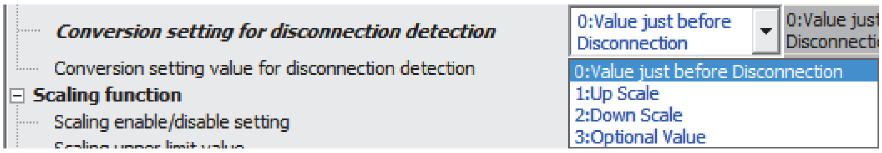
(4) When the disconnected wiring is reconnected

A normal digital output value is stored in the buffer memory area in the next conversion after recovery from the disconnection. When the averaging processing has been performed, the normal digital output value is stored in the buffer memory after the disconnected wiring is reconnected and the averaging process cycle elapses.
Until the normal digital output value is stored in the buffer memory area, the digital output value remains a specified value in the conversion setting at disconnection detection (such as the down-scale value).

(5) Setting procedure

1. **In "Conversion setting for disconnection detection", set a value to be stored in CH☐ Digital output value (Un\G11 to Un\G14) at disconnection detection.**

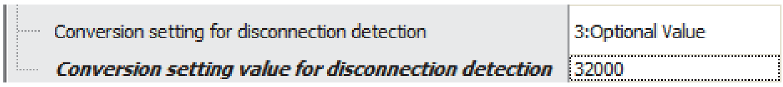
Project window ⇨ [Intelligent Function Module] ⇨ module name ⇨ [Parameter]



Conversion setting for disconnection detection: 0:Value just before Disconnection

Conversion setting value for disconnection detection
Scaling function
Scaling enable/disable setting
0:Value just before Disconnection
1:Up Scale
2:Down Scale
3:Optional Value

2. **When "3: Optional Value" is set, set "Conversion setting value for disconnection detection".**



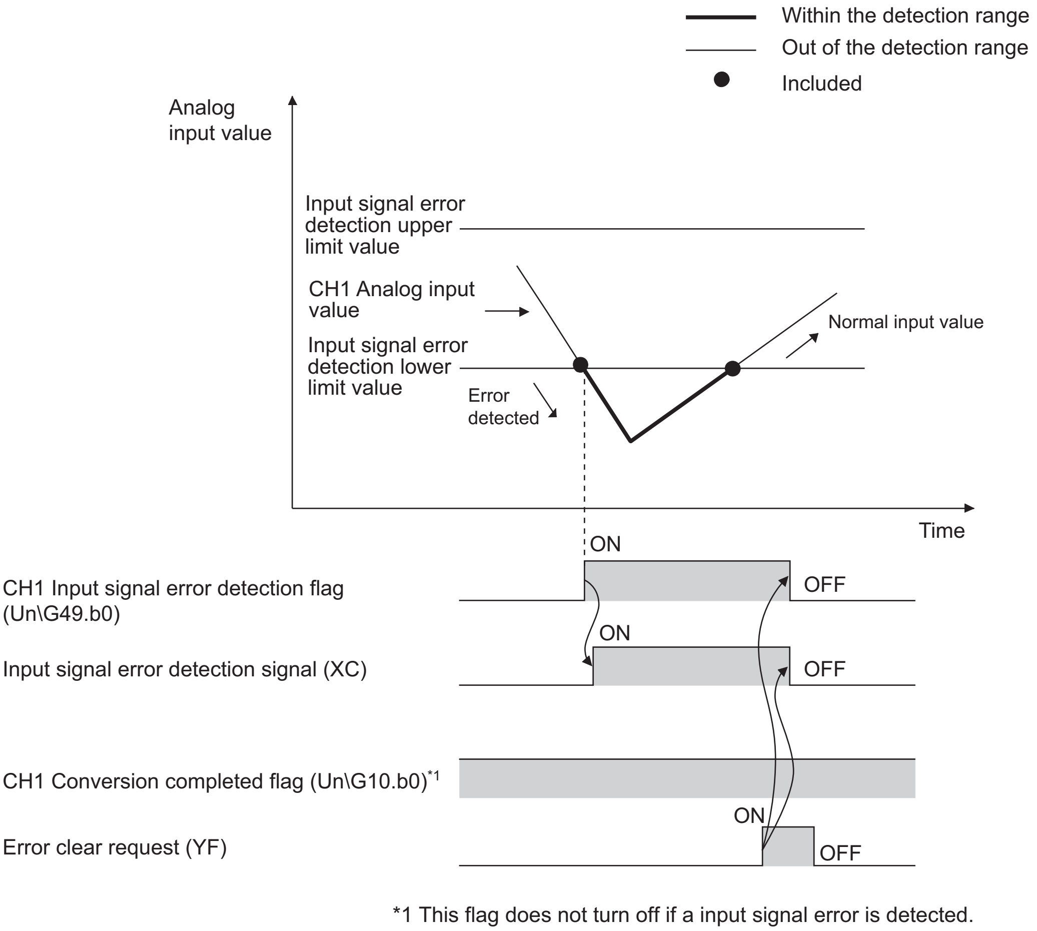
Conversion setting for disconnection detection: 3:Optional Value
Conversion setting value for disconnection detection: 32000

Item	Setting range
Conversion setting value for disconnection detection	-32768 to 32767

8.7 Input Signal Error Detection Function

Current **Voltage**

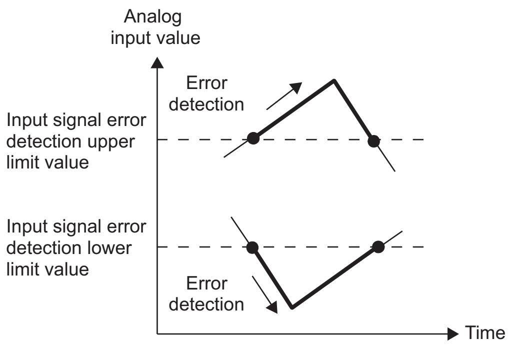
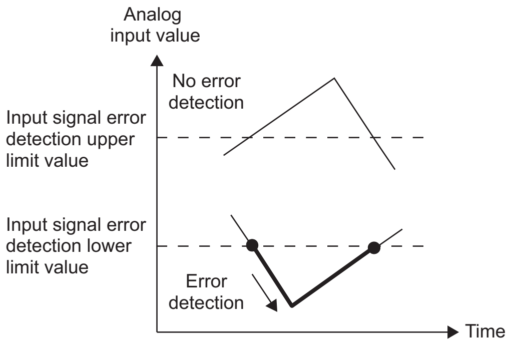
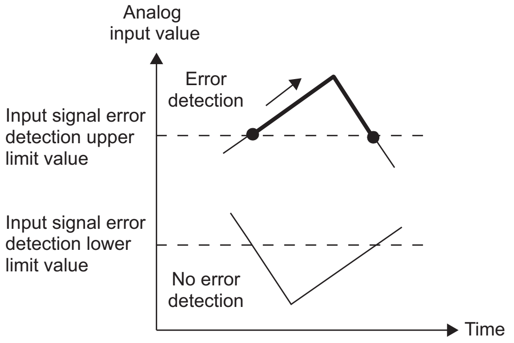
This function outputs an alarm if an analog input value exceeds a preset range, provided that the input type is voltage or current.


Within the detection range
Out of the detection range
Included
Analog input value
Input signal error detection upper limit value
CH1 Analog input value
Input signal error detection lower limit value
Error detected
Normal input value
Time
ON
OFF
CH1 Input signal error detection flag (Un\G49.b0)
ON
OFF
Input signal error detection signal (XC)
CH1 Conversion completed flag (Un\G10.b0)*1
ON
OFF
Error clear request (YF)

*1 This flag does not turn off if a input signal error is detected.

(1) Detection method

One of the following detection methods can be selected.

Detection method (Set value of Input signal error detection setting (Un\G402))	Detection condition	
Disable (0)	Input signal error detection is not performed.	
Upper and Lower Detection (1)	When the analog input value becomes equal to or greater than the input signal error detection upper limit value, or becomes equal to or smaller than the input signal error detection lower limit value, an error is detected.	 Analog input value Error detection Input signal error detection upper limit value Input signal error detection lower limit value Error detection Time
Lower Detection (2)	When the analog input value becomes equal to or smaller than the input signal error detection lower limit value, an error is detected. If the analog input value becomes equal to or greater than the input signal error detection upper limit value, an error is not detected.	 Analog input value No error detection Input signal error detection upper limit value Input signal error detection lower limit value Error detection Time
Upper Detection (3)	When the analog input value becomes equal to or greater than the input signal error detection upper limit value, an error is detected. If the analog input value becomes equal to or smaller than the input signal error detection lower limit value, an error is not detected.	 Analog input value Error detection Input signal error detection upper limit value Input signal error detection lower limit value No error detection Time
Simple Disconnection Detection (4)	Simple disconnection detection is performed. For details, refer to the following. • Simple disconnection detection (☞ Page 64, Section 8.7 (1) (a))	

Point

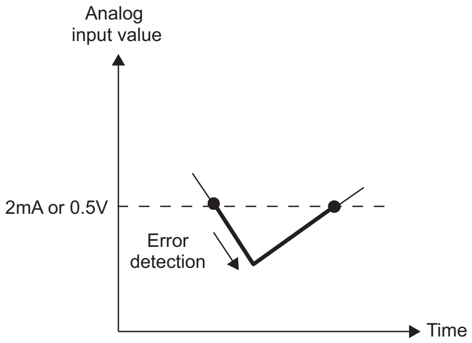
When an input signal error and warning output (process alarm or rate alarm) occur simultaneously, the ALM LED flashes.
For details on the warning output function, refer to the following.

- Warning Output Function (☞ Page 69, Section 8.8)

(a) Simple disconnection detection

Combining with the input range extension function allows a simple disconnection detection. If either of the following conditions is satisfied, Input signal error (1) is stored in the bit of Input signal error detection flag (Un\G49) corresponding to the channel number.

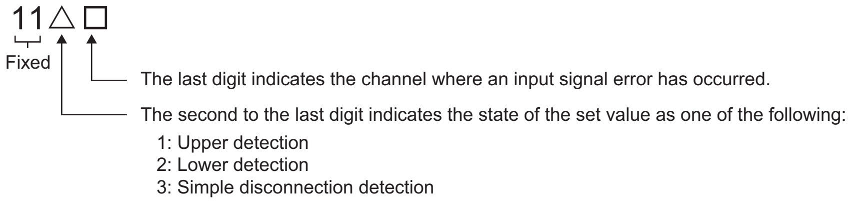
Input range	Disconnection detection condition
4 to 20mA (extended mode)	Analog input value ≤ 2mA
1 to 5V (extended mode)	Analog input value ≤ 0.5V



The setting in CH☐ Input signal error detection setting value (Un\G412 to Un\G415) is ignored.

(2) Notifying input signal errors

If an input signal error or a disconnection is detected, 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, the alarm code (11△☐) is stored in Latest error code (Un\G19). The stored value of an alarm code differs depending on the value of the detected input signal error (upper detection, lower detection, or simple disconnection detection).
The following figure shows the alarm codes stored.


11△☐
Fixed
The last digit indicates the channel where an input signal error has occurred.
The second to the last digit indicates the state of the set value as one of the following:
1: Upper detection
2: Lower detection
3: Simple disconnection detection

For details of the alarm codes, refer to the following.

- List of Alarm Codes (☞ Page 126, Section 11.5)

(3) Operations performed when an input signal error is detected

On the channel where an error is detected, the digital output value obtained immediately before the error is detected is held. At this time, Conversion completed flag (Un\G10) does not turn off.

If the analog input value falls back within the set range, conversion resumes regardless of whether or not Input signal error detection flag (Un\G49) and Input signal error detection signal (XC) are reset. (The ALM LED keeps flashing.)

Point

During an input signal error, the values of CH☐ Digital output value (Un\G11 to Un\G14) and CH☐ Scaling value (Un\G54 to Un\G57) are not updated.

(4) Detection cycle

The detection of an input signal error is performed at every sampling cycle.

(5) Clearing input signal errors

After the analog input value returns within the set range, turn on and off Error clear request (YF). If the simple disconnection detection is set, turn on and off Error clear request (YF) after the analog input value exceeds 2.0mA or 0.5V.

When an input signal error is cleared, the multiple input module performs as follows.

- Clears Input signal error detection flag (Un\G49).
- Turns off Input signal error detection signal (XC).
- Turns off the ALM LED.
- Clears the alarm code (11△☐) stored in Latest error code (Un\G19).

(6) How to set the input signal error detection setting value

Set the input signal error detection upper limit value and input signal error detection lower limit value by 1 (0.1%) based on the input signal error detection setting value.

Both the input signal error detection upper limit value and the input signal error detection lower limit value reflect the input signal error detection setting value.

(a) Input signal error detection upper limit value

This value is calculated by adding "Input range width (gain value - offset value) × Input signal error detection setting value" to the gain value. Only the value equal to or greater than the gain value can be set.

To calculate the input signal error detection setting value based on the input signal error detection upper limit value, use the following equation:

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

(b) Input signal error detection lower limit value

This value is calculated by subtracting "Input range width (gain value - offset value) × Input signal error detection setting value" from the lower limit value of each range. Only the value below the lower limit value of the range can be set.

To calculate the input signal error detection setting value based on the input signal error detection lower limit value, use the following equation:

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

Remark

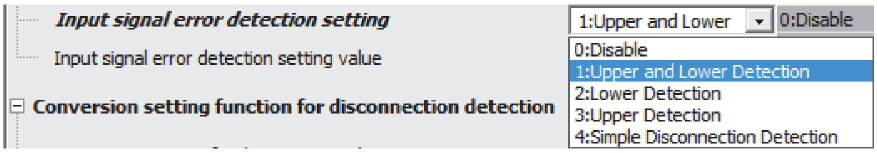
The following table lists the lower limit value, offset value, and gain value for each range.

Input range		Lower limit value	Offset value	Gain value
Current	4 to 20mA	4mA		20mA
	0 to 20mA	0mA		20mA
	4 to 20mA (extended mode)	4mA		20mA
Voltage	1 to 5V	1V		5V
	0 to 5V	0V		5V
	-10 to 10V	-10V	0V	10V
	0 to 10V	0V		10V
	1 to 5V (extended mode)	1V		5V

(7) Setting procedure

1. **Select a detection method from "Input signal error detection setting".**

Project window ⇨ [Intelligent Function Module] ⇨ module name ⇨ [Parameter]

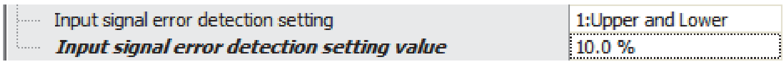


Input signal error detection setting | 1:Upper and Lower | 0:Disable

Input signal error detection setting value

⊟ Conversion setting function for disconnection detection

2. **Set a value for "Input signal error detection setting value".**



Input signal error detection setting: 1:Upper and Lower

Input signal error detection setting value: 10.0 %

Item	Setting range
Input signal error detection setting value	0 to 25.0%

Point

- When "4: Simple Disconnection Detection" is set for "Input signal error detection setting", the setting for "Input signal error detection setting value" becomes invalid.
- When the input type is set to voltage or current for CH□ Input type/range setting (Un\G500 to Un\G503) and when "4: Simple Disconnection Detection" is set for "Input signal error detection setting" on the channel where the input range is set to a range other than 4 to 20mA (extended mode) and 1 to 5V (extended mode), an error occurs. The error code (82□) is stored in Latest error code (Un\G19) and Error flag (XF) turns on.
- When the specifications of simple disconnection detection, 2mA (4 to 20mA (extended mode) or 0.5V (input range: 1 to 5V (extended mode)), do not fill the needs of the system, set "Input signal error detection setting" to "2: Lower Detection" and set "Input signal error detection setting value" to a judging value to detect a disconnection.

(8) Setting example of input signal error detection

To detect an error on a channel where CH☐ Input type/range setting (Un\G500 to Un\G503) is set to the current of 4 to 20mA when the analog input value is 2.4mA or lower, make the following substitutions in the equation based on the input signal error detection lower limit value.

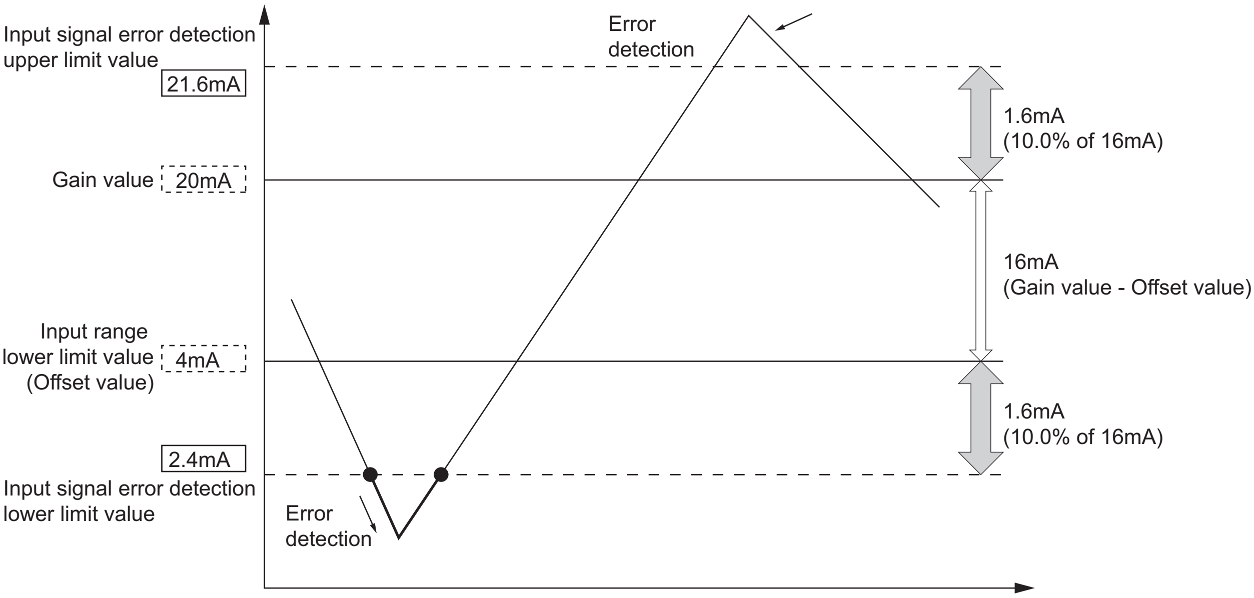
- Input signal error detection lower limit value: 2.4mA
- Lower limit value of the input range (offset value): 4.0mA
- Gain value: 20.0mA

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

$$= 100(10.0\%)$$

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

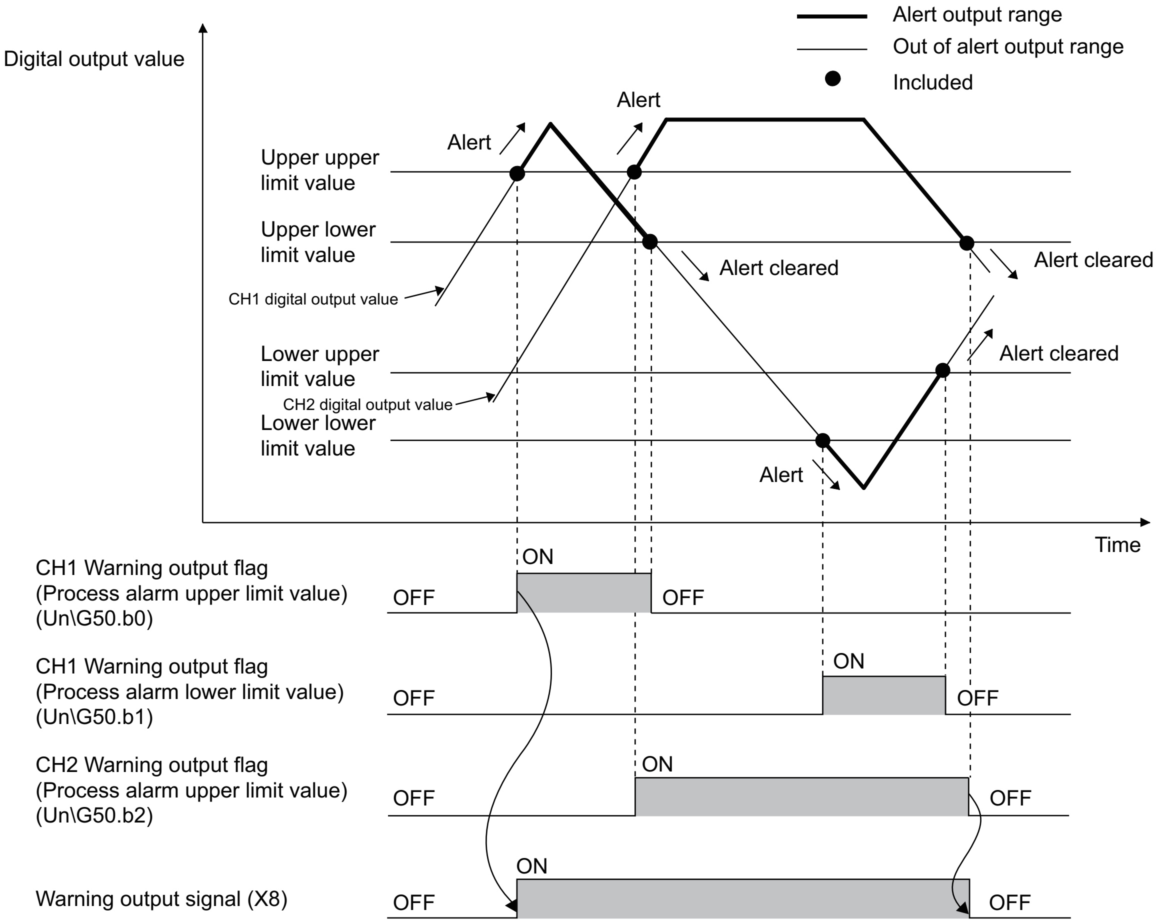
Ex. When "2: Lower Detection" is set for "Input signal error detection setting", the input signal error detection value works as shown below.



8.8 Warning Output Function

(1) Process alarm

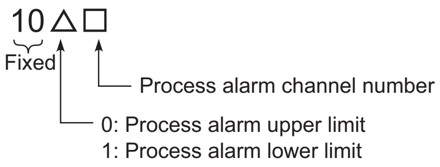
When a digital output value falls within a preset warning output range, a warning is output.
When the scaling function is enabled, the scaling value is the warning detection target.



(a) Operation performed when a warning is output

When the digital output value falls within a warning output range, equal to or larger than the process alarm upper upper limit value or equal to or less than the process alarm lower lower limit value, a warning is notified by the following operations.

- Alarm ON (1) is stored in the bit of Warning output flag (process alarm) (Un\G50) corresponding to the channel number (upper limit alarm or lower limit alarm).
- Warning output signal (X8) turns on.
- The ALM LED turns on.
- The alarm code (10△□) is stored in Latest error code (Un\G19). The following figure shows the alarm codes stored.


10△□
Fixed
Process alarm channel number
0: Process alarm upper limit
1: Process alarm lower limit

The conversion in the channels where a warning is output continues.

(b) Operation performed after a warning is output

When the digital output value is smaller than the process alarm upper lower limit value or larger than the rate alarm lower upper limit value after a warning is output, Normal (0) is stored in the bit of Warning output flag (process alarm) (Un\G50) in the corresponding channel.

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

However, the alarm code (10△□) stored in Latest error code (Un\G19) is not cleared. Turn on and off Error clear request (YF) to clear the alarm code (10△□).

(c) Warning detection period

When the time average is specified, the warning detection is performed per set time (for averaging). When the count average is specified, it is performed per count (for averaging).

When another conversion method is specified, it is performed per sampling cycle.

(d) Warning detection target

When the scaling function is enabled, the value in CH□ Scaling value (Un\G54 to Un\G57) is the warning detection target.

For the setting of CH1 Process alarm lower lower limit value (Un\G86) to CH4 Process alarm upper upper limit value (Un\G101), set values in consideration of the scale conversion.

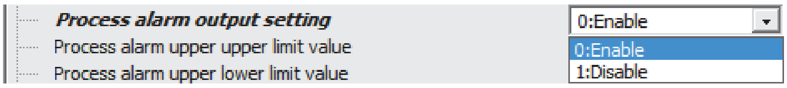
(e) Operation performed when a disconnection is detected

For the micro voltage input range, resistance temperature detector input range, or thermocouple input range, a process alarm may occur simultaneously because the value in CH□ Digital output value (Un\G11 to Un\G14) changes depending on the value in Conversion setting at disconnection detection (Un\G400) when a disconnection is detected.

(f) Setting procedure

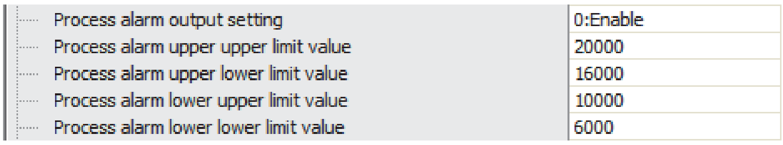
1. **Set "Process alarm output setting" to "0: Enable".**

Project window ⇨ [Intelligent Function Module] ⇨ module name ⇨ [Parameter]



Process alarm output setting: 0:Enable
Process alarm upper upper limit value
Process alarm upper lower limit value

2. **Set values for "Process alarm upper upper limit", "Process alarm upper lower limit", "Process alarm lower upper limit", and "Process alarm lower lower limit".**



Process alarm output setting: 0:Enable
Process alarm upper upper limit value: 20000
Process alarm upper lower limit value: 16000
Process alarm lower upper limit value: 10000
Process alarm lower lower limit value: 6000

Item	Setting range
Process alarm upper upper limit value	-32768 to 32767
Process alarm upper lower limit value	
Process alarm lower upper limit value	
Process alarm lower lower limit value	

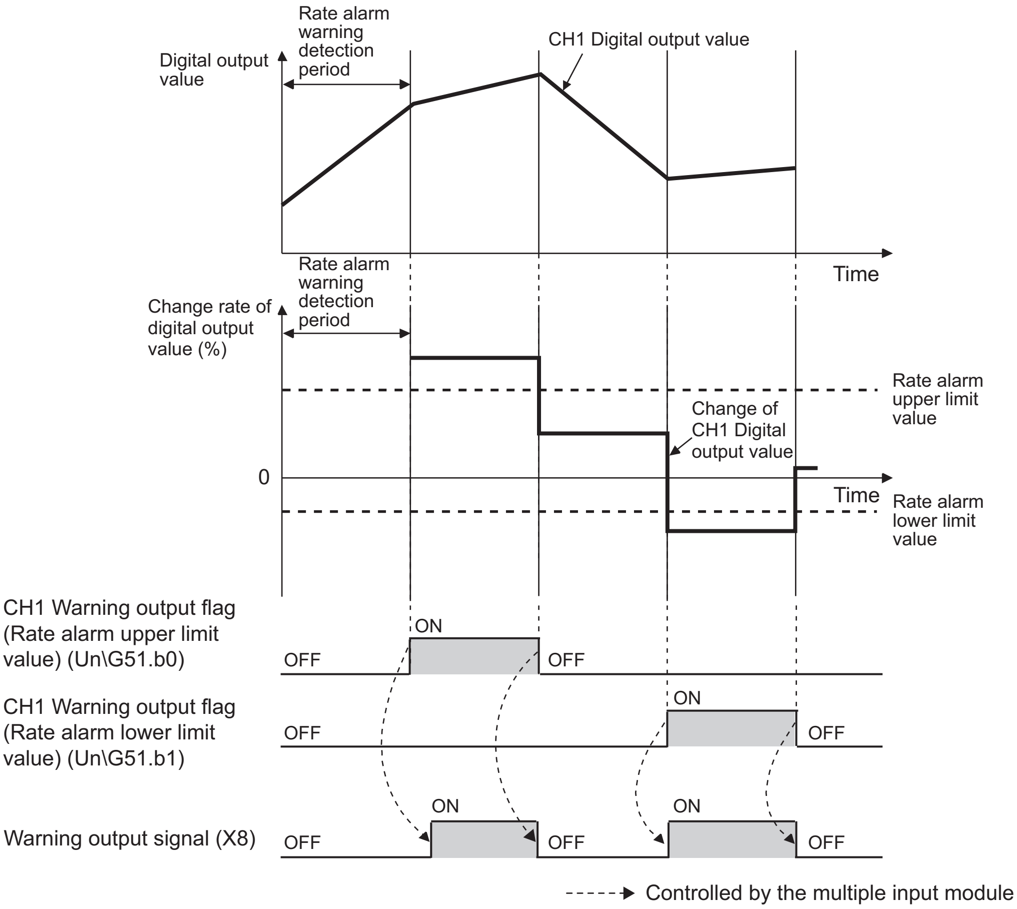
Point

Set the warning output setting in 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

AbN automation

(2) Rate alarm

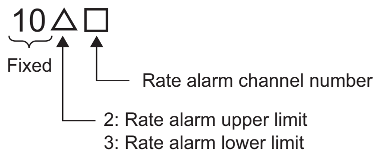
When the change rate of a digital output value is equal to or larger than the rate alarm upper limit value or equal to or smaller than the rate alarm lower limit value, a warning is output.



(a) Operation performed when a warning is output

If the change rate of a digital output value is equal to or larger than the rate alarm upper limit value or equal to or smaller than the rate alarm lower limit value with the digital output value monitored for each set rate alarm warning detection period, a warning is notified by the following operations.

- Alarm ON (1) is stored in the bit of Warning output flag (rate alarm) (Un\G51) corresponding to the channel number (upper limit alarm or lower limit alarm).
- Warning output signal (X8) turns on.
- The ALM LED turns on.
- The alarm code (10△□) is stored in Latest error code (Un\G19). The following figure shows the alarm codes stored.


10△□
Fixed
Rate alarm channel number
2: Rate alarm upper limit
3: Rate alarm lower limit

The conversion in the channels where a warning is output continues.

(b) Operation performed after a warning is output

When the change rate of the digital output value is smaller than the rate alarm upper limit value or larger than the rate alarm lower limit value after a warning is output, Normal (0) is stored in the bit of Warning output flag (rate alarm) (Un\G51) in the corresponding channel.

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

However, the alarm code (10△□) stored in Latest error code (Un\G19) is not cleared. Turn on and off Error clear request (YF) to clear the alarm code (10△□).

(c) Warning detection period

The rate alarm detection cycle can be obtained by multiplying the value set in CH□ Rate alarm detection cycle (Un\G118 to Un\G121) by the conversion cycle. The setting range of CH□ Rate alarm detection cycle is from 1 to 36000 times.

Ex. Rate alarm detection cycle in the following condition

- Number of channels where the conversion is enabled: three channels (conversion cycle = 50ms × 3 = 150ms)
- CH1 Rate alarm detection cycle: 5 times

The rate alarm detection cycle is 750ms (5 (times) × 150 (ms)). The digital output values are compared at intervals of 750ms and the change rate is detected from this comparison result.

Point

When the value in CH□ Rate alarm detection cycle (Un\G118 to Un\G121) is out of the setting range, an alarm code (71□) is stored in Latest error code (Un\G19).

(d) Operation performed when a disconnection is detected

For the micro voltage input range, resistance temperature detector input range, or thermocouple input range, a rate alarm may occur simultaneously because the value in CH□ Digital output value (Un\G11 to Un\G14) changes depending on the value in Conversion setting at disconnection detection (Un\G400) when a disconnection is detected. When the digital output value changes due to recovery from the disconnection, no rate alarm occurs.

(e) Rate alarm judgment

The rate alarm upper limit value and rate alarm lower limit value are judged after they are converted into digital values per rate alarm detection cycle.

The following shows the conversion formula for values used for the rate alarm judgment.

$$\text{Value for judgement at each rate alarm detection cycle (digit)}^{*1} = \left(\frac{R_H \text{ or } R_L}{1000}\right) \times D_x$$

*1: Numbers after the decimal point are rounded down.

Item	Description	
R_H	Rate alarm upper limit value (unit: 0.1%)	
R_L	Rate alarm lower limit value (unit: 0.1%)	
D_X	For current input range, voltage input range, or micro voltage input range	Gain value of digital output value - Offset value of digital output value
	For resistance temperature detector input range or thermocouple input rage	Upper limit value of digital output value - Lower limit value of digital output value

Ex. When the current input range of 4 to 20mA is set and the setting values are as follows, the current value is compared to the previous value at intervals of 500ms of the rate alarm detection cycle. The current digital output value is judged whether it has increased by 5000 digits (25%) or more or 1000 digits (5%) or less compared to the previous digital output value.

Judging value (upper limit value) = (250 ÷ 1000) × 20000 = 5000 [digit]

Judging value (lower limit value) = (50 ÷ 1000) × 20000 = 1000 [digit]

- Conversion cycle: 50ms/1CH
- CH1 Rate alarm detection cycle: 10 times
- CH1 Rate alarm upper limit value: 250 (25%)
- CH1 Rate alarm lower limit value: 50 (5%)
- Gain value - Offset value: 20000

Ex. When the resistance temperature detector input range of Pt100 (-20 to 120℃) is set and the setting values are as follows, the current value is compared to the previous value at intervals of 500ms of the rate alarm detection cycle. The current digital output value is judged whether it has increased by 3500 digits (25%) or more or 700 digits (5%) or less compared to the previous digital output value.

Judging value (upper limit value) = (250 ÷ 1000) × 14000 = 3500 [digit]

Judging value (lower limit value) = (50 ÷ 1000) × 14000 = 700 [digit]

- Conversion cycle: 50ms/1CH
- CH1 Rate alarm detection cycle: 10 times
- CH1 Rate alarm upper limit value: 250 (25%)
- CH1 Rate alarm lower limit value: 50 (5%)
- Upper limit value of digital output value - Lower limit value of digital output value: 14000

The following shows the method to obtain the change rate to be set from the change rate of voltage, current, and temperature measured values where warnings are to be detected.

- Voltage

$$\text{Change rate to be set} = \left(\frac{\text{Change amount of voltage for detecting a warning (V)}}{\text{Gain voltage (V) - Offset voltage (V)}} \times 1000 \right)^{*1}$$

*1: Numbers after the decimal point are rounded down.

- Current

$$\text{Change rate to be set} = \left(\frac{\text{Change amount of current for detecting a warning (mA)}}{\text{Gain current (mA) - Offset current (mA)}} \times 1000 \right)^{*1}$$

*1: Numbers after the decimal point are rounded down.

- Micro voltage

$$\text{Change rate to be set} = \left(\frac{\text{Change amount of voltage for detecting a warning (mV)}}{\text{Gain voltage (mV) - Offset voltage (mV)}} \times 1000 \right)^{*1}$$

*1: Numbers after the decimal point are rounded down.

- Temperature measured value

$$\text{Change rate to be set} = \left(\frac{\text{Change amount of temperature measured value for detecting a warning (℃, ℉)}}{\text{Temperature measuring range upper limit (℃, ℉)} - \text{Temperature measuring range lower limit (℃, ℉)}} \times 1000 \right)^{*1}$$

*1: Numbers after the decimal point are rounded down.

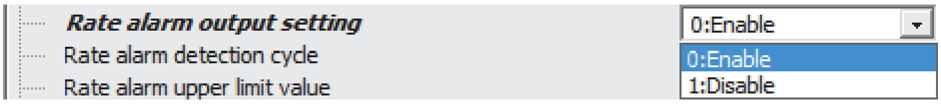
(f) Warning detection target

Regardless of the enable/disable state of the scaling function, the target is CH☐ Digital output value (Un\G11 to Un\G14).

(g) Setting procedure

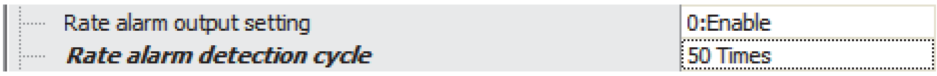
1. Set "Rate alarm output setting" to "0: Enable".

Project window ⇨ [Intelligent Function Module] ⇨ module name ⇨ [Parameter]



Rate alarm output setting: 0:Enable
Rate alarm detection cycle
Rate alarm upper limit value

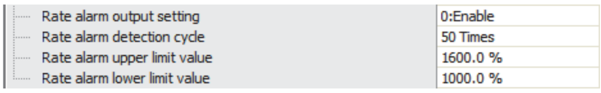
2. Set a value for "Rate alarm detection cycle".



Rate alarm output setting: 0:Enable
Rate alarm detection cycle: 50 Times

Item	Setting range
Rate alarm detection cycle	1 to 36000 times

3. Set values for "Rate alarm upper limit value" and "Rate alarm lower limit value".



Rate alarm output setting: 0:Enable
Rate alarm detection cycle: 50 Times
Rate alarm upper limit value: 1600.0 %
Rate alarm lower limit value: 1000.0 %

Item	Setting range
Rate alarm upper limit value	-3276.8 to 3276.7%
Rate alarm lower limit value	

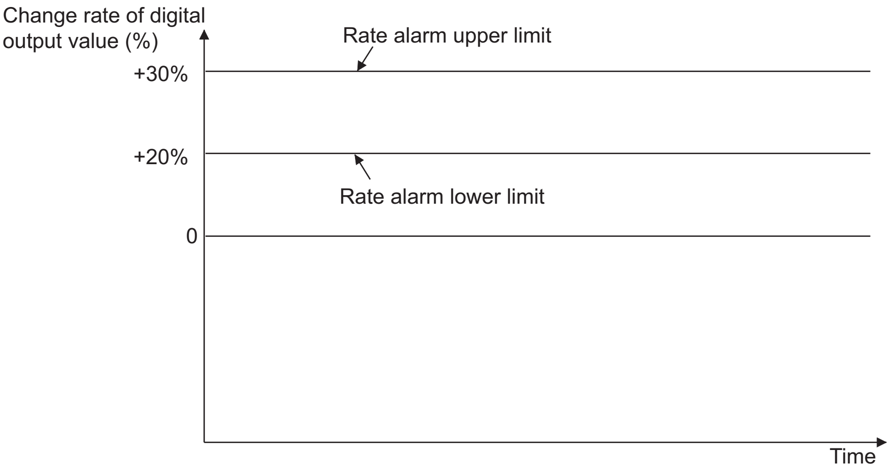
Point

- Set the rate alarm upper limit value and rate alarm lower limit value in increments of 0.1% for the following items.
  - For current/voltage/micro voltage input range: Gain value of digital output value - Offset value of digital output value
  - For resistance temperature detector/thermocouple input range: Upper limit value of digital output value - Lower limit value of digital output value
- Set the rate alarm setting in the following condition.
  Rate alarm upper limit value > Rate alarm lower limit value

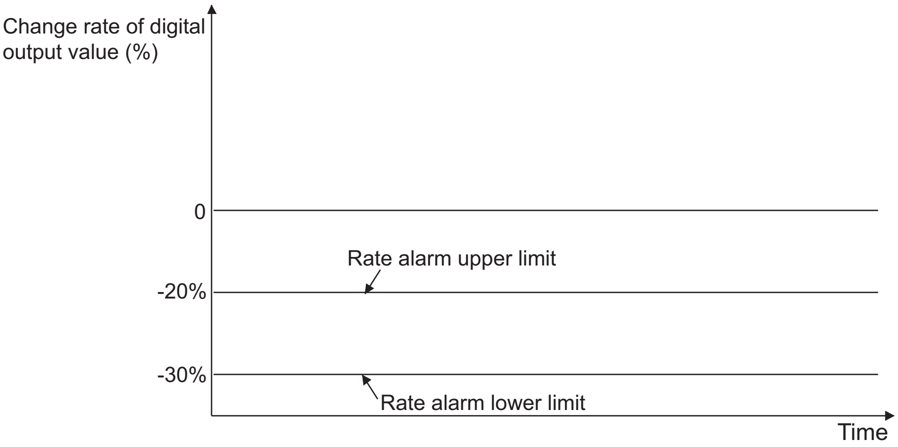
(h) Application example of rate alarm

The rate alarm is useful to monitor the change rate of digital output values in a limited range as follows.

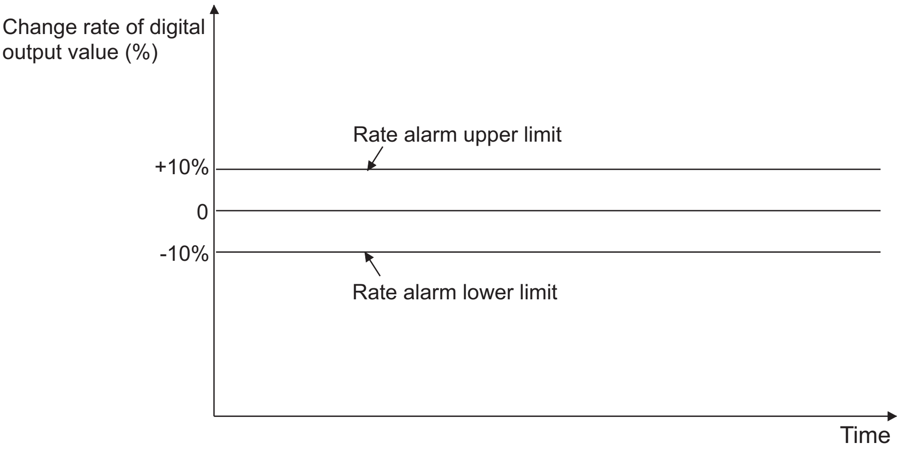
Ex. Monitoring whether the increase rate of a digital output value lies within a specified range



Ex. Monitoring whether the decrease rate of a digital output value lies within a specified range



Ex. Monitoring whether the change rate of a digital output value lies within a specified range



8.9 Scaling Function

This function performs the scale conversion on digital output values. The values are converted within a specified range between a scaling upper limit value and scaling lower limit value.
The converted values are stored in CH☐ Scaling value (Un\G54 to Un\G57).

(1) Concept of scaling setting

Ex. When the input type is set to the resistance temperature detector and the input range is set to Pt100 (-200 to 850℃)
For the scaling lower limit value, set a value corresponding to the lower limit of the input range (-2000).
For the scaling upper limit value, set a value corresponding to the upper limit of the input range (8500).

(2) Calculating the scaling value

The scaling value is calculated based on the following equations.
(All digits to the right of the decimal point are rounded off during scale conversion.)

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

- Current: 4 to 20mA, 0 to 20mA, 4 to 20mA (extended mode)[*1]
- Voltage: 1 to 5V, 0 to 5V, 0 to 10V, 1 to 5V (extended mode)[*1]

$$\text{Scaling value (digital operation value)} = \frac{D_X \times (S_H - S_L)}{DMax} + S_L$$

- Voltage: -10 to 10V
- Micro voltage: -100 to 100mV

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

- Resistance temperature detector, thermocouple

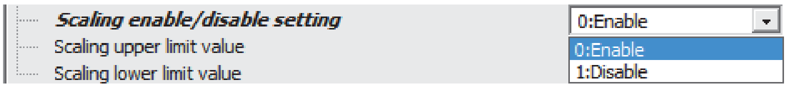
$$\text{Scaling value} = \frac{(D_X - D_{Min}) \times (S_H - S_L)}{D_{Max} - D_{Min}} + S_L$$

[*1] Although the range of the digital output value in the extended mode is -5000 to 22500, this function scales digital output values within the range of 0 to 20000. For an example of scaling setting using the extended mode, refer to the following.
Setting example of scaling function (☞ Page 79, Section 8.9 (4))

(3) Setting procedure

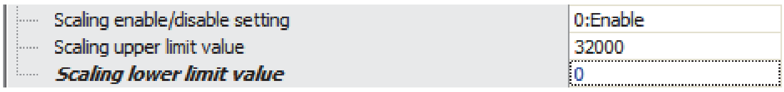
1. **Set "Scaling enable/disable setting" to "0: Enable".**

Project window ⇨ [Intelligent Function Module] ⇨ module name ⇨ [Parameter]



Scaling enable/disable setting	0:Enable
Scaling upper limit value	0:Enable
Scaling lower limit value	1:Disable

2. **Set values for "Scaling upper limit value" and "Scaling lower limit value".**



Scaling enable/disable setting	0:Enable
Scaling upper limit value	32000
Scaling lower limit value	0

Item	Setting range
Scaling upper limit value	-32000 to 32000
Scaling lower limit value	

Point

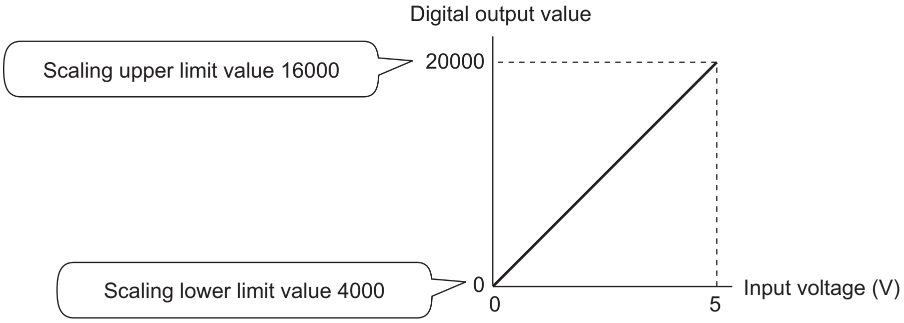
- Whatever the settings for the scaling upper limit value and the scaling lower limit value, the resolution does not become higher.
- If the relation between the values is conversion scaling lower limit value > conversion scaling upper limit value, the scale conversion can be performed according to a negative slope.
- Set different values for the scaling upper limit value and scaling lower limit value.
  If the same value is set, an error occurs. The error code (91□) is stored in Latest error code (Un\G19) and Error flag (XF) turns on.

(4) Setting example of scaling function

Ex. When the following values are set for a channel with an input range of 0 to 5V:

- "Scaling enable/disable setting": "0: Enable"
- "Scaling upper limit value": 16000
- "Scaling lower limit value": 4000

The following figure and table show the digital output values and the corresponding scaling values.

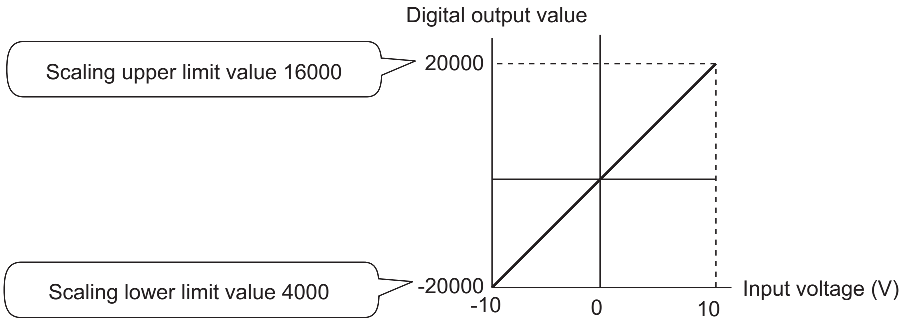


Analog input voltage (V)	Digital output value	Scaling value
0	0	4000
1	4000	6400
2	8000	8800
3	12000	11200
4	16000	13600
5	20000	16000

Ex. When the following values are set for a channel with an input range of -10 to 10V:

- "Scaling enable/disable setting": "0: Enable"
- "Scaling upper limit value": 16000
- "Scaling lower limit value": 4000

The following figure and table show the digital output values and the corresponding scaling values.



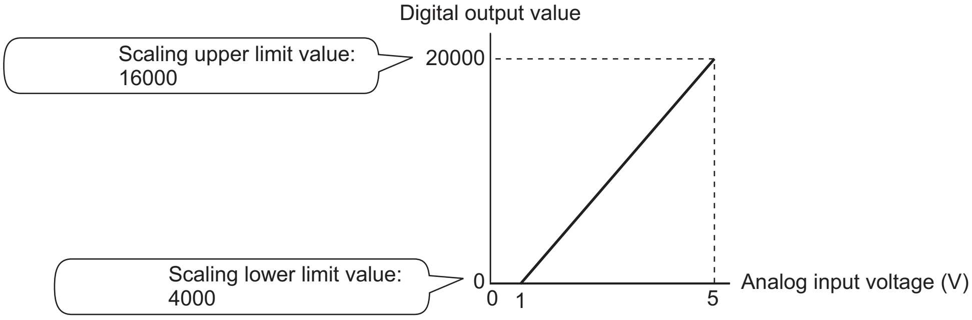
Analog input voltage (V)	Digital output value	Scaling value
-10	-20000	4000
-5	-10000	7000
0	0	10000
5	10000	13000
10	20000	16000

AbN automation

Ex. When the following values are set for a channel with an input range of 1 to 5V (extended mode):

- "Scaling enable/disable setting": "0: Enable"
- "Scaling upper limit value": 16000
- "Scaling lower limit value": 4000

The following figure and table show the digital output values and the corresponding scaling values.

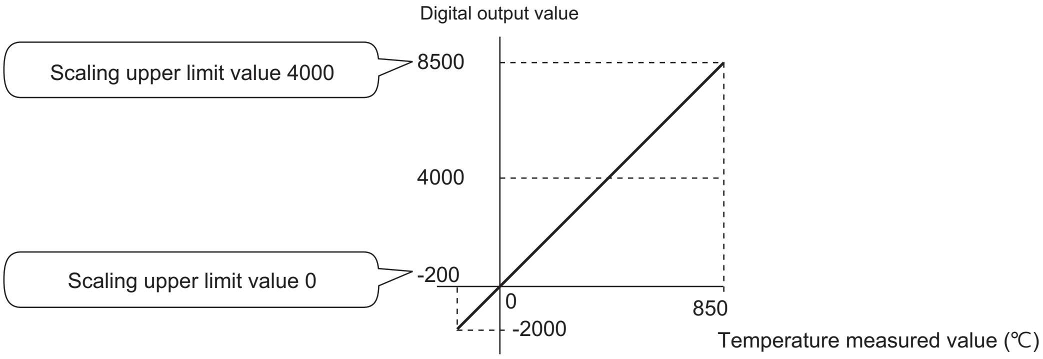


Analog input voltage (V)	Digital output value	Scaling value
0	-5000	1000
1	0	4000
2	5000	7000
3	10000	10000
4	15000	13000
5	20000	16000
5.5	22500	17500

Ex. When the following values are set for a channel where the input type is set to the resistance temperature detector and the input range is set to Pt100 (-200 to 850℃):

- "Scaling enable/disable setting": "0: Enable"
- "Scaling upper limit value": 4000
- "Scaling lower limit value": 0

The following figure and table show the digital output values and the corresponding scaling values.



Resistance temperature detector input (℃)	Digital output value	Scaling value
-200	-2000	0
0	0	762
200	2000	1524
400	4000	2286
600	6000	3048
800	8000	3810
850	8500	4000

AbN automation

8.10 Error Log Function

This function stores the errors and alarms that occurred in the multiple input module in the buffer memory area (Un\G1810 to Un\G1969).
A total of 16 errors and alarms can be stored.

(1) Processing of the error log function

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

Ex. For error history No. 1

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

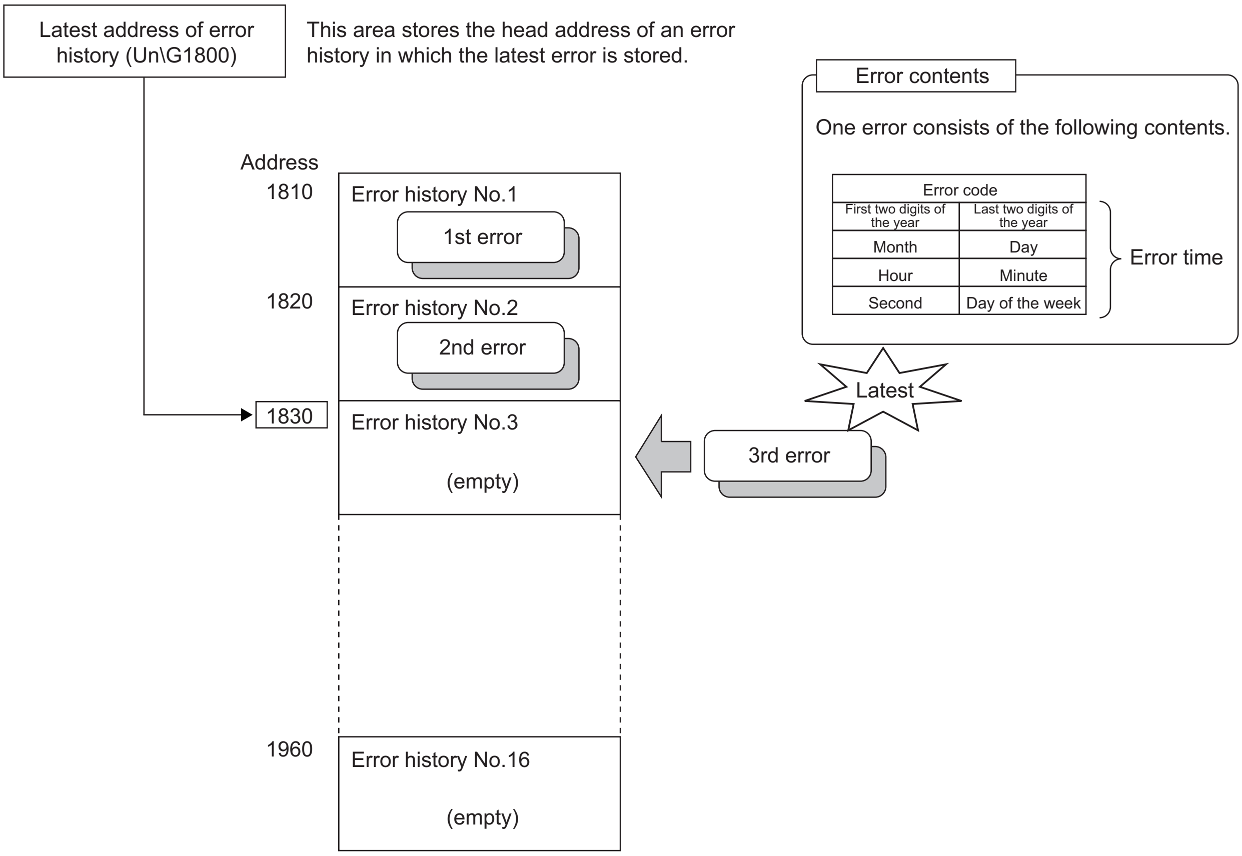
Item	Stored value and code	Example of stored value[*1]
First two digits of the year/Last two digits of the year	Stored in BCD code.	2014_H
Month/Day		0501_H
Hour/Minute		1035_H
Second		40_H
Day of the week	The value that corresponds to the day of the week is stored in BCD code. • Sunday: 00_H • Monday: 01_H • Tuesday: 02_H • Wednesday: 03_H • Thursday: 04_H • Friday: 05_H • Saturday: 06_H	04_H

[*1] Values stored when an error occurs on Thursday, May 01, 2014 at 10:35:40.

(2) Checking error history

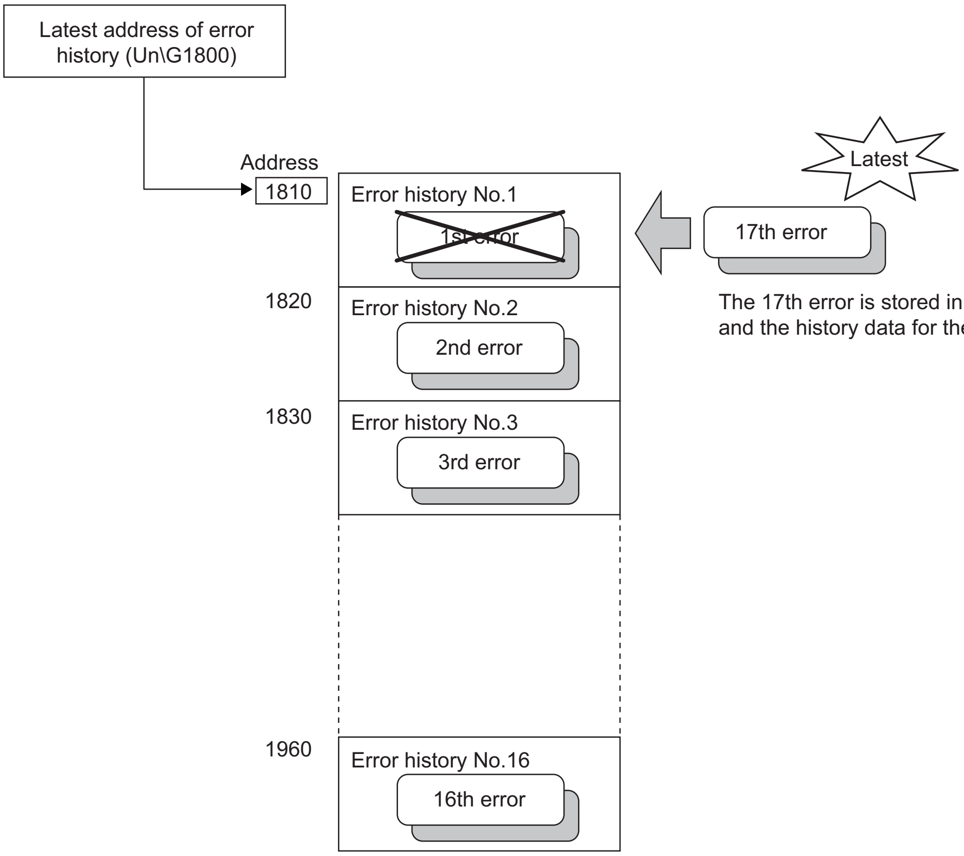
The start address of the latest stored error can be checked in Latest address of error history (Un\G1800).

Ex. 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).


Latest address of error history (Un\G1800)
This area stores the head address of an error history in which the latest error is stored.
Address
1810
Error history No.1
1st error
1820
Error history No.2
2nd error
1830
Error history No.3
(empty)
1960
Error history No.16
(empty)
Error contents
One error consists of the following contents.
Error code
First two digits of the year
Last two digits of the year
Month
Day
Hour
Minute
Second
Day of the week
Error time
Latest
3rd error

Ex. 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) is stored to Latest address of error history (Un\G1800).


Latest address of error history (Un\G1800)
Address
1810
Error history No.1
~~1st error~~
1820
Error history No.2
2nd error
1830
Error history No.3
3rd error
1960
Error history No.16
16th error
Latest
17th error
The 17th error is stored in Error history No.1 and the history data for the 1st error is erased.

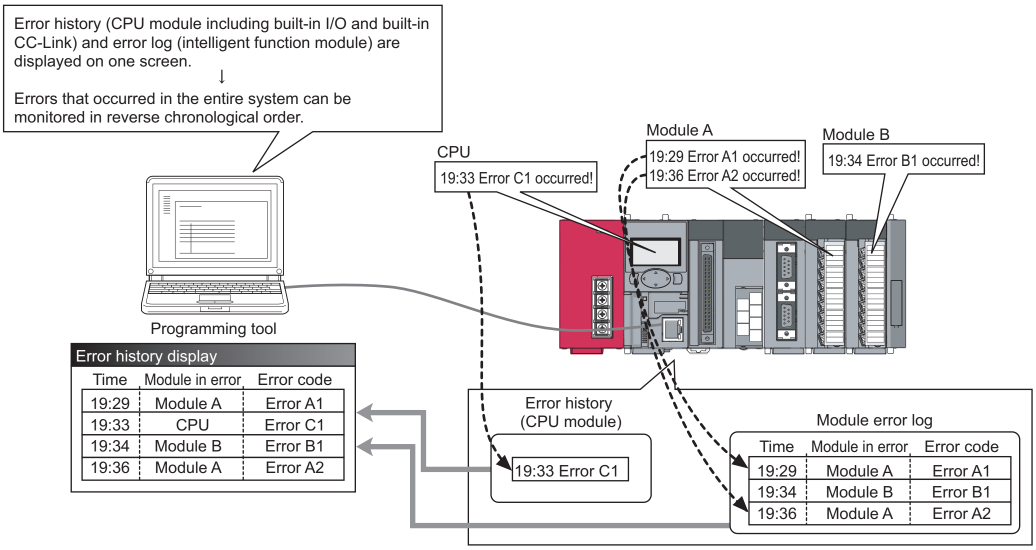
Point

- The same process for errors is used when an alarm occurs.
- Once the error history storage area becomes full, subsequent error information will overwrite the existing data, starting from Error history No.1 (Un\G1810 to Un\G1819), and continues sequentially thereafter. (The overwritten history is deleted.)
- The stored error history is cleared when the multiple input module is powered off, or when the CPU module is reset.

8.11 Module Error Collection Function

This function collects the errors and alarms that occurred in the multiple input module and stores them in the CPU module.

By holding the module errors in a CPU module memory that can hold data in the event of power failure, the details on errors can be held even after the module is powered off or reset.



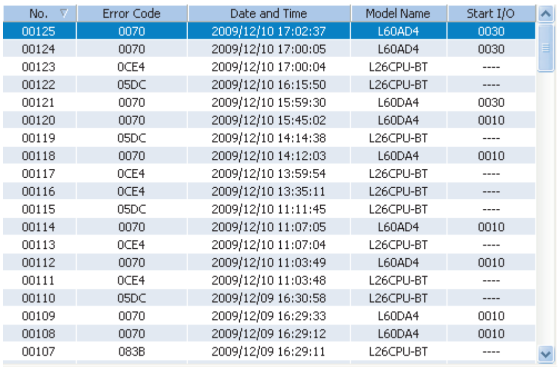
Error history (CPU module including built-in I/O and built-in CC-Link) and error log (intelligent function module) are displayed on one screen.

↓

Errors that occurred in the entire system can be monitored in reverse chronological order.

CPU
19:33 Error C1 occurred!
Module A
19:29 Error A1 occurred!
19:36 Error A2 occurred!
Module B
19:34 Error B1 occurred!
Programming tool
Error history display
Time
Module in error
Error code
19:29 Module A Error A1
19:33 CPU Error C1
19:34 Module B Error B1
19:36 Module A Error A2
Error history
(CPU module)
19:33 Error C1
Module error log
Time
Module in error
Error code
19:29 Module A Error A1
19:34 Module B Error B1
19:36 Module A Error A2

[Example of screen display]



No.	Error Code	Date and Time	Model Name	Start I/O
00125	0070	2009/12/10 17:02:37	L60AD4	0030
00124	0070	2009/12/10 17:00:05	L60AD4	0030
00123	0CE4	2009/12/10 17:00:04	L26CPU-BT	----
00122	05DC	2009/12/10 16:15:50	L26CPU-BT	----
00121	0070	2009/12/10 15:59:30	L60DA4	0030
00120	0070	2009/12/10 15:45:02	L60DA4	0010
00119	05DC	2009/12/10 14:14:38	L26CPU-BT	----
00118	0070	2009/12/10 14:12:03	L60DA4	0010
00117	0CE4	2009/12/10 13:59:54	L26CPU-BT	----
00116	0CE4	2009/12/10 13:35:11	L26CPU-BT	----
00115	05DC	2009/12/10 11:11:45	L26CPU-BT	----
00114	0070	2009/12/10 11:07:05	L60AD4	0010
00113	0CE4	2009/12/10 11:07:04	L26CPU-BT	----
00112	0070	2009/12/10 11:03:49	L60AD4	0010
00111	0CE4	2009/12/10 11:03:48	L26CPU-BT	----
00110	05DC	2009/12/09 16:30:58	L26CPU-BT	----
00109	0070	2009/12/09 16:29:33	L60DA4	0010
00108	0070	2009/12/09 16:29:12	L60DA4	0010
00107	083B	2009/12/09 16:29:11	L26CPU-BT	----

Point

For details on the module error collection function, refer to the following.
📖MELSEC-L CPU Module User's Manual (Function Explanation, Program Fundamentals)

8.12 Error Clear Function

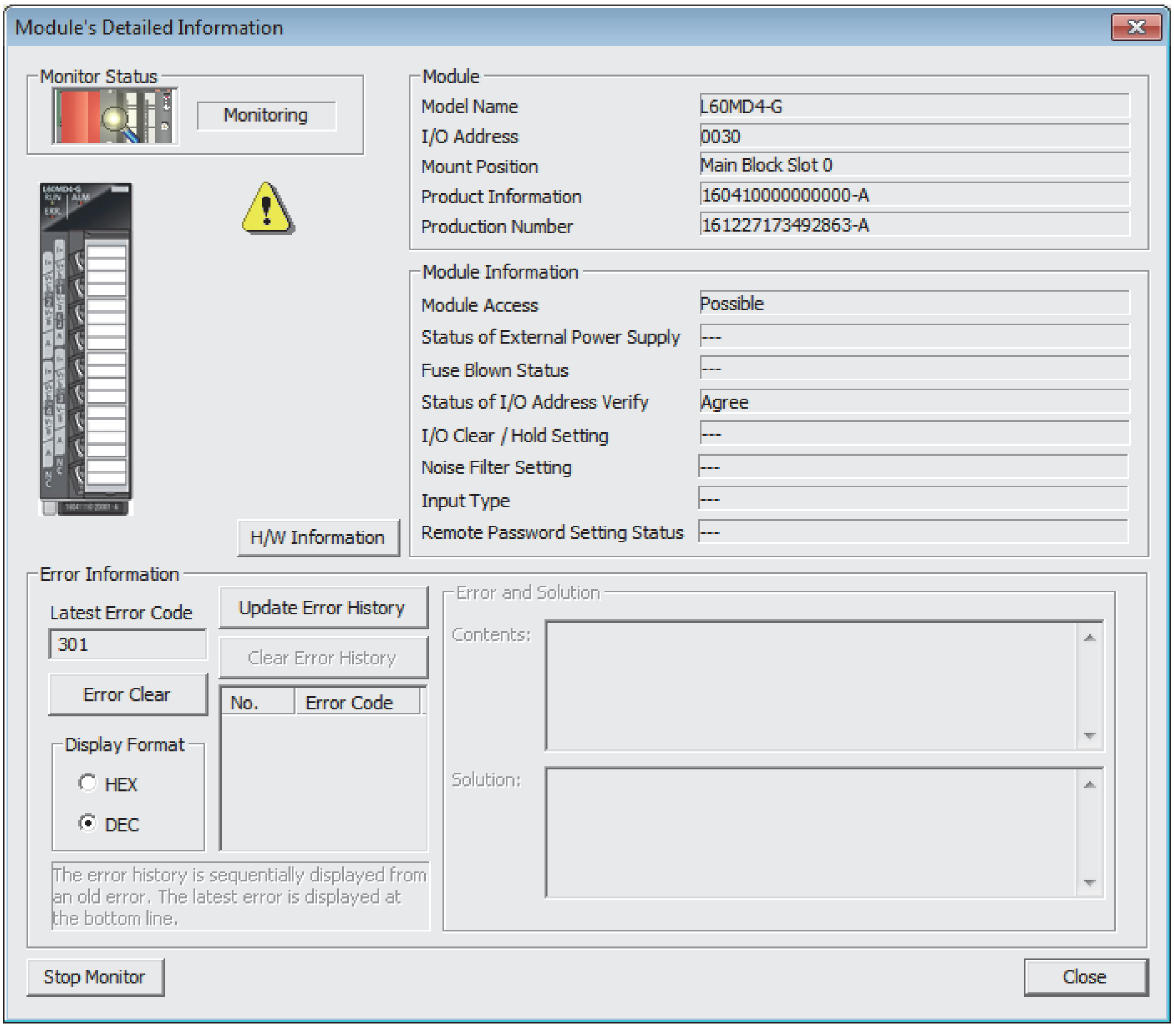
This function clears errors that occur using the system monitor.

By clicking the Error Clear button in the system monitor, the latest error code stored in Latest error code (Un\G19) is cleared and the ERR.LED turns off. The operation is the same as that for Error clear request (YF) and clearing the error from the display unit.

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

For instructions on Error clear request (YF) and clearing the error from the display unit, refer to the following.

- Error clear request (YF) (☞ Page 138, Appendix 1.2 (3))
- Checking and Clearing Errors (☞ Page 99, Section 9.4)


Module's Detailed Information
Monitor Status
Monitoring
H/W Information
Update Error History
Clear Error History
Error Clear
Stop Monitor
Close

Module
Model Name: L60MD4-G
I/O Address: 0030
Mount Position: Main Block Slot 0
Product Information: 160410000000000-A
Production Number: 161227173492863-A

Module Information
Module Access: Possible
Status of External Power Supply: ---
Fuse Blown Status: ---
Status of I/O Address Verify: Agree
I/O Clear / Hold Setting: ---
Noise Filter Setting: ---
Input Type: ---
Remote Password Setting Status: ---

Error Information
Latest Error Code: 301

No.	Error Code

Display Format
○ HEX
● DEC

The error history is sequentially displayed from an old error. The latest error is displayed at the bottom line.

Error and Solution
Contents:
Solution:

CHAPTER 9 DISPLAY UNIT

This chapter describes the functions of the display unit that can be used with the multiple input module.
For instruction on operating the display unit, or for details on the functions and menu configuration, refer to the following.
MELSEC-L CPU Module User's Manual (Function Explanation, Program Fundamentals)

9.1 Display Unit

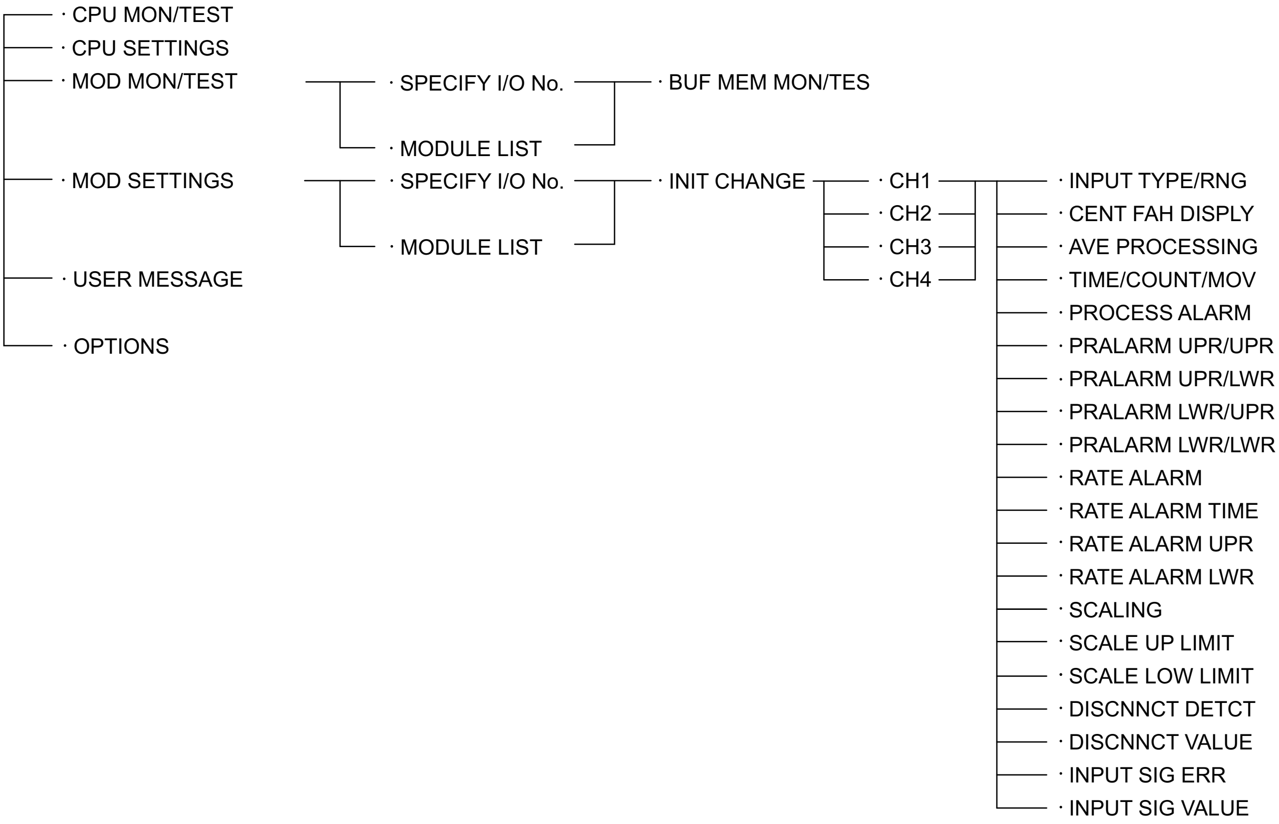
The display unit is an LCD attachable to the CPU module. By attaching it to the CPU module, the status of the system can be checked and the system settings can be changed without the software package.
In addition, if a problem occurs, the cause of the problem can be identified by displaying the error information.
For details on how to check and clear an error from the display unit, refer to the following.

- Checking and Clearing Errors (☞ Page 99, Section 9.4)

9.2 Menu Transition

(1) Organization

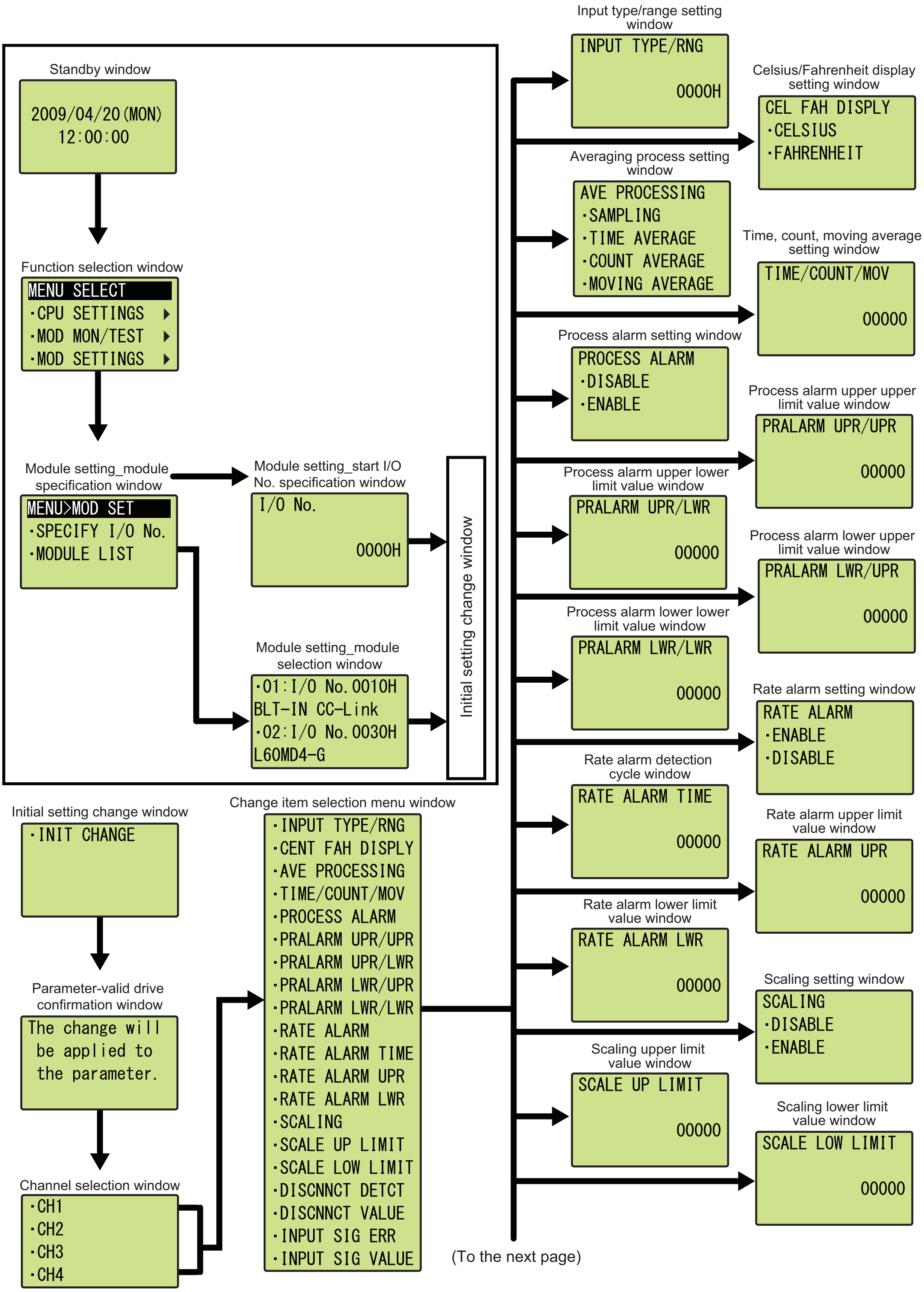
The following figure shows how the "MOD MON/TEST" and "MOD SETTINGS" menus are organized.



· CPU MON/TEST
· CPU SETTINGS
· MOD MON/TEST
· SPECIFY I/O No.
· BUF MEM MON/TES
· MODULE LIST
· MOD SETTINGS
· SPECIFY I/O No.
· INIT CHANGE
· MODULE LIST
· CH1
· CH2
· CH3
· CH4
· INPUT TYPE/RNG
· CENT FAH DISPLY
· AVE PROCESSING
· TIME/COUNT/MOV
· PROCESS ALARM
· PRALARM UPR/UPR
· PRALARM UPR/LWR
· PRALARM LWR/UPR
· PRALARM LWR/LWR
· RATE ALARM
· RATE ALARM TIME
· RATE ALARM UPR
· RATE ALARM LWR
· SCALING
· SCALE UP LIMIT
· SCALE LOW LIMIT
· DISCNNCT DETCT
· DISCNNCT VALUE
· INPUT SIG ERR
· INPUT SIG VALUE
· USER MESSAGE
· OPTIONS

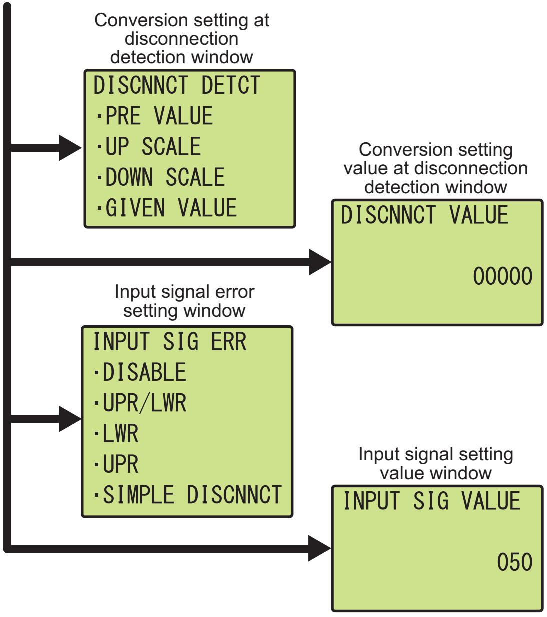
(2) Window transitions up to the initial setting change window

The following diagram shows how the windows transition to the initial setting change window.


Standby window
2009/04/20(MON)
12:00:00
Function selection window
MENU SELECT
·CPU SETTINGS
·MOD MON/TEST
·MOD SETTINGS
Module setting_module specification window
MENU>MOD SET
·SPECIFY I/O No.
·MODULE LIST
Module setting_start I/O No. specification window
I/O No.
0000H
Module setting_module selection window
·01:I/O No.0010H
BLT-IN CC-Link
·02:I/O No.0030H
L60MD4-G
Initial setting change window
Initial setting change window
·INIT CHANGE
Parameter-valid drive confirmation window
The change will be applied to the parameter.
Channel selection window
·CH1
·CH2
·CH3
·CH4
Change item selection menu window
·INPUT TYPE/RNG
·CENT FAH DISPLY
·AVE PROCESSING
·TIME/COUNT/MOV
·PROCESS ALARM
·PRALARM UPR/UPR
·PRALARM UPR/LWR
·PRALARM LWR/UPR
·PRALARM LWR/LWR
·RATE ALARM
·RATE ALARM TIME
·RATE ALARM UPR
·RATE ALARM LWR
·SCALING
·SCALE UP LIMIT
·SCALE LOW LIMIT
·DISCNNCT DETCT
·DISCNNCT VALUE
·INPUT SIG ERR
·INPUT SIG VALUE
Input type/range setting window
INPUT TYPE/RNG
0000H
Celsius/Fahrenheit display setting window
CEL FAH DISPLY
·CELSIUS
·FAHRENHEIT
Averaging process setting window
AVE PROCESSING
·SAMPLING
·TIME AVERAGE
·COUNT AVERAGE
·MOVING AVERAGE
Time, count, moving average setting window
TIME/COUNT/MOV
00000
Process alarm setting window
PROCESS ALARM
·DISABLE
·ENABLE
Process alarm upper upper limit value window
PRALARM UPR/UPR
00000
Process alarm upper lower limit value window
PRALARM UPR/LWR
00000
Process alarm lower upper limit value window
PRALARM LWR/UPR
00000
Process alarm lower lower limit value window
PRALARM LWR/LWR
00000
Rate alarm setting window
RATE ALARM
·ENABLE
·DISABLE
Rate alarm detection cycle window
RATE ALARM TIME
00000
Rate alarm upper limit value window
RATE ALARM UPR
00000
Rate alarm lower limit value window
RATE ALARM LWR
00000
Scaling setting window
SCALING
·DISABLE
·ENABLE
Scaling upper limit value window
SCALE UP LIMIT
00000
Scaling lower limit value window
SCALE LOW LIMIT
00000

(To the next page)

(From the previous page)


Conversion setting at disconnection detection window
DISCNNCT DETCT
·PRE VALUE
·UP SCALE
·DOWN SCALE
·GIVEN VALUE
Conversion setting value at disconnection detection window
DISCNNCT VALUE
00000
Input signal error setting window
INPUT SIG ERR
·DISABLE
·UPR/LWR
·LWR
·UPR
·SIMPLE DISCNNCT
Input signal setting value window
INPUT SIG VALUE
050

9.3 List of Setting Value Change Windows

The following table lists the setting value change windows.

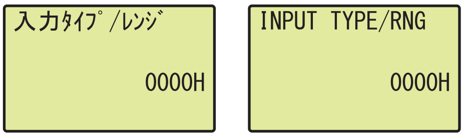
(1) Displayed in English:

Name		Window format	Input limits	
Setting item	Window display		Upper limit	Lower limit
Input type/range setting	INPUT TYPE/RNG	Numeric	$FFFF_H$	0000_H
Celsius/Fahrenheit display setting	CEL FAH DISPLY	Selection	-	-
Average processing setting	AVE PROCESSING	Selection	-	-
Time Average/Count Average/Moving Average	TIME/COUNT/MOV	Numeric	36000	0
Warning output function (Process Alarm)	PROCESS ALARM	Selection	-	-
Process alarm upper upper limit value	PRALARM UPR/UPR	Numeric	32767	-32768
Process alarm upper lower limit value	PRALARM UPR/LWR	Numeric	32767	-32768
Process alarm lower upper limit value	PRALARM LWR/UPR	Numeric	32767	-32768
Process alarm lower lower limit value	PRALARM LWR/LWR	Numeric	32767	-32768
Warning output function (Rate Alarm)	RATE ALARM	Selection	-	-
Rate alarm detect cycle time	RATE ALARM TIME	Numeric	36000	0
Rate alarm upper limit value	RATE ALARM UPR	Numeric	32767	-32768
Rate alarm lower limit value	RATE ALARM LWR	Numeric	32767	-32768
Scaling enable/disable setting	SCALING	Selection	-	-
Scaling upper limit value	SCALE UP LIMIT	Numeric	32000	-32000
Scaling lower limit value	SCALE LOW LIMIT	Numeric	32000	-32000
Conversion setting for disconnection detection	DISCNNCT DETCT	Selection	-	-
Conversion setting for disconnection detection value	DISCNNCT VALUE	Numeric	32767	-32768
Input signal error detection setting	INPUT SIG ERR	Selection	-	-
Input signal error detection setting value	INPUT SIG VALUE	Numeric	250	0

(2) Input type/range setting

Select an input type/range in the "INPUT TYPE/RNG" window.

"INPUT TYPE/RNG" window



入力ﾀｲﾌﾟ/ﾚﾝｼﾞ
0000H

INPUT TYPE/RNG
0000H

1. Move the cursor using the ◀ and ▶ buttons, then increment or decrement the value at the cursor using the ▲ and ▼ buttons. Confirm with the OK button.

For details on setting values, refer to the following.
☞ CH□ Input type/range setting (Un\G500 to Un\G503) (Page 155, Appendix 2 (21))

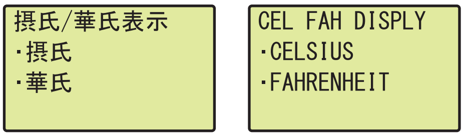
Point

A value between 0000_H and $FFFF_H$ can be input on the display unit. However, if a value out of the setting range is set, an error occurs on the multiple input module.

(3) Celsius/Fahrenheit display setting Thermocouple RTD

Select "CELSIUS" or "FAHRENHEIT" in the "CEL FAH DISPLY" window.

"CEL FAH DISPLY" window



摂氏/華氏表示
･摂氏
･華氏

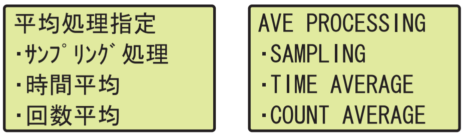
CEL FAH DISPLY
･CELSIUS
･FAHRENHEIT

1. Use the ▲ and ▼ buttons to select "CELSIUS" or "FAHRENHEIT". Confirm with the OK button.

(4) Averaging process setting

In the "AVE PROCESSING" window, select whether to perform sampling processing or averaging processing (time average, count average, moving average).

"AVE PROCESSING" window

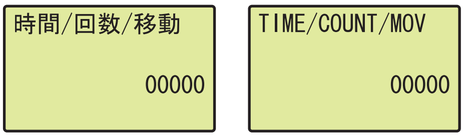


平均処理指定
･ｻﾝﾌﾟﾘﾝｸﾞ 処理
･時間平均
･回数平均

AVE PROCESSING
･SAMPLING
･TIME AVERAGE
･COUNT AVERAGE

↓

"TIME/COUNT/MOV" window



時間/回数/移動
00000

TIME/COUNT/MOV
00000

1. **Use the ▲ and ▼ buttons to select "SAMPLING", "TIME AVERAGE", "COUNT AVERAGE", or "MOVING AVERAGE". Confirm with the OK button. (When a value other than "SAMPLING" is selected, follow the procedure 2.)**

2. **Move the cursor using the ◀ and ▶ buttons, then increment or decrement the value at the cursor using the ▲ and ▼ buttons. Confirm with the OK button.**

Table of input items

Input item	Input range	
	Input upper limit	Input lower limit
TIME	18000	8
COUNT	36000	4
MOV	1000	2

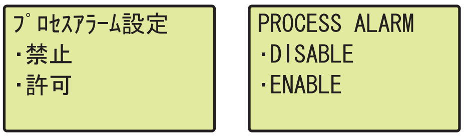
Point

A value between 0 and 36000 can be input for any type of averaging processing on the display unit. However, if a value out of the setting range for each averaging processing is set, an error occurs on the multiple input module.

(5) Process alarm setting

Select "DISABLE" or "ENABLE" in the "PROCESS ALARM" window.

"PROCESS ALARM" window

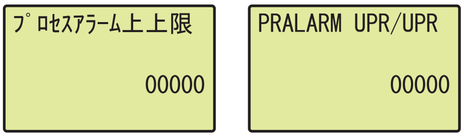

ﾌﾟﾛｾｽｱﾗｰﾑ設定
・禁止
・許可

PROCESS ALARM
・DISABLE
・ENABLE

1. **Use the ▲ and ▼ buttons to select "DISABLE" or "ENABLE". Confirm with the OK button. (When "ENABLE" is selected, follow the procedure 2 and later.)**

↓

"PRALARM UPR/UPR" window

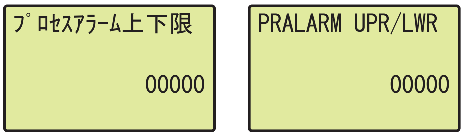

ﾌﾟﾛｾｽｱﾗｰﾑ上上限
00000

PRALARM UPR/UPR
00000

2. **Move the cursor using the ◀ and ▶ buttons, then increment or decrement the value at the cursor using the ▲ and ▼ buttons. Confirm with the OK button.**

↓

"PRALARM UPR/LWR" window

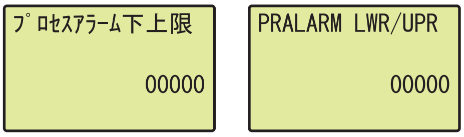

ﾌﾟﾛｾｽｱﾗｰﾑ上下限
00000

PRALARM UPR/LWR
00000

3. **Move the cursor using the ◀ and ▶ buttons, then increment or decrement the value at the cursor using the ▲ and ▼ buttons. Confirm with the OK button.**

↓

"PRALARM LWR/UPR" window

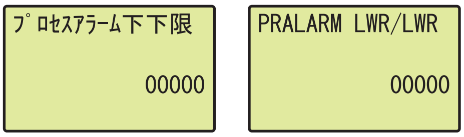

ﾌﾟﾛｾｽｱﾗｰﾑ下上限
00000

PRALARM LWR/UPR
00000

4. **Move the cursor using the ◀ and ▶ buttons, then increment or decrement the value at the cursor using the ▲ and ▼ buttons. Confirm with the OK button.**

↓

"PRALARM LWR/LWR" window


ﾌﾟﾛｾｽｱﾗｰﾑ下下限
00000

PRALARM LWR/LWR
00000

5. **Move the cursor using the ◀ and ▶ buttons, then increment or decrement the value at the cursor using the ▲ and ▼ buttons. Confirm with the OK button.**

Table of input items

Input item	Input range	
	Input upper limit	Input lower limit
PRALARM UPR/UPR	32767	-32768
PRALARM UPR/LWR		
PRALARM LWR/UPR		
PRALARM LWR/LWR		

Point

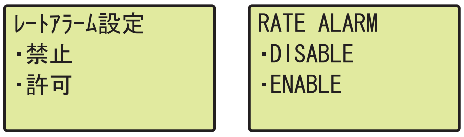
Set values for "PRALARM UPR/UPR" to "PRALARM LWR/LWR" so that they satisfy the following condition.
"PRALARM UPR/UPR" ≥ "PRALARM UPR/LWR" ≥ "PRALARM LWR/UPR" ≥ "PRALARM LWR/LWR"
Even though a value that does not satisfy the above condition can be input to the display unit, an error occurs on the multiple input module.

AbN automation

(6) Rate alarm setting

Select "DISABLE" or "ENABLE" in the "RATE ALARM" window.

"RATE ALARM" window



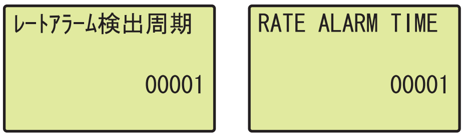
レートアラーム設定
・禁止
・許可

RATE ALARM
・DISABLE
・ENABLE

1. **Use the ▲ and ▼ buttons to select "DISABLE" or "ENABLE". Confirm with the OK button. (When "ENABLE" is selected, follow the procedure 2 and later.)**

↓

"RATE ALARM TIME" window



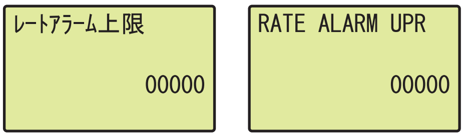
レートアラーム検出周期
00001

RATE ALARM TIME
00001

2. **Move the cursor using the ◀ and ▶ buttons, then increment or decrement the value at the cursor using the ▲ and ▼ buttons. Confirm with the OK button.**

↓

"RATE ALARM UPR" window



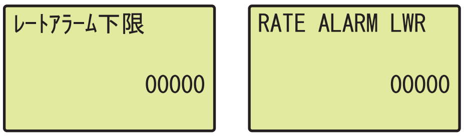
レートアラーム上限
00000

RATE ALARM UPR
00000

3. **Move the cursor using the ◀ and ▶ buttons, then increment or decrement the value at the cursor using the ▲ and ▼ buttons. Confirm with the OK button.**

↓

"RATE ALARM LWR" window



レートアラーム下限
00000

RATE ALARM LWR
00000

4. **Move the cursor using the ◀ and ▶ buttons, then increment or decrement the value at the cursor using the ▲ and ▼ buttons. Confirm with the OK button.**

Table of input items

Input item	Input range	
	Input upper limit	Input lower limit
RATE ALARM TIME	36000	1
RATE ALARM UPR	32767	-32768
RATE ALARM LWR		

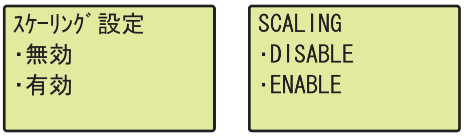
Point

- A value between 0 and 36000 can be input for "RATE ALARM TIME" on the display unit. However, if a value out of the setting range is set, an error occurs on the multiple input module.
- Set values so that they satisfy the condition "RATE ALARM UPR" > "RATE ALARM LWR".
  Even though a value that does not satisfy the above condition can be input to the display unit, an error occurs on the multiple input module.

(7) Scaling setting

Select "DISABLE" or "ENABLE" in the "SCALING" window.

"SCALING" window



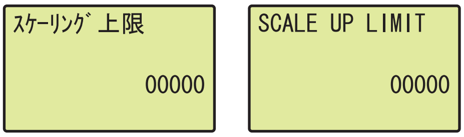
ｽｹｰﾘﾝｸﾞ 設定
・無効
・有効

SCALING
・DISABLE
・ENABLE

1. **Use the ▲ and ▼ buttons to select "DISABLE" or "ENABLE". Confirm with the OK button. (When "ENABLE" is selected, follow the procedure 2 and later.)**

↓

"SCALE UP LIMIT" window



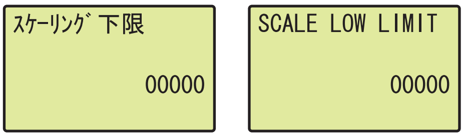
ｽｹｰﾘﾝｸﾞ 上限
00000

SCALE UP LIMIT
00000

2. **Move the cursor using the ◀ and ▶ buttons, then increment or decrement the value at the cursor using the ▲ and ▼ buttons. Confirm with the OK button.**

↓

"SCALE LOW LIMIT" window



ｽｹｰﾘﾝｸﾞ 下限
00000

SCALE LOW LIMIT
00000

3. **Move the cursor using the ◀ and ▶ buttons, then increment or decrement the value at the cursor using the ▲ and ▼ buttons. Confirm with the OK button.**

Table of input items

Input item	Input range	
	Input upper limit	Input lower limit
SCALE UP LIMIT	32000	-32000
SCALE LOW LIMIT		

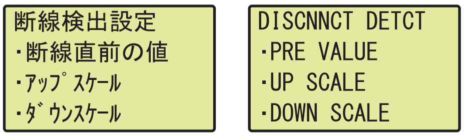
Point

Set different values for "SCALE UP LIMIT" and "SCALE LOW LIMIT".
Even though the same value can be input for "SCALE UP LIMIT" and "SCALE LOW LIMIT" on the display unit, an error occurs on the multiple input module.

(8) Conversion setting at disconnection detection Micro voltage Thermocouple RTD

Select a conversion setting in the "DISCNNCT DETCT" window.

"DISCNNCT DETCT" window

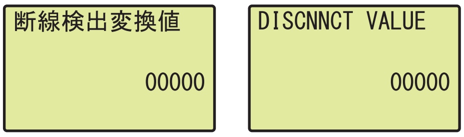


断線検出設定
・断線直前の値
・ｱｯﾌﾟｽｹｰﾙ
・ﾀﾞｳﾝｽｹｰﾙ

DISCNNCT DETCT
・PRE VALUE
・UP SCALE
・DOWN SCALE

↓

"DISCNNCT VALUE" window



断線検出変換値
00000

DISCNNCT VALUE
00000

1. **Use the ▲ and ▼ buttons to select the conversion setting from the following. Confirm with the OK button.**

- PRE VALUE
- UP SCALE
- DOWN SCALE
- GIVEN VALUE

(When "GIVEN VALUE" is selected, follow the procedure 2.)

2. **Move the cursor using the ◀ and ▶ buttons, then increment or decrement the value at the cursor using the ▲ and ▼ buttons. Confirm with the OK button.**

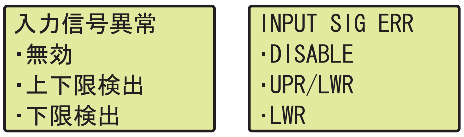
Table of input items

Input item	Input range	
	Input upper limit	Input lower limit
DISCNNCT VALUE	32767	-32768

(9) Input signal error detection setting Current Voltage

Select a detection method in the "INPUT SIG ERR" window.

"INPUT SIG ERR" window


入力信号異常
·無効
·上下限検出
·下限検出
INPUT SIG ERR
·DISABLE
·UPR/LWR
·LWR

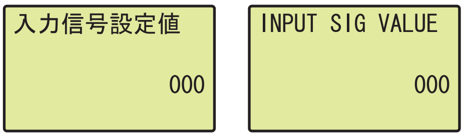
1. **Use the ▲ and ▼ buttons to select the detection method from the following. Confirm with the OK button.**

- DISABLE
- UPR/LWR
- LWR
- UPR
- SIMPLE DISCNNCT

(When "UPR/LWR", "LWR", or "UPR" is selected, follow the procedure 2.)

↓

"INPUT SIG VALUE" window


入力信号設定値
000
INPUT SIG VALUE
000

2. **Move the cursor using the ◀ and ▶ buttons, then increment or decrement the value at the cursor using the ▲ and ▼ buttons. Confirm with the OK button.**

Table of input items

Input item	Input range	
	Input upper limit	Input lower limit
INPUT SIG VALUE	250	0

9.4 Checking and Clearing Errors

The errors that occurred in the multiple input module can be checked from the display unit. In addition, the existing error can be cleared.

(1) Checking errors

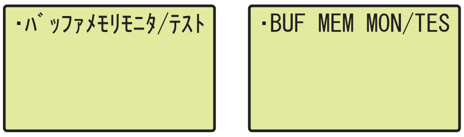
The error that occurred in the multiple input module can be checked by specifying Latest error code (Un\G19) from "BUF MEM MON/TES".

For details on the error codes or alarm codes, refer to the following.

- List of Error Codes (☞ Page 124, Section 11.4)
- List of Alarm Codes (☞ Page 126, Section 11.5)

Ex. When an error occurs in the multiple input module with a start I/O number of 10

"BUF MEM MON/TES" window



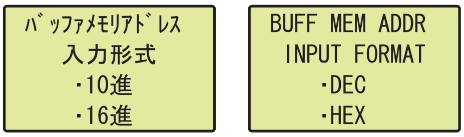
```
・ﾊﾞｯﾌｧﾒﾓﾘﾓﾆﾀ/ﾃｽﾄ
```

```
・BUF MEM MON/TES
```

1. **Press the OK button.**

↓

"BUFF MEM ADDR INPUT FORMAT" window



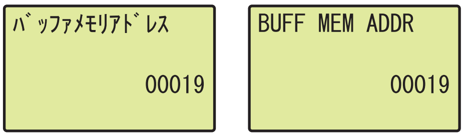
```
 ﾊﾞｯﾌｧﾒﾓﾘｱﾄﾞﾚｽ
   入力形式
   ・10進
   ・16進
```

```
 BUFF MEM ADDR
 INPUT FORMAT
    ・DEC
    ・HEX
```

2. **Use the ▲ and ▼ buttons to select "DEC" for the input format of the buffer memory address. Confirm with the OK button.**

↓

"BUFF MEM ADDR" window



```
ﾊﾞｯﾌｧﾒﾓﾘｱﾄﾞﾚｽ

           00019
```

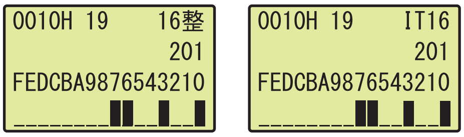
```
BUFF MEM ADDR

           00019
```

3. **Move the cursor using the ◀ and ▶ buttons, then increment or decrement the value at the cursor using the ▲ and ▼ buttons, and set the value to 19. Confirm with the OK button.**

↓

"Buffer memory monitor" window



```
0010H 19     16整
              201
FEDCBA9876543210
________██__█__█
```

```
0010H 19     IT16
              201
FEDCBA9876543210
________██__█__█
```

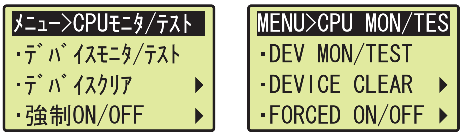
4. **The error that occurred can be checked in the "Buffer memory monitor" window.**

(2) Clearing errors

An error can be cleared by eliminating the cause of the error, and turning on and off Error clear request (YF) from "DEV MON/TEST".

Ex. When an error occurs in the multiple input module with a start I/O number of 10

"CPU MON/TES" window



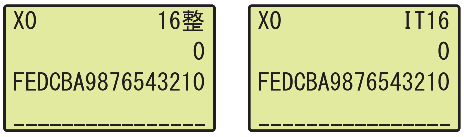
```
ﾒﾆｭｰ>CPUﾓﾆﾀ/ﾃｽﾄ
･ﾃﾞﾊﾞｲｽﾓﾆﾀ/ﾃｽﾄ
･ﾃﾞﾊﾞｲｽｸﾘｱ     ▶
･強制ON/OFF    ▶
```

```
MENU>CPU MON/TES
･DEV MON/TEST
･DEVICE CLEAR  ▶
･FORCED ON/OFF ▶
```

1. **Use the ▲ and ▼ buttons to select "DEV MON/TEST". Confirm with the OK button.**

↓

"Device monitor" window



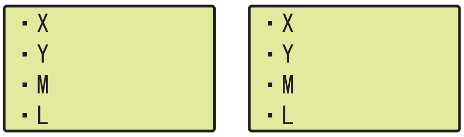
```
X0           16整
                0
FEDCBA9876543210
________________
```

```
X0           IT16
                0
FEDCBA9876543210
________________
```

2. **Press the ◀ button.**

↓

"Device selection" window



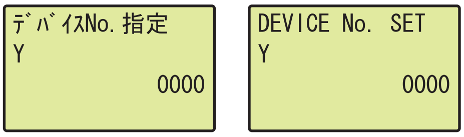
```
･X
･Y
･M
･L
```

```
･X
･Y
･M
･L
```

3. **Use the ▲ and ▼ buttons to set the device to Y. Confirm with the OK button.**

↓

"DEVICE No. SET" window



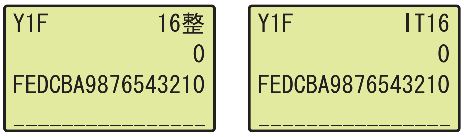
```
ﾃﾞﾊﾞｲｽNo.指定
Y
             0000
```

```
DEVICE No. SET
Y
             0000
```

4. **Set the device to Error clear request (Y1F). Confirm with the OK button.**

↓

"Device monitor" window



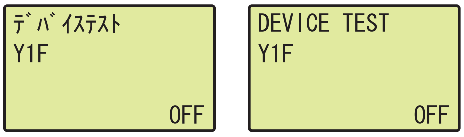
```
Y1F          16整
                0
FEDCBA9876543210
________________
```

```
Y1F          IT16
                0
FEDCBA9876543210
________________
```

5. **Press the OK button.**

↓

"DEVICE TEST" window

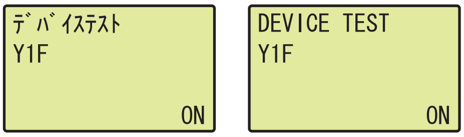


```
ﾃﾞﾊﾞｲｽﾃｽﾄ
Y1F
              OFF
```

```
DEVICE TEST
Y1F
              OFF
```

6. **Press the OK button.**

↓



```
ﾃﾞﾊﾞｲｽﾃｽﾄ
Y1F
               ON
```

```
DEVICE TEST
Y1F
               ON
```

7. **Use the ▲ and ▼ buttons to switch on. Confirm with the OK button.**

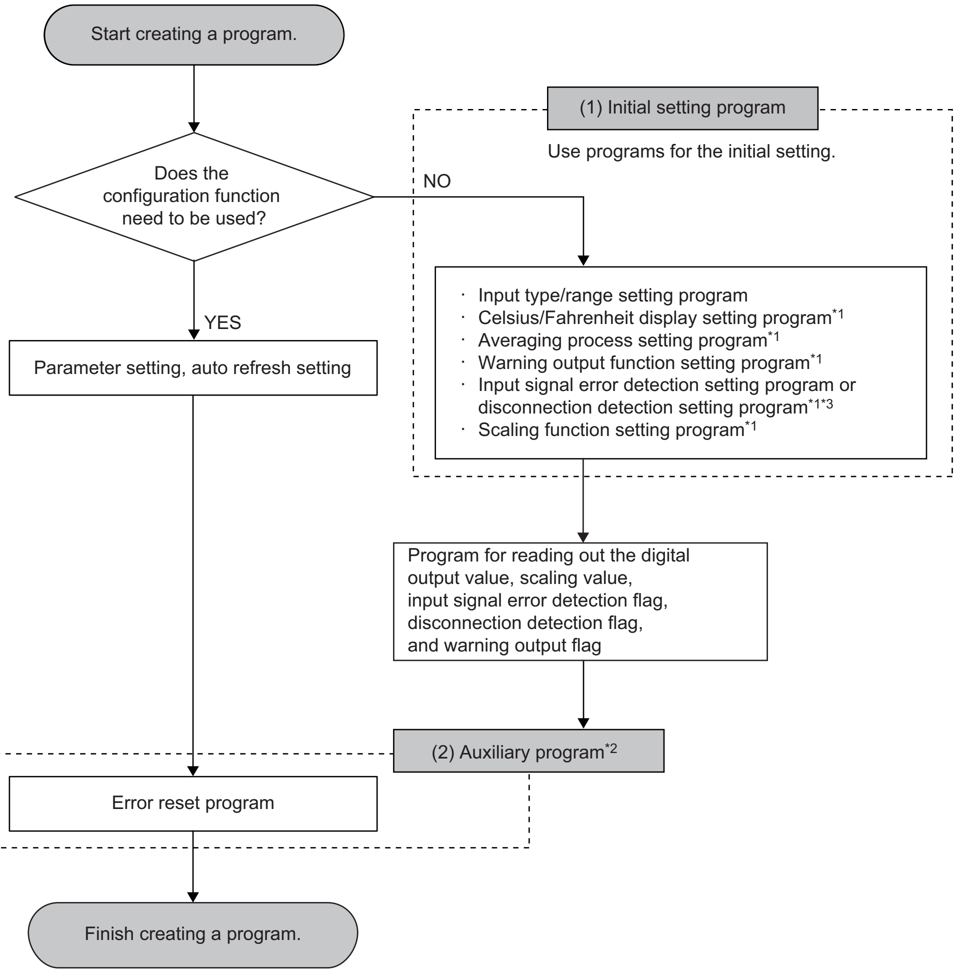
AbN automation

CHAPTER 10 PROGRAMMING

This chapter describes the programming procedure and the basic program of the multiple input module.

10.1 Programming Procedure

Create a program to execute the multiple input module according to the following procedure.


Start creating a program.
Does the configuration function need to be used?
NO
YES
Parameter setting, auto refresh setting
(1) Initial setting program
Use programs for the initial setting.
· Input type/range setting program
· Celsius/Fahrenheit display setting program*1
· Averaging process setting program*1
· Warning output function setting program*1
· Input signal error detection setting program or disconnection detection setting program*1*3
· Scaling function setting program*1
Program for reading out the digital output value, scaling value, input signal error detection flag, disconnection detection flag, and warning output flag
(2) Auxiliary program*2
Error reset program
Finish creating a program.

*1 A program which is created according to the used function.

*2 A program which is added according to the control target. Create it as needed.

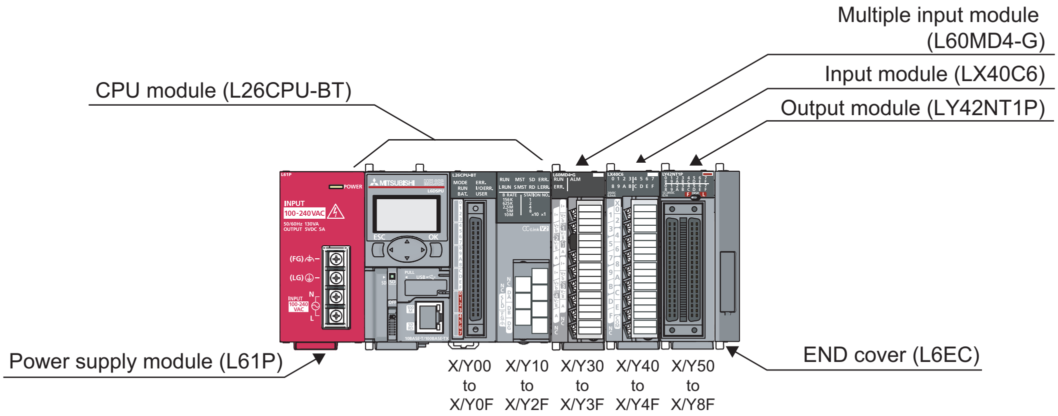
*3 Create one of the following setting programs depending on the input type of each channel.
  - Channels for voltage/current: Input signal error detection setting program
  - Channels for thermocouple/resistance temperature detector/micro voltage: Disconnection detection setting program

10.2 When Using the Module in a Standard System Configuration

This section shows a program example where the following system configuration and conditions apply.

(1) System configuration

The following shows a system configuration example.


Multiple input module (L60MD4-G)
Input module (LX40C6)
Output module (LY42NT1P)
CPU module (L26CPU-BT)
Power supply module (L61P)
END cover (L6EC)
X/Y00 to X/Y0F
X/Y10 to X/Y2F
X/Y30 to X/Y3F
X/Y40 to X/Y4F
X/Y50 to X/Y8F

(2) Programming condition

This program enables the conversion for CH1 to CH4 and reads digital output values.

- CH1: Thermocouple (type R thermocouple)
- CH2: Current (4 to 20mA)
- CH3: Resistance temperature detector (new JIS Pt100 (-200 to 850℃))
- CH4: Voltage (-10 to 10V)

This program performs the sampling processing to CH1, CH3, and CH4 and the averaging processing every 50 times to CH2 for the conversion. When an error occurs in the module, an error code is indicated in BCD.

(3) Initial setting

(a) Channel setting

Setting item		CH1	CH2	CH3	CH4
Basic setting	Input type	Thermocouple	Current	Resistance temperature detector	Voltage
	Input range	Type R thermocouple	4 to 20mA	Pt100 (-200 to 850℃)	-10 to 10V
	Celsius/Fahrenheit display setting	Fahrenheit	Celsius	Celsius	Celsius
	Averaging process setting	Sampling processing	Count average	Sampling processing	Sampling processing
	Time Average/Count Average/ Moving Average	0	50 times	0	0
Input signal error detection function	Input signal error detection setting	Disable	Disable	Disable	Upper limit
	Input signal error detection setting value	5.0%	5.0%	5.0%	5.0%
Disconnection detection function	Conversion setting at disconnection detection	Down scale	Value just before disconnection	Optional value	Value just before disconnection
	Conversion setting value at disconnection detection	0℉	0	-3276.8℃	0
Scaling function	Scaling enable/disable setting	Disable	Disable	Disable	Enable
	Scaling upper limit value	0	0	0	10000
	Scaling lower limit value	0	0	0	-10000
Warning output function	Process alarm output setting	Disable	Disable	Enable	Disable
	Process alarm upper upper limit value	0.0℉	0	300.0℃	0
	Process alarm upper lower limit value	0.0℉	0	295.0℃	0
	Process alarm lower upper limit value	0.0℉	0	205.0℃	0
	Process alarm lower lower limit value	0.0℉	0	200.0℃	0
	Rate alarm output setting	Enable	Disable	Disable	Disable
	Rate alarm detection cycle	5	0	0	0
	Rate alarm upper limit value	5.0%	0	0	0
	Rate alarm lower limit value	-5.0%	0	0	0

(b) Devices for user

Device	Description
D1 (D11)	CH1 Digital output value
D2 (D12)	CH2 Digital output value
D3 (D13)	CH3 Digital output value
D4	CH4 Digital output value
D8	Disconnection detection flag
D9	Error code
D10	Input signal error detection flag
D18	Warning output flag (process alarm)
D19	Warning output flag (rate alarm)
D26 (D14)	CH4 Scaling value
M0	CH1 Conversion completed flag
M1	CH2 Conversion completed flag
M2	CH3 Conversion completed flag
M3	CH4 Conversion completed flag

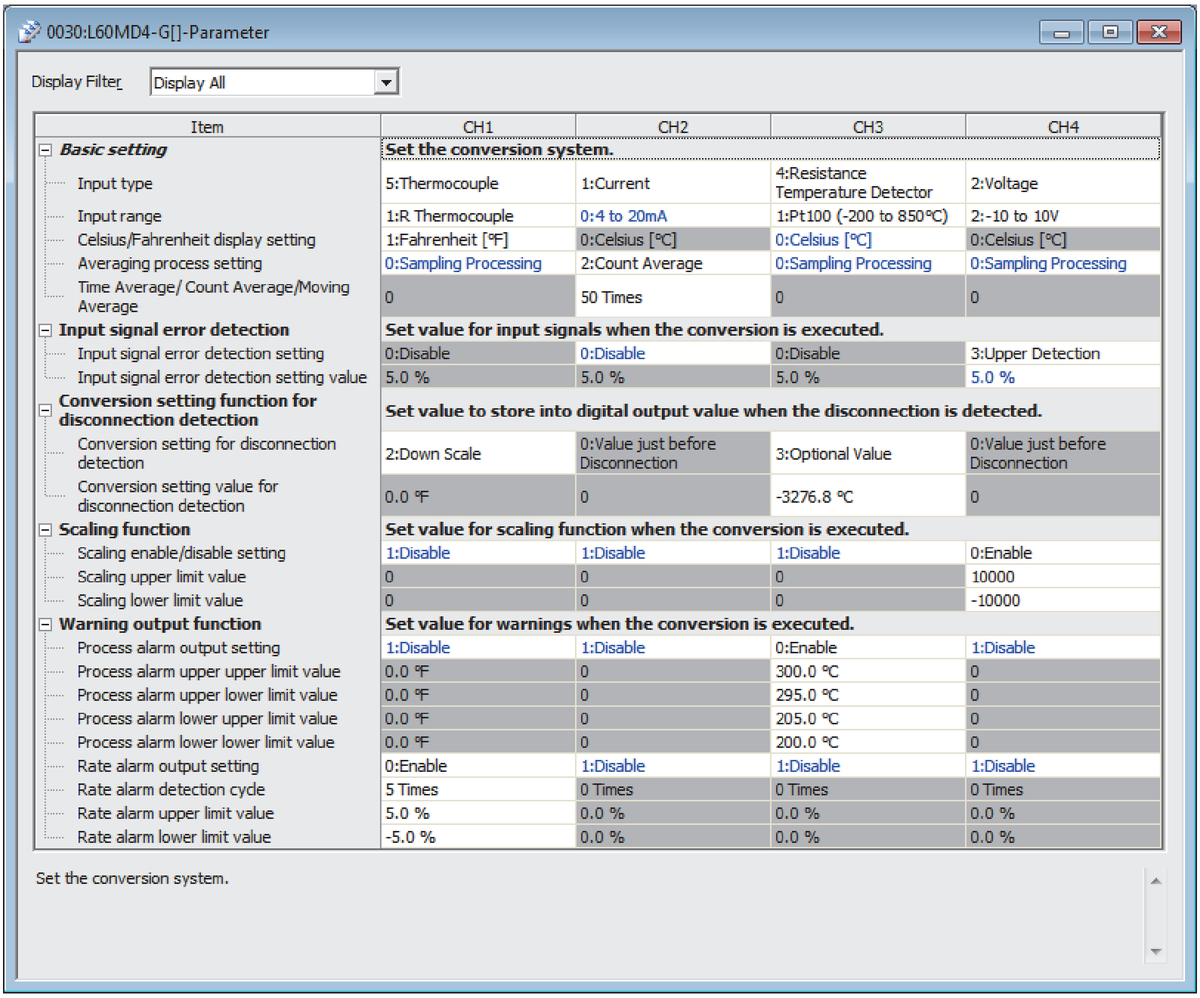
Device	Description	
M20 to M27	Warning output flag (process alarm)	
M30 to M37	Warning output flag (rate alarm)	
M50 to M53	Disconnection detection flag	
M60 to M63	Input signal error detection flag	
M100	Module READY checking flag	
X40	Digital output value read command input signal	LX40C6 (X40 to X4F)
X43	Disconnection detection reset signal	
X45	Error reset signal	
X47	Input signal error detection reset signal	
Y50 to Y5F	Error code notation (BCD 4 digits)	LY42NT1P (Y50 to Y5F)

(4) Program example for using the parameter of the intelligent function module

(a) Parameter setting

Configure the initial settings in the parameter.

Project window⇨[Intelligent Function Module]⇨Module Name⇨[Parameter]



0030:L60MD4-G[]-Parameter

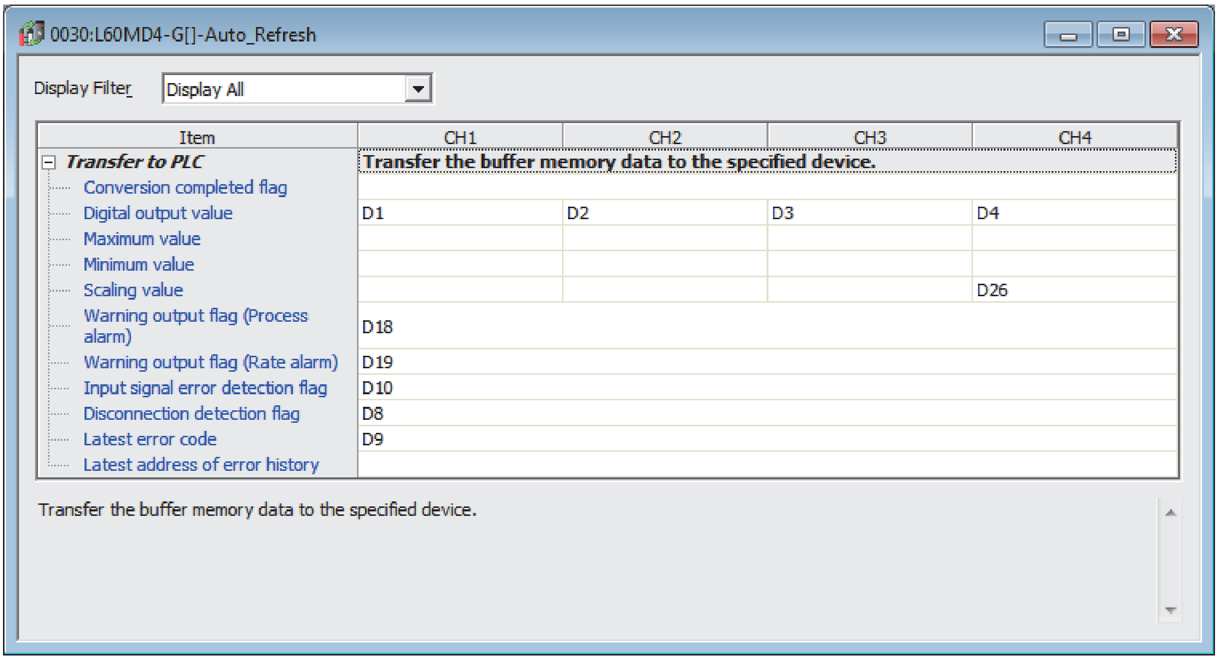
Display Filter: Display All

Item	CH1	CH2	CH3	CH4
⊟ ***Basic setting***	**Set the conversion system.**			
Input type	5:Thermocouple	1:Current	4:Resistance Temperature Detector	2:Voltage
Input range	1:R Thermocouple	0:4 to 20mA	1:Pt100 (-200 to 850℃)	2:-10 to 10V
Celsius/Fahrenheit display setting	1:Fahrenheit [℉]	0:Celsius [℃]	0:Celsius [℃]	0:Celsius [℃]
Averaging process setting	0:Sampling Processing	2:Count Average	0:Sampling Processing	0:Sampling Processing
Time Average/ Count Average/Moving Average	0	50 Times	0	0
⊟ **Input signal error detection**	**Set value for input signals when the conversion is executed.**			
Input signal error detection setting	0:Disable	0:Disable	0:Disable	3:Upper Detection
Input signal error detection setting value	5.0 %	5.0 %	5.0 %	5.0 %
⊟ **Conversion setting function for disconnection detection**	**Set value to store into digital output value when the disconnection is detected.**			
Conversion setting for disconnection detection	2:Down Scale	0:Value just before Disconnection	3:Optional Value	0:Value just before Disconnection
Conversion setting value for disconnection detection	0.0 ℉	0	-3276.8 ℃	0
⊟ **Scaling function**	**Set value for scaling function when the conversion is executed.**			
Scaling enable/disable setting	1:Disable	1:Disable	1:Disable	0:Enable
Scaling upper limit value	0	0	0	10000
Scaling lower limit value	0	0	0	-10000
⊟ **Warning output function**	**Set value for warnings when the conversion is executed.**			
Process alarm output setting	1:Disable	1:Disable	0:Enable	1:Disable
Process alarm upper upper limit value	0.0 ℉	0	300.0 ℃	0
Process alarm upper lower limit value	0.0 ℉	0	295.0 ℃	0
Process alarm lower upper limit value	0.0 ℉	0	205.0 ℃	0
Process alarm lower lower limit value	0.0 ℉	0	200.0 ℃	0
Rate alarm output setting	0:Enable	1:Disable	1:Disable	1:Disable
Rate alarm detection cycle	5 Times	0 Times	0 Times	0 Times
Rate alarm upper limit value	5.0 %	0.0 %	0.0 %	0.0 %
Rate alarm lower limit value	-5.0 %	0.0 %	0.0 %	0.0 %

Set the conversion system.

(b) Auto refresh setting

Project window⇨[Intelligent Function Module]⇨Module Name⇨[Auto Refresh]



0030:L60MD4-G[]-Auto_Refresh

Display Filter: Display All

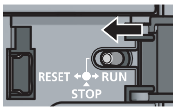
Item	CH1	CH2	CH3	CH4
Transfer to PLC	Transfer the buffer memory data to the specified device.			
Conversion completed flag				
Digital output value	D1	D2	D3	D4
Maximum value				
Minimum value				
Scaling value				D26
Warning output flag (Process alarm)	D18			
Warning output flag (Rate alarm)	D19			
Input signal error detection flag	D10			
Disconnection detection flag	D8			
Latest error code	D9			
Latest address of error history				

Transfer the buffer memory data to the specified device.

(c) Writing the parameter of the intelligent function module

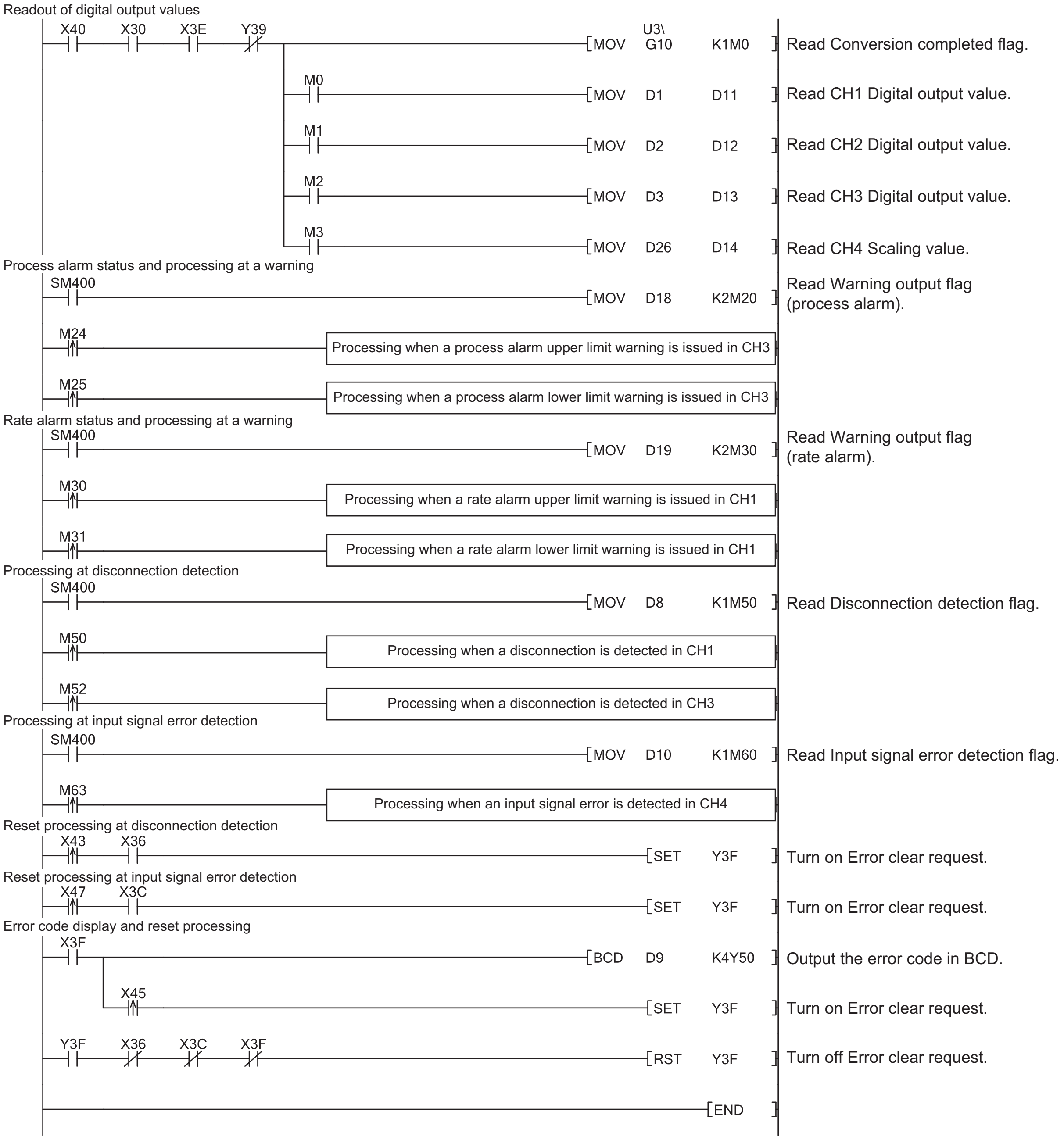
Write the set parameter to the CPU module and reset the CPU module, or power off and on the programmable controllers.

[Online]⇨[Write to PLC]

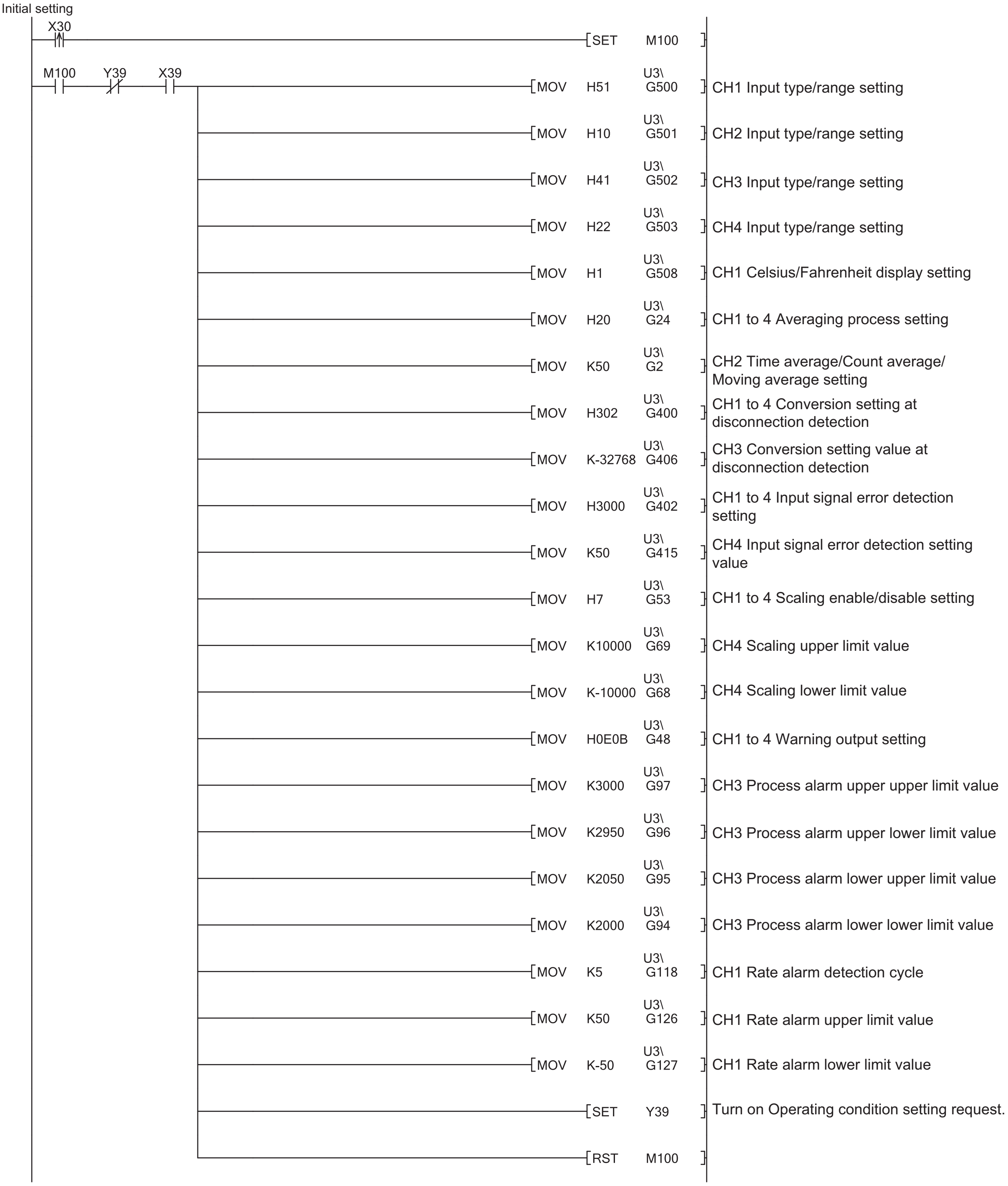


or Power OFF → ON

(d) Program example


Readout of digital output values
X40
X30
X3E
Y39
MOV U3\G10 K1M0
Read Conversion completed flag.
M0
MOV D1 D11
Read CH1 Digital output value.
M1
MOV D2 D12
Read CH2 Digital output value.
M2
MOV D3 D13
Read CH3 Digital output value.
M3
MOV D26 D14
Read CH4 Scaling value.
Process alarm status and processing at a warning
SM400
MOV D18 K2M20
Read Warning output flag (process alarm).
M24
Processing when a process alarm upper limit warning is issued in CH3
M25
Processing when a process alarm lower limit warning is issued in CH3
Rate alarm status and processing at a warning
SM400
MOV D19 K2M30
Read Warning output flag (rate alarm).
M30
Processing when a rate alarm upper limit warning is issued in CH1
M31
Processing when a rate alarm lower limit warning is issued in CH1
Processing at disconnection detection
SM400
MOV D8 K1M50
Read Disconnection detection flag.
M50
Processing when a disconnection is detected in CH1
M52
Processing when a disconnection is detected in CH3
Processing at input signal error detection
SM400
MOV D10 K1M60
Read Input signal error detection flag.
M63
Processing when an input signal error is detected in CH4
Reset processing at disconnection detection
X43
X36
SET Y3F
Turn on Error clear request.
Reset processing at input signal error detection
X47
X3C
SET Y3F
Turn on Error clear request.
Error code display and reset processing
X3F
BCD D9 K4Y50
Output the error code in BCD.
X45
SET Y3F
Turn on Error clear request.
Y3F
X36
X3C
X3F
RST Y3F
Turn off Error clear request.
END

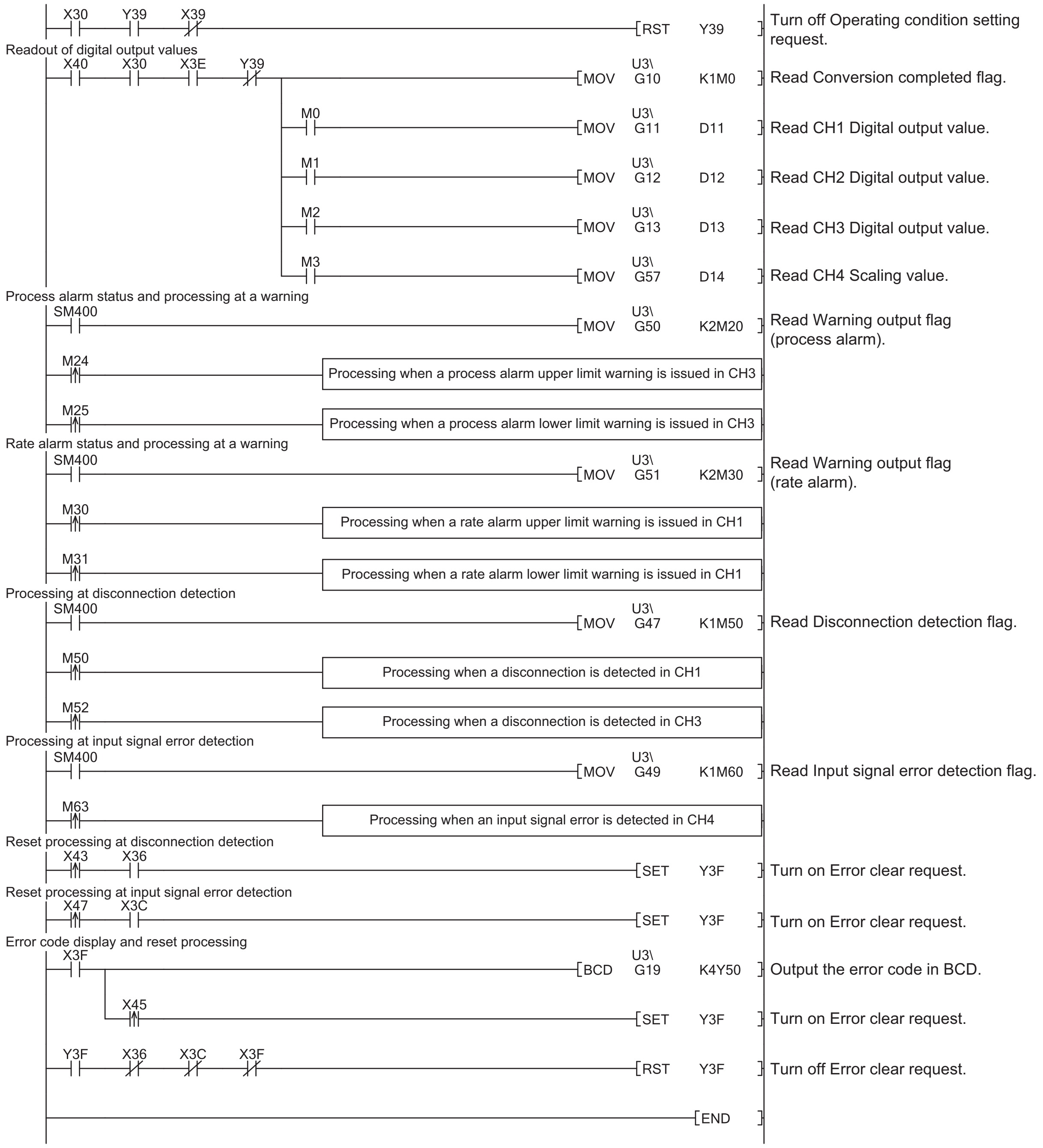
(5) Program example for not using the parameter of the intelligent function module



```
Initial setting
 X30
-|↑|------------------------------------[SET  M100        ]

 M100   Y39   X39
-| |----|/|---| |--+---------------------[MOV  H51     U3\G500 ] CH1 Input type/range setting
                   +---------------------[MOV  H10     U3\G501 ] CH2 Input type/range setting
                   +---------------------[MOV  H41     U3\G502 ] CH3 Input type/range setting
                   +---------------------[MOV  H22     U3\G503 ] CH4 Input type/range setting
                   +---------------------[MOV  H1      U3\G508 ] CH1 Celsius/Fahrenheit display setting
                   +---------------------[MOV  H20     U3\G24  ] CH1 to 4 Averaging process setting
                   +---------------------[MOV  K50     U3\G2   ] CH2 Time average/Count average/
                   |                                             Moving average setting
                   +---------------------[MOV  H302    U3\G400 ] CH1 to 4 Conversion setting at
                   |                                             disconnection detection
                   +---------------------[MOV  K-32768 U3\G406 ] CH3 Conversion setting value at
                   |                                             disconnection detection
                   +---------------------[MOV  H3000   U3\G402 ] CH1 to 4 Input signal error detection
                   |                                             setting
                   +---------------------[MOV  K50     U3\G415 ] CH4 Input signal error detection setting
                   |                                             value
                   +---------------------[MOV  H7      U3\G53  ] CH1 to 4 Scaling enable/disable setting
                   +---------------------[MOV  K10000  U3\G69  ] CH4 Scaling upper limit value
                   +---------------------[MOV  K-10000 U3\G68  ] CH4 Scaling lower limit value
                   +---------------------[MOV  H0E0B   U3\G48  ] CH1 to 4 Warning output setting
                   +---------------------[MOV  K3000   U3\G97  ] CH3 Process alarm upper upper limit value
                   +---------------------[MOV  K2950   U3\G96  ] CH3 Process alarm upper lower limit value
                   +---------------------[MOV  K2050   U3\G95  ] CH3 Process alarm lower upper limit value
                   +---------------------[MOV  K2000   U3\G94  ] CH3 Process alarm lower lower limit value
                   +---------------------[MOV  K5      U3\G118 ] CH1 Rate alarm detection cycle
                   +---------------------[MOV  K50     U3\G126 ] CH1 Rate alarm upper limit value
                   +---------------------[MOV  K-50    U3\G127 ] CH1 Rate alarm lower limit value
                   +-----------------------------[SET  Y39     ] Turn on Operating condition setting request.
                   +-----------------------------[RST  M100    ]
```

AbN automation


X30 Y39 X39
RST Y39
Turn off Operating condition setting request.
Readout of digital output values
X40 X30 X3E Y39
MOV U3\G10 K1M0
Read Conversion completed flag.
M0
MOV U3\G11 D11
Read CH1 Digital output value.
M1
MOV U3\G12 D12
Read CH2 Digital output value.
M2
MOV U3\G13 D13
Read CH3 Digital output value.
M3
MOV U3\G57 D14
Read CH4 Scaling value.
Process alarm status and processing at a warning
SM400
MOV U3\G50 K2M20
Read Warning output flag (process alarm).
M24
Processing when a process alarm upper limit warning is issued in CH3
M25
Processing when a process alarm lower limit warning is issued in CH3
Rate alarm status and processing at a warning
SM400
MOV U3\G51 K2M30
Read Warning output flag (rate alarm).
M30
Processing when a rate alarm upper limit warning is issued in CH1
M31
Processing when a rate alarm lower limit warning is issued in CH1
Processing at disconnection detection
SM400
MOV U3\G47 K1M50
Read Disconnection detection flag.
M50
Processing when a disconnection is detected in CH1
M52
Processing when a disconnection is detected in CH3
Processing at input signal error detection
SM400
MOV U3\G49 K1M60
Read Input signal error detection flag.
M63
Processing when an input signal error is detected in CH4
Reset processing at disconnection detection
X43 X36
SET Y3F
Turn on Error clear request.
Reset processing at input signal error detection
X47 X3C
SET Y3F
Turn on Error clear request.
Error code display and reset processing
X3F
BCD U3\G19 K4Y50
Output the error code in BCD.
X45
SET Y3F
Turn on Error clear request.
Y3F X36 X3C X3F
RST Y3F
Turn off Error clear request.
END

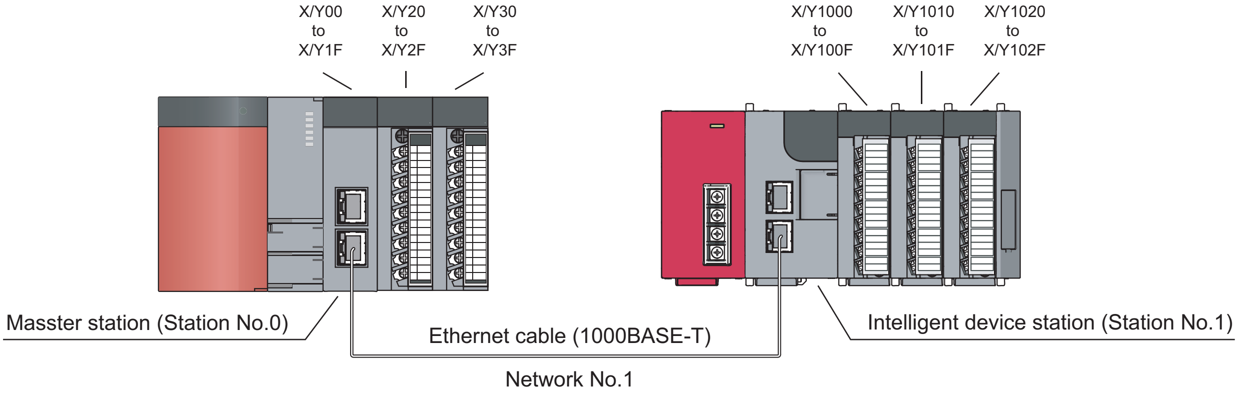
10.3 When a Multiple Input Module Is Connected to a Head Module

This section shows the system configuration of the multiple input module and a program example under the operation condition.

(1) System configuration

Power supply module (Q62P)
CPU module (Q10UDHCPU)
Master/local module (QJ71GF11-T2)
Input module (QX10)
Output module (QY40P)

Power supply module (L61P)
Head module (LJ72GF15-T2)
Multiple input module (L60MD4-G)
Input module (LX40C6)
Output module (LY10R2)
END cover (L6EC)


X/Y00 to X/Y1F
X/Y20 to X/Y2F
X/Y30 to X/Y3F
X/Y1000 to X/Y100F
X/Y1010 to X/Y101F
X/Y1020 to X/Y102F
Masster station (Station No.0)
Ethernet cable (1000BASE-T)
Intelligent device station (Station No.1)
Network No.1

(2) Programming condition

This program enables the conversion for CH1 to CH4 and reads digital output values.

- CH1: Thermocouple (type R thermocouple)
- CH2: Current (4 to 20mA)
- CH3: Resistance temperature detector (new JIS Pt100 (-200 to 850℃))
- CH4: Voltage (-10 to 10V)

This program performs the sampling processing to CH1, CH3, and CH4 and the averaging processing every 50 times to CH2 for the conversion. When an error occurs in the module, an error code is indicated in BCD.

(3) Initial setting

Setting item		CH1	CH2	CH3	CH4
Basic setting	Input type	Thermocouple	Current	Resistance temperature detector	Voltage
	Input range	Type R thermocouple	4 to 20mA	Pt100 (-200 to 850℃)	-10 to 10V
	Celsius/Fahrenheit display setting	Fahrenheit	Celsius	Celsius	Celsius
	Averaging process setting	Sampling processing	Count average	Sampling processing	Sampling processing
	Time Average/Count Average/ Moving Average	0	50 times	0	0
Input signal error detection function	Input signal error detection setting	Disable	Disable	Disable	Upper limit
	Input signal error detection setting value	5.0%	5.0%	5.0%	5.0%
Disconnection detection function	Conversion setting at disconnection detection	Down scale	Value just before disconnection	Optional value	Value just before disconnection
	Conversion setting value at disconnection detection	0℉	0	-3276.8℃	0
Scaling function	Scaling enable/disable setting	Disable	Disable	Disable	Enable
	Scaling upper limit value	0	0	0	10000
	Scaling lower limit value	0	0	0	-10000
Warning output function	Process alarm output setting	Disable	Disable	Enable	Disable
	Process alarm upper upper limit value	0.0℉	0	300.0℃	0
	Process alarm upper lower limit value	0.0℉	0	295.0℃	0
	Process alarm lower upper limit value	0.0℉	0	205.0℃	0
	Process alarm lower lower limit value	0.0℉	0	200.0℃	0
	Rate alarm output setting	Enable	Disable	Disable	Disable
	Rate alarm detection cycle	5	0	0	0
	Rate alarm upper limit value	5.0%	0	0	0
	Rate alarm lower limit value	-5.0%	0	0	0

(4) Device for user

Device	Description
W1000	Conversion completed flag
W1001 (D11)	CH1 Digital output value
W1002 (D12)	CH2 Digital output value
W1003 (D13)	CH3 Digital output value
W1004	CH4 Digital output value
W1008	Disconnection detection flag
W1009	Error code
W1010	Input signal error detection flag
W1018	Warning output flag (process alarm)
W1019	Warning output flag (rate alarm)
W1026 (D14)	CH4 Scaling value
M0	CH1 Conversion completed flag
M1	CH2 Conversion completed flag
M2	CH3 Conversion completed flag
M3	CH4 Conversion completed flag
M20 to M27	Warning output flag (process alarm)

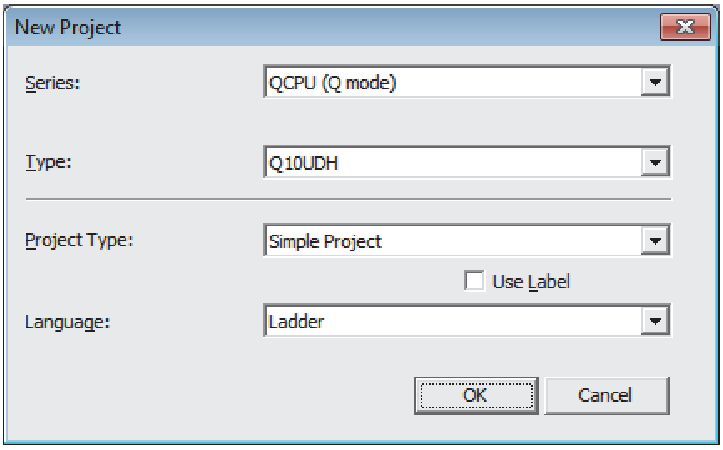
Device	Description	
M30 to M37	Warning output flag (rate alarm)	
M50 to M53	Disconnection detection flag	
M60 to M63	Input signal error detection flag	
X20	Digital output value read command input signal	QX10 (X20 to X2F)
X23	Disconnection detection reset signal	
X25	Error reset signal	
X27	Input signal error detection reset signal	
Y30 to Y3F	Error code notation (BCD 4 digits)	QY40P (Y30 to Y3F)

(5) Setting on the master station

1. **Create a project on GX Works2.**

Select "QCPU (Q mode)" for "Series" and select "Q10UDH" for "Type".

[Project]⇨[New]



New Project

Series: QCPU (Q mode)

Type: Q10UDH

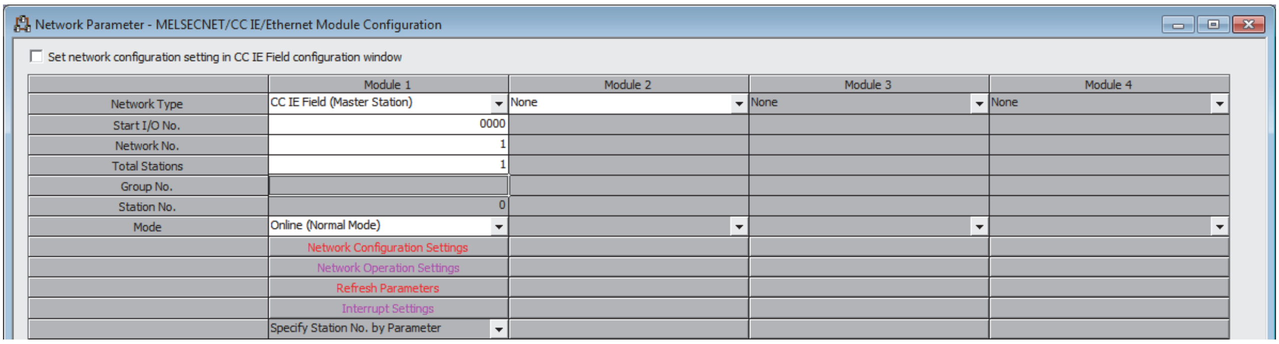
Project Type: Simple Project

☐ Use Label

Language: Ladder

2. **Display the Network Parameter window and configure the setting as follows.**

Project window⇨[Parameter]⇨[Network Parameter]⇨[Ethernet/CC IE/MELSECNET]



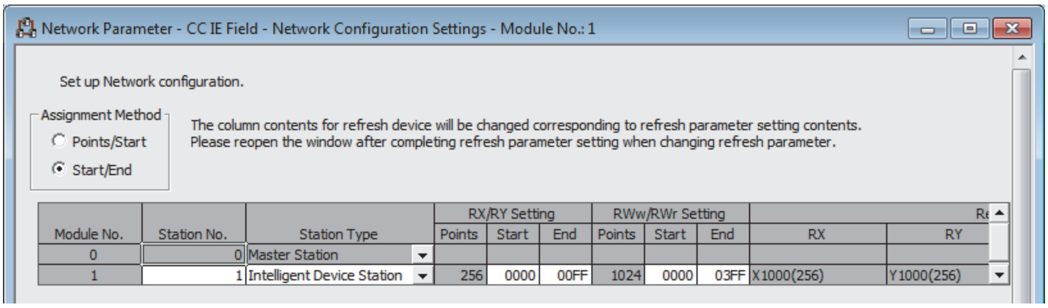
Network Parameter - MELSECNET/CC IE/Ethernet Module Configuration

☐ Set network configuration setting in CC IE Field configuration window

	Module 1	Module 2	Module 3	Module 4
Network Type	CC IE Field (Master Station)	None	None	None
Start I/O No.	0000			
Network No.	1			
Total Stations	1			
Group No.				
Station No.	0			
Mode	Online (Normal Mode)			
	Network Configuration Settings			
	Network Operation Settings			
	Refresh Parameters			
	Interrupt Settings			
	Specify Station No. by Parameter			

3. **Display the Network Configuration Settings window and configure the setting as follows.**

Project window⇨[Parameter]⇨[Network Parameter]⇨[Ethernet/CC IE/MELSECNET]⇨ Network Configuration Settings button



Network Parameter - CC IE Field - Network Configuration Settings - Module No.: 1

Set up Network configuration.

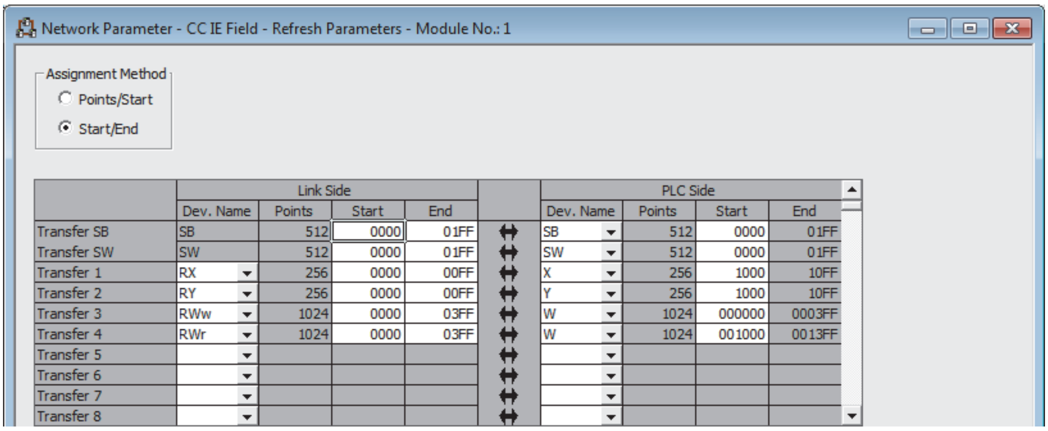
Assignment Method
○ Points/Start
● Start/End

The column contents for refresh device will be changed corresponding to refresh parameter setting contents.
Please reopen the window after completing refresh parameter setting when changing refresh parameter.

			RX/RY Setting			RWw/RWr Setting			Re	
Module No.	Station No.	Station Type	Points	Start	End	Points	Start	End	RX	RY
0	0	Master Station								
1	1	Intelligent Device Station	256	0000	00FF	1024	0000	03FF	X1000(256)	Y1000(256)

4. **Display the Refresh Parameters window and configure the setting as follows.**

Project window⇨[Parameter]⇨[Network Parameter]⇨[Ethernet/CC IE/MELSECNET]⇨ Refresh Parameters button

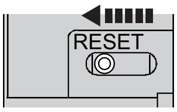

Network Parameter - CC IE Field - Refresh Parameters - Module No.: 1

Assignment Method
○ Points/Start
● Start/End

	Link Side					PLC Side			
	Dev. Name	Points	Start	End		Dev. Name	Points	Start	End
Transfer SB	SB	512	0000	01FF	↔	SB	512	0000	01FF
Transfer SW	SW	512	0000	01FF	↔	SW	512	0000	01FF
Transfer 1	RX	256	0000	00FF	↔	X	256	1000	10FF
Transfer 2	RY	256	0000	00FF	↔	Y	256	1000	10FF
Transfer 3	RWw	1024	0000	03FF	↔	W	1024	000000	0003FF
Transfer 4	RWr	1024	0000	03FF	↔	W	1024	001000	0013FF
Transfer 5					↔				
Transfer 6					↔				
Transfer 7					↔				
Transfer 8					↔				

5. **Write the set parameter to the CPU module of the master station and reset the CPU module, or power off and on the programmable controllers.**

[Online]⇨[Write to PLC]



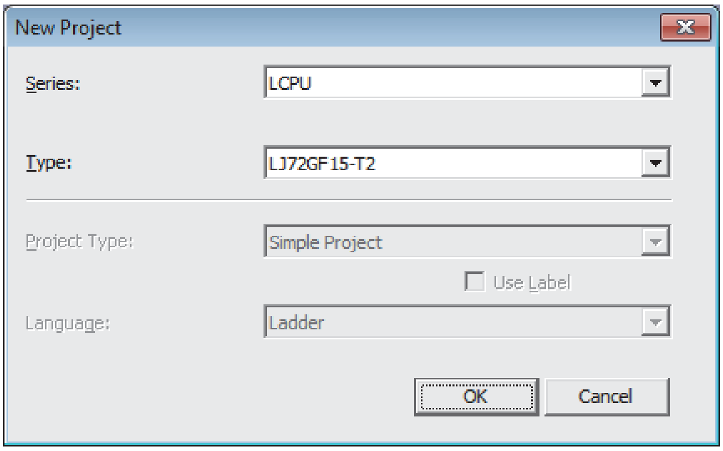
or Power OFF→ON

(6) Setting on the intelligent device station

1. **Create a project on GX Works2.**

Select "LCPU" for "Series" and select "LJ72GF15-T2" for "Type".

[Project]⇨[New]



New Project

Series: LCPU

Type: LJ72GF15-T2

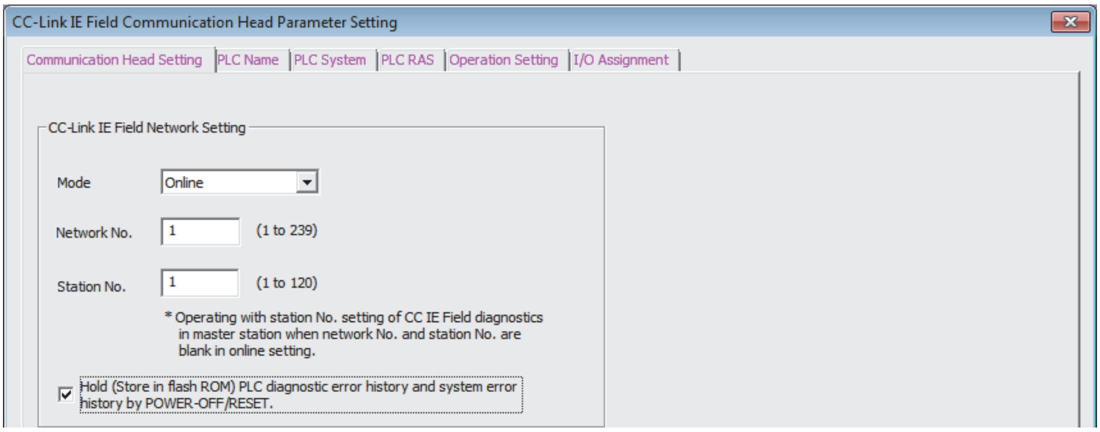
Project Type: Simple Project

☐ Use Label

Language: Ladder

2. **Display the PLC Parameter window and configure the setting as follows.**

Project window⇨[Parameter]⇨[PLC parameter]⇨"Communication Head Setting"



CC-Link IE Field Communication Head Parameter Setting

Communication Head Setting
PLC Name
PLC System
PLC RAS
Operation Setting
I/O Assignment

CC-Link IE Field Network Setting

Mode: Online

Network No.: 1 (1 to 239)

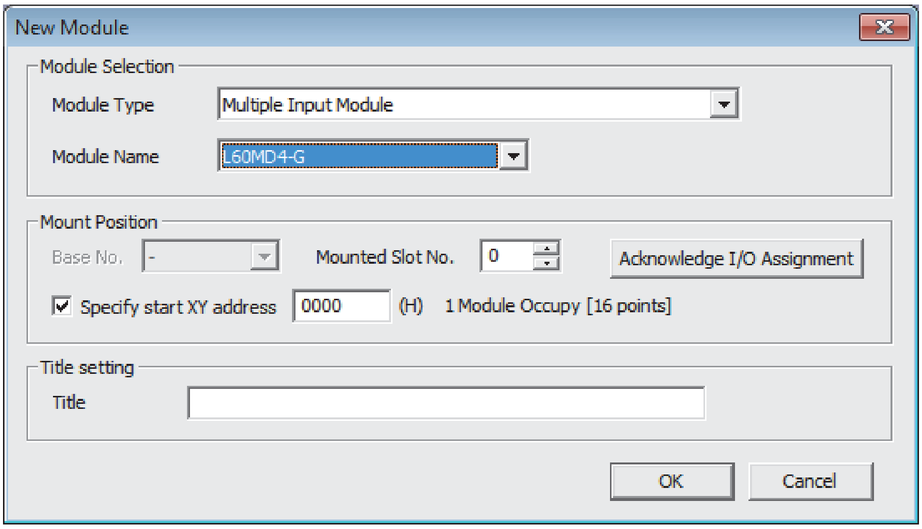
Station No.: 1 (1 to 120)

* Operating with station No. setting of CC IE Field diagnostics in master station when network No. and station No. are blank in online setting.

☑ Hold (Store in flash ROM) PLC diagnostic error history and system error history by POWER-OFF/RESET.

3. **Add the multiple input module (L60MD4-G) to the project of GX Works2.**

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



New Module

Module Selection

Module Type: Multiple Input Module

Module Name: L60MD4-G

Mount Position

Base No.: -

Mounted Slot No.: 0

☑ Specify start XY address: 0000 (H)

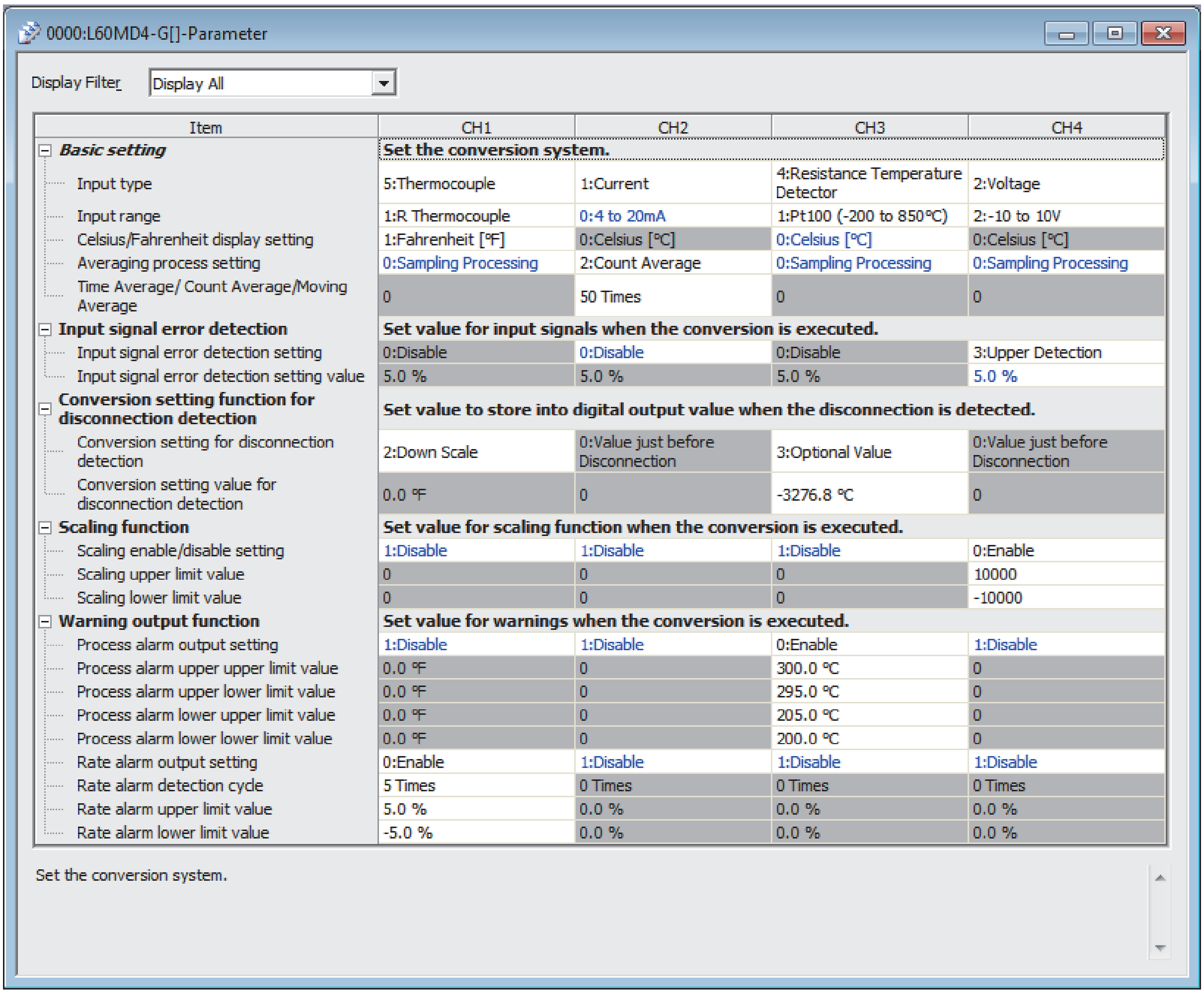
1 Module Occupy [16 points]

Title setting

Title:

4. **Display the initial setting window for the multiple input module (L60MD4-G) and configure the setting as follows.**

Project window⇨[Intelligent Function Module]⇨Module Name⇨[Parameter]



0000:L60MD4-G[]-Parameter

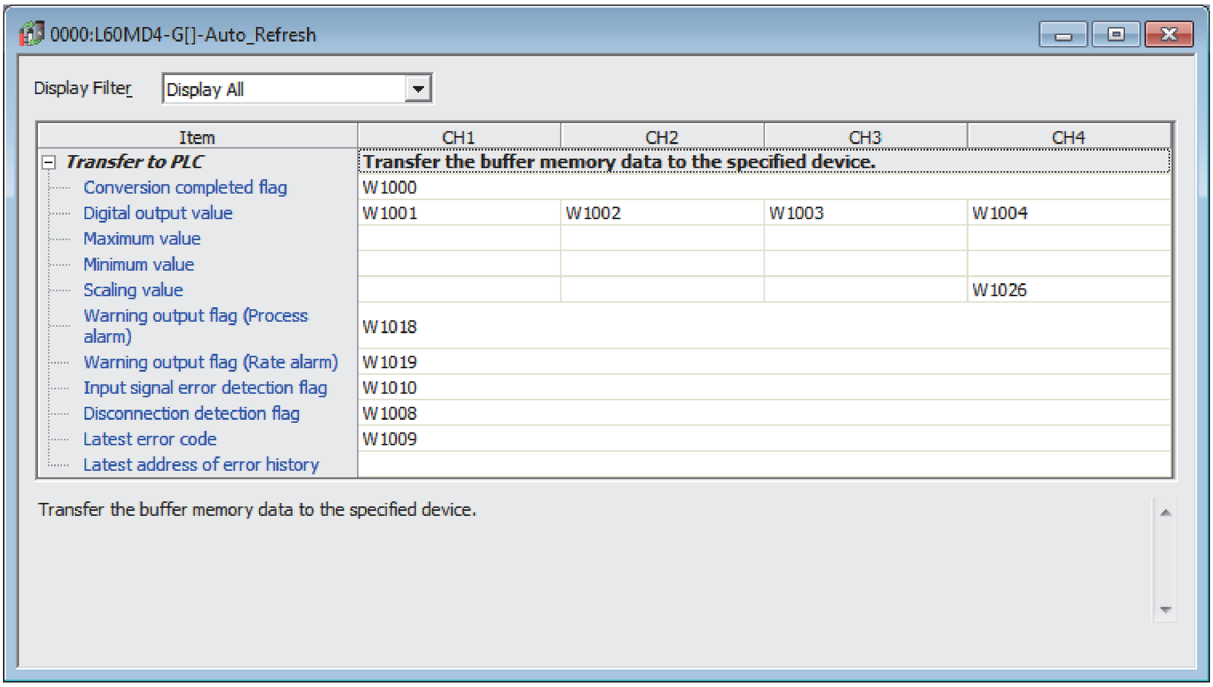
Display Filter: Display All

Item	CH1	CH2	CH3	CH4
Basic setting	**Set the conversion system.**			
Input type	5:Thermocouple	1:Current	4:Resistance Temperature Detector	2:Voltage
Input range	1:R Thermocouple	0:4 to 20mA	1:Pt100 (-200 to 850℃)	2:-10 to 10V
Celsius/Fahrenheit display setting	1:Fahrenheit [℉]	0:Celsius [℃]	0:Celsius [℃]	0:Celsius [℃]
Averaging process setting	0:Sampling Processing	2:Count Average	0:Sampling Processing	0:Sampling Processing
Time Average/ Count Average/Moving Average	0	50 Times	0	0
Input signal error detection	**Set value for input signals when the conversion is executed.**			
Input signal error detection setting	0:Disable	0:Disable	0:Disable	3:Upper Detection
Input signal error detection setting value	5.0 %	5.0 %	5.0 %	5.0 %
Conversion setting function for disconnection detection	**Set value to store into digital output value when the disconnection is detected.**			
Conversion setting for disconnection detection	2:Down Scale	0:Value just before Disconnection	3:Optional Value	0:Value just before Disconnection
Conversion setting value for disconnection detection	0.0 ℉	0	-3276.8 ℃	0
Scaling function	**Set value for scaling function when the conversion is executed.**			
Scaling enable/disable setting	1:Disable	1:Disable	1:Disable	0:Enable
Scaling upper limit value	0	0	0	10000
Scaling lower limit value	0	0	0	-10000
Warning output function	**Set value for warnings when the conversion is executed.**			
Process alarm output setting	1:Disable	1:Disable	0:Enable	1:Disable
Process alarm upper upper limit value	0.0 ℉	0	300.0 ℃	0
Process alarm upper lower limit value	0.0 ℉	0	295.0 ℃	0
Process alarm lower upper limit value	0.0 ℉	0	205.0 ℃	0
Process alarm lower lower limit value	0.0 ℉	0	200.0 ℃	0
Rate alarm output setting	0:Enable	1:Disable	1:Disable	1:Disable
Rate alarm detection cycle	5 Times	0 Times	0 Times	0 Times
Rate alarm upper limit value	5.0 %	0.0 %	0.0 %	0.0 %
Rate alarm lower limit value	-5.0 %	0.0 %	0.0 %	0.0 %

Set the conversion system.

5. **Display the Auto Refresh setting window for the multiple input module (L60MD4-G) and configure the setting as follows.**

Project window⇨[Intelligent Function Module]⇨Module Name⇨[Auto Refresh]



Display Filter: Display All

Item	CH1	CH2	CH3	CH4
Transfer to PLC	**Transfer the buffer memory data to the specified device.**			
Conversion completed flag	W1000			
Digital output value	W1001	W1002	W1003	W1004
Maximum value				
Minimum value				
Scaling value				W1026
Warning output flag (Process alarm)	W1018			
Warning output flag (Rate alarm)	W1019			
Input signal error detection flag	W1010			
Disconnection detection flag	W1008			
Latest error code	W1009			
Latest address of error history				

Transfer the buffer memory data to the specified device.

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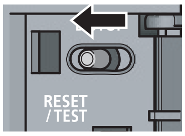
6. **Write the set parameter to the head module and reset the head module, or power off and on the programmable controllers.**

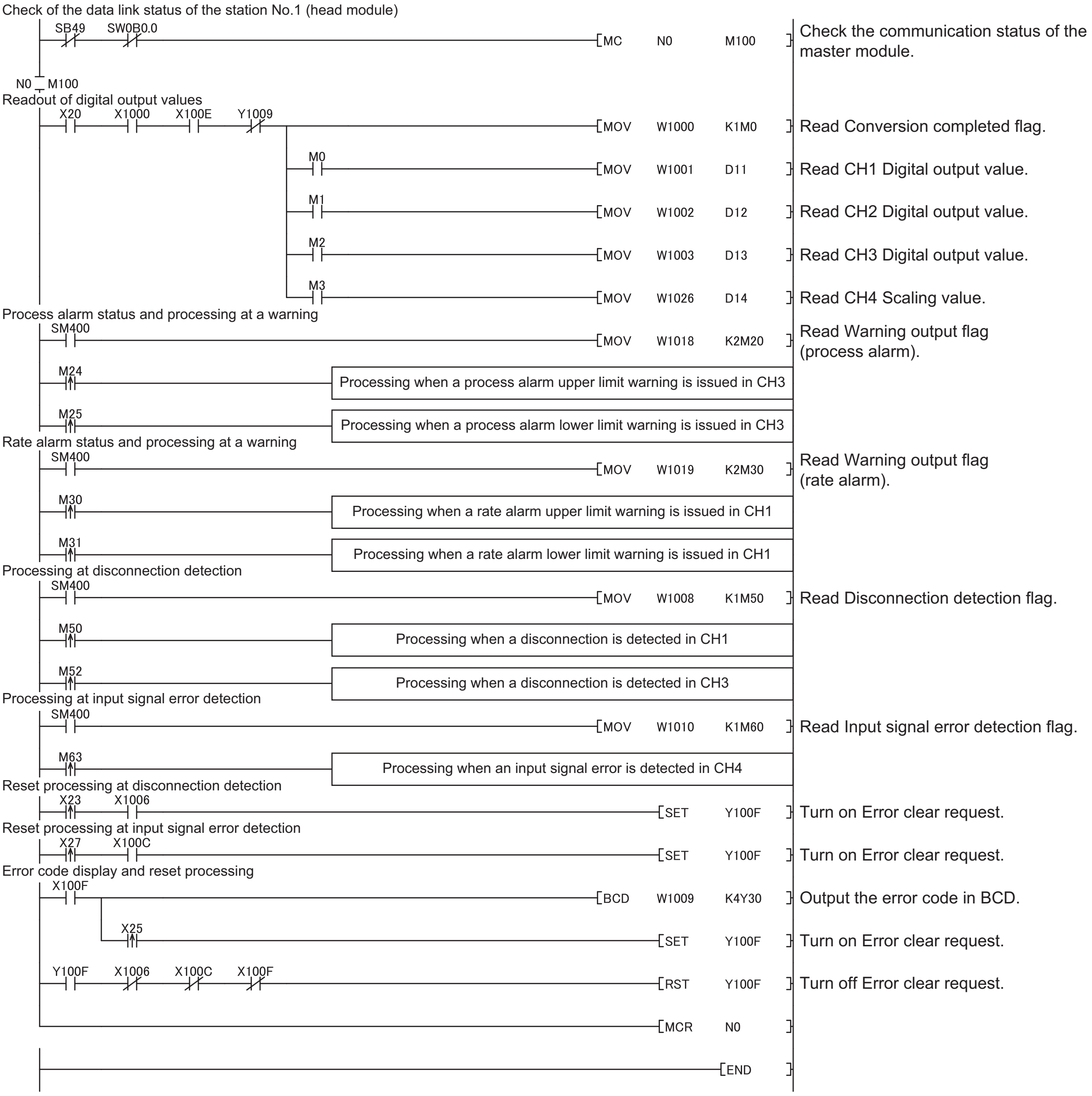
[Online]⇨[Write to PLC]



or Power OFF→ON

(7) Program example

The following shows a program example. Write the program to the CPU module of the master station.



```
Check of the data link status of the station No.1 (head module)
 SB49  SW0B0.0
-|/|---|/|------------------------------[MC    N0     M100 ]  Check the communication status of the
                                                               master module.
N0 = M100
Readout of digital output values
 X20   X1000  X100E  Y1009
-| |---| |----| |----|/|--+-------------[MOV   W1000  K1M0 ]  Read Conversion completed flag.
                          |  M0
                          +--| |--------[MOV   W1001  D11  ]  Read CH1 Digital output value.
                          |  M1
                          +--| |--------[MOV   W1002  D12  ]  Read CH2 Digital output value.
                          |  M2
                          +--| |--------[MOV   W1003  D13  ]  Read CH3 Digital output value.
                          |  M3
                          +--| |--------[MOV   W1026  D14  ]  Read CH4 Scaling value.
Process alarm status and processing at a warning
 SM400
-| |------------------------------------[MOV   W1018  K2M20]  Read Warning output flag
                                                               (process alarm).
 M24
-|↑|---------[Processing when a process alarm upper limit warning is issued in CH3]
 M25
-|↑|---------[Processing when a process alarm lower limit warning is issued in CH3]
Rate alarm status and processing at a warning
 SM400
-| |------------------------------------[MOV   W1019  K2M30]  Read Warning output flag
                                                               (rate alarm).
 M30
-|↑|---------[Processing when a rate alarm upper limit warning is issued in CH1]
 M31
-|↑|---------[Processing when a rate alarm lower limit warning is issued in CH1]
Processing at disconnection detection
 SM400
-| |------------------------------------[MOV   W1008  K1M50]  Read Disconnection detection flag.
 M50
-|↑|---------[Processing when a disconnection is detected in CH1]
 M52
-|↑|---------[Processing when a disconnection is detected in CH3]
Processing at input signal error detection
 SM400
-| |------------------------------------[MOV   W1010  K1M60]  Read Input signal error detection flag.
 M63
-|↑|---------[Processing when an input signal error is detected in CH4]
Reset processing at disconnection detection
 X23   X1006
-|↑|---| |------------------------------------[SET  Y100F ]  Turn on Error clear request.
Reset processing at input signal error detection
 X27   X100C
-|↑|---| |------------------------------------[SET  Y100F ]  Turn on Error clear request.
Error code display and reset processing
 X100F
-| |--+---------------------------------[BCD   W1009  K4Y30]  Output the error code in BCD.
      |  X25
      +--|↑|----------------------------------[SET  Y100F ]  Turn on Error clear request.
 Y100F  X1006  X100C  X100F
-| |----|/|----|/|----|/|-----------------------[RST  Y100F ]  Turn off Error clear request.

----------------------------------------------[MCR  N0    ]

----------------------------------------------------[END  ]
```

CHAPTER 11 TROUBLESHOOTING

This chapter describes errors that may occur while using the multiple input module, and those troubleshooting.

(1) Checking for the error codes and the alarm codes

The errors and alarms that occurred in the multiple input module can be checked with the following methods. Choose a method depending on the purpose and application.

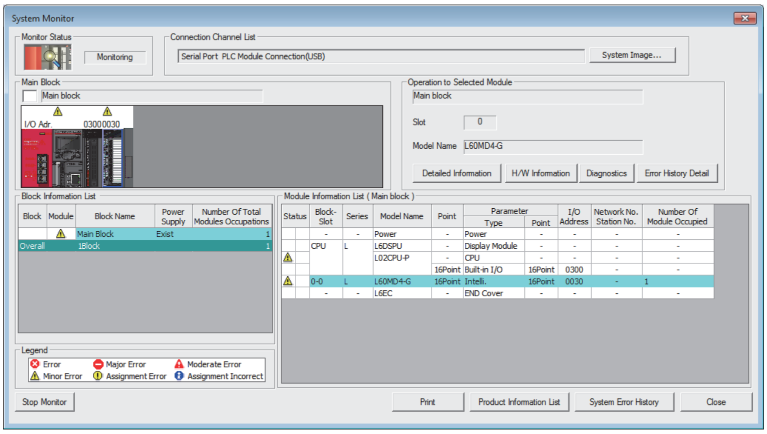
- Checking on the Module's Detailed Information window (☞ Page 121, Section 11.1)
- Checking in Latest error code (Un\G19) (☞ Page 122, Section 11.2)
- Checking through the module error collection function (☞ Page 123, Section 11.3)
- Checking with the display unit (☞ Page 99, Section 9.4)

11.1 Checking on the "Module's Detailed Information" Window

The following section describes how to check the errors on the module detailed information.

[Diagnostics] ⇨ [System Monitor]

1. **Select the multiple input module in "Main Block" and click the Detailed Information button.**



System Monitor

Monitor Status: Monitoring

Connection Channel List: Serial Port PLC Module Connection(USB)

Main Block: Main block

I/O Adr. 0300 0030

Operation to Selected Module: Main block

Slot: 0

Model Name: L60MD4-G

Block Information List

Block	Module	Block Name	Power Supply	Number Of Total Modules Occupations
	⚠	Main Block	Exist	1
Overall		1Block		1

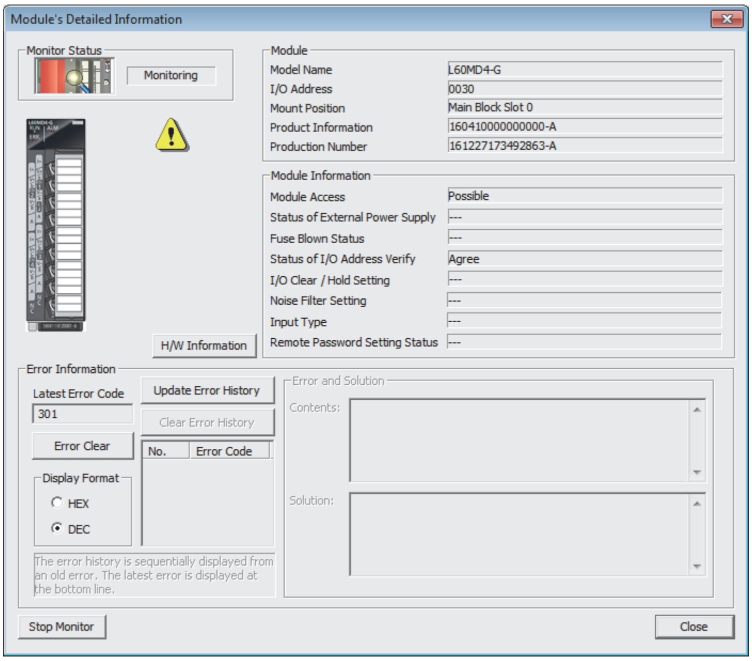
Module Information List (Main block)

Status	Block-Slot	Series	Model Name	Point	Parameter Type	Parameter Point	I/O Address	Network No. Station No.	Number Of Module Occupied
	-	-	Power	-	Power	-	-	-	-
	CPU	L	L6DSPU	-	Display Module	-	-	-	-
⚠			L02CPU-P	-	CPU	-	-	-	-
				16Point	Built-in I/O	16Point	0300	-	-
⚠	0-0	L	L60MD4-G	16Point	Intelli.	16Point	0030	-	1
	-	-	L6EC	-	END Cover	-	-	-	-

System Image...
Detailed Information
H/W Information
Diagnostics
Error History Detail
Legend
Error
Major Error
Moderate Error
Minor Error
Assignment Error
Assignment Incorrect
Stop Monitor
Print
Product Information List
System Error History
Close

↓

2. **"Module's Detailed Information" of the multiple input module is displayed.**



Module's Detailed Information

Monitor Status: Monitoring

Module

Model Name	L60MD4-G
I/O Address	0030
Mount Position	Main Block Slot 0
Product Information	160410000000000-A
Production Number	161227173492863-A

Module Information

Module Access	Possible
Status of External Power Supply	---
Fuse Blown Status	---
Status of I/O Address Verify	Agree
I/O Clear / Hold Setting	---
Noise Filter Setting	---
Input Type	---
Remote Password Setting Status	---

Error Information

Latest Error Code: 301

Display Format: ○ HEX ● DEC

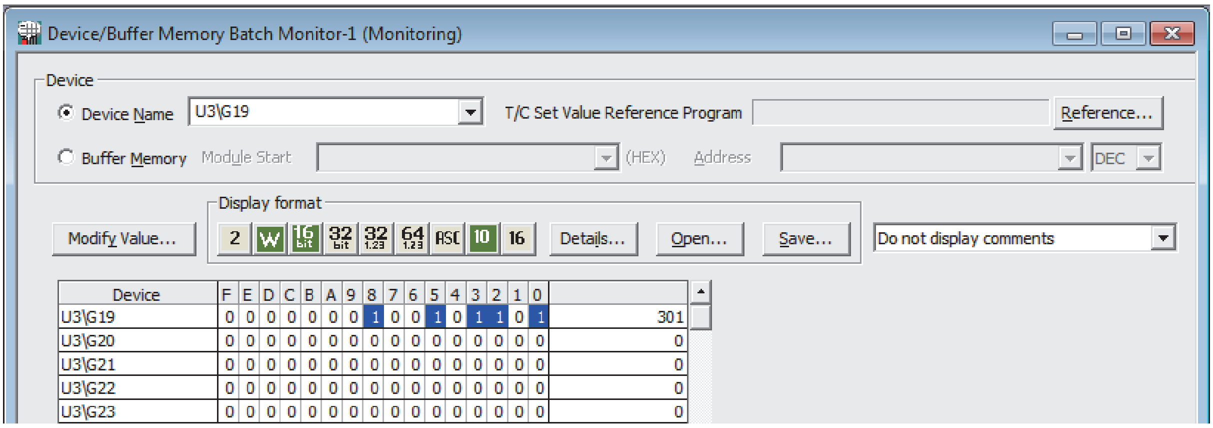
The error history is sequentially displayed from an old error. The latest error is displayed at the bottom line.

H/W Information
Update Error History
Clear Error History
Error Clear
No.
Error Code
Error and Solution
Contents:
Solution:
Stop Monitor
Close

11.2 Checking in Latest Error Code (Un\G19)

The following section describes how to check the errors in Latest error code (Un\G19).

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]


Reference...
Modify Value...
Display format
2
W
16 bit
32 bit
32 1.23
64 1.23
ASC
10
16
Details...
Open...
Save...

Device/Buffer Memory Batch Monitor-1 (Monitoring)

Device

● Device Name: U3\G19

T/C Set Value Reference Program:

○ Buffer Memory Module Start: (HEX) Address: DEC

Do not display comments

Device	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	
U3\G19	0	0	0	0	0	0	0	1	0	0	1	0	1	1	0	1	301
U3\G20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U3\G21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U3\G22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U3\G23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Point

When multiple errors or warnings occur, the latest error code or alarm code is stored in Latest error code (Un\G19).

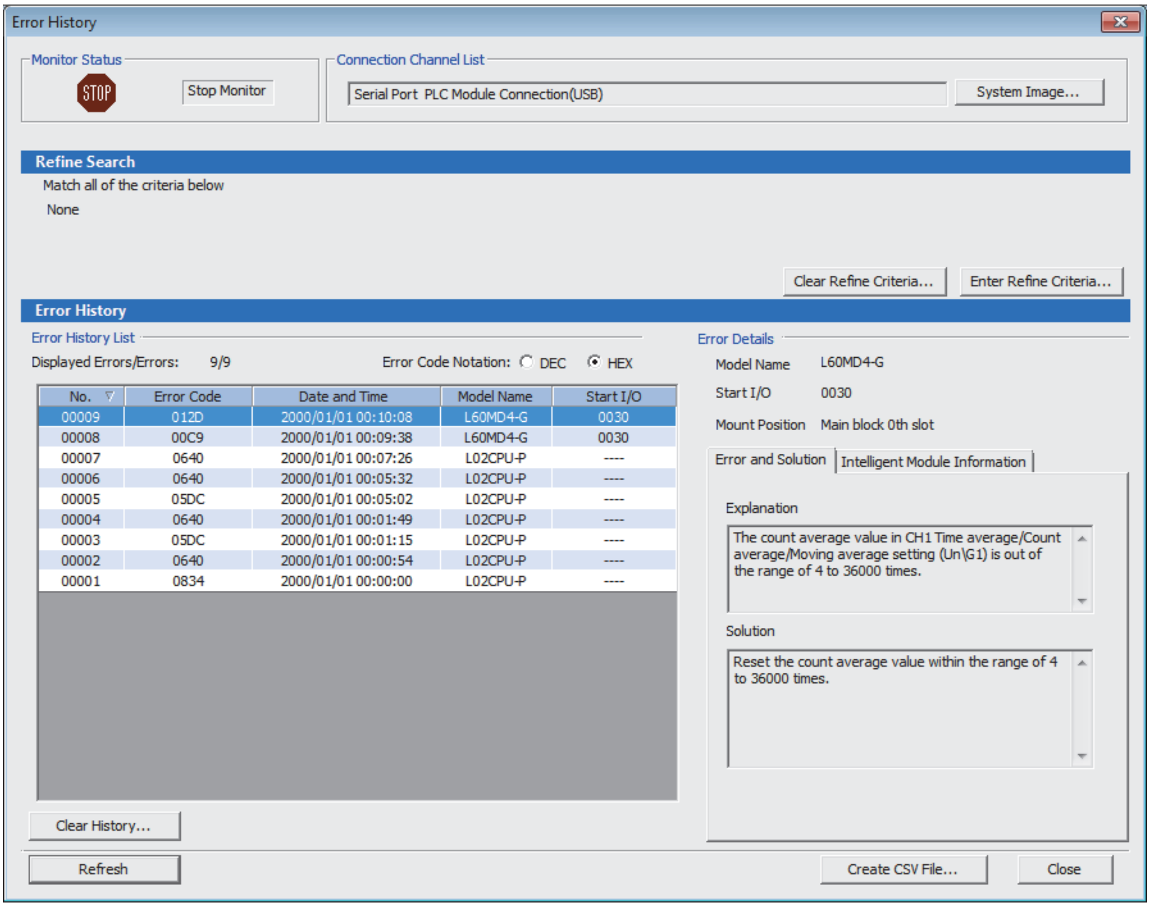
11.3 Checking Through the Module Error Collection Function

The errors occurred in the multiple input module are saved in the CPU module by using the module error collection function. The error information can be held even after the system is powered off and on or the CPU module is reset.

(1) How to check the errors through the module error collection function

To check the errors of the multiple input module collected by the CPU module, open the "Error History" window.

[Diagnostic] ⇨ [System Monitor] ⇨ Click the Error History Detail button.


Error History
Monitor Status
STOP
Stop Monitor
Connection Channel List
System Image...
Refine Search
Clear Refine Criteria...
Enter Refine Criteria...
Error History
Error History List
Error Details
Error and Solution
Intelligent Module Information
Clear History...
Refresh
Create CSV File...
Close

Serial Port PLC Module Connection(USB)

Match all of the criteria below

None

Displayed Errors/Errors: 9/9

Error Code Notation: ○ DEC ● HEX

No.	Error Code	Date and Time	Model Name	Start I/O
00009	012D	2000/01/01 00:10:08	L60MD4-G	0030
00008	00C9	2000/01/01 00:09:38	L60MD4-G	0030
00007	0640	2000/01/01 00:07:26	L02CPU-P	----
00006	0640	2000/01/01 00:05:32	L02CPU-P	----
00005	05DC	2000/01/01 00:05:02	L02CPU-P	----
00004	0640	2000/01/01 00:01:49	L02CPU-P	----
00003	05DC	2000/01/01 00:01:15	L02CPU-P	----
00002	0640	2000/01/01 00:00:54	L02CPU-P	----
00001	0834	2000/01/01 00:00:00	L02CPU-P	----

Model Name L60MD4-G

Start I/O 0030

Mount Position Main block 0th slot

Explanation

The count average value in CH1 Time average/Count average/Moving average setting (Un\G1) is out of the range of 4 to 36000 times.

Solution

Reset the count average value within the range of 4 to 36000 times.

(2) Errors to be collected

The multiple input module reports the following information to the CPU module:

- List of Error Codes (☞ Page 124, Section 11.4)
- List of Alarm Codes (☞ Page 126, Section 11.5)

11.4 List of Error Codes

This section describes the list of error codes.
The code of an error that has occurred is stored into Latest error code (Un\G19).
The error code is also reported to the CPU module.

Error code (decimal)	Description and cause of error	Action
10☐	CH☐ Input type/range setting (Un\G500 to Un\G503) is out of the setting range. ☐ indicates the number of the channel where an error has occurred.	Set values within the range in CH☐ Input type/range setting (Un\G500 to Un\G503).
111	A hardware failure has occurred in the module.	Turn off and on the power. If the error occurs again, the possible cause is a failure of the module. Please consult your local Mitsubishi representative.
15☐	The input type in CH1 Input type/range setting (Un\G500) is other than a thermocouple, and any input type in Input type/range setting (Un\G501 to Un\G503) of CH2 to CH4 is a thermocouple. ☐ indicates the number of the channel where an error has occurred.	To use thermocouple input, assign either one of the thermocouple inputs to CH1.
20☐*1	The time average setting value in CH☐ Time average/Count average/Moving average setting (Un\G1 to Un\G4) is out of the range of 8 to 18000. ☐ indicates the number of the channel where an error has occurred.	Set the time average setting value within the range of 8 to 18000. The time average is given by: Time average (ms) = Time average setting value × 100 (ms).
30☐*1	The count average setting value in CH☐ Time average/Count average/Moving average setting (Un\G1 to Un\G4) is out of the range of 4 to 36000 times. ☐ indicates the number of the channel where an error has occurred.	Set the count average setting value within the range of 4 to 36000 times.
31☐*1	The moving average number setting value in CH☐ Time average/Count average/Moving average setting (Un\G1 to Un\G4) is out of the range of 2 to 1000 times. ☐ indicates the number of the channel where an error has occurred.	Set the moving average number setting value within the range of 2 to 1000 times.
6△☐*1	The settings in CH1 Process alarm lower lower limit value (Un\G86) to CH4 Process alarm upper upper limit value (Un\G101) contain an inconsistency. ☐ indicates the number of the channel where an error has occurred. △ indicates the corresponding one of the following states: 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	Set appropriate values in CH1 Process alarm lower lower limit value (Un\G86) to CH4 Process alarm upper upper limit value (Un\G101).
70☐*1	In CH1 Rate alarm upper limit value (Un\G126) to CH4 Rate alarm lower limit value (Un\G133), a rate alarm lower limit value is equal to or greater than a rate alarm upper limit value. ☐ indicates the number of the channel where an error has occurred.	Set values in CH1 Rate alarm upper limit value (Un\G126) to CH4 Rate alarm lower limit value (Un\G133) so that a rate alarm lower limit value is lower than a rate alarm upper limit value.
71☐*1	CH☐ Rate alarm detection cycle (Un\G118 to Un\G121) is out of the range of 1 to 36000 times. ☐ indicates the number of the channel where an error has occurred.	Set values within the range of 1 to 36000 times in CH☐ Rate alarm detection cycle (Un\G118 to Un\G121).
80☐*1	CH☐ Input signal error detection setting value (Un\G412 to Un\G415) is out of the range of 0 to 250. ☐ indicates the number of the channel where an error has occurred.	Set values within the range of 0 to 250 in CH☐ Input signal error detection setting value (Un\G412 to Un\G415).
81☐*1	A value other than 0 to 4 is set in any channel of Input signal error detection setting (Un\G402). ☐ indicates the number of the channel where an error has occurred.	Set the channel where an error of Input signal error detection setting (Un\G402) has occurred to either value of the following: • Disable (0) • Upper and Lower Detection (1) • Lower Detection (2) • Upper Detection (3) • Simple Disconnection Detection (4)

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Error code (decimal)	Description and cause of error	Action
82☐[1]	In any channel, Input signal error detection setting (Un\G402) is set to Simple disconnection detection (4) and CH☐ Input type/range setting (Un\G500 to Un\G503) is set to other than the following: • 4 to 20mA (extended mode) • 1 to 5V (extended mode) ☐ indicates the number of the channel where an error has occurred.	• For the channel used for simple disconnection detection with the input signal error detection function, set CH☐ Input type/range setting (Un\G500 to Un\G503) to 4 to 20mA (extended mode) or 1 to 5V (extended mode). • For channels used for other than simple disconnection detection, set the channel corresponding to Input signal error disconnection setting (Un\G402) to a value other than Simple disconnection detection (4).
90☐[1]	CH1 Scaling lower limit value (Un\G62) to CH4 Scaling upper limit value (Un\G69) are out of the range of -32000 to 32000. ☐ indicates the number of the channel where an error has occurred.	Set values 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]	Both 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 set to the same value. ☐ indicates the number of the channel where an error has occurred.	Set 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) so that these values differ from each other.
200☐[1]	Values other than Celsius (0) and Fahrenheit (1) are set in CH☐ Celsius/Fahrenheit display setting (Un\G508 to Un\G511). ☐ indicates the number of the channel where an error has occurred.	Set CH☐ Celsius/Fahrenheit display setting (Un\G508 to Un\G511) to either value of Celsius (0) or Fahrenheit (1).
201☐[1]	A value other than 0 to 3 is set in any channel of Conversion setting at disconnection detection (Un\G400). ☐ indicates the number of the channel where an error has occurred.	Set the channel where an error of Conversion setting at disconnection detection (Un\G400) has occurred to either value of the following: • Value just before disconnection (0) • Up scale (1) • Down scale (2) • Optional value (3)

[1] To clear the error, correct the values to fall within the proper range and perform either of the following two operations:

- Turning on and off Error clear request (YF)
- Turning on and off Operating condition setting request (Y9)

Note that if Operating condition setting request (Y9) is turned on and off, the conversion is reset and resumes from the beginning.

11.5 List of Alarm Codes

This section describes the list of alarm codes.
The code of an alarm that has occurred is stored into Latest error code (Un\G19).
The alarm code is also reported to the CPU module.

Alarm code (decimal)	Description and cause of alarm	Action
10△□[1]	A process alarm or rate alarm has occurred. □ indicates the number of the channel where a process alarm or rate alarm has occurred. △ indicates the corresponding one of the following states: 0: Process alarm upper limit 1: Process alarm lower limit 2: Rate alarm upper limit 3: Rate alarm lower limit	For the process alarm, adjust the digital output value to fall within the proper range. As a result, the relevant bits in Warning output flag (Process alarm) (Un\G50), and Warning output signal (X8) turn off automatically. For the rate alarm, adjust the variation rate of the digital output to fall within the proper range. As a result, the relevant bits in Warning output flag (Rate alarm) (Un\G51), and Warning output signal (X8) turn off automatically. To clear the alarm code, check that the digital output value falls within the proper range, and turn on and off Error clear request (YF). (If the scaling function is enabled, the scaling value is subject to a process alarm.)
11△□[1]	An input signal error has occurred. □ indicates the number of the channel where an input signal error has occurred. △ indicates the corresponding one of the following detection states: • 1: Upper Detection • 2: Lower Detection • 3: Simple Disconnection Detection	Adjust the analog input value to fall within the proper range, and turn on and off Error clear request (YF). As a result, the relevant bits in Input signal error detection flag (Un\G49), and Input signal error detection signal (XC) turn off.
130□[1]	A disconnection has been detected. □ indicates the number of the channel where a disconnection has been detected.	Check continuity of the external wiring (thermocouples, compensation lead wire, cold junction compensation resistors, resistance temperature detectors, and cables) to replace the disconnection point of it. Eliminate the cause of the disconnection detection, and turn on and off Error clear request (YF). As a result, the relevant bits in Disconnection detection flag (Un\G47), and Disconnection detection signal (X6) turn off.

[1] To clear the alarm, eliminate the alarm cause and perform either of the following two operations:
- Turning on and off Error clear request (YF)
- Turning on and off Operating condition setting request (Y9)

Note that if Operating condition setting request (Y9) is turned on and off, the conversion is reset and resumes from the beginning.

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11.6 Troubleshooting

11.6.1 Troubleshooting using LEDs

(1) When the RUN LED turns off

Check item	Action
Is the power supplied?	Check that the supply voltage of power supply module is within the rated range.
Is the capacity of power supply module enough?	Check that the power capacity is enough by calculating the current consumption of connected modules, such as the CPU module, I/O modules, and intelligent function modules.
Is the module connected properly?	Check the module connection.
The case other than the above	A watchdog timer error may have occurred. Reset the CPU module, and check that the RUN LED turns on. If the RUN LED remains off, the module may be failed. Please consult your local Mitsubishi representative.

(2) When the ERR. LED turns on

Check item	Action
Has any error occurred?	Check Latest error code (Un\G19), and take actions described in the list of error codes. • List of Error Codes (☞ Page 124, Section 11.4)

(3) When the ALM LED turns on or flashes

(a) When turning on

Check item	Action
Has any warning occurred?	Check Warning output flag (process alarm) (Un\G50).
	Check Warning output flag (rate alarm) (Un\G51).

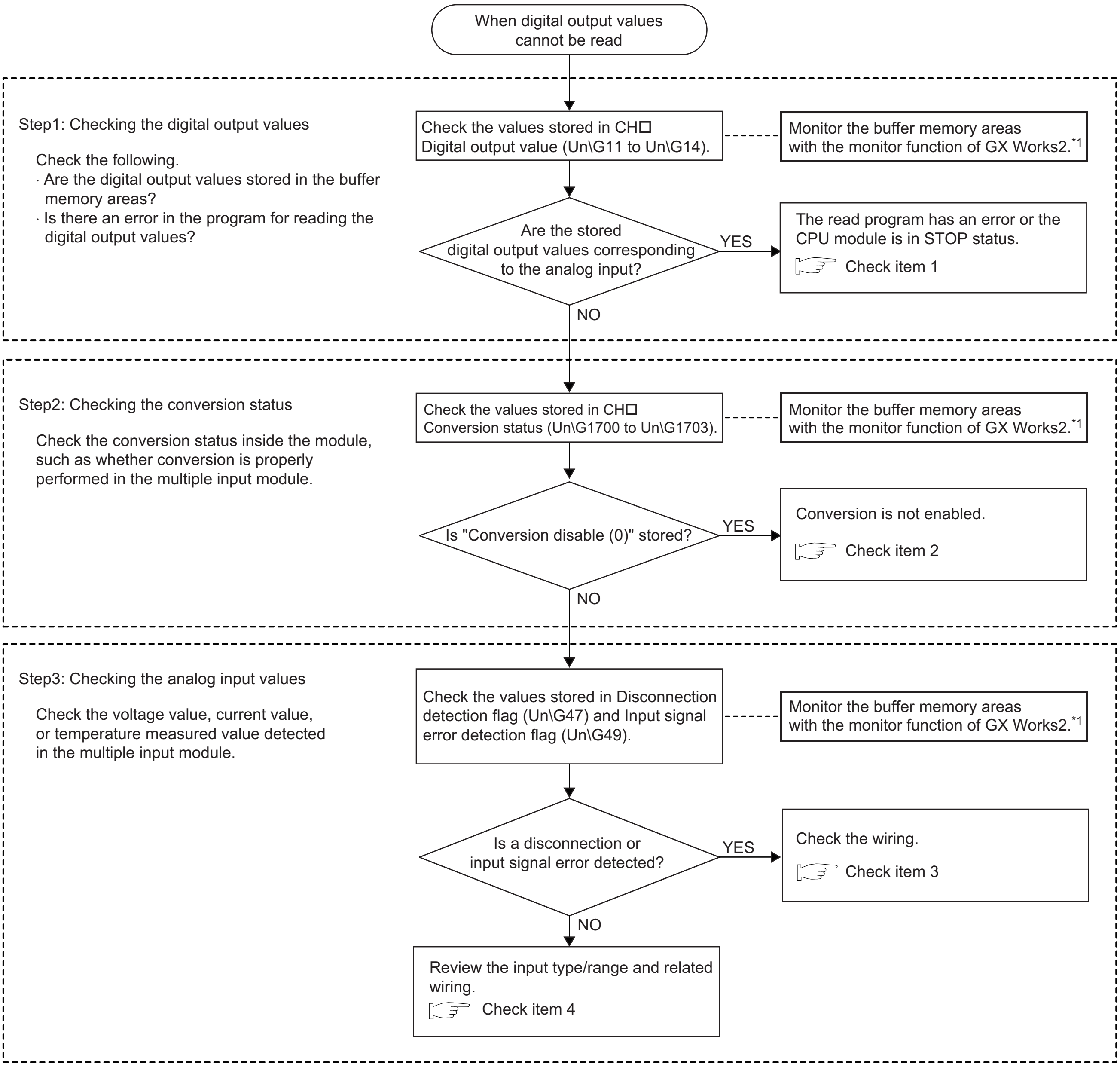
(b) When flashing

Check item	Action
Has any cable been disconnected?	Check Disconnection detection flag (Un\G47). If an external wiring is disconnected, Disconnection (1) is stored in the bit of Disconnection detection flag (Un\G47) corresponding to the channel number. When any bit of Disconnection detection flag (Un\G47) is on, check whether an analog signal line is off or disconnected.
When the thermocouple input is used, is a cold junction compensation resistor (CJ) connected to CH1?	To use the thermocouple input, always connect the cold junction compensation resistor (CJ) supplied with the module between the CH1 V-/B terminal (pin number 5) and the CH1 A terminal (pin number 7).
Has any input signal error occurred?	Check Input signal error detection flag (Un\G49). When the analog input value becomes equal to or greater than the input signal error detection upper limit value, or becomes equal to or smaller than the input signal error detection lower limit value, Input signal error (1) is stored in the bit of Input signal error detection flag (Un\G49) corresponding to the channel number. When any bit of Input signal error detection flag (Un\G49) is on, check the external wiring and the voltage value or current value of the analog input signal.
Is a value of the micro voltage, resistance temperature detector, or thermocouple set to CH☐ Input type/range setting (Un\G500 to Un\G503) of a channel where no wire is to be connected?	Set Conversion disable (0000_H) to the channel where no wire is to be connected.

11.6.2 Troubleshooting for the conversion

(1) When a digital output value cannot be read

Check the cause with the flowchart below.


When digital output values cannot be read
Step1: Checking the digital output values
Check the following.
· Are the digital output values stored in the buffer memory areas?
· Is there an error in the program for reading the digital output values?
Check the values stored in CH☐ Digital output value (Un\G11 to Un\G14).
Monitor the buffer memory areas with the monitor function of GX Works2.*1
Are the stored digital output values corresponding to the analog input?
YES
The read program has an error or the CPU module is in STOP status.
Check item 1
NO
Step2: Checking the conversion status
Check the conversion status inside the module, such as whether conversion is properly performed in the multiple input module.
Check the values stored in CH☐ Conversion status (Un\G1700 to Un\G1703).
Monitor the buffer memory areas with the monitor function of GX Works2.*1
Is "Conversion disable (0)" stored?
YES
Conversion is not enabled.
Check item 2
NO
Step3: Checking the analog input values
Check the voltage value, current value, or temperature measured value detected in the multiple input module.
Check the values stored in Disconnection detection flag (Un\G47) and Input signal error detection flag (Un\G49).
Monitor the buffer memory areas with the monitor function of GX Works2.*1
Is a disconnection or input signal error detected?
YES
Check the wiring.
Check item 3
NO
Review the input type/range and related wiring.
Check item 4

[1] Use "Device/Buffer Memory Batch Monitor" or "Intelligent Function Module Monitor".

Point

If the digital output value cannot be read even after the above actions are taken, the multiple input module may be failed. Please consult your local Mitsubishi representative.

(a) Check item 1

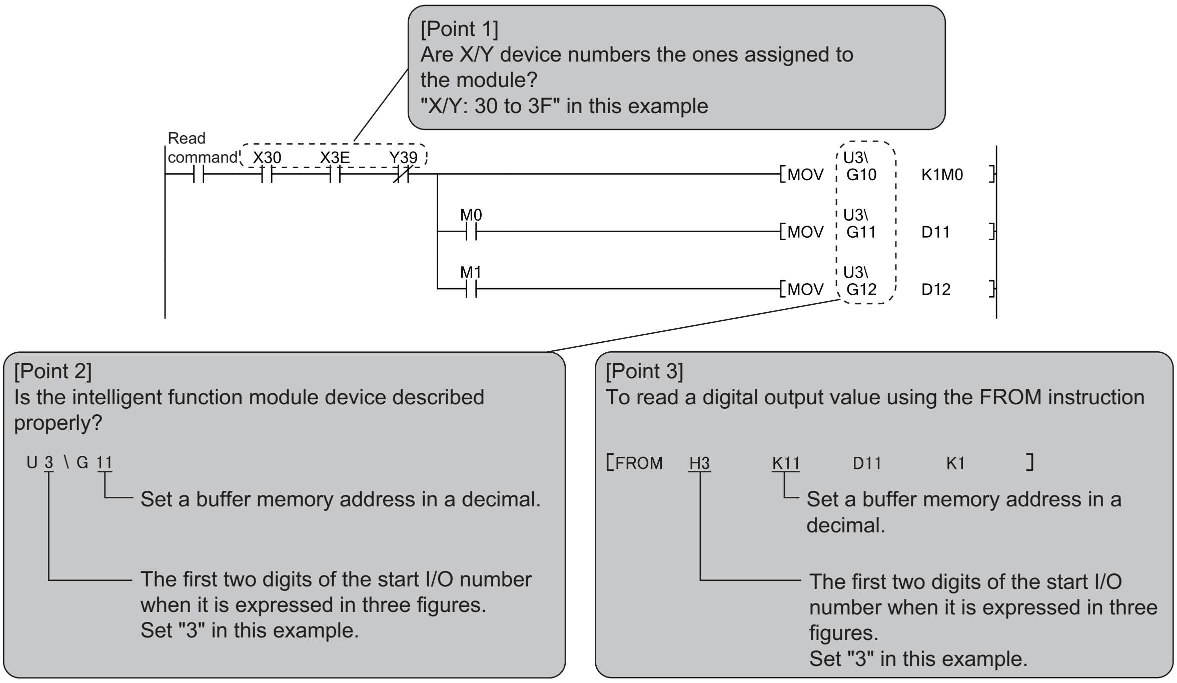
The read program is incorrect, or the CPU module is in STOP status. Check the following items.

Check item	Action
Is the program to read a digital output value correct?	Check CH□ Digital output value (Un\G11 to Un\G14) using the monitor function of GX Works2 ("Device/Buffer Memory Batch" or "Intelligent Function Module Monitor"). If the digital output value is stored according to the analog input, correct the read program.
Is the auto refresh setting correct?	If the value in CH□ Digital output value (Un\G11 to Un\G14) is transferred to the device of the CPU module using auto refresh, check that the auto refresh setting is correct.
Is the CPU module in the STOP status?	Change the status of the CPU module to RUN.

Point

The following are the points to check the read program.

- Program example for the multiple input module where the start I/O number is set to X/Y30



[Point 1]
Are X/Y device numbers the ones assigned to the module?
"X/Y: 30 to 3F" in this example

[Point 2]
Is the intelligent function module device described properly?

Set a buffer memory address in a decimal.

The first two digits of the start I/O number when it is expressed in three figures.
Set "3" in this example.

[Point 3]
To read a digital output value using the FROM instruction

Set a buffer memory address in a decimal.

The first two digits of the start I/O number when it is expressed in three figures.
Set "3" in this example.

(b) Check item 2

The conversion is not executed. Check the following items.

Check item	Action
Is Conversion disable (0000_H) set to CH□ Input type/range setting (Un\G500 to Un\G503) of the channel to input a value?	Check CH□ Input type/range setting (Un\G500 to Un\G503) using the monitor function of GX Works2 ("Device/Buffer Memory Batch" or "Intelligent Function Module Monitor"), and set a desired input type/range using a program or the parameter setting.
Has Operating condition setting request (Y9) been executed?	Turn on and off Operating condition setting request (Y9)[*1] with a method other than using a program, such as the current value change function of GX Works2, and check that a digital output value is stored in CH□ Digital output value (Un\G11 to Un\G14). If a correct value is stored, check the program whether the descriptions of Operating condition setting request (Y9) is correct.

*1 If Operating condition setting request (Y9) is on, the conversion does not start. Therefore, check that Operating condition setting completed flag (X9) is off after turning on Operating condition setting request (Y9), and turn off Operating condition setting request (Y9).

(c) Check item 3

Wiring is incorrect. Check the following items.

Check item		Action
Common	Are terminal screws tightened securely?	Retighten the terminal screws within the specified torque range. • Terminal Block (☞ Page 35, Section 6.2)
	Are the correct terminals connected?	Refer to the external wiring example and correct the wiring. • External Wiring (☞ Page 40, Section 6.4)
When the input type is voltage, current, or micro voltage	Is there any problem with wiring, such as off or disconnection of analog signal lines?	Check the faulty area by checking the signal line visually or conductively.
	Are the (V+/b) terminal and (I+) terminal connected at the current input?	For the current input, always connect the (V+/b) terminal and (I+) terminal by referring to the external wiring example. • External Wiring (☞ Page 40, Section 6.4)
When the input type is thermocouple	Are the thermocouples, compensation lead wires, and cables properly connected?	Check the continuity of thermocouples, compensation lead wires, and cables, and replace the disconnected thermocouple, compensation lead wire, or cable.
	Is a cold junction compensation resistor (CJ) connected to CH1?	Connect the cold junction compensation resistor (CJ) supplied with the module between the CH1 V-/B terminal (pin number 5) and the CH1 A terminal (pin number 7).
When the input type is resistance temperature detector	Is the resistance temperature detector properly connected?	Check the continuity of the resistance temperature detector, and replace the disconnected one.

(d) Check item 4

Correct the input type/input range and the wiring. Check the following items.

Check item	Action
Is CH□ Input type/range setting (Un\G500 to Un\G503) correct?	Check CH□ Input type/range monitor (Un\G516 to Un\G519) using "Device/Buffer Memory Batch" or "Intelligent Function Module Monitor". If the input type/range is incorrect, set CH□ Input type/range setting (Un\G500 to Un\G503) again and turn on and off Operating condition setting request (Y9).
Are the correct terminals connected?	Refer to the external wiring example and correct the wiring. • External Wiring (☞ Page 40, Section 6.4)

(2) When a digital output value does not fall within the range of accuracy

Check item	Action
Is any measure against noise taken?	Take measures against noise, such as using a shielded cable for connection.
Has the thermocouple input been influenced by noises?	Always use shielded compensation lead wires for the connection and ground the shield wire of the compensation lead wire for each channel. Check the influence from adjacent devices and take measures against noise.
Has the resistance temperature detector input been affected by noises?	Always use shielded cables for the connection and ground the shield wire for each channel. Check the influence from adjacent devices and take measures against noise.
Is a heat-generating object placed near the module while the thermocouple input range is being used?	The multiple input module measures a temperature on the basis of the temperature of a terminal block. Therefore, if the temperature distribution of the terminal block becomes inhomogeneous because of the effect of heat emitted from each module, the measured temperature error may become large. In such case, use the function block (FB) for the shift processing and correct the temperature. For details on the function block (FB), refer to the following. • 📖MELSEC-L Multiple Input (Voltage/Current/Temperature) Module FB Library Reference Manual (FBM-M115)

11.7 Checking the Multiple Input Module Status Using the System Monitor

To check the LED status, select "H/W information" of the multiple input module on the system monitor of GX Works2.

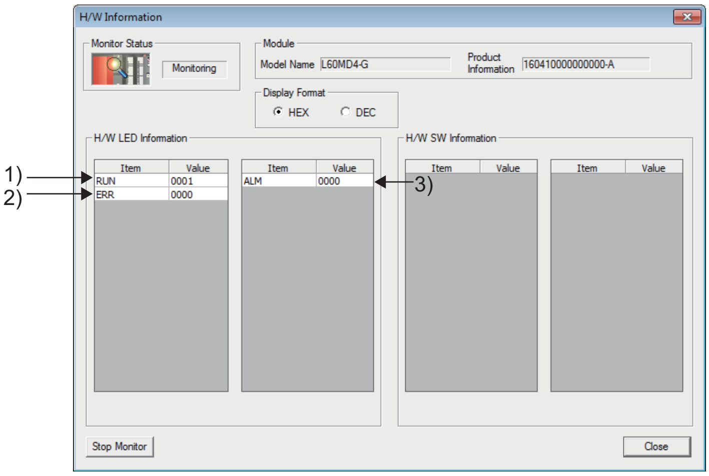
(1) H/W LED Information

The LED on/off status is displayed.

No.	LED name	Status
1)	RUN LED	0000_H: Indicates that the LED is off. 0001_H: Indicates that the LED is on. Alternating indication between 0000_H and 0001_H: Indicates that the LED is flashing. (GX Works2 displays the communication status with the multiple input module. The values 0000_H and 0001_H are not always displayed evenly.)
2)	ERR. LED	
3)	ALM LED	

(2) H/W SW Information

Since this module does not use the intelligent function module switch setting, the setting status is not displayed.



Monitor Status: Monitoring

Module

Model Name: L60MD4-G

Product Information: 160410000000000-A

Display Format: ● HEX ○ DEC

H/W LED Information

Item	Value
RUN	0001
ERR	0000

Item	Value
ALM	0000

H/W SW Information

Item	Value

Item	Value

AbN automation

APPENDICES

Appendix 1 Details of I/O Signals

The following describes the details of the I/O signals for the multiple input module which are assigned to the CPU module.
The I/O number (X/Y) described in Appendix 1 are for the case when the start I/O number of the multiple input module is set to 0.

Appendix 1.1 Input signal

(1) Module READY (X0)

Module READY (X0) turns on to indicate that the preparation for the conversion is completed after the power-on or after the reset operation of the CPU module.
Module READY (X0) turns off when a watchdog timer error has occurred in the multiple input module. (No conversion processing is performed.)

(2) Disconnection detection signal (X6) Micro voltage Thermocouple RTD

(a) When Disconnection detection signal (X6) turns on

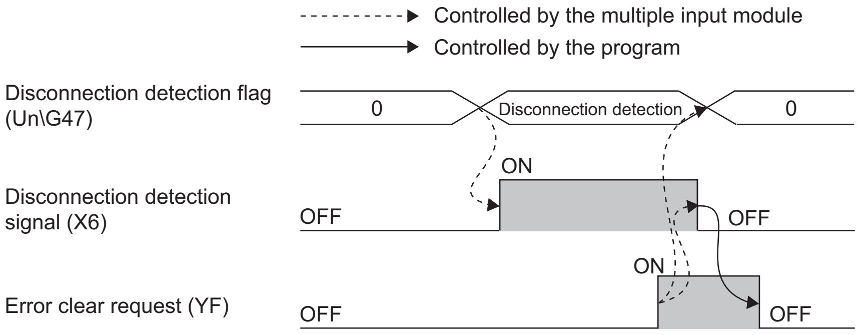
Disconnection detection signal (X6) turns on when at least one disconnection of the input signal line is detected in an input circuit of the channel for which the conversion is enabled.
When Disconnection detection signal (X6) turns on, the following operation is applied.

- The values set in Conversion setting at disconnection detection (Un\G400) and CH☐ Conversion setting value at disconnection detection (Un\G404 to Un\G407) are stored in the digital output value of the corresponding channel.
- The ALM LED flashes.

(b) When Disconnection detection signal (X6) turns off

Eliminate the cause of the disconnection, and turn on and off Error clear request (YF). As a result, Disconnection detection signal (X6) turns off.
When Disconnection detection signal (X6) turns off, the following operation is applied.

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


Controlled by the multiple input module
Controlled by the program
Disconnection detection flag (Un\G47)
0
Disconnection detection
0
Disconnection detection signal (X6)
ON
OFF
OFF
Error clear request (YF)
ON
OFF
OFF

Point

- After the disconnection cause is eliminated, the conversion processing restarts regardless of turning on and off Error clear request (YF). However, the on status of Disconnection detection signal (X6) and the flashing status of the ALM LED are not cleared.
- The averaging processing starts from the first after the conversion processing restarts.

(3) Warning output signal (X8)

Warning output signal (X8) turns on when a process alarm or rate alarm is detected.

Process alarms or rate alarms can be detected only when the warning output function is enabled.

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

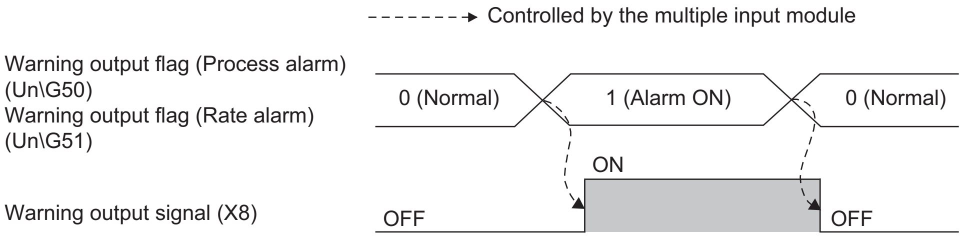
- Warning Output Function (☞ Page 69, Section 8.8)

(a) Process alarm

- When the digital output value (scaling value if the scaling function is enabled) exceeds the setting range of CH1 Process alarm lower lower limit value (Un\G86) to CH4 Process alarm upper upper limit value (Un\G101), Warning output signal (X8) turns on. In addition, the ALM LED turns on.
- When the digital output values (scaling values if the scaling function is enabled) of all the channels for which the conversion is enabled fall within the setting range, Warning output signal (X8) turns off. In addition, the ALM LED turns off.

(b) Rate alarm

- When the change rate of the digital output value exceeds the change rate set in CH1 Rate alarm upper limit value (Un\G126) to CH4 Rate alarm lower limit value (Un\G133), Warning output signal (X8) turns on. In addition, the ALM LED turns on.
- When the change rates of the digital output value of all the channels for which the conversion is enabled fall within the setting range, Warning output signal (X8) turns off. In addition, the ALM LED turns off.


Controlled by the multiple input module
Warning output flag (Process alarm) (Un\G50)
Warning output flag (Rate alarm) (Un\G51)
Warning output signal (X8)
0 (Normal)
1 (Alarm ON)
0 (Normal)
ON
OFF
OFF

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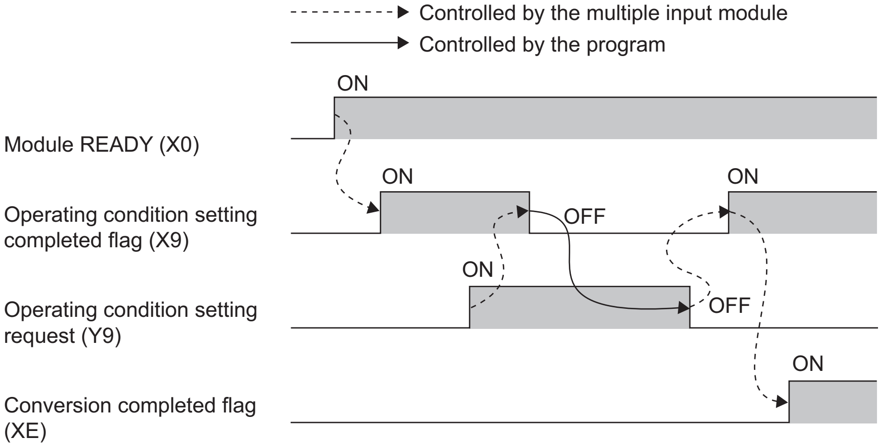
(4) Operating condition setting completed flag (X9)

Operating condition setting completed flag (X9) is used as the interlock condition to turn on and off Operating condition setting request (Y9) when the value of the buffer memory is changed. For buffer memory items that require Operating condition setting request (Y9) to be turned on and off to enable the new value, refer to the following.

- List of Buffer Memory Addresses (☞ Page 27, Section 3.5)

When Operating condition setting completed flag (X9) is off, conversion processing is not performed.
When Operating condition setting request (Y9) is on, Operating condition setting completed flag (X9) turns off.


Controlled by the multiple input module
Controlled by the program
Module READY (X0)
ON
Operating condition setting completed flag (X9)
ON
OFF
ON
Operating condition setting request (Y9)
ON
OFF
Conversion completed flag (XE)
ON

(5) Input signal error detection signal (XC) Current Voltage

(a) When Input signal error detection signal (XC) turns on

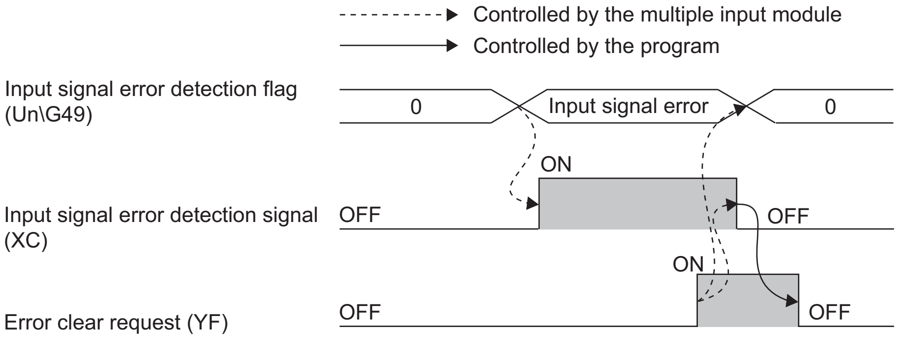
Input signal error detection signal (XC) turns on when a detection condition is set in Input signal error disconnection setting (Un\G402) and an analog input value exceeds the range set in CH□ Input signal error detection setting value (Un\G412 to Un\G415) in any of the channels for which the conversion is enabled. If the simple disconnection detection is set, the setting of CH□ Input signal error detection setting value (Un\G412 to Un\G415) is ignored and Input signal error detection signal (XC) turns on at the simple disconnection detection.
When Input signal error detection signal (XC) turns on, the following operation is applied.

- The digital output value or scaling value of the corresponding channel immediately before the error detection is held.
- The ALM LED flashes.

(b) When Input signal error detection signal (XC) turns off

Adjust the analog input value to fall within the proper range, and turn on and off Error clear request (YF). As a result, Input signal error detection signal (XC) turns off.
When Input signal error detection signal (XC) turns off, the following operation is applied.

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

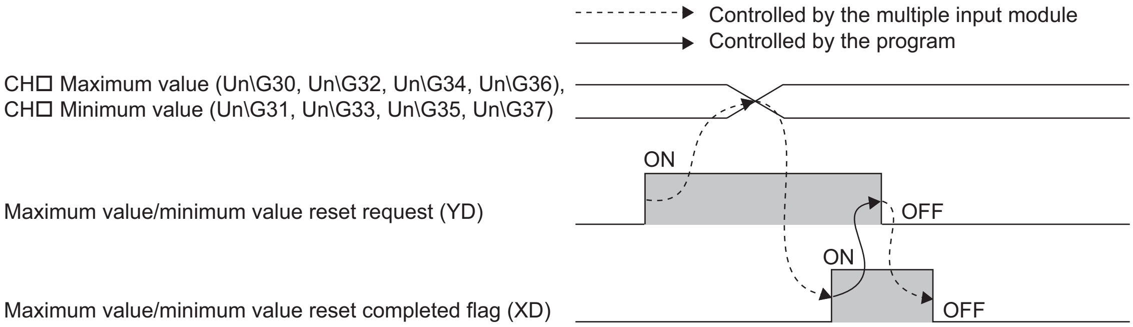

Controlled by the multiple input module
Controlled by the program
Input signal error detection flag (Un\G49)
0
Input signal error
0
ON
Input signal error detection signal (XC)
OFF
OFF
ON
Error clear request (YF)
OFF
OFF

Point

- After the analog input value falls within the setting range, the conversion processing restarts regardless of turning on and off Error clear request (YF). However, the on status of Input signal error detection signal (XC) and the flashing status of the ALM LED are not cleared.
- The averaging processing starts from the first after the conversion processing restarts.

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

Maximum value/minimum value reset completed flag (XD) turns on when the maximum value stored in CH□ Maximum value (Un\G30, Un\G32, Un\G34, Un\G36) and the minimum value stored in CH□ Minimum value (Un\G31, Un\G33, Un\G35, Un\G37) are reset by turning on Maximum value/minimum value reset request (YD). When Maximum value/minimum value reset request (YD) is turned off while Maximum value/minimum value reset completed flag (XD) is on, Maximum value/minimum value reset completed flag (XD) also turns off.

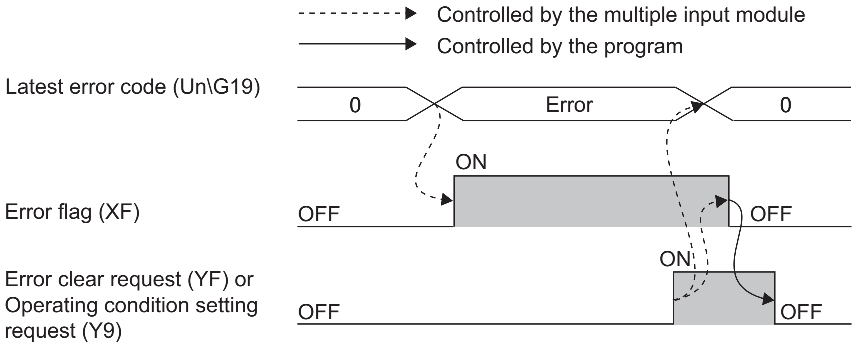

Controlled by the multiple input module
Controlled by the program
CH□ Maximum value (Un\G30, Un\G32, Un\G34, Un\G36),
CH□ Minimum value (Un\G31, Un\G33, Un\G35, Un\G37)
ON
Maximum value/minimum value reset request (YD)
OFF
ON
Maximum value/minimum value reset completed flag (XD)
OFF

(7) Conversion completed flag (XE)

Conversion completed flag (XE) turns on when the first conversion of all the channels for which the conversion is enabled is completed.
When reading digital output values, use this signal or Conversion completed flag (Un\G10) as an interlock condition.

(8) Error flag (XF)

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


Controlled by the multiple input module
Controlled by the program
Latest error code (Un\G19)
0
Error
0
ON
Error flag (XF)
OFF
OFF
ON
Error clear request (YF) or Operating condition setting request (Y9)
OFF
OFF

(a) When Error flag (XF) turns off

Error flag (XF) turns off after the error cause is eliminated and either of the following two operations is performed:

- Turning on and off Error clear request (YF)
- Turning on and off Operating condition setting request (Y9)

Error flag (XF) and Latest error code (Un\G19) are cleared when Error clear request (YF) or Operating condition setting request (Y9) is turned on.
Note that if Operating condition setting request (Y9) is turned on and off, the conversion is reset and resumes from the beginning.

Appendix 1.2 Output signal

(1) Operating condition setting request (Y9)

Turn on and off Operating condition setting request (Y9) to enable the settings of the buffer memory.

For the timing to turn on and off Operating condition setting request (Y9), refer to the following.

- Operating condition setting completed flag (X9) (☞ Page 135, Appendix 1.1 (4))

For the buffer memory items to be enabled, refer to the following.

- List of Buffer Memory Addresses (☞ Page 27, Section 3.5)

When an error or alarm is detected but its cause is removed, turning on and off this signal clears the detected error or alarm (except for a process alarm and rate alarm).

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

Turn on and off Maximum value/minimum value reset request (YD) to reset 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 to turn on and off Maximum value/minimum value reset request (YD), refer to the following.

- Maximum value/minimum value reset completed flag (XD) (☞ Page 137, Appendix 1.1 (6))

(3) Error clear request (YF)

Turn on and off Error clear request (YF) to clear Error flag (XF), Input signal error detection signal (XC), Disconnection detection signal (X6), and Latest error code (Un\G19).

For the timing to turn on and off Error clear request (YF), refer to the following.

- Disconnection detection signal (X6) (☞ Page 133, Appendix 1.1 (2))
- Input signal error detection signal (XC) (☞ Page 136, Appendix 1.1 (5))
- Error flag (XF) (☞ Page 137, Appendix 1.1 (8))

Appendix 2 Details of Buffer Memory Addresses

(1) CH1□ Time Average/Count Average/Moving Average (Un\G1 to Un\G4)

Set average time, an average count, and moving average by channel where the averaging process setting is enabled.

- The following table lists the setting range.

Processing method	Setting range
Time average	8 to 18000[*1]
Count average	4 to 36000 (times)[*2]
Moving average	2 to 1000 (times)

[*1] Set the time average in increments of 100ms (800 to 1800000ms). To set the time average of 1000ms, set 10.

[*2] When a program is used to set 32768 to 36000 (times), set the value in hexadecimal. To set 36000 (times), set $8CA0_H$.

- When a value outside the above range is written, an error occurs on the corresponding channel. The corresponding error code is stored in Latest error code (Un\G19), Error flag (XF) turns on, and conversion processing is performed using the previous setting.
- On a channel where Averaging process setting (Un\G24) has been set to Sampling processing (0), any setting for this area is ignored.

(a) Enabling the setting

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

(b) Default value

All channels are set to 0.

Point

The default value is 0. Change the value according to the processing method.

(2) Conversion completed flag (Un\G10)

The conversion status can be checked.

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

b4 to b15 are fixed to 0.

0: Converting or unused
1: Conversion completed

(a) Conversion completion

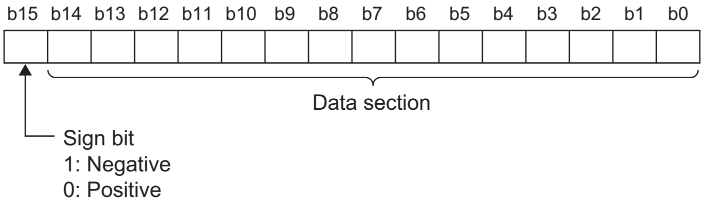
When the first conversion is completed in the channel where the conversion is enabled, the flag turns to Conversion completed (1).

Conversion completed flag (XE) turns on when the conversion of all the channels where the conversion is enabled is completed.

Turning on and off Operating condition setting request (Y9) turns the flag back to its default "Converting or unused (0)", and when the first conversion is complete, the flag turns to Conversion completed (1).

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

The converted digital output value is stored in the 16-bit signed binary format.



The data to be stored differs depending on the setting value of CH□ Input type/range setting (Un\G500 to Un\G503)

(a) For voltage input range, current input range, or micro voltage input range

The converted digital output value is stored as is. (The value is rounded to integers.)

(b) For resistance temperature detector input range

The temperature measured value, which is a temperature value converted from the resistance temperature detector value input from the resistance temperature detector, is stored.

Input range	Storage contents	Example (When the temperature measured value is 123.025℃)
Pt100 (-20 to 120℃) JPt100 (-20 to 120℃)	The temperature measured value after the following processing is stored. • Rounding off the value to two decimal places • Multiplying the value rounded off to two decimal places by 100	12303
Other than above (such as Pt100 (-200 to 850℃))	The temperature measured value after the following processing is stored. • Rounding off the value to one decimal place • Multiplying the value rounded off to one decimal place by 10	1230

(c) For thermocouple input range

The temperature measured value, which is a temperature value converted from the thermoelectromotive force value input from the thermocouple, is stored. The temperature measured value is rounded off to one decimal place, multiplied by 10, and stored.

Ex. When the temperature measured value is 123.025℃, 1230 is stored.

(d) Stored value at disconnection detection

For the micro voltage input range, resistance temperature detector input range, or thermocouple input range, the value set with Conversion setting at disconnection detection (Un\G400) is stored in CH□ Digital output value (Un\G11 to Un\G14) at disconnection detection.

A normal digital output value is automatically stored after recovery from the disconnection.

For details on the disconnection detection function, refer to the following.

- Disconnection Detection Function (☞ Page 58, Section 8.6)

(e) Updating cycle

If averaging processing is used, values are updated every set averaging process cycle. Otherwise values are updated every sampling cycle.

(4) Latest error code (Un\G19)

The latest error code or alarm code, which the multiple input module detects, is stored.

For details on error codes or alarm codes, refer to the following.

- List of Error Codes (☞ Page 124, Section 11.4)
- List of Alarm Codes (☞ Page 126, Section 11.5)

(a) Clearing an error

Turn on and off Error clear request (YF) or Operating condition setting request (Y9).

Note that if Operating condition setting request (Y9) is turned on and off, the conversion is reset and resumes from the beginning.

(5) Averaging process setting (Un\G24)

Select sampling processing or averaging processing for each channel.

When averaging processing is selected, time average, count average, or moving average can be selected.

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 channel where a value out of the above setting range is written operates with the sampling processing.

(a) Enabling the setting

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

(b) Default value

All channels are set to Sampling processing (0).

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

The maximum digital output value and minimum digital output value are stored in 16-bit signed binary.
When the following operations are performed, 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.

- Maximum value/minimum value reset request (YD) is turned on and off.
- Operating condition setting request (Y9) is turned on and off, and the setting is changed.

If CH□ Input type/range setting (Un\G500 to Un\G503) is changed and Operating condition setting request (Y9) is turned on and off, CH□ Maximum value (Un\G30, Un\G32, Un\G34, Un\G36) and CH□ Minimum value (Un\G31, Un\G33, Un\G35, Un\G37) are cleared to 0.

Point

- ● For the channel to which the averaging processing is specified, the maximum and minimum values are stored at averaging processing cycles.
- ● If the scaling function is enabled, the maximum scaling value and minimum scaling value are stored.

(7) Disconnection detection flag (Un\G47) Micro voltage Thermocouple RTD

The disconnection status can be checked for each channel.

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

b4 to b15 are fixed to 0.

0: Normal
1: Disconnection

(a) Status of Disconnection detection flag (Un\G47)

- If disconnection in an external signal wire, thermocouple, compensation lead wire, cold junction compensation resistor, or resistance temperature detector is detected, the flag corresponding to the channel in which the disconnection is detected turns to Disconnection (1). For the channel in which disconnection is detected, the value set in Conversion setting at disconnection detection (Un\G400) is stored in CH□ Digital output value (Un\11 to Un\G14). In the channel in which no disconnection is detected, the conversion continues.
- If disconnection is detected even in one of the channels for which the micro voltage input range, resistance temperature detector input range, or thermocouple input range is set in CH□ Input type/range setting (Un\G500 to Un\G503), Disconnection detection signal (X6) turns on.

(b) Clearing Disconnection detection flag (Un\G47)

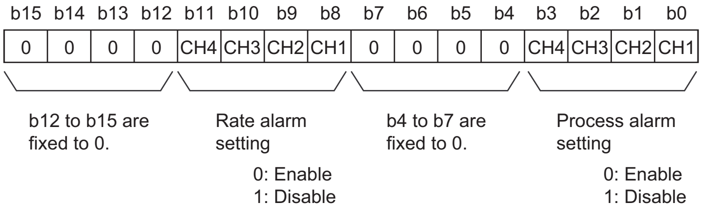
To clear Disconnection detection flag (Un\G47), check the wiring, eliminate the disconnection cause, and turn on and off Error clear request (YF).
Turning on and off Operating condition setting request (Y9) also clears the flag, but the conversion is reset and resumed from the beginning.

(8) Warning output setting (Un\G48)

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

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

- Warning Output Function (☞ Page 69, Section 8.8)



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

b12 to b15 are fixed to 0.
Rate alarm setting
0: Enable
1: Disable
b4 to b7 are fixed to 0.
Process alarm setting
0: Enable
1: Disable

(a) Enabling the setting

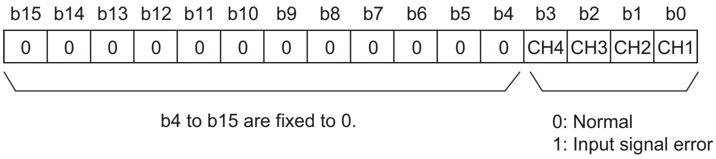
Turn on and off Operating condition setting request (Y9) to enable the setting.

(b) Default value

All channels are set to Disable (1).

(9) Input signal error detection flag (Un\G49) Current Voltage

The input signal status of each channel can be checked with this flag.



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

b4 to b15 are fixed to 0.
0: Normal
1: Input signal error

(a) Status of Input signal error detection flag (Un\G49)

- When an analog input value out of the setting range for CH☐ Input signal error detection setting value (Un\G142 to Un\G145) is detected, Input signal error detection flag (Un\G49) corresponding to each channel is turned to Input signal error (1).
- Even when an error is detected on just one of channels where the conversion and input signal error detection are enabled, Input signal error detection signal (XC) turns on.

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

To clear Input signal error detection flag (Un\G49), adjust the analog input value so that it falls within the setting range and turn on and off Error clear request (YF).

Turning on and off Operating condition setting request (Y9) also clears the flag, but the conversion is reset and resumed from the beginning.

(10)Warning output flag (process alarm) (Un\G50), Waning output flag (rate alarm) (Un\G51)

Whether the output process alarm or rate alarm is for the upper limit or lower limit can be checked for each channel.

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

- Warning Output Function (☞ Page 69, Section 8.8)

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Warning output flag (Process alarm) (Un\G50)	0	0	0	0	0	0	0	0	CH4 Lower limit value	CH4 Upper limit value	CH3 Lower limit value	CH3 Upper limit value	CH2 Lower limit value	CH2 Upper limit value	CH1 Lower limit value	CH1 Upper limit value
Warning output flag (Rate alarm) (Un\G51)	0	0	0	0	0	0	0	0	CH4 Lower limit value	CH4 Upper limit value	CH3 Lower limit value	CH3 Upper limit value	CH2 Lower limit value	CH2 Upper limit value	CH1 Lower limit value	CH1 Upper limit value

b8 to b15 are fixed to 0.

0: Normal
1: Alarm ON

(a) Status of Warning output flag (process alarm) (Un\G50), Waning output flag (rate alarm) (Un\G51)

When a warning is detected due to either of the following events, Alarm ON (1) is stored in the bit of Warning output flag corresponding to the channel.

Buffer memory	Warning detection condition
Warning output flag (process alarm) (Un\G50)	The digital output value exceeds the range set in CH1 Process alarm lower lower limit value (Un\G86) to CH4 Process alarm upper upper limit value (Un\G101). (If the scaling function is enabled, the scaling value exceeds the setting range.)
Warning output flag (rate alarm) (Un\G51)	The change rate of the digital output value exceeds the change rate set in CH1 Rate alarm upper limit value (Un\G126) to CH4 Rate alarm lower limit value (Un\G133).

Even when a warning is detected on just one of channels where the conversion and warning output are enabled, Warning output signal (X8) turns on.

(b) Clearing Warning output flag (process alarm) (Un\G50), Waning output flag (rate alarm) (Un\G51)

The warning output flags are cleared under the following conditions.

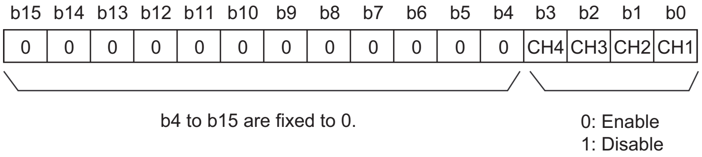
Buffer memory	Warning clear condition
Warning output flag (process alarm) (Un\G50)	• The digital output value falls within the setting range. (If the scaling function is enabled, the scaling value falls within the setting range.) • Operating condition setting request (Y9) is turned on and off.
Warning output flag (rate alarm) (Un\G51)	• The change rate of the digital output value falls within the setting range. • Operating condition setting request (Y9) is turned on and off.

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

Set whether to enable or disable scaling for each channel.

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

- Scaling Function (☞ Page 77, Section 8.9)


b4 to b15 are fixed to 0.
0: Enable
1: Disable

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

(a) Enabling the setting

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

(b) Default value

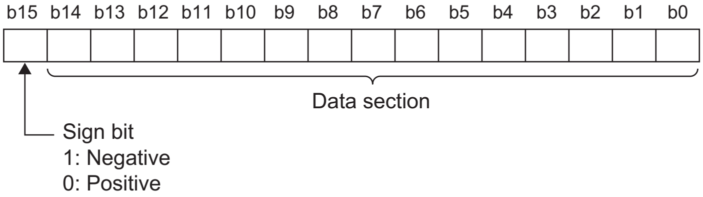
All channels are set to Disable (1).

(12) CH☐ Scaling value (Un\G54 to Un\G57)

The scaling value calculated by using the scaling function is stored in 16-bit signed binary.

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

- Scaling Function (☞ Page 77, Section 8.9)


b15
b14
b13
b12
b11
b10
b9
b8
b7
b6
b5
b4
b3
b2
b1
b0
Data section
Sign bit
1: Negative
0: Positive

(a) Updating cycle

If averaging processing is used, values are updated every set averaging process cycle. Otherwise values are updated every sampling cycle.

Point

If the scaling function is not used, the same value as CH☐ Digital output value (Un\G11 to Un\G14) is stored.

(13)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 the scaling function, refer to the following.

- Scaling Function (☞ Page 77, Section 8.9)

(a) Setting range

- The setting range is between -32000 and 32000.
- If the relation between the values is scaling lower limit value > scaling upper limit value, the scale conversion can be performed according to a negative slope.
- Set different values for the scaling upper limit value and scaling lower limit value. If the same value is set, an error occurs. The error code (91□) is stored in Latest error code (Un\G19), Error flag (XF) turns on, and the module operates with the previous setting.
- If a value outside the setting range is set, an error occurs on the corresponding channel The error code (90□) is stored in Latest error code (Un\G19), Error flag (XF) turns on, and the module operates with the previous setting.
- When Scaling enable/disable setting (Un\G53) is set to Disable (1), the settings 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.

(b) Enabling the setting

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

(c) Default value

All channels are set to 0.

Point

The default value is 0. To use the scaling function, change the value.

(14)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 warning output range of the digital output value for each channel. Set four values: process alarm upper upper limit value, process alarm upper lower limit value, process alarm lower upper limit value, and process alarm lower lower limit value.

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

- Warning output function (process alarm) (☞ Page 69, Section 8.8 (1))

(a) Setting range

- The setting range is between -32768 and 32767.
- When the resistance temperature detector input range or thermocouple input range is set, set the process alarm upper limit value and lower value as follows.

Input type/Input range	Setting procedure
• Resistance temperature detector: Pt100 (-20 to 120℃) • Resistance temperature detector: JPt100 (-20 to 120℃)	Set the value in increments of 0.01℃ (or 0.01℉).
• Resistance temperature detector input range other than the above • Thermocouple input range	Set the value in increments of 0.1℃ (or 0.1℉).

Ex. To set CH1 Process alarm upper lower limit value to 123℃ with the thermocouple input range, store 1230 in CH1 Process alarm upper lower limit value (Un\G88).

- Set the values so that the following condition is satisfied: Process alarm upper upper limit value ≥ Process alarm upper lower limit value ≥ Process alarm lower upper limit value ≥ Process alarm lower lower limit value. An error occurs in the channel with the setting that does not satisfy the condition, the error code (6△□) is stored in Latest error code (Un\G19), and Error flag (XF) turns on. The process alarm function operates with the previous setting.
- When Disable (1) is set in Warning output setting (Un\G48), the settings 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 are ignored.
- When using the scaling function, set values in consideration of the scale conversion. (☞ Page 77, Section 8.9)

(b) Enabling the setting

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

(c) Default value

All channels are set to 0.

Point

The default value is 0. To use the process alarm, change the value.

(15)CH☐ Rate alarm detection cycle (Un\G118 to Un\G121)

Set the cycle of checking the change rate of the digital output value for each channel. (The change rate is a ratio of the change in the digital output value from the previous check.) The change rate of the digital output value is checked at every setting cycle.

A value obtained by multiplying the setting value by the conversion cycle is a cycle that detects a warning of the rate alarm.

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

- Warning output function (rate alarm) (☞ Page 71, Section 8.8 (2))

(a) Setting range

- The setting range is from 1 to 36000 (times).
- When a value outside the above range is set, an error occurs on the corresponding channel. The error code (71☐) is stored in Latest error code (Un\G19), and Error flag (XF) turns on.
- When Disable (1) is set in Warning output setting (Un\G48), the setting of the rate alarm detection cycle is ignored.

Remark

If the upper or lower limit value of the rate alarm is small, a warning may be output as a sensitive response to disturbances. Setting the long rate alarm detection cycle can prevent such a sensitive response to disturbances.

(b) Enabling the setting

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

(c) Default value

All channels are set to 0.

Point

The default value is 0. To use the rate alarm, change the value.

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(16)CH☐ Rate alarm upper limit value (Un\G126, Un\G128, Un\G130, Un\G132), CH☐ Rate alarm lower limit value (Un\G127, Un\G129, Un\G131, Un\G133)

The digital output value is checked at every warning detection cycle, and the change rate is detected from the check result. Set the range of the change rate of the digital output value for each channel in this area.
For details on the warning output function (rate alarm), refer to the following.

- Warning output function (rate alarm) (☞ Page 71, Section 8.8 (2))

(a) Setting range

- The setting range is between -32768 and 32767 (-3276.8 to 3276.7%). (The value can be set in increments of 0.1%.)
- Set the values so that the following condition is satisfied: Rate alarm upper limit value > Rate alarm lower limit value. An error occurs in the channel with the setting that does not satisfy the condition, the error code (70☐) is stored in Latest error code (Un\G19), and Error flag (XF) turns on. The rate alarm function operates with the previous setting.
- When Disable (1) is set in Warning output setting (Un\G48), the settings of the rate alarm upper limit value and rate alarm lower limit value are ignored.

(b) Enabling the setting

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

(c) Default value

All channels are set to 0.

Point

The default value is 0. To use the rate alarm, change the value.

(17)Conversion setting at disconnection detection (Un\G400) Micro voltage Thermocouple RTD

Set a value to be stored in CH☐ Digital output value (Un\G11 to Un\G14) at disconnection detection for each channel.

For details on the disconnection detection function, refer to the following.

- Disconnection Detection Function (☞ Page 58, Section 8.6)

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

Digital output value	Setting value
Value just before disconnection	0_H
Up scale	1_H
Down scale	2_H
Optional value	3_H

- When a value outside the above range is set, an error occurs on the corresponding channel. The error code (201☐) is stored in Latest error code (Un\G19), Error flag (XF) turns on, and the module operates with the previous setting.
- Conversion setting at disconnection detection (Un\G400) is enabled only when the micro voltage input range, thermocouple input range, or resistance temperature detector input range is set in CH☐ Input type/range setting (Un\G500 to Un\G503). The setting value of the channel for which the current input range or voltage input range is set is ignored.

Point

When disconnection is detected, the value set in this area is stored in CH☐ Digital output value (Un\G11 to Un\G14). Thus, the disconnection status can be checked only with CH☐ Digital output value (Un\G11 to Un\G14).

(a) Enabling the setting

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

(b) Default value

All channels are set to Value just before disconnection (0).

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(18)Input signal error detection setting (Un\G402) Current Voltage

To use the input signal error detection function, set the method of detecting input signal errors for each channel. For details on the input signal error detection function, refer to the following.

- Input Signal Error Detection Function (☞ Page 62, Section 8.7)

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

Detection method	Setting value
Disable	0_H
Upper and lower detection	1_H
Lower detection	2_H
Upper detection	3_H
Simple disconnection detection	4_H

- When a value outside the above range is set, an error occurs on the corresponding channel. The error code (81□) is stored in Latest error code (Un\G19), Error flag (XF) turns on, and the module operates with the previous setting.
- Input signal error detection setting (Un\G402) is enabled only when the current input range or voltage input range is set in CH□ Input type/range setting (Un\G500 to Un\G503). The setting value of the channel for which the micro voltage input range, thermocouple input range, or resistance temperature detector input range is set is ignored.
- Simple disconnection detection (4) is enabled only when the input range is set to 4 to 20mA (extended mode) or 1 to 5V (extended mode). When Simple disconnection detection (4) is set for the channel for which the input range is set to other than 4 to 20mA (extended mode) or 1 to 5V (extended mode), an error occurs. The error code (82□) is stored in Latest error code (Un\G19), Error flag (XF) turns on, and the module operates with the previous setting.

(a) Enabling the setting

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

(b) Default value

All channels are set to Disable (0).

(19)CH□ Conversion setting value at disconnection detection (Un\G404 to Un\G407) Micro voltage Thermocouple RTD

When "Optional value (3)" is set in Conversion setting at disconnection detection (Un\G400), the value set in this area is stored in CH□ Digital output value (Un\G11 to Un\G14) at disconnection detection.

For details on the disconnection detection function, refer to the following.

- Disconnection Detection Function (☞ Page 58, Section 8.6)

(a) Setting range

- The setting range is between -32768 and 32767.
- When the input range is set to the resistance temperature detector or thermocouple, set the conversion setting value at disconnection detection as follows.

Input type/Input range	Setting procedure
• Resistance temperature detector: Pt100 (-20 to 120℃) • Resistance temperature detector: JPt100 (-20 to 120℃)	Set the value in increments of 0.01℃ (or 0.01℉).
• Resistance temperature detector input range other than the above • Thermocouple input range	Set the value in increments of 0.1℃ (or 0.1℉).

Ex. To set CH1 Conversion setting value at disconnection detection to 123℃ with the thermocouple input range, store 1230 in CH1 Conversion setting value at disconnection detection (Un\G404).

- CH□ Conversion setting value at disconnection detection (Un\G404 to Un\G407) is enabled only when the micro voltage input range, thermocouple input range, or resistance temperature detector input range is set in CH□ Input type/range setting (Un\G500 to Un\G503). The setting value of the channel for which the current input range or voltage input range is set is ignored.
- When Conversion setting at disconnection detection (Un\G400) is set to other than Optional value (3), the setting of CH□ Conversion setting value at disconnection detection (Un\G404 to Un\G407) is ignored.

(b) Enabling the setting

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

(c) Default value

All channels are set to 0.

(20)CH□ Input signal error detection setting value (Un\G412 to Un\G415) **Current** **Voltage**

Set the setting value to detect an error of an input analog value for each channel.
For details on the input signal error detection function, refer to the following.

- Input Signal Error Detection Function (☞ Page 62, Section 8.7)

(a) Setting range

- The setting range is between 0 and 250 (0 to 25.0%). Set the value in increments of 1 (0.1%).
- When a value outside the above range is set, an error occurs on the corresponding channel. The error code (80□) is stored in Latest error code (Un\G19), Error flag (XF) turns on, and the module operates with the previous setting.
- CH□ Input signal error detection setting value (Un\G412 to Un\G415) is enabled only when the current input range or voltage input range is set in CH□ Input type/range setting (Un\G500 to Un\G503). The setting value of the channel for which the micro voltage input range, thermocouple input range, or resistance temperature detector input range is set is ignored.
- The input signal error detection upper limit value and input signal error detection lower limit value are calculated as follows, based on the input signal error detection setting value. The input signal error detection upper limit value and input signal error detection lower limit value to be calculated differ depending on the input range used.

[Input signal error detection upper limit value]

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

[Input signal error detection lower limit value]

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

Ex. When 100 (10%) is set in the input signal error detection setting value
Used range: 4 to 20mA
The input signal error detection upper limit value and input signal error detection lower limit value are as follows.

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

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

Remark

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

<table>
<tr><th colspan="2">Input range</th><th>Lower limit value</th><th>Offset value</th><th>Gain value</th></tr>
<tr><td rowspan="3">Current</td><td>4 to 20mA</td><td colspan="2">4mA</td><td>20mA</td></tr>
<tr><td>0 to 20mA</td><td colspan="2">0mA</td><td>20mA</td></tr>
<tr><td>4 to 20mA (extended mode)</td><td colspan="2">4mA</td><td>20mA</td></tr>
<tr><td rowspan="5">Voltage</td><td>1 to 5V</td><td colspan="2">1V</td><td>5V</td></tr>
<tr><td>0 to 5V</td><td colspan="2">0V</td><td>5V</td></tr>
<tr><td>-10 to 10V</td><td>-10V</td><td>0V</td><td>10V</td></tr>
<tr><td>0 to 10V</td><td colspan="2">0V</td><td>10V</td></tr>
<tr><td>1 to 5V (extended mode)</td><td colspan="2">1V</td><td>5V</td></tr>
</table>

- Conditions vary as follows depending on the setting in Input signal error detection setting (Un\G402).

Input signal error detection setting (Un\G402)	Detection condition
Upper and Lower Detection (1)	Input signal error detection upper limit value or input signal error detection lower limit value.
Lower Detection (2)	Input signal error detection lower limit value
Upper Detection (3)	Input signal error detection upper limit value
Simple Disconnection Detection (4)	• 2mA or lower, or 0.5V or lower • The setting for CH☐ Input signal error detection setting value (Un\G412 to Un\G415) is ignored. • Input ranges other than 4 to 20mA (extended mode) or 1 to 5V (extended mode) cannot be used.

(b) Enabling the setting

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

(c) Default value

All channels are set to 5% (50).

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(21)CH☐ Input type/range setting (Un\G500 to Un\G503)

Set the input type and input range depending on the sensor type to be connected for each channel.

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

- Input Type/Range Setting (☞ Page 49, Section 8.2)

Input type	Input range	Setting value
Conversion disable (default)		0000_H
Current	4 to 20mA	0010_H
	0 to 20mA	0011_H
	4 to 20mA (extended mode)	0012_H
Voltage	1 to 5V	0020_H
	0 to 5V	0021_H
	-10 to 10V	0022_H
	0 to 10V	0023_H
	1 to 5V (extended mode)	0024_H
Micro voltage	-100 to 100mV	0030_H
Resistance temperature detector	Pt100 (-20 to 120℃)	0040_H
	Pt100 (-200 to 850℃)	0041_H
	JPt100 (-20 to 120℃)	0042_H
	JPt100 (-200 to 600℃)	0043_H
	Pt1000 (-200 to 850℃)	0044_H
	Pt50 (-200 to 650℃)	0045_H
Thermocouple	Type B thermocouple	0050_H
	Type R thermocouple	0051_H
	Type S thermocouple	0052_H
	Type K thermocouple	0053_H
	Type E thermocouple	0054_H
	Type J thermocouple	0055_H
	Type T thermocouple	0056_H
	Type N thermocouple	0057_H
	Type U thermocouple	0058_H
	Type L thermocouple	0059_H
	Type PL II thermocouple	$005A_H$
	Type W5Re/W26Re thermocouple	$005B_H$

- When a value outside the above range is set, an error occurs. The error code (10☐) is stored in Latest error code (Un\G19) and Error flag (XF) turns on. No conversion is performed.

(a) Enabling the setting

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

(b) Default value

All channels are set to Conversion disable (0000$_H$). Change the value according to the sensor type to be connected.

Point

When the thermocouple input is used, the thermocouple input range must be set for CH1. If the input type of CH1 is set to a type other than the thermocouple input range and the input type of any of CH2 to CH4 is set to the thermocouple input range, an error (error code: 15□) occurs in the channel where the thermocouple input range is set and the conversion is not performed.

(22)CH□ Celsius/Fahrenheit display setting (Un\G508 to Un\G511) Thermocouple RTD

When the input type is the resistance temperature detector or thermocouple, set the display method of CH□ Digital output value (Un\G11 to Un\G14) for each channel.

Display method	Setting value
Celsius	0
Fahrenheit	1

- When a value outside the above range is set, an error occurs on the corresponding channel. The error code (200□) is stored in Latest error code (Un\G19), and Error flag (XF) turns on. The module operates with the previous setting.
- CH□ Celsius/Fahrenheit display setting (Un\G508 to Un\G511) is enabled only when the resistance temperature detector input range or thermocouple input range is set in CH□ Input type/range setting (Un\G500 to Un\G503). The setting value of the channel for which the current input range, voltage input range, or micro voltage input range is set is ignored.

(a) Enabling the setting

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

(b) Default value

All channels are set to Celsius (0). Change the value according to the display method to be used.

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(23)CH☐ Input type/range monitor (Un\G516 to Un\G519)

The input type and input range that are being operated can be checked in this area.

Input type	Input range	Stored value
Conversion disable (default)		0000_H
Current	4 to 20mA	0010_H
	0 to 20mA	0011_H
	4 to 20mA (extended mode)	0012_H
Voltage	1 to 5V	0020_H
	0 to 5V	0021_H
	-10 to 10V	0022_H
	0 to 10V	0023_H
	1 to 5V (extended mode)	0024_H
Micro voltage	-100 to 100mV	0030_H
Resistance temperature detector	Pt100 (-20 to 120℃)	0040_H
	Pt100 (-200 to 850℃)	0041_H
	JPt100 (-20 to 120℃)	0042_H
	JPt100 (-200 to 600℃)	0043_H
	Pt1000 (-200 to 850℃)	0044_H
	Pt50 (-200 to 650℃)	0045_H
Thermocouple	Type B thermocouple	0050_H
	Type R thermocouple	0051_H
	Type S thermocouple	0052_H
	Type K thermocouple	0053_H
	Type E thermocouple	0054_H
	Type J thermocouple	0055_H
	Type T thermocouple	0056_H
	Type N thermocouple	0057_H
	Type U thermocouple	0058_H
	Type L thermocouple	0059_H
	Type PL II thermocouple	$005A_H$
	Type W5Re/W26Re thermocouple	$005B_H$

Point

The input type and input range cannot be changed with CH☐ Input type/range monitor (Un\G516 to Un\G519).
To change the input type and input range, use CH☐ Input type/range setting (Un\G500 to Un\G503).
For CH☐ Input type/range setting (Un\G500 to Un\G503), refer to the following.

- ☞ Page 155, Appendix 2 (21)

(24)CH□ Celsius/Fahrenheit monitor (Un\G524 to Un\G527) Thermocouple RTD

The Celsius/Fahrenheit display setting that are being operated can be checked in this area.

Display method	Stored value
Celsius	0
Fahrenheit	1

Point

The Celsius/Fahrenheit display setting cannot be changed with CH□ Celsius/Fahrenheit monitor (Un\G524 to Un\G527). To change the Celsius/Fahrenheit display setting, use CH□ Celsius/Fahrenheit display setting (Un\G508 to Un\G511). For CH□ Celsius/Fahrenheit display setting (Un\G508 to Un\G511), refer to the following.

- ☞ Page 156, Appendix 2 (22)

(25)CH□ Conversion status (Un\G1700 to Un\G1703)

The conversion status is stored.

Use this area for troubleshooting. For details, refer to the following.

- Troubleshooting for the conversion (☞ Page 128, Section 11.6.2)

Conversion status	Stored value	Description
Conversion disable	0	Conversion has been disabled. Conversion has not been performed on the corresponding channel.
Conversion start	1	Conversion has been enabled and the first conversion has yet to be complete.
Conversion completion	2	The first conversion has been complete. Conversion is in execution.
Input signal error detection/disconnection detection	3	An input signal error or disconnection has been detected.

(26)Latest address of error history (Un\G1800)

The buffer memory address of Error history No.□ (Un\G1810 to Un\G1969) that stores the latest error code is stored.

(27)Error history No.□ (Un\G1810 to Un\G1969)

Up to 16 errors that have occurred in the module are recorded.

For details on the error log function, refer to the following.

- Error Log Function (☞ Page 83, Section 8.10)

	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		Example*1
First two digits of the year/Last two digits of the year	The value is stored in BCD code.		2014_H
Month/Day			0401_H
Hour/Minute			1234_H
Second			56_H
Day of the week	The value that corresponds to the day of the week is stored in BCD code.		02_H
	• Sunday: 00_H	• Monday: 01_H	
	• Tuesday: 02_H	• Wednesday: 03_H	
	• Thursday: 04_H	• Friday: 05_H	
	• Saturday: 06_H		

*1 Values stored when an error occurs on Tuesday, April 1, 2014 at 12:34:56.

Appendix 3 I/O Conversion Characteristic of Voltage/Current

The I/O conversion characteristic of voltage/current is the slope of the line that joins the offset value and gain value, both of which are used when an analog signal (voltage or current) from outside the programmable controller is converted to the corresponding digital value.

(1) Offset value

The analog input value (voltage or current) corresponding to the digital output value 0

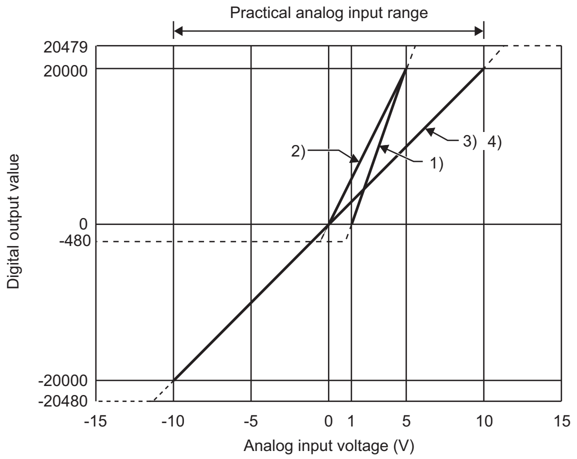
(2) Gain value

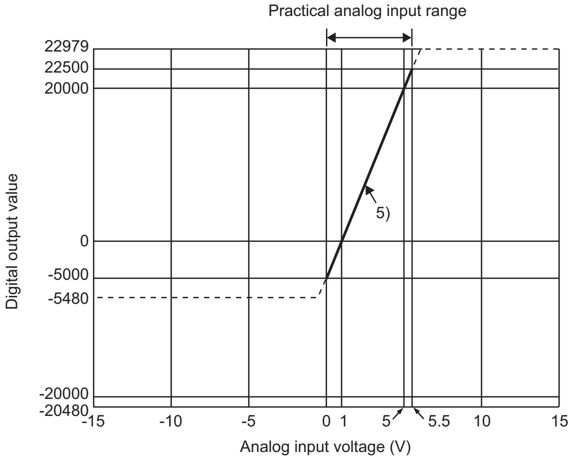
The analog input value (voltage or current) corresponding to the digital output value 20000

AbN automation

(3) Voltage input characteristic

The following graph shows the voltage input characteristic.





No.	Analog input range setting	Offset value	Gain value	Digital output value[*1]	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

[*1] When an analog input exceeds the range of digital output values, the corresponding digital output value is fixed to the maximum or minimum.

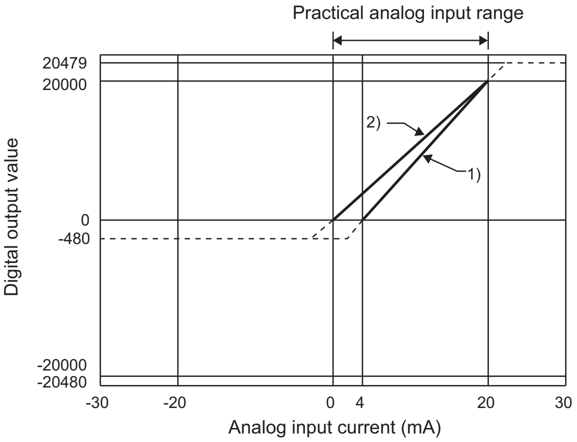
Analog input range setting	Digital output value	
	Minimum	Maximum
1 to 5V	-480	20479
0 to 5V		
-10 to 10V	-20480	
0 to 10V	-480	
1 to 5V (extended mode)	-5480	22979

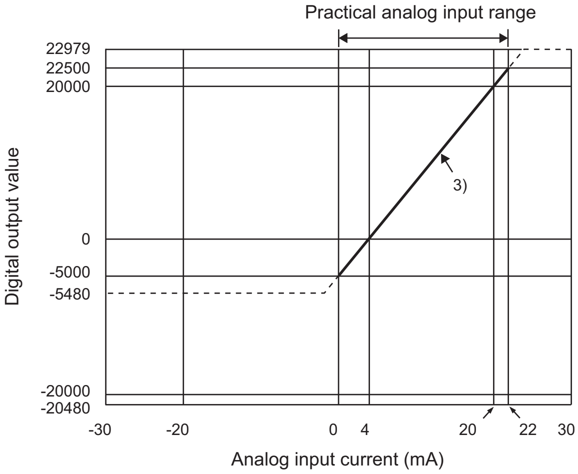
Point

- Use the analog I/O module with values within the practical analog input range and practical digital output range of each input range. If a value is out of the range, the resolution and accuracy may not fall within the range of performance specifications.
(Do not use the values in the dotted lines in the above voltage input characteristic graph.)
- Do not input a voltage of ±15V or higher/lower. This may damage the elements.

(4) Current input characteristic

The following graph shows the current input characteristic.





No.	Analog input range setting	Offset value	Gain value	Digital output value[*1]	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

*1 When an analog input exceeds the range of digital output values, the corresponding digital output value is fixed to the maximum or minimum.

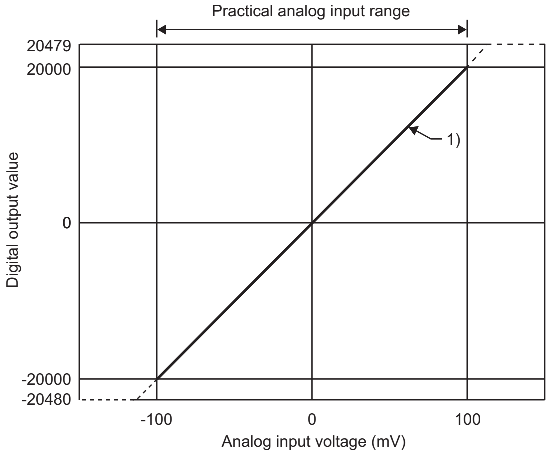
Analog input range setting	Digital output value	
	Minimum	Maximum
4 to 20mA	-480	20479
0 to 20mA		
4 to 20mA (extended mode)	-5480	22979

Point

- Use the analog I/O module with values within the practical analog input range and practical digital output range of each input range. If a value is out of the range, the resolution and accuracy may not fall within the range of performance specifications.
(Do not use the values in the dotted lines in the above current input characteristic graph.)
- Do not input a voltage of ±30mA or higher/lower. This may damage the elements.

(5) Micro voltage input characteristic

The following graph shows the micro voltage input characteristic.



No.	Analog input range setting	Offset value	Gain value	Digital output value[*1]	Resolution
1)	-100 to 100mV	0mV	100mV	-20000 to 20000	5μV

[*1] When an analog input exceeds the range of digital output values, the corresponding digital output value is fixed to the maximum or minimum.

Analog input range setting	Digital output value	
	Minimum	Maximum
-100 to 100mV	-20480	20479

Point

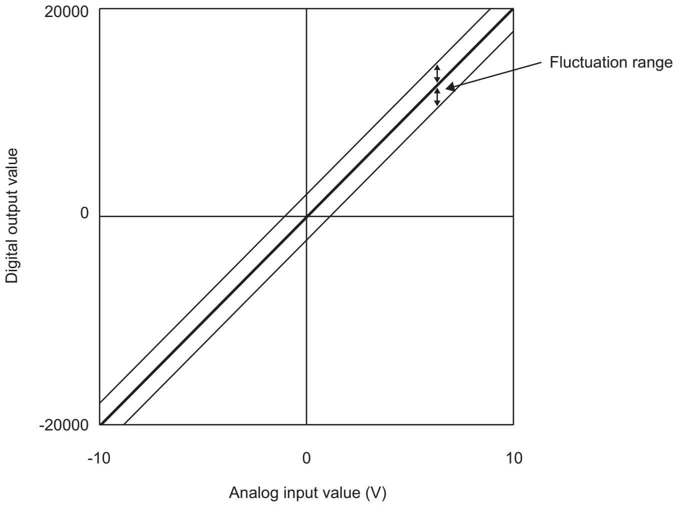
- Use the analog I/O module with values within the practical analog input range and practical digital output range of each input range. If a value is out of the range, the resolution and accuracy may not fall within the range of performance specifications.
  (Do not use the values in the dotted lines in the above micro voltage input characteristic graph.)
- Do not input a voltage of ±15V or higher/lower. This may damage the elements.

Appendix 4 Accuracy

(1) Accuracy at voltage/current/micro voltage input

This is the accuracy for the maximum digital output value.

The following graph shows the fluctuation range of accuracy when the range of -10 to 10V is selected.



The fluctuation range differs depending on the ambient temperature and the input range as described in the following table.

Noise influences are not considered in the following.

Analog input range		Fluctuation range	
		Ambient temperature: 25±5℃	**Ambient temperature: 0 to 55℃**
Voltage	0 to 10V	Within ±0.3% (±60digit)	Within ±0.9% (±180digit)
	-10 to 10V		
	0 to 5V		
	1 to 5V		
	1 to 5V (extended mode)		
Current	0 to 20mA		
	4 to 20mA		
	4 to 20mA (extended mode)		
Micro voltage	-100 to 100mV		

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(2) Accuracy when a thermocouple is connected

The following is the formula for calculating the accuracy when a thermocouple is connected.

Accuracy (℃) = Full scale × Thermocouple accuracy + Cold junction compensation accuracy

Ex. Accuracy when a type B thermocouple is used, operating ambient temperature is 25℃, and measured temperature is 1000℃

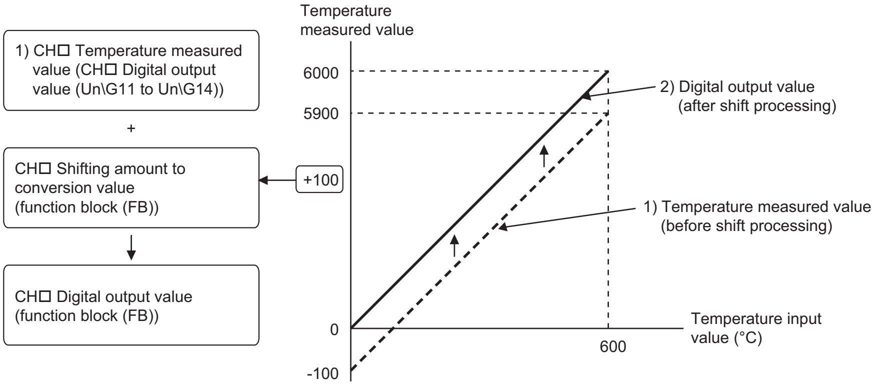
Full scale × Thermocouple accuracy + Cold junction compensation accuracy
= (1820℃ - 0℃) × (±0.0015) + (±1℃)
= ±3.7℃

Type of thermo couple	Celsius				Fahrenheit			
	Measured temperature range	Conversion accuracy (Operating ambient temperature 25±5℃)[*1]	Conversion accuracy (Operating ambient temperature 0 to 55℃)[*1]	Influence by 1Ω wiring resistance (℃/Ω)	Measured temperature range	Conversion accuracy (Operating ambient temperature 25±5℃)[*1]	Conversion accuracy (Operating ambient temperature 0 to 55℃)[*1]	Influence by 1Ω wiring resistance (℉/Ω)
B	0 to 600℃	-	-	-	32 to 1100℉	-	-	-
	600 to 1700℃	3.8℃	6.5℃	0.084	1100 to 3000℉	6.6℉	11.4℉	0.16
	1700 to 1820℃	-	-	-	3000 to 3200℉	-	-	-
R	-50 to 0℃	-	-	-	-	-	-	-
	0 to 1600℃	3.8℃	6.5℃	0.10	0 to 2900℉	6.6℉	11.4℉	0.18
	1600 to 1760℃	-	-	-	2900 to 3200℉	-	-	-
S	-50 to 0℃	-	-	-	-	-	-	-
	0 to 1600℃	3.8℃	6.5℃	0.10	0 to 2900℉	6.6℉	11.4℉	0.18
	1600 to 1760℃	-	-	-	2900 to 3200℉	-	-	-
K	-270 to -200℃	-	-	-	-400 to -300℉	-	-	-
	-200 to -150℃	5.5℃	8.0℃	0.034	-300 to -200℉	9.6℉	13.8℉	0.062
	-150 to -100℃	4.5℃	7.0℃	0.021	-200 to -100℉	7.8℉	12.0℉	0.038
	-100 to 1200℃	3.5℃	6.0℃	0.017	-100 to 2100℉	6.0℉	10.2℉	0.031
	1200 to 1370℃	-	-	-	2100 to 2400℉	-	-	-
E	-270 to -200℃	-	-	-	-400 to -300℉	-	-	-
	-200 to -150℃	5.0℃	6.9℃	0.020	-300 to -200℉	8.7℉	12.0℉	0.036
	-150 to -100℃	4.0℃	5.9℃	0.014	-200 to -100℉	6.9℉	10.2℉	0.026
	-100 to 900℃	3.0℃	4.9℃	0.012	-100 to 1600℉	5.1℉	8.4℉	0.022
	900 to 1000℃	-	-	-	1600 to 1800℉	-	-	-
J	-210 to -40℃	-	-	-	-300 to 0℉	-	-	-
	-40 to 750℃	3.2℃	5.3℃	0.011	0 to 1300℉	5.4℉	9.0℉	0.020
	750 to 1200℃	-	-	-	1300 to 2100℉	-	-	-
T	-270 to -200℃	-	-	-	-	-	-	-
	-200 to -150℃	6.1℃	7.1℃	0.032	-300 to -200℉	10.4℉	11.7℉	0.058
	-150 to -100℃	4.1℃	5.1℃	0.023	-200 to -100℉	6.8℉	8.1℉	0.042
	-100 to 0℃	3.1℃	4.1℃	0.018	-100 to 0℉	5.0℉	6.3℉	0.033
	0 to 350℃	2.1℃	3.1℃		0 to 600℉	3.2℉	4.5℉	
	350 to 400℃	-	-	-	-	-	-	-
N	-270 to -200℃	-	-	-	-400 to -300℉	-	-	-
	-200 to -150℃	5.4℃	7.8℃	0.050	-300 to -200℉	9.5℉	13.5℉	0.090
	-150 to -100℃	4.4℃	6.8℃	0.032	-200 to -100℉	7.7℉	11.7℉	0.058
	-100 to 1250℃	3.4℃	5.8℃	0.024	-100 to 2200℉	5.9℉	9.9℉	0.044
	1250 to 1300℃	-	-	-	2200 to 2300℉	-	-	-
U	-200 to -150℃	5.2℃	6.4℃	0.050	-300 to -200℉	9.3℉	11.4℉	0.090
	-150 to -100℃	4.2℃	5.4℃	0.025	-200 to -100℉	7.5℉	9.6℉	0.045
	-100 to 0℃	3.2℃	4.4℃		-100 to 0℉	5.7℉	7.8℉	
	0 to 600℃	2.2℃	3.4℃		0 to 1100℉	3.9℉	6.0℉	
L	-200 to -150℃	4.7℃	6.3℃	0.025	-300 to -200℉	8.3℉	11.0℉	0.045
	-150 to -100℃	3.7℃	5.3℃	0.017	-200 to -100℉	6.5℉	9.3℉	0.031
	-100 to 900℃	2.7℃	4.3℃	0.013	-100 to 1600℉	4.7℉	7.5℉	0.024
PL II	0 to 1390℃	3.1℃	5.2℃	0.017	32 to 2500℉	5.6℉	9.3℉	0.031
W5Re/ W26Re	0 to 2000℃	4.5℃	7.9℃	0.041	32 to 3200℉	6.6℉	11.4℉	0.074
	2000 to 2300℃		12.5℃	0.054	-	-	-	-

[*1] The accuracy includes an error of cold junction compensation.

Point

The multiple input module measures a temperature on the basis of the temperature of a terminal block. Therefore, if the temperature distribution of the terminal block becomes inhomogeneous because of the effect of heat emitted from each module, the measured temperature error may become large.
In such case, use the function block (FB) for the shift processing and correct the temperature.


1) CH☐ Temperature measured value (CH☐ Digital output value (Un\G11 to Un\G14))
+
CH☐ Shifting amount to conversion value (function block (FB))
+100
CH☐ Digital output value (function block (FB))
Temperature measured value
6000
5900
0
-100
600
2) Digital output value (after shift processing)
1) Temperature measured value (before shift processing)
Temperature input value (°C)

For details on the function block (FB), refer to the following.
📖MELSEC-L Multiple Input (Voltage/Current/Temperature) Module FB Library Reference Manual (FBM-M115)

(3) Accuracy when a resistance temperature detector is connected

The accuracy when a resistance temperature detector is connected is the sum of the allowable difference and the temperature characteristics of the resistance temperature detector using the conversion accuracy of the module. The following is the formula for calculating the accuracy.

(Accuracy) = (Conversion accuracy) + (Temperature characteristics) × (Operating ambient temperature change) + (Allowable difference of resistance temperature detector used)

- Allowable difference of Pt100 (JIS C 1604-1997, IEC 751 1983)

Class	Allowable difference
A	±(0.15 + 0.002|t|)℃
B	±(0.3 + +0.005|t|)℃

- Allowable difference of JPt100 and Pt50 (JIS C 1604-1981)

Class	Allowable difference
0.15	±(0.15 + +0.0015|t|)℃
0.2	±(0.15 + 0.002|t|)℃
0.5	±(0.3 + 0.005|t|)℃

Point

The allowable difference of Pt1000 is not provided in the JIS standard, and thus is not described here either.
Contact the sales agency for the sensor used as needed.

Ex. Pt100: -200 to 850℃, Ambient temperature 40℃, Resistance temperature detector: Class A Pt100, Measured temperature 800℃

(Accuracy) = (±2℃) + (±2℃) + {±(0.15℃ + 0.002 × 800℃)} = ±5.75℃

Type of resistance temperature detector	Celsius			Fahrenheit		
	Measured temperature range	Conversion accuracy[*1]	Temperature characteristics[*2]	Measured temperature range	Conversion accuracy[*1]	Temperature characteristics[*2]
Pt100	-20 to -120℃	1℃	0.1℃	0 to 200℉	1℉	0.1℉
	-200 to 850℃	2℃	0.2℃	-300 to 1500℉	3℉	0.3℉
JPt100	-20 to -120℃	1℃	0.1℃	0 to 200℉	1℉	0.1℉
	-200 to 600℃	2℃	0.2℃	-300 to 1100℉	3℉	0.3℉
Pt1000	-200 to 850℃	2℃	0.2℃	-300 to 1500℉	3℉	0.3℉
Pt50	-200 to 650℃	2℃	0.2℃	-300 to 1200℉	3℉	0.2℉

[*1] For when the operating ambient temperature is 25±5℃

[*2] For a change of 1℃ in the operating ambient temperature

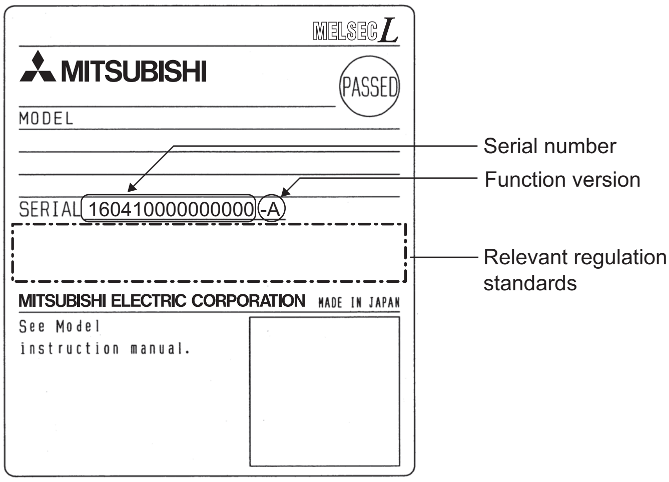
Appendix 5 How to Check the Function Version and Serial Number

The serial number and the function version of the multiple input module can be checked with the following methods.

- Checking on the rating plate
- Checking on the front part of the module
- Checking on the system monitor of a programming tool

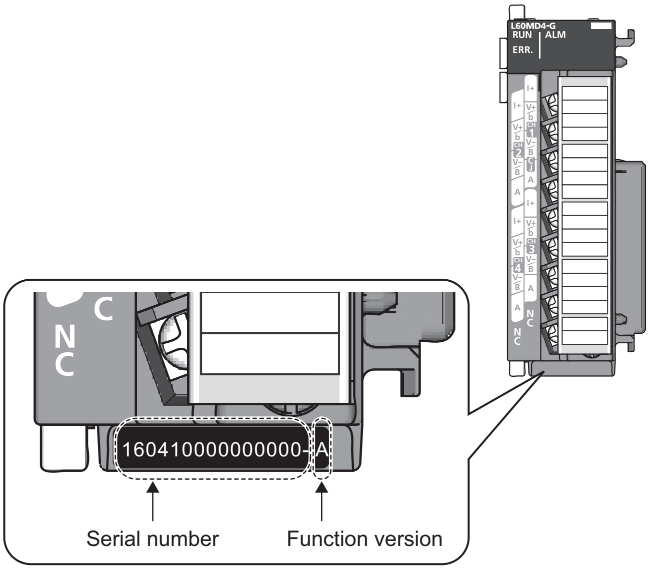
(1) Checking on the rating plate

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


MELSEC L
MITSUBISHI
PASSED
MODEL
SERIAL 160410000000000-A
MITSUBISHI ELECTRIC CORPORATION MADE IN JAPAN
See Model
instruction manual.
Serial number
Function version
Relevant regulation standards

(2) Checking on the front part of the module

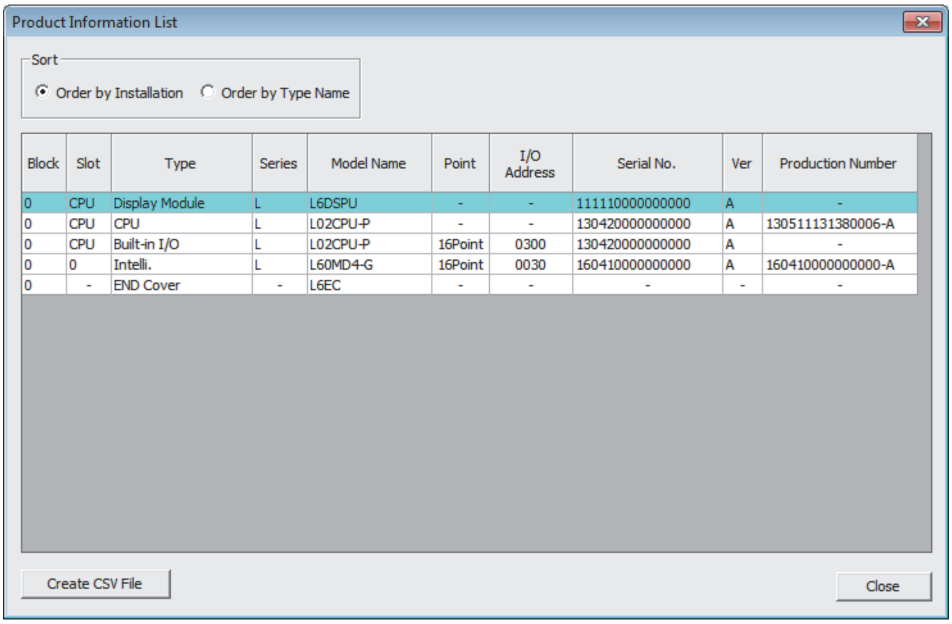
The function version and serial number on the rating plate are also shown on the front part (bottom part) of the module.


L60MD4-G
RUN
ALM
ERR.
NC
160410000000000-A
Serial number
Function version

(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 button



Block	Slot	Type	Series	Model Name	Point	I/O Address	Serial No.	Ver	Production Number
0	CPU	Display Module	L	L6DSPU	-	-	111110000000000	A	-
0	CPU	CPU	L	L02CPU-P	-	-	130420000000000	A	130511131380006-A
0	CPU	Built-in I/O	L	L02CPU-P	16Point	0300	130420000000000	A	-
0	0	Intelli.	L	L60MD4-G	16Point	0030	160410000000000	A	160410000000000-A
0	-	END Cover	-	L6EC	-	-	-	-	-

(a) Displaying production number

The serial number (production number) on the rating plate is displayed in "Production Number". Thus, the serial number (production number) can be checked without checking the module.

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.

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Appendix 6 When Using GX Developer

This chapter describes the operating procedure when GX Developer is used.

(1) Compatible software version

For the compatible software versions, refer to the following.
📖MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)

Appendix 6.1 Operation of GX Developer

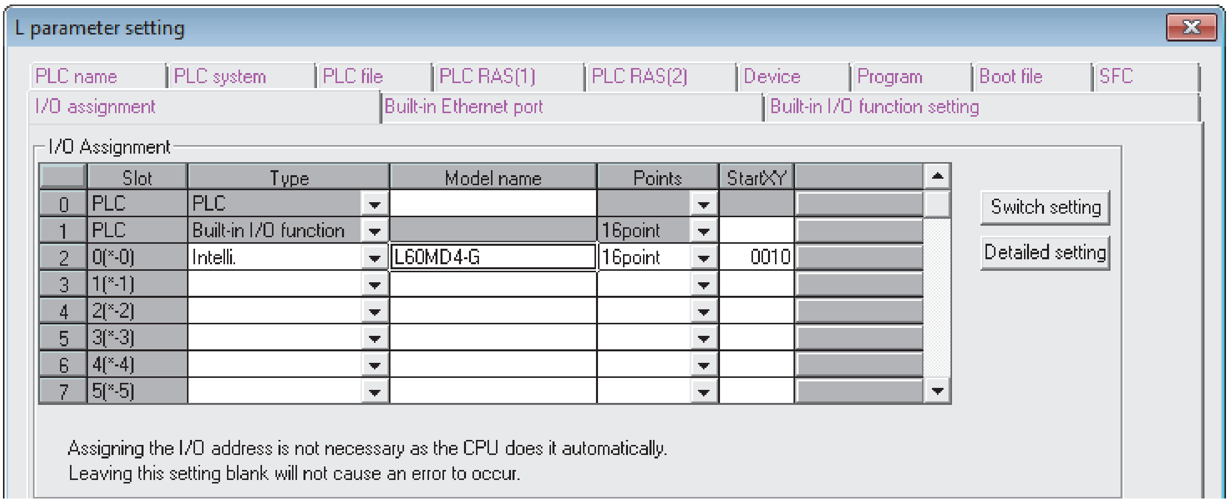
Configure the setting on the following window when using GX Developer.

Window name	Application	Reference
I/O assignment	Set the type of module installed and the range of I/O signals.	Page 171, Appendix 6.1 (1)
Switch setting	Configure the switch setting of an intelligent function module. The multiple input module does not require the intelligent function module switch setting.	-

(1) I/O assignment

Configure the setting from "I/O assignment" in "PLC parameter".

🖱 Parameter⇨[PLC parameter]⇨[I/O assignment]


L parameter setting
PLC name
PLC system
PLC file
PLC RAS(1)
PLC RAS(2)
Device
Program
Boot file
SFC
I/O assignment
Built-in Ethernet port
Built-in I/O function setting
I/O Assignment
Switch setting
Detailed setting

	Slot	Type	Model name	Points	StartXY
0	PLC	PLC			
1	PLC	Built-in I/O function		16point	
2	0(*-0)	Intelli.	L60MD4-G	16point	0010
3	1(*-1)				
4	2(*-2)				
5	3(*-3)				
6	4(*-4)				
7	5(*-5)				

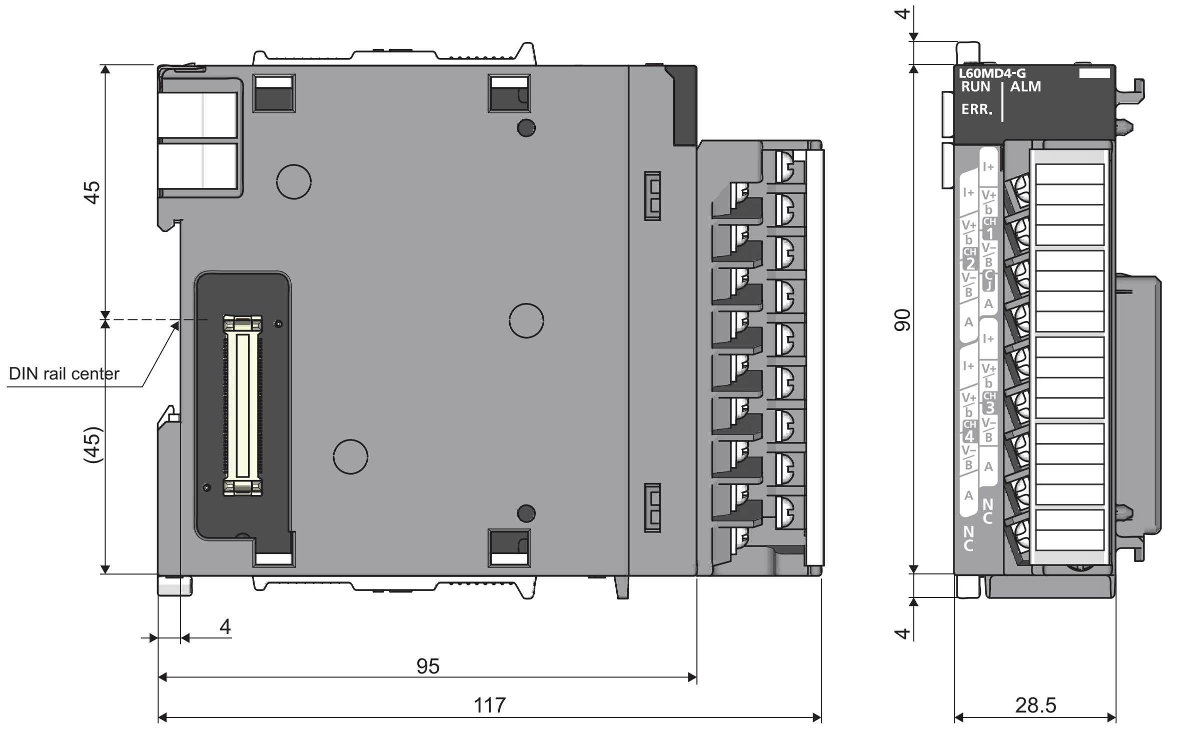
Assigning the I/O address is not necessary as the CPU does it automatically.
Leaving this setting blank will not cause an error to occur.

Item	Description
Type	Select "Intelli."
Model name	Enter the model name of the multiple input module.
Points	Select "16point".
StartXY	Enter a desired start I/O number of the multiple input module.

Appendix 7 External Dimensions

The following figure shows the external dimensions of the multiple input module.

(1) L60MD4-G


45
DIN rail center
(45)
4
95
117
4
90
4
28.5
L60MD4-G
RUN
ALM
ERR.
I+
V+
b
CH 1
CH 2
CH 3
CH 4
V−
B
A
NC

(Unit: mm)

Memo

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REVISIONS

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

Print date	*Manual number	Revision
July 2014	SH(NA)-081365ENG-A	First edition
June 2015	SH(NA)-081365ENG-B	Additions of the item for the troubleshooting and the precautions for a resistance temperature detector connection

Japanese manual version SH-081364-B

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WARRANTY

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

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion.

Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.

Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.

1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued.
Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

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

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

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

5. Changes in product specifications

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

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SH(NA)-081365ENG-B(1506)MEE
MODEL: L60MD4-G-U-E
MODEL CODE: 13JZ76

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