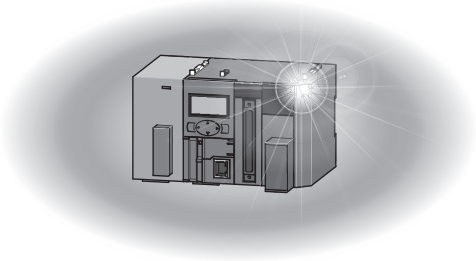
MITSUBISHI ELECTRIC

Mitsubishi Programmable Controller

MELSEC *L series*

MELSEC-L RTD Input Module User's Manual

-L60RD8



●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 CPU module to the intelligent function module.
  Doing so may cause malfunction of the programmable controller system.

[Design Precautions]

⚠CAUTION

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

[Installation Precautions]

⚠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.
- Do not directly touch any conductive parts and electronic components of the module. Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠CAUTION

- 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 or connector 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.
- After the first use of the product (module, display unit, and terminal block), the number of connections/disconnections is limited to 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")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

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

INTRODUCTION

Thank you for purchasing the Mitsubishi MELSEC-L series programmable controllers.
This manual describes the functions and programming of an RTD input module.

Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the MELSEC-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: L60RD8

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 an RTD 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 5)

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
- 📖 MELSEC-L SSCNETIII/H 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
MELSEC-L SSCNETIII/H Head Module User's Manual <SH-081152ENG, 13JZ78>	Specifications, procedures before operation, system configuration, installation, wiring, settings, and troubleshooting of the head module

(3) Operating manual

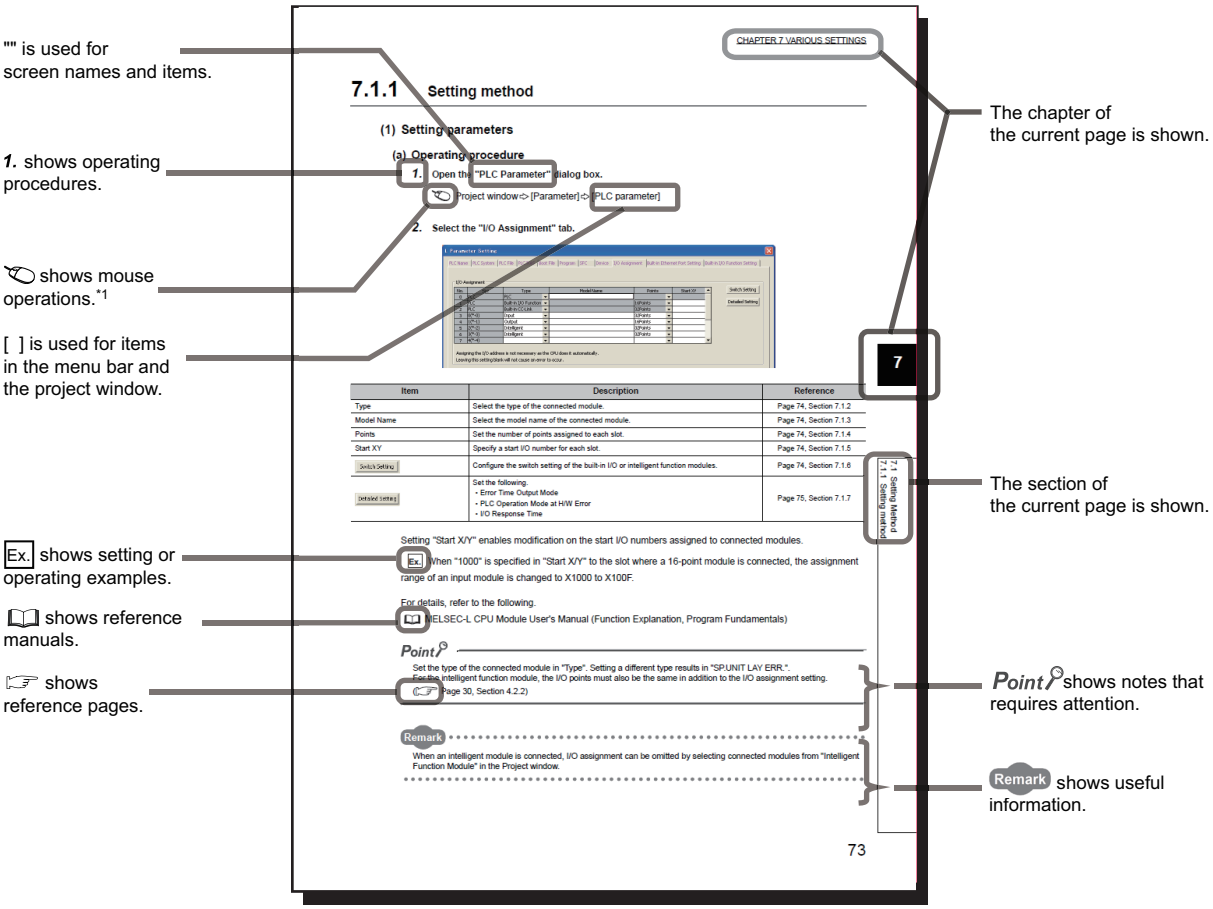
Manual name <manual number, model code>	Description
GX Works2 Version 1 Operating Manual (Common) <SH-080779ENG, 13JU63>	System configuration, parameter settings, and online operations of GX Works2, which are common to Simple projects and Structured projects
GX Developer Version 8 Operating Manual <SH-080373E, 13JU41>	Operating methods of GX Developer, such as programming, printing, monitoring, and debugging

CONTENTS

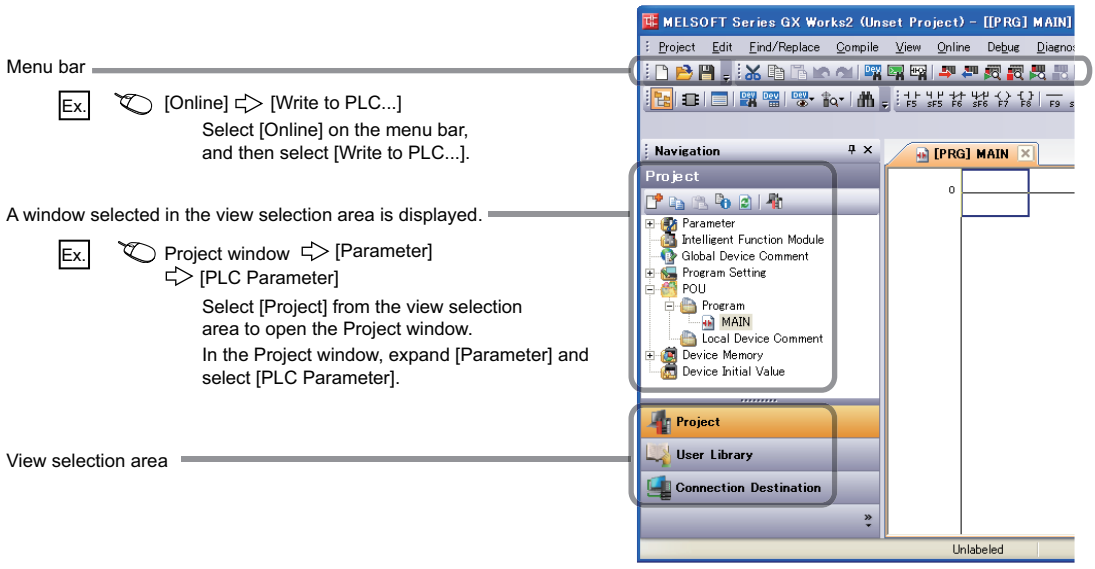
MANUAL PAGE ORGANIZATION

In this manual, pages are organized and the symbols are used as shown below.

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



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



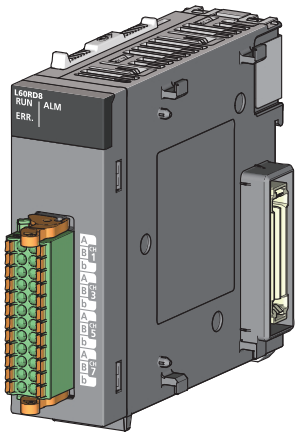
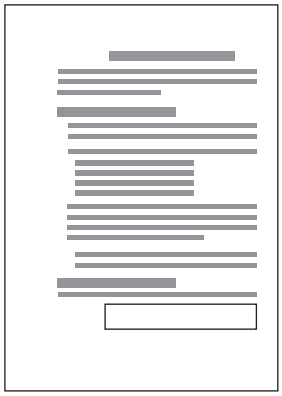
TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
Accuracy	The degree to which the result of a measurement is closed to an input value of an RTD input module. The accuracy represents a ratio of an error.
Actual temperature	The actual temperature of the measurement environment. An RTD input module measures the actual temperature and converts it to a temperature measured value.
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
CC-Link IE Field Network	A high-speed and large-capacity open field network that is based on Ethernet (1000BASE-T)
Conversion	A generic term for processing of converting a resistance value, which is measured by an RTD, into a temperature measured value
Conversion cycle	The cycle at which an RTD input module internally performs the temperature conversion. Conversion cycle = Conversion speed × Number of conversion enabled channels
Conversion disabled	The state that Conversion disable (0) is set in CH□ Input range setting (Un\G500 to Un\G507). In this state, the conversion is not performed on the corresponding channel.
Conversion enabled	The state that the input range suitable to the type of sensor connected (value other than Conversion disable (0)) is set in CH□ Input range setting (Un\G500 to Un\G507). In this state, the conversion is performed on the corresponding channel.
Conversion speed	A generic term for the speed at which the temperature conversion is performed
Digital operation value	A value obtained by correcting a temperature measured value with the scaling function or the sensor correction function
Display unit	A liquid crystal display to be attached to the CPU module
GX Developer	The product name of the software package for the MELSEC programmable controllers
GX Works2	
Head module	The abbreviation for the LJ72GF15-T2 CC-Link IE Field Network head module
Input range	A type of an RTD
Programming tool	A generic term for GX Works2 and GX Developer
Resolution	The degree (number) to which a certain range of analog quantity is resolved
RTD input module	The abbreviation for the MELSEC-L series RTD input module
Temperature measured value	A generic term for temperature measured values converted from analog signals which have been input from the outside
Watchdog timer error	An RTD input module monitors its own internal processing by using the watchdog timer. The module generates this error if the internal processing fails.

PACKING LIST

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

L60RD8	
 L60RD8	 Before Using the Product

CHAPTER 1 RTD INPUT MODULE

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

1.1 Application

The RTD input module converts temperature data input by a corresponding RTD (nine types: Pt100, JPt100, Pt1000, Pt50, Ni100, Ni120, Ni500, Cu100, or Cu50) to a temperature measured value and digital operation value.

1.2 Features

(1) Multiple-channel temperature input

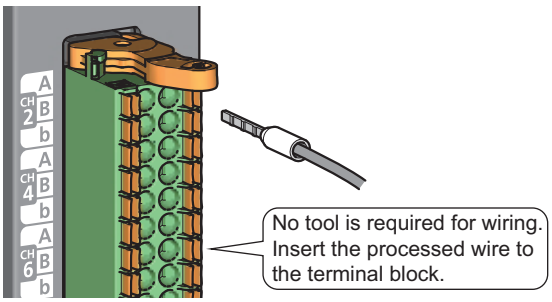
One module can measure temperatures through eight channels.
The RTD input module has twice as many channels as the four channels of the standard product (L60MD4-G), and this saves the space and reduces cost for the system.

(2) Various input ranges

Besides Pt100, JPt100, and Pt50 of the old and new JIS standards, the ranges of Ni (DIN standard), Cu (GOST standard), and Pt1000 are supported, allowing applications to a wide range of systems.
To measure temperatures with higher accuracy in low-temperature ranges, which are the measured temperature range for air-conditioning control, use the range of -20 to 120℃ of Pt100 or JPt100.

(3) Reducing man-hours for tightening screws

Because the spring clamp terminal block is employed, man-hours required for tightening screws can be reduced.
The terminal block is a push-in type and no tool is required for wiring.
Periodic maintenance including retightening screws is not required.



(4) Comparing and monitoring an object

The status of the connected device can be easily monitored with the disconnection detection function or warning output function (process alarms and rate alarms).

(5) Switching the Celsius/Fahrenheit display

The display unit of temperature measured values can be selected from Celsius and Fahrenheit, allowing the temperature display based on a system.

(6) User-friendliness with the scaling function

Temperature measured values can be converted to any numerical values. Thus, users can obtain values that they can easily understand as temperature measured values. This function contributes to reducing programming.

(7) Correction of measured values

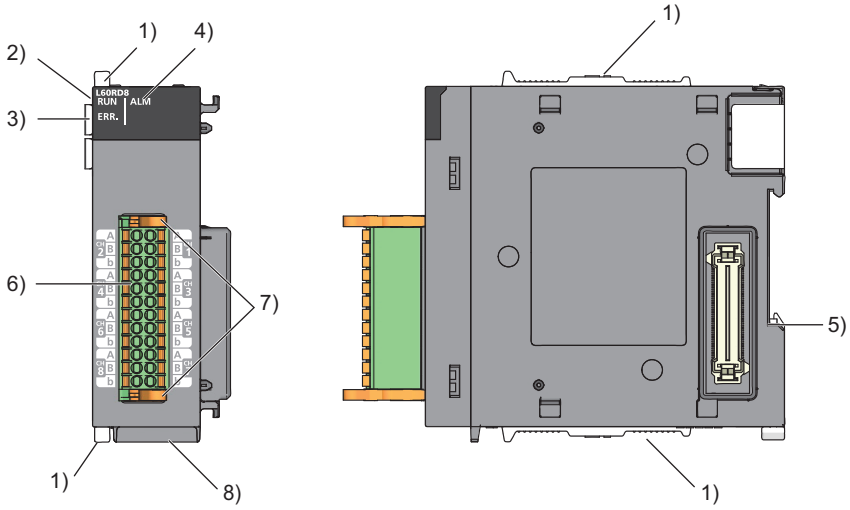
The difference between a temperature measured value and an actual temperature can be easily corrected with the sensor correction function (shift function, sensor two-point correction function).

(8) 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 RTD input module.



No.	Name	Description
1)	Module joint levers	Levers for connecting modules
2)	RUN LED (green)	Indicates the operating status of the RTD 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 RTD input module. On: An error has occurred.*1 Off: The module is operating normally.
4)	ALM LED (red)	Indicates the alarm occurrence of the RTD input module. On: A warning (process alarm, rate alarm) has occurred.*2 Flashing: A disconnection has been detected.*2 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 24-point spring clamp terminal block for connecting input signal lines of external devices
7)	Terminal block lock/release lever*4	A lever used to mount or remove the terminal block
8)	Serial number marking	Shows the serial number printed on the rating plate.

*1 For details, refer to the list of error codes (☞ Page 128, Section 11.4).
*2 For details, refer to the list of alarm codes (☞ Page 130, Section 11.5).
*3 For the signal assignment for the terminal block, refer to the signal names of the terminal block (☞ Page 39, Section 6.2 (1)).
*4 For details, refer to the terminal block (☞ Page 39, Section 6.2).

Memo

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 RTD 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 RTD input module.

Item		Model	
		L60RD8	
Number of analog input points		8 points (8 channels)	
Output	Temperature measured value	-3280 to 15620	
	Digital operation value	-32768 to 32767	
Applicable RTD		9 types Pt100 (JIS C 1604-2013), JPt100 (JIS C 1604-1981), Pt1000, Pt50 (JIS C 1604-1981), Ni100 (DIN 43760 1987), Ni120 (DIN 43760 1987), Ni500 (DIN 43760 1987), Cu100 (GOST 6651-2009, α = 0.00428), Cu50 (GOST 6651-2009, α = 0.00428)	
Measured temperature range		Celsius	Fahrenheit
	Pt100	-20 to 120℃	-4 to 248℉
		-200 to 850℃	-328 to 1562℉
	JPt100	-20 to 120℃	-4 to 248℉
		-200 to 600℃	-328 to 1112℉
	Pt1000	-200 to 850℃	-328 to 1562℉
	Pt50	-200 to 650℃	-328 to 1202℉
	Ni100	-60 to 250℃	-76 to 482℉
	Ni120	-60 to 250℃	-76 to 482℉
	Ni500	-60 to 250℃	-76 to 482℉
	Cu100	-180 to 200℃	-292 to 392℉
	Cu50	-180 to 200℃	-292 to 392℉
Temperature detecting output current[*1]		1mA	Pt100, JPt100, Pt50, Ni100, Ni120, Cu100, Cu50
		100μA	Pt1000, Ni500
Conversion accuracy[*2]	Ambient temperature 25±5℃	Accuracy (☞ Page 166, Appendix 3) Measured temperature range accuracy at RTD input	
	Ambient temperature 0 to 55℃		
Resolution[*3]		0.1℃	
Conversion speed		40ms/channel	
Number of sensor two-point correction settings		10000 times maximum	
Insulation method		Between input terminals and programmable controller power supply: Photocoupler Between input channels: Non-insulation	
Withstand voltage		Between input terminals and programmable controller power supply: 500VACrms for 1 minute Between input channels: Non-insulation	
Insulation resistance		Between input terminals and programmable controller power supply: 500VDC 10MΩ or higher Between input channels: Non-insulation	
Disconnection detection[*4]		Available	
Number of occupied I/O points		16 points (I/O assignment: Intelligent 16 points)	
External connection system		24-point spring clamp terminal block	
Applicable cable type[*5]		Solid wire, stranded wire, bar solderless terminal	
Applicable wire size[*6]		Core	0.5 to 1.5mm^2 (24 to 16 AWG)
		Terminal hole size	2.4mm × 1.5mm
Applicable solderless terminal		AI 0.5-10WH [Applicable wire size: 0.5mm^2]	Phoenix Contact Co., Ltd.
		AI 0.75-10GY [Applicable wire size: 0.75mm^2]	
		A 1-10 [Applicable wire size: 1.0mm^2]	
		A 1.5-10 [Applicable wire size: 1.5mm^2]	

Item	Model
	L60RD8
Wire strip length	10mm
Internal current consumption (5VDC)	0.22A
Weight	0.15kg

*1 Current is output only on channels in which conversion is being performed.
*2 Except when receiving noise influence.
*3 When the standard product (L60MD4-G) is replaced by this module, the resolution of Pt100 (-20 to 120℃) and JPt100 (-20 to 120℃) is different.
*4 Select the setting for the output at disconnection detection from "Value just before disconnection", "Upscale", "Downscale", and "Any value".
*5 When a stranded wire is used, attach a bar solderless terminal.
*6 The solderless terminal having an end length of 10mm that complies with DIN 46228-1 can be used.

3.2.1 Number of parameter settings

Set the initial settings of the RTD 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 RTD input module

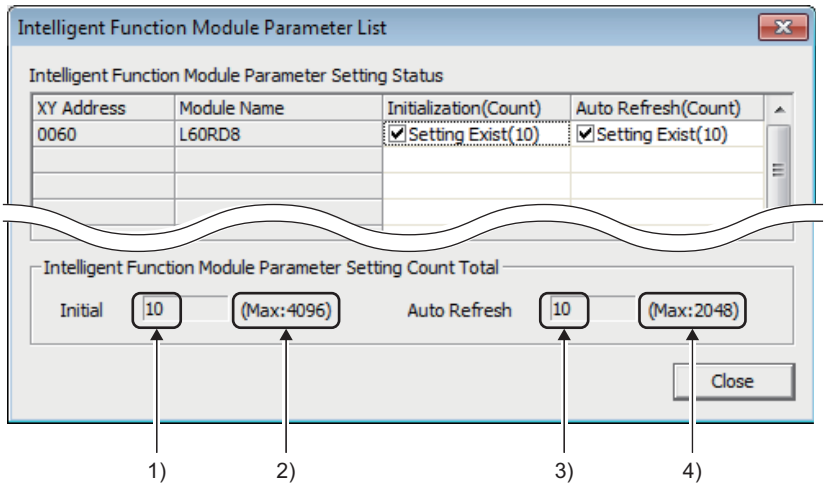
The following number of parameters can be set in a single RTD input module.

Target module	Initial setting	Auto refresh setting
L60RD8	10	23 (maximum number of settings)

(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]



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 RTD input module.

Item			Description	Reference
Temperature conversion function			By connecting an RTD, 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 162, Appendix 2 (31)
Input range setting			The input range to be used can be selected for each channel. Disabling the conversion for unused channels reduces the conversion cycles.	Page 53, Section 8.2
Conversion method	Sampling processing		Temperature input values are converted at every conversion cycle, and the converted values are stored in the buffer memory areas as temperature measured values.	Page 55, 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 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.	Page 55, 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 the minimum values. The values obtained in averaging processing are stored in the buffer memory area. The time taken to store the mean value, obtained by the count average processing, into the buffer memory area changes depending on the number of channels where the conversion is enabled.	Page 56, Section 8.3 (2) (b)
		Moving average	The average of a specified number of temperature measured values is calculated at every conversion 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 temperature measured value can be obtained.	Page 56, Section 8.3 (2) (c)
Sensor correction function			When an error between a temperature measured value and an actual temperature occurs depending on the measuring situation, this function corrects the error. The error can be corrected using the following two functions. • Shift function: If a measured temperature is simply higher or lower than the actual temperature, this function subtracts or adds a value equivalent to the error from/to the temperature measured value to correct the error. • Sensor two-point correction function: This function corrects an error using set two points (correction offset value, correction gain value).	Page 73, Section 8.8 (4) (h)
Maximum value/minimum value hold function			This function stores the minimum and maximum digital operation values in the buffer memory area for each channel.	Page 58, Section 8.4
Disconnection detection function			This function outputs an alarm when disconnection of the external wiring is detected. The temperature measured value at the disconnection detection can be selected from the following values. • Value just before disconnection • Upscale • Downscale • Any value	Page 59, Section 8.5
Waning output function	Process alarm		This function outputs a warning when a temperature measured value falls within a preset warning output range.	Page 62, Section 8.6 (1)
	Rate alarm		When the change rate of a temperature measured 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.	Page 64, Section 8.6 (2)
Scaling function			This function performs the scale conversion on temperature measured values. The values are converted within a specified range between a 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 71, Section 8.7
Error log function			This function stores the errors and alarms that occurred in the RTD input module in the buffer memory areas. A total of 16 errors and alarms can be stored.	Page 89, Section 8.9
Module error collection function			This function collects the errors and alarms that occurred in the RTD input module and stores them in the CPU module.	Page 92, Section 8.10
Error clear function			This function clears errors that occurred using the system monitor.	Page 93, Section 8.11

3.4 List of I/O Signals

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

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

- Details of I/O Signals (☞ Page 136, Appendix 1)

Input signal		Output signal	
Device number	Signal name	Device number	Signal name
X0	Module READY	Y0	Use prohibited
X1	Sensor correction value registration flag	Y1	Sensor correction value registration start request
X2	Use prohibited	Y2	Sensor correction value registration stop request
X3		Y3	Use prohibited
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	Sensor correction value write completed flag	YA	Sensor correction value write request
XB	Sensor correction value change completed flag	YB	Sensor correction value change request
XC	Use prohibited	YC	Use prohibited
XD	Maximum value/minimum value reset completed flag	YD	Maximum value/minimum value reset request
XE	Conversion completed flag	YE	Use prohibited
XF	Error flag	YF	Error clear request

Point

- The I/O number (X/Y) described above shows the case that the start I/O number of the RTD 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 RTD input module cannot be guaranteed.

3.5 List of Buffer Memory Addresses

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

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

- Details of Buffer Memory Addresses (☞ Page 144, Appendix 2)

Point

Do not write data to the system areas and write-protect 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	5_H	CH5 Time Average/Count Average/Moving Average	0	R/W	○
6	6_H	CH6 Time Average/Count Average/Moving Average	0	R/W	○
7	7_H	CH7 Time Average/Count Average/Moving Average	0	R/W	○
8	8_H	CH8 Time Average/Count Average/Moving Average	0	R/W	○
9	9_H	System area	-	-	-
10	A_H	Conversion completed flag	0000_H	R	-
11	B_H	CH1 Temperature measured value	0	R	-
12	C_H	CH2 Temperature measured value	0	R	-
13	D_H	CH3 Temperature measured value	0	R	-
14	E_H	CH4 Temperature measured value	0	R	-
15	F_H	CH5 Temperature measured value	0	R	-
16	10_H	CH6 Temperature measured value	0	R	-
17	11_H	CH7 Temperature measured value	0	R	-
18	12_H	CH8 Temperature measured value	0	R	-
19	13_H	Latest error code	0	R	-
20 to 23	14_H to 17_H	System area	-	-	-
24	18_H	Averaging process setting (CH1 to CH4)	0000_H	R/W	○
25	19_H	Averaging process setting (CH5 to CH8)	0000_H	R/W	○
26 to 29	$1A_H$ 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	-

Address (decimal)	Address (hexadecimal)	Name	Default value[*1]	Read/Write[*2]	Item enabled by turning on and off Operating condition setting request (Y9)
38	26_H	CH5 Maximum value	0	R	-
39	27_H	CH5 Minimum value	0	R	-
40	28_H	CH6 Maximum value	0	R	-
41	29_H	CH6 Minimum value	0	R	-
42	$2A_H$	CH7 Maximum value	0	R	-
43	$2B_H$	CH7 Minimum value	0	R	-
44	$2C_H$	CH8 Maximum value	0	R	-
45	$2D_H$	CH8 Minimum value	0	R	-
46	$2E_H$	System area	-	-	-
47	$2F_H$	Disconnection detection flag	0000_H	R	-
48	30_H	Warning output setting	$FFFF_H$	R/W	○
49	31_H	System area	-	-	-
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	Rate alarm change rate selection	0000_H	R/W	○
53	35_H	Scaling enable/disable setting	$00FF_H$	R/W	○
54	36_H	CH1 Digital operation value	0	R	-
55	37_H	CH2 Digital operation value	0	R	-
56	38_H	CH3 Digital operation value	0	R	-
57	39_H	CH4 Digital operation value	0	R	-
58	$3A_H$	CH5 Digital operation value	0	R	-
59	$3B_H$	CH6 Digital operation value	0	R	-
60	$3C_H$	CH7 Digital operation value	0	R	-
61	$3D_H$	CH8 Digital operation value	0	R	-
62	$3E_H$	CH1 Scaling lower limit value	0	R/W	○
63	$3F_H$	CH1 Scaling upper limit value	0	R/W	○
64	40_H	CH2 Scaling lower limit value	0	R/W	○
65	41_H	CH2 Scaling upper limit value	0	R/W	○
66	42_H	CH3 Scaling lower limit value	0	R/W	○
67	43_H	CH3 Scaling upper limit value	0	R/W	○
68	44_H	CH4 Scaling lower limit value	0	R/W	○
69	45_H	CH4 Scaling upper limit value	0	R/W	○
70	46_H	CH5 Scaling lower limit value	0	R/W	○
71	47_H	CH5 Scaling upper limit value	0	R/W	○
72	48_H	CH6 Scaling lower limit value	0	R/W	○
73	49_H	CH6 Scaling upper limit value	0	R/W	○
74	$4A_H$	CH7 Scaling lower limit value	0	R/W	○
75	$4B_H$	CH7 Scaling upper limit value	0	R/W	○
76	$4C_H$	CH8 Scaling lower limit value	0	R/W	○
77	$4D_H$	CH8 Scaling upper limit value	0	R/W	○
78 to 85	$4E_H$ to 55_H	System area	-	-	-
86	56_H	CH1 Process alarm lower lower limit value	0	R/W	○
87	57_H	CH1 Process alarm lower upper limit value	0	R/W	○
88	58_H	CH1 Process alarm upper lower limit value	0	R/W	○
89	59_H	CH1 Process alarm upper upper limit value	0	R/W	○

Address (decimal)	Address (hexadecimal)	Name	Default value[*1]	Read/Write[*2]	Item enabled by turning on and off Operating condition setting request (Y9)
90	$5A_H$	CH2 Process alarm lower lower limit value	0	R/W	○
91	$5B_H$	CH2 Process alarm lower upper limit value	0	R/W	○
92	$5C_H$	CH2 Process alarm upper lower limit value	0	R/W	○
93	$5D_H$	CH2 Process alarm upper upper limit value	0	R/W	○
94	$5E_H$	CH3 Process alarm lower lower limit value	0	R/W	○
95	$5F_H$	CH3 Process alarm lower upper limit value	0	R/W	○
96	60_H	CH3 Process alarm upper lower limit value	0	R/W	○
97	61_H	CH3 Process alarm upper upper limit value	0	R/W	○
98	62_H	CH4 Process alarm lower lower limit value	0	R/W	○
99	63_H	CH4 Process alarm lower upper limit value	0	R/W	○
100	64_H	CH4 Process alarm upper lower limit value	0	R/W	○
101	65_H	CH4 Process alarm upper upper limit value	0	R/W	○
102	66_H	CH5 Process alarm lower lower limit value	0	R/W	○
103	67_H	CH5 Process alarm lower upper limit value	0	R/W	○
104	68_H	CH5 Process alarm upper lower limit value	0	R/W	○
105	69_H	CH5 Process alarm upper upper limit value	0	R/W	○
106	$6A_H$	CH6 Process alarm lower lower limit value	0	R/W	○
107	$6B_H$	CH6 Process alarm lower upper limit value	0	R/W	○
108	$6C_H$	CH6 Process alarm upper lower limit value	0	R/W	○
109	$6D_H$	CH6 Process alarm upper upper limit value	0	R/W	○
110	$6E_H$	CH7 Process alarm lower lower limit value	0	R/W	○
111	$6F_H$	CH7 Process alarm lower upper limit value	0	R/W	○
112	70_H	CH7 Process alarm upper lower limit value	0	R/W	○
113	71_H	CH7 Process alarm upper upper limit value	0	R/W	○
114	72_H	CH8 Process alarm lower lower limit value	0	R/W	○
115	73_H	CH8 Process alarm lower upper limit value	0	R/W	○
116	74_H	CH8 Process alarm upper lower limit value	0	R/W	○
117	75_H	CH8 Process alarm upper upper limit value	0	R/W	○
118	76_H	CH1 Rate alarm warning detection cycle	0	R/W	○
119	77_H	CH2 Rate alarm warning detection cycle	0	R/W	○
120	78_H	CH3 Rate alarm warning detection cycle	0	R/W	○
121	79_H	CH4 Rate alarm warning detection cycle	0	R/W	○
122	$7A_H$	CH5 Rate alarm warning detection cycle	0	R/W	○
123	$7B_H$	CH6 Rate alarm warning detection cycle	0	R/W	○
124	$7C_H$	CH7 Rate alarm warning detection cycle	0	R/W	○
125	$7D_H$	CH8 Rate alarm warning detection cycle	0	R/W	○
126	$7E_H$	CH1 Rate alarm upper limit value	0	R/W	○
127	$7F_H$	CH1 Rate alarm lower limit value	0	R/W	○
128	80_H	CH2 Rate alarm upper limit value	0	R/W	○
129	81_H	CH2 Rate alarm lower limit value	0	R/W	○
130	82_H	CH3 Rate alarm upper limit value	0	R/W	○
131	83_H	CH3 Rate alarm lower limit value	0	R/W	○
132	84_H	CH4 Rate alarm upper limit value	0	R/W	○
133	85_H	CH4 Rate alarm lower limit value	0	R/W	○
134	86_H	CH5 Rate alarm upper limit value	0	R/W	○

Address (decimal)	Address (hexadecimal)	Name	Default value[*1]	Read/Write[*2]	Item enabled by turning on and off Operating condition setting request (Y9)
135	87_H	CH5 Rate alarm lower limit value	0	R/W	○
136	88_H	CH6 Rate alarm upper limit value	0	R/W	○
137	89_H	CH6 Rate alarm lower limit value	0	R/W	○
138	$8A_H$	CH7 Rate alarm upper limit value	0	R/W	○
139	$8B_H$	CH7 Rate alarm lower limit value	0	R/W	○
140	$8C_H$	CH8 Rate alarm upper limit value	0	R/W	○
141	$8D_H$	CH8 Rate alarm lower limit value	0	R/W	○
142 to 149	$8E_H$ to 95_H	System area	-	-	-
150	96_H	CH1 Shifting amount to conversion value	0	R/W	-
151	97_H	CH2 Shifting amount to conversion value	0	R/W	-
152	98_H	CH3 Shifting amount to conversion value	0	R/W	-
153	99_H	CH4 Shifting amount to conversion value	0	R/W	-
154	$9A_H$	CH5 Shifting amount to conversion value	0	R/W	-
155	$9B_H$	CH6 Shifting amount to conversion value	0	R/W	-
156	$9C_H$	CH7 Shifting amount to conversion value	0	R/W	-
157	$9D_H$	CH8 Shifting amount to conversion value	0	R/W	-
158 to 199	$9E_H$ to $C7_H$	System area	-	-	-
200	$C8_H$	CH1 Sensor correction enable/disable setting	0	R/W	○
201	$C9_H$	CH2 Sensor correction enable/disable setting	0	R/W	○
202	CA_H	CH3 Sensor correction enable/disable setting	0	R/W	○
203	CB_H	CH4 Sensor correction enable/disable setting	0	R/W	○
204	CC_H	CH5 Sensor correction enable/disable setting	0	R/W	○
205	CD_H	CH6 Sensor correction enable/disable setting	0	R/W	○
206	CE_H	CH7 Sensor correction enable/disable setting	0	R/W	○
207	CF_H	CH8 Sensor correction enable/disable setting	0	R/W	○
208 to 209	$D0_H$ to $D1_H$	System area	-	-	-
210	$D2_H$	CH1 Sensor two-point correction offset value (measured value)	0	R/W	-
211	$D3_H$	CH1 Sensor two-point correction offset value (corrected value)	0	R/W	-
212	$D4_H$	CH1 Sensor two-point correction gain value (measured value)	0	R/W	-
213	$D5_H$	CH1 Sensor two-point correction gain value (corrected value)	0	R/W	-
214	$D6_H$	CH2 Sensor two-point correction offset value (measured value)	0	R/W	-
215	$D7_H$	CH2 Sensor two-point correction offset value (corrected value)	0	R/W	-
216	$D8_H$	CH2 Sensor two-point correction gain value (measured value)	0	R/W	-
217	$D9_H$	CH2 Sensor two-point correction gain value (corrected value)	0	R/W	-
218	DA_H	CH3 Sensor two-point correction offset value (measured value)	0	R/W	-
219	DB_H	CH3 Sensor two-point correction offset value (corrected value)	0	R/W	-
220	DC_H	CH3 Sensor two-point correction gain value (measured value)	0	R/W	-
221	DD_H	CH3 Sensor two-point correction gain value (corrected value)	0	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)
222	DE_H	CH4 Sensor two-point correction offset value (measured value)	0	R/W	-
223	DF_H	CH4 Sensor two-point correction offset value (corrected value)	0	R/W	-
224	$E0_H$	CH4 Sensor two-point correction gain value (measured value)	0	R/W	-
225	$E1_H$	CH4 Sensor two-point correction gain value (corrected value)	0	R/W	-
226	$E2_H$	CH5 Sensor two-point correction offset value (measured value)	0	R/W	-
227	$E3_H$	CH5 Sensor two-point correction offset value (corrected value)	0	R/W	-
228	$E4_H$	CH5 Sensor two-point correction gain value (measured value)	0	R/W	-
229	$E5_H$	CH5 Sensor two-point correction gain value (corrected value)	0	R/W	-
230	$E6_H$	CH6 Sensor two-point correction offset value (measured value)	0	R/W	-
231	$E7_H$	CH6 Sensor two-point correction offset value (corrected value)	0	R/W	-
232	$E8_H$	CH6 Sensor two-point correction gain value (measured value)	0	R/W	-
233	$E9_H$	CH6 Sensor two-point correction gain value (corrected value)	0	R/W	-
234	EA_H	CH7 Sensor two-point correction offset value (measured value)	0	R/W	-
235	EB_H	CH7 Sensor two-point correction offset value (corrected value)	0	R/W	-
236	EC_H	CH7 Sensor two-point correction gain value (measured value)	0	R/W	-
237	ED_H	CH7 Sensor two-point correction gain value (corrected value)	0	R/W	-
238	EE_H	CH8 Sensor two-point correction offset value (measured value)	0	R/W	-
239	EF_H	CH8 Sensor two-point correction offset value (corrected value)	0	R/W	-
240	$F0_H$	CH8 Sensor two-point correction gain value (measured value)	0	R/W	-
241	$F1_H$	CH8 Sensor two-point correction gain value (corrected value)	0	R/W	-
242 to 249	$F2_H$ to $F9_H$	System area	-	-	-
250	FA_H	CH1 Sensor two-point correction offset latch request	0	R/W	-
251	FB_H	CH1 Sensor two-point correction gain latch request	0	R/W	-
252	FC_H	CH2 Sensor two-point correction offset latch request	0	R/W	-
253	FD_H	CH2 Sensor two-point correction gain latch request	0	R/W	-
254	FE_H	CH3 Sensor two-point correction offset latch request	0	R/W	-
255	FF_H	CH3 Sensor two-point correction gain latch request	0	R/W	-
256	100_H	CH4 Sensor two-point correction offset latch request	0	R/W	-
257	101_H	CH4 Sensor two-point correction gain latch request	0	R/W	-
258	102_H	CH5 Sensor two-point correction offset latch request	0	R/W	-
259	103_H	CH5 Sensor two-point correction gain latch request	0	R/W	-
260	104_H	CH6 Sensor two-point correction offset latch request	0	R/W	-
261	105_H	CH6 Sensor two-point correction gain latch request	0	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)
262	106_H	CH7 Sensor two-point correction offset latch request	0	R/W	-
263	107_H	CH7 Sensor two-point correction gain latch request	0	R/W	-
264	108_H	CH8 Sensor two-point correction offset latch request	0	R/W	-
265	109_H	CH8 Sensor two-point correction gain latch request	0	R/W	-
266 to 269	$10A_H$ to $10D_H$	System area	-	-	-
270	$10E_H$	CH1 Sensor two-point correction offset latch completion	0	R	-
271	$10F_H$	CH1 Sensor two-point correction gain latch completion	0	R	-
272	110_H	CH2 Sensor two-point correction offset latch completion	0	R	-
273	111_H	CH2 Sensor two-point correction gain latch completion	0	R	-
274	112_H	CH3 Sensor two-point correction offset latch completion	0	R	-
275	113_H	CH3 Sensor two-point correction gain latch completion	0	R	-
276	114_H	CH4 Sensor two-point correction offset latch completion	0	R	-
277	115_H	CH4 Sensor two-point correction gain latch completion	0	R	-
278	116_H	CH5 Sensor two-point correction offset latch completion	0	R	-
279	117_H	CH5 Sensor two-point correction gain latch completion	0	R	-
280	118_H	CH6 Sensor two-point correction offset latch completion	0	R	-
281	119_H	CH6 Sensor two-point correction gain latch completion	0	R	-
282	$11A_H$	CH7 Sensor two-point correction offset latch completion	0	R	-
283	$11B_H$	CH7 Sensor two-point correction gain latch completion	0	R	-
284	$11C_H$	CH8 Sensor two-point correction offset latch completion	0	R	-
285	$11D_H$	CH8 Sensor two-point correction gain latch completion	0	R	-
286 to 289	$11E_H$ to 121_H	System area	-	-	-
290	96_H	CH1 Digital operation processing method	0	R	-
291	97_H	CH2 Digital operation processing method	0	R	-
292	98_H	CH3 Digital operation processing method	0	R	-
293	99_H	CH4 Digital operation processing method	0	R	-
294	$9A_H$	CH5 Digital operation processing method	0	R	-
295	$9B_H$	CH6 Digital operation processing method	0	R	-
296	$9C_H$	CH7 Digital operation processing method	0	R	-
297	$9D_H$	CH8 Digital operation processing method	0	R	-
298 to 399	$12A_H$ to $18F_H$	System area	-	-	-
400	190_H	Conversion setting at disconnection detection (CH1 to CH4)	0000_H	R/W	○
401	191_H	Conversion setting at disconnection detection (CH5 to CH8)	0000_H	R/W	○
402 to 403	192_H to 193_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)
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	198_H	CH5 Conversion setting value at disconnection detection	0	R/W	○
409	199_H	CH6 Conversion setting value at disconnection detection	0	R/W	○
410	$19A_H$	CH7 Conversion setting value at disconnection detection	0	R/W	○
411	$19B_H$	CH8 Conversion setting value at disconnection detection	0	R/W	○
412 to 499	$19C_H$ to $1F3_H$	System area	-	-	-
500	$1F4_H$	CH1 Input range setting	0000_H	R/W	○
501	$1F5_H$	CH2 Input range setting	0000_H	R/W	○
502	$1F6_H$	CH3 Input range setting	0000_H	R/W	○
503	$1F7_H$	CH4 Input range setting	0000_H	R/W	○
504	$1F8_H$	CH5 Input range setting	0000_H	R/W	○
505	$1F9_H$	CH6 Input range setting	0000_H	R/W	○
506	$1FA_H$	CH7 Input range setting	0000_H	R/W	○
507	$1FB_H$	CH8 Input range setting	0000_H	R/W	○
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	200_H	CH5 Celsius/Fahrenheit display setting	0	R/W	○
513	201_H	CH6 Celsius/Fahrenheit display setting	0	R/W	○
514	202_H	CH7 Celsius/Fahrenheit display setting	0	R/W	○
515	203_H	CH8 Celsius/Fahrenheit display setting	0	R/W	○
516	204_H	CH1 Input range monitor	0000_H	R	-
517	205_H	CH2 Input range monitor	0000_H	R	-
518	206_H	CH3 Input range monitor	0000_H	R	-
519	207_H	CH4 Input range monitor	0000_H	R	-
520	208_H	CH5 Input range monitor	0000_H	R	-
521	209_H	CH6 Input range monitor	0000_H	R	-
522	$20A_H$	CH7 Input range monitor	0000_H	R	-
523	$20B_H$	CH8 Input range monitor	0000_H	R	-
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	210_H	CH5 Celsius/Fahrenheit monitor	0	R	-
529	211_H	CH6 Celsius/Fahrenheit monitor	0	R	-
530	212_H	CH7 Celsius/Fahrenheit monitor	0	R	-

Address (decimal)	Address (hexadecimal)	Name	Default value*1	Read/Write*2	Item enabled by turning on and off Operating condition setting request (Y9)
531	213_H	CH8 Celsius/Fahrenheit monitor	0	R	-
532 to 1699	214_H to $6A3_H$	System area	-	-	-
1700	$6A4_H$	CH1 Temperature conversion status	0	R	-
1701	$6A5_H$	CH2 Temperature conversion status	0	R	-
1702	$6A6_H$	CH3 Temperature conversion status	0	R	-
1703	$6A7_H$	CH4 Temperature conversion status	0	R	-
1704	$6A8_H$	CH5 Temperature conversion status	0	R	-
1705	$6A9_H$	CH6 Temperature conversion status	0	R	-
1706	$6AA_H$	CH7 Temperature conversion status	0	R	-
1707	$6AB_H$	CH8 Temperature conversion status	0	R	-
1708 to 1729	$6AC_H$ to $6C1_H$	System area	-	-	-
1730	$6C2_H$	RUN LED status monitor	*3	R	-
1731	$6C3_H$	ERR LED status monitor	*3	R	-
1732	$6C4_H$	ALM LED status monitor	*3	R	-
1733 to 1799	$6C5_H$ to 707_H	System area	-	-	-

*1 This is a value set after power-on or after the reset operation of the CPU module.

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

*3 The LED status after power-on or after the reset operation of the CPU module is stored.

(2) Error history No. (Un\G1800 to Un\G61439)

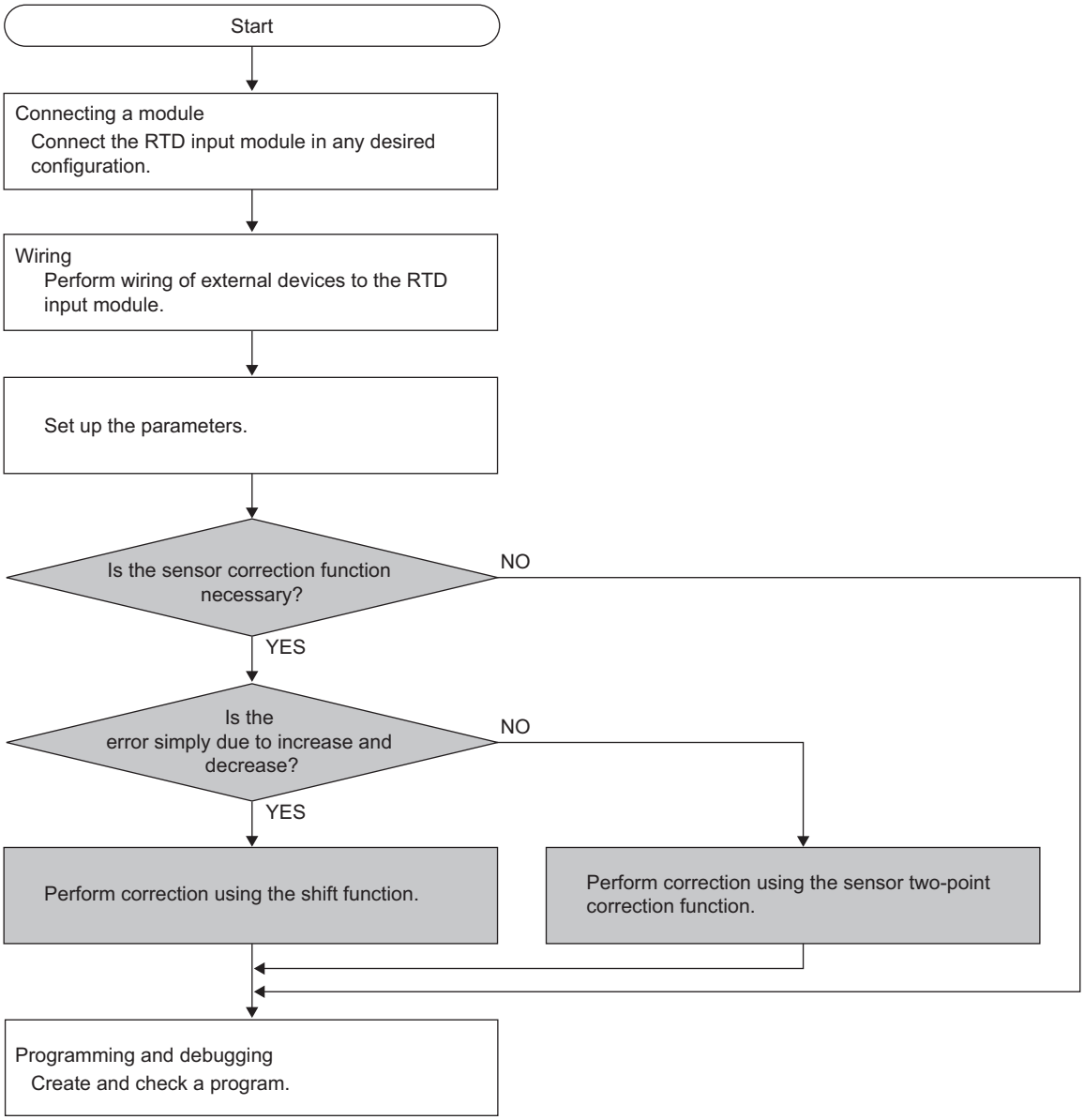
Address (decimal)	Address (hexadecimal)	Name				Default value*1	Read/Write *2	Item enabled by turning on and off Operating condition setting request (Y9)
1800	708_H	Latest address of error history				0	R	-
1801	709_H	System area				0	R	-
1802	$70A_H$	Clear setting of error history				0	R/W	-
1803 to 1809	$70B_H$ to 711_H	System area				-	-	-
1810	712_H	Error history 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	Error history No. 2	Same as Error history No. 1					-
1830 to 1839	726_H to $72F_H$	Error history No. 3	Same as Error history No. 1					-
1840 to 1849	730_H to 739_H	Error history No. 4	Same as Error history No. 1					-
1850 to 1859	$73A_H$ to 743_H	Error history No. 5	Same as Error history No. 1					-
1860 to 1869	744_H to $74D_H$	Error history No. 6	Same as Error history No. 1					-
1870 to 1879	$74E_H$ to 757_H	Error history No. 7	Same as Error history No. 1					-
1880 to 1889	758_H to 761_H	Error history No. 8	Same as Error history No. 1					-
1890 to 1899	762_H to $76B_H$	Error history No. 9	Same as Error history No. 1					-
1900 to 1909	$76C_H$ to 775_H	Error history No. 10	Same as Error history No. 1					-
1910 to 1919	776_H to $77F_H$	Error history No. 11	Same as Error history No. 1					-
1920 to 1929	780_H to 789_H	Error history No. 12	Same as Error history No. 1					-
1930 to 1939	$78A_H$ to 793_H	Error history No. 13	Same as Error history No. 1					-
1940 to 1949	794_H to $79D_H$	Error history No. 14	Same as Error history No. 1					-
1950 to 1959	$79E_H$ to $7A7_H$	Error history No. 15	Same as Error history No. 1					-
1960 to 1969	$7A8_H$ to $7B1_H$	Error history No. 16	Same as Error history No. 1					-
1970 to 61439	$7B2_H$ to $EFFF_H$	System area				-	-	-

*1 This is a value set after power-on or after the reset operation of 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.



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

- ☞ Page 36, Section 5.1

For wiring, refer to the following.

- ☞ Page 43, Section 6.3

Memo

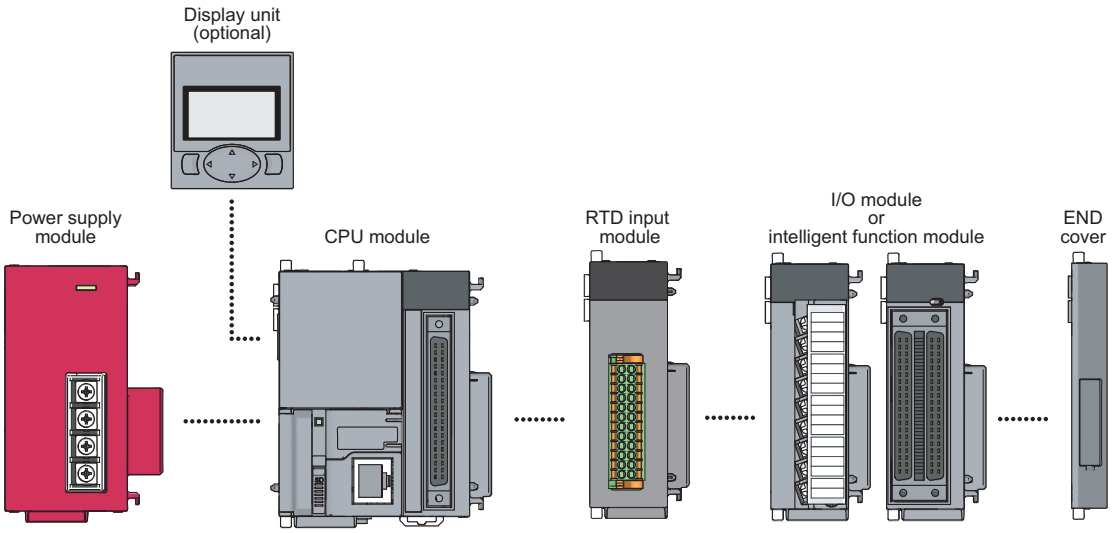
CHAPTER 5 SYSTEM CONFIGURATION

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

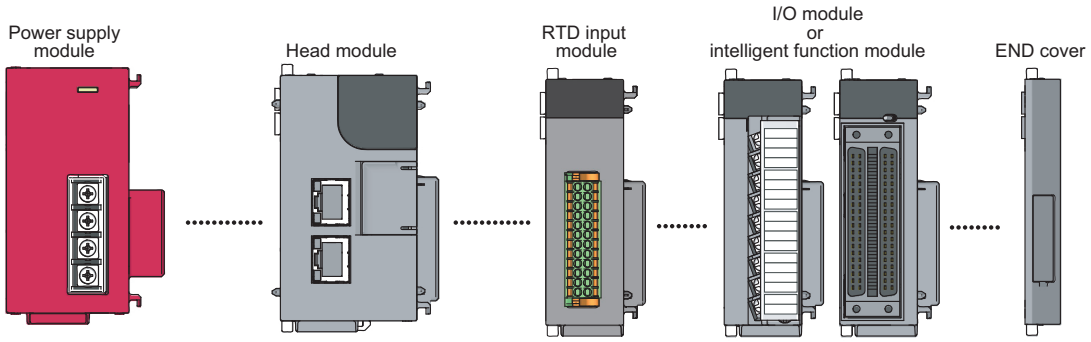
5.1 Overall System Configuration

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

(1) When connected to a CPU module



(2) When connected to a head module



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 1.535H or later
GX Developer	Version 8.89T or later

(3) RTD

For available RTDs, refer to the following.

- Performance Specifications (☞ Page 20, Section 3.2)

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.

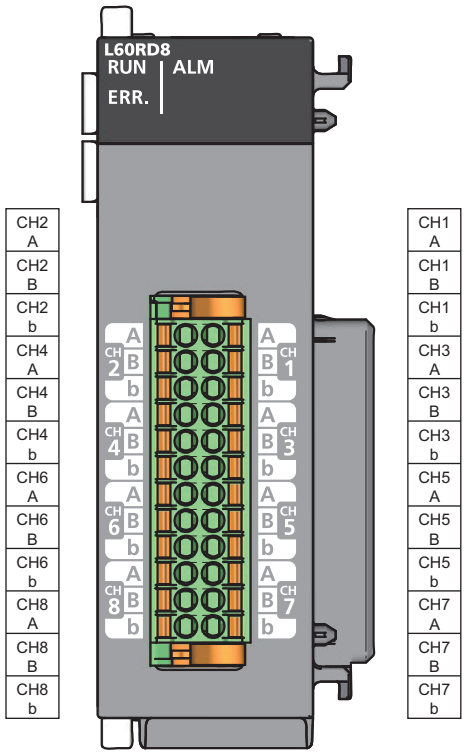
MELSEC-L CPU Module User's Manual (Hardware Design, Maintenance and Inspection)

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

6.2 Terminal Block

(1) Signal names of the terminal block

The following table shows signal names of the terminal block.

Terminal block	CH No.	Terminal name
	CH1	A
		B
		b
	CH2	A
		B
		b
	CH3	A
		B
		b
	CH4	A
		B
		b
	CH5	A
		B
		b
	CH6	A
		B
		b
	CH7	A
		B
		b
	CH8	A
		B
		b

(2) Removing and installing the terminal block

The following shows how to remove and install the terminal block.

(a) Lever position to lock and release

A 3-step stopper is attached to prevent the lever from rotating, facilitating installation and removal of the terminal block.

When removing or installing the terminal block, move the lever to the corresponding position.

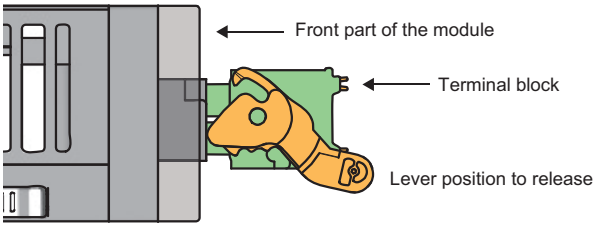


Figure from the top of the module: When removing the terminal block

1. **Lever position to release**

The figure left shows the lever position when the terminal block has been completely removed from the module.
Rotate the lever from the lock position to the release position, and lift the terminal block from the module.

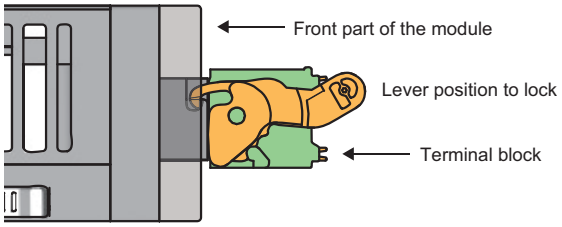


Figure from the top of the module: When the terminal block is installed

2. **Lever position to lock**

The figure left shows the lever position when the terminal block is completely engaged with the module.
Check that the lever is at the lock position, and pull the terminal block slightly to check that the module and terminal block are completely engaged.

(b) Removal procedure

Rotate the lever to the release position, and remove the terminal block from the module.

(c) Installation procedure

Move the lever to the lock position, and insert the terminal block. When the terminal block is inserted sufficiently, the lever latch engages with the module and the terminal block is engaged with the module.

Point

The terminal block can be inserted even when the lever is not at the lock position.

- After inserting the terminal block, check that the lever is at the lock position.

(3) Wiring to the terminal block

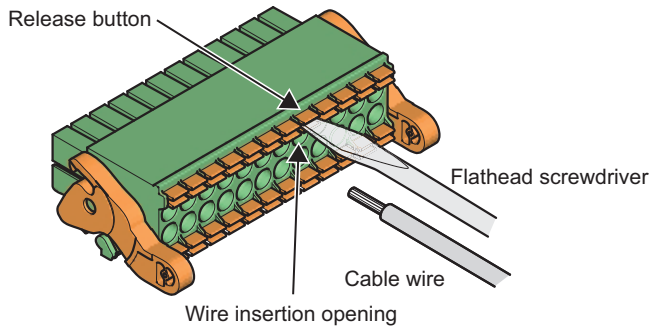
(a) Connection of the cable

The sheath of the cable must meet the following.

- Length of stripped part: 10mm

Fully insert a cable whose end has been properly processed into the wire insertion opening.

If the cable cannot be inserted with this procedure, fully insert the cable while pushing the release button with a flathead screwdriver having a tip width of 2.0 to 2.5mm. After fully inserting the cable, remove the screwdriver.



Point

Pull the cable or bar solderless terminal slightly to check that the cable is securely clamped.

(b) Disconnection of the cable

While pushing the release button with a flathead screwdriver having a tip width of 2.0 to 2.5mm, disconnect the cable.

(c) List of reference products of the bar solderless terminal

When the end processing is required, a bar solderless terminal must be attached.

Item	Description
Applicable wire size	Core 0.5 to 1.5mm^2 (24 to 16 AWG)
Terminal hole size	2.4mm × 1.5mm

The following table lists applicable bar solderless terminals to be connected to the terminal block. For wiring, use wires satisfying the condition listed in the following table. Use UL-listed bar solderless terminals and, for processing, use a tool recommended by their manufacturer.

Bar solderless terminal	Wire			
Model	Wire diameter	Type	Material	Temperature rating
AI 0.5-10WH	24 to 16 AWG	Stranded wire	Copper wire	75℃ or higher
AI 0.75-10GY				
A 1-10				
A 1.5-10				

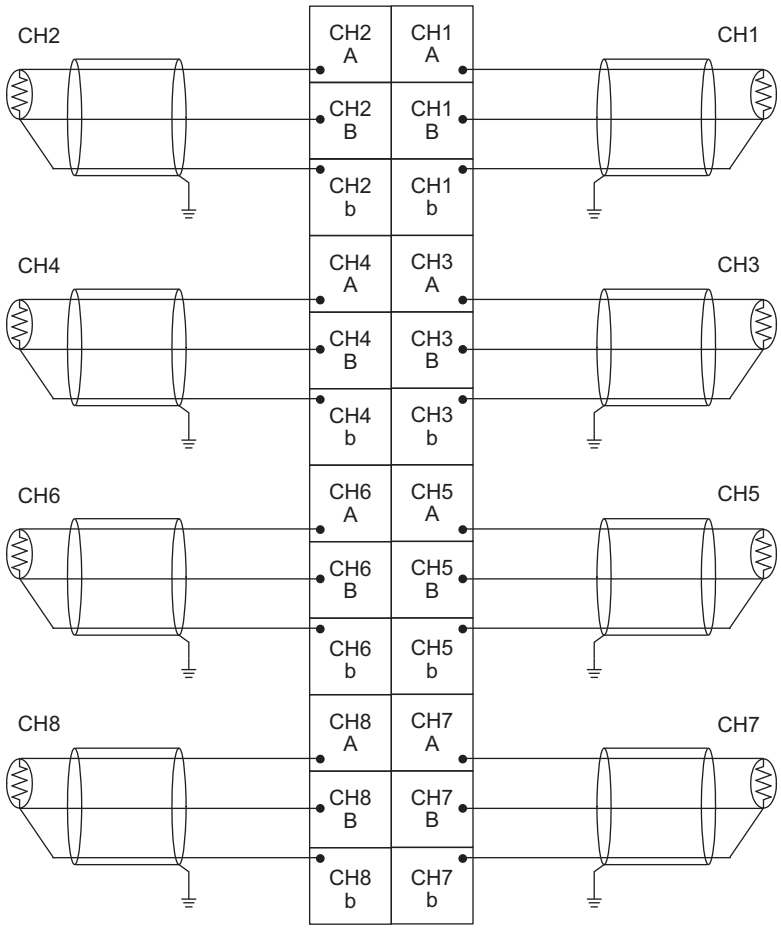
The following shows reference products of the bar solderless terminal.

Product name	Model	Applicable wire size	Contact
Bar solderless terminal*1	AI 0.5-10WH	0.5mm^2	Phoenix Contact Co., Ltd.
	AI 0.75-10GY	0.75mm^2	
	A 1-10	1.0mm^2	
	A 1.5-10	1.5mm^2	
Bar solderless terminal tool	CRIMPFOX6		

*1 The solderless terminal having an end length of 10mm that complies with DIN 46228-1 can be used.

6.3 Wiring

The following shows wiring to the terminal block.

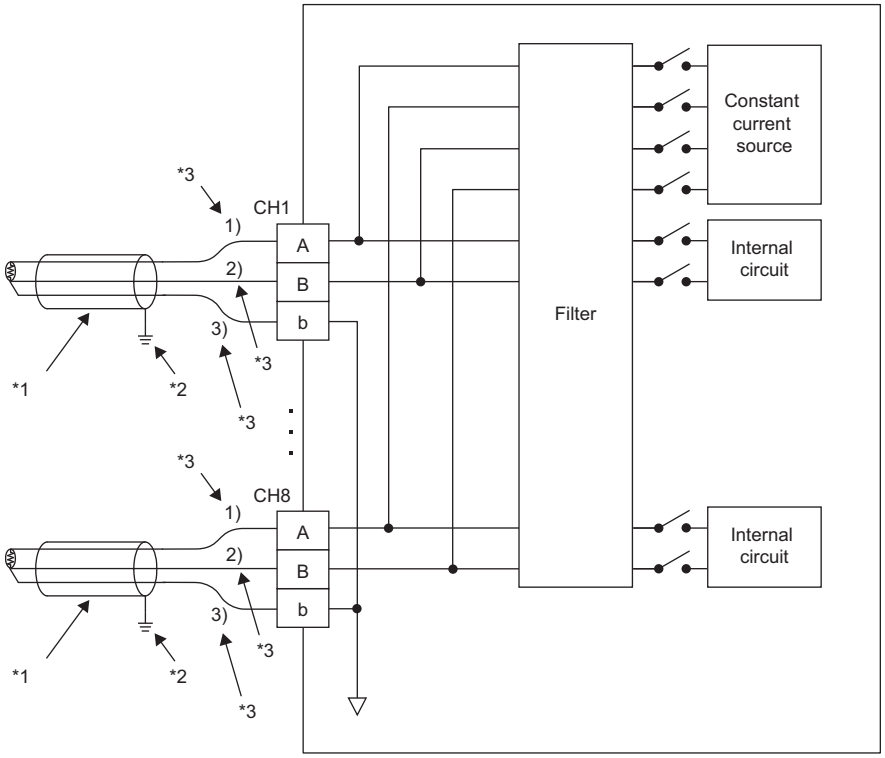


6.4 External Wiring

The following shows the external wiring.

Point

The RTD input module detects disconnection when an input range is set for unused channels.
Temperature measured values of channels in which conversion is being performed are also affected. Therefore, do not change CH□ Input range setting (Un\G500 to Un\G507) of unused channels from Conversion disable (0).



*1 Always use a shielded cable.

*2 Always ground the shielded cable in each channel.

*3 The conductor resistance value must be 70Ω or lower at 1), 70Ω or lower at 2), and 70Ω or lower at 3).
When an error due to conductor resistance values of "1) the conducting wire between the RTD and A terminal" and "2) the conducting wire between the RTD and B terminal" is large, use the sensor correction function (☞ Page 73, Section 8.8) to correct the error.

CHAPTER 7 VARIOUS SETTINGS

This chapter describes the setting procedures of the RTD 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.

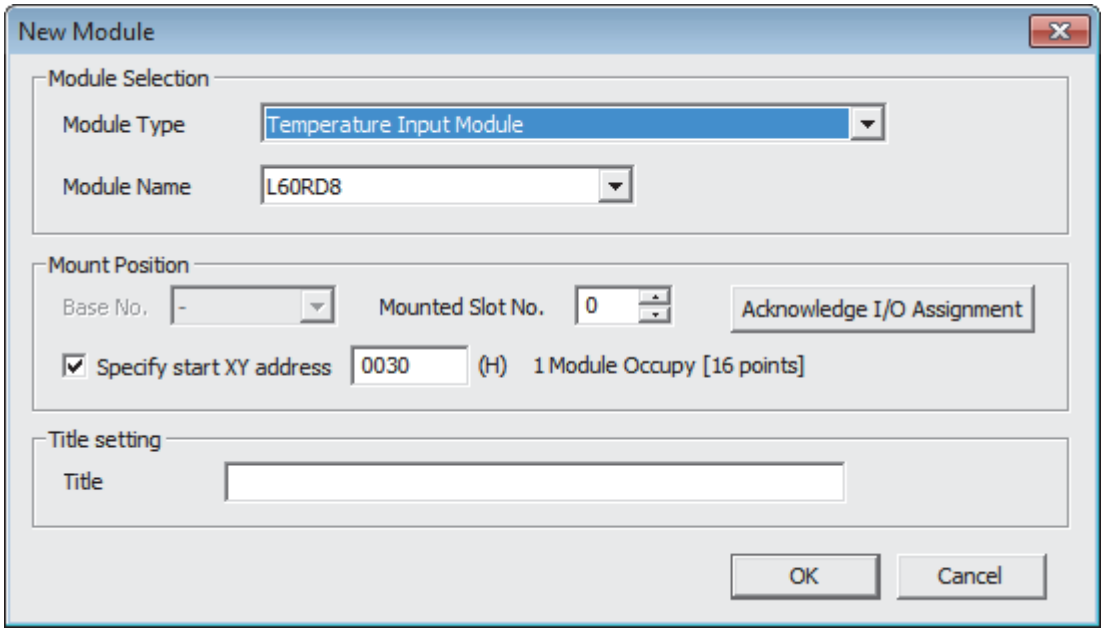
7.1 Adding a Module

Add the model of an RTD input module to use on the project.

(1) Addition procedure

Open the "New Module" window.

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



Item		Description
Module Selection	Module Type	Set "Temperature Control Module".
	Module Name	Select the model 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.

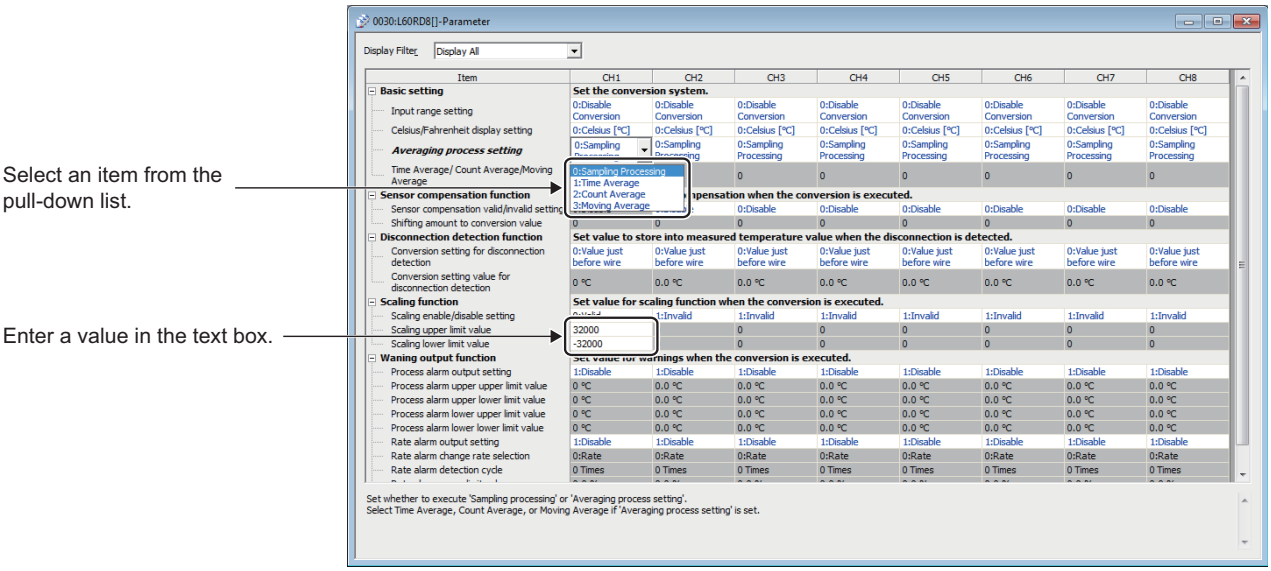
By setting the parameters, the setting by programming becomes unnecessary.

(1) Setting procedure

Open the "Parameter" window.

1. Start "Parameter".

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



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 CH8, follow the operation of step 2.

Item			Setting value		Reference
Basic setting		Input Range Setting	0: Disable (default value) 1: Pt100 (-20 to 120℃) 2: Pt100 (-200 to 850℃) 3: JPt100 (-20 to 120℃) 4: JPt100 (-200 to 600℃) 5: Pt1000 (-200 to 850℃) 6: Pt50 (-200 to 650℃) 7: Ni100 (-60 to 250℃) 8: Ni120 (-60 to 250℃) 9: Ni500 (-60 to 250℃) 10: Cu100 (-180 to 200℃) 11: Cu50 (-180 to 200℃)		Page 53, Section 8.2
		Celsius/Fahrenheit display setting	0: Celsius [℃] (default value) 1: Fahrenheit [℉]		Page 162, Appendix 2 (31)
		Averaging process setting	0: Sampling Processing (default value) 1: Time Average 2: Count Average 3: Moving Average		Page 55, Section 8.3
		Time Average/Count Average/Moving Average	Time Average	13 to 18000 (× 100ms) (default value: 0)	
			Count Average	4 to 36000 times (default value: 0)	
			Moving Average	2 to 1000 times (default value: 0)	
Disconnection detection function		Conversion setting for disconnection detection	0: Value before Disconnection (default value) 1: UpScale 2: Downscale 3: Arbitrary Value		Page 59, Section 8.5
		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 71, Section 8.7
		Scaling upper limit value	-32000 to 32000 (default value: 0)		
		Scaling lower limit value	-32000 to 32000 (default value: 0)		
Warning output function		Process alarm output setting	0: Enable 1: Disable (default value)		Page 62, Section 8.6 (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 64, Section 8.6 (2)
		Rate alarm change rate selection	0: Rate (default value) 1: Temperature		
		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)		
Sensor compensation function	-	Sensor compensation valid/invalid setting	0: Disable (default value) 1: Shift function enable 2: 2-point sensor compensation function enable 3: Shift function and 2-point sensor compensation function enable		Page 73, Section 8.8
	Shift function	Shifting amount to conversion value	-32768 to 32767 (default value: 0)		

Point

When the setting value for "Celsius/Fahrenheit display setting" or "Rate alarm change rate selection" is changed, the displayed unit is automatically changed.

7.3 Auto Refresh

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

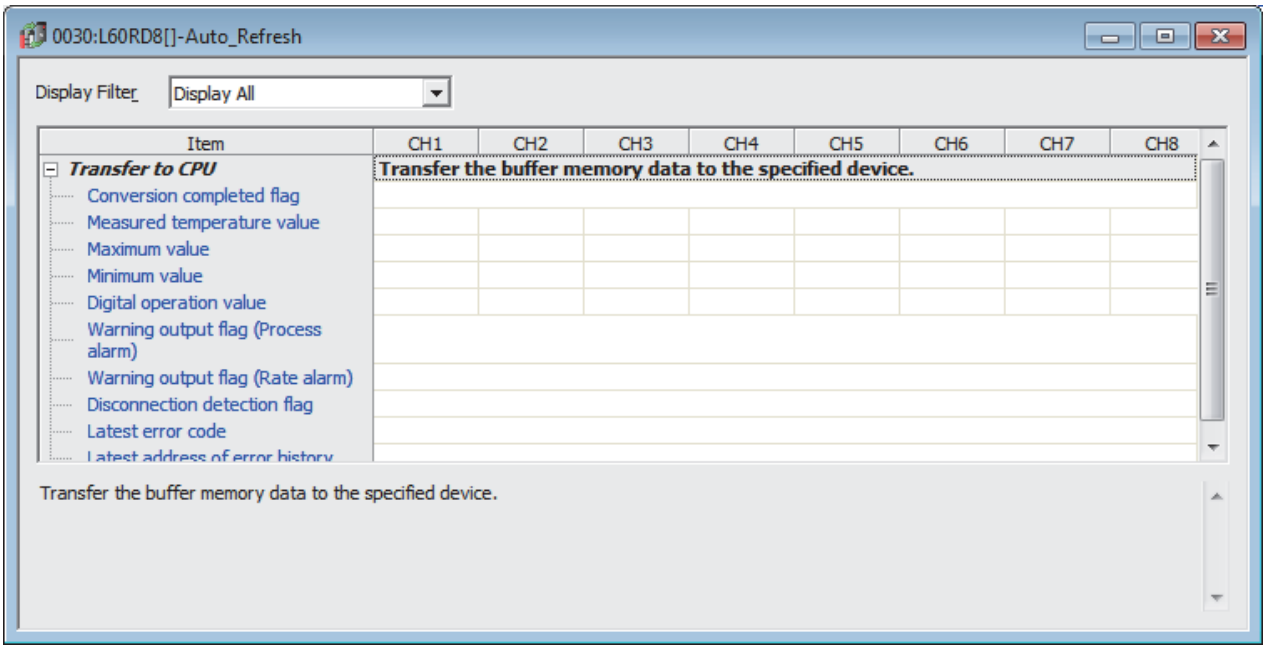
(1) Setting procedure

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.



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 number. (Example: If X10 is set, the data are stored in X10 to X1F.)

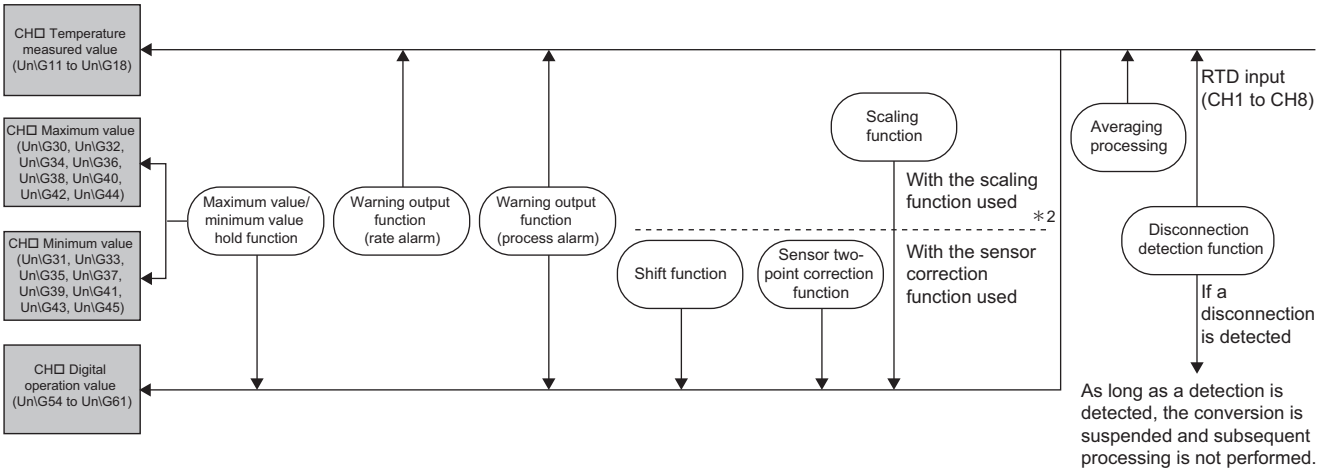
CHAPTER 8 FUNCTIONS

This chapter describes the functions of the RTD 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 136, Appendix 1)
- Details of Buffer Memory Addresses (☞ Page 144, Appendix 2)

8.1 Processing Order of Each Function

Analog input values and the following digital values of (1) to (3) are processed in the order shown below. When the scaling function or the sensor correction function (the shift function and the sensor two-point correction function) is not used, the same values as the temperature measured values are stored. The scaling function and the sensor correction function (the shift function and the sensor two-point correction function) cannot be used at the same time.



*1 When the scaling function or the sensor correction function (the shift function and the sensor two-point correction function) is not used, the same values as the temperature measured values are stored.

*2 The scaling function and the sensor correction function (the shift function and the sensor two-point correction function) cannot be used at the same time.

(1) Temperature measured value

Temperature measured values obtained in sampling processing or averaging processing are stored.

(2) Digital operation value

Values obtained by calculating temperature measured values with the scaling function or the sensor correction function are stored. When the scaling function or the sensor correction function is not used, the same values as the temperature measured values are stored.

(3) Maximum and minimum values

The maximum temperature measured value and minimum temperature measured value are stored. When the scaling function or the sensor correction function is enabled, the digital operation values are stored in Maximum value and Minimum value.

For the channel to which the averaging process is set, the maximum and minimum values are stored at averaging process cycles.

Point

- When the averaging processing (time average or count average) is performed on temperature measured values, digital operation values, or maximum and minimum values, the values are stored at every averaging process cycle.
- If a disconnection is detected, the conversion is stopped.
  The digital values in this case are as follows:
  - Temperature measured value: The values are stored according to the setting in Conversion setting at disconnection detection (Un\G400, Un\G401).
  - Digital operation value: The values obtained by calculating above temperature measured values with the scaling function or the sensor correction function are stored.
  - Maximum and minimum values: The values are updated based on the settings in Conversion setting at disconnection detection (Un\G400, Un\G401).

  The conversion restarts when the disconnected wiring is reconnected.
  For details on the disconnection detection function, refer to the following.
  - Disconnection Detection Function (☞ Page 59, Section 8.5)

8.2 Input Range Setting

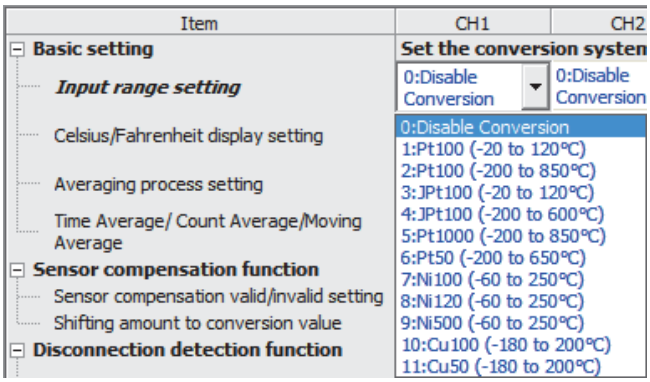
The input range to be used can be selected for each channel.
Disabling the conversion for unused channels reduces the conversion cycles.

(1) Setting procedure

Set the input range depending on the type of the RTD to be connected.

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

1. **Set "Input Range Setting".**



Input type	Input range
RTD	0: Disable
	1: Pt100 (-20 to 120℃)
	2: Pt100 (-200 to 850℃)
	3: JPt100 (-20 to 120℃)
	4: JPt100 (-200 to 600℃)
	5: Pt1000 (-200 to 850℃)
	6: Pt50 (-200 to 650℃)
	7: Ni100 (-60 to 250℃)
	8: Ni120 (-60 to 250℃)
	9: Ni500 (-60 to 250℃)
	10: Cu100 (-180 to 200℃)
	11: Cu50 (-180 to 200℃)

Point

The default setting is Disable (0). Change the setting depending on the type of the RTD to be connected.

(2) Enabling conversion and disabling conversion

Whether to enable or disable conversion for each channel is set in "Input Range Setting". In this manual, "Enabling conversion" and "Disabling conversion" are defined as follows.

(a) Disabling conversion

Disable (0) is set in "Input Range Setting". In this case, the conversion is not performed in the target channel. For the RTD input module, Disable (0) is set for all channels by default. Thus, change the setting value in "Input Range Setting" depending on the type of the connected RTD.

(b) Enabling conversion

A value according to the type of the connected RTD (a value other than Disable (0)) is set in "Input Range Setting". In this case, the conversion is performed in the target channel.

(3) Conversion cycle

The conversion cycle varies depending on the number of channels where the conversion is enabled.
For details, refer to the following.

- Conversion Method (☞ Page 55, Section 8.3 (1))

(4) When the value set in "Input Range Setting" is changed during module operation

The stored values in the following buffer memory areas are cleared to 0.
When the first conversion with the changed input range is completed, the first conversion value is stored in the following buffer memory areas. However, when "Input Range Setting" is set to Disable (0) or a value out of the setting range, the conversion is stopped and the stored values in the following buffer memory areas remain 0.

- CH☐ Temperature measured value (Un\G11 to Un\G18)
- CH☐ Maximum value (Un\G30, Un\G32, Un\G34, Un\G36, Un\G38, Un\G40, Un\G42, Un\G44)
- CH☐ Minimum value (Un\G31, Un\G33, Un\G35, Un\G37, Un\G39, Un\G41, Un\G43, Un\G45)
- CH☐ Digital operation value (Un\G54 to Un\G61)

8.3 Conversion Method

Set sampling processing or averaging processing for each channel.

(1) Sampling processing

Temperature input values are converted at every conversion cycle, and the converted values are stored in the buffer memory areas as temperature measured values.

Point

The conversion cycle is "Conversion speed (40ms) × Number of channels where conversion is enabled".
Whether to enable or disable conversion 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 80ms (40ms × 2).

(2) Averaging processing

Averaging processing is performed on temperature measured 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 13 to 18000 (set in increments of 100ms; 1300ms to 1800000ms).

$$\text{Number of processing (times)} = \frac{\text{Setting time (value)} \times 100\text{ms}}{40\text{ms} \times \text{Number of channels where conversion is enabled}}$$

Ex. Processing times with the following settings

Item	Setting
Number of channels where conversion is enabled	8 channels
Setting time	22 (2200ms)

$$\frac{2200}{40 \times 8} = 6 \text{ (times)} \cdots \text{Numbers after the decimal point are rounded down.}$$

→ The processing is performed 6 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 mean value, obtained by the count 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) = Set number of times × (40ms × Number of channels where conversion is enabled)

Ex. Processing time with the following settings

Item	Setting
Number of channels where conversion is enabled	8 channels
Set number of times	20 times

20 × (40 × 8) = 6400 (ms) → A mean value is output every 6400ms.

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.

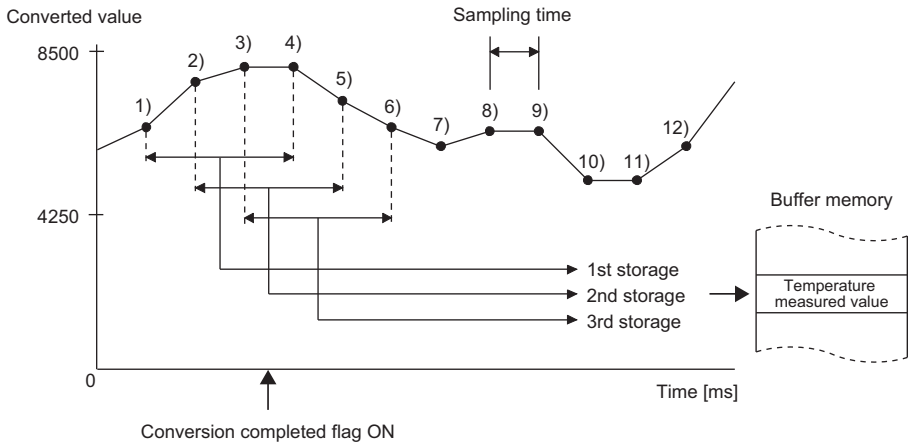
(c) Moving average

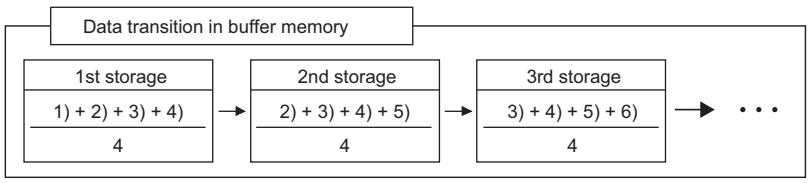
The average of a specified number of temperature measured values is calculated at every conversion cycle and is stored in the buffer memory area.

Because the target range for averaging processing is moved in response to every sampling processing, the latest temperature measured 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 input range setting is "RTD: Pt100 (-200 to 850℃)" and the set number of times is four.



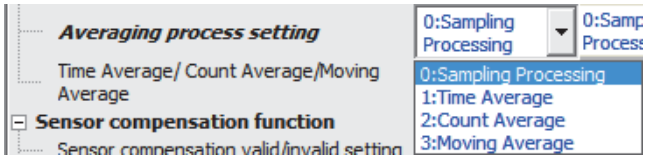


(3) Setting procedure

(a) Sampling processing

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

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

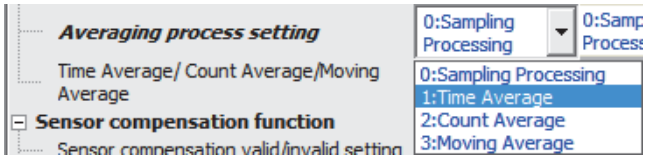


(b) Averaging processing

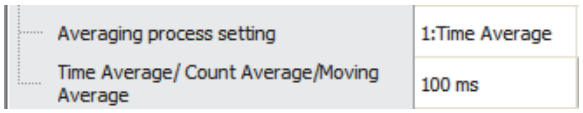
Ex. When "Averaging process setting" is set to "1: Time Average"

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

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



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



Item	Setting range
Time Average	13 to 18000 (1300ms to 1800000ms)
Count Average	4 to 36000 times
Moving Average	2 to 1000 times

Point

- If Time Average is set to a value outside the setting range, an error occurs on the corresponding channel. The error code (20☐) is stored in Latest error code (Un\G19), and Error flag (XF) turns on.
- If Count Average is set to a value outside the setting range, an error occurs on the corresponding channel. The error code (30☐) is stored in Latest error code (Un\G19), and Error flag (XF) turns on.
- If Moving Average is set to a value outside the setting range, an error occurs on the corresponding channel. The error code (31☐) is stored in Latest error code (Un\G19), and Error flag (XF) turns on.

8.4 Maximum Value/Minimum Value Hold Function

This function stores the minimum and maximum digital operation values in the buffer memory area for each channel. Values are updated at every averaging process cycle if averaging process setting is selected, otherwise updated at every conversion cycle.

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

- List of Buffer Memory Addresses (☞ Page 25, Section 3.5)

(1) Resetting the maximum value and the minimum value

When either of the following two operations is performed, the maximum value and minimum value are replaced with the current digital operation value.

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

When the setting value in CH□ Input range setting (Un\G500 to Un\G507) is changed and Operating condition setting request (Y9) is turned on and off, the maximum value and the minimum value are cleared to 0.

8.5 Disconnection Detection Function

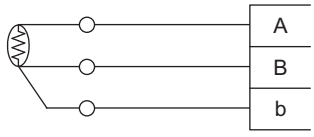
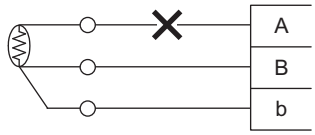
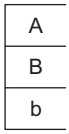
This function detects disconnection of external wiring (RTD or conducting wires).

(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", "Upscale", "Downscale", or "Any value" specified in Conversion setting at disconnection detection (Un\G400, Un\G401) is stored in CH☐ Temperature measured value (Un\G11 to Un\G18).

(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 configured in CH☐ Input range setting (Un\G500 to Un\G507).)

Connection status	Status of the conversion enable/disable setting	Disconnection detection flag
 No disconnection	Enable	Off
	Disable	
 Disconnection	Enable	On
	Disable	Off
 No connection	Enable	On
	Disable	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.
  - Waning Output Function (☞ Page 62, Section 8.6)
- For Disconnection detection flag (Un\G47), Disconnection detection signal (X6), the ALM LED, and Latest error code (Un\G19), 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.

(3) Conversion setting at disconnection detection

Setting Conversion setting at disconnection detection (Un\G400, Un\G401) allows specifying the value to be stored in CH☐ Temperature measured value (Un\G11 to Un\G18) at disconnection detection. Thus, the disconnection detection becomes possible only by checking CH☐ Temperature measured value (Un\G11 to Un\G18) without monitoring Disconnection detection signal (X6).

By default, Value just before disconnection (0) is set in Conversion setting at disconnection detection (Un\G400, Un\G401). Change the setting value as needed.

Conversion setting at disconnection detection	Processing at disconnection detection
Value just before disconnection (0)	The value immediately before a disconnection detection is held in CH☐ Temperature measured value (Un\G11 to Un\G18).
Upscale (1)	The upscale value (upper limit value + 5% of the input range) of the input range currently set is stored in CH☐ Temperature measured value (Un\G11 to Un\G18).
Downscale (2)	The downscale value (lower limit value - 5% of the input range) of the input range currently set is stored in CH☐ Temperature measured value (Un\G11 to Un\G18).
Any value (3)	The value set in CH☐ Conversion setting value at disconnection detection (Un\G404 to Un\G411) is stored in CH☐ Temperature measured value (Un\G11 to Un\G18).

(a) Upscale and downscale

The upscale value (upper limit value + 5% of the input range) or the downscale value (lower limit value - 5% of the input range) of the input range currently set is stored in CH☐ Temperature measured value (Un\G11 to Un\G18) when a disconnection is detected.

If Upscale or Downscale is selected, the following values are stored in CH☐ Temperature measured value (Un\G11 to Un\G18) when a disconnection is detected.

Input range	Celsius			Fahrenheit		
	Output range of temperature measured value	Upscale	Downscale	Output range of temperature measured value	Upscale	Downscale
Pt100 (-20 to 120℃)	-200 to 1200	1270	-270	-40 to 2480	2606	-166
Pt100 (-200 to 850℃)	-2000 to 8500	9025	-2525	-3280 to 15620	16565	-4225
JPt100 (-20 to 120℃)	-200 to 1200	1270	-270	-40 to 2480	2606	-166
JPt100 (-200 to 600℃)	-2000 to 6000	6400	-2400	-3280 to 11120	11840	-4000
Pt1000 (-200 to 850℃)	-2000 to 8500	9025	-2525	-3280 to 15620	16565	-4225
Pt50 (-200 to 650℃)	-2000 to 6500	6925	-2425	-3280 to 12020	12785	-4045
Ni100 (-60 to 250℃)	-600 to 2500	2655	-755	-760 to 4820	5099	-1039
Ni120 (-60 to 250℃)	-600 to 2500	2655	-755	-760 to 4820	5099	-1039
Ni500 (-60 to 250℃)	-600 to 2500	2655	-755	-760 to 4820	5099	-1039
Cu100 (-180 to 200℃)	-1800 to 2000	2190	-1990	-2920 to 3920	4262	-3262
Cu50 (-180 to 200℃)	-1800 to 2000	2190	-1990	-2920 to 3920	4262	-3262

(b) Any value

The value set in CH☐ Conversion setting value at disconnection detection (Un\G404 to Un\G411) is stored in CH☐ Temperature measured value (Un\G11 to Un\G18) when a disconnection is detected.

The default value of CH☐ Conversion setting value at disconnection detection (Un\G404 to Un\G411) is 0. The disconnection detection function is available with 0. However, the value can be changed to any value.

Point

When the scaling function or the sensor correction function is enabled, the following values are stored in CH☐ Digital operation value (Un\G54 to Un\G61) when a disconnection is detected.

- When the scaling function is enabled
  The scale conversion is performed on a value determined by the set value for Conversion setting at disconnection detection (Un\G400 to Un\G401), and the converted value is stored.
- When the sensor correction function is enabled
  According to the set value in Conversion setting at disconnection detection (Un\G400 to Un\G401), values are stored as follows.
  - When Value just before disconnection (0) is set in Conversion setting at disconnection detection, the value in CH☐ Digital operation value (Un\G54 to Un\G61) immediately before disconnection is held.
  - When Upscale (1), Downscale (2), or Any value (3) is set in Conversion setting at disconnection detection, the same value as that in CH☐ Temperature measured value (Un\G11 to Un\G18) is stored.

(4) When the disconnected wiring is reconnected

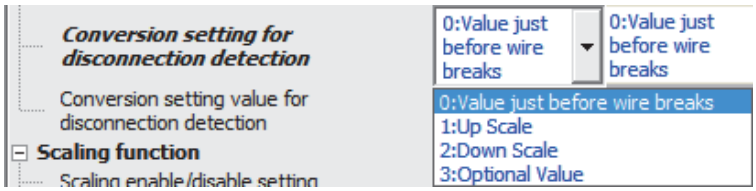
A normal temperature measured value is stored in the buffer memory area in the next conversion after recovery from the disconnection. For sampling processing, a normal temperature measured value is stored in the next or later conversions. When the averaging processing has been performed, the normal temperature measured value is stored in the buffer memory after the disconnected wiring is reconnected and the averaging process cycle elapses.

Until the normal temperature measured value is stored in the buffer memory area, the temperature measured value remains a specified value in Conversion setting at disconnection detection (such as the downscale value).

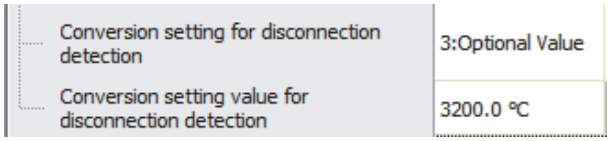
(5) Setting procedure

1. In "Conversion setting for disconnection detection", set a value to be stored in CH☐ Temperature measured value (Un\G11 to Un\G18) at disconnection detection.

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



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

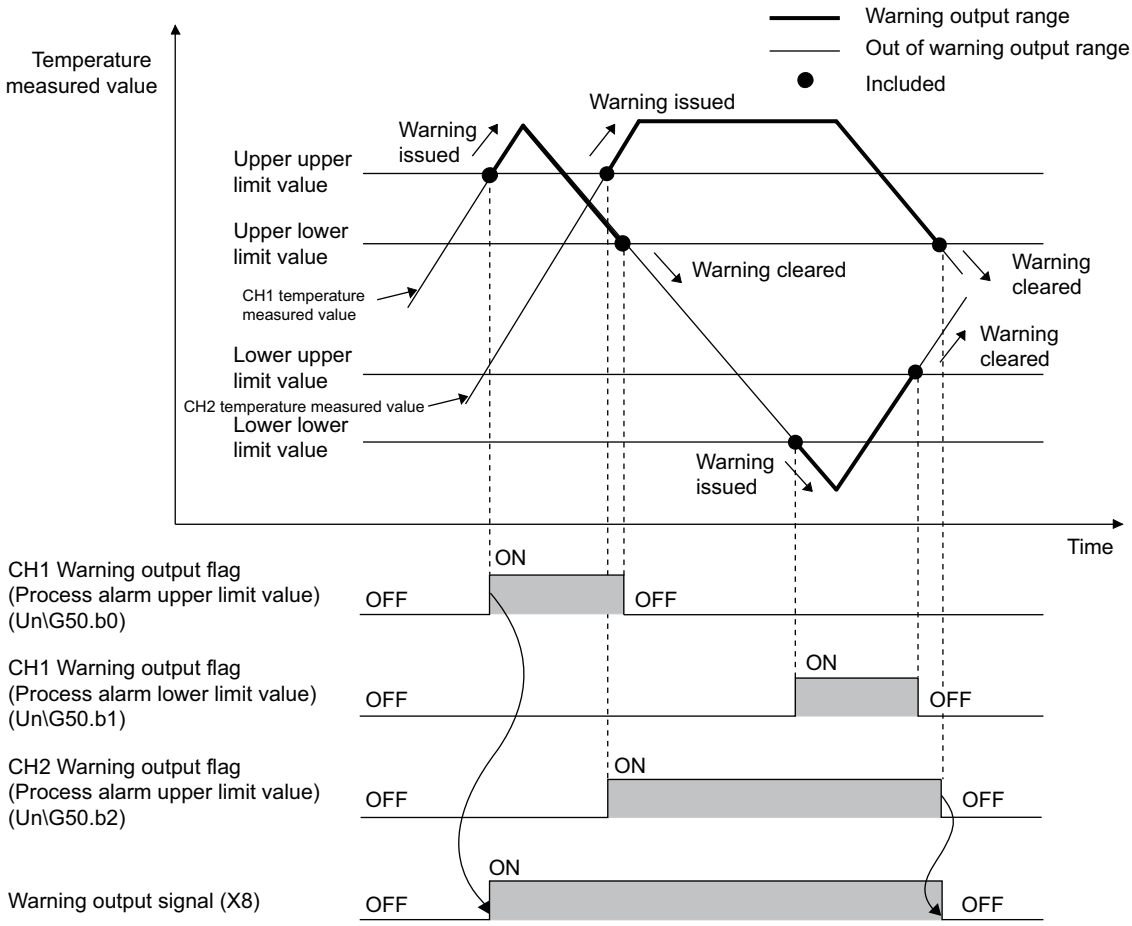


Item	Setting range
Conversion setting value for disconnection detection	-32768 to 32767

8.6 Warning Output Function

(1) Process alarm

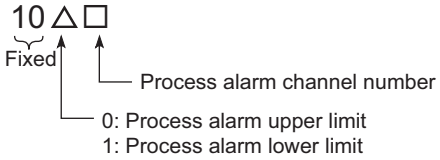
This function outputs a warning when a temperature measured value falls within a preset warning output range. When the scaling function or the sensor correction function is enabled, the warning detection target is values calculated with those functions.



(a) Operation performed when a warning is output

When the temperature measured value falls within a warning output range, equal to or larger than the process alarm upper upper limit value or equal to or smaller 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 warning or lower limit warning).
- 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.



However, the conversion in the channel where a warning is output continues.

(b) Operation performed after a warning is output

When the temperature measured value is smaller than the process alarm upper lower limit value or larger than the process alarm lower upper limit value after the warning output, Normal (0) is stored in the bit of Warning output flag (Process alarm) (Un\G50) of 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 cycle

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 conversion cycle.

(d) Warning detection target

When the scaling function or the sensor correction function is enabled, the warning detection target is values in CH☐ Digital operation value (Un\G54 to Un\G61).

For the setting values of CH1 Process alarm lower lower limit value (Un\G86) to CH8 Process alarm upper upper limit value (Un\G117), set values considering operations by each function.

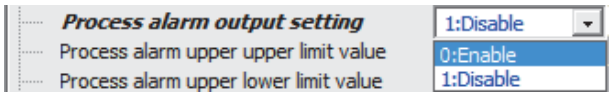
(e) Operation performed when a disconnection is detected

A process alarm may occur simultaneously because the value in CH☐ Temperature measured value (Un\G11 to Un\G18) changes depending on the value in Conversion setting at disconnection detection (Un\G400, Un\G401) when a disconnection is detected.

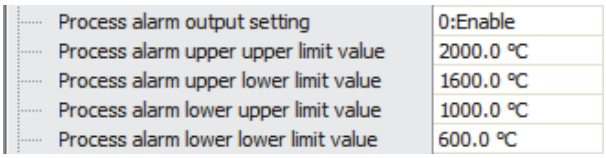
(f) Setting procedure

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

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



2. Set values for "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".



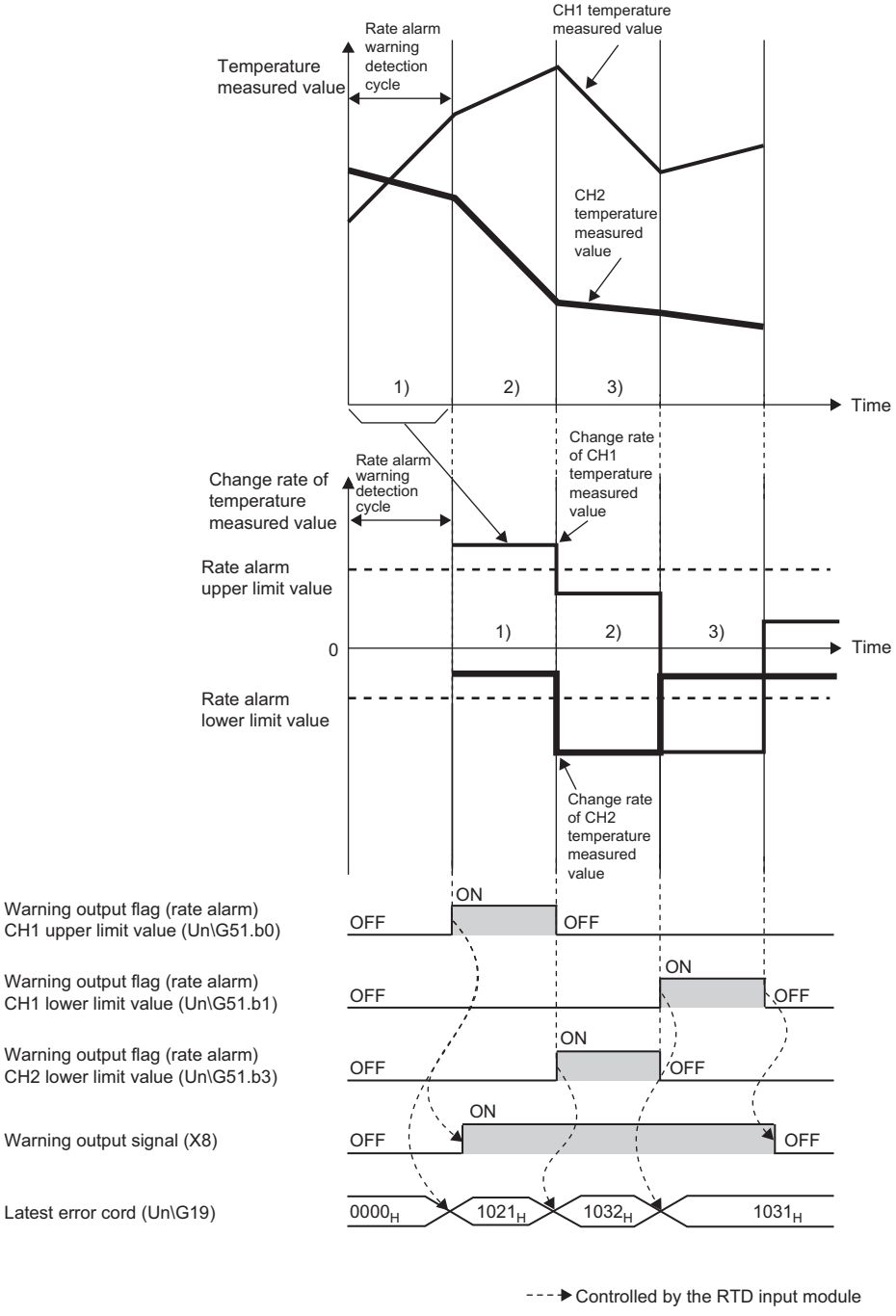
Item	Setting range
Process alarm upper upper limit value	-32768 to 32767
Process alarm upper lower limit value	
Process alarm lower upper limit value	
Process alarm lower lower limit value	

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

(2) Rate alarm

When the change rate of a temperature measured 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) Rate alarm change rate

For the rate alarm change rate, set values in CH1 Rate alarm upper limit value (Un\G126) to CH8 Rate alarm lower limit value (Un\G141).

According to the setting in Rate alarm change rate selection (Un\G52), the setting unit of the rates is changed.

1. **When Ratio (0) is set in Rate alarm change rate selection (Un\G52)**

For CH1 Rate alarm upper limit value (Un\G126) to CH8 Rate alarm lower limit value (Un\G141), set values in increments of 0.1% to the value of (maximum value - minimum value) of the temperature measured value.

The setting range is between -32768 to 32767 (-3276.8% to 3276.7%)

2. **When Temperature (1) is set in Rate alarm change rate selection (Un\G52)**

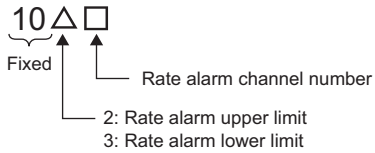
For CH1 Rate alarm upper limit value (Un\G126) to CH8 Rate alarm lower limit value (Un\G141), set values in increments of 0.1℃ (or 0.1℉) to the temperature measuring range.

The setting range is between -32768 to 32767 [-3276.8 to 3276.7℃ (℉)].

(b) Operation performed when a warning is output

If the change rate of a temperature measured 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 while the temperature measured value is monitored for set rate alarm warning detection cycle, 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 warning or lower limit warning).
- 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.



However, the conversion in the channel where a warning is output continues.

(c) Operation performed after a warning is output

When the change rate of the temperature measured value is smaller than the rate alarm upper limit value or larger than the rate alarm lower limit value, Normal (0) is stored in the bit of Warning output flag (Rate alarm) (Un\G51) of 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△□).

(d) Warning detection cycle

The rate alarm warning detection cycle can be obtained by multiplying the value set in CH□ Rate alarm warning detection cycle (Un\G118 to Un\G125) by the conversion cycle. The setting range of CH□ Rate alarm warning detection cycle (Un\G118 to Un\G125) is 1 to 36000 times.

Ex. Rate alarm warning detection cycle in the following condition

- Number of channels where the conversion is enabled: three channels (conversion cycle = 40ms × 3 = 120ms)
- CH1 Rate alarm warning detection cycle: 5 times

The rate alarm warning detection cycle is 600ms (5 (times) × 120 (ms)) The temperature measured values are compared at intervals of 600ms, and the change rate is output using the comparison results.

Point

When the value in CH□ Rate alarm warning detection cycle (Un\G118 to Un\G125) is out of the setting range, an error code (71□) is stored in Latest error code (Un\G19).

(e) Operation performed when a disconnection is detected

A rate alarm may occur simultaneously because the value in CH□ Temperature measured value (Un\G11 to Un\G18) changes depending on the value in Conversion setting at disconnection detection (Un\G400, Un\G401) when a disconnection is detected. When the temperature measured value changes after the disconnected wiring has been reconnected, a rate alarm is not output.

(f) Rate alarm judgment

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

The conversion formula for values used for the rate alarm judgment depends on the setting for Rate alarm change rate selection (Un\G52).

1. When Ratio (0) is set in Rate alarm change rate selection (Un\G52)

Values for judgment per rate alarm warning detection cycle [℃ or ℉][*1] = (R_H or $R_L \times 0.1 \times 0.01 \times Dx$)

*1 Cut off numbers after the decimal point.

Item	Description
R_H	Rate alarm upper limit value
R_L	Rate alarm lower limit value
D_X	Upper limit value of temperature measured value - Lower limit value of temperature measured value

Ex. When the RTD input range of Pt100 (-200 to 850℃) is set and the setting values are as follows, the current value is compared to the last value at intervals of 400ms of the rate alarm warning detection cycle. The current temperature measured value is judged whether it has increased by 262.5℃ (25%) or more or 52.5℃ (5%) or less compared to the last temperature measured value.

Judging value (upper limit value) = (250 × 0.001) × 10500 = 262.5 [℃]

Judging value (lower limit value) = 50 × 0.001 × 10500 = 52.5 [℃]

- Conversion cycle: 40ms/1CH
- CH1 Rate alarm warning detection cycle: 10 times
- CH1 Rate alarm upper limit value: 250 (25%)
- CH1 Rate alarm lower limit value: 50 (5%)
- Upper limit value of temperature measured value - Lower limit value of temperature measured value: 10500

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

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

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

2. When Temperature (1) is set in Rate alarm change rate selection (Un\G52)

Values for judgment per rate alarm warning detection cycle [℃ or ℉][*1] = (R_H or $R_L \times 0.1$)

*1 Cut off numbers after the decimal point.

R_H	Rate alarm upper limit value
R_L	Rate alarm lower limit value

Ex. When the RTD input range of Ni100 (-76 to 482℉) is set and the setting values are as follows, the current value is compared to the last value at intervals of 600ms of the rate alarm warning detection cycle. The current temperature measured value is judged whether it has increased by 200(20.0℉) or more or 100(10.0℉) or less compared to the last temperature measured value.

Judging value (upper limit value) = 200 × 0.1 = 20.0 [℉]

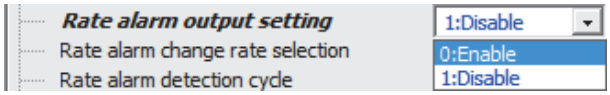
Judging value (lower limit value) = 100 × 0.1 = 10.0 [℉]

- Celsius/Fahrenheit display setting: Fahrenheit [℉]
- Conversion cycle: 40ms/1CH
- CH1 Rate alarm warning detection cycle: 15 times
- CH1 Rate alarm change rate selection: 1
- CH1 Rate alarm upper limit value: 200 (20.0℉)
- CH1 Rate alarm lower limit value: 100 (10.0℉)

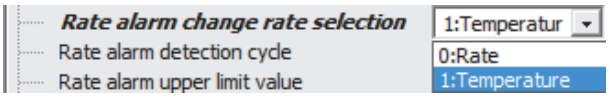
(g) Setting procedure

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

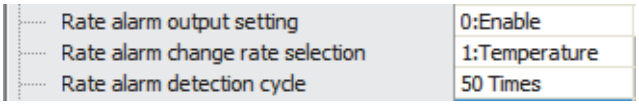
Project window ⇨ [Intelligent Function Module] ⇨ Module Name ⇨ [Parameter]



2. Set "Rate alarm change rate selection" to "1: Temperature".

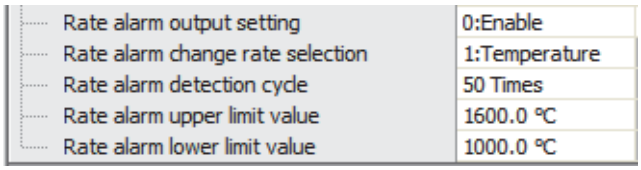


3. Set a value for "Rate alarm detection cycle".



Item	Setting range
Rate alarm detection cycle	1 to 36000 times

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



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

Point

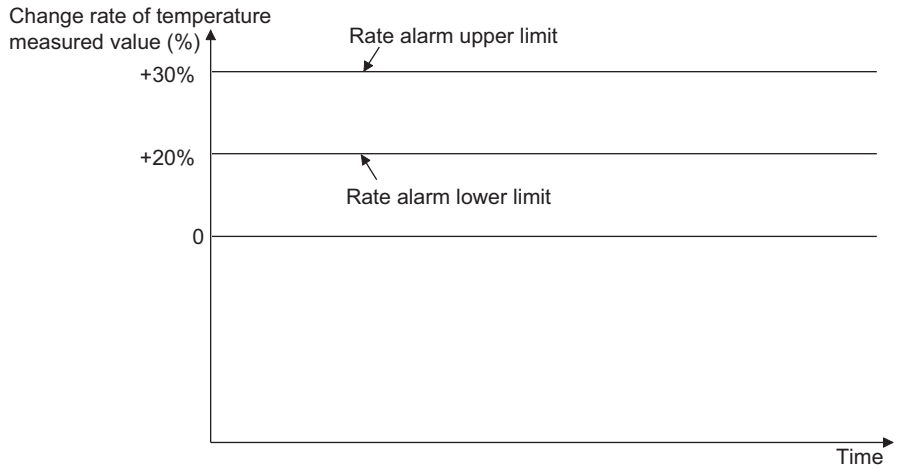
- Set the rate alarm upper limit value and rate alarm lower limit value in increments of 0.1% for the following item.
  Upper limit value of temperature measured value - Lower limit value of temperature measured value
- Set the rate alarm in the following condition.
  Rate alarm upper limit value > Rate alarm lower limit value

(h) Application example of the rate alarm

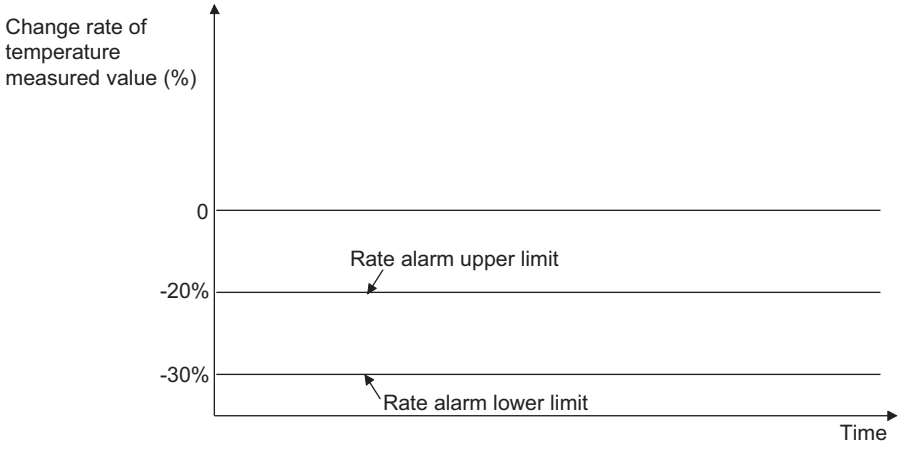
The rate alarm is useful to monitor the change rate of temperature measured values in a limited range as follows.

(When Ratio (0) is set in Rate alarm change rate selection (Un\G52))

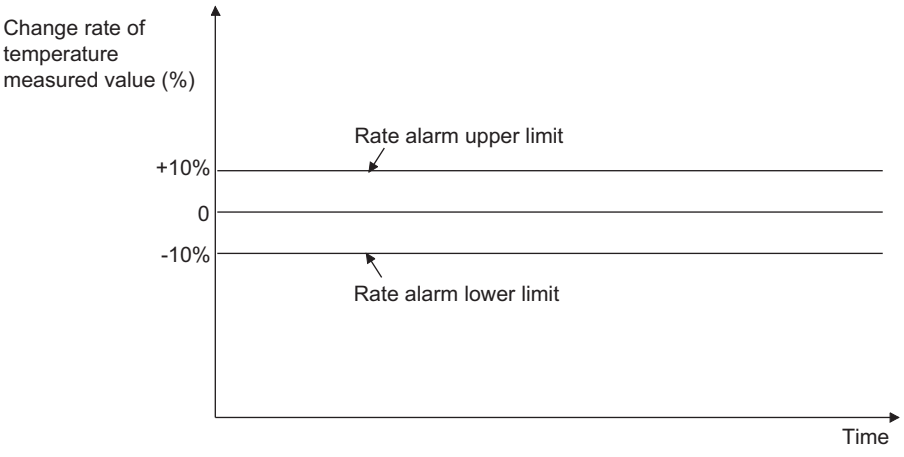
Ex. Monitoring whether the increase rate of a temperature measured value lies within a specified range



Ex. Monitoring whether the decrease rate of a temperature measured value lies within a specified range



Ex. Monitoring whether the change rate of a temperature measured value lies within a specified range



8.7 Scaling Function

This function performs the scale conversion on temperature measured 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□ Digital operation value (Un\G54 to Un\G61).

(1) Concept of scaling setting

Ex. When the input range is set to Pt100 (-200 to 850℃)
For the scaling lower limit value, set a value corresponding to the lower limit value of the input range (0).
For the scaling upper limit value, set a value corresponding to the upper limit value of the input range (4000).

(2) Calculating digital operation values

The values are calculated based on the following formula.
(All digits to the right of the decimal point are rounded off in scale conversion.)

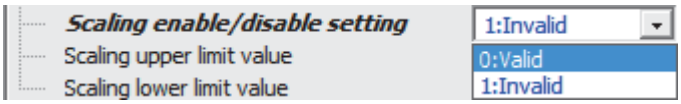
Item	Description
D_x	Temperature measured value
D_{Max}	Maximum temperature measured value of the input range in use
D_{Min}	Minimum temperature measured value of the input range in use
S_H	Scaling upper limit value
S_L	Scaling lower limit value

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

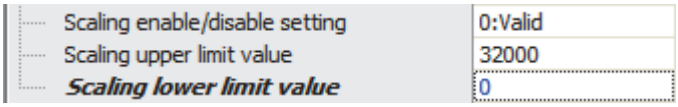
(3) Setting procedure

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

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



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



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

Point

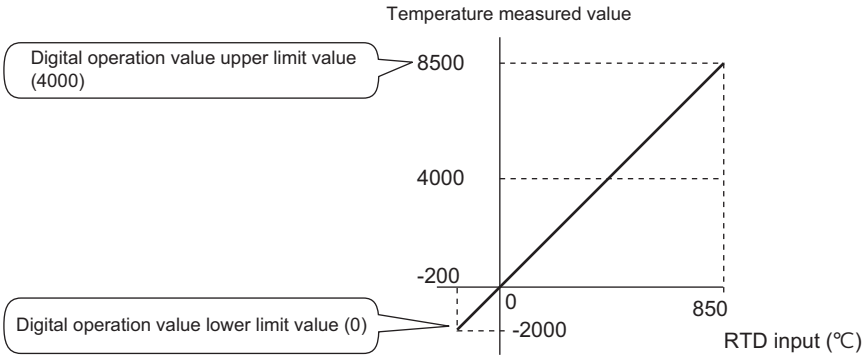
- The scaling function and sensor correction function (the shift function and sensor two-point correction function) cannot be used at the same time. If both of Scaling enable/disable setting (Un\G53) and CH☐ Sensor correction enable/disable setting (Un\G200 to Un\G207) are enabled for the same channel, the error (303☐) occurs.
- Whatever values are set 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 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.
  In a channel where 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 the scaling function

Ex. When the following values are set for a channel with an input range of Pt100 (-200 to 850℃):

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

The temperature measured values and the digital operation values are as follows.



RTD input (℃)	Temperature measured value	Digital operation value
-200	-2000	0
0	0	762
200	2000	1524
400	4000	2286
600	6000	3048
800	8000	3810
850	8500	4000

8.8 Sensor Correction Function

If there is an error between the measured temperature and the actual temperature, the following two functions correct the error.

- Shift function
- Sensor two-point correction function

This function can be used only when Shift function enable (1), Sensor two-point correction function enable (2), or Both functions enable (3) is set in CH□ Sensor correction enable/disable setting (Un\G200 to Un\G207).

(1) Setting the sensor correction function

- To use the sensor correction function, set Shift function enable (1), Sensor two-point correction function enable (2), or Both functions enable (3) in CH□ Sensor correction enable/disable setting (Un\G200 to Un\G207), and turn on and off Operating condition setting request (Y9).
- After the value in CH□ Temperature measured value (Un\G11 to Un\G18) is corrected with the sensor correction function, the corrected value is stored in CH□ Digital operation value (Un\G54 to Un\G61).
- When a value other than Disable (0) to Both functions enable (3) is set in CH□ Sensor correction enable/disable setting (Un\G200 to Un\G207), the error (302□) occurs and the sensor correction function is disabled.
- The scaling function and sensor correction function (the shift function and sensor two-point correction function) cannot be used at the same time.
- If both of Scaling enable/disable setting (Un\G53) and CH□ Sensor correction enable/disable setting (Un\G200 to Un\G207) are enabled for the same channel, the error (303□) occurs and the same value as the one stored in CH□ Temperature measured value (Un\G11 to Un\G18) is stored in CH□ Digital operation value (Un\G54 to Un\G61).

Point

- When Both functions enable (3) is set in CH□ Sensor correction enable/disable setting (Un\G200 to Un\G207), the shift function and the sensor two-point correction function can be used at the same time.
- To check which function, the scaling function or the sensor correction function, is being used, use CH□ Digital operation processing method (Un\G290 to Un\G297).
  For details on the digital operation processing method, refer to the following.
  - CH□ Digital operation processing method (☞ Page 160, Appendix 2 (27))

8.8.1 Shift function

If the measured temperature is simply higher or lower than the actual temperature, this function subtracts or adds a value equivalent to the error from/to the temperature measured value to correct the error.
When the shifting amount to conversion value is changed, the change is reflected on CH☐ Digital operation value (Un\G54 to Un\G61) in real time.

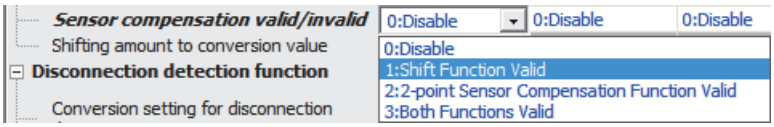
Point

- Set a value for the shifting amount to conversion value according to the setting for CH☐ Celsius/Fahrenheit display setting (Un\G508 to Un\G515).
- The shifting amount to conversion value is reflected on CH☐ Digital operation value (Un\G54 to Un\G61).

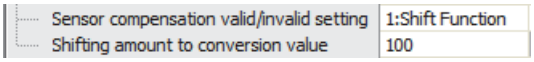
(1) Setting procedure

1. Set "Sensor compensation valid/invalid setting" to "1: Shift function enable" or "3: Shift function and 2-point sensor compensation function enable".

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



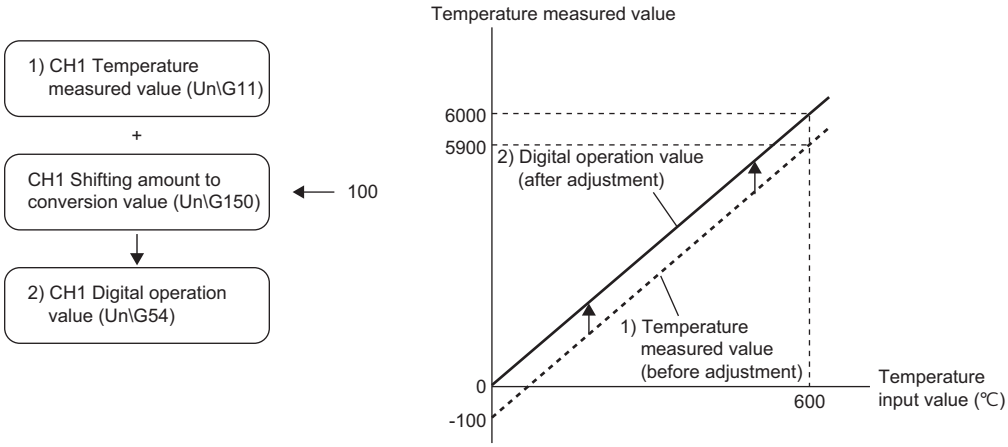
2. Set a value in "Shifting amount to conversion value".



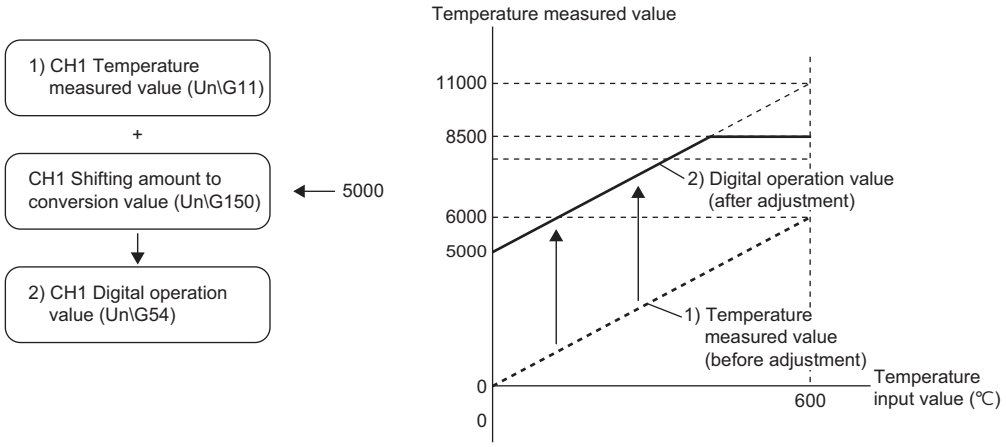
Ex. To correct the system with the following I/O characteristics for the channel where Pt100 (-200 to 850℃) is set as the input range

Temperature input value (℃)	CH☐ Temperature measured value (Un\G11 to Un\G18)	CH☐ Digital operation value (Un\G54 to Un\G61)
0	-100	0
600	5900	6000

In this case, set the shifting amount to conversion value to "100".



Ex. To set the shifting amount to conversion value to "5000" for the module to which Pt100 (-200 to 850℃) is set as the input range



Temperature input value (℃)	CH□ Temperature measured value (Un\G11 to Un\G18)	CH□ Digital operation value (Un\G54 to Un\G61)
0	0	5000
600	6000	8500*1

*1 Fixed to 8500 (upper limit value) because the value exceeds the range of -2000 to 8500.

8.8.2 Sensor two-point correction function

This function registers errors between CH☐ Temperature measured value (Un\G11 to Un\G18) and the actual temperature at preset two points and corrects the error by utilizing the slope between the values of the two points.
The sensor two-point correction function is executed with the following four buffer memory areas.

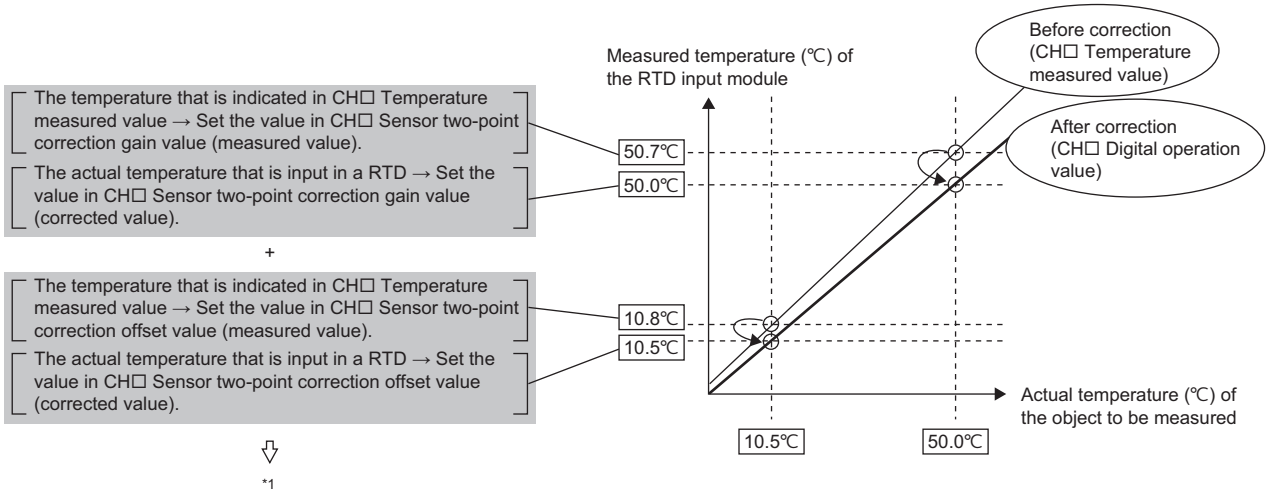
Item	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Sensor two-point correction offset value (measured value)	Un\G210	Un\G214	Un\G218	Un\G222	Un\G226	Un\G230	Un\G234	Un\G238
Sensor two-point correction offset value (corrected value)	Un\G211	Un\G215	Un\G219	Un\G223	Un\G227	Un\G231	Un\G235	Un\G239
Sensor two-point correction gain value (measured value)	Un\G212	Un\G216	Un\G220	Un\G224	Un\G228	Un\G232	Un\G236	Un\G240
Sensor two-point correction gain value (corrected value)	Un\G213	Un\G217	Un\G221	Un\G225	Un\G229	Un\G233	Un\G237	Un\G241

To use the sensor two-point correction function, register those setting values in the module in advance.
For the registration procedure of the sensor two-point correction values, refer to the following.

- Registration procedure of sensor two-point correction values (for GX Works2) (☞ Page 77, Section 8.8 (1))
- Registration procedure of sensor two-point correction values (for programs) (☞ Page 84, Section 8.8 (2))

The following figure shows a registration example of when the actual temperature input in the RTD is 10.5 [℃] and the measured temperature is 10.8 [℃] and when the actual temperature input in the RTD is 50.0 [℃] and the measured temperature is 50.7 [℃].

Item	Setting value
Sensor two-point correction offset value (measured value)	10.8 [℃] (The temperature corresponding to the offset value of the range to be corrected)
Sensor two-point correction gain value (measured value)	50.7 [℃] (The temperature corresponding to the gain value of the range to be corrected)
Sensor two-point correction offset value (corrected value)	10.5 [℃] (The actual temperature input in the RTD when 10.8 [℃] is indicated in Temperature measured value)
Sensor two-point correction gain value (corrected value)	50.0 [℃] (The actual temperature input in the RTD when 50.7 [℃] is indicated in Temperature measured value)

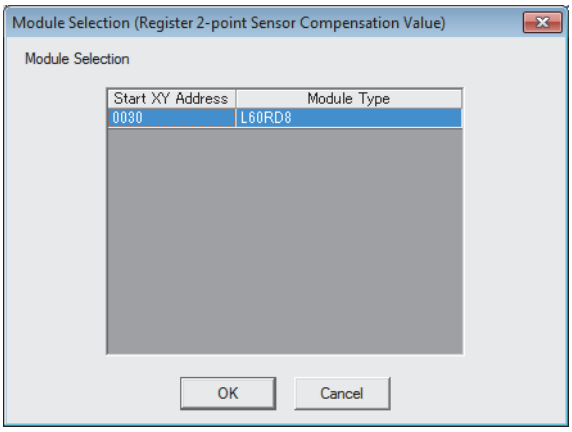


*1 By these settings, the digital operation value is corrected to fall within the range of 10.5 to 50.0 [℃] when the temperature measured value is within the range of 10.8 to 50.7 [℃]. Thus, the temperature measured value close to the actual value input in the RTD can be obtained.

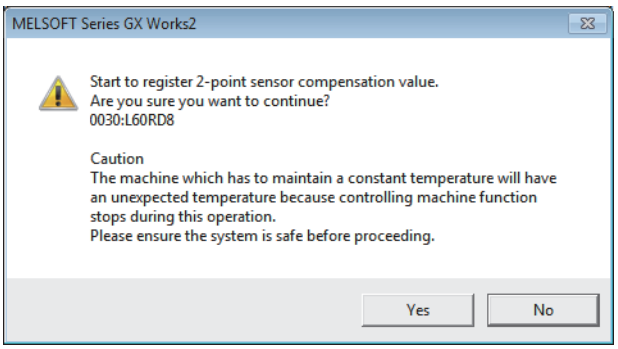
(1) Registration procedure of sensor two-point correction values (for GX Works2)

Start the registration from "Register 2-point sensor compensation value".

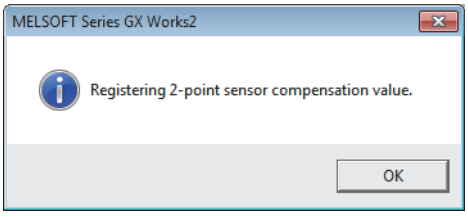
[Tool] ⇨ [Intelligent Function Module Tool] ⇨ [Temperature Control Module] ⇨ [Register 2-point sensor compensation value]



↓



↓



↓

(To the next step)

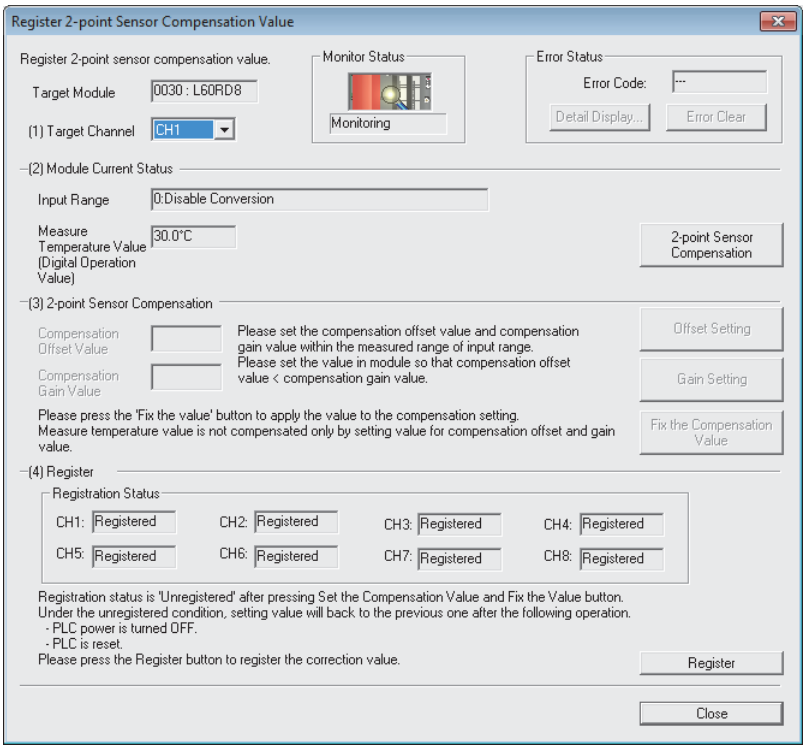
1. **Select a module in which sensor two-point correction values are registered, and click the** OK **button.**

2. **Click the** Yes **button.**

3. **Click the** OK **button.**

(From the previous step)

↓



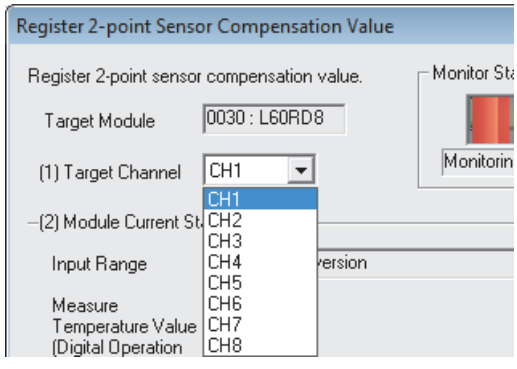
4. The "Register 2-point sensor compensation value" window appears.

Display description of "Registration Status"

Display	Description
Unregistered	Indicates that the correction values have been determined by clicking the Fix the Compensation Value button but the values are not registered.
Registered*1	Indicates that the correction values have been registered by clicking the Register button.

*1 Note that "Registration Status" is shown as Registered on the initial display of this window because the sensor two-point correction values of the factory default setting or the previous user setting have been registered in the module.

↓



5. In "Target Channel", select a channel where the sensor two-point correction values are registered.

↓

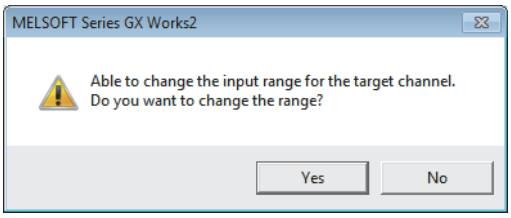
6. Click the 2-point Sensor Compensation button.

↓

(To the next step)

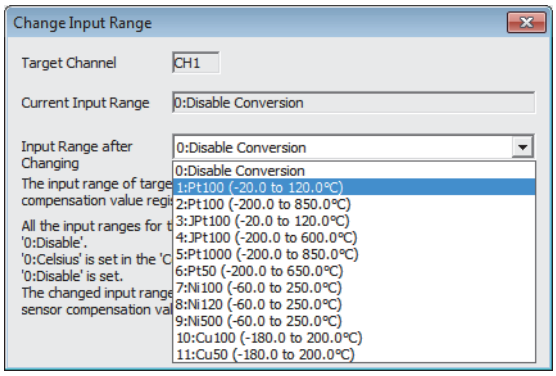
(From the previous step)

↓



↓

7. Click the Yes button.



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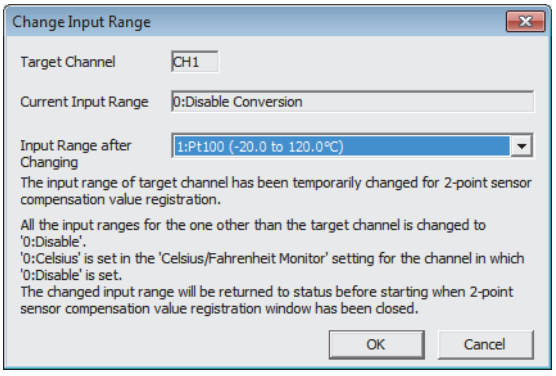
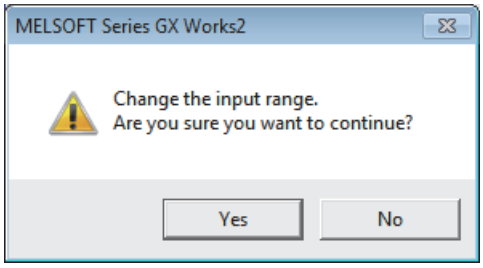
8. In "New Input Range", select an input range setting to be used.



↓

9. Click the OK button.



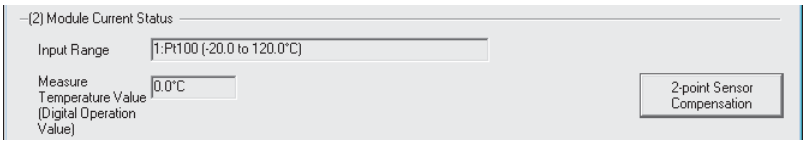
↓

10. Click the Yes button.

(To the next step)

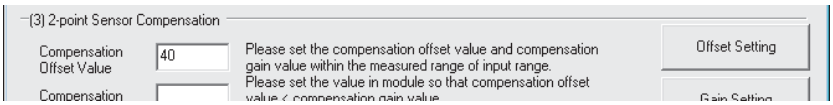
(From the previous step)

↓



11. **Input the temperature which is used as the correction offset value (measured value) by using the RTD. The temperature used as the correction offset value (measured value) is stored in "Measured Temperature Value (Digital Operation Value)".**

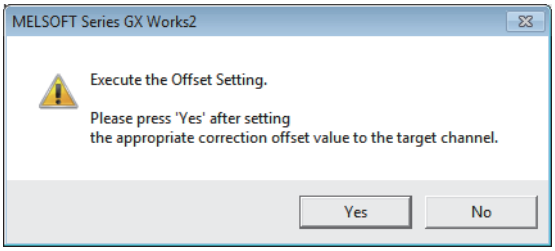
↓



12. **In "Compensation Offset Value", enter the actual temperature input in the RTD. After the entry, click the** Offset Setting **button.**

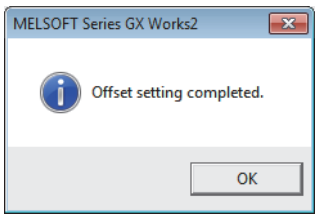
↓

13. **Click the** Yes **button.**



↓

14. **Click the** OK **button.**

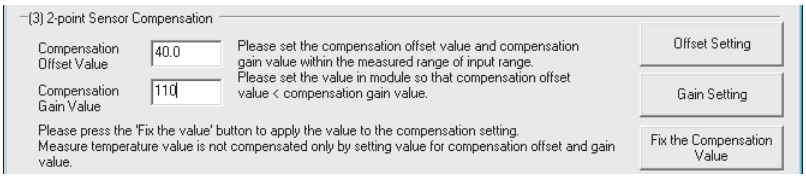


↓

15. **Input the temperature which is used as the correction gain value (measured value) by using the RTD. The temperature used as the correction gain value (measured value) is stored in "Measured Temperature Value (Digital Operation Value)".**

↓

16. **In "Compensation Gain Value", enter the actual temperature input in the RTD. After the entry, click the** Gain Setting **button.**

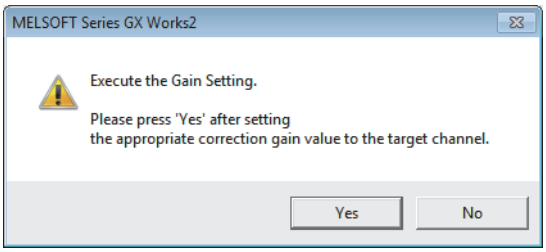


↓

(To the next step)

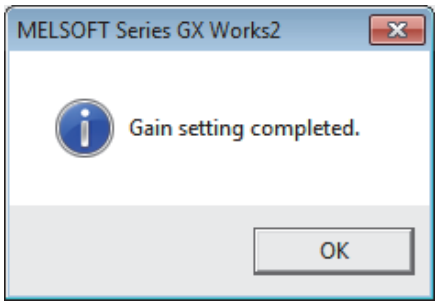
(From the previous step)

↓



17. **Click the** Yes **button.**

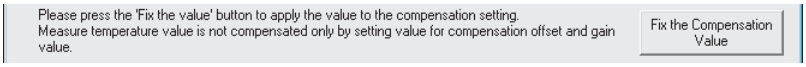
↓



18. **Click the** OK **button.**

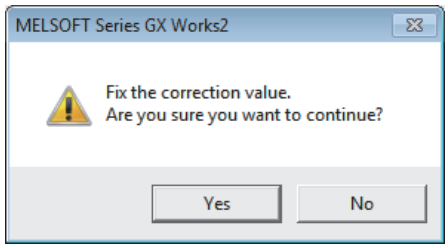
- If the settings need to be configured for other channels, repeat the procedure of step 4 to 17.
- If not, go on to the next step.

↓



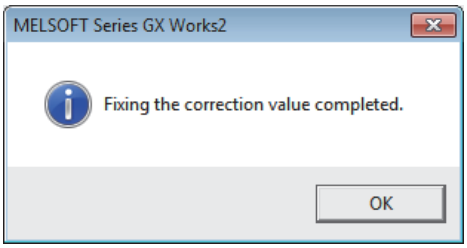
19. **Click the** Fix the Compensation Value **button.**

↓



20. **Click the** Yes **button.**

↓



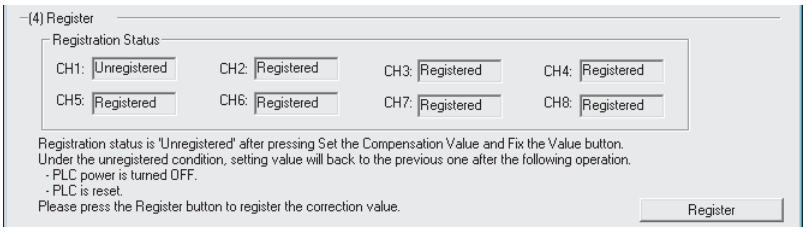
21. **Click the** OK **button.**

↓

(To the next step)

(From the previous step)

↓

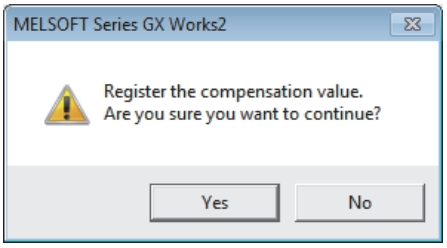


22. After the correction values have been determined, "Registration Status" of the target channels is shown as Unregistered.

- With this state, the sensor two-point correction values are immediately reflected on the digital operation values.
- If "Registration Status" are left Unregistered and the module is powered off or the CPU module is reset, the values are discarded.

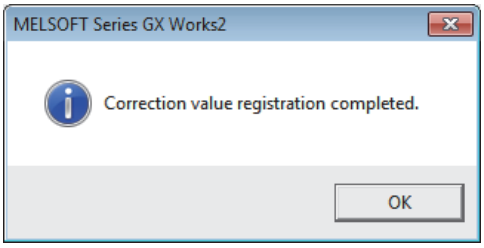
To register the values in the flash memory in the module, click the Register button.

↓



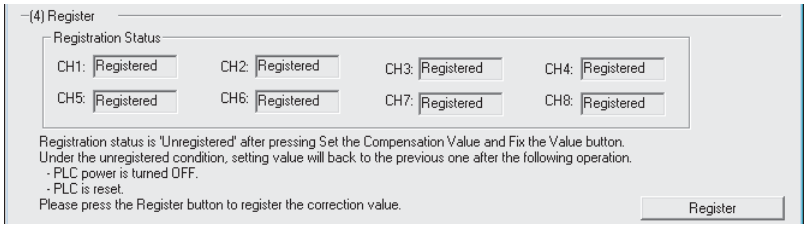
23. Click the Yes button.

↓



24. Click the OK button.

↓



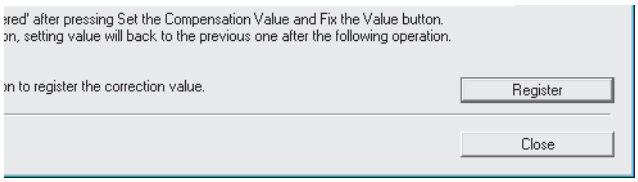
25. After the correction values have been registered, "Registration Status" is shown as Registered.

↓

(To the next step)

(From the previous step)

↓



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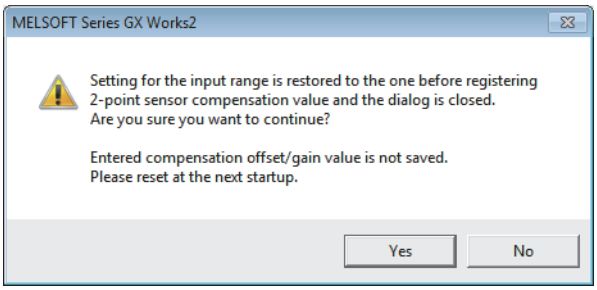


↓

Complete

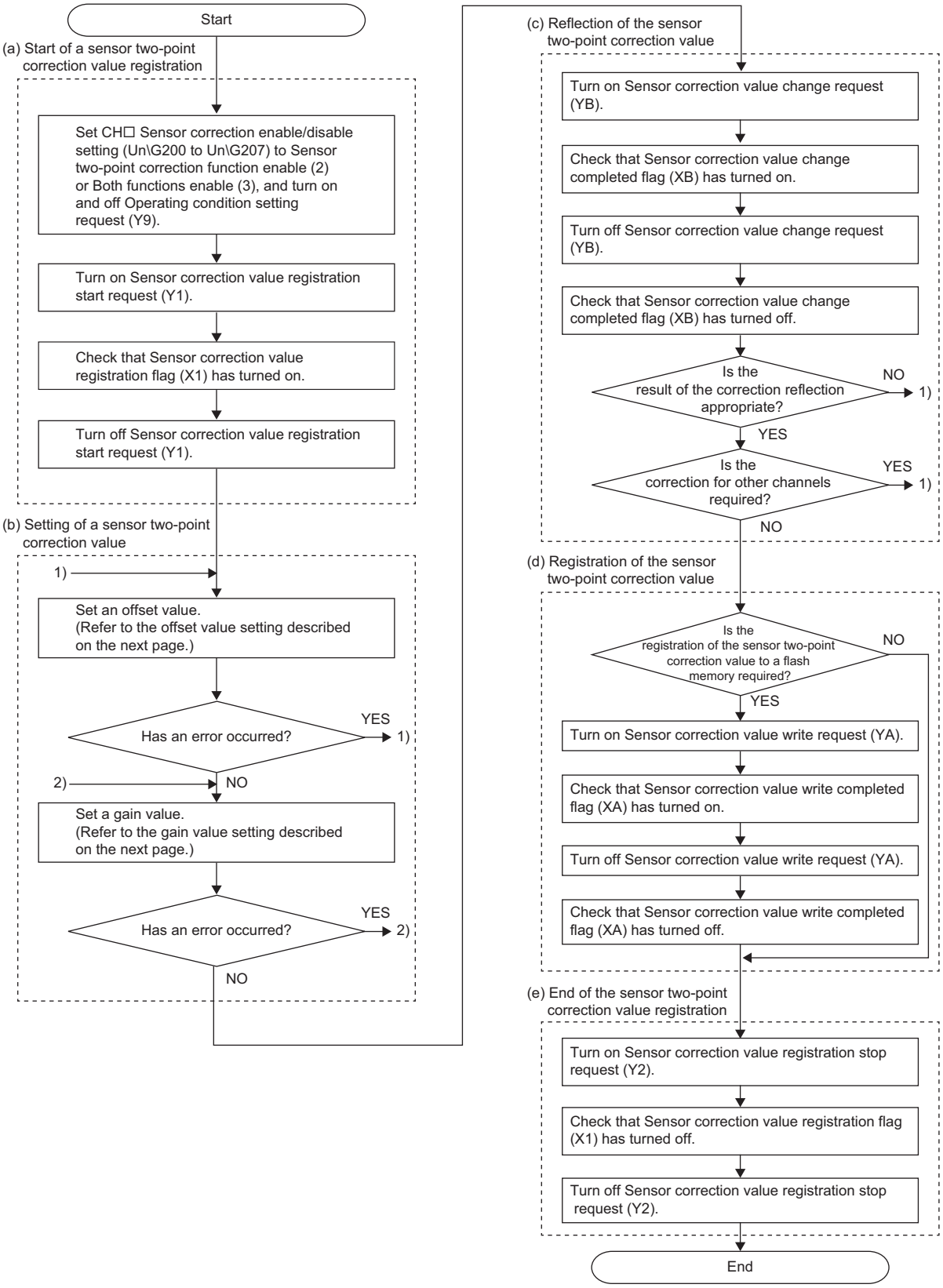
26. **Click the** Close **button.**

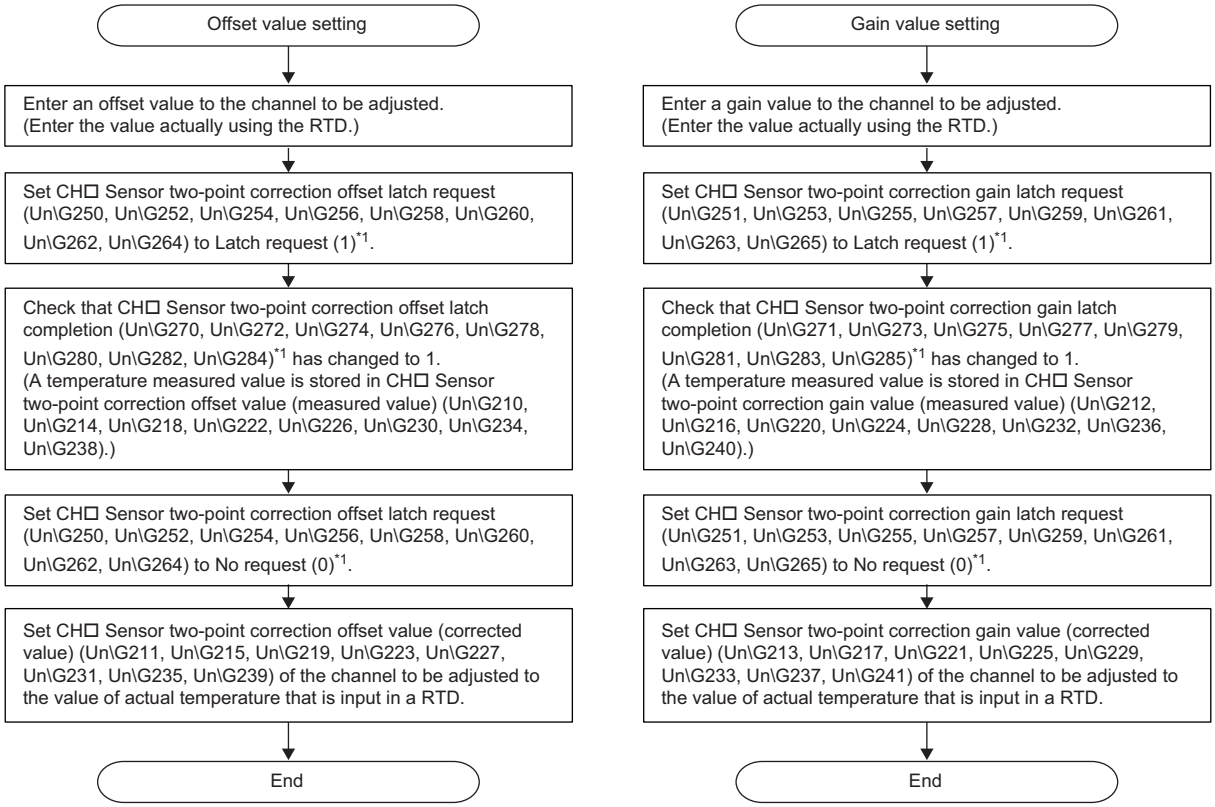
27. **Click the** Yes **button.**

(2) Registration procedure of sensor two-point correction values (for programs)

The flow chart of the execution procedure is shown below.

The registration procedure can be roughly divided into five processes.





*1 For CH□ Sensor two-point correction offset value (measured value) (Un\G210, Un\G214, Un\G218, Un\G222, Un\G226, Un\G230, Un\G234, Un\G238) and CH□ Sensor two-point correction gain value (measured value) (Un\G212, Un\G216, Un\G220, Un\G224, Un\G228, Un\G232, Un\G236, Un\G240), the value can be directly input to the buffer memory area without using the latch request.

The following table lists the buffer memory addresses to be set.

Item	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Sensor two-point correction offset value (measured value)	Un\G210	Un\G214	Un\G218	Un\G222	Un\G226	Un\G230	Un\G234	Un\G238
Sensor two-point correction offset value (corrected value)	Un\G211	Un\G215	Un\G219	Un\G223	Un\G227	Un\G231	Un\G235	Un\G239
Sensor two-point correction gain value (measured value)	Un\G212	Un\G216	Un\G220	Un\G224	Un\G228	Un\G232	Un\G236	Un\G240
Sensor two-point correction gain value (corrected value)	Un\G213	Un\G217	Un\G221	Un\G225	Un\G229	Un\G233	Un\G237	Un\G241
Sensor two-point correction offset latch request	Un\G250	Un\G252	Un\G254	Un\G256	Un\G258	Un\G260	Un\G262	Un\G264
Sensor two-point correction gain latch request	Un\G251	Un\G253	Un\G255	Un\G257	Un\G259	Un\G261	Un\G263	Un\G265
Sensor two-point correction offset latch completion	Un\G270	Un\G272	Un\G274	Un\G276	Un\G278	Un\G280	Un\G282	Un\G284
Sensor two-point correction gain latch completion	Un\G271	Un\G273	Un\G275	Un\G277	Un\G279	Un\G281	Un\G283	Un\G285

Point

- When the sensor two-point correction function becomes enabled for the first time after the purchase, the error (300☐) or the error (301☐) occurs if a value other than the default value is set in CH☐ Input range setting (Un\G500 to Un\G507) and CH☐ Celsius/Fahrenheit display setting (Un\G508 to Un\G515).
  In this case, register the Input range setting and the Celsius/Fahrenheit display setting in the flash memory according to the environment where the module is used.
- Default values of the flash memory

Item	Setting
Input range setting	0041_H
Celsius/Fahrenheit display setting	0
Sensor two-point correction offset value (measured value)	-2000
Sensor two-point correction gain value (measured value)	8500
Sensor two-point correction offset value (corrected value)	-2000
Sensor two-point correction gain value (corrected value)	8500

(a) Starting registering the sensor two-point correction value

To start registering the sensor two-point correction value, turn on and off Sensor correction value registration start request (Y1).

With the above operation, Sensor correction value registration flag (X1) turns on and following requests related to the registration of the sensor two-point correction value can be accepted.

The requests related to the registration are as follows:

- Sensor correction value write request (YA)
- Sensor correction value change request (YB)
- CH☐ Sensor two-point correction offset latch request (☞ Page 159, Appendix 2 (23))
- CH☐ Sensor two-point correction gain latch request (☞ Page 159, Appendix 2 (24))

Point

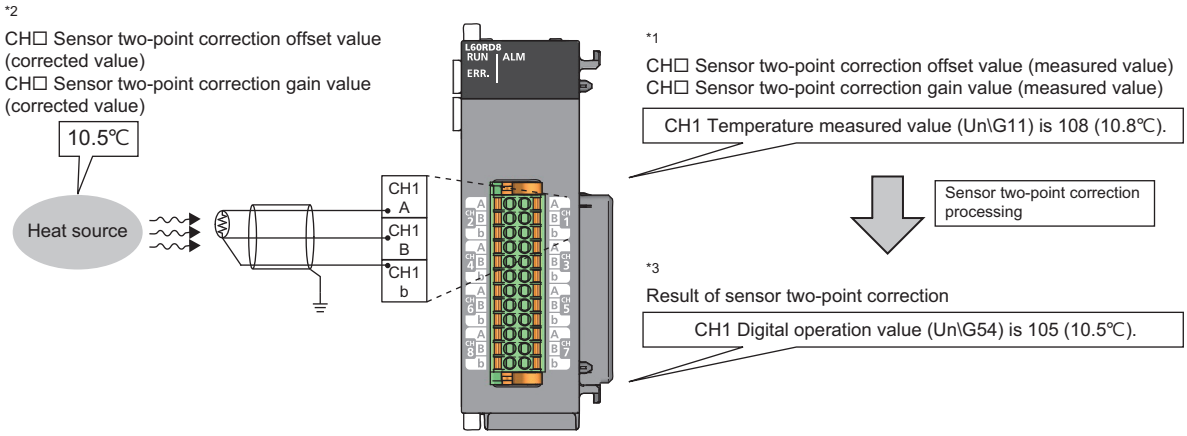
While Sensor correction value registration flag (X1) is on, Operating condition setting request (Y9) cannot be accepted. Turn on Sensor correction value registration start request (Y1) after completing the setting change of CH☐ Input range setting (Un\G500 to Un\G507), CH☐ Celsius/Fahrenheit display setting (Un\G508 to Un\G515), and CH☐ Sensor correction enable/disable setting (Un\G200 to Un\G207), which are necessary for the registration of the sensor two-point correction value.

(b) Setting the sensor two-point correction value

Configure settings to obtain a sensor two-point correction value to be registered.

- CH□ Sensor two-point correction offset value (measured value) (☞ Page 157, Appendix 2 (19))
- CH□ Sensor two-point correction gain value (measured value) (☞ Page 158, Appendix 2 (21))
- CH□ Sensor two-point correction offset value (corrected value) (☞ Page 157, Appendix 2 (20))
- CH□ Sensor two-point correction gain value (corrected value)

Ex. If the heat source is 10.5℃ and CH1 Temperature measured value (Un\G11) measured in the environment where the module is used is 10.8℃, performing the sensor two-point correction function stores 10.5℃ in CH1 Digital operation value (Un\G54).



*1 Setting for CH□ Sensor two-point correction offset value (measured value) (☞ Page 157, Appendix 2 (19)) and CH□ Sensor two-point correction gain value (measured value) (☞ Page 158, Appendix 2 (21))
Set a value stored in CH□ Temperature measured value (Un\G11 to Un\G18).

*2 Setting for CH□ Sensor two-point correction offset value (corrected value) (☞ Page 157, Appendix 2 (20)) and CH□ Sensor two-point correction gain value (corrected value) (☞ Page 158, Appendix 2 (22))
Set the actual temperature that is input in a RTD.

*3 The registration result of the sensor two-point correction value is stored in CH□ Digital operation value (Un\G54 to Un\G61).

Point

Set the sensor two-point correction value in the following conditions.

- CH□ Sensor two-point correction offset value (measured value) (☞ Page 157, Appendix 2 (19)) < CH□ Sensor two-point correction gain value (measured value) (☞ Page 158, Appendix 2 (21))
- CH□ Sensor two-point correction offset value (corrected value) (☞ Page 157, Appendix 2 (20)) < CH□ Sensor two-point correction gain value (corrected value) (☞ Page 158, Appendix 2 (22))
- All correction values must be within the range of CH□ Input range setting (Un\G500 to Un\G507).

When a value outside the above range is set, an error occurs on the corresponding channel. The error code (304□) is stored in Latest error code (Un\G19), and Error flag (XF) turns on.

(c) Reflecting the sensor two-point correction value

After completing the settings for the sensor two-point correction value, turn on and off Sensor correction value change request (YB).

The set correction value is immediately reflected on CH□ Digital operation value (Un\G54 to Un\G61).

When the set correction value is not proper, adjust the value by setting the sensor two-point correction value again.

Point

When result value of the sensor two-point correction is outside the setting range of CH□ Input range setting (Un\G500 to Un\G507), CH□ Digital operation value (Un\G54 to Un\G61) is fixed to the upper limit value or the lower limit value of CH□ Input range setting (Un\G500 to Un\G507).

(d) Registering the sensor two-point correction value

Turn on and off Sensor correction value write request (YA) to register the sensor two-point correction value, which was reflected on the RTD input module with Sensor correction value change request (YB), in the flash memory in the module.

By registering the sensor two-point correction value in the flash memory, even if either of the following operations is performed, the registered value is taken over.

- Power off the module.
- Reset the CPU module.

Perform either of the following operations to read the sensor two-point correction value registered in the flash memory.

- Power off and on the module.
- Reset the CPU module.

Check procedure of the sensor two-point correction value registration

1. **Set Conversion enable (1) to CH□ Input range setting (Un\G500 to Un\G507) of the channel to be checked.**
2. **Set Sensor two-point correction function enable (2) or Both functions enable (3) in CH□ Sensor correction enable/disable setting (Un\G200 to Un\G207) of the channel to be checked.**
3. **After the above settings, the read correction value is reflected on the module when Operating condition setting request (Y9) is turned on and off, and the sensor two-point correction function starts.**

Point

For CH□ Input range setting (Un\G500 to Un\G507) and CH□ Celsius/Fahrenheit display setting (Un\G508 to Un\G515), set the same values for registering the correction value in the flash memory and reading the correction value from the flash memory.

- When different values are set for CH□ Input range setting (Un\G500 to Un\G507) for the registration and for the reading, the error (300□) occurs. (☞ Page 163, Appendix 2 (32))
- When different values are set for CH□ Celsius/Fahrenheit display setting (Un\G508 to Un\G515) for the registration and for the reading, the error (301□) occurs. (☞ Page 163, Appendix 2 (33))
- If the above error occurs, the value stored in CH□ Temperature measured value (Un\G11 to Un\G18) or a value after the shift conversion is stored in CH□ Digital operation value (Un\G54 to Un\G61).

(e) Finishing registering the sensor two-point correction value

To finish registering the sensor two-point correction value, turn on and off Sensor correction value registration stop request (Y2).

Sensor correction value registration flag (X1) turns off and Operating condition setting request (Y9) can be accepted.

8.9 Error Log Function

This function stores the errors and alarms that occurred in the RTD input module in the buffer memory areas (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. The 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	The value is 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.		04_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 has occurred on Thursday, May 01, 2014 at 10:35:40

(2) Clearing the error history

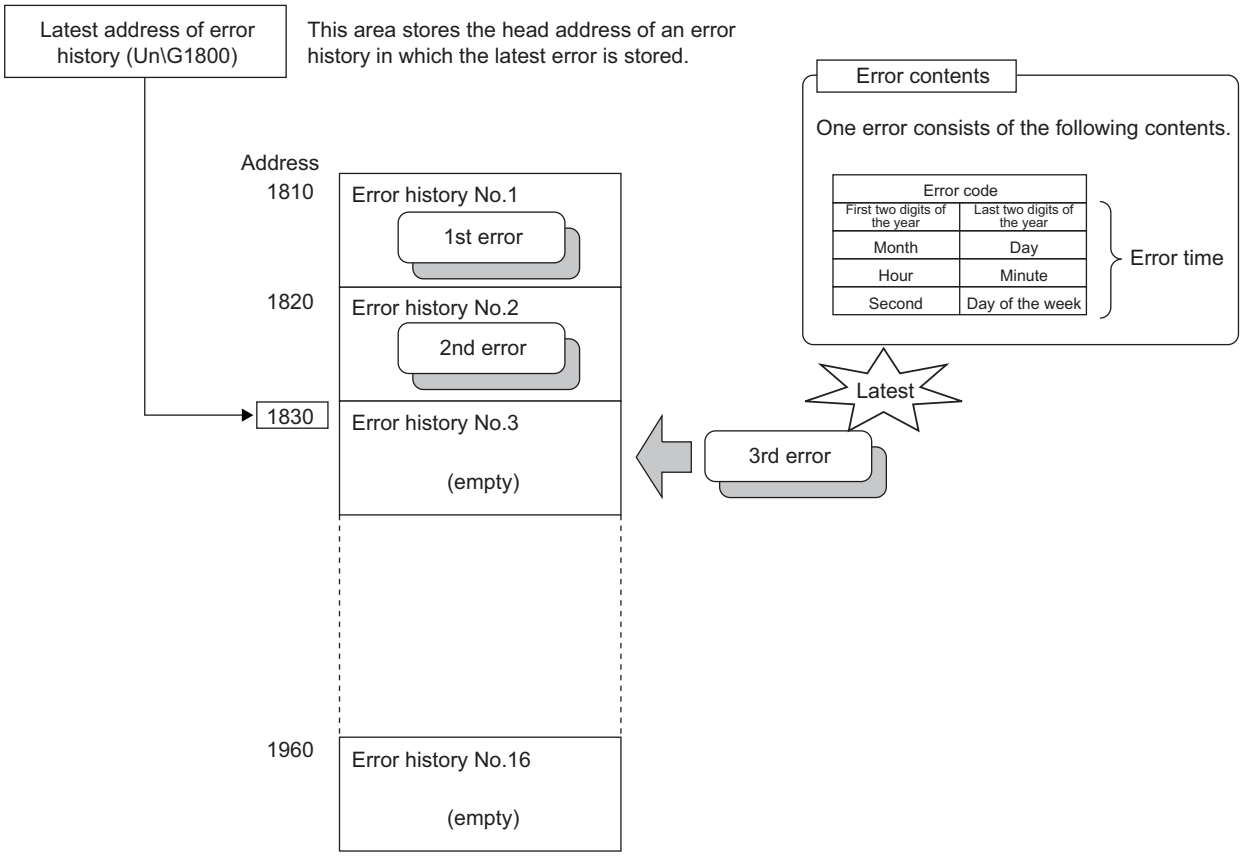
Perform any of the following operations to clear the error history.

- Power off the module.
- Reset the CPU module.
- Set Clear (1) in Clear setting of error history (Un\G1802) and turn on and off Error clear request (YF) or Operating condition setting request (Y9).

(3) Checking the error history

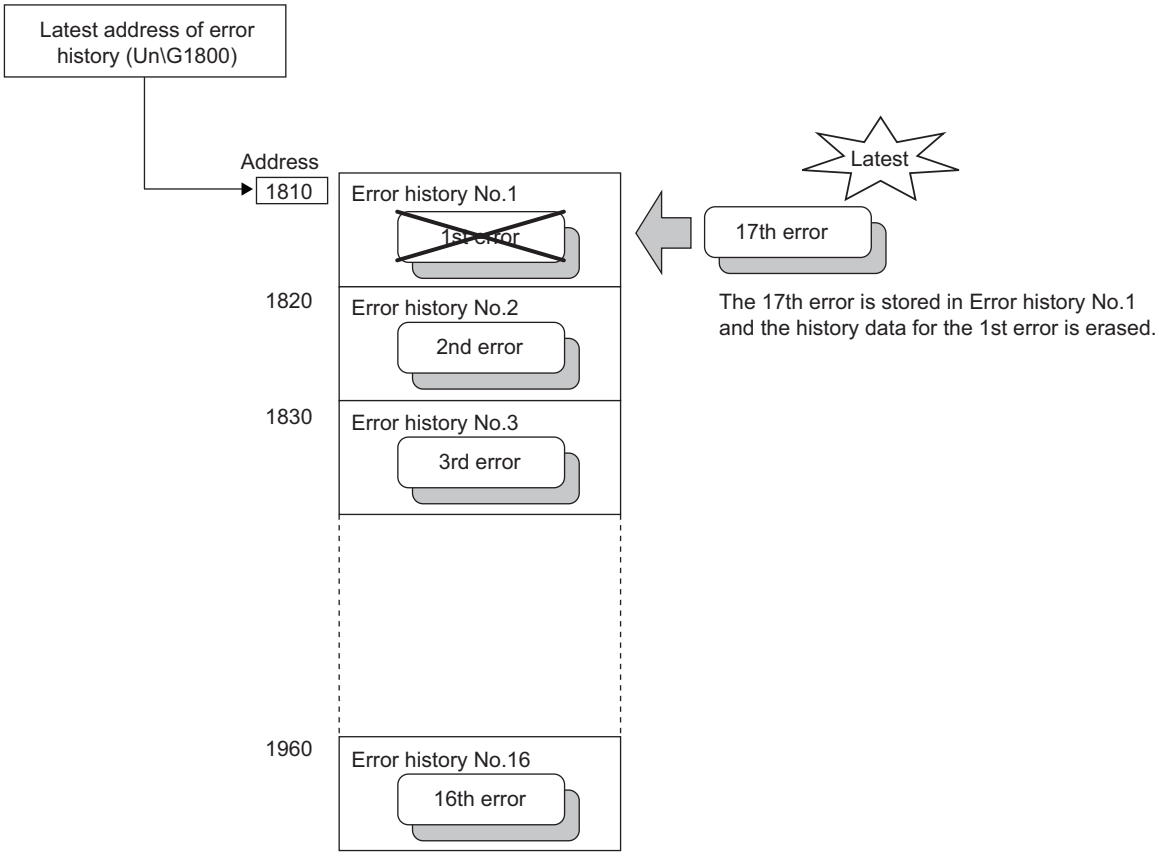
The start address of the Error history where the latest error is stored can be checked in Latest address of error history (Un\G1800).

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 in Latest address of error history (Un\G1800).



Ex. When the 17th error occurs:

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



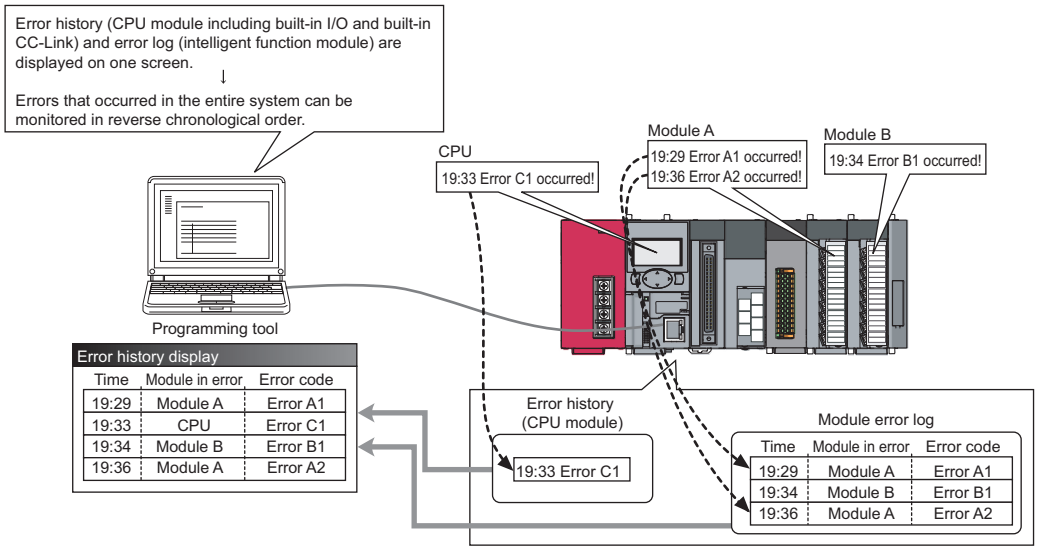
Point

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

8.10 Module Error Collection Function

This function collects the errors and alarms that occurred in the RTD 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 the CPU module is reset.



[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)

8.11 Error Clear Function

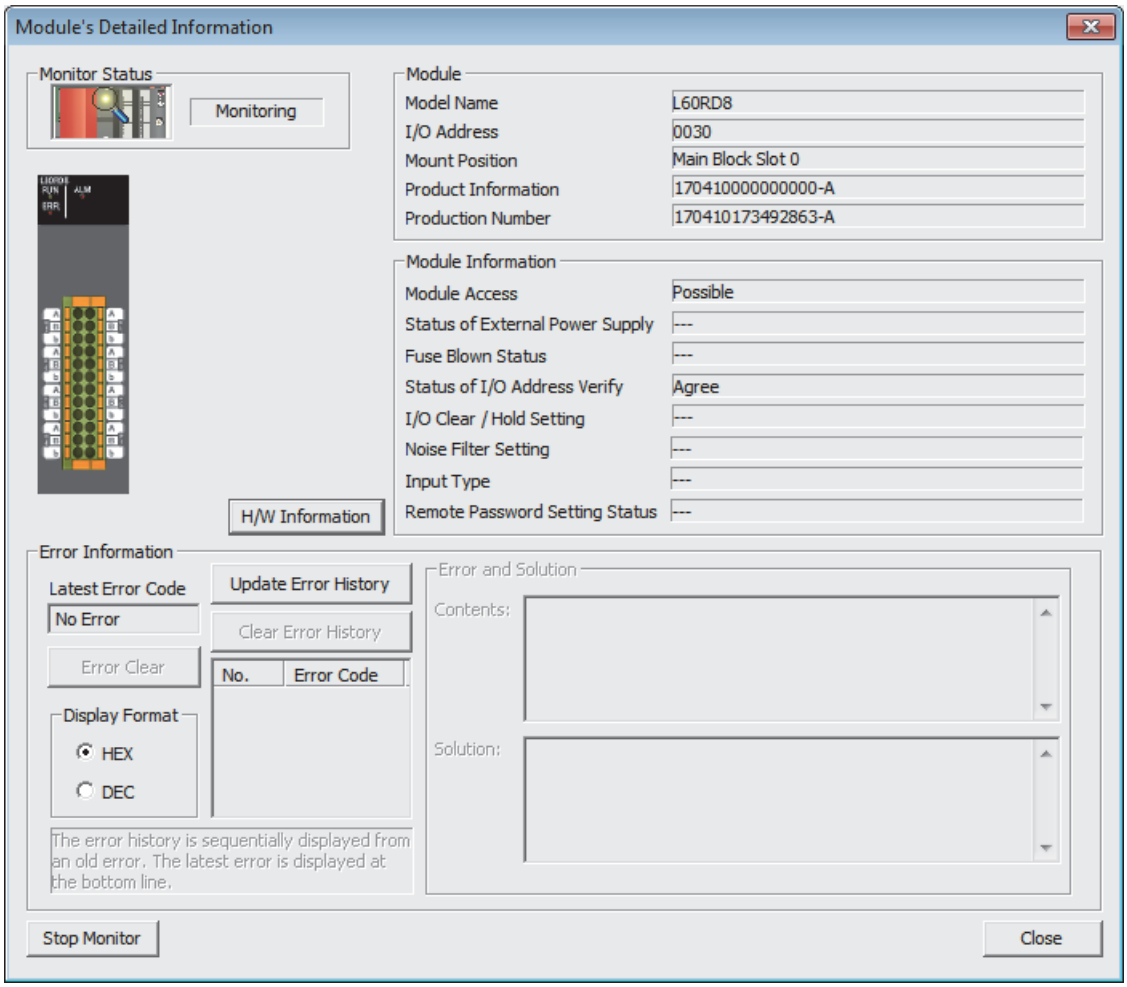
This function clears errors that occur using the system monitor.

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 the error clear using Error clear request (YF) or from the display unit.

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

For how to clear errors with Error clear request (YF) or the display unit, refer to the following.

- Error clear request (YF) (☞ Page 143, Appendix 1.2 (7))
- Checking and Clearing Errors (☞ Page 104, Section 9.4)



CHAPTER 9 DISPLAY UNIT

This chapter describes the functions of the display unit that can be used with the RTD 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

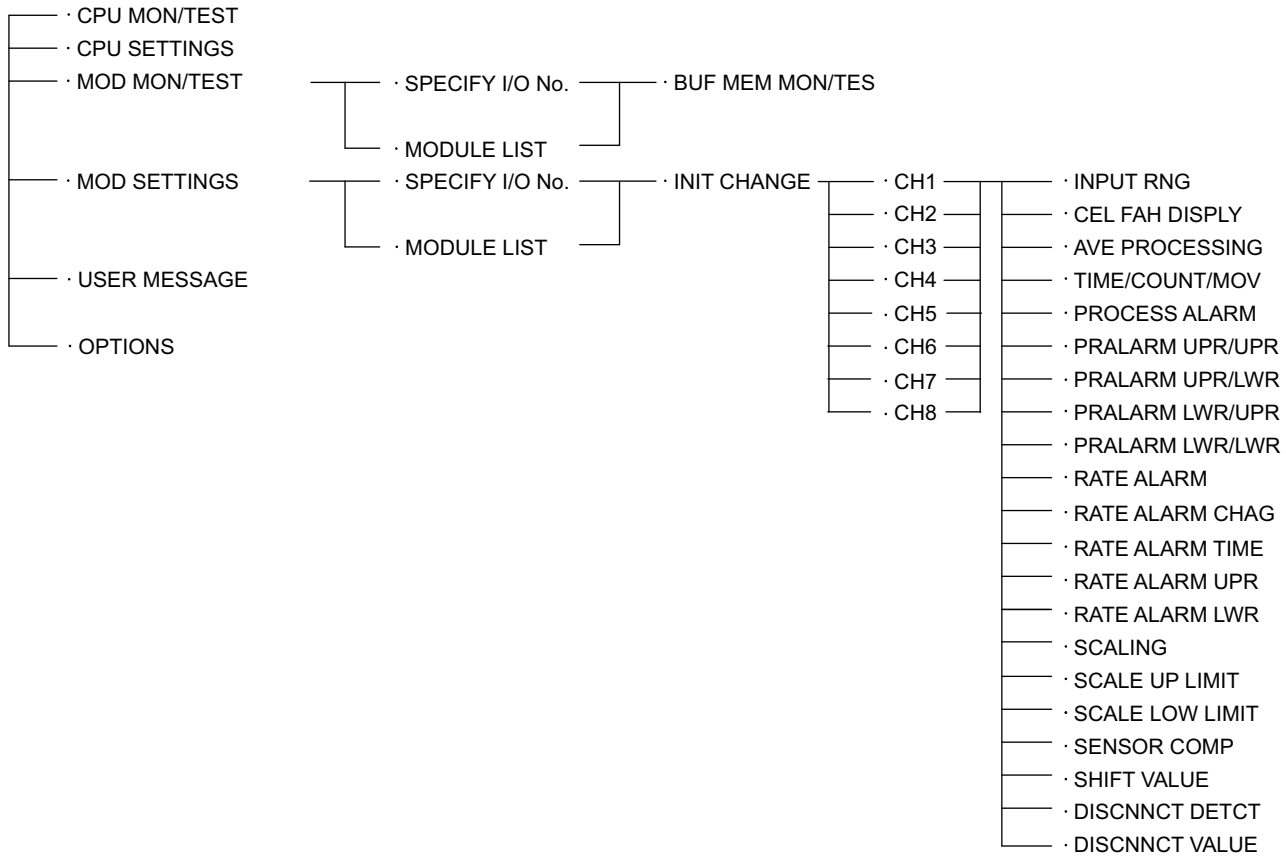
The display unit is an LCD attachable to the CPU module. By attaching it to the CPU module, the status of the system can be checked and the system settings can be changed without the software package.
In addition, if a problem occurs, the cause of the problem can be identified by displaying the error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

- Checking and Clearing Errors (☞ Page 104, Section 9.4)

9.2 Menu Transition

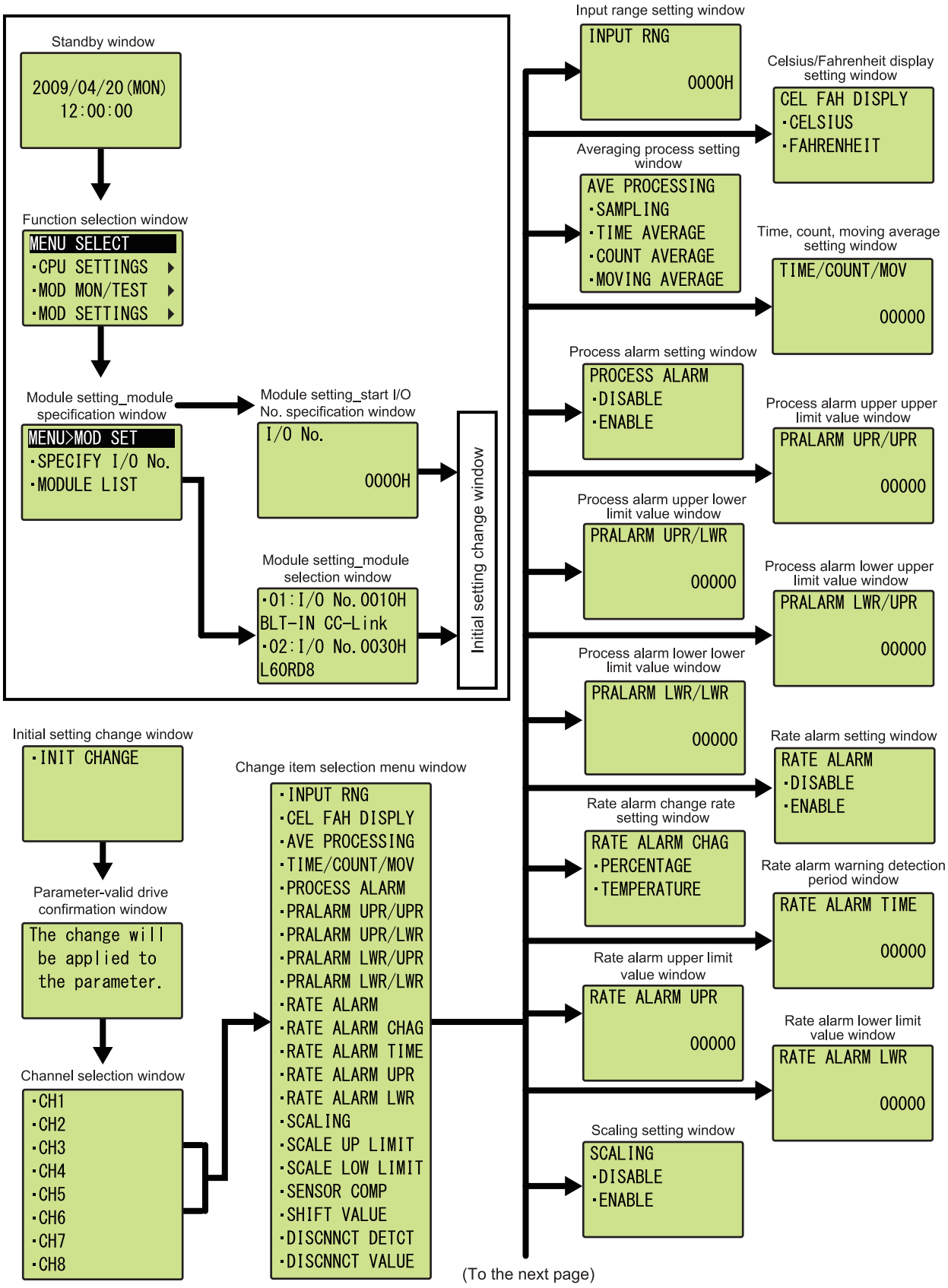
(1) Organization

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

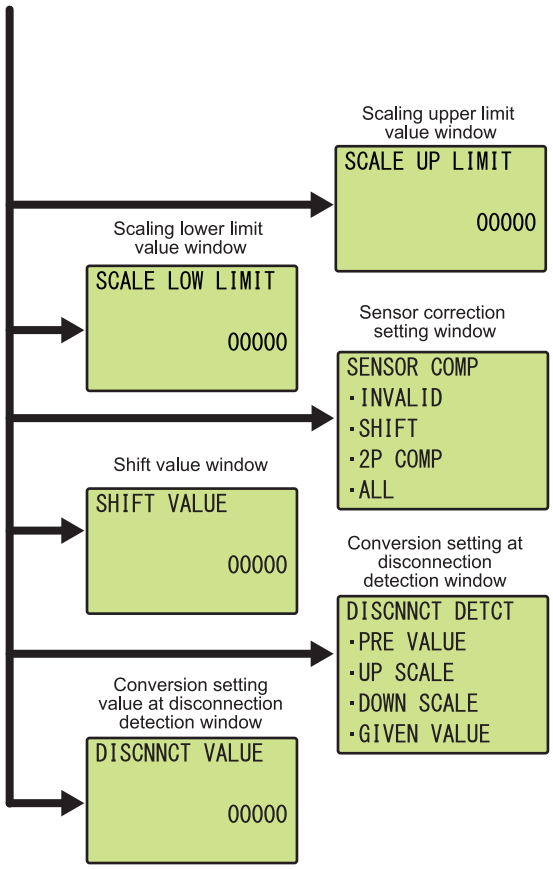


(2) Window transitions up to the initial setting change window

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



（From the previous page）



9.3 List of Setting Value Change Windows

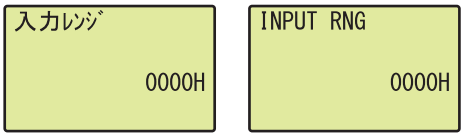
The following table lists the setting value change windows.

Name		Window format	Input limits	
Setting item	Window display		Upper limit	Lower limit
Input range setting	INPUT RNG	Numerical	$FFFF_H$	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	Numerical	36000	0
Warning output function(Process Alarm)	PROCESS ALARM	Selection	-	-
Process alarm upper upper limit value	PRALARM UPR/UPR	Numerical	32767	-32768
Process alarm upper lower limit value	PRALARM UPR/LWR	Numerical	32767	-32768
Process alarm lower upper limit value	PRALARM LWR/UPR	Numerical	32767	-32768
Process alarm lower lower limit value	PRALARM LWR/LWR	Numerical	32767	-32768
Warning output function(Rate Alarm)	RATE ALARM	Selection	-	-
Rate alarm change rate selection	RATE ALARM CHAG	Selection	-	-
Rate alarm detect cycle time	RATE ALARM TIME	Numerical	36000	0
Rate alarm upper limit value	RATE ALARM UPR	Numerical	32767	-32768
Rate alarm lower limit value	RATE ALARM LWR	Numerical	32767	-32768
Scaling enable/disable setting	SCALING	Selection	-	-
Scaling upper limit value	SCALE UP LIMIT	Numerical	32000	-32000
Scaling lower limit value	SCALE LOW LIMIT	Numerical	32000	-32000
Sensor compensation valid/invalid setting	SENSOR COMP	Selection	-	-
Shifting amount to conversion value	SHIFT VALUE	Numerical	32767	-32768
Conversion setting for disconnection detection	DISCNNCT DETCT	Selection	-	-
Conversion setting for disconnection detection value	DISCNNCT VALUE	Numerical	32767	-32768

(1) Input range setting

Select an input range in the "INPUT RANGE" window.

"INPUT RANGE" window



1. Move the cursor with the ◀ or ▶ button, increase and decrease the value of the cursor one by one with the ▲ or ▼ button, and confirm with the OK button.

For details on setting values, refer to the following.

☞ CH□ Input range setting (Un\G500 to Un\G507) (Page 162, Appendix 2 (30))

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 RTD input module.

(2) Celsius/Fahrenheit display setting

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

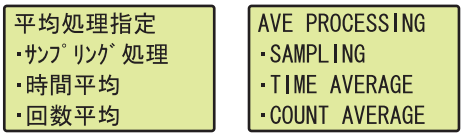
"CEL FAH DISPLY" window

1. Select "CELSIUS" or "FAHRENHEIT" with the ▲ or ▼ button and confirm with the OK button.

(3) Averaging process setting

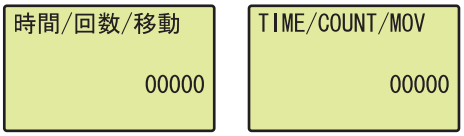
In the "AVE PROCESSING" window, select whether to perform sampling processing or averaging processing (time average, count average, moving average).

"AVE PROCESSING" window



↓

"TIME/COUNT/MOV" window



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

2. **Move the cursor with the ◀ or ▶ button, increase and decrease the value of the cursor one by one with the ▲ or ▼ button, and confirm with the OK button.**

Table of input items

Input item	Input range	
	Input upper limit	Input lower limit
TIME	18000	13
COUNT	36000	4
MOV	1000	2

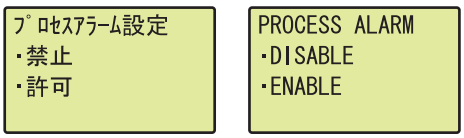
Point

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 RTD input module.

(4) Process alarm setting

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

"PROCESS ALARM" window



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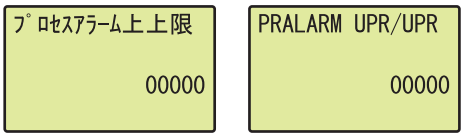
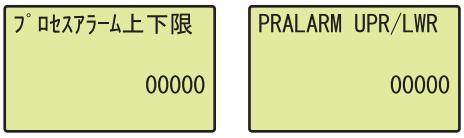
"PRALARM UPR/UPR" window



↓

"PRALARM UPR/LWR" window



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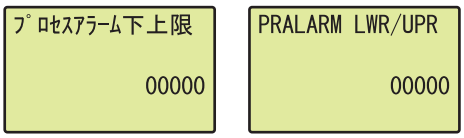
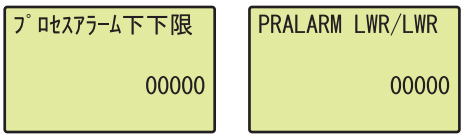
"PRALARM LWR/UPR" window



↓

"PRALARM LWR/LWR" window



1. **Select "DISABLE" or "ENABLE" with the ▲ or ▼ button and confirm with the OK button. (When "ENABLE" is selected, follow the procedure 2 and later.)**

2. **Move the cursor with the ◀ or ▶ button, increase and decrease the value of the cursor one by one with the ▲ or ▼ button, and confirm with the OK button.**

3. **Move the cursor with the ◀ or ▶ button, increase and decrease the value of the cursor one by one with the ▲ or ▼ button, and confirm with the OK button.**

4. **Move the cursor with the ◀ or ▶ button, increase and decrease the value of the cursor one by one with the ▲ or ▼ button, and confirm with the OK button.**

5. **Move the cursor with the ◀ or ▶ button, increase and decrease the value of the cursor one by one with the ▲ or ▼ button, and 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		

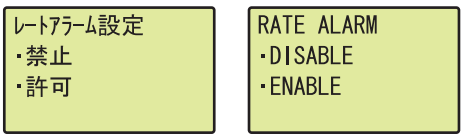
Point

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 RTD input module.

(5) Rate alarm setting

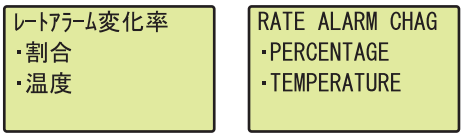
Select "DISABLE" or "ENABLE" in the "RATE ALARM" window.

"RATE ALARM" window



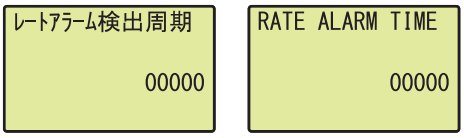
↓

"RATE ALARM CHAG" window



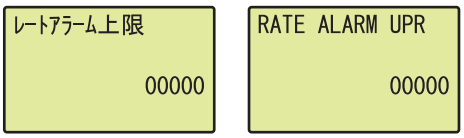
↓

"RATE ALARM TIME" window



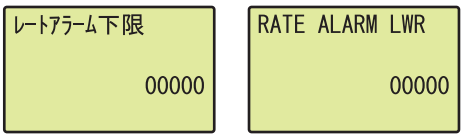
↓

"RATE ALARM UPR" window



↓

"RATE ALARM LWR" window



1. **Select "DISABLE" or "ENABLE" with the ▲ or ▼ button and confirm with the OK button. (When "ENABLE" is selected, follow the procedure 2 and later.)**

2. **Select "PERCENTAGE" or "TEMPERATURE" with the ▲ or ▼ button and confirm with the OK button.**

3. **Move the cursor with the ◀ or ▶ button, increase and decrease the value of the cursor one by one with the ▲ or ▼ button, and confirm with the OK button.**

4. **Move the cursor with the ◀ or ▶ button, increase and decrease the value of the cursor one by one with the ▲ or ▼ button, and confirm with the OK button.**

5. **Move the cursor with the ◀ or ▶ button, increase and decrease the value of the cursor one by one with the ▲ or ▼ button, and 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		

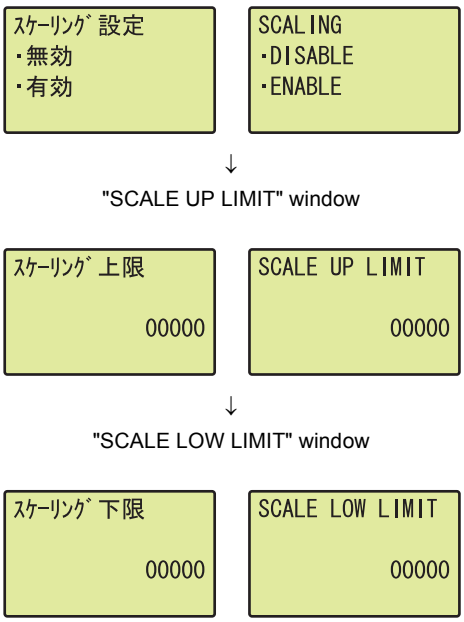
Point

- 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 RTD 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 RTD input module.

(6) Scaling setting

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

"SCALING" window



1. **Select "DISABLE" or "ENABLE" with the ▲ or ▼ button and confirm with the OK button. (When "ENABLE" is selected, follow the procedure 2 and later.)**

2. **Move the cursor with the ◀ or ▶ button, increase and decrease the value of the cursor one by one with the ▲ or ▼ button, and confirm with the OK button.**

3. **Move the cursor with the ◀ or ▶ button, increase and decrease the value of the cursor one by one with the ▲ or ▼ button, and 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 RTD input module.

(7) Sensor correction setting

Select a conversion setting in the "SENSOR COMP" window.

"SENSOR COMP" window

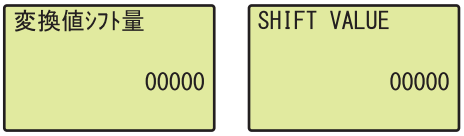
1. **Select a conversion setting from the following with the ▲ or ▼ button and confirm with the OK button.**

- INVALID
- SHIFT
- 2P COMP
- ALL

(8) Shifting amount to conversion value

Set the shifting amount to conversion value in the "SHIFT VALUE" window.

"SHIFT VALUE" window



1. **Move the cursor with the ◀ or ▶ button, increase and decrease the value of the cursor one by one with the ▲ or ▼ button, and confirm with the OK button.**

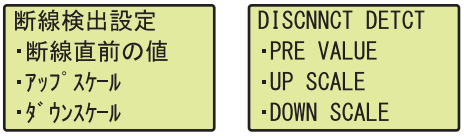
Table of input items

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

(9) Conversion setting at disconnection detection

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

"DISCNNCT DETCT" window



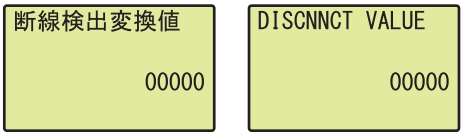
1. **Select a conversion setting from the following with the ▲ or ▼ button and confirm with the OK button.**

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

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

↓

"DISCNNCT VALUE" window



2. **Move the cursor with the ◀ or ▶ button, increase and decrease the value of the cursor one by one with the ▲ or ▼ button, and confirm with the OK button.**

Table of input items

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

9.4 Checking and Clearing Errors

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

(1) Checking errors

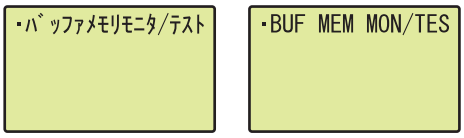
The error that occurred in the RTD input module can be checked by specifying Latest error code (Un\G19) from "BUF MEM MON/TES".

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

- List of Error Codes (☞ Page 128, Section 11.4)
- List of Alarm Codes (☞ Page 130, Section 11.5)

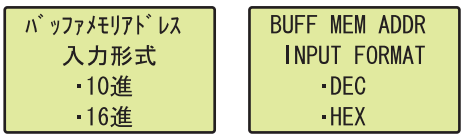
Ex. When an error occurs in the RTD input module with a start I/O number of 10

"BUF MEM MON/TES" window



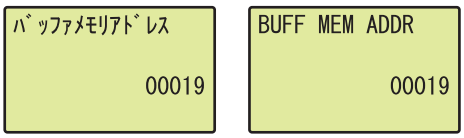
↓

"BUFF MEM ADDR INPUT FORMAT" window



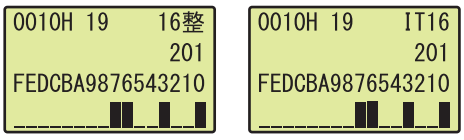
↓

"BUFF MEM ADDR" window



↓

Buffer memory monitor window



1. **Press the OK button.**

2. **Set the input type of buffer memory address to "DEC" with the ▲ or ▼ button and confirm with the OK button.**

3. **Move the cursor with the ◀or ▶ button, increase and decrease the value of the cursor one by one with the ▲ or ▼ button to set 19. Confirm with the OK button.**

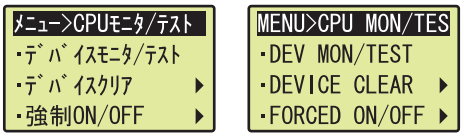
4. **The error that occurred can be checked in the buffer memory monitor window.**

(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".

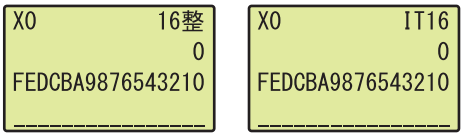
Ex. When an error occurs in the RTD input module with a start I/O number of 10

"CPU MON/TES" window



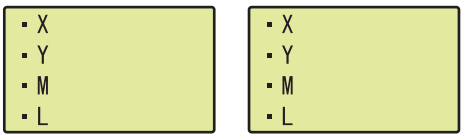
↓

Device monitor window



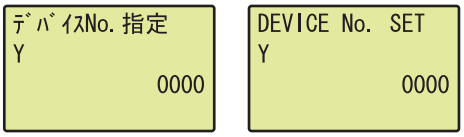
↓

Device selection window



↓

"DEVICE No. SET" window



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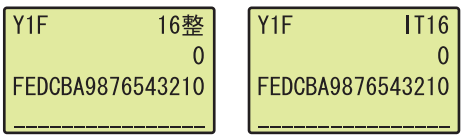
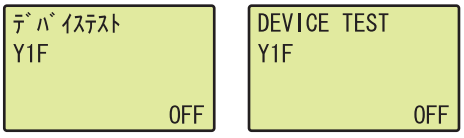
Device monitor window

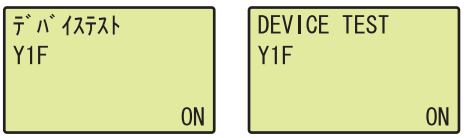


↓

"DEVICE TEST" window



↓



1. **Select "DEV MON/TEST" with the ▲ or ▼ button and confirm with the OK button.**

2. **Press the ◀ button.**

3. **Select Y as the target device with the ▲ or ▼ button and confirm with the OK button.**

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

5. **Press the OK button.**

6. **Press the OK button.**

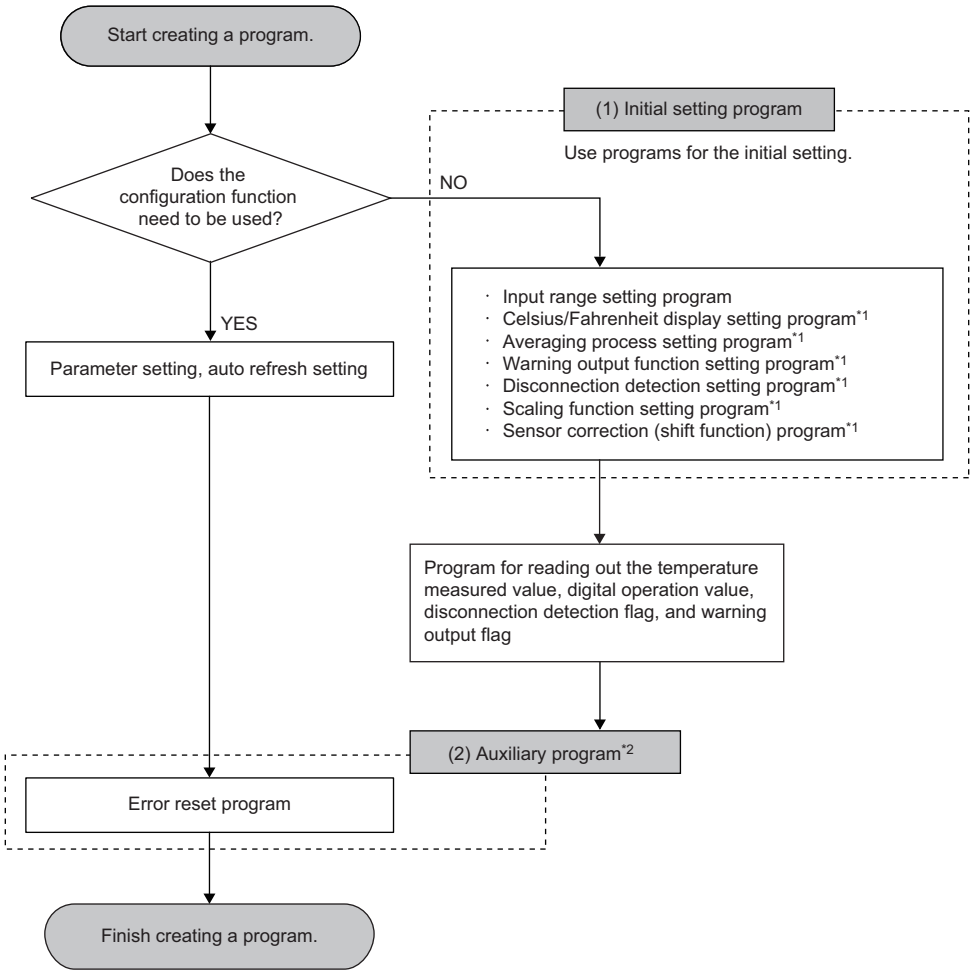
7. **Turn ON with the ▲ or ▼ button and confirm with the OK button.**

CHAPTER 10 PROGRAMMING

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

10.1 Programming Procedure

Create a program to operate the RTD input module according to the following procedure.



*1 These programs are required depending on the function used.

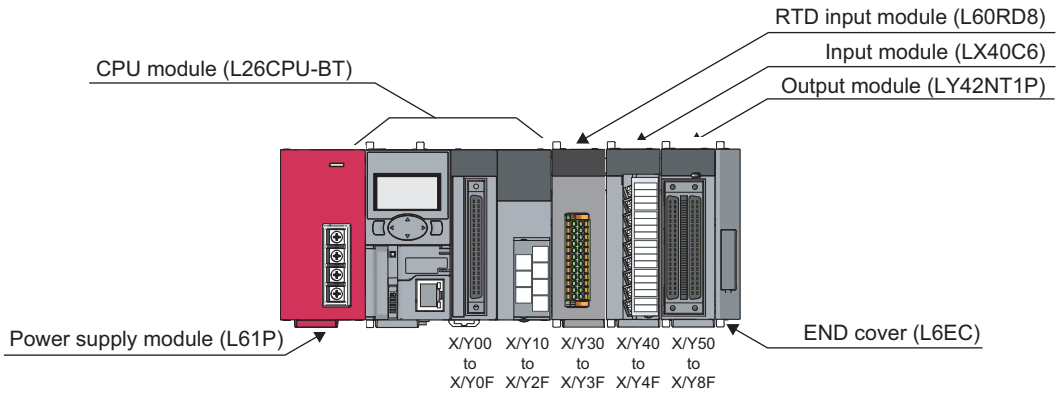
*2 This program is required depending on the control. Create the program as needed.

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 the system configuration example.



(2) Programming condition

This program enables the conversion for CH1 to CH4 and reads temperature measured values.

- CH1: RTD (Pt50 -200 to 650℃)
- CH2: RTD (Cu100 -180 to 200℃)
- CH3: RTD (Pt100 -200 to 850℃)
- CH4: RTD (Ni120 -60 to 250℃)
- CH5 to CH8: Conversion disable

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

Item			CH1	CH2	CH3	CH4	CH5 to CH8
Basic setting		Input range setting	Pt50 (-200 to 650℃)	Cu100 (-180 to 200℃)	Pt100 (-200 to 850℃)	Ni120 (-60 to 250℃)	Conversion disable
		Celsius/Fahrenheit display setting	Fahrenheit	Celsius	Celsius	Celsius	Celsius
		Averaging process setting	Sampling processing	Count average	Sampling processing	Sampling processing	Sampling processing
		Time Average/Count Average/ Moving Average	0	50 times	0	0	0
Disconnection detection function		Conversion setting at disconnection detection	Downscale	Value just before disconnection	Any value	Value just before disconnection	Downscale
		Conversion setting value at disconnection detection	0℉	0℃	-3276.8℃	0℃	0℃
Scaling function		Scaling enable/disable setting	Disable	Disable	Disable	Enable	Disable
		Scaling upper limit value	0	0	0	10000	0
		Scaling lower limit value	0	0	0	-10000	0
Waning output function		Process alarm output setting	Disable	Disable	Enable	Disable	Disable
		Process alarm upper upper limit value	0.0℉	0℃	300.0℃	0℃	0℃
		Process alarm upper lower limit value	0.0℉	0℃	295.0℃	0℃	0℃
		Process alarm lower upper limit value	0.0℉	0℃	205.0℃	0℃	0℃
		Process alarm lower lower limit value	0.0℉	0℃	200.0℃	0℃	0℃
		Rate alarm output setting	Enable	Disable	Disable	Disable	Disable
		Rate alarm change rate selection	Temperature	Ratio	Ratio	Ratio	Ratio
		Rate alarm warning detection cycle	5	0	0	0	0
		Rate alarm upper limit value	12.2℉	0℃	0℃	0℃	0℃
		Rate alarm lower limit value	-12.2℉	0℃	0℃	0℃	0℃
Sensor correction function	-	Sensor correction enable/disable setting	Disable	Shift function enable	Disable	Disable	Disable
	Shift function	Shifting amount to conversion value	0	100	0	0	0

(b) Device for user

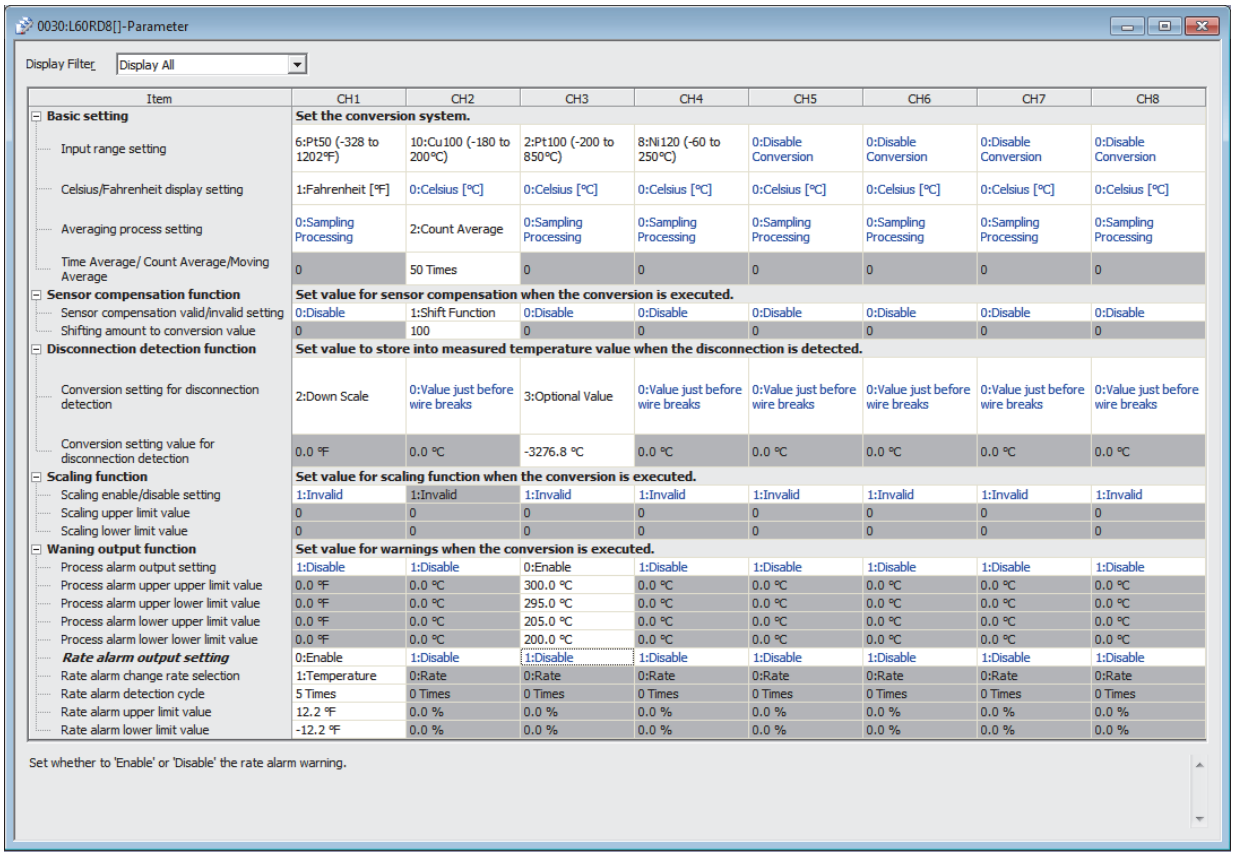
Device	Description	
D1 (D11)	CH1 Temperature measured value	
D2	CH2 Temperature measured value	
D3 (D13)	CH3 Temperature measured value	
D4	CH4 Temperature measured value	
D8	Disconnection detection flag	
D9	Error code	
D18	Warning output flag (Process alarm)	
D19	Warning output flag (Rate alarm)	
D24 (D12)	CH2 Digital operation value	
D26 (D14)	CH4 Digital operation 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)	
M40 to M47	Warning output flag (Rate alarm)	
M60 to M63	Disconnection detection flag	
M100	Module READY checking flag	
X40	Temperature measured value read command input signal	LX40C6 (X40 to X4F)
X43	Disconnection detection reset signal	
X44	Warning output reset signal	
X45	Error 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]

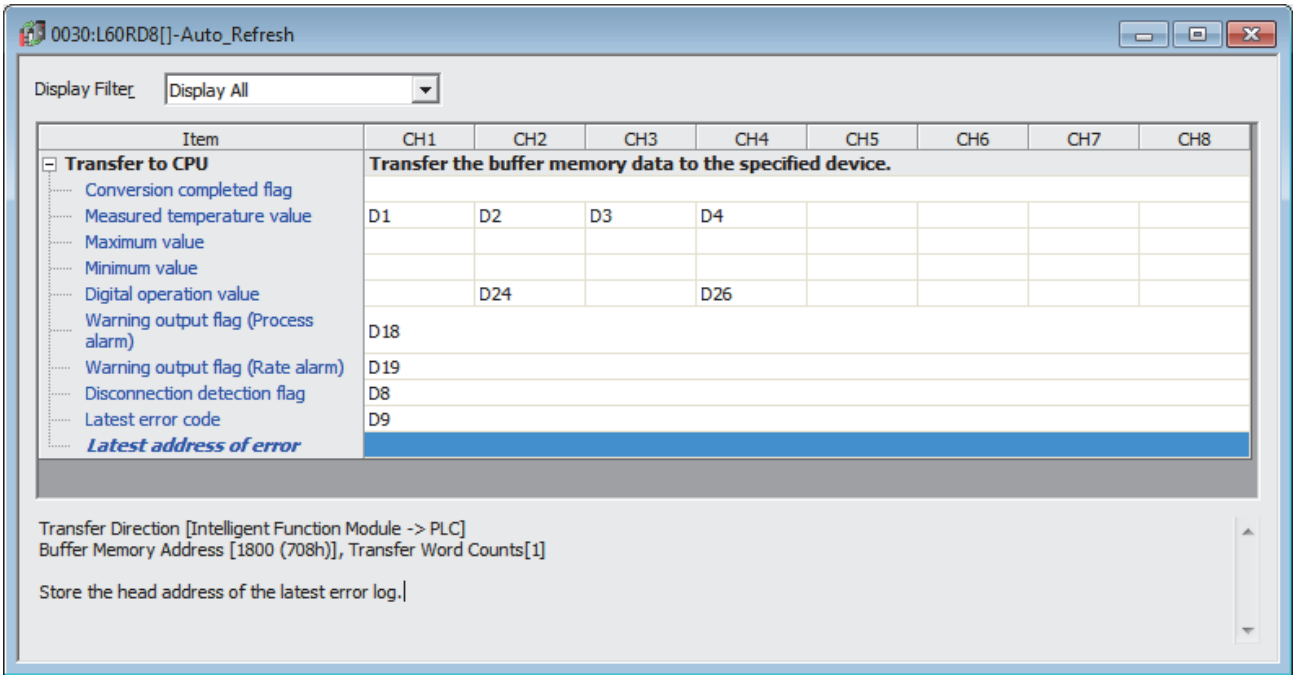


Item	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Basic setting	**Set the conversion system.**							
Input range setting	6:Pt50 (-328 to 1202°F)	10:Cu100 (-180 to 200°C)	2:Pt100 (-200 to 850°C)	8:Ni120 (-60 to 250°C)	0:Disable Conversion	0:Disable Conversion	0:Disable Conversion	0:Disable Conversion
Celsius/Fahrenheit display setting	1:Fahrenheit [°F]	0:Celsius [°C]	0:Celsius [°C]	0:Celsius [°C]	0:Celsius [°C]	0:Celsius [°C]	0:Celsius [°C]	0:Celsius [°C]
Averaging process setting	0:Sampling Processing	2:Count Average	0:Sampling Processing	0:Sampling Processing	0:Sampling Processing	0:Sampling Processing	0:Sampling Processing	0:Sampling Processing
Time Average/ Count Average/Moving Average	0	50 Times	0	0	0	0	0	0
Sensor compensation function	**Set value for sensor compensation when the conversion is executed.**							
Sensor compensation valid/invalid setting	0:Disable	1:Shift Function	0:Disable	0:Disable	0:Disable	0:Disable	0:Disable	0:Disable
Shifting amount to conversion value	0	100	0	0	0	0	0	0
Disconnection detection function	**Set value to store into measured temperature value when the disconnection is detected.**							
Conversion setting for disconnection detection	2:Down Scale	0:Value just before wire breaks	3:Optional Value	0:Value just before wire breaks	0:Value just before wire breaks	0:Value just before wire breaks	0:Value just before wire breaks	0:Value just before wire breaks
Conversion setting value for disconnection detection	0.0 °F	0.0 °C	-3276.8 °C	0.0 °C	0.0 °C	0.0 °C	0.0 °C	0.0 °C
Scaling function	**Set value for scaling function when the conversion is executed.**							
Scaling enable/disable setting	1:Invalid	1:Invalid	1:Invalid	1:Invalid	1:Invalid	1:Invalid	1:Invalid	1:Invalid
Scaling upper limit value	0	0	0	0	0	0	0	0
Scaling lower limit value	0	0	0	0	0	0	0	0
Waning output function	**Set value for warnings when the conversion is executed.**							
Process alarm output setting	1:Disable	1:Disable	0:Enable	1:Disable	1:Disable	1:Disable	1:Disable	1:Disable
Process alarm upper upper limit value	0.0 °F	0.0 °C	300.0 °C	0.0 °C	0.0 °C	0.0 °C	0.0 °C	0.0 °C
Process alarm upper lower limit value	0.0 °F	0.0 °C	295.0 °C	0.0 °C	0.0 °C	0.0 °C	0.0 °C	0.0 °C
Process alarm lower upper limit value	0.0 °F	0.0 °C	205.0 °C	0.0 °C	0.0 °C	0.0 °C	0.0 °C	0.0 °C
Process alarm lower lower limit value	0.0 °F	0.0 °C	200.0 °C	0.0 °C	0.0 °C	0.0 °C	0.0 °C	0.0 °C
Rate alarm output setting	0:Enable	1:Disable	1:Disable	1:Disable	1:Disable	1:Disable	1:Disable	1:Disable
Rate alarm change rate selection	1:Temperature	0:Rate	0:Rate	0:Rate	0:Rate	0:Rate	0:Rate	0:Rate
Rate alarm detection cycle	5 Times	0 Times	0 Times	0 Times	0 Times	0 Times	0 Times	0 Times
Rate alarm upper limit value	12.2 °F	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %
Rate alarm lower limit value	-12.2 °F	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %

Set whether to 'Enable' or 'Disable' the rate alarm warning.

(b) Auto refresh setting

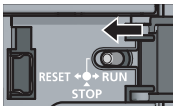
Project window ⇨ [Intelligent Function Module] ⇨ Module name ⇨ [Auto_Refresh]



(c) Writing the parameter of the intelligent function module

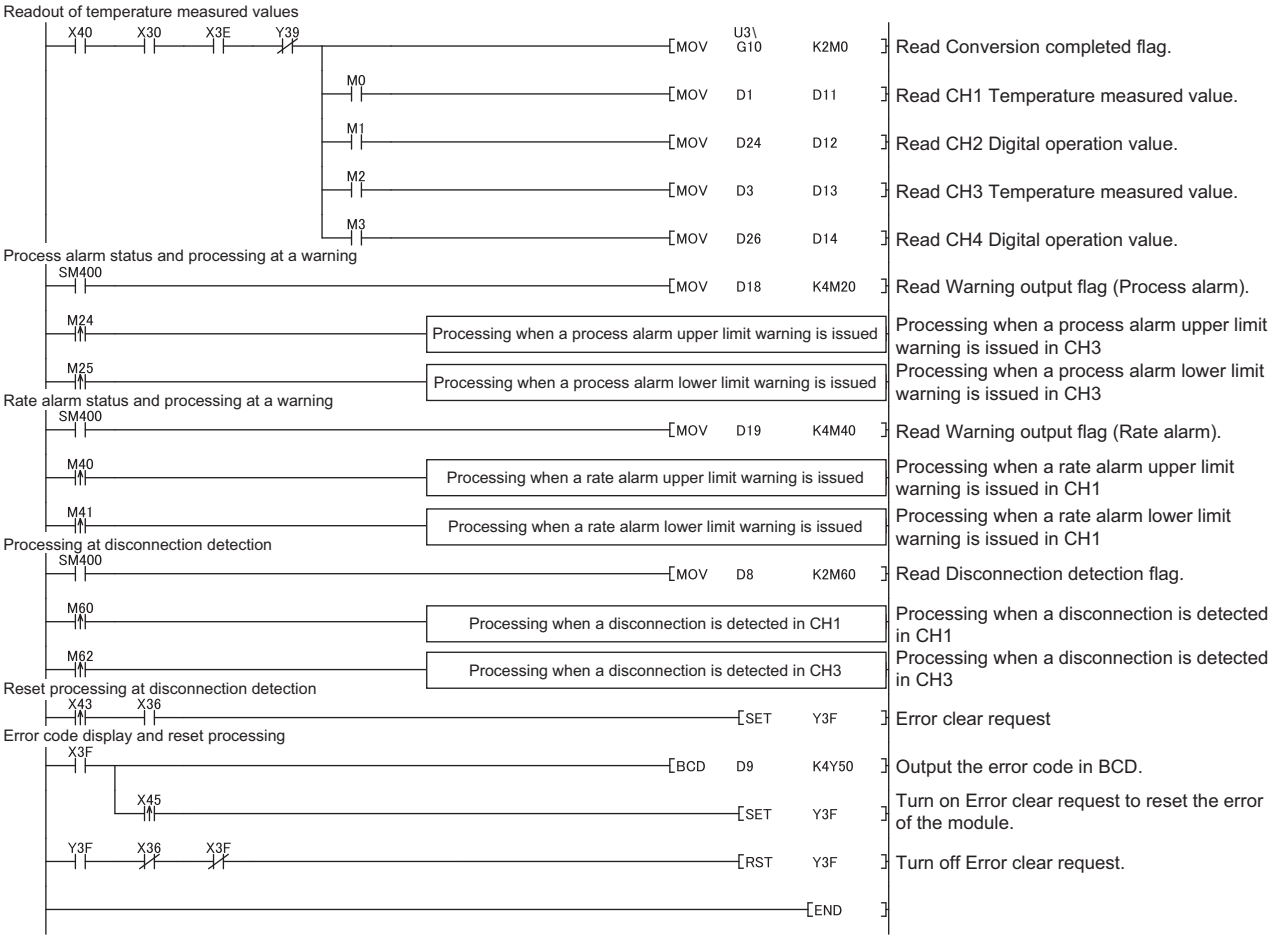
Write the set parameter to the CPU module and reset the CPU module, or power off and on the programmable controllers.

[Online] ⇨ [Write to PLC]

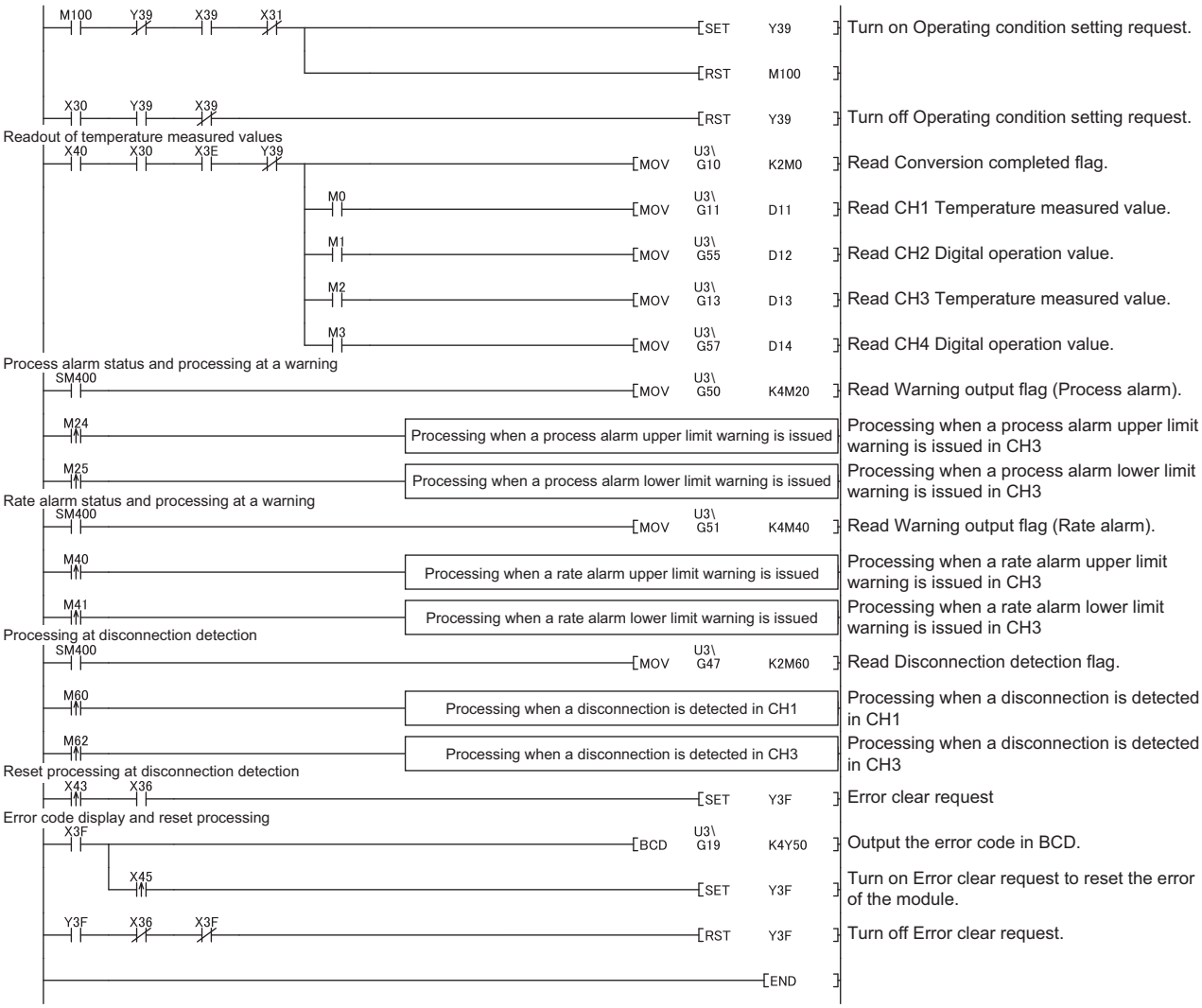


or Power OFF → ON

(d) Program example



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


M100 Y39 X39 X31 SET Y39 Turn on Operating condition setting request.
RST M100
X30 Y39 X39 RST Y39 Turn off Operating condition setting request.
Readout of temperature measured values
X40 X30 X3E Y39 MOV U3\G10 K2M0 Read Conversion completed flag.
M0 MOV U3\G11 D11 Read CH1 Temperature measured value.
M1 MOV U3\G55 D12 Read CH2 Digital operation value.
M2 MOV U3\G13 D13 Read CH3 Temperature measured value.
M3 MOV U3\G57 D14 Read CH4 Digital operation value.
Process alarm status and processing at a warning
SM400 MOV U3\G50 K4M20 Read Warning output flag (Process alarm).
M24 Processing when a process alarm upper limit warning is issued Processing when a process alarm upper limit warning is issued in CH3
M25 Processing when a process alarm lower limit warning is issued Processing when a process alarm lower limit warning is issued in CH3
Rate alarm status and processing at a warning
SM400 MOV U3\G51 K4M40 Read Warning output flag (Rate alarm).
M40 Processing when a rate alarm upper limit warning is issued Processing when a rate alarm upper limit warning is issued in CH3
M41 Processing when a rate alarm lower limit warning is issued Processing when a rate alarm lower limit warning is issued in CH3
Processing at disconnection detection
SM400 MOV U3\G47 K2M60 Read Disconnection detection flag.
M60 Processing when a disconnection is detected in CH1 Processing when a disconnection is detected in CH1
M62 Processing when a disconnection is detected in CH3 Processing when a disconnection is detected in CH3
Reset processing at disconnection detection
X43 X36 SET Y3F 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 to reset the error of the module.
Y3F X36 X3F RST Y3F Turn off Error clear request.
END

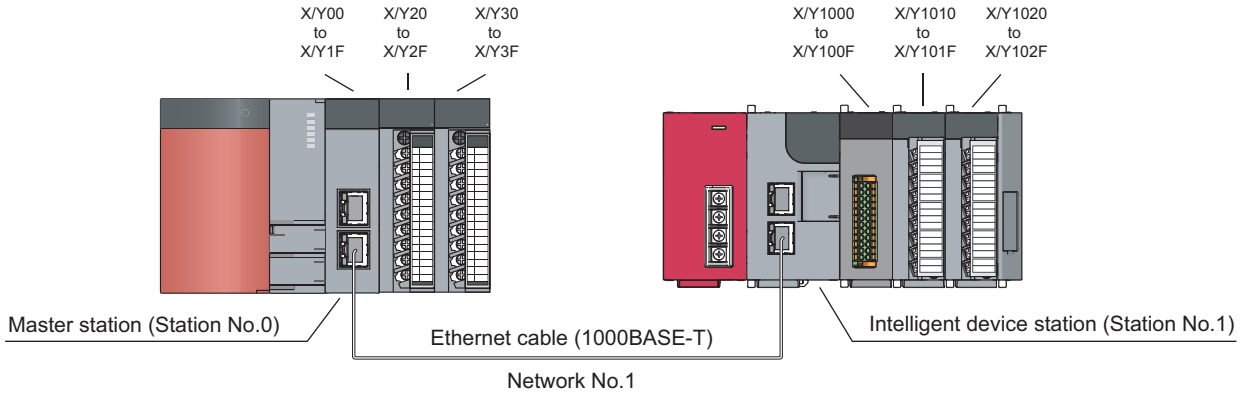
10.3 When Using the Module Connected to a Head Module

This section shows a program example where the system configuration and conditions of the RTD input module apply.

(1) System configuration

Power supply module (Q62P)
CPU module (Q10UDHCPU)
Master/local module (QJ71GF11-T2)
Input module (QX10)
Output module (QY10)

Power supply module (L61P)
Head module (LJ72GF15-T2)
RTD input module (L60RD8)
Input module (LX40C6)
Output module (LY10R2)
END cover (L6EC)



(2) Programming condition

This program enables the conversion for CH5 to CH8 and reads temperature measured values.

- CH1 to CH4: Conversion disable
- CH5: RTD (Pt50 -200 to 650℃)
- CH6: RTD (Cu100 -180 to 200℃)
- CH7: RTD (Pt100 -200 to 850℃)
- CH8: RTD (Ni120 -60 to 250℃)

This program performs the sampling processing to CH5, CH7, and CH8 and the averaging processing every 50 times to CH6 for the conversion. When an error occurs in the module, an error code is indicated in BCD.

(3) Initial setting

Item			CH1 to CH4	CH5	CH6	CH7	CH8
Basic setting		Input range setting	Conversion disable	Pt50 (-200 to 650℃)	Cu100 (-180 to 200℃)	Pt100 (-200 to 850℃)	Ni120 (-60 to 250℃)
		Celsius/Fahrenheit display setting	Celsius	Fahrenheit	Celsius	Celsius	Celsius
		Averaging process setting	Sampling processing	Sampling processing	Count average	Sampling processing	Sampling processing
		Time Average/Count Average/ Moving Average	0	0	50 times	0	0
Disconnection detection function		Conversion setting at disconnection detection	Downscale	Downscale	Value just before disconnection	Any value	Value just before disconnection
		Conversion setting value at disconnection detection	0℃	0℉	0℃	-3276.8℃	0℃
Scaling function		Scaling enable/disable setting	Disable	Disable	Disable	Disable	Enable
		Scaling upper limit value	0	0	0	0	10000
		Scaling lower limit value	0	0	0	0	-10000
Waning output function		Process alarm output setting	Disable	Disable	Disable	Enable	Disable
		Process alarm upper upper limit value	0℃	0.0℉	0℃	300.0℃	0℃
		Process alarm upper lower limit value	0℃	0.0℉	0℃	295.0℃	0℃
		Process alarm lower upper limit value	0℃	0.0℉	0℃	205.0℃	0℃
		Process alarm lower lower limit value	0℃	0.0℉	0℃	200.0℃	0℃
		Rate alarm output setting	Disable	Enable	Disable	Disable	Disable
		Rate alarm change rate selection	Ratio	Temperature	Ratio	Ratio	Ratio
		Rate alarm warning detection cycle	0	5	0	0	0
		Rate alarm upper limit value	0℃	12.2℉	0℃	0℃	0℃
		Rate alarm lower limit value	0℃	-12.2℉	0℃	0℃	0℃
Sensor correction function	-	Sensor correction enable/disable setting	Disable	Disable	Shift function enable	Disable	Disable
	Shift function	Shifting amount to conversion value	0	0	100	0	0

(4) Device for user

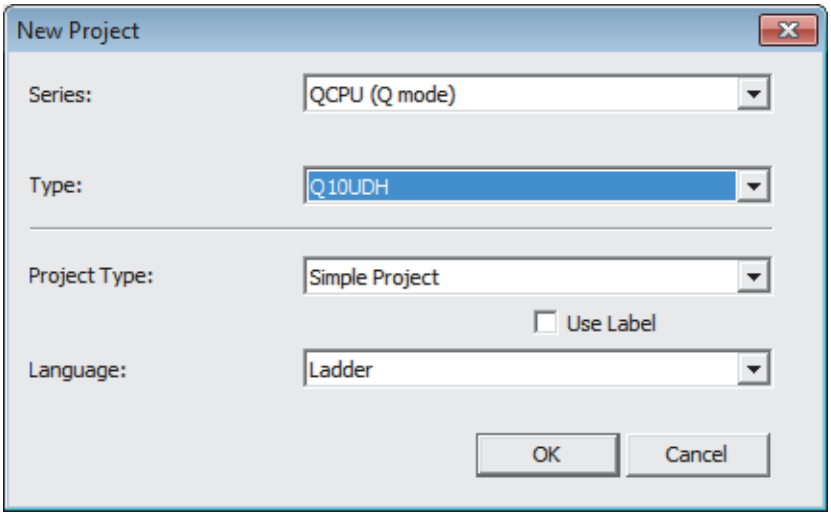
Device	Description	
W1000	Conversion completed flag	
W1005 (D11)	CH5 Temperature measured value	
W1006	CH6 Temperature measured value	
W1007 (D13)	CH7 Temperature measured value	
W1008	CH8 Temperature measured value	
W1009	Disconnection detection flag	
W1010	Latest error code	
W1018	Warning output flag (Process alarm)	
W1019	Warning output flag (Rate alarm)	
W1024 (D12)	CH6 Digital operation value	
W1026 (D14)	CH8 Digital operation value	
D25	CH5 Temperature measured value	
D26	CH6 Digital operation value	
D27	CH7 Temperature measured value	
D28	CH8 Digital operation value	
M4	CH5 Conversion completed flag	
M5	CH6 Conversion completed flag	
M6	CH7 Conversion completed flag	
M7	CH8 Conversion completed flag	
M20 to M35	Warning output flag (Process alarm)	
M40 to M55	Warning output flag (Rate alarm)	
M60 to M67	Disconnection detection flag	
X20	Temperature measured value read command input signal	QX10 (X20 to X2F)
X23	Disconnection detection reset signal	
X24	Warning output reset signal	
X25	Error reset signal	
X26	Initial setting signal	
Y30 to Y3F	Error code notation (BCD 4 digits)	QY40P (Y30 to Y3F)
SB49	Data link status of own station	
SWB0.0	Data link status of each station (station number 1)	
N0	Nesting (station number 1)	
M100	Communication ready flag (station number 1)	
D60	Warning output flag (Process alarm)	
D61	Warning output flag (Rate alarm)	
D57	Disconnection detection flag	
D29	Latest error code	

(5) Setting on the master station

1. Create a project on GX Works2.

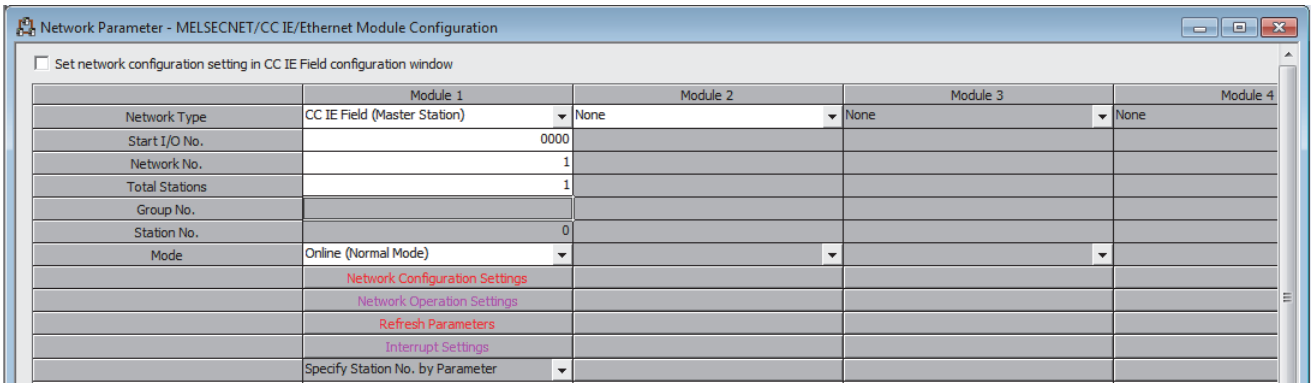
Select "QCPU (Q mode)" for "Series" and select "Q10UDH" for "Type".

[Project] ⇨ [New]



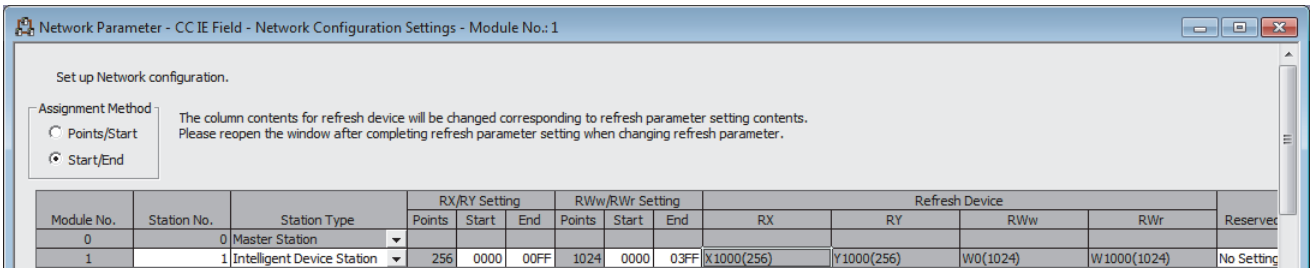
2. Display the Network Parameter window and configure the setting as follows.

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



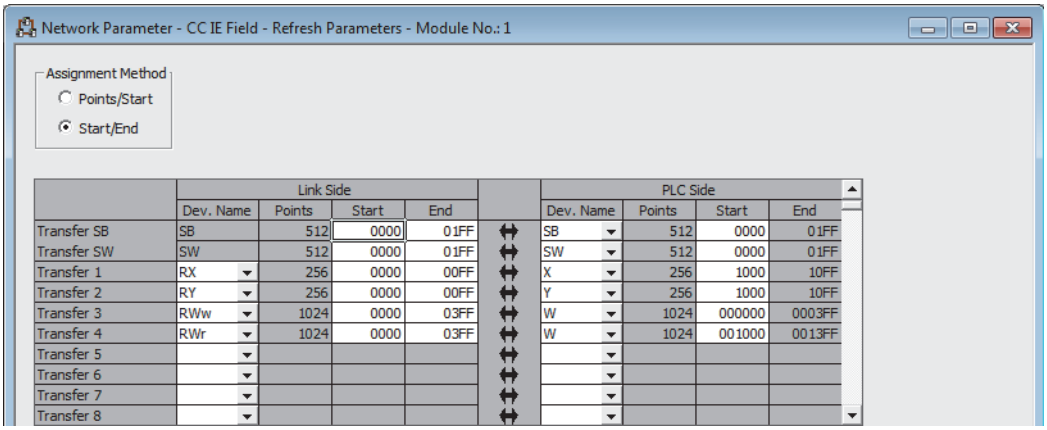
3. Display the Network Configuration Settings window and configure the setting as follows.

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



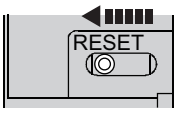
4. Display the Refresh Parameters window and configure the setting as follows.

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



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

[Online] ⇨ [Write to PLC]



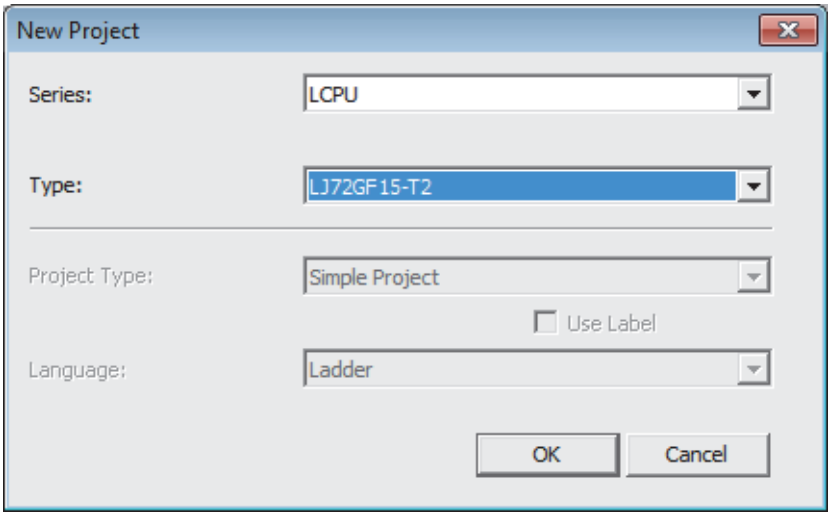
or Power OFF→ON

(6) Setting on the intelligent device station

1. Create a project on GX Works2.

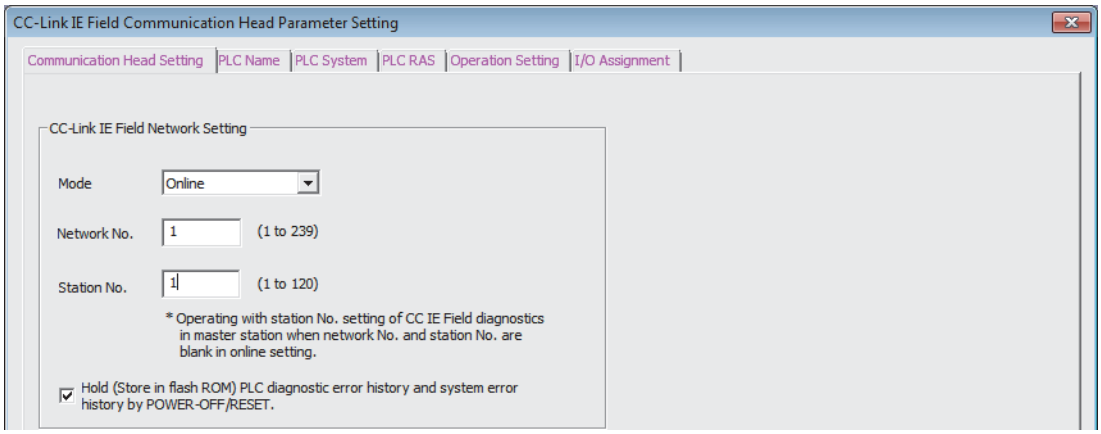
Select "LCPU" for "Series" and select "LJ72GF15-T2" for "Type".

[Project] ⇨ [New]



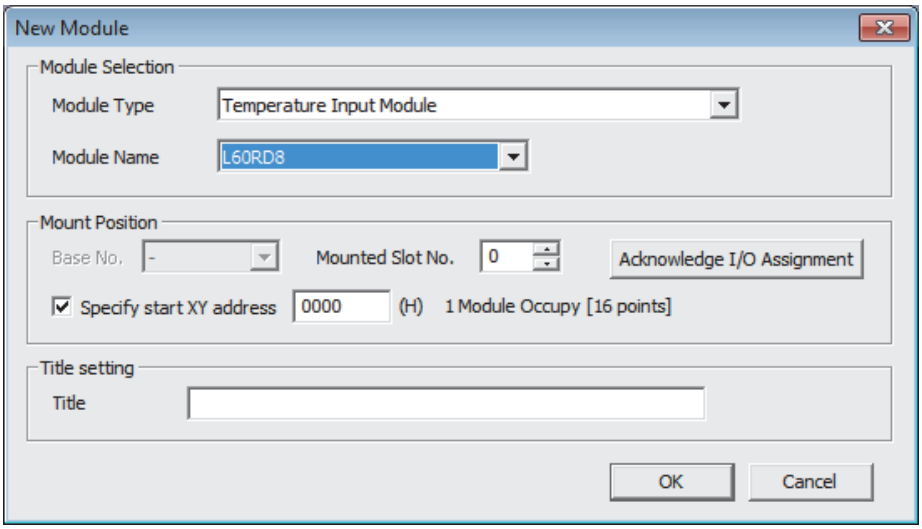
2. Display the PLC Parameter window and configure the setting as follows.

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



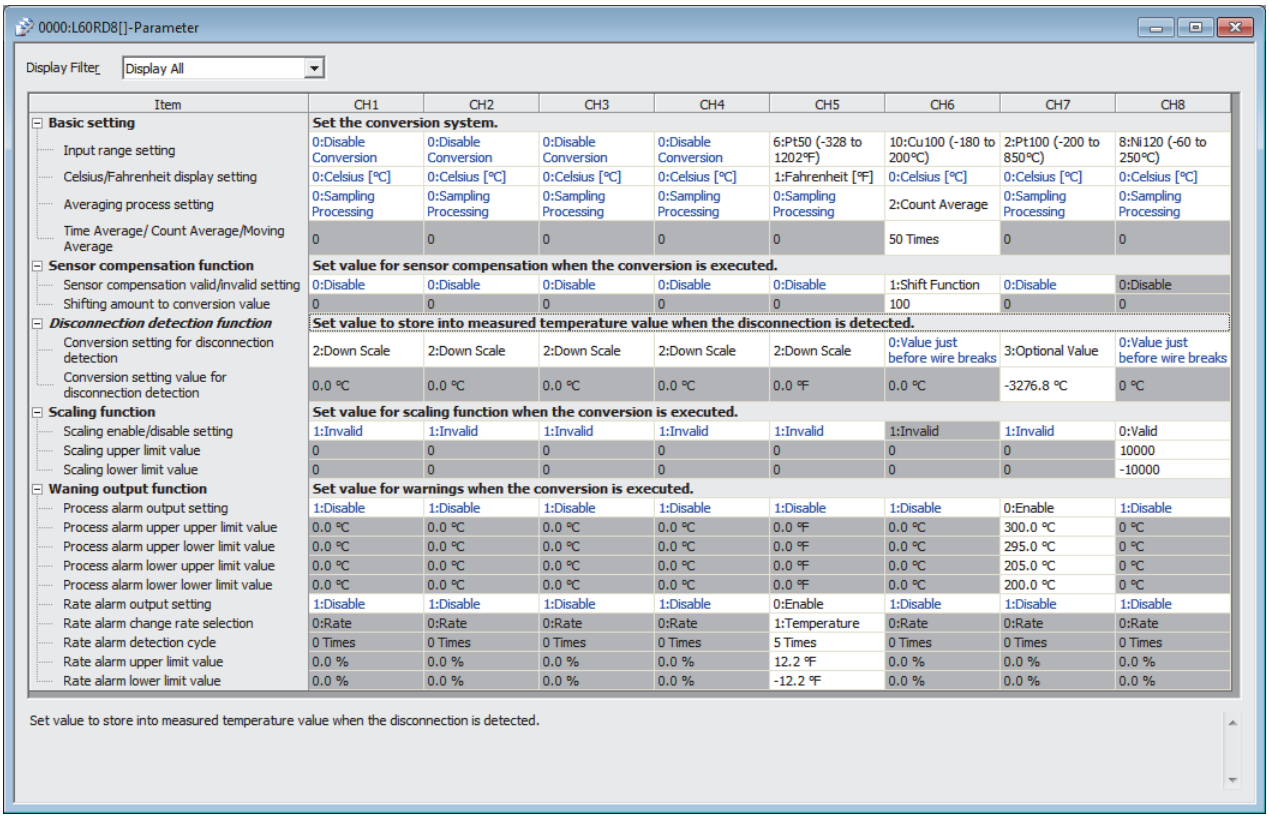
3. Add the RTD input module (L60RD8) to the project of GX Works2.

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



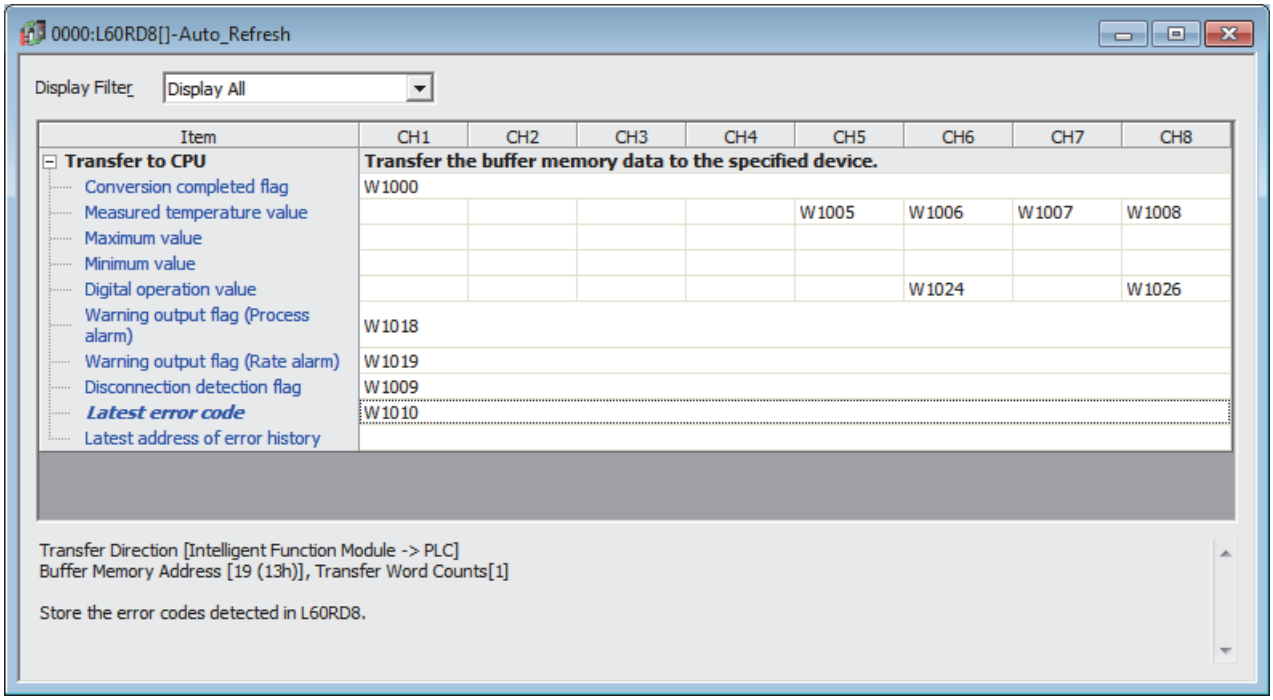
4. Display the initial setting window for the RTD input module (L60RD8) and configure the setting as follows.

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



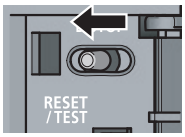
5. Display the Auto Refresh window for the RTD input module (L60RD8) and configure the setting as follows.

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



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

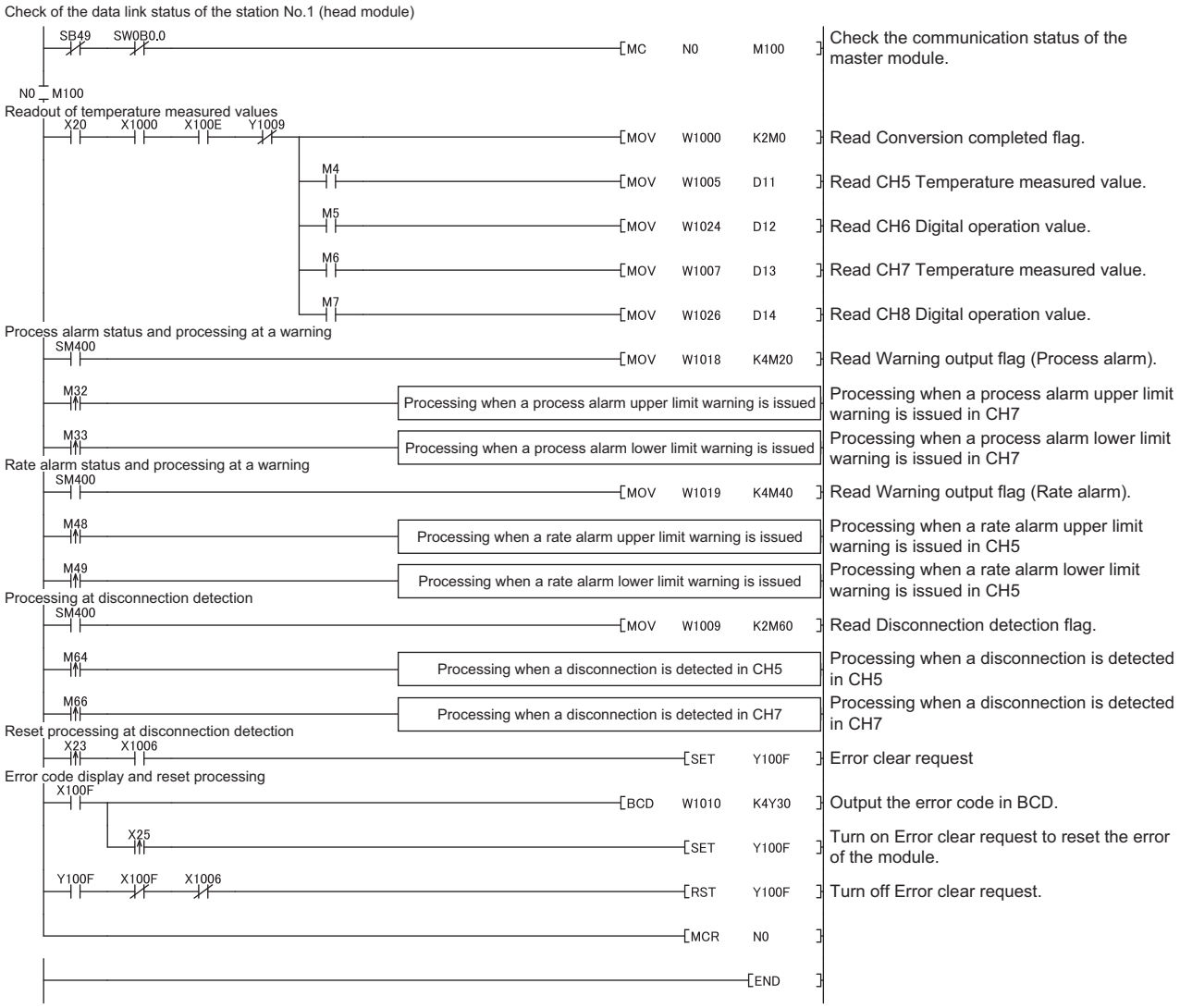
[Online] ⇨ [Write to PLC]



or Power OFF→ON

(7) Program example

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



CHAPTER 11 TROUBLESHOOTING

This chapter describes errors that may occur while the RTD input module is being used, and those troubleshooting.

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

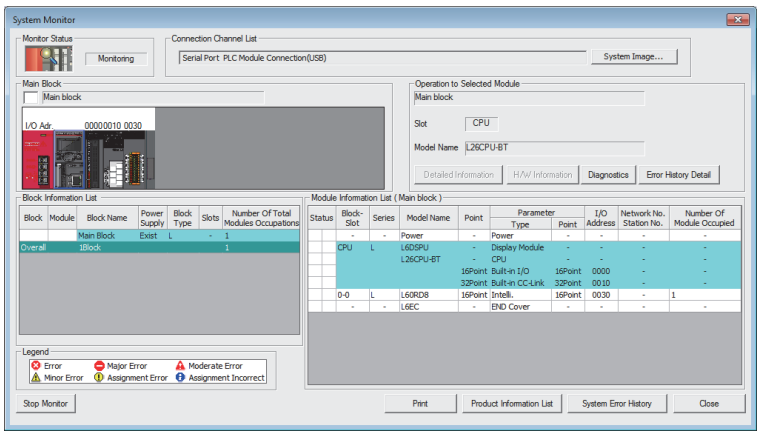
The errors and alarms that occurred in the RTD input module can be checked with the following methods. Choose a method depending on the purpose and application.

- Checking on the "Module's Detailed Information" Window (☞ Page 125, Section 11.1)
- Checking in Latest error code (Un\G19) (☞ Page 126, Section 11.2)
- Checking through the Module Error Collection Function (☞ Page 127, Section 11.3)
- Checking with the display unit (☞ Page 104, Section 9.4)

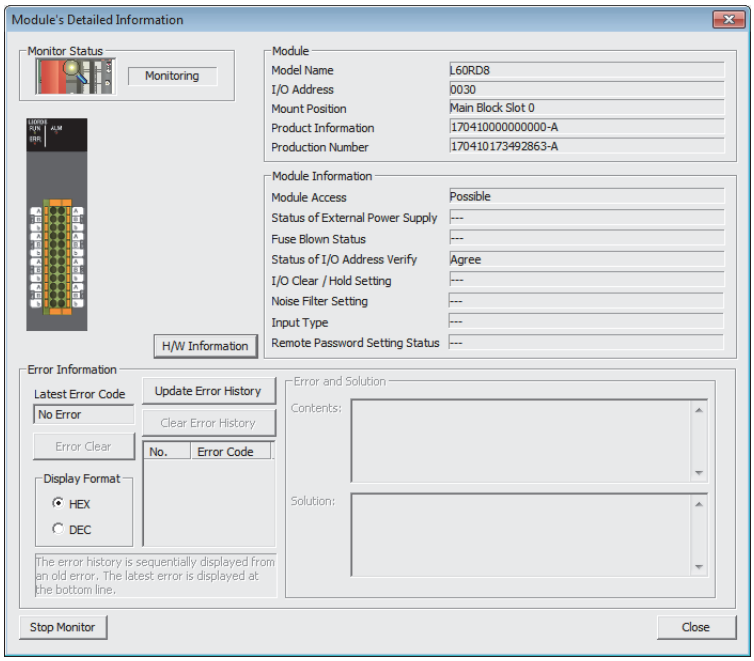
11.1 Checking on the "Module's Detailed Information" Window

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

[Diagnostics] ⇨ [System Monitor]



↓



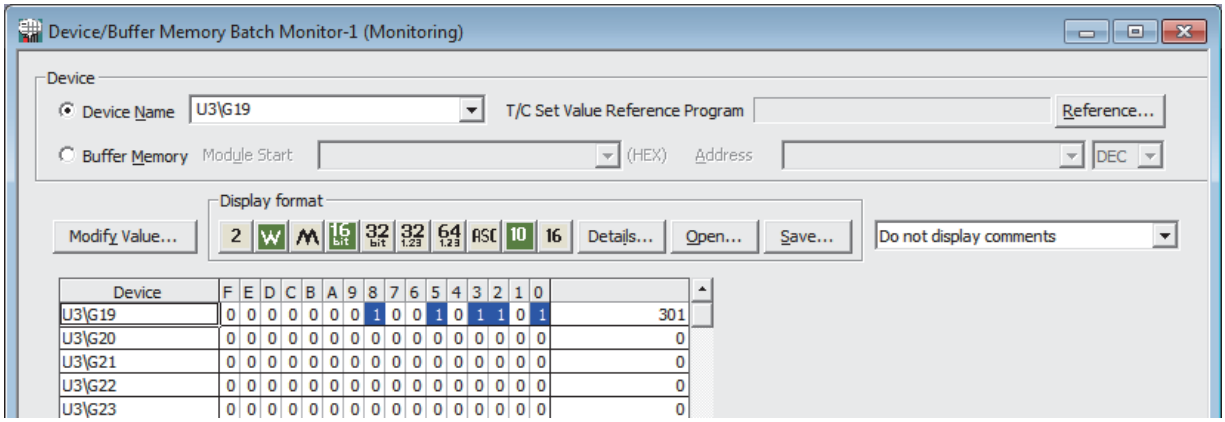
1. **Select the RTD input module in "Main block" and click the Detailed Information button.**

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

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]



Point

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

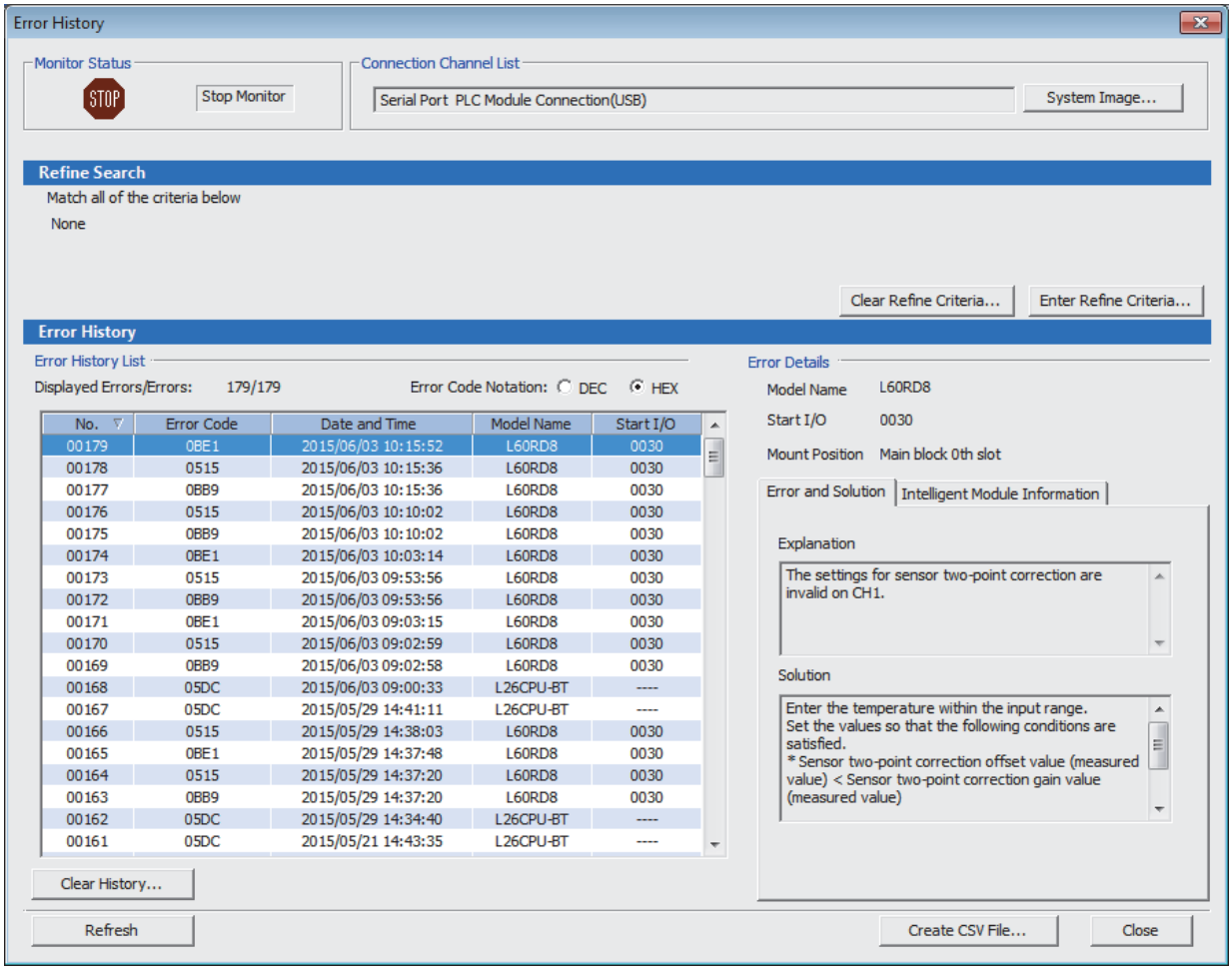
11.3 Checking through the Module Error Collection Function

The errors that occurred in the RTD input module are saved in the CPU module by using the module error collection function. The error information are held even after the system is powered off or the CPU module is reset.

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

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

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



(2) Errors to be collected

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

- List of Error Codes (☞ Page 128, Section 11.4)
- List of Alarm Codes (☞ Page 130, Section 11.5)

11.4 List of Error Codes

This section lists 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□	The value in CH□ Input range setting (Un\G500 to Un\G507) 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 range setting (Un\G500 to Un\G507).
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.
120*1	The sensor correction value written to the flash memory is invalid. The number of an error channel cannot be identified.	Write a sensor correction value to the flash memory again for all channels where the sensor two-point correction function is used. If the error occurs again, the possible cause is a failure of the module. Please consult your local Mitsubishi representative.
12□*1	The sensor correction value written to the flash memory is invalid. □ indicates the number of the channel where an error has occurred.	Write a sensor correction value to the flash memory again for the channel where the error has occurred. If the error occurs again, the possible cause is a failure of the module. Please consult your local Mitsubishi representative.
162*1	A sensor correction value has been consecutively written to the flash memory 26 times or more.	Do not turn on and off Sensor correction value write request (YA) consecutively when the sensor two-point correction is performed.
170*1	The number of writing a sensor correction value to the flash memory has exceeded the guaranteed maximum number.	Any further writing of a sensor correction value may not be reflected correctly.
20□*1	The time average setting value in CH□ Time Average/Count Average/Moving Average (Un\G1 to Un\G8) is out of the range of 13 to 18000. □ indicates the number of the channel where an error has occurred.	Set the time average setting value within the range of 13 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 (Un\G1 to Un\G8) 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 (Un\G1 to Un\G8) 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 of CH1 Process alarm lower lower limit value (Un\G86) to CH8 Process alarm upper upper limit value (Un\G117) contain an inconsistency. □ indicates the number of the channel where an error has occurred. △ indicates that the setting values are as follows: 2: Process alarm lower lower limit value > Process alarm lower upper limit value 3: Process alarm lower upper limit value > Process alarm upper lower limit value 4: Process alarm upper lower limit value > Process alarm upper upper limit value	Set appropriate values in CH1 Process alarm lower lower limit value (Un\G86) to CH8 Process alarm upper upper limit value (Un\G117).
70□*1	In CH1 Rate alarm upper limit value (Un\G126) to CH8 Rate alarm lower limit value (Un\G141), 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 CH8 Rate alarm lower limit value (Un\G141) so that a rate alarm lower limit value is smaller than a rate alarm upper limit value.
71□*1	The value in CH□ Rate alarm warning detection cycle (Un\G118 to Un\G125) 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 warning detection cycle (Un\G118 to Un\G125).
90□*1	Values in CH1 Scaling lower limit value (Un\G62) to CH8 Scaling upper limit value (Un\G77) 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 CH8 Scaling upper limit value (Un\G77).

Error code (decimal)	Description and cause of error	Action
91□*1	The same value is set in both CH□ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68, Un\G70, Un\G72, Un\G74, Un\G76) and CH□ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69, Un\G71, Un\G73, Un\G75, Un\G77). □ indicates the number of the channel where an error has occurred.	Set different values in CH□ Scaling lower limit value (Un\G62, Un\G64, Un\G66, Un\G68, Un\G70, Un\G72, Un\G74, Un\G76) and CH□ Scaling upper limit value (Un\G63, Un\G65, Un\G67, Un\G69, Un\G71, Un\G73, Un\G75, Un\G77).
200□*1	A value other than Celsius (0) and Fahrenheit (1) is set in CH□ Celsius/Fahrenheit display setting (Un\G508 to Un\G515). □ indicates the number of the channel where an error has occurred.	Set either value of Celsius (0) or Fahrenheit (1) in CH□ Celsius/Fahrenheit display setting (Un\G508 to Un\G515).
201□*1	A value other than 0 to 3 is set in any channel of Conversion setting at disconnection detection (Un\G400, Un\G401). □ indicates the number of the channel where an error has occurred.	Set one of the following values in the error channel of Conversion setting at disconnection detection (Un\G400, Un\G401): • Value just before disconnection (0) • Upscale (1) • Downscale (2) • Any value (3)
300□*1	CH□ Input range setting (Un\G500 to Un\G507) when the sensor two-point correction has been executed is different from the current setting. □ indicates the number of the channel where an error has occurred.	Perform either of following operations so that different input range settings become the same. • Perform the sensor two-point correction using the current input range setting. • Correct the current input range setting.
301□*1	CH□ Celsius/Fahrenheit display setting (Un\G508 to Un\G515) for the temperature measured value when the sensor two-point correction has been executed is different from the current setting. □ indicates the number of the channel where an error has occurred.	Perform either of following operations so that the different display units for the temperature measured value become the same. • Perform the sensor two-point correction using the current setting of display unit for the temperature measured value. • Correct the current setting of display unit for the temperature measured value.
302□*1	The value in CH□ Sensor correction enable/disable setting (Un\G200 to Un\G207) is out of the setting range. □ indicates the number of the channel where an error has occurred.	Set one of the following values in CH□ Sensor correction enable/disable setting (Un\G200 to Un\G207): • Disable (0) • Shift function enable (1) • Sensor two-point correction function enable (2) • Both functions enable (3)
303□*1	Both the scaling function and the sensor correction function are set to be enabled. □ indicates the number of the channel where an error has occurred.	Set either of following functions to be disabled: • Scaling function • Sensor correction function
304□*1	The settings for sensor two-point correction are invalid. □ indicates the number of the channel where an error has occurred.	Enter the temperature within the input range. Set the values so that the following conditions are satisfied. • Sensor two-point correction offset value (measured value) < Sensor two-point correction gain value (measured value) • Sensor two-point correction offset value (corrected value) < Sensor two-point correction gain value (corrected value)
305□*1	The value in CH□ Sensor two-point correction offset latch request (Un\G250, Un\G252, Un\G254, Un\G256, Un\G258, Un\G260, Un\G262, Un\G264) is out of the setting range. □ indicates the number of the channel where an error has occurred.	Set either value of No request (0) or Latch request (1) in CH□ Sensor two-point correction offset latch request (Un\G250, Un\G252, Un\G254, Un\G256, Un\G258, Un\G260, Un\G262, Un\G264).
306□*1	The value in CH□ Sensor two-point correction gain latch request (Un\G251, Un\G253, Un\G255, Un\G257, Un\G259, Un\G261, Un\G263, Un\G265) is out of the setting range. □ indicates the number of the channel where an error has occurred.	Set either value of No request (0) or Latch request (1) in CH□ Sensor two-point correction gain latch request (Un\G251, Un\G253, Un\G255, Un\G257, Un\G259, Un\G261, Un\G263, Un\G265).

*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 lists alarm codes.

The code of an alarm that has occurred is stored into Latest error code (Un\G19).

The error 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 that the alarm is 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 temperature measured value to fall within the proper range. (Adjust the digital operation value instead when the scaling function or the sensor correction function is enabled.) As a result, the corresponding bit of Warning output flag (Process alarm) (Un\G50), and Warning output signal (X8) turn off automatically. For the rate alarm, adjust the change rate of the temperature measured value to fall within the proper range. As a result, the corresponding bit of Warning output flag (Rate alarm) (Un\G51), and Warning output signal (X8) turn off automatically. To clear the alarm code, check that the temperature measured value has fallen within the proper range, and turn on and off Error clear request (YF).
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 (RTD, conducting wire) and replace the disconnection point of the wiring. After eliminating the cause of the disconnection, turn on and off Error clear request (YF). As a result, the corresponding bit of 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.

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 the power supply module is within the rated range.
Is the capacity of the 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 have 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 128, 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).

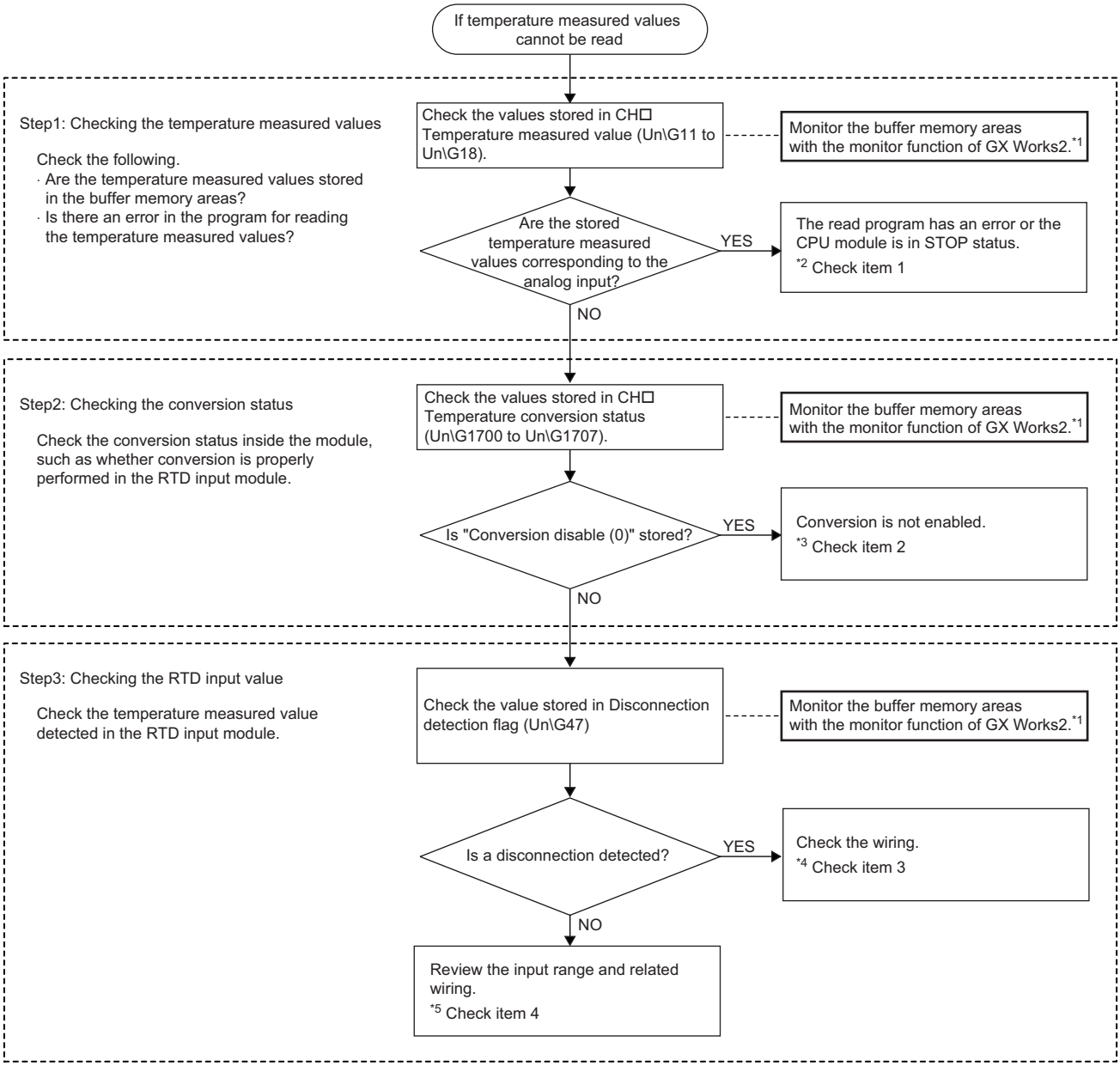
(b) When flashing

Check item	Action
Has any cable been disconnected?	Check Disconnection detection signal (X6) and Disconnection detection flag (Un\G47) and take actions described in the troubleshooting for the conversion. • Troubleshooting for the conversion (☞ Page 132, Section 11.6.2)
Is an incorrect value set for CH☐ Input range setting (Un\G500 to Un\G507) of the channel where no wire is to be connected?	Set Conversion disable (0) to the channel where no wire is to be connected.

11.6.2 Troubleshooting for the conversion

(1) When temperature measured values cannot be read

Check the cause with the flowchart below.



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

*2 For details on the check item 1, refer to the following. ☞ Page 133, Section 11.6 (1) (a)

*3 For details on the check item 2, refer to the following. ☞ Page 133, Section 11.6 (1) (b)

*4 For details on the check item 3, refer to the following. ☞ Page 134, Section 11.6 (1) (c)

*5 For details on the check item 4, refer to the following. ☞ Page 134, Section 11.6 (1) (d)

Point

If temperature measured values cannot be read even after the above actions are taken, the RTD input module may have failed. Please consult your local Mitsubishi representative.

(a) Check item 1

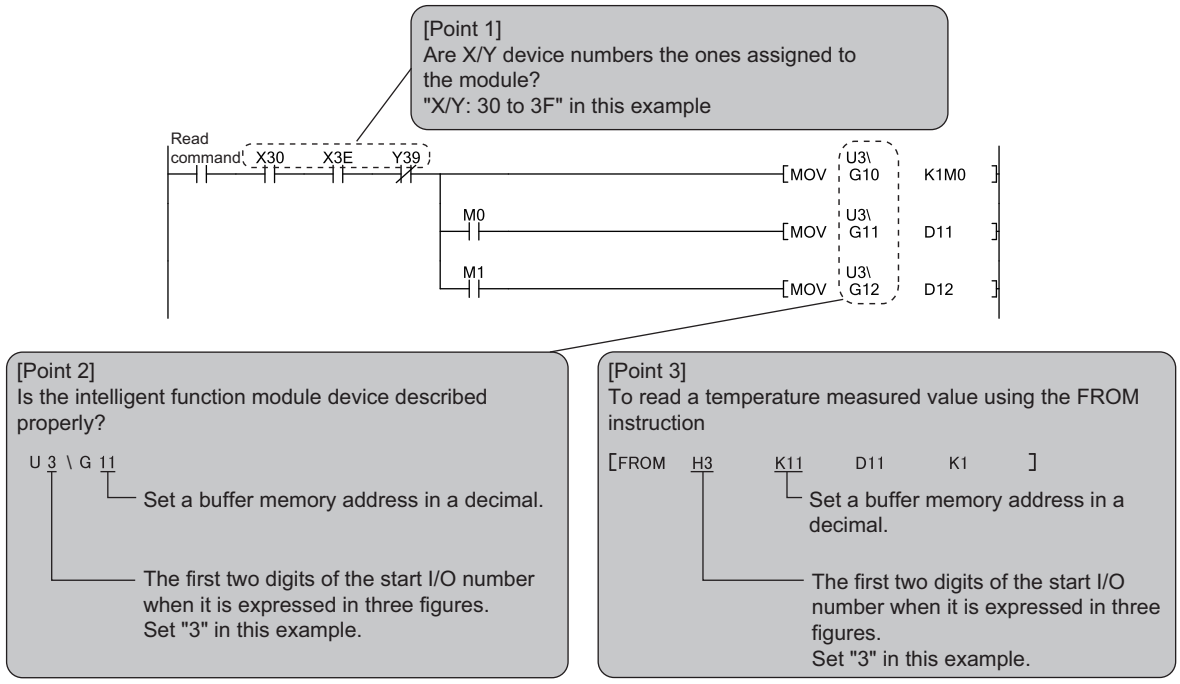
The read program is incorrect, or the CPU module is in the STOP status. Check the following items.

Check item	Action
Is the program to read a temperature measured value correct?	Check CH□ Temperature measured value (Un\G11 to Un\G18) using the monitor function of GX Works2 ("Device/Buffer Memory Batch" or "Intelligent Function Module Monitor"). If the temperature measured value is stored according to the analog input, correct the read program.
Is the auto refresh setting correct?	If the value in CH□ Temperature measured value (Un\G11 to Un\G18) 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 RTD input module where the start I/O number is set to X/Y30



(b) Check item 2

The conversion is not executed. Check the following items.

Check item	Action
Is Conversion disable (0) set to CH□ Input range setting (Un\G500 to Un\G507) of the channel to input a value?	Check CH□ Input range setting (Un\G500 to Un\G507) using the monitor function of GX Works2 ("Device/Buffer Memory Batch" or "Intelligent Function Module Monitor"), and set a desired input 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 temperature measured value is stored in CH□ Temperature measured value (Un\G11 to Un\G18). 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
Is the wire inserted into the terminal block?	Pull the cable or bar solderless terminal slightly to check that the cable is securely inserted. • Wiring to the terminal block (☞ Page 41, Section 6.2 (3))
Is the terminal block engaged?	Install the terminal block referring to the descriptions for installing the terminal block. • Removing and installing the terminal block (☞ Page 40, Section 6.2 (2))
Are the correct terminals connected?	Refer to the external wiring example and correct the wiring. • External Wiring (☞ Page 44, Section 6.4)
Is the RTD properly connected?	Check the continuity of the RTD, and replace the disconnected one.

(d) Check item 4

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

Check item	Action
Is CH□ Input range setting (Un\G500 to Un\G507) correct?	Check CH□ Input range monitor (Un\G516 to Un\G523) using the monitor function of GX Works2 ("Device/Buffer Memory Batch" or "Intelligent Function Module Monitor"). If the input range is incorrect, set CH□ Input range setting (Un\G500 to Un\G507) 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 44, Section 6.4)
Is the wiring resistance value too large?	Correct the temperature error caused by the wiring resistance using the sensor correction function. • Sensor correction function (☞ Page 73, Section 8.8)

(2) When a temperature measured value does not fall within the range of accuracy

Check item	Action
Is any measure to reduce noise taken?	Take measures to reduce noise, such as using a shielded cable for connection.
Has the RTD input been affected by noises?	Always use shielded cables for the connection and ground the shielded cable for each channel. Check the influence from adjacent devices and take measures to reduce noise.
Is a temperature measured base on the input from a calibrator?	Enable the conversion of only one channel when using the input from a calibrator for temperature measurement. When using a calibrator (☞ Page 168, Appendix 3 (3))

11.7 Checking the RTD Input Module Status using the System Monitor

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

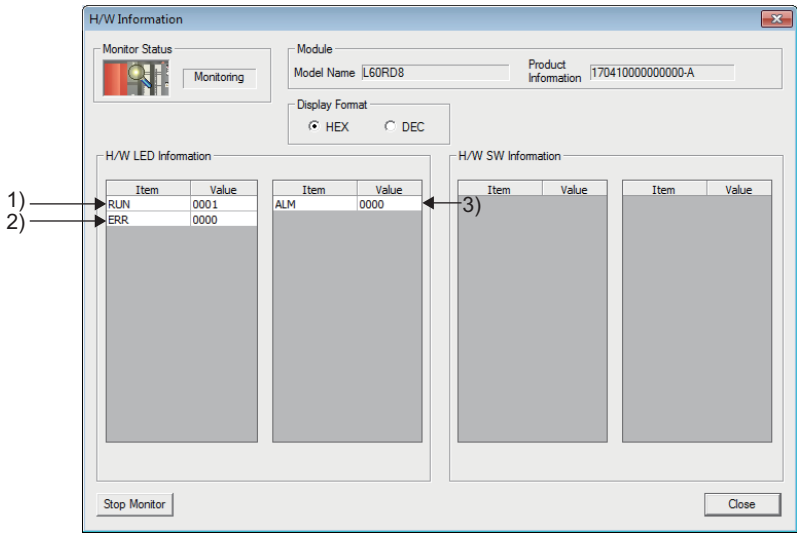
(1) Hardware LED information

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.
2)	ERR. LED	
3)	ALM 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 RTD input module. The values 0000_H and 0001_H are not always displayed evenly.)

(2) Hardware switch information

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



APPENDICES

Appendix 1 Details of I/O Signals

The following describes the details of the I/O signals for the RTD input module that 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 RTD input module is set to 0.

Appendix 1.1 Input Signal

(1) Module READY (X0)

This signal 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.

The signal turns off when a watchdog timer error has occurred in the RTD input module. (No conversion processing is performed.)

(2) Sensor correction value registration flag (X1)

This signal is used as the interlock condition to turn on and off Sensor correction value write request (YA) and Sensor correction value change request (YB).

For details on the interlock, refer to Sensor correction value write completed flag (XA) and Sensor correction value change completed flag (XB).

- Sensor correction value write completed flag (XA) (☞ Page 139, Appendix 1.1 (6))
- Sensor correction value change completed flag (XB) (☞ Page 140, Appendix 1.1 (7))

(a) When Sensor correction value registration flag (X1) turns on

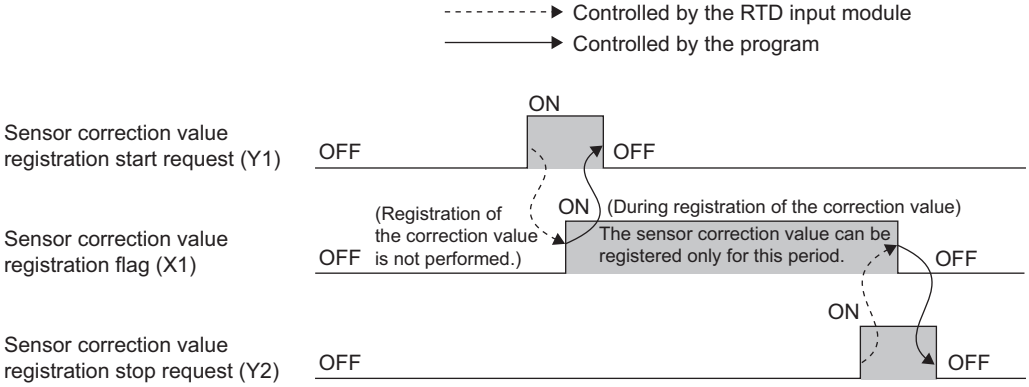
When Sensor correction value registration start request (Y1) is turned on and off, Sensor correction value registration flag (X1) turns on and registration of the sensor correction value will be ready.

During registration of the sensor correction value, Sensor correction value registration flag (X1) remains on.

While Sensor correction value registration flag (X1) is on, the input of Operating condition setting request (Y9) cannot be accepted.

(b) When Sensor correction value registration flag (X1) turns off

When Sensor correction value registration stop request (Y2) is turned on and off, Sensor correction value registration flag (X1) turns off.



Point

Before registering a sensor correction value, set the range that is applied to the sensor correction value registration in CH□ Input range setting (Un\G500 to Un\G507). For the channel where Conversion disable (0) is set, a sensor correction value registration cannot be performed.

(3) Disconnection detection signal (X6)

(a) Turning on of Disconnection detection signal (X6)

This signal 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 operations are performed.

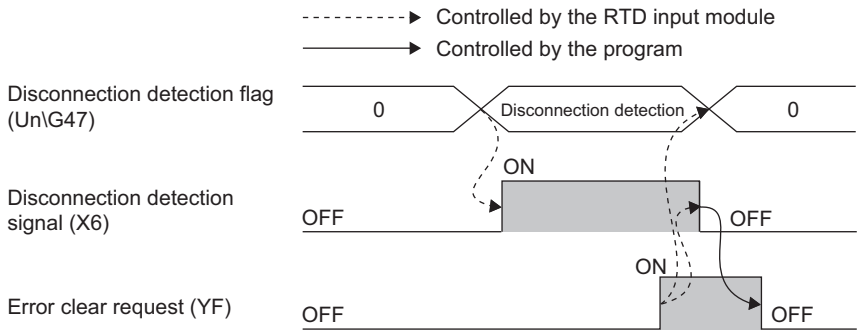
- The value is stored in Temperature measured value of the corresponding channel according to the settings in Conversion setting at disconnection detection (Un\G400, Un\G401) and CH□ Conversion setting value at disconnection detection (Un\G404 to Un\G411).
- The ALM LED flashes.

(b) Turning off of Disconnection detection signal (X6)

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 operations are performed.

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



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.

(4) Warning output signal (X8)

This signal 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.

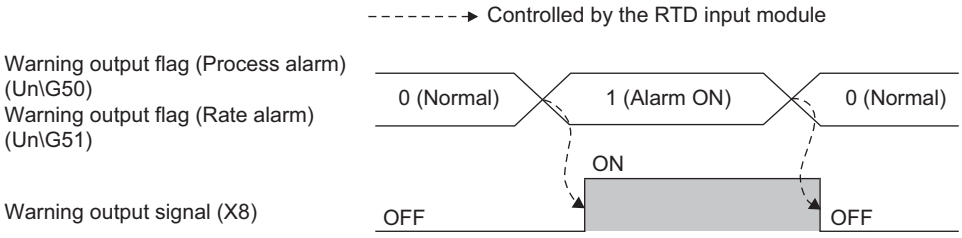
- Warning Output Function (☞ Page 62, Section 8.6)

(a) Process alarm

- When a temperature measured value (digital operation value if the scaling function or sensor correction function is enabled) exceeds or falls below the setting range set by CH1 Process alarm lower lower limit value (Un\G86) to CH8 Process alarm upper upper limit value (Un\G117), Warning output signal (X8) turns on. In addition, the ALM LED turns on.
- When the temperature measured values (digital operation value 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 a temperature measured value exceeds or falls below the change rate set in CH1 Rate alarm upper limit value (Un\G126) to CH8 Rate alarm lower limit value (Un\G141), Warning output signal (X8) turns on. In addition, the ALM LED turns on.
- When the change rates of the temperature measured values 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.

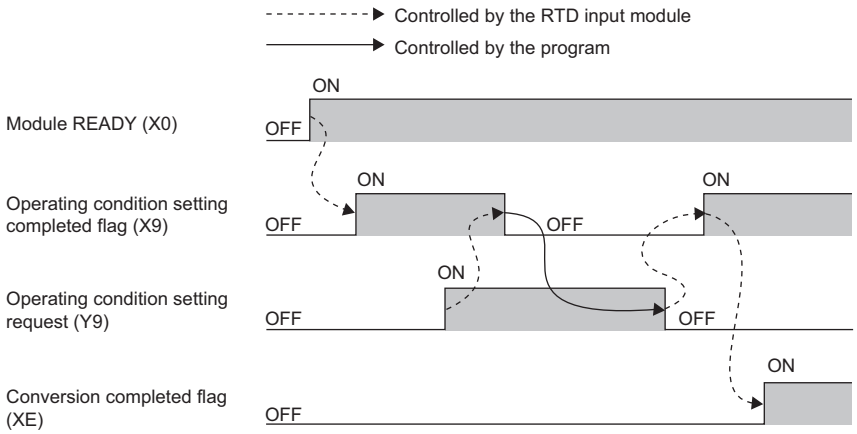


(5) Operating condition setting completed flag (X9)

This signal 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 areas that require Operating condition setting request (Y9) to be turned on and off to enable the new value, refer to the following.

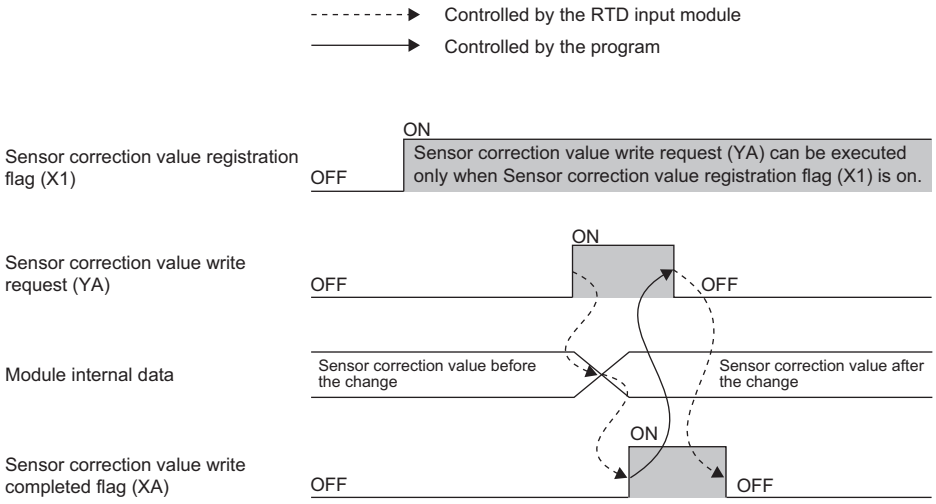
- List of Buffer Memory Addresses (☞ Page 25, Section 3.5)

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.
When Sensor correction value registration flag (X1) is on, a new buffer memory value is not applied. However, Operating condition setting completed flag (X9) operates as the following timing chart.



(6) Sensor correction value write completed flag (XA)

This signal indicates completion for Sensor correction value write request.
The signal turns on at the timing of a new sensor correction value registration inside the module.

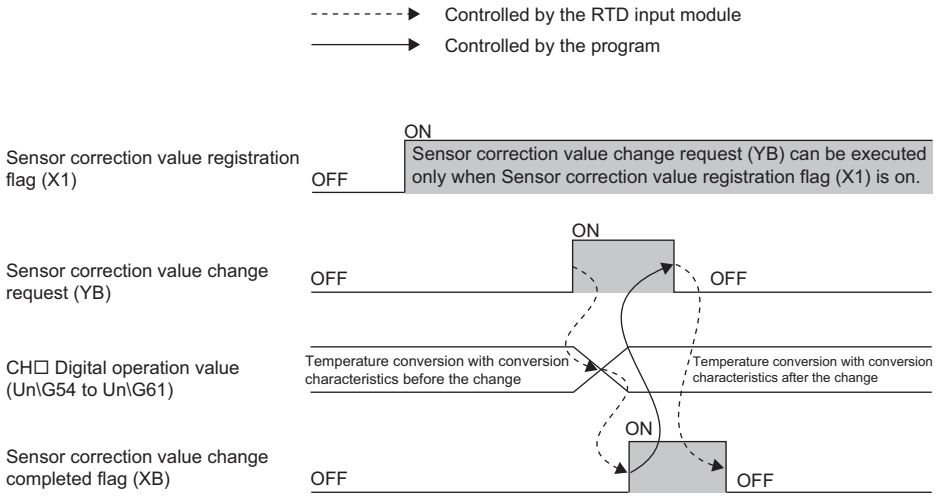


(7) Sensor correction value change completed flag (XB)

This signal indicates completion for Sensor correction value change request.

The signal is used as the interlock condition to turn on and off Sensor correction value change request (YB) after completion of sensor correction.

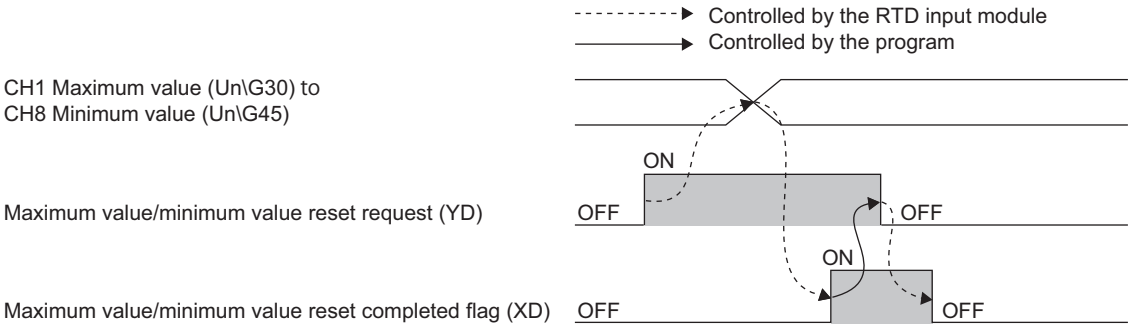
The signal turns on at the timing of reflection of the sensor correction result to the temperature measured value. Then, the temperature measured value to which sensor correction has been applied is stored in CH□ Digital operation value (Un\G54 to Un\G61).



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

This signal turns on when Maximum value/minimum value reset request (YD) is turned on and off to reset the maximum value and minimum value stored in CH1 Maximum value (Un\G30) to CH8 Minimum value (Un\G45).

When turning off Maximum value/minimum value reset request (YD) after checking that Maximum value/minimum value reset completed flag (XD) has turned on, Maximum value/minimum value reset completed flag (XD) also turns off.



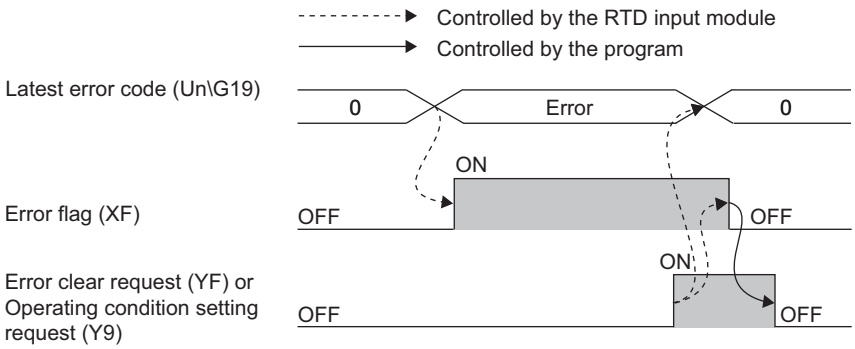
(9) Conversion completed flag (XE)

This signal turns on when the first conversion of all the channels for which the conversion is enabled is completed.

When reading a temperature measured value, use this signal or Conversion completed flag (Un\G10) as an interlock condition.

(10)Error flag (XF)

This signal turns on when an error occurs.



(a) Turning off of Error flag (XF)

The signal 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)

The following items are cleared when Error clear request (YF) or Operating condition setting request (Y9) is turned on.

- Error flag (XF)
- Latest error code (Un\G19)
- When Clear (1) is set in Error history No.☐ (Un\G1810 to Un\G1969) and Clear setting of error history (Un\G1802).

Appendix 1.2 Output Signal

(1) Sensor correction value registration start request (Y1)

Turn on and off this signal to start registration of a sensor correction value.

For the timing to turn on and off Sensor correction value registration start request (Y1), refer to the following.

- Sensor correction value registration flag (X1) (☞ Page 136, Appendix 1.1 (2))

(2) Sensor correction value registration stop request (Y2)

Turn on and off this signal to stop (end) sensor correction.

For the timing to turn on and off Sensor correction value registration stop request (Y2), refer to the following.

- Sensor correction value registration flag (X1) (☞ Page 136, Appendix 1.1 (2))

(3) Operating condition setting request (Y9)

Turn on and off this signal to enable the settings of the buffer memory.

While Sensor correction value registration flag (X1) is on, the input of Operating condition setting request (Y9) cannot be accepted. However, Operating condition setting completed flag (X9) turns on and off, as when Sensor correction value registration flag (X1) is off.

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

- Operating condition setting completed flag (X9) (☞ Page 139, Appendix 1.1 (5))

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

- List of Buffer Memory Addresses (☞ Page 25, Section 3.5)

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

(4) Sensor correction value write request (YA)

Turn on and off this signal to register a sensor correction value inside the module.

Only while Sensor correction value registration flag (X1) is on, the input of Sensor correction value write request (YA) is accepted.

For the timing to turn on and off Sensor correction value write request (YA), refer to the following.

- Sensor correction value write completed flag (XA) (☞ Page 139, Appendix 1.1 (6))

(5) Sensor correction value change request (YB)

Turn on and off this signal to apply the sensor correction value to the operation of the module.

Only while Sensor correction value registration flag (X1) is on, the input of Sensor correction value change request (YB) is accepted.

For the timing to turn on and off Sensor correction value change request (YB), refer to the following.

- Sensor correction value change completed flag (XB) (☞ Page 140, Appendix 1.1 (7))

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

Turn on and off this signal to reset CH1 Maximum value (Un\G30) to CH8 Minimum value (Un\G45).

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 140, Appendix 1.1 (8))

(7) Error clear request (YF)

Turn on and off this signal to clear Error flag (XF), 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 137, Appendix 1.1 (3))
- Error flag (XF) (☞ Page 141, Appendix 1.1 (10))

Appendix 2 Details of Buffer Memory Addresses

(1) CH□ Time Average/Count Average/Moving Average (Un\G1 to Un\G8)

Set time (for averaging), a count (for averaging), and moving average count by channel where the averaging process setting is enabled.

- The following table lists the setting range.

Processing method	Setting range
Time average	13 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 (1300 to 1800000ms). To set the time (for averaging) of 2000ms, set 20.

*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 before the error has occurred.
- On a channel where Sampling processing (0) is set in Averaging process setting (Un\G24, Un\G25), 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

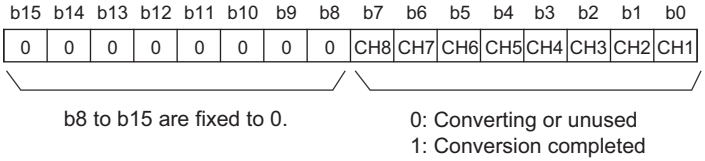
All channels are set to 0.

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.



(a) Conversion completion

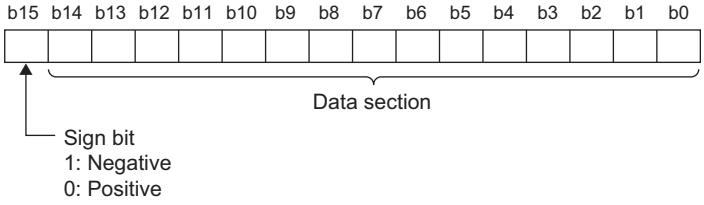
When the first conversion is completed in the channel where the conversion is enabled, the flag turns to Conversion completed (1).

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 completed, the flag turns to Conversion completed (1).

(3) CH□ Temperature measured value (Un\G11 to Un\G18)

The converted temperature measured value is stored in the 16-bit signed binary format.



Data to be stored differs depending on the setting value of CH□ Input range setting (Un\G500 to Un\G507).

(a) Stored value at disconnection detection

At disconnection detection, a value is stored in CH□ Temperature measured value (Un\G11 to Un\G18) according to the value set in Conversion setting at disconnection detection (Un\G400, Un\G401) in advance.
A normal temperature measured value is automatically stored after recovery from the disconnection.
For details on the disconnection detection function, refer to the following.

- Disconnection Detection Function (☞ Page 59, Section 8.5)

(b) Refreshing cycle

If averaging processing is used, values are refreshed every set averaging process cycle. Otherwise values are refreshed every conversion cycle.

(4) Latest error code (Un\G19)

The latest error code or alarm code that the RTD input module detects is stored.
For details on error codes or alarm codes, refer to the following.

- List of Error Codes (☞ Page 128, Section 11.4)
- List of Alarm Codes (☞ Page 130, 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, Un\G25)

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
Averaging process setting (CH1 to CH4) (Un\G24)	CH4	CH3	CH2	CH1
Averaging process setting (CH5 to CH8) (Un\G25)	CH8	CH7	CH6	CH5

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

*1 If averaging processing (1_H to 3_H) has been set, set time or a count in CH□ Time Average/Count Average/Moving Average (Un\G1 to Un\G8).

- A channel where a value outside 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_H).

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

The maximum temperature measured value and minimum temperature measured value are stored in the 16-bit signed binary.

When any of the following operations is performed, CH1 Maximum value (Un\G30) and CH8 Minimum value (Un\G45) are refreshed to the current values.

- 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.

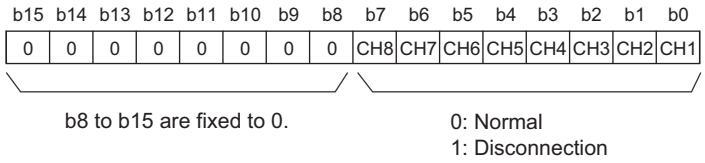
When the setting value in CH□ Input range setting (Un\G500 to Un\G507) is changed and Operating condition setting request (Y9) is turned on and off, CH1 Maximum value (Un\G30) and CH8 Minimum value (Un\G45) are cleared to 0.

Point

- For the channel to which the averaging process is set, the maximum and minimum values are stored every averaging process cycle.
- If the scaling function or sensor correction function is enabled, the maximum value and minimum values calculated by the scaling function or sensor correction function are stored.

(7) Disconnection detection flag (Un\G47)

The disconnection status can be checked for each channel.



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

- If disconnection in an RTD is detected, the flag corresponding to the channel in which the disconnection is detected turns to Disconnection (1). For the channel in which the disconnection is detected, a value is stored in CH☐ Temperature measured value (Un\G11 to Un\G18) according to the setting of Conversion setting at disconnection detection (Un\G400, Un\G401). 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 RTD input range is set in CH☐ Input range setting (Un\G500 to Un\G507), 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).

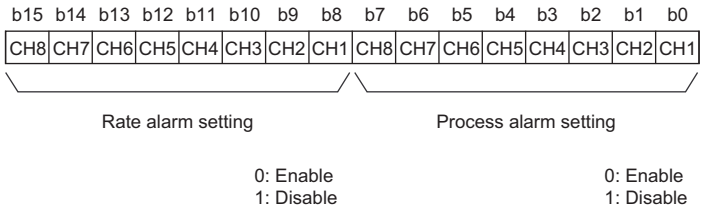
Turning on and off Operating condition setting request (Y9) also clears the flag, but the conversion is reset and resumed from the beginning.

(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 62, Section 8.6)



(a) Enabling the setting

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

(b) Default value

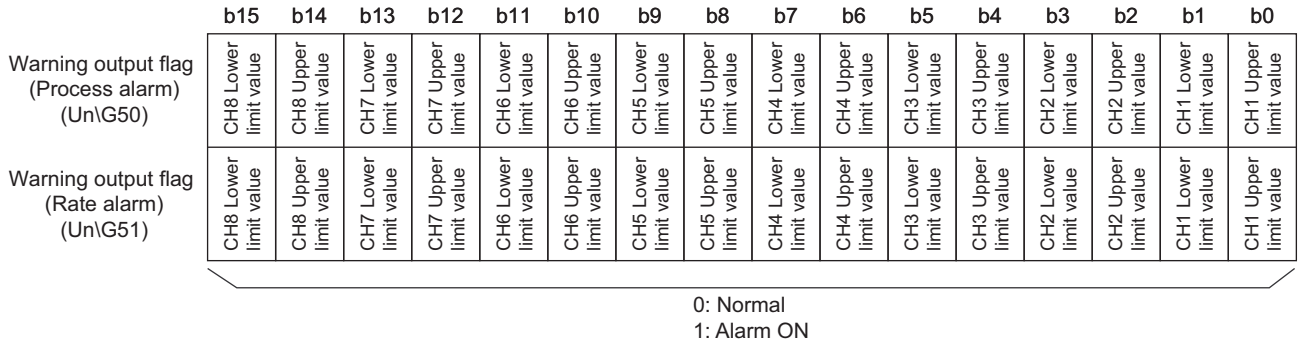
All channels are set to Disable (1).

(9) Warning output flag (Process alarm) (Un\G50), Warning 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 62, Section 8.6)



(a) Status of Warning output flag (Process alarm) (Un\G50) or Warning 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)	A temperature measured value has exceeded or fallen below the setting range set by CH1 Process alarm lower lower limit value (Un\G86) to CH8 Process alarm upper upper limit value (Un\G117). When the scaling function or sensor correction function is enabled, a digital operation value has exceeded or fallen below the setting range.
Warning output flag (Rate alarm) (Un\G51)	The change rate of a temperature measured value has exceeded or fallen below the change rate set in CH1 Rate alarm upper limit value (Un\G126) to CH8 Rate alarm lower limit value (Un\G141).

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) or Warning output flag (Rate alarm) (Un\G51)

The warning output flags are cleared under the following conditions.

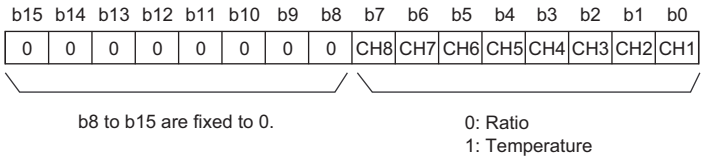
Buffer memory	Warning clear condition
Warning output flag (Process alarm) (Un\G50)	• A temperature measured value has fallen within the setting range. • When the scaling function or sensor correction function is enabled, a digital operation value has fallen within the setting range. • Operating condition setting request (Y9) has been turned on and off.
Warning output flag (Rate alarm) (Un\G51)	• The change rate of a temperature measured value has fallen within the setting range. • Operating condition setting request (Y9) has been turned on and off.

(10)Rate alarm change rate selection (Un\G52)

Set the unit (rate or temperature) of the change rate of the rate alarm for each channel.

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

- Warning output function (rate alarm) (☞ Page 64, Section 8.6 (2))



(a) Enabling the setting

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

(b) Default value

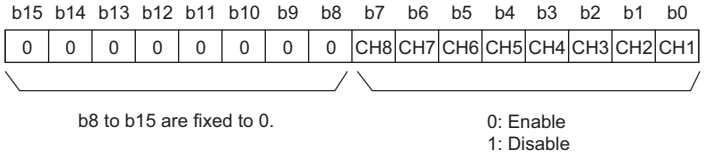
All channels are set to Ratio (0).

(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 71, Section 8.7)



(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).

Point

- The scaling function and sensor correction function (the shift function and sensor two-point correction function) cannot be used at the same time.
- If both Scaling enable/disable setting (Un\G53) and CH□ Sensor correction enable/disable setting (Un\G200 to Un\G207) are enabled for a channel and Operating condition setting request (Y9) is turned on and off, the error (303□) occurs and the value set in CH□ Temperature measured value (Un\G11 to Un\G18) is stored in CH□ Digital operation value (Un\G54 to Un\G61).

(12)CH□ Digital operation value (Un\G54 to Un\G61)

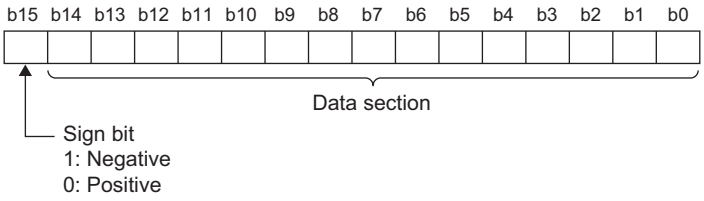
A value calculated by the scaling function or sensor correction function is stored in the 16-bit signed binary format.

For details on the scaling function or sensor correction function, refer to the following.

- Scaling Function (☞ Page 71, Section 8.7)
- Sensor Correction Function (☞ Page 73, Section 8.8)

(a) Refreshing cycle

If averaging processing is used, values are refreshed every set averaging process cycle. Otherwise values are refreshed every conversion cycle.



Point

When either of the scaling function or sensor correction function is not used, the same value as the value set in CH□ Temperature measured value (Un\G11 to Un\G18) is stored.

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

Set the range of scale conversion for each channel.

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

- Scaling Function (☞ Page 71, Section 8.7)

(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 on the corresponding channels. 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 before the error has occurred.
- 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 before the error has occurred.
- When Disable (1) is set in Scaling enable/disable setting (Un\G53), the settings for CH1 Scaling lower limit value (Un\G62) to CH8 Scaling upper limit value (Un\G77) 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)CH1 Process alarm lower lower limit value (Un\G86) to CH8 Process alarm upper upper limit value (Un\G117)

Set the warning output range of a temperature measured 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 62, Section 8.6 (1))

(a) Setting range

- The setting range is between -32768 and 32767.
- Set the process alarm upper limit value or process alarm lower limit value in increments of 0.1℃ (or 0.1℉).

Ex. To set 123℃ in CH1 Process alarm upper lower limit value when CH1 Input range setting is Pt100 (-200 to 850℃), 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 before the error has occurred.
- When Disable (1) is set in Warning output setting (Un\G48), the settings of the 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 or sensor correction function, always set values considering the operation of each function. (☞ Page 71, Section 8.7)

(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 warning detection cycle (Un\G118 to Un\G125)

Set the cycle for checking the change rate of the temperature measured value for each channel. (The change rate is a ratio of the change in the temperature measured value from the previous check.) The change rate of the temperature measured value is checked at every setting cycle.

A value obtained by multiplying the setting value by the conversion cycle is a cycle for detecting 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 64, Section 8.6 (2))

(a) Setting range

- The setting range is between 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 CH□ Rate alarm warning detection cycle (Un\G118 to Un\G125) 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.

Point

The default value is 0. To use the rate alarm, change the value.

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

When the change rate of the temperature measured value detected at every warning detection cycle 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 rate alarm is detected. Set the range of the change rate of the temperature measured value for each channel in this area.

To use the rate alarm, change the setting based on the setting of Rate alarm change rate selection (Un\G52).

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

- Warning output function (rate alarm) (☞ Page 64, Section 8.6 (2))

(a) Setting range

- The setting range is between -32768 and 32767.
- Set the values so that the following condition is satisfied: Rate alarm upper limit value > Rate alarm lower limit value. An error occurs on 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 before the error has occurred.
- When Disable (1) is set in Warning output setting (Un\G48), the settings of CH1 Rate alarm upper limit value (Un\G126) to CH8 Rate alarm lower limit value (Un\G141) are ignored.

(b) Enabling the setting

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

(c) Default value

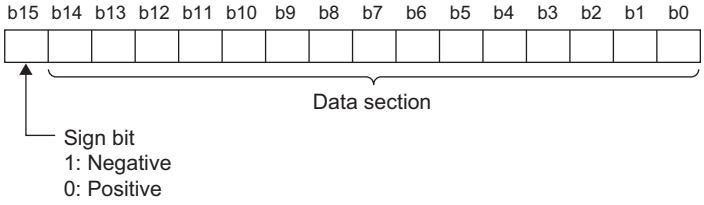
All channels are set to 0.

Point

The default value is 0. To use the rate alarm, change the value.

(17)CH□ Shifting amount to conversion value (Un\G150 to Un\G157)

Set the shifting amount to conversion value used for the shift function for each channel.



A value on which the set shifting amount to conversion value is reflected is stored in CH□ Digital operation value (Un\G54 to Un\G61).

- If a value is set in this area with Shift function enable (1) or Both functions enable (3) is set in CH□ Sensor correction enable/disable setting (Un\G200 to Un\G207), the set shifting amount to conversion value is reflected on CH□ Digital operation value (Un\G54 to Un\G61) in real time.
- The range of the digital operation value added by the shift function is the same as the range of the temperature measured value of the input range setting used.

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

- Shift Function (☞ Page 74, Section 8.8)

(a) Setting range

The setting range is between -32768 and 32767.

(b) Default value

All channels are set to 0.

Point

- The default value is 0. To use the shifting amount to conversion value, change the value.
- If Disable (0) or Sensor two-point correction function enable (2) is set in CH□ Sensor correction enable/disable setting (Un\G200 to Un\G207), the shifting amount to conversion value is not reflected.

(18)CH□ Sensor correction enable/disable setting (Un\G200 to Un\G207)

Set whether to reflect a value corrected with the sensor correction function (shift function, sensor two-point correction function) on CH□ Digital operation value (Un\G54 to Un\G61) for each channel.

For details on the sensor correction function, refer to the following.

- Sensor Correction Function (☞ Page 73, Section 8.8)

(a) Setting range

Processing method	Setting value
Disable	0
Shift function enable	1
Sensor two-point correction function enable	2
Both functions enable	3

(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 Disable (0).

Point

- When a value outside the range is set, the error (302□) occurs and the sensor correction function becomes disabled.
- The scaling function and sensor correction function (the shift function and sensor two-point correction function) cannot be used at the same time.
- If both Scaling enable/disable setting (Un\G53) and CH□ Sensor correction enable/disable setting (Un\G200 to Un\G207) are enabled for a channel and Operating condition setting request (Y9) is turned on and off, the error (303□) occurs and the value set in CH□ Temperature measured value (Un\G11 to Un\G18) is stored in CH□ Digital operation value (Un\G54 to Un\G61).

(19)CH□ Sensor two-point correction offset value (measured value) (Un\G210, Un\G214, Un\G218, Un\G222, Un\G226, Un\G230, Un\G234, Un\G238)

Specify the temperature equivalent to an offset selecting from two points in CH□ Temperature measured value (Un\G11 to Un\G18).

(a) Enabling the stored value

With Sensor correction value registration flag (X1) on, set Latch request (1) in CH□ Sensor two-point correction offset latch request (Un\G250, Un\G252, Un\G254, Un\G256, Un\G258, Un\G260, Un\G262, Un\G264).

At this time, the temperature measured value obtained by the sensor is stored in this area.

(b) Reading a corrected value from the flash memory

When the following conditions are satisfied, turn on and off Operating condition setting request (Y9).

- CH□ Input range setting (Un\G500 to Un\G507) is set to Conversion enable.
- CH□ Sensor correction enable/disable setting (Un\G200 to Un\G207) is set to Sensor two-point correction function enable (2) or Both functions enable (3).

Point

When a corrected value is read from the flash memory, the value is also read to CH1 Sensor two-point correction offset value (measured value) (Un\G210) to CH8 Sensor two-point correction gain value (corrected value) (Un\G241) at the same time.

(20)CH□ Sensor two-point correction offset value (corrected value) (Un\G211, Un\G215, Un\G219, Un\G223, Un\G227, Un\G231, Un\G235, Un\G239)

Specify a target value to which the sensor two-point correction offset value (measured value) is corrected.

(a) Setting range

The range is the temperature measuring range of the set input range.

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

- Input Range Setting (☞ Page 53, Section 8.2)

(b) Enabling the setting

With Sensor correction value registration flag (X1) on, turn on and off Sensor correction value change request (YB).

A slope after the correction is determined based on CH□ Sensor two-point correction offset value (measured value) (Un\G210, Un\G214, Un\G218, Un\G222, Un\G226, Un\G230, Un\G234, Un\G238) and the setting value in this area, and the corrected value is stored in CH□ Digital operation value (Un\G54 to Un\G61).

Point

If a value outside the temperature measuring range of the set input range is set, the error (304□) occurs and the sensor correction function becomes disabled.

(21)CH□ Sensor two-point correction gain value (measured value) (Un\G212, Un\G216, Un\G220, Un\G224, Un\G228, Un\G232, Un\G236, Un\G240)

Specify the temperature equivalent to a gain selecting from two points in CH□ Temperature measured value (Un\G11 to Un\G18).

(a) Enabling the stored value

With Sensor correction value registration flag (X1) on, set Latch request (1) in CH□ Sensor two-point correction gain latch request (Un\G251, Un\G253, Un\G255, Un\G257, Un\G259, Un\G261, Un\G263, Un\G265).

At this time, the temperature measured value obtained by the sensor is stored in this area.

(22)CH□ Sensor two-point correction gain value (corrected value) (Un\G213, Un\G217, Un\G221, Un\G225, Un\G229, Un\G233, Un\G237, Un\G241)

Specify a target value to which the sensor two-point correction gain value (measured value) is corrected.

(a) Setting range

The range is the temperature measuring range of the set input range.

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

- Input Range Setting (☞ Page 53, Section 8.2)

(b) Enabling the setting

With Sensor correction value registration flag (X1) on, turn on and off Sensor correction value change request (YB).

A slope after the correction is determined based on CH□ Sensor two-point correction gain value (measured value) (Un\G212, Un\G216, Un\G220, Un\G224, Un\G228, Un\G232, Un\G236, Un\G240) and the setting value in this area, and the corrected value is stored in CH□ Digital operation value (Un\G54 to Un\G61).

Point

If a value outside the temperature measuring range of the set input range is set, the error (304□) occurs and the sensor correction function becomes disabled.

(23)CH□ Sensor two-point correction offset latch request (Un\G250, Un\G252, Un\G254, Un\G256, Un\G258, Un\G260, Un\G262, Un\G264)

This request is for storing CH□ Temperature measured value (Un\G11 to Un\G18) as a sensor two-point correction offset value (measured value) in CH□ Sensor two-point correction offset value (measured value) (Un\G210, Un\G214, Un\G218, Un\G222, Un\G226, Un\G230, Un\G234, Un\G238).

(a) Setting range

Processing method	Setting value
No request	0
Latch request	1

Point

- If a value outside the range is set, the error (305□) occurs and CH□ Sensor two-point correction offset value (measured value) (Un\G210, Un\G214, Un\G218, Un\G222, Un\G226, Un\G230, Un\G234, Un\G238) retains the previous value before the error has occurred.
- If Disable (0) is set in CH□ Sensor correction enable/disable setting (Un\G200 to Un\G207), this request becomes disabled.

(b) Default value

All channels are set to No request (0).

(24)CH□ Sensor two-point correction gain latch request (Un\G251, Un\G253, Un\G255, Un\G257, Un\G259, Un\G261, Un\G263, Un\G265)

This request is for storing CH□ Temperature measured value (Un\G11 to Un\G18) as a sensor two-point correction gain value (measured value) in CH□ Sensor two-point correction gain value (measured value) (Un\G212, Un\G216, Un\G220, Un\G224, Un\G228, Un\G232, Un\G236, Un\G240).

(a) Setting range

Processing method	Setting value
No request	0
Latch request	1

Point

- If a value outside the range is set, the error (306□) occurs and CH□ Sensor two-point correction gain value (measured value) (Un\G212, Un\G216, Un\G220, Un\G224, Un\G228, Un\G232, Un\G236, Un\G240) retains the previous value before the error has occurred.
- If Disable (0) is set in CH□ Sensor correction enable/disable setting (Un\G200 to Un\G207), this request becomes disabled.

(b) Default value

All channels are set to No request (0).

(25)CH□ Sensor two-point correction offset latch completion (Un\G270, Un\G272, Un\G274, Un\G276, Un\G278, Un\G280, Un\G282, Un\G284)

If a sensor two-point correction offset value is stored in the corresponding buffer memory area, the setting for this area changes to Completed (1).

If No request (0) is set in CH□ Sensor two-point correction offset latch request (Un\G250, Un\G252, Un\G254, Un\G256, Un\G258, Un\G260, Un\G262, Un\G264), this area is cleared to 0.

(26)CH□ Sensor two-point correction gain latch completion (Un\G271, Un\G273, Un\G275, Un\G277, Un\G279, Un\G281, Un\G283, Un\G285)

If a sensor two-point correction gain value is stored in the corresponding buffer memory area, the setting for this area changes to Completed (1).

If No request (0) is set in CH□ Sensor two-point correction gain latch request (Un\G251, Un\G253, Un\G255, Un\G257, Un\G259, Un\G261, Un\G263, Un\G265), this area is cleared to 0.

(27)CH□ Digital operation processing method (Un\G290 to Un\G297)

A value indicating a digital operation method selected for each channel is stored.

The following table lists the stored values.

Conversion status	Stored value	Description
No selection	0	Neither the scaling function nor sensor correction function has been selected.
Scaling being run	1	The scaling function has been selected.
Sensor correction being run (shift)	2	The sensor correction function (shift) has been selected.
Sensor correction being run (sensor two-point correction)	3	The sensor correction function (sensor two-point correction) has been selected.
Sensor correction being run (shift + sensor two-point correction)	4	The sensor correction function (shift + sensor two-point correction) has been selected.

Point

With CH□ Digital operation processing method (Un\G290 to Un\G297), whether to enable or disable the scaling function or sensor correction function cannot be changed.

To change whether to enable or disable the scaling function or sensor correction function, use the following.

- Scaling enable/disable setting (Un\G53)
- CH□ Sensor correction enable/disable setting (Un\G200 to Un\G207)

(28)Conversion setting at disconnection detection (Un\G400, Un\G401)

Set a value to be stored in CH☐ Temperature measured value (Un\G11 to Un\G18) at disconnection detection for each channel.

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

- Disconnection Detection Function (☞ Page 59, Section 8.5)

	b15 to b12	b11 to b8	b7 to b4	b3 to b0
Conversion setting at disconnection detection (CH1 to CH4) (Un\G400)	CH4	CH3	CH2	CH1
Conversion setting at disconnection detection (CH5 to CH8) (Un\G401)	CH8	CH7	CH6	CH5

Temperature measured value	Setting value
Value just before disconnection	0_H
Upscale	1_H
Downscale	2_H
Any 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 before the error has occurred.

Point

When disconnection is detected, the value set in this area is stored in CH☐ Temperature measured value (Un\G11 to Un\G18). Thus, the disconnection status can be checked only with CH☐ Temperature measured value (Un\G11 to Un\G18).

(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_H).

(29)CH☐ Conversion setting value at disconnection detection (Un\G404 to Un\G411)

When Any value (3_H) is set in Conversion setting at disconnection detection (Un\G400, Un\G401), the value set in this area is stored in CH☐ Temperature measured value (Un\G11 to Un\G18) at disconnection detection.

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

- Disconnection Detection Function (☞ Page 59, Section 8.5)

(a) Setting range

- The setting range is between -32768 and 32767.
- When a setting other than Any value (3_H) is set in Conversion setting at disconnection detection (Un\G400, Un\G401), the setting of CH☐ Conversion setting value at disconnection detection (Un\G404 to Un\G411) 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.

(30)CH□ Input range setting (Un\G500 to Un\G507)

Set the input range according to the type of the RTD to be connected for each channel.

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

- Input Range Setting (☞ Page 53, Section 8.2)

Input type	Input range	Setting value
Conversion disable (default)		0000_H
RTD	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
	Ni100 (-60 to 250℃)	0047_H
	Ni120 (-60 to 250℃)	0048_H
	Ni500 (-60 to 250℃)	0049_H
	Cu100 (-180 to 200℃)	$004C_H$
	Cu50 (-180 to 200℃)	$004D_H$

- 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 (0). Change the setting value according to the type of an RTD to be connected.

(31)CH□ Celsius/Fahrenheit display setting (Un\G508 to Un\G515)

Set a display method of CH□ Temperature measured value (Un\G11 to Un\G18) 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 before the error has occurred.

(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.

(32)CH□ Input range monitor (Un\G516 to Un\G523)

The input range that is operating can be checked in this area.

Input type	Input range	Stored value
Conversion disable (default)		0000_H
RTD	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
	Ni100 (-60 to 250℃)	0047_H
	Ni120 (-60 to 250℃)	0048_H
	Ni500 (-60 to 250℃)	0049_H
	Cu100 (-180 to 200℃)	$004C_H$
	Cu50 (-180 to 200℃)	$004D_H$

Point

The input range cannot be changed with CH□ Input range monitor (Un\G516 to Un\G523).
To change the input range, use CH□ Input range setting (Un\G500 to Un\G507).
For CH□ Input range setting (Un\G500 to Un\G507), refer to the following.

- Input range setting (☞ Page 162, Appendix 2 (30))

(33)CH□ Celsius/Fahrenheit monitor (Un\G524 to Un\G531)

The Celsius/Fahrenheit display setting that is operating 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\G531).
To change the Celsius/Fahrenheit display setting, use CH□ Celsius/Fahrenheit display setting (Un\G508 to Un\G515).
For CH□ Celsius/Fahrenheit display setting (Un\G508 to Un\G515), refer to the following.

- Celsius/Fahrenheit display setting (☞ Page 162, Appendix 2 (31))

(34)CH□ Temperature conversion status (Un\G1700 to Un\G1707)

The conversion operating status is stored.

Use this area for troubleshooting. For details, refer to the following.

- Troubleshooting for the conversion (☞ Page 132, 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 completed.
Conversion completion	2	The first conversion has been completed. Conversion is in execution.
Disconnection being detected	3	A disconnection is being detected.

(35)RUN LED status monitor (Un\G1730)

The current LED status is stored.

For details, refer to the following.

- PART NAMES (☞ Page 17, CHAPTER 2)

LED status	Stored value	Description
Off	0	Indicates that the LED is off.
On	1	Indicates that the LED is on.

(36)ERR LED status monitor (Un\G1731)

The current LED status is stored.

For details, refer to the following.

- PART NAMES (☞ Page 17, CHAPTER 2)

LED status	Stored value	Description
Off	0	Indicates that the LED is off.
On	1	Indicates that the LED is on.

(37)ALM LED status monitor (Un\G1732)

The current LED status is stored.

For details, refer to the following.

- PART NAMES (☞ Page 17, CHAPTER 2)

LED status	Stored value	Description
Off	0	Indicates that the LED is off.
On	1	Indicates that the LED is on.
Flashing (at intervals of 0.5s)	2	Indicates that the LED is flashing (at intervals of 0.5s).

(38)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.

(39)Clear setting of error history (Un\G1802)

Set whether to clear Error history No.☐ (Un\G1810 to Un\G1969).

Display method	Setting value
Not clear	0
Clear	1

(a) Enabling the setting

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

(b) Default value

The default value is Not clear (0).

(40)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 89, Section 8.9)

	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	Description		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 has occurred on Tuesday, April 1, 2014 at 12:34:56

Appendix 3 Accuracy

The accuracy when an RTD is connected is the sum of the conversion accuracy of the module and the allowable difference of the RTD.
The following is the formula for calculating the accuracy.
(Accuracy) = (Conversion accuracy) + (Allowable difference of RTD used)

- Allowable difference of Pt100 (JIS C 1604-2013)

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|)℃

- Allowable difference of Ni100, Ni120, and Ni500 (DIN 43760 1987)

Class	Allowable difference
-60 to 0℃	±(0.4 + 0.007|t|)℃
0 to 250℃	±(0.3 + 0.0028|t|)℃

- Allowable difference of Cu100 and Cu50 (GOST 6651-2009)

Class	Allowable difference
AA	±(0.1 + 0.0017|t|)℃
A	±(0.15 + 0.002|t|)℃
B	±(0.3 + 0.005|t|)℃
C	±(0.6 + 0.01|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 25℃, RTD: Class A Pt100, Measured temperature 800℃

(Accuracy) = {Specified temperature × (±0.3%)} + {±(0.15℃ + 0.002 × Specified temperature)}

= {800℃ × (±0.3%)*1} + {±(0.15℃ + 0.002 × 800℃)*2}

= ±4.15℃

*1 Conversion accuracy (Measured temperature range accuracy at RTD input) (☞ Page 167, (1))

*2 Allowable difference of class A Pt100 at measured temperature 800℃

(1) Conversion accuracy

Measured temperature range accuracy at RTD input

Type of RTD	Celsius			Fahrenheit		
	Measured temperature range	Conversion accuracy		Measured temperature range	Conversion accuracy	
		Operating ambient temperature 25±5℃	Operating ambient temperature 0 to 55℃		Operating ambient temperature 25±5℃	Operating ambient temperature 0 to 55℃
Pt100	-20 to 120℃	±0.6℃	±2.0℃	-4 to 248℉	±1.1℉	±3.6℉
	-200 to 850℃	Specified temperature × ±0.3% or ±0.8℃, whichever is greater	Specified temperature × ±0.8% or ±2.7℃, whichever is greater	-328 to 1562℉	Specified temperature × ±0.3% or ±1.5℉, whichever is greater	Specified temperature × ±0.8% or ±4.9℉, whichever is greater
JPt100	-20 to 120℃	±0.6℃	±2.0℃	-4 to 248℉	±1.1℉	±3.6℉
	-200 to 600℃	Specified temperature × ±0.3% or ±0.8℃, whichever is greater	Specified temperature × ±0.8% or ±2.7℃, whichever is greater	-328 to 1112℉	Specified temperature × ±0.3% or ±1.5℉, whichever is greater	Specified temperature × ±0.8% or ±4.9℉, whichever is greater
Pt1000	-200 to 850℃	Specified temperature × ±0.3% or ±0.8℃, whichever is greater	Specified temperature × ±0.8% or ±2.7℃, whichever is greater	-328 to 1562℉	Specified temperature × ±0.3% or ±1.5℉, whichever is greater	Specified temperature × ±0.8% or ±4.9℉, whichever is greater
Pt50	-200 to 650℃	Specified temperature × ±0.3% or ±0.8℃, whichever is greater	Specified temperature × ±0.8% or ±4.1℃, whichever is greater	-328 to 1202℉	Specified temperature × ±0.3% or ±1.5℉, whichever is greater	Specified temperature × ±0.8% or ±7.4℉, whichever is greater
Ni100	-60 to 250℃	±0.6℃	Specified temperature × ±0.8% or ±1.4℃, whichever is greater	-76 to 482℉	±1.1℉	Specified temperature × ±0.8% or ±2.6℉, whichever is greater
Ni120	-60 to 250℃	±0.6℃	Specified temperature × ±0.8% or ±1.4℃, whichever is greater	-76 to 482℉	±1.1℉	Specified temperature × ±0.8% or ±2.6℉, whichever is greater
Ni500	-60 to 250℃	±0.6℃	Specified temperature × ±0.8% or ±1.4℃, whichever is greater	-76 to 482℉	±1.1℉	Specified temperature × ±0.8% or ±2.6℉, whichever is greater
Cu100	-180 to 200℃	±0.8℃	±2.7℃	-292 to 392℉	±1.5℉	±4.9℉
Cu50	-180 to 200℃	±0.8℃	±2.7℃	-292 to 392℉	±1.5℉	±4.9℉

(2) For measurement with high accuracy

For measurement with high accuracy using an RTD, pay attention to the following items.

Item	Description	Action
Conducting wire resistance	The conducting wire resistance value between the RTD and each terminal causes a temperature error.	Refer to the external wiring example. • External Wiring (☞ Page 44, Section 6.4) For measurement with higher accuracy after the above action has been taken, correct the error with sensor correction function. • Sensor Correction Function (☞ Page 73, Section 8.8)
Ambient temperature, heat-generating object	Changes in the ambient temperature and heat generated from the adjacent module cause a temperature error.	Correct the error with the sensor correction function. • Sensor Correction Function (☞ Page 73, Section 8.8)

Point

When correcting errors with the sensor correction function for higher accuracy
After adding the module to the system used and warming up the module, correct errors.
Apply the full scale of the temperature range used to the correction.

Ex. When the temperature measuring range is 0 to 200℃, conduct sensor two-point correction using the following settings.

- CH□ Sensor two-point correction offset value (corrected value) (Un\G211, Un\G215, Un\G219, Un\G223, Un\G227, Un\G231, Un\G235, Un\G239): 0℃
- CH□ Sensor two-point correction gain value (corrected value) (Un\G213, Un\G217, Un\G221, Un\G225, Un\G229, Un\G233, Un\G237, Un\G241): 200℃

(3) When using a calibrator

This module outputs a temperature detecting output current only to the channel on which conversion is being performed. Thus, when Conversion enable (1) is set to multiple channels, response time occurs until the caliblator generates a resistance value after a temperature detecting output current is output.
When using the input from a calibrator for temperature measurement, set Conversion enable (1) in only one channel.

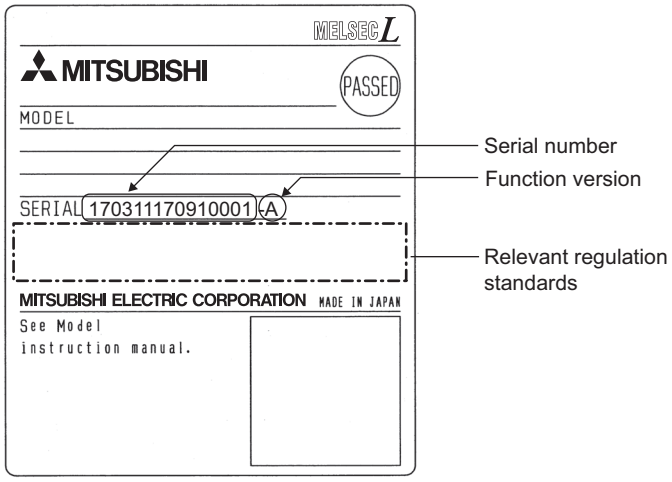
Appendix 4 How to Check the Function Version and Serial Number

The serial number and the function version of the RTD 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

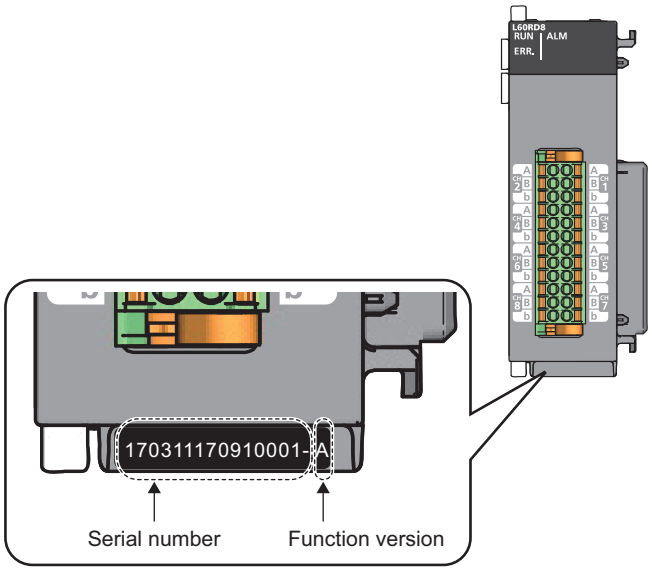
(1) Checking on the rating plate

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



(2) Checking on the front part of the module

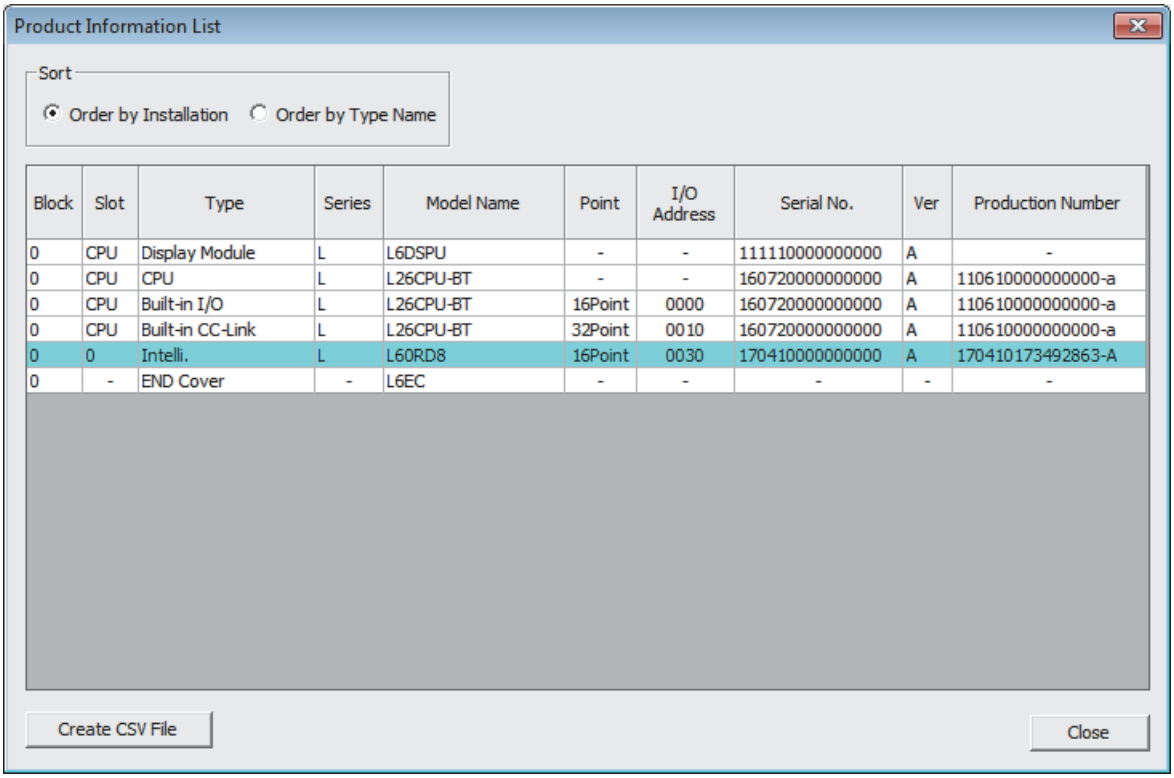
The function version and serial number on the rating plate are also shown on the front part (bottom part) of the module.



(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



(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.

Appendix 5 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 5.1 Operation of GX Developer

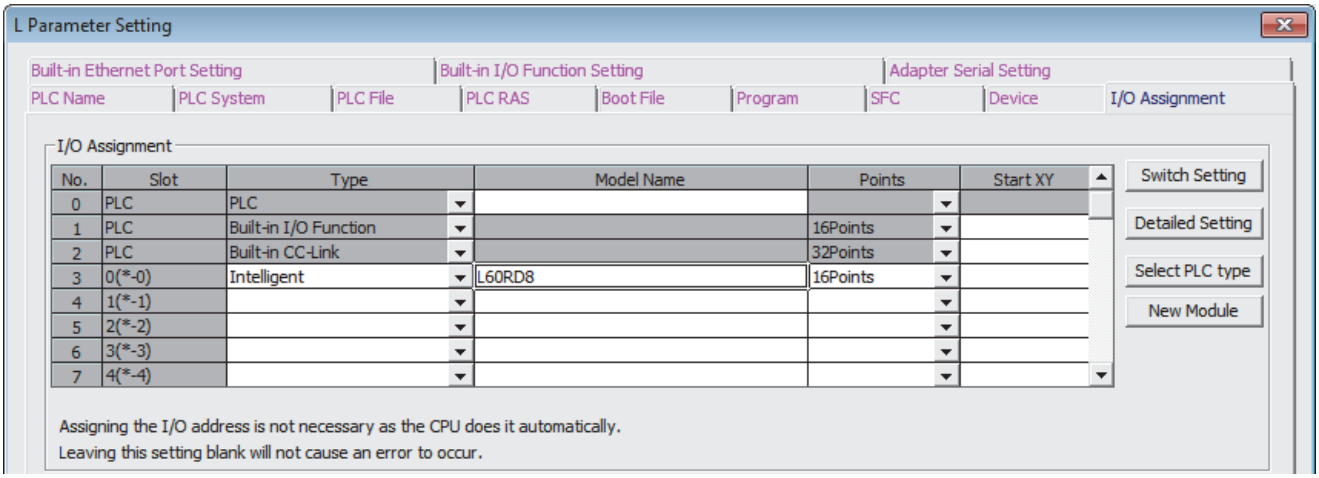
Configure the setting on the following window when using GX Developer.

Window name	Application	Reference
I/O assignment	Set the type of module installed and the range of I/O signals.	Page 171, Appendix 5.1 (1)
Switch setting	Configure the switch setting of an intelligent function module. The RTD 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]

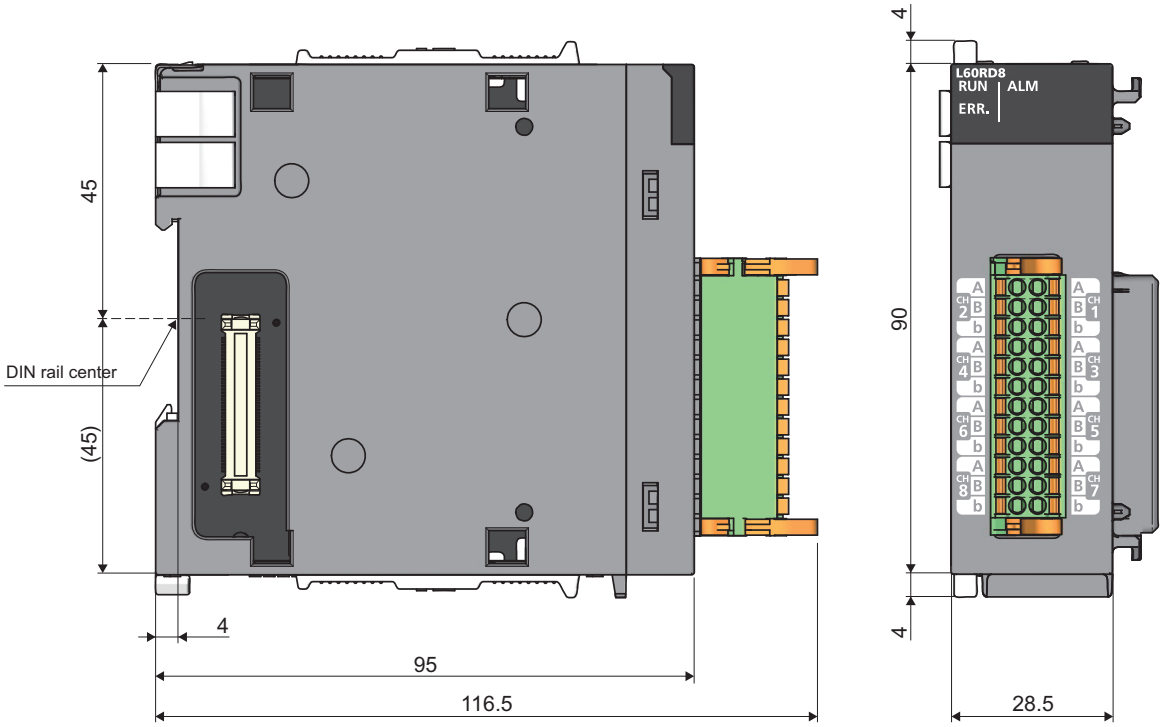


Item	Description
Type	Select "Intelli."
Model name	Input the model name of the RTD input module.
Points	Select "16point".
StartXY	Input a desired start I/O number of the RTD input module.

Appendix 6 External Dimensions

The following figure shows the external dimensions of the RTD input module.

(1) L60RD8



(Unit: mm)

Memo

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W

REVISIONS

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

Print date	*Manual number	Revision
July 2015	SH(NA)-081530ENG-A	First edition

Japanese manual version SH-081525-A

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)-081530ENG-A(1507)MEE
MODEL: L60RD8-U-E
MODEL CODE: 13JX36

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