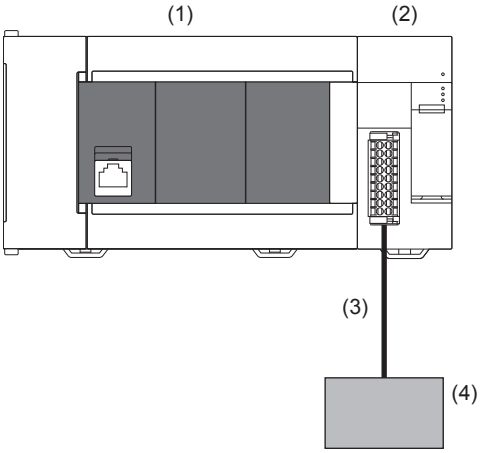
PART 1 ANALOG INPUT MODULE

Part 1 describes the analog input module.

1 FX5-4AD

1.1 Overview

The FX5-4AD analog input module can convert 4 points of analog input values (voltage, current) into digital values.
It can be added to the FX5 CPU module and enables it to capture voltage/current data of 4 channels.



(1) FX5 CPU module
(2) Analog input module (FX5-4AD)
(3) Analog device connection cable
(4) Analog device (flow sensor etc.)

1.2 Specifications

This section describes the specifications of FX5-4AD.

General specifications

The general specifications other than below are the same as those for the CPU module to be connected.
For general specifications, refer to the following manuals.
MELSEC iQ-F FX5UJ User's Manual (Hardware)
MELSEC iQ-F FX5U User's Manual (Hardware)
MELSEC iQ-F FX5UC User's Manual (Hardware)

Items	Specifications	
Dielectric withstand voltage	500 V AC for 1 minute	Between all terminals and ground terminal
Insulation resistance	10 MΩ or higher by 500 V DC insulation resistance tester	

Power supply specifications

The following table lists the power supply specifications.

Items		Specifications
Internal power supply	Power supply voltage	24 V DC, 5 V DC
	Current consumption	24 V DC: 40 mA 5 V DC: 100 mA

Performance specifications

The following table lists the performance specifications.

Items		Specifications
Number of input points		4 points (4 channels)
Conversion speed		80 μs/ch
Isolation method	Between input terminal and PLC	Photocoupler
	Between input terminal and channels	Non-isolation
Number of occupied I/O points		8 points
Applicable CPU module		• FX5UJ CPU module (from the first) • FX5U CPU module (Ver.1.050 or later) • FX5UC CPU module*1 (Ver.1.050 or later)
Applicable engineering tool		• FX5UJ CPU module: GX Works3 (Ver.1.060N or later) • FX5U/FX5UC CPU module: GX Works3 (Ver.1.040S or later)

*1 FX5-CNV-IFC or FX5-C1PS-5V is necessary to connect FX5-4AD to the FX5UC CPU module.

Voltage/current input specifications

Items	Specifications			
Analog input voltage	-10 to +10 V DC (Input resistance 400 kΩ or more)			
Analog input current	-20 to +20 mA DC (Input resistance 250 Ω)			
Digital output value	16-bit signed binary (-32768 to +32767)			
Input characteristics, resolution*1	Analog input range		Digital output value	Resolution
	Voltage	0 to 10 V	0 to 32000	312.5 μV
		0 to 5 V	0 to 32000	156.25 μV
		1 to 5 V	0 to 32000	125 μV
		-10 to +10 V	-32000 to +32000	312.5 μV
		User range setting	-32000 to +32000	125 μV*2
	Current	0 to 20 mA	0 to 32000	625 nA
		4 to 20 mA	0 to 32000	500 nA
		-20 to +20 mA	-32000 to +32000	625 nA
		User range setting	-32000 to +32000	500 nA*2
Accuracy (accuracy for the full scale digital output value)	Ambient temperature 25±5℃: within ±0.1% (±64 digits) Ambient temperature 0 to 55℃: within ±0.2% (±128 digits) Ambient temperature -20 to 0℃: within ±0.3% (±192 digits)			
Absolute maximum input	Voltage: ±15 V, Current: ±30 mA			

*1 For details on the input characteristics, refer to ☞ Page 19 Input conversion characteristics.

*2 Maximum resolution in the user range setting.

Input conversion characteristics

The input conversion characteristics of A/D conversion are expressed by the slope of the straight line connecting the offset value and the gain value, both of which are used when an analog signal (voltage or current) from outside the programmable controller is converted to the corresponding digital output value.

Offset value

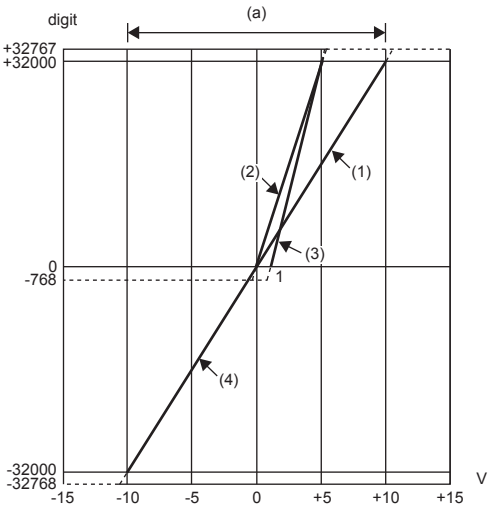
This value is the analog input value (voltage or current) where the corresponding digital output value is 0.

Gain value

This value is the analog input value (voltage or current) where the corresponding digital output value is 32000.

Voltage input characteristics

The following shows the list of the analog input ranges and the graphs of each voltage input characteristic, at the voltage input.



digit: Digital output value

V: Analog input voltage (V)

(a): Practical analog input range

No.	Input range setting	Offset value	Gain value	Digital output value*1	Resolution
(1)	0 to 10 V	0 V	10 V	0 to 32000	312.5 μV
(2)	0 to 5 V	0 V	5 V		156.25 μV
(3)	1 to 5 V	1 V	5 V		125 μV
(4)	-10 to +10 V	0 V	10 V	-32000 to +32000	312.5 μV
—	User range setting	*2	*2		125 μV*3

*1 If an analog input value exceeds the range of digital output value, the digital output value is fixed to the maximum or minimum value.

Input range setting	Digital output value	
	Minimum	Maximum
0 to 10 V	-768	+32767
0 to 5 V		
1 to 5 V		
-10 to +10 V	-32768	
User range setting		

*2 Set the offset value and gain value in the user range setting within a range satisfying the following conditions. Failure to satisfy the conditions may not result in proper A/D conversion.
Setting range of the offset value and gain value: -10 to +10 V
((Gain value) - (Offset value)) ≥ 2.0 V

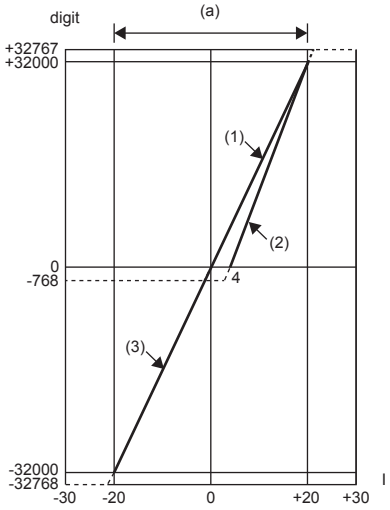
*3 Maximum resolution in the user range setting. The resolution reaches the maximum when (gain value - offset value) = 4 V. Even when (gain value - offset value) < 4 V, the maximum resolution is unchanged.

Point

- Set values within the practical range of the analog input and the digital output at each input range. If the range is exceeded, the resolution and accuracy may not fall within the range of the performance specifications. (Do not use the values in the dotted line region in the graph of voltage input characteristics.)
- Do not set the voltage over ±15 V. Doing so can cause breakdown of components.

Current input characteristics

The following shows the list of the analog input ranges and the graph of each current input characteristic, at the current input.



digit: Digital output value

I: Analog input current (mA)

(a): Practical analog input range

No.	Input range setting	Offset value	Gain value	Digital output value*1	Resolution
(1)	0 to 20 mA	0 mA	20 mA	0 to 32000	625 nA
(2)	4 to 20 mA	4 mA	20 mA		500 nA
(3)	-20 to +20 mA	0 mA	20 mA	-32000 to +32000	625 nA
—	User range setting	*2	*2		500 nA*3

*1 If an analog input value exceeds the range of digital output value, the digital output value is fixed to the maximum or minimum value.

Input range setting	Digital output value	
	Minimum	Maximum
0 to 20 mA	-768	+32767
4 to 20 mA		
-20 to +20 mA	-32768	
User range setting		

*2 Set the offset value and gain value in the user range setting within a range satisfying the following conditions. Failure to satisfy the conditions may not result in proper A/D conversion.
Setting range of the offset value and gain value: 0 to 20 mA
((Gain value) - (Offset value)) ≥ 6.0 mA

*3 Maximum resolution in the user range setting. The resolution reaches the maximum when (gain value - offset value) = 16 mA. Even when (gain value - offset value) < 16 mA, the maximum resolution is unchanged.

Point

- Set values within the practical range of the analog input and the digital output at each input range. If the range is exceeded, the resolution and accuracy may not fall within the range of the performance specifications. (Do not use the values in the dotted line region in the graph of current input characteristics.)
- Do not set the current over ±30 mA. Doing so can cause breakdown of components.
- If a current is input from an external device into a channel set for voltage as the input type, an overvoltage may occur and destroy components. Limit the voltage so that the external device's voltage value does not exceed the range of -10 to +10 V.

Accuracy

The accuracy of A/D conversion is the accuracy for the full scale of digital output value.

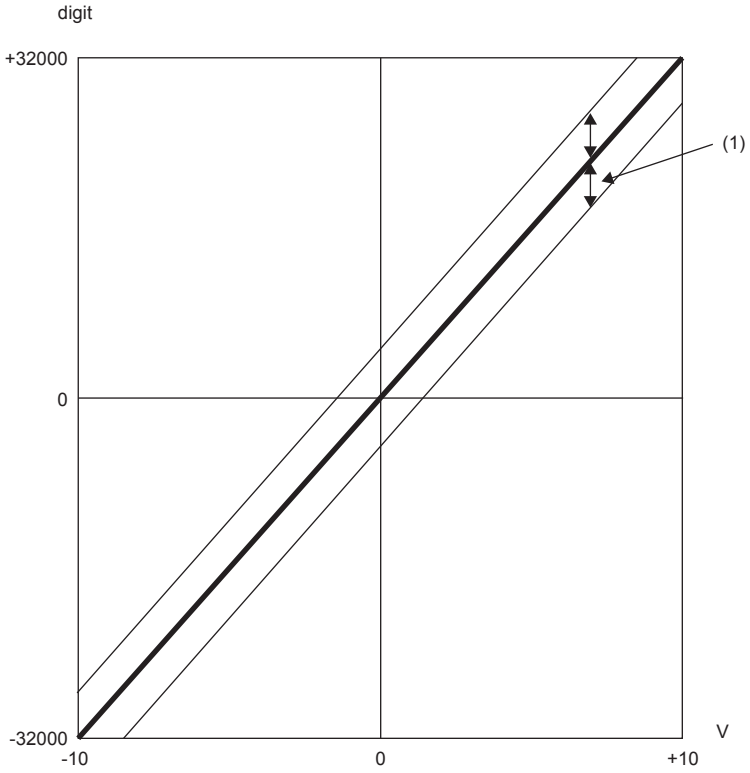
The fluctuation range varies as follows depending on ambient temperature and input range.

Analog input range		Ambient temperature		
		25±5℃	**0 to 55℃**	**-20 to 0℃**
Voltage	0 to 10 V	Within ±0.1% (±64 digits)/full scale	Within ±0.2% (±128 digits)/full scale	Within ±0.3% (±192 digits)/full scale
	0 to 5 V			
	1 to 5 V			
	-10 to +10 V			
Current	0 to 20 mA			
	4 to 20 mA			
	-20 to +20 mA			

(Except for the conditions under noise influence.)

Ex.

Accuracy at -10 to +10 V range selection



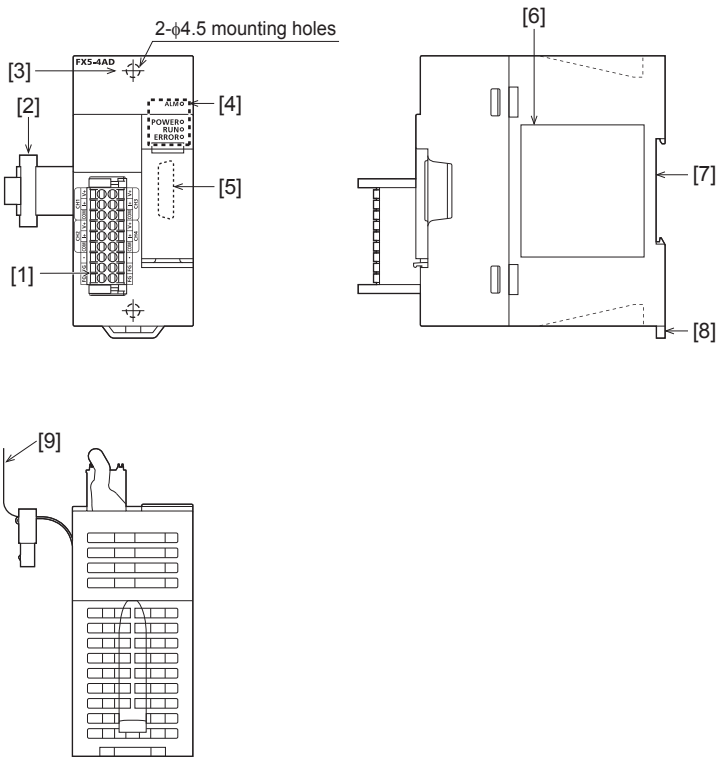
digit: Digital output value

V: Analog input voltage (V)

(1) Fluctuation range

Part names

This section describes the part names of the analog input module.



No.	Name	Description
[1]	Terminal block (Spring clamp terminal block)	Used for current/voltage input.
[2]	Expansion cable	Cable for connecting the module when adding the analog input module.
[3]	Direct mounting hole	Screw holes (2-ϕ4.5, mounting screw: M4 screw) for direct installation.
[4]	Operations status display LEDs	Indicates the operating status of the module. (☞ Page 23 LED display)
[5]	Extension connector	Connector for connecting the extension cable of an extension module.
[6]	Name plate	The product model name and manufacturer's serial number are shown.
[7]	DIN rail mounting groove	The module can be installed on DIN46277 rail (35 mm wide).
[8]	DIN rail mounting hook	Hook for mounting the module on a DIN rail of DIN46277 (35 mm wide).
[9]	Pull out tab	They are used when drawing out an extension cable.

LED display

The following table lists the LED display.

LED display	LED color	Description
POWER	Green	Indicates the power supply status. ON: Power ON OFF: Power off or module failure
RUN	Green	Indicates the operating status. Light on: Normal operation Flashing: Offset/gain setting mode Light off: Error occuring
ERROR	Red	Indicates the error status. ON: Minor error Flashing: Moderate error or major error OFF: Normal operation
ALM	Red	Indicates the output status. Light on: Process alarm or rate alarm issued Flashing: Input signal error Light off: Normal operation

1.3 Procedures Before Operation

This section describes the procedures before operation.

1. Check the analog input module specifications

Check the analog input module specifications. (☞ Page 18 Specifications)

2. Install the analog input module

Install the analog input module to the CPU module. For details, refer to the following.

📖MELSEC iQ-F FX5UJ User's Manual (Hardware)

📖MELSEC iQ-F FX5U User's Manual (Hardware)

📖MELSEC iQ-F FX5UC User's Manual (Hardware)

3. Wiring

Perform wiring of external devices to the analog input module.

4. Adding a module

Add an analog input module to the module configuration by using GX Works3.

Point

When adding a new analog input module, if selecting the module whose module model name has "(FX3)" at the end, it can be used as FX3 allocation mode.

- FX5-4AD: Normal mode
- FX5-4AD(FX3): FX3 allocation mode

For details on the FX3 allocation mode function, refer to ☞ Page 82 FX3 allocation mode function

5. Parameter settings

Set parameters of the analog input module by using GX Works3. (☞ Page 88 Parameter Settings)

6. Offset/gain setting

When setting the user range, perform the offset/gain setting.

7. Programming

Create a program.

1.4 Functions

This section describes the functions of an analog input module and the setting procedures for those functions.

For details on the buffer memory areas, refer to the following.

☞ Page 115 Buffer Memory Areas

Point

- This section describes buffer memory addresses for CH1. For details on the buffer memory addresses after CH2, refer to the following.

☞ Page 115 List of buffer memory areas

- Numerical values corresponding to the channel where an error has occurred and the error description fit in the □ and △ of an error code and alarm code described in this section. For details on the numerical values, refer to the following.

☞ Page 107 List of error codes

☞ Page 110 List of alarm codes

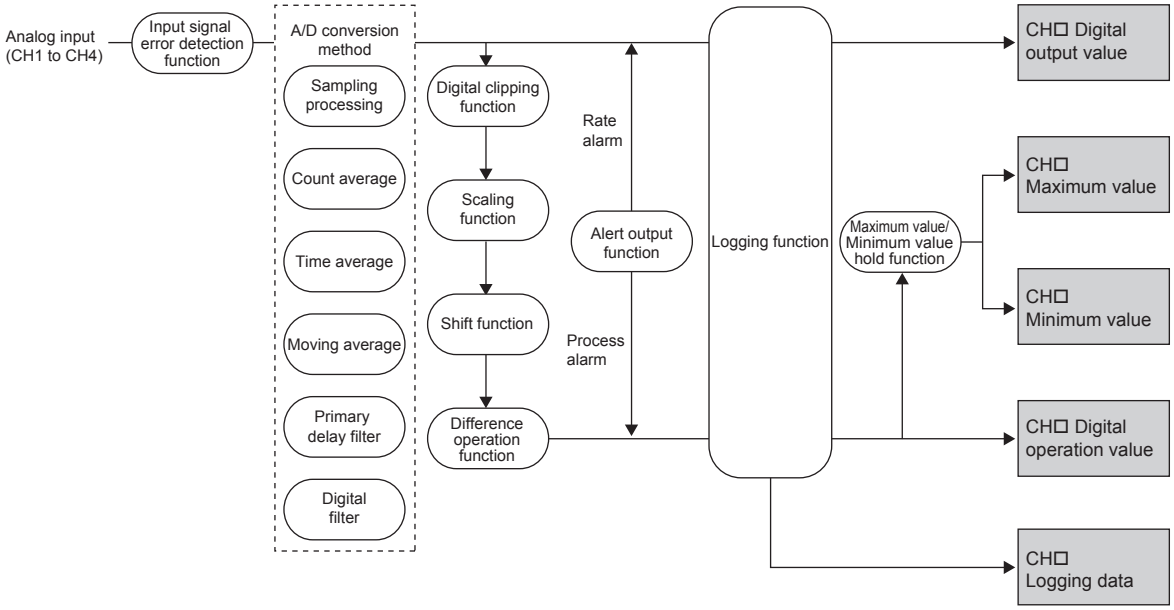
Function list

This section lists the functions of analog input modules.

Item			Description	Reference
Operation mode			Select the operation mode (normal mode, offset/gain setting mode) of the analog input module.	Page 26
Range switching function			Allows switching the input range of an analog input for each channel. Switching the range makes it possible to change the input conversion characteristic.	Page 27
A/D conversion enable/disable setting function			Controls whether to enable or disable the A/D conversion for each channel. Disabling A/D conversion for unused channels reduces the conversion cycles.	Page 27
A/D conversion method	Sampling processing		Converts analog input values into digital at every sampling period, storing them in buffer memory areas.	Page 28
	Averaging processing	Time average	Executes A/D conversion for the set time and performs the averaging processing on the total value excluding the maximum and minimum values. The processed values are stored in the buffer memory area. The number of processing times within the set time changes depending on the number of channels where A/D conversion is enabled.	Page 28
		Count average	Executes A/D conversion for a set number of times and performs the averaging processing on the total value excluding the maximum and minimum values. The processed values are stored in the buffer memory area. The time taken to store the count average value obtained by the processing in the buffer memory area varies depending on the number of channels where the conversion is enabled.	Page 29
		Moving average	Averages digital output values taken at every sampling period for a specified number of times, and stores the averaged value in the buffer memory area. The target range for averaging processing moves at each sampling processing, thereby allowing the latest digital output value to be obtained.	Page 29
	Primary delay filter		Performs digital output where the transient noise of analog input is smoothed depending on the set time constant, and stores the value in the buffer memory area.	Page 30
	Digital filter		Removes the fluctuation below the set value when the measurement signal includes noise such as a steep spike and stores the resulting stable data in the buffer memory.	Page 31
Scaling function			Performs scale conversion on digital output values within the range from a scaling upper limit value to a scaling lower limit value, both of which are set at desired values. This function helps reduce the man-hours taken for creating a scale conversion program.	Page 34
Shift function			Adds (shifts) a set conversion value shift amount to a digital output value, and stores the result in the buffer memory area. A change in conversion value shift amount is reflected to the digital operation value in real time, which facilitates fine adjustment at system start-up.	Page 36
Digital clipping function			Fixes a possible digital operation value to the maximum digital output value or the minimum digital output value when an input current or voltage exceeds the input range.	Page 39
Difference operation function			The digital operation value at the start of this function is treated as 0 (reference value). Thereafter, values that increased or decreased from the reference value are stored in the buffer memory.	Page 41
Maximum value/minimum value hold function			Stores the maximum and minimum values of digital operation values in the buffer memory area for each channel.	Page 45
Alert output function	Process alarm		Outputs an alert when a digital operation value falls within the preset alert output range.	Page 46
	Rate alarm		This function outputs an alert when the change rate of a digital output value is equal to or greater than the rate alarm upper limit value, or the rate is equal to or smaller than the rate alarm lower limit value.	Page 48
Input signal error detection function			Outputs an alarm when an analog input value exceeds the preset range.	Page 53
Logging function			Logs (records) digital output values or digital operation values. 10000 points of data can be logged for each channel.	Page 59
Logging read function			After logging starts, an interrupt request is sent to the CPU module and an interrupt program is executed every time the preset number of data to be read is logged.	Page 72
Interrupt function			Executes an interrupt program of the CPU module when an interrupt factor such as an input signal error or alarm output is detected.	Page 76
Error history function			Records up to 16 errors and alarms that occurred in an analog input module to store them in the buffer memory areas.	Page 79
Offset/gain setting function			Allows the correction of errors in digital output values.	Page 92
Offset/gain initialization function			Initializes the offset and gain values to the factory defaults.	Page 81
FX3 allocation mode function			Converts the layout of buffer memory addresses of an analog input module to the one equivalent to FX3U-4AD. This compatibility enables the reuse of programs that have proven performance on FX3U-4AD.	Page 82

Processing of each function

The functions are processed in the order shown below. If multiple functions are enabled, the output of the first processed function is used as the input of the next function.



Digital output value

The digital values subjected to the sampling processing, each averaging processing, or each filter processing are stored.

Digital operation value

These values are obtained by operating a digital output value using the digital clipping function, scaling function, shift function, or difference operation function. When each function is not used, the same value as the digital output value is stored.

Maximum value and minimum value

The maximum and minimum values of the digital operation values are stored.

Logging data

When the logging function is used, digital output values or digital operation values are collected.

Operation mode

The analog input module operation mode can be selected.

Setting procedure

Set "Operation mode setting".

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Basic setting] ⇨ [Operation mode setting function]

Operation mode	Description
Normal mode	A mode to perform usual A/D conversion.
Offset/gain setting mode	A mode used for performing the offset/gain setting at user range setting.

Range switching function

Allows switching the input range of an analog input for each channel.
Switching the range makes it possible to change the input conversion characteristic.

Setting procedure

Set the input range to be used in the "Input range setting".

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Basic setting] ⇨ [Range switching function]

Input range setting	Digital output value
4 to 20 mA	0 to 32000
0 to 20 mA	0 to 32000
-20 to +20 mA	-32000 to +32000
1 to 5 V	0 to 32000
0 to 5 V	0 to 32000
0 to 10 V	0 to 32000
-10 to +10 V	-32000 to +32000
User range setting*1	-32000 to +32000

*1 When using the user range setting, set the offset/gain.
For offset/gain settings, refer to the following.
☞ Page 92 Offset/Gain Setting

After the data is written, the range is switched when the programmable controller power supply is turned off→on or when the CPU module is reset.

Point

With the following buffer memory areas, the range switching and range setting can be monitored.
'CH1 Range setting' (Un\G598)
'CH1 Range setting monitor' (Un\G430)
For details on the buffer memory, refer to the following.
☞ Page 174 CH1 Range setting
☞ Page 148 CH1 Range setting monitor

A/D conversion enable/disable setting function

Controls whether to enable or disable the A/D conversion for each channel.
Disabling A/D conversion for unused channels reduces the conversion cycles.

Setting procedure

Set "A/D conversion enable/disable setting" to "A/D conversion enable" or "A/D conversion disable".

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Basic setting] ⇨ [A/D conversion enable/disable setting function]

A/D conversion method

An A/D conversion method can be set for each channel.

Sampling processing

This function A/D converts analog input values and stores them in the digital output value and digital operation value every sampling cycle.

Point

The sampling cycle is "Conversion speed (80 μs) × Number of A/D conversion enabled channels".
Whether to enable or disable the A/D conversion can be set for each channel. Disabling the A/D conversion for unused channels reduces the A/D conversion cycles.
Conversion cycle that applies when the three channels get A/D conversion enabled
• 80 × 3 = 240 (μs)
The conversion cycle is 240 (μs).

Averaging processing

The digital output value is averaging processed for each channel, and averaged value is stored in the digital output value and the digital operation value.
The following three types of averaging processing are provided.

- Time average
- Count average
- Moving average

■Time average

Executes A/D conversion for the set time and performs the averaging processing on the total value excluding the maximum and minimum values. The averaged value is stored in the digital output value and the digital operation value.
The number of processing times within the set time changes depending on the number of channels where A/D conversion is enabled.

$$\text{Processing times (times)}^{*1} = \frac{\text{Setting time}}{(\text{Number of A/D conversion enabled channels} \times \text{Conversion speed})}$$

*1 Values after the decimal point are omitted.

Ex.

The following table shows the processing times with the setting below.

Item	Setting
Number of channels where the A/D conversion is enabled	Four channels (CH1 to CH4)
Setting time	2 ms

$$\frac{2}{(4 \times 0.08)} = 6.25 \fallingdotseq 6$$

Conversion is processed 6 times and the mean value is output.

Point

The valid lower limit setting value for the time average is calculated by the formula "Minimum processing times (4 times) × Number of A/D conversion enabled channels × Conversion speed".

■Count average

Executes A/D conversion for a set number of times and performs the averaging processing on the total value excluding the maximum and minimum values. The averaged value is stored in the digital output value and the digital operation value.
The time taken to store the count average value obtained by the processing in the buffer memory area varies depending on the number of channels where the conversion is enabled.
Processing time = Set number of times × (Number of A/D conversion enabled channels × Conversion speed)

Ex.
The following table shows the processing time with the setting below.

Item	Setting
Number of channels where the A/D conversion is enabled	Four channels (CH1 to CH4)
Set number of times	Five times

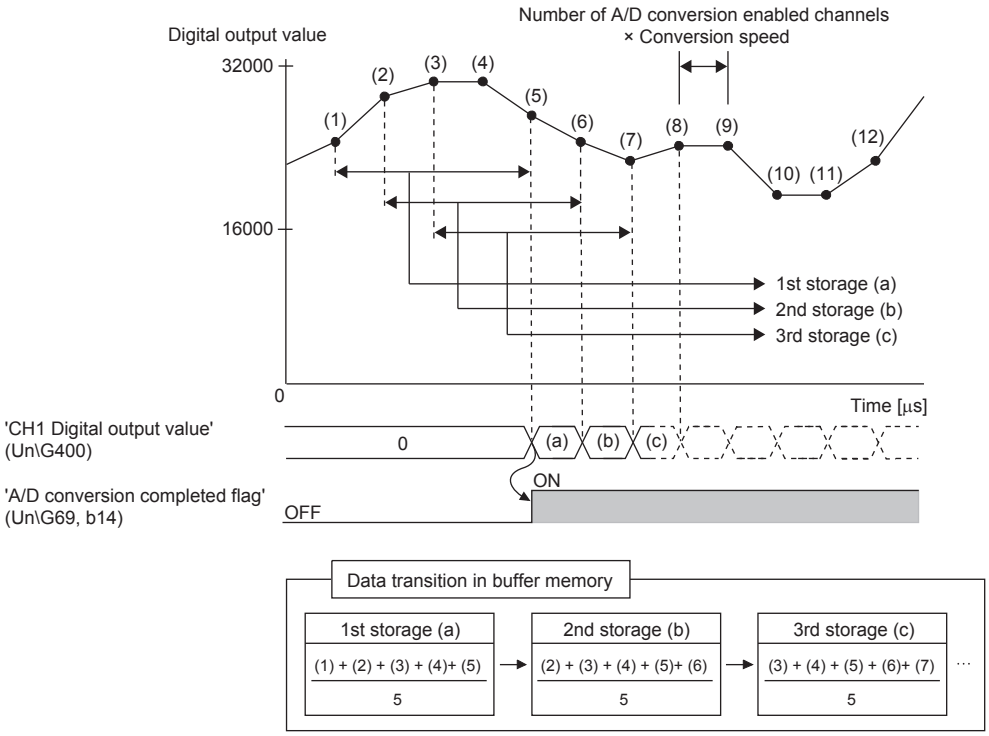
5 (times) × (4 (CH) × 80 (μs)) = 1600 (μs) = 1.6 (ms)
An average value is output every 1.6 ms.

Point

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

■Moving average

Converted values for the specified number of times captured every sampling period are averaged and stored in the digital output value and the digital operation value. The target range for averaging processing moves at each sampling processing, thereby allowing the latest digital output value to be obtained.
The following figure shows the moving average processing of when the set number of times is five.



Primary delay filter

Depending on the set time constant, transient noise of analog input is smoothed and stored in the digital output value and digital operation value area.

The degree of smoothing varies depending on the setting of a time constant (s).

Time constant is the time taken for the digital output value to reach 63.2% of the steady-state value.

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

When n = 1[*1]

$Y_n = 0$

When n = 2

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

When n ≥ 3

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

Y_n : Present digital output value
Y_{n-1} : Last digital output value
n : Number of sampling
X_n : Digital output value before smoothing
X_{n-1} : Last digital output value before smoothing
ΔT : Conversion time
TA : Time constant

*1 A/D conversion completed flag turns on when n ≥ 2.

Point

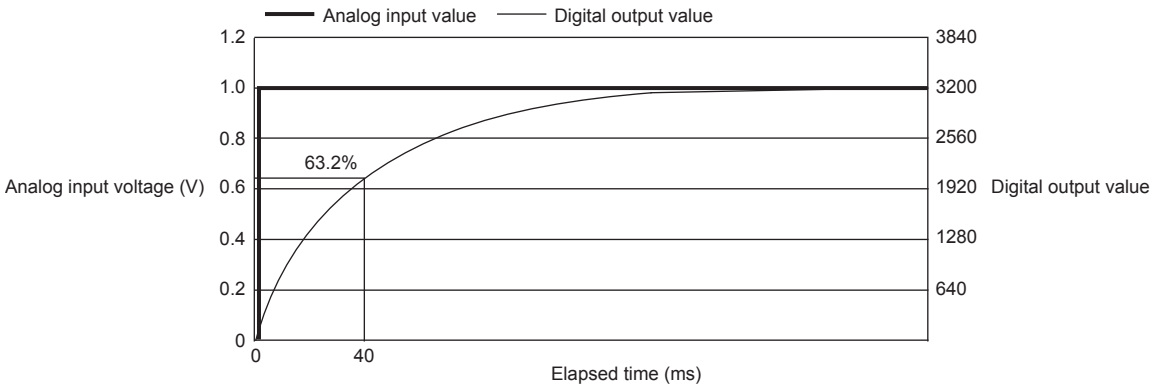
Time constant = [Primary delay filter constant set by "CH1 Time average/Count average/Primary delay filter constant setting" (Un\G502)] × [Conversion cycle].

Ex.

Digital output value when an analog input value is changed 0 → 1 V

The following figure shows the change of the digital output value with the input range of 0 to 10 V and time constant (Conversion cycle × Primary delay filter) of 40 ms.

After 40 ms from the analog input value becomes 1 V, the digital output value reaches 63.2% of the digital output value of when the sampling processing is selected.



Digital filter

The digital filter can remove fluctuation of the analog input value below the digital filter setting value.
The relationships among the digital output, digital filter setting, and analog input values are as follows.

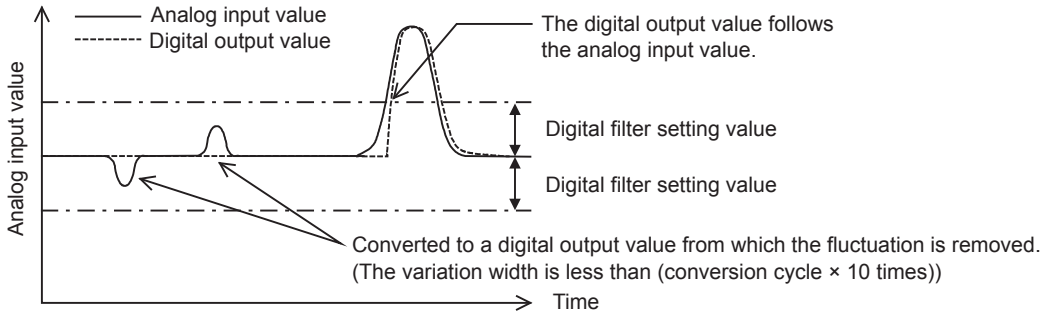
■Digital filter setting value > Analog input value fluctuation

If the analog input value fluctuation is smaller than the digital filter setting value, the conversion value resulting from removal of the fluctuation will be stored as the digital output value. Note that the fluctuation range below the digital filter setting value must satisfy the following expression.

Fluctuation range below the digital filter setting value < Conversion cycle × 10 times

■Digital filter setting value ≤ Analog input value fluctuation

When the analog input value fluctuation is larger than or equal to the digital filter setting value, the conversion value following the analog input value is stored as the digital output and digital operation values.



Digital filter requires the A/D conversion values for 23 times to remove the fluctuation which is smaller than the digital filter setting value. Therefore, when using the digital filter, the first digital output value is updated at the timing when the A/D conversion values for 23 times are completed.

From the second time on, the digital output value is updated every conversion cycle.

■Digital filter conversion cycle

The digital filter conversion cycle varies depending on the setting value of the digital filter fluctuation range setting. The conversion cycle of the digital filter in operation is stored in 'CH1 Digital filter conversion cycle monitor' (Un\G411).

Point

After CH1 digital filter conversion cycle monitor (Un\G411) turns on and off the operating condition setting request, "0" is stored for any of the following states.

- A/D conversion not allowed
- Operates in the A/D conversion method other than the digital filter.
- "Averaging process specification setting range error" (error code: 191□H) occurs
- "Time average setting range error" (error code: 192□H) occurs
- "Count average setting range error" (error code: 193□H) occurs
- "Moving average setting range error" (error code: 194□H) occurs
- "Primary delay filter constant setting range error" (error code: 195□H) occur
- "Digital filter setting range error" (error code: 19D□H) occur
- "Digital filter fluctuation width setting range error" (error code: 19E□H) occur

Setting procedure

■Sampling processing

Set "Average processing setting" to "Sampling processing".

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Basic setting] ⇨ [A/D conversion method]

■Averaging processing and Primary delay filter

1. Set "Average processing setting" to "Time average", "Count average", "Moving average", or "Primary delay filter".

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Basic setting] ⇨ [A/D conversion method]

2. Set a value for "Time average/Count average/Moving average/Primary delay filter constant setting".

Item	Setting range
Time average	2 to 5000 (ms)
Count average	4 to 62500 (counts)
Moving average	2 to 1000 (counts)
Primary delay filter	1 to 500 (times)

■Digital filter

1. Set "Average process specification" to "Digital filter".

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Basic setting] ⇨ [A/D conversion method]

2. Set a value for "Digital filter setting".

Item	Setting range
Digital filter setting	1 to 1600 (digits)

3. Set "Digital filter fluctuation range setting".

Item	Setting range
Digital filter fluctuation range setting	80 to 200000 (μs)*1

*1 For the digital filter fluctuation range setting, set a value equal to or larger than [Number of A/D conversion enabled channels × Conversion speed].
If a value less than [Number of A/D conversion enabled channels × Conversion speed] is set when the digital filter fluctuation range setting is within the setting range, it will operate with sampling processing without performing digital filtering.

• Digital filter conversion cycle

The digital filter conversion cycle varies as follows depending on the setting value of the digital filter fluctuation range setting.

Number of A/D conversion enabled channels	Digital filter fluctuation range setting	Conversion cycle
1	80≤ Fluctuation range <800	Sampling processing conversion processing
	800≤ Fluctuation range ≤ 200000	Time average conversion cycle*2
2	160≤ Fluctuation range <1600	Sampling processing conversion processing
	1600≤ Fluctuation range ≤ 200000	Time average conversion cycle*2
3	240≤ Fluctuation range <2400	Sampling processing conversion processing
	2400≤ Fluctuation range ≤ 200000	Time average conversion cycle*2
4	320≤ Fluctuation range <3200	Sampling processing conversion processing
	3200≤ Fluctuation range ≤ 200000	Time average conversion cycle*2

*2 The time average conversion cycle is as follows.

$$\text{Time average conversion cycle} = \left(\text{Variation width} \div \underbrace{\left(\text{Number of A/D conversion enabled channels} \times \text{Conversion speed} \times 10\right)}_{\text{Values after the decimal point are omitted}} + 1\right) \times \text{Number of A/D conversion enabled channels} \times \text{Conversion speed}$$

If the above calculation result is smaller than [Minimum acquisition count (4 times) × Number of A/D conversion enabled channels × Conversion speed], the time average conversion cycle is as follows.
Time average conversion cycle = Minimum acquisition count (4 times) × Number of A/D conversion enabled channels ×Conversion speed

Ex.

If the channel used is only CH1 and the digital filter fluctuation range setting is 50000

Time average conversion cycle = ((50000 ÷ (1 × 80 × 10)) + 1) × 1 × 80 = 5040 (μs)

Since the calculation result is larger than or equal to [Minimum acquisition count (4 times) × Number of A/D conversion enabled channels × Conversion speed], the time average conversion cycle is 5040 μs.

Ex.

If the channel used is only CH1 and the digital filter fluctuation range setting is 1000

Time average conversion cycle = ((1000 ÷ (1 × 80 × 10)) + 1) × 1 × 80 = 160 (μs)

Since the calculation result is smaller than or equal to [Minimum acquisition count (4 times) × Number of A/D conversion enabled channels × Conversion speed], the time average conversion cycle is 320 μs.

Scaling function

Performs scale conversion on digital output values within a specified range between a scaling upper limit value and a scaling lower limit value.
The converted values are stored in 'CH1 Digital operation value' (Un\G402).

Concept of scaling setting

The concepts of each setting item are described below.

- For the scaling upper limit value, set a value corresponding to the upper limit value after the input range conversion.
- For the scaling lower limit value, set a value corresponding to the lower limit value after the input range conversion.

Ex.

If the input range is 0 to 5 V in voltage and the scaling upper and lower limit values are set to 20000 and 4000, respectively, 4000 will be stored in 'CH1 Digital operation value' (Un\G402) when the voltage input is 0 V and 20000 will be stored there when the voltage input is 5 V.

Calculating the scaling value

The scale value conversion is based on the following formula. (In scale conversion, values are rounded to the nearest whole number.)

Range setting	Relational expression	Element
Current: 0 to 20 mA, 4 to 20 mA, user range setting	$\frac{D_x \times (S_H - S_L)}{DMax} + S_L$	D_x: Digital output value DMax: Maximum digital output value of the input range in use DMin: Minimum digital output value of the input range in use S_H: Scaling upper limit value S_L: Scaling lower limit value
Voltage: 0 to 10 V, 0 to 5 V, 1 to 5 V, user range setting		
Current: -20 to +20 mA	$\frac{D_x \times (S_H - S_L)}{(DMax - DMin)} + \frac{(S_H + S_L)}{2}$	
Voltage: -10 to +10 V		

Point

If the calculated digital output value is 32767 or more, 32767 will be set. If it is -32768 or smaller, -32768 will be stored.

Setting procedure

1. Set "Scaling enable/disable setting" to "Enable".

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Application setting] ⇨ [Scaling function]

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

Item	Setting range
Scaling upper limit value	-2147483648 to +2147483647 (practical range: -32000 to +32000)
Scaling lower limit value	

Point

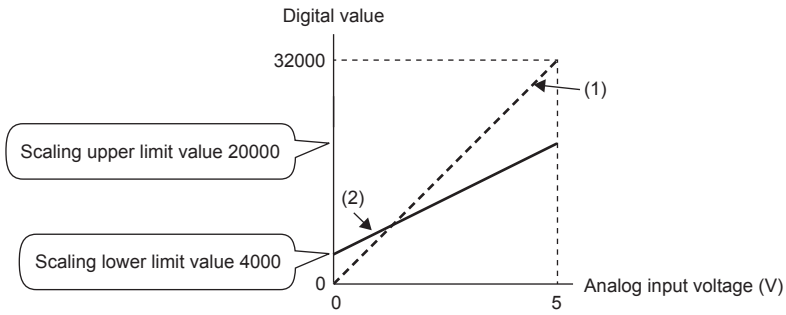
- Even when the scaling upper limit value and the scaling lower limit value are set so that the change is greater than the resolution, the resolution will not increase.
- If the relation between the values is the conversion scaling lower limit value > the conversion scaling upper limit value, the scale conversion can be performed according to a negative slope.
- Set the scaling with the condition "Scaling upper limit value ≠ Scaling lower limit value".
- When the scaling function is used with the digital clipping function, the scale conversion is performed on the digital operation values after digital clipping.

Setting example

Ex.

An example of the following settings is shown below.

Item	Setting
Range setting	Voltage (0 to 5 V)
Scaling enable/disable setting	Enable
Scaling upper limit value	20000
Scaling lower limit value	4000



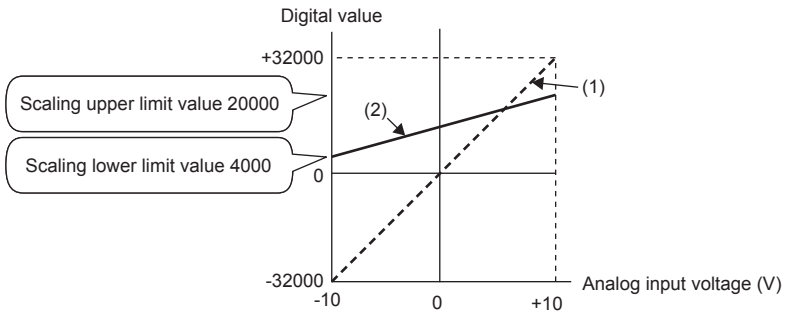
Input voltage (V)	(1) Digital output value	(2) Digital operation value (scaling value)
0	0	4000
1	6400	7200
2	12800	10400
3	19200	13600
4	25600	16800
5	32000	20000

Ex.

An example of the following settings is shown below.

Item	Setting
Range setting	Voltage (-10 to +10 V)
Scaling enable/disable setting	Enable
Scaling upper limit value	20000
Scaling lower limit value	4000

Input voltage and scaling value become as follows.



Analog input voltage (V)	(1) Digital output value	(2) Digital operation value (scaling value)
-10	-32000	4000
-5	-16000	8000
0	0	12000
+5	+16000	16000
+10	+32000	20000

Shift function

Adds (shifts) a set conversion value shift amount to a digital output value and stores the result as the digital operation value. A change in conversion value shift amount is reflected to the digital operation value in real time, which facilitates fine adjustment at system start-up.

Operation

A set conversion value shift amount is added to the digital operation value. The digital operation value with shift addition is stored in 'CH1 Digital operation value' (Un\G402). The conversion value shift amount is added in every sampling cycle for sampling processing and is added in every averaging process cycle for averaging processing. After that, the added values are stored in 'CH1 Digital operation value' (Un\G402). If a value is set to the conversion value shift amount, the conversion value shift amount is added regardless of turning off→on→off 'Operating condition setting request' (Un\G70, b9).

Setting procedure

Set a value for "Conversion value shift amount".

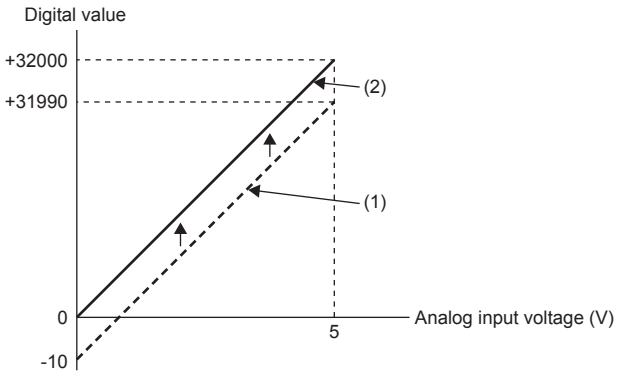
[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Application setting] ⇨ [Shift function]

Item	Setting range
Conversion value shift amount	-32768 to +32767

Setting example

Ex.

When the input characteristics is adjusted in a channel where the input range of 0 to 5 V is set by the shift function



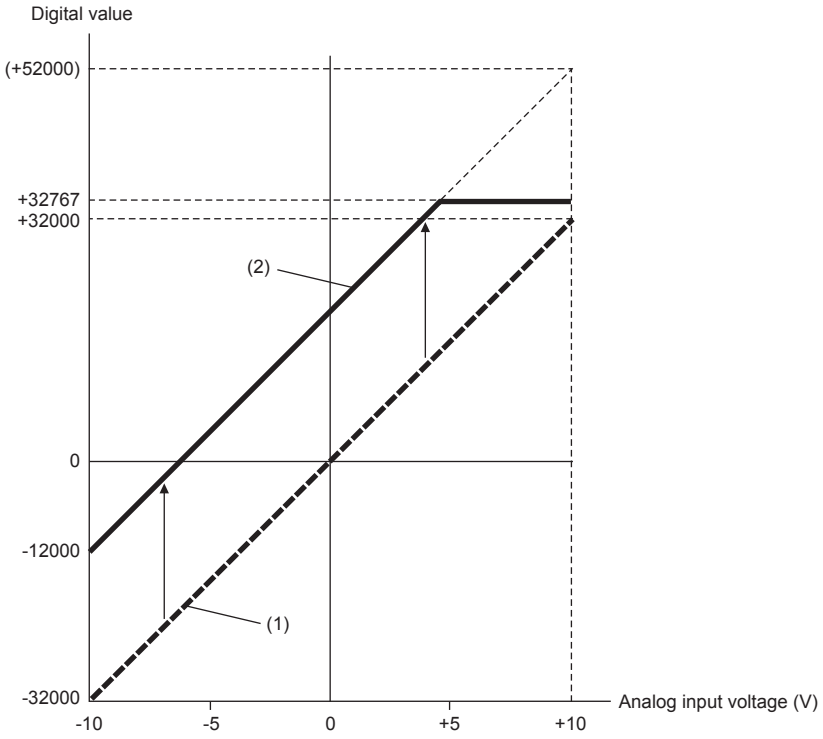
(1) 'CH1 Digital output value' (Un\G400): -10 to +31990
↓ 'CH1 Conversion value shift amount' (Un\G472) "+10"

(2) 'CH1 Digital operation value' (Un\G402): 0 to +32000

Voltage input	(1) Digital output value	(2) Digital operation value
0	-10	0
5	+31990	+32000

Ex.

When the input characteristics is adjusted in a channel where the input range of -10 to +10 V is set by the shift function



(1) 'CH1 Digital output value' (Un\G400): -32000 to +32000
↓ 'CH1 Conversion value shift amount' (Un\G472) "+20000"

(2) 'CH1 Digital operation value' (Un\G402): -12000 to +32767

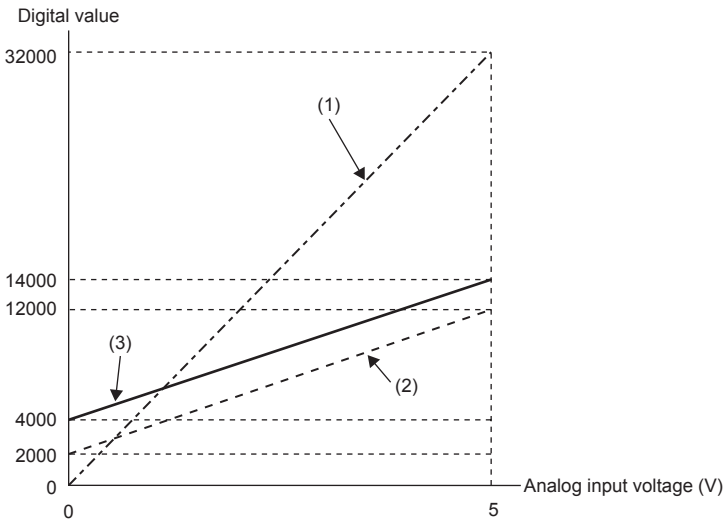
Voltage input	(1) Digital output value	(2) Digital operation value
-10	-32000	-12000
-5	-16000	+4000
0	0	+20000
+5	+16000	+32767*1
+10	+32000	+32767*1

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

Ex.

If the following are set for a channel for which the input range 0 to 5 V is set

Item	Setting
'CH1 Scaling enable/disable setting' (Un\G504)	Enable (0)
'CH1 Scaling upper limit value' (Un\G506)	12000
'CH1 Scaling lower limit value' (Un\G508)	2000
'CH1 Conversion value shift amount' (Un\G472)	2000



(1) 'CH1 Digital output value' (Un\G400): 0 to 32000
↓ Scaling
(2) Value after scaling: 2000 to 12000
↓ 'CH1 Conversion value shift amount' (Un\G472) "+2000"
(3) 'CH1 Digital operation value' (Un\G402): 4000 to 14000

Voltage input	(1) Digital output value	(2) Value after scaling	(3) Digital operation value
0	0	2000	4000
1	6400	4000	6000
2	12800	6000	8000
3	19200	8000	10000
4	25600	10000	12000
5	32000	12000	14000

Point

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

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

☞ Page 40 Setting example

Digital clipping function

This function fixes the range of the digital operation value with the maximum digital output value and the minimum digital output value when the corresponding current or voltage exceeds the input range.

List of output ranges

The following table lists the output ranges of the digital operation values when the digital clipping function is enabled with each range.

Input range	Output range of digital operation values	
	Digital clipping function is enabled	Digital clipping function is disabled
4 to 20 mA	0 to 32000	-768 to +32767
0 to 20 mA		
-20 to +20 mA	-32000 to +32000	-32768 to +32767
1 to 5 V	0 to 32000	-768 to +32767
0 to 5 V		
0 to 10 V		
-10 to +10 V	-32000 to +32000	-32768 to +32767
User range setting		

Setting procedure

Set "Digital clipping enable/disable setting" to "Enable".

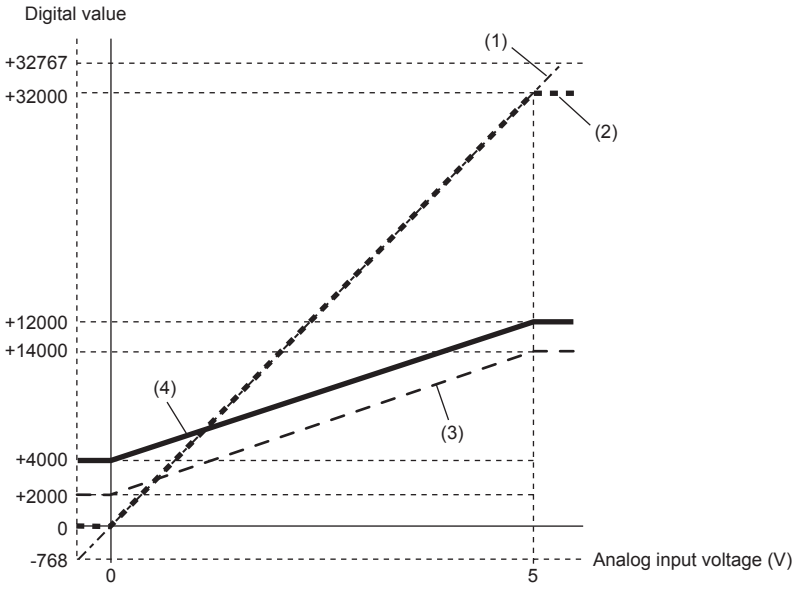
[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨[Application setting] ⇨ [Digital clipping function]

Setting example

Ex.

If the following are set for a channel for which the input range 0 to 5 V is set

Item	Setting
'CH1 Scaling enable/disable setting' (Un\G504)	Enable (0)
'CH1 Scaling upper limit value' (Un\G506, Un\G507)	12000
'CH1 Scaling lower limit value' (Un\G508, Un\G509)	2000
'CH1 Conversion value shift amount' (Un\G472)	2000
'CH1 Digital clipping enable/disable setting' (Un\G510)	Enable (0)



(1) 'CH1 Digital output value' (Un\G400): -768 to +32767
↓ Digital clipping

(2) Value after digital clipping: 0 to 32000
↓ Scaling

(3) Value after scaling: 2000 to 12000
↓ 'CH1 Conversion value shift amount' (Un\G472) "+2000"

(4) 'CH1 Digital operation value' (Un\G402): 4000 to 14000

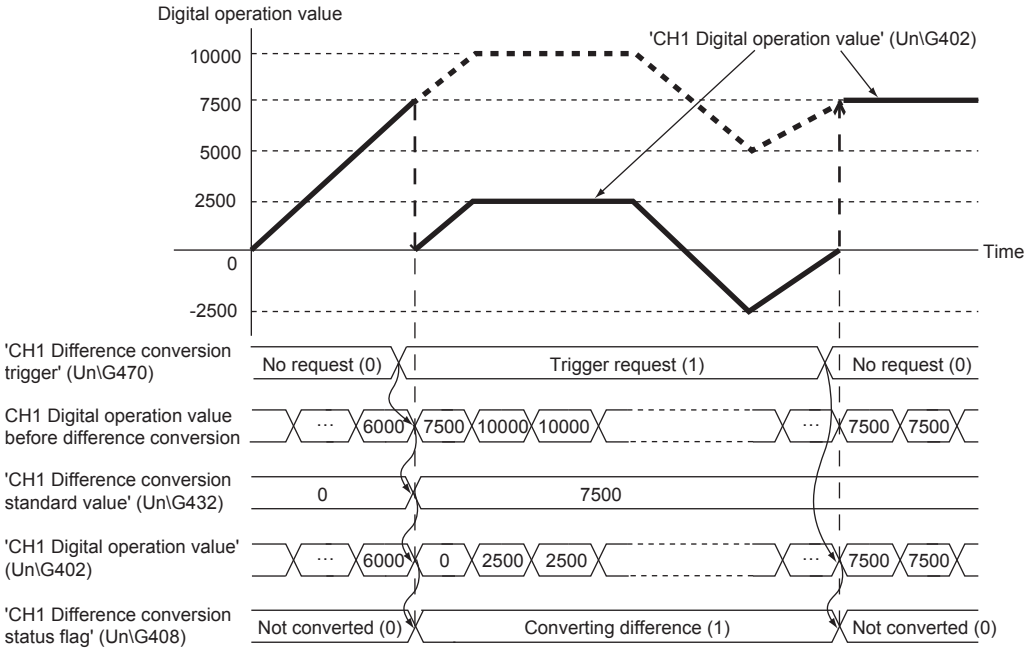
Input voltage (V)	(1) Digital output value	(2) Value after digital clipping	(3) Value after scaling	(4) Digital operation value
-0.12	-768	0	2000	4000
0	0	0	2000	4000
+1	+6400	+6400	4000	6000
+2	+12800	+12800	6000	8000
+3	+19200	+19200	8000	10000
+4	+25600	+25600	10000	12000
+5	+32000	+32000	12000	14000
+5.12	+32767	+32000	12000	14000

Point

When the digital clipping function is used with the scaling function, shift function, and difference operation function, scale conversion, shift-and-add, and difference conversion are performed on the value obtained after digital clipping.

Difference operation function

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



Operation

The digital operation value at the start of the difference conversion (the data stored inside the analog input module before the difference conversion starts) is determined as a difference conversion reference value. The value acquired by subtracting the difference conversion reference value from the digital operation value is stored in 'CH1 Digital operation value' (Un\G402). At the start of this function, the digital operation value is 0 (because the digital operation value and the difference conversion reference value have the same value at the start).

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

■Starting the difference conversion

1. Change 'CH1 Difference conversion trigger' (Un\G470) from No request (0) to Trigger request (1).

The rise of No request (0) → Trigger request (1) is detected as a trigger. When the trigger is detected, the digital operation value at the start is output to the difference conversion reference value. The value acquired by subtracting the difference conversion reference value from the digital operation value is stored in 'CH1 Digital operation value' (Un\G402). After the value is stored, 'CH1 Difference conversion status flag' (Un\G408) turns to Converting difference (1).

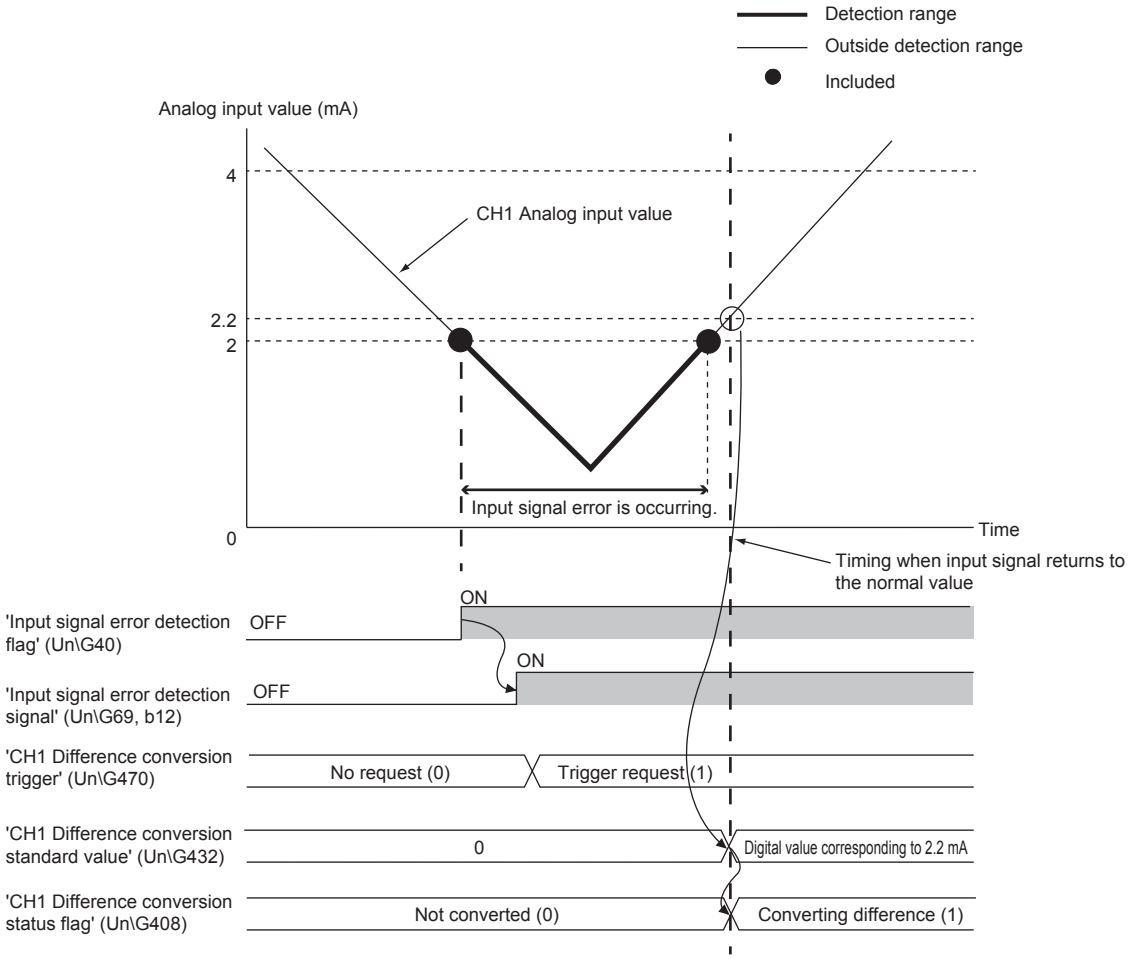
■Stopping the difference conversion

1. Change 'CH1 Difference conversion trigger' (Un\G470) from Trigger request (1) to No request (0).

The fall of Trigger request (1) to No request (0) is detected as a trigger. When the trigger is detected, the difference conversion stops, and 'CH1 Difference conversion status flag' (Un\G408) turns to Not converted (0). Thereafter, the digital operation value is stored as it is in 'CH1 Digital operation value' (Un\G402).

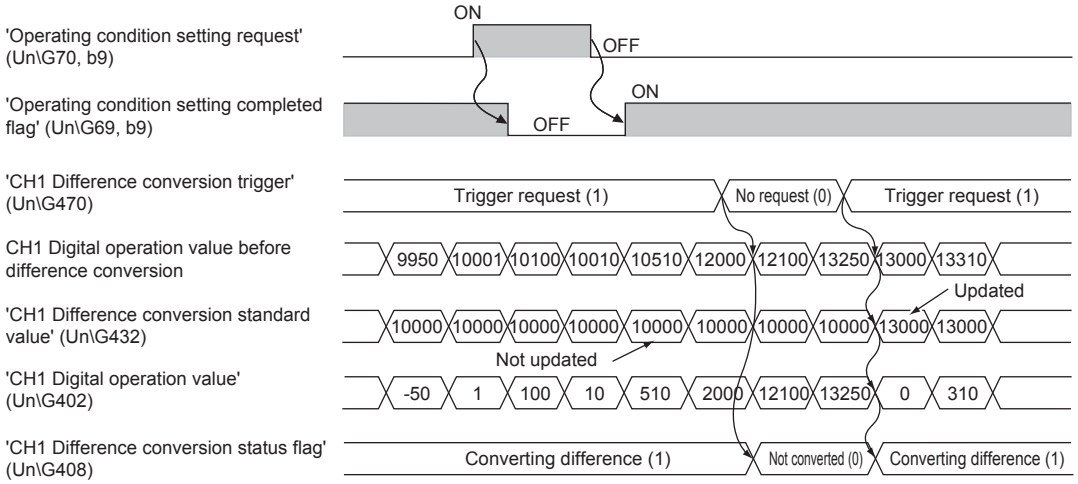
■Operations when an input signal error occurs

When an input signal error occurs, even if 'CH1 Difference conversion trigger' (Un\G470) changes from No request (0) to Trigger request (1), the difference conversion does not start. After the input signal error returns to the normal value, change 'CH1 Difference conversion trigger' (Un\G470) from No request (0) to Trigger request (1) again. If an input signal error occurs in the status of Trigger request (1), the difference conversion starts at the timing when the input signal error returns to the normal value, treating the digital operation value as the difference conversion reference value.



■Operation performed when the operation condition setting request (Un\G70, b9) is turned off→on→off

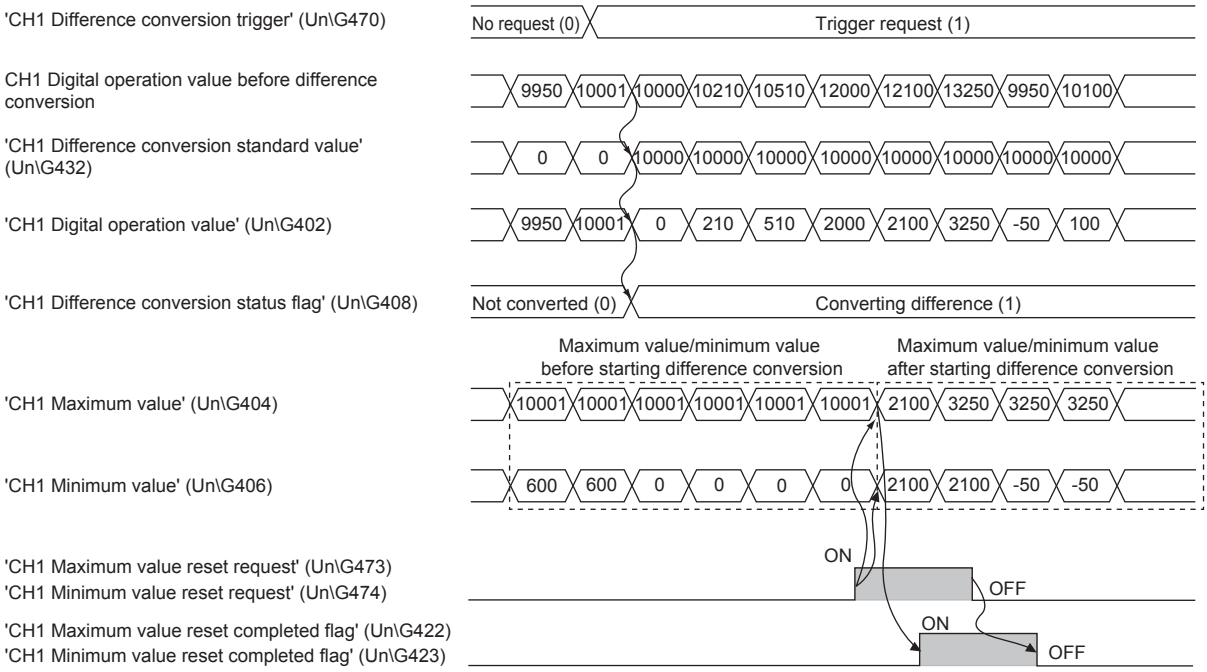
- During the difference conversion, even when 'Operating condition setting request' (Un\G70, b9) is turned off→on→off, the difference conversion continues without updating the difference conversion reference value. To update the difference conversion reference value, restart the difference conversion by changing CH1 Difference conversion trigger (Un\G470) from Trigger request (1) to No request (0), and Trigger request (1) again.
- CH1 Difference conversion trigger (Un\G470) does not become valid even when the trigger changes from No request (0) to Trigger request (1) when 'Operating condition setting request' (Un\G70, b9) is turned off→on. After turning off→on→off Operating condition setting request (Un\G70, b9), change CH1 Difference conversion trigger (Un\G470) from No request (0) to Trigger request (1) again.



■Operations of maximum value and minimum value

When the difference conversion starts, the maximum value and the minimum value of the values acquired by the difference conversion are stored in 'CH1 Maximum value' (Un\G404) and 'CH1 Minimum value' (Un\G406). By turning on 'Maximum value reset request' (Un\G473) and 'Minimum value reset request' (Un\G474), the maximum and minimum values after the start of the difference conversion can be checked.

If 'Maximum value reset request' (Un\G473) or 'Minimum value reset request' (Un\G474) is not turned on, the maximum and minimum values before and after the start of the differential conversion will be mixed.



■Operation when the averaging processing is set

If the difference conversion starts after the averaging processing is set, the digital operation value at the completion of the averaging processing is determined as 'CH1 Difference conversion standard value' (Un\G432). 'CH1 Difference conversion state flag' (Un\G408) turns to Converting difference (1).

Point

- The difference operation function can be started at any timing.
- When the difference operation function is used with the digital clipping function, scaling function, and shift function, each digital operation value is determined as a difference conversion reference value and used for the difference conversion.
- Even though the digital clipping function, scaling function, and shift function are enabled during the difference conversion, the value in 'CH1 Difference conversion standard value' (Un\G432) is not updated. To update the value in 'CH1 Difference conversion standard value' (Un\G432), stop the difference conversion and restart it again.

Maximum value/minimum value hold function

Stores the maximum and minimum values of digital operation values to the buffer memory area for each channel.

Resetting the maximum value and the minimum value

The maximum and minimum values can be reset to the current value by performing the following processing.

■Resetting the maximum value

When 'CH1 Maximum value reset request' (Un\G473) turns on (1), 'CH1 Maximum value' (Un\G404) is updated with current value, and 'CH1 Maximum value reset completion flag' (Un\G422) turns on (1).

■Resetting the minimum value

When 'CH1 Minimum value reset request' (Un\G474) turns on (1), 'CH1 Minimum value' (Un\G406) is updated with current value, and 'CH1 Minimum value reset completion flag' (Un\G423) turns on (1).

■Resetting the maximum value and the minimum value

The following two types of average processing of the maximum value and minimum value are provided.

- Perform “Reset Maximum value" and "Reset Minimum value" respectively.
- ‘CH1 Maximum value' (Un\G404) and 'CH1 Minimum value' (Un\G406) are updated with the current value when ‘Operating condition setting request’ (Un\G70, b9) turns on (1). 'CH1 Maximum value reset completion flag' (Un\G422) and 'CH1 Minimum value reset completion flag' (Un\G423) are not ON (1).

Point

If "A/D conversion disable" is set in ‘CH1 A/D conversion enable/disable setting’ (Un\G500), 0 is stored in both 'CH1 Maximum value' (Un\G404) and 'CH1 Minimum value' (Un\G406).

Values to be the maximum value and the minimum value

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

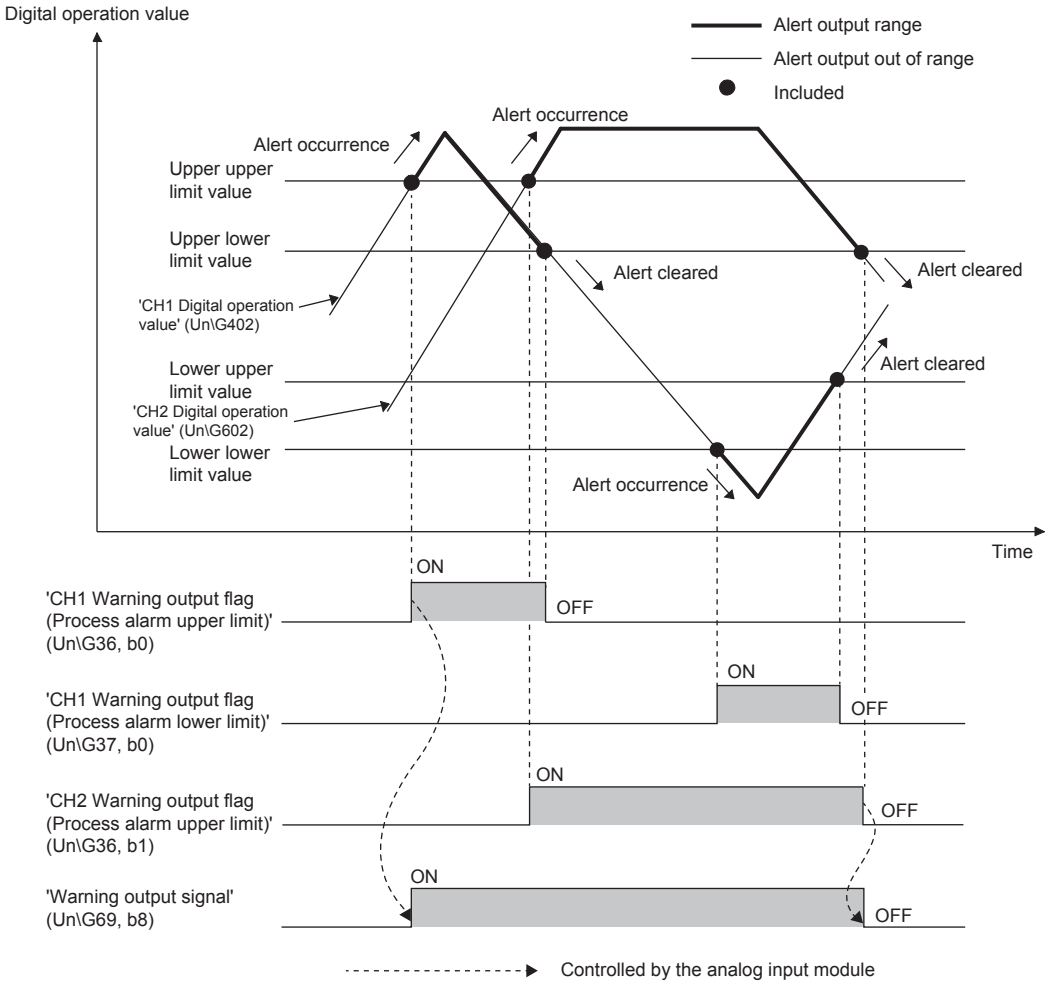
Using the averaging processing or the digital clipping, scaling, shift, or difference operation function results in storage of the maximum and minimum values of the digital operation values calculated by each function.

Alert output function

This section describes process alarms and rate alarms used for the alert output function.

Process alarm

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



■Operation

[Operation performed when an alarm is output]

When a digital operation value is equal to or greater than 'CH1 Process alarm upper upper limit value' (Un\G514), or the value is equal to or smaller than 'CH1 Process alarm lower lower limit value' (Un\G520) and the value enters the alarm output range, an alert is output as follows.

- Alarm ON (1) is stored in the bit position corresponding to the channel number of 'Warning output flag (Process alarm upper limit)' (Un\G36) or 'Warning output flag (Process alarm lower limit)' (Un\G37).
- 'Alarm output signal' (Un\G69, b8) turns on.
- The ALM LED turns on.
- An alarm code is stored in 'Latest alarm code' (Un\G2). (☞ Page 110 List of alarm codes)

Point

- The A/D conversion on a channel where an alarm was output continues.
- A cycle to output the process alarm is within 2 ms. When the process alarm is detected multiple times within 2 ms, only the first process alarm detected may be notified as an alert.

[Operation after an alarm was output]
After an alarm was output, if the digital operation value does not satisfy the alarm output condition due to being smaller than the process alarm upper lower limit value or being greater than the process alarm lower upper limit value, Normal (0) is stored in a bit position corresponding to the channel number of 'Warning output flag (Process alarm upper limit)' (Un\G36) or 'Warning output flag (Process alarm lower limit)' (Un\G37).
In addition, when all the bits of 'Warning output flag (Process alarm upper limit)' (Un\G36) and 'Warning output flag (Process alarm lower limit)' (Un\G37) return to Normal (0), 'Alarm output signal' (Un\G69, b8) turns off and the ALM LED turns off. However, the alarm code stored in 'Latest alarm code' (Un\G2) is not cleared. To clear the alarm code, turn off→on→off 'Error clear request (Un\G70, b15)' after all the bits of 'Warning output flag (Process alarm upper limit)' (Un\G36) and 'Warning output flag (Process alarm lower limit)' (Un\G37) return to Normal (0).

■Detection cycle

When time average is specified, the function works at every interval of the time (for averaging). When count average is specified, the function works at every count (for averaging).
When the sampling processing, moving average, or Primary delay filter is specified, this function works every conversion cycle.

■Detection target for outputting an alert

When the digital clipping function, scaling function, shift function, or difference operation function is used, the digital operation value to which digital clipping, scale conversion, shift-and-add, or difference conversion is performed is the detection target for outputting an alarm. Set values for CH1 Process alarm upper upper limit value (Un\G514), CH1 Process alarm upper lower limit value (Un\G516), CH1 Process alarm lower upper limit value (Un\G518), and CH1 Process alarm lower lower limit value (Un\G520) while considering the digital clipping, scale conversion, shift-and-add, and difference conversion.

■Setting procedure

1. Set "Warning output setting (Process alarm)" to "Enable".

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Application setting] ⇨ [Warning output function (Process alarm)]

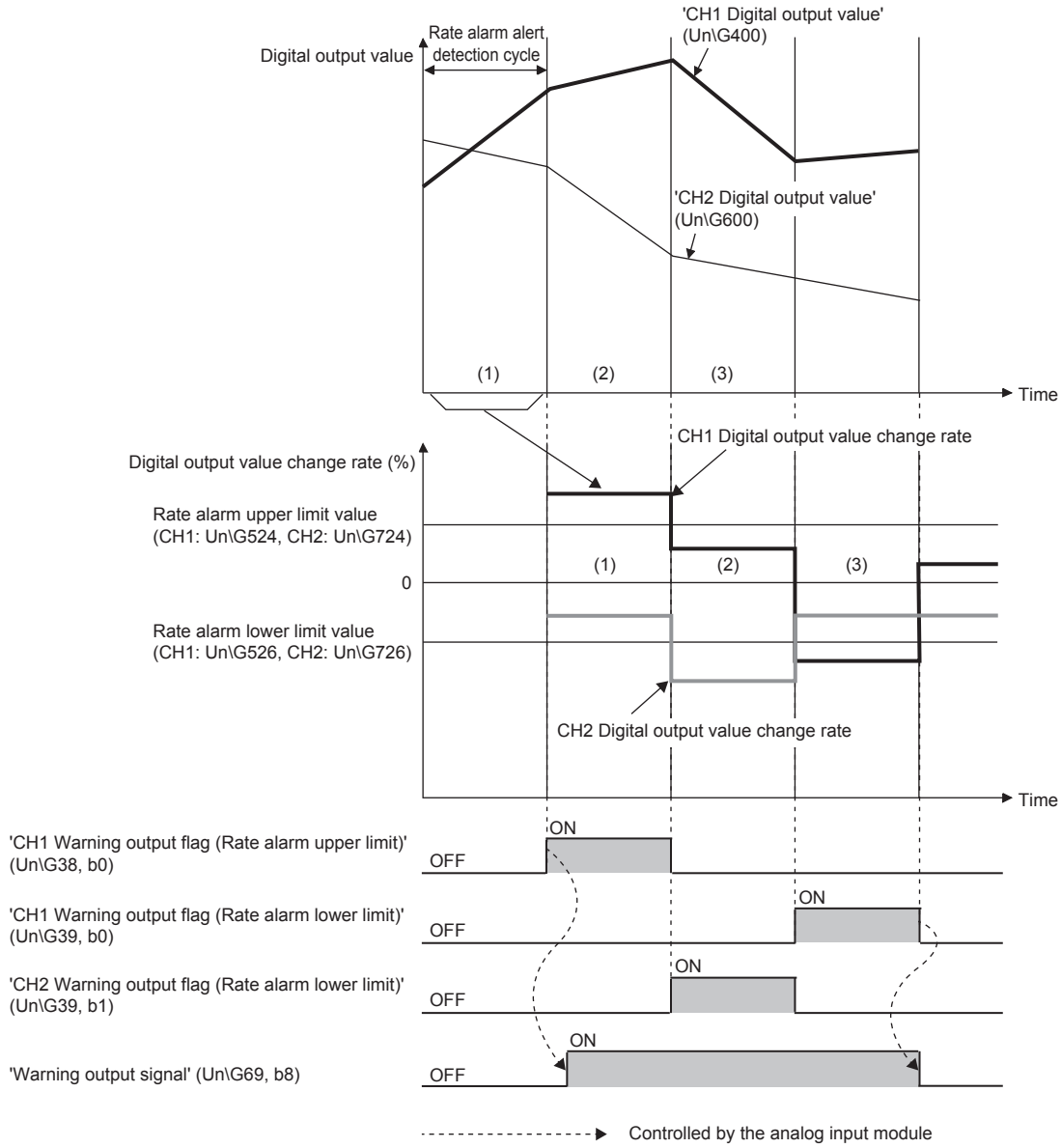
2. Set values for "Process alarm upper upper limit value", "Process alarm upper lower limit value", "Process alarm lower upper limit value", and "Process alarm lower lower limit value". The setting range is from -32768 to +32767.

Point

Set values within the range satisfying the 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. If a value out of the range is set, a process alarm upper lower limit value setting range error (error code: 1B△□H) occurs.

Rate alarm

Outputs an alarm when the change rate of a digital output value is equal to or more than the rate alarm upper limit value, or the rate is equal to or less than the rate alarm lower limit value.



■Operation

[Operation performed when an alarm is output]

Digital output values are monitored on the rate alarm alert detection cycle. When a change rate of a digital output value (from a previous value) is equal to or more than the rate alarm upper limit value, or the rate is equal to or less than the rate alarm lower limit value, an alert is output as follows.

- Alarm ON (1) is stored in the bit position corresponding to the channel number of 'Warning output flag (Rate alarm upper limit)' (Un\G38) or 'Warning output flag (Rate alarm lower limit)' (Un\G39).
- 'Alarm output signal' (Un\G69, b8) turns on.
- The ALM LED turns on.
- An alarm code is stored in 'Latest alarm code' (Un\G2). (☞ Page 110 List of alarm codes)

Point

- The A/D conversion on a channel where an alarm was output continues.
- A cycle to output the rate alarm is within 2 ms. When the rate alarm is detected multiple times within 2 ms, only the first rate alarm detected may be notified as an alert.

[Operation after an alarm was output]

After an alarm was output, if the change rate of a digital output value does not satisfy the alarm output conditions due to being smaller than the rate alarm upper limit value or being greater than the rate alarm lower limit value, Normal (0) is stored in the bit position corresponding to the channel number of 'Warning output flag (Rate alarm upper limit)' (Un\G38) or 'Warning output flag (Rate alarm lower limit)' (Un\G39).

In addition, when all 'Warning output flag (Rate alarm upper limit)' (Un\G38) and 'Warning output flag (Rate alarm lower limit)' (Un\G39) return to Normal (0), 'Alarm output signal' (Un\G69, b8) turns off and the ALM LED turns off. However, the alarm code stored in 'Latest alarm code' (Un\G2) is not cleared. To clear the alarm code, turn off→on→off 'Error clear request (Un\G70, b15)' after all the bits of 'Warning output flag (Rate alarm upper limit)' (Un\G38) and 'Warning output flag (Rate alarm lower limit)' (Un\G39) return to Normal (0).

■Detection cycle

The rate alarm detection cycle is calculated by the following formula.

- Rate alarm detection cycle = Conversion cycle × Setting value of 'CH1 Rate alarm detection cycle setting' (Un\G522)

Ex.

The rate alarm detection cycle under the following conditions

- A/D conversion enable: CH1
- 'CH1 Rate alarm detection cycle setting' (Un\G522): 5 (times)

The rate alarm detection cycle is 400 μs (80 μs × 1 (CH) × 5 (times)).

Digital output values are compared in 400 μs intervals to check the change rate.

Ex.

The rate alarm detection cycle under the following conditions

- A/D conversion enable: CH1, CH2
- 'CH1 Rate alarm detection cycle setting' (Un\G522): 5 (times)
- 'CH2 Rate alarm detection cycle setting' (Un\G722): 5 (times)
- 'CH1 Averaging process specification' (Un\G501): Count average (2)
- 'CH2 Averaging process specification' (Un\G701): Count average (2)
- 'CH1 Time average/Count average/Moving average/Primary delay filter constant setting' (Un\G502): 100 (counts)
- 'CH2 Time average/Count average/Moving average/Primary delay filter constant setting' (Un\G702): 100 (counts)

The rate alarm detection cycle is 80 ms. (80 μs × 100 (times) ×2(CH)× 5 (times)).

Digital output values are compared in 80 ms intervals to check the change rate.

■Judgment of rate alarm

The rate alarm is judged as follows according to the setting of 'Rate alarm change rate selection' (Un\G299).

• When 'Rate alarm change rate selection' is "Rate specification"

The change rate is judged with 'CH1 Rate alarm upper limit value' (Un\G524) and 'CH1 Rate alarm lower limit value' (Un\G526) converted to digital values per rate alarm detection cycle.

The following shows the conversion formula*1 of judgment values used for the rate alarm detection.

Rate alarm upper limit (lower limit) × 0.1 × 0.01 × Maximum digital output value

*1 Values after the decimal point are omitted.

Ex.

The judgment value under the following conditions

Setting item	Setting content
Number of A/D conversion enabled channels	CH1
Rate alarm change rate selection	Rate specification
CH1 Average processing specification	Sampling processing
CH1 Rate alarm alert detection cycle setting	5 times
CH1 Rate alarm upper limit value	250 (25.0%)
CH1 Rate alarm lower limit value	50 (5.0%)

In the above case, the current and previous digital output values are compared with each other with a rate alarm warning detection cycle of 400 μs (conversion cycle 80 μs × 5). As a result of the comparison, it is judged whether the increase of the digital output value is 8000 (= 250 × 0.1 × 0.01 × 32000) digit or more or 1600 (= 50 × 0.1 × 0.01 × 32000) digit or less.

Use the following formula to calculate a change rate to be set based on the change amount of voltage and current to detect an alarm.

$$\text{Change rate to be set (0.1\%)} = \left(\frac{\text{Change amount of the voltage (current) to detect an alert (V(mA))}}{\text{Gain voltage (current) (V(mA)) - Offset voltage (current) (V(mA))}} \times 1000 \right)^{*2}$$

*2 Values after the decimal point are omitted.

• When 'Rate alarm change rate selection' is "Digital output value specification"

It is judged by comparing the difference between the current digital output value and the digital output value in the previous detection cycle with the 'CH1 Rate alarm upper limit value' (Un\G524) and the 'CH1 Rate alarm lower limit value' (Un\G526).

Alarm occurrence condition	Conversion formula
For alert outputting of rate alarm upper limit	Current digital output value - Digital output value at the previous detection cycle ≥ Rate alarm upper limit value
For alert outputting of rate alarm lower limit	Current digital output value - Digital output value at the previous detection cycle ≤ Rate alarm lower limit value

Ex.

The judgment value under the following conditions

Setting item	Setting content
Number of A/D conversion enabled channels	CH1
Rate alarm change rate selection	Digital output value specification
CH1 Average processing specification	Sampling processing
CH1 Rate alarm alert detection cycle setting	5 times
CH1 Rate alarm upper limit value	10000 (digit)
CH1 Rate alarm lower limit value	3200 (digit)

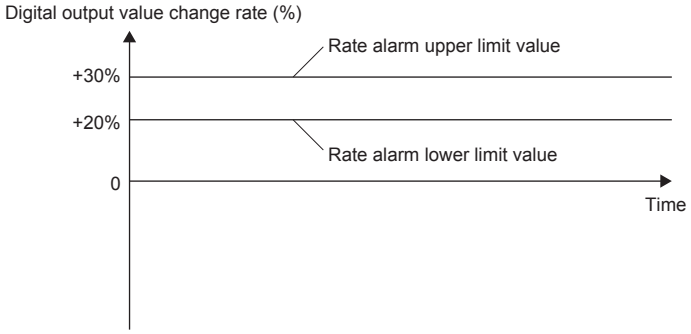
In the above case, the current and previous digital output values are compared with each other with a rate alarm warning detection cycle of 400 μs (conversion cycle 80 μs × 5 times). From the comparison, it is judged whether or not the increase in the digital output value is 10000 digits or more, or 3200 or less.

■Application examples of rate alarms

A rate alarm serves to monitor that the variation rate of a digital output value lies in a limited range as shown below:

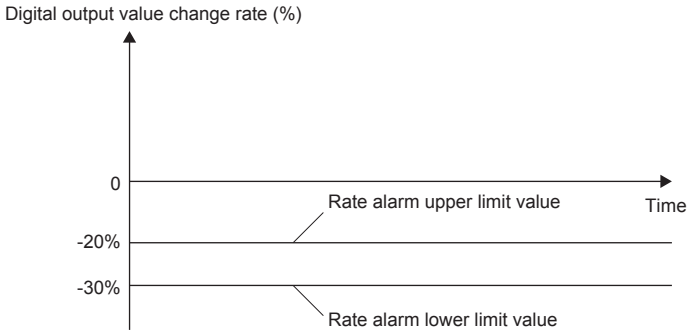
Ex.

To monitor that a rising rate of a digital output value is within the specified range



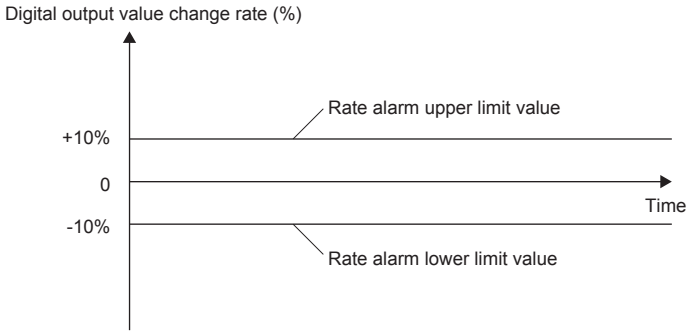
Ex.

To monitor that a drop rate of a digital output value is within the specified range



Ex.

To monitor that a change rate of a digital output value is within the specified range



■Setting procedure

1. Set "Warning output setting (Rate alarm)" to "Enable".

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Application setting] ⇨ [Warning output function (Rate alarm)]

2. Set "Rate alarm change rate selection".

Item	Setting range
Rate alarm change rate selection	0: Rate specification
	1: Digital output value specification

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

The rate input and the digital output value input vary depending on the rate alarm change rate selection.

• When the rate alarm change rate selection is "Rate specification"

Set it in increments of 0.1% for the width of the analog input range (gain value - offset value).

Item	Setting range
Rate alarm upper limit value	-32768 to +32767 (-3276.8 to +3276.7%)
Rate alarm lower limit value	

• When 'Rate alarm change rate' is "Digital output value specification"

Set a value for the range of the digital output value in increments of 1 digits.

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

Point

Set values within the range satisfying the condition "Rate alarm upper limit value > Rate alarm lower limit value".

If a value out of the range is set, a rate alarm upper/lower limit setting value inversion error (error code: 1BA□H) occurs.

4. Set an alarm detection cycle of rate alarms.

Set the cycle in "Rate alarm detection cycle setting".

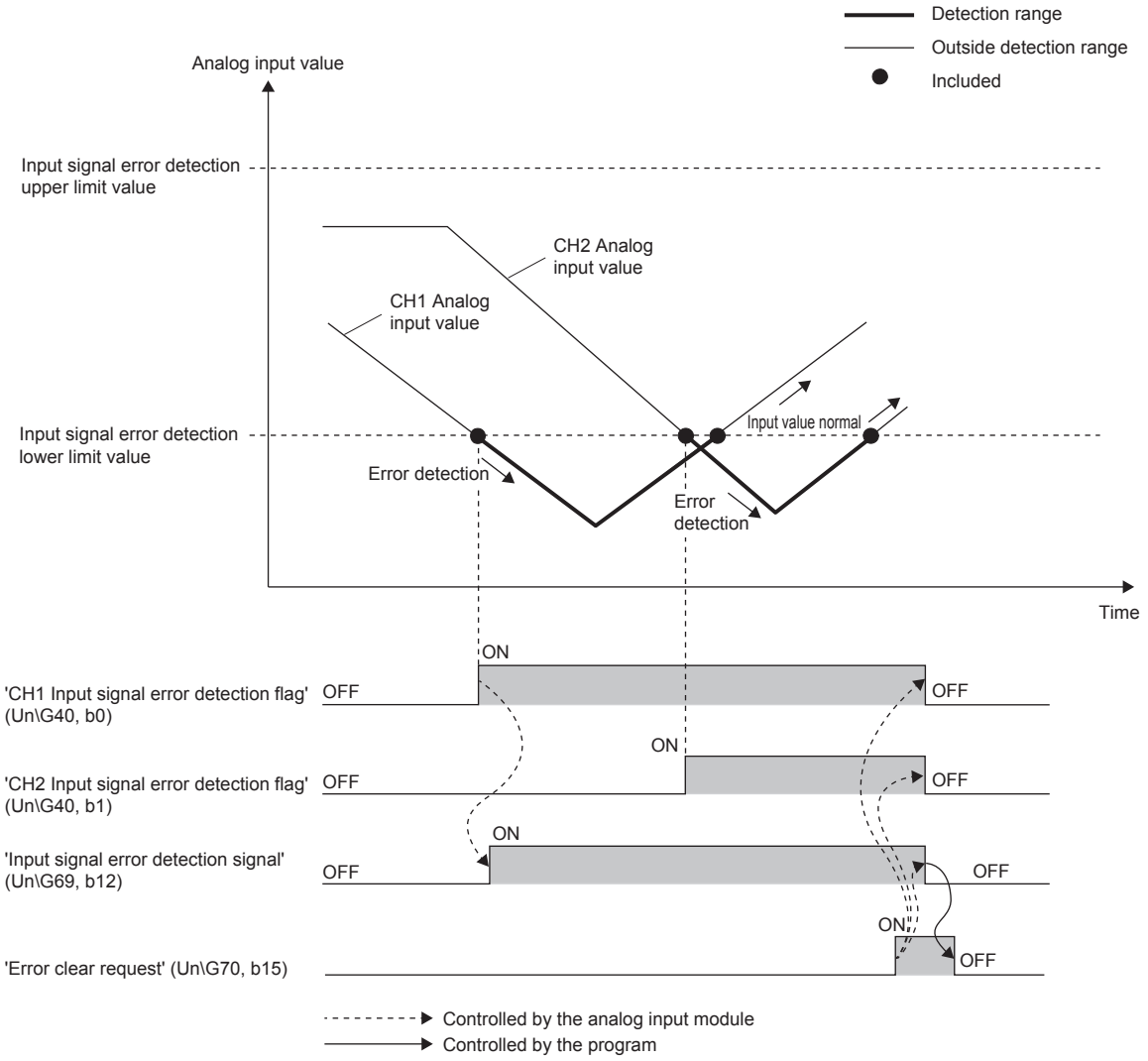
Item	Setting range
Rate alarm alert detection cycle setting	1 to 32000 (times)

Point

A channel where the set value is out of the above range causes a rate alarm detection cycle setting range error (error code: 1B9□H).

Input signal error detection function

Detects an analog input value that is above or below the set range.



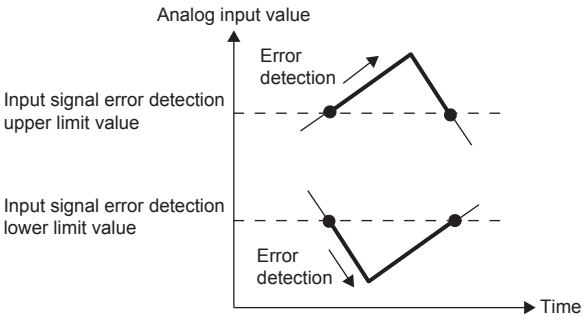
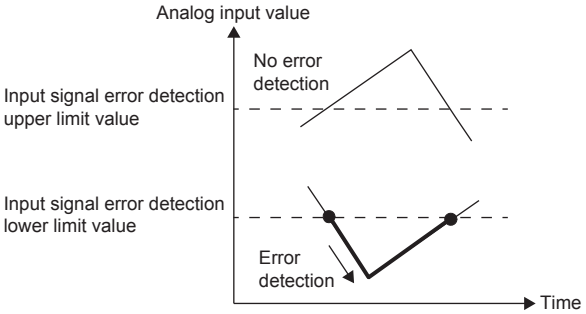
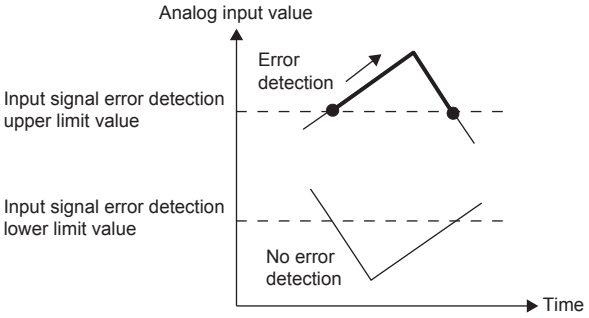
Point

Errors can also be cleared with the Input signal error auto-clear enable/disable setting. Refer to the following sections for details.

☞ Page 55 Clearing input signal errors

Detection method

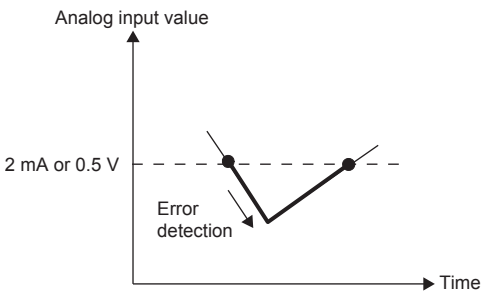
One of the following detection methods can be selected.

Detection method	Detection condition	
0: Disable	Input signal errors are not detected.	—
1: Upper and lower limit detection	An input signal error is detected when the analog input value is equal to or greater than the input signal error detection upper limit value, or when the analog input value is equal to or smaller than the input signal error detection lower limit value.	
2: Lower limit detection	An input signal error is detected when the analog input value is equal to or smaller than the input signal error detection lower limit value.	
3: Upper limit detection	An input signal error is detected when the analog input value is equal to or greater than the input signal error detection upper limit value.	
4: Simple disconnection detection	Simple disconnection detection is performed. For details, refer to the following. ☞ Page 54 Simple disconnection detection	

■Simple disconnection detection

Simple disconnection detection is enabled by the range setting. The simple broken wire detection is supported only in the "4 to 20 mA" or "1 to 5 V" range. When an analog input value satisfies either of the following conditions, a disconnection occurs and 'Input signal error detection flag' (Un\G40) turns on.

Input range	Disconnection detection signal
4 to 20 mA	Analog input value ≤ 2 mA
1 to 5 V	Analog input value ≤ 0.5 V



The settings for 'CH1 Input signal error detection lower limit setting value' (Un\G529) and 'CH1 Input signal error detection upper limit setting value' (Un\G530) are ignored.

Notification

When an input signal error is detected, an error is notified as follows.

- The input signal error (1) is stored in the bit position corresponding to the channel number of 'Input signal error detection flag' (Un\G40).
- 'Input signal error detection signal' (Un\G69, b12) turns on.
- The ALM LED flashes.
- An alarm code is stored in 'Latest alarm code' (Un\G2). Alarm codes are stored whenever the analog input value satisfies the condition for the input signal error detection. (☞ Page 110 List of alarm codes)

Operation

On the channel where an error is detected, the last digital output value and digital operation value just before the error was detected are stored.

When the analog input does not satisfy the condition of the input signal error detection, the A/D conversion restarts regardless of the reset on 'Input signal error detection flag' (Un\G40) or 'Input signal error detection signal' (Un\G69, b12). (The ALM LED remains flashing.)

Point

- When an input signal error occurs, the digital output value and digital operation value are not updated.
- The A/D conversion continues on the channel where no Input signal error is detected.
- Whether an input signal error occurred is judged with the value when the first A/D conversion is completed. Thus, A/D conversion completed flag turns on even when an input signal error is detected.
- A cycle to output the input signal error is within 2 ms. When the input signal error is detected multiple times within 2 ms, only the first input signal error detected may be notified.

Clearing input signal errors

One of the following methods for clearing input signal errors can be selected by setting 'Input signal error auto-clear enable/disable setting' (Un\G302).

■When Input signal error auto-clear enable/disable setting is set to Disable (1)

After the analog input value returns within the set range, turn off→on→off 'Error clear request' (Un\G70, b15).

The analog input module arranges the following status when an input signal error is cleared.

- 'Input signal error detection flag' (Un\G40) is cleared.
- 'Input signal error detection signal' (Un\G69, b12) turns off.
- The ALM LED turns off.
- 'Latest alarm code' (Un\G2) is cleared.

■When Input signal error auto-clear enable/disable setting is set to Enable (0)

After the analog input value returns to within the setting range, the analog input module arranges the following status automatically.

- 'Input signal error detection flag' (Un\G40) is cleared.
- 'Input signal error detection signal' (Un\G69, b12) turns off.
- The ALM LED turns off.

Point

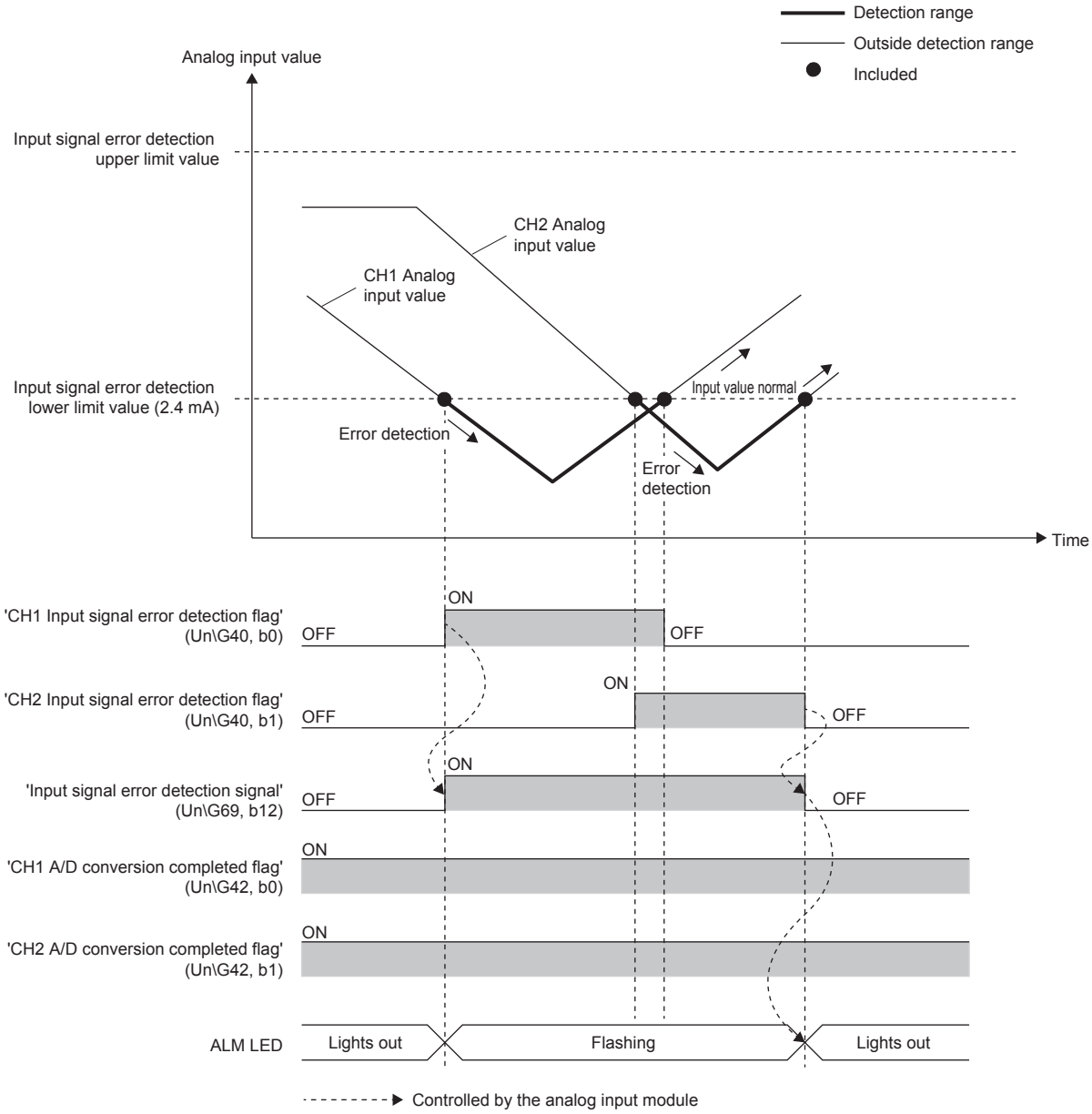
'Latest alarm code' (Un\G2) is not cleared.

After the analog input value returns within the setting range, turn off→on→off 'Error clear request' (Un\G70, b15) to clear 'Latest alarm code' (Un\G2).

Ex.

The following figure shows the operation when an analog input value falls below 2.4 mA and returns within the normal range under the following condition.

Item	Setting
'Input signal error auto-clear enable/disable setting' (Un\G302)	Enable (0)
Input range	4 to 20 mA
'CH1 Input signal error detection setting' (Un\G528)	Upper and lower limit detection (1)
'CH2 Input signal error detection setting' (Un\G728)	Upper and lower limit detection (1)
Input signal error detection lower limit value	2.4 mA



Setting the input signal error detection upper or lower limit setting value

For the input signal error upper and lower values, set the ratio to the analog input range width (gain value - offset value) in increments of 0.1%.

Item	Setting range
Input signal error detection upper limit setting value	0 to 250 (0 to 25.0%)
Input signal error detection lower limit setting value	

■Input signal error detection upper limit setting value

This value is calculated by adding "Analog input range width (Gain value - Offset value) Input signal error detection upper limit set value (%)" to the gain value. Only a value which is equal to or greater than the gain value can be set.

To calculate the input signal error detection upper limit set value based on the input signal error detection upper limit value, use the following formula.

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

■Input signal error detection lower limit setting value

This value is calculated by subtracting "Analog input range width (Gain value - Offset value) Input signal error detection lower limit set value (%)" from the lower limit value of each range. Only the value which is equal to or smaller than the lower limit value of the range can be set.

To calculate the input signal error detection lower limit set value based on the input signal error detection lower limit value, use the following formula.

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

Point

- When Input signal error detection setting is set to Upper limit detection, the input signal error detection lower setting value is disabled.
- When Input signal error detection setting is set to Lower limit detection, the input signal error detection upper limit setting value is disabled.

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

Input range		Lower limit value	Offset value	Gain value
Voltage	0 to 10 V	0 V	0 V	10 V
	0 to 5 V	0 V	0 V	5 V
	1 to 5 V	1 V	1 V	5 V
	-10 to +10 V	-10 V	0 V	10 V
	User range setting	Analog input value equivalent to the digital output value of -32000	Analog input value set as an offset value	Analog input value set as a gain value
Current	0 to 20 mA	0 mA	0 mA	20 mA
	4 to 20 mA	4 mA	4 mA	20 mA
	-20 to +20 mA	-20 mA	0 mA	20 mA
	User range setting	Analog input value equivalent to the digital output value of -32000	Analog input value set as an offset value	Analog input value set as a gain value

Setting procedure

1. Select a detection method in "Input signal error detection setting".

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Application setting] ⇨ [Input signal error detection function]

2. Set values for Input signal error detection upper and lower limit setting values.

Item	Setting range
Input signal error detection upper limit setting value	0 to 250 (0.0 to 25.0%)
Input signal error detection lower limit setting value	

Point

In the channel where a value out of the range is set, an input signal error detection setting value range error (error code: 1C1□H) occurs.

3. Set "Input signal error auto-clear enable/disable setting" to "Enable" or "Disable".

Setting example

■Setting example of the input signal error detection

In the channel where the following values are set, an input error is detected when an analog input value falls below -10.2 V or exceeds +10.2 V.

Item	Setting value
Input range	-10 to +10 V
'Input signal error auto-clear enable/disable setting' (Un\G304)	Disable (1)
'CH1 Input signal error detection setting' (Un\G528)	Upper and lower limit detection (1)

Assign the following values in a formula to determine the input signal error detection lower limit set value and input signal error detection upper limit set value.

- Input signal error detection lower limit value: -10.2 V
- Input signal error detection upper limit value: +10.2 V
- Range lower limit value: -10 V
- Offset value: 0.0 V
- Gain value: 10.0 V

[Calculation of lower limit value]

$$\text{Input signal error detection lower limit setting value} = \frac{-10.0 - (-10.2)}{10.0 - 0.0} \times 1000$$
$$= 20\ (2.0\%)$$

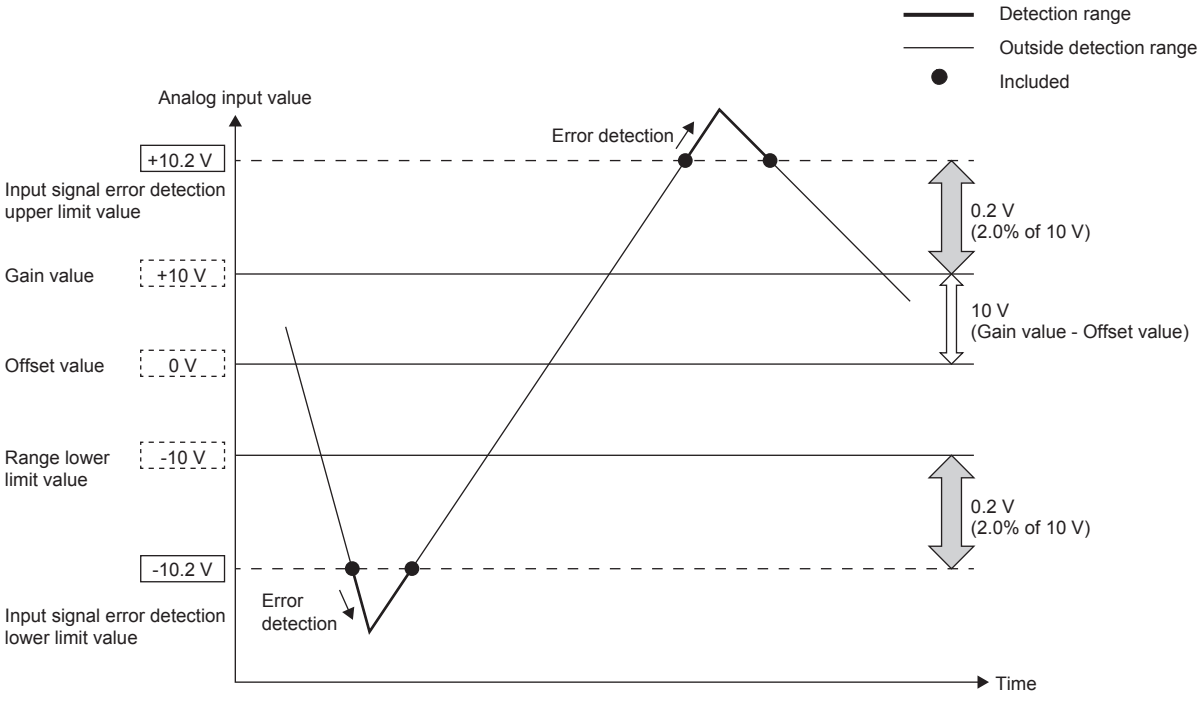
Set 'CH1 Input signal error detection lower limit set value' (Un\G529) to 20 (2.0%).

[Calculation of upper limit value]

$$\text{Input signal error detection upper limit setting value} = \frac{10.2 - 10.0}{10.0 - 0.0} \times 1000$$
$$= 20\ (2.0\%)$$

Set 'CH1 Input signal error detection upper limit set value' (Un\G530) to 20 (2.0%).

The following figure shows the operation of the input signal error detection.



Logging function

This function stores 10000 points of digital output values or digital operation values per channel in the buffer memory area. In addition, the data collection can be stopped by using the status change of the data as a trigger. This function also helps the error analysis since the data before and after the occurrence of an error is held.

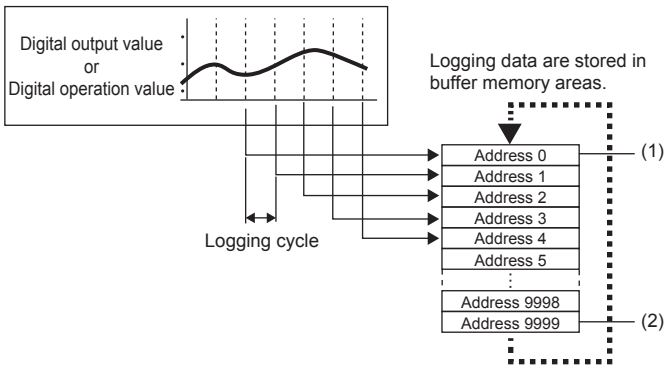
Logging function

■Collecting logging data

Logging data is collected as follows.

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

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



(1) Head pointer
The address of the oldest data in logging data can be checked.

(2) Latest pointer
The address of the latest data in logging data can be checked.

Point

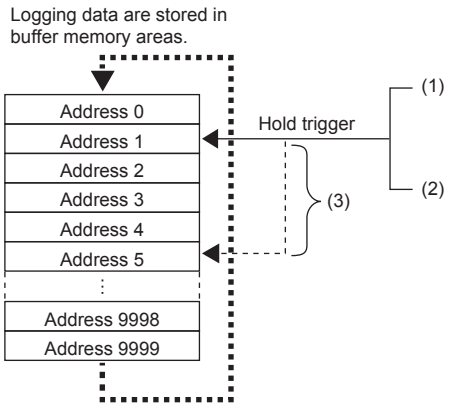
When the number of stored data points is 10001 or greater, data is sequentially overwritten from address 0 with new data.

■Stopping the Logging Operation

The logging data is refreshed at high speed during logging. Stop logging when the logging data needs to be referred without paying attention to the logging cycle.

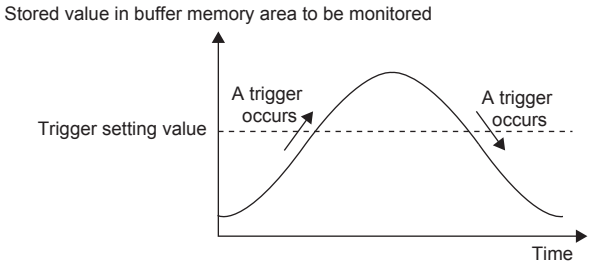
Logging can be stopped by the hold trigger.

- A hold trigger allows two options: Logging hold request or Level trigger.
- The number of data points to be collected after a hold trigger occurs can be set.



(1) Logging hold request
A hold trigger is generated from a program at any timing.

(2) Level trigger
A hold trigger is generated when a stored value in a buffer memory area is monitored and the set condition is satisfied as follows.
Example When the stored value exceeds or falls below the set value, a hold trigger is generated.



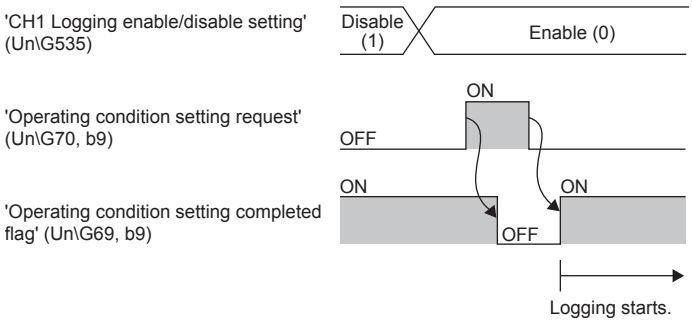
(3) Post-trigger logging points
When the set points of data is collected after a hold trigger is generated, the logging operation is stopped.

Operation of logging

■Starting logging data collection

Logging data collection starts when 'CH1 Logging enable/disable setting' (Un\G535) is set to Enable (0) and 'Operating condition setting request' (Un\G70, b9) is turned off→on→off.

The data in 'CH1 Digital output value' (Un\G400) or 'CH1 Digital operation value' (Un\G402) is stored in CH1 Logging data (Un\G10000 to Un\G19999) on the set logging cycle.



■Logging data

Logging data are stored in the following buffer memory areas.

When the number of stored data points is 1001 or greater, the data is overwritten with new data from the head of the storage area of the corresponding channel.

Channel	Storage area for logging data
CH1	Un\G10000 to Un\G19999
CH2	Un\G20000 to Un\G29999
CH3	Un\G30000 to Un\G39999
CH4	Un\G40000 to Un\G49999

If logging has been performed even once, all the logging data above are cleared to 0 at the timing when 'Operating condition setting request' (Un\G70, b9) is turned off→on.

Logging data setting

Select a data type to be collected with 'CH1 Logging data setting' (Un\G536).

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

Logging cycle

■Logging cycle setting

Set the logging cycle with 'CH1 Logging cycle setting value' (Un\G537) and 'CH1 Logging cycle unit setting' (Un\G538).
The following table lists the setting range for each cycle.

Setting value of CH1 Logging cycle unit setting	Setting range of CH1 Logging cycle setting value
μs (0)	80 to 32767
ms (1)	1 to 32767
s (2)	1 to 3600

The logging cycle must be an integral multiple of the conversion cycle. Even if the setting is not an integral multiple, the actual logging cycle is adjusted to the integral multiple of the conversion cycle within a limit of the set logging cycle.
The following table lists the conversion cycle for each A/D conversion method.

Conversion method	Conversion cycle
Sampling processing	Number of conversion enabled channels × Conversion speed
Time average	$\left(\frac{\text{Time set in Time average/Count average/Moving average/Primary delay filter constant setting}}{\text{Number of conversion enabled channels} \times \text{Conversion speed}}\right)^{*1} \times \text{Number of A/D conversion enabled channels} \times \text{Conversion speed}$
Count average	The count set to CH1 Time average/Count average/Moving average/Primary delay filter constant setting (Un\G502)) × (Number of A/D conversion enabled channels × Conversion speed
Moving average	Number of A/D conversion enabled channels × Conversion speed
Primary delay filter	Number of A/D conversion enabled channels × Conversion speed
Digital filter	For details, refer to the following. ☞ Page 31 Digital filter

*1 Values after the decimal point are omitted.

Ex.
With the following settings, the conversion cycle is 320 μs and the actual logging cycle is 9.92 ms (integral multiple of 320 μs).

Item	Setting
Conversion enabled channels	CH1 to CH4
Averaging process specification	Sampling processing
Logging cycle setting value	10
Logging cycle unit setting	ms

The following values are stored in 'CH1 Logging cycle monitor value' (Un\G441 to Un\G443).

Address	Item	Stored value
441	CH1 Logging cycle monitor value (Un\G441 to Un\G443)	0 (s)
442		9 (ms)
443		920 (μs)

■When the logging function becomes disabled

The logging is not performed when one of the following errors occurs after the logging function is enabled and 'Operating condition setting request' (Un\G70, b9) is off→on→off.

- Error code (191□H): Setting errors of 'CH1 Averaging process specification' (Un\G501)
- Error code (192□H to 195□H): Setting errors of 'CH1 Time average/Count average/Moving average/Primary delay filter constant setting' (Un\G502)
- Error code (19D□H): Setting error of 'CH1 Digital filter setting' (Un\G570)
- Error code (19E□H): Setting error of 'CH1 Digital filter fluctuation width setting' (Un\G572, Un\G573)
- Error code (1D0□H to 1D6□H): Setting errors of the logging function
- Error code (1D8□H, 1D9□H): Setting errors of the logging read function

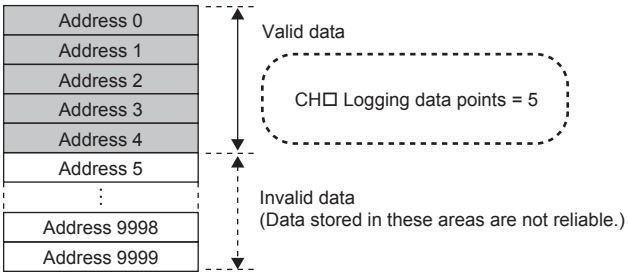
Point

When 'Operating condition setting request' (Un\G70, b9) is turned off→on→off on the condition that the logging cycle determined by 'CH1 Logging cycle setting value' (Un\G537) and 'CH1 Logging cycle unit setting' (Un\G538) is shorter than the conversion cycle, an error occurs and logging does not start. A logging cycle setting disable error (error code: 1D2□H) is stored in 'Latest error code' (Un\G0), 'Error flag' (Un\G69, b15) and the ERROR LED turn on.

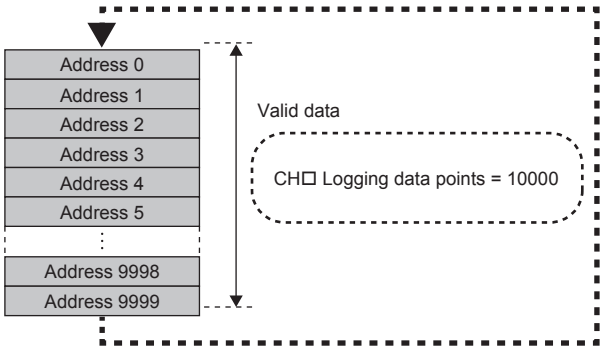
■Number of logging data

With 'CH1 Number of logging data' (Un\G436), the number of valid data in 'CH1 Logging data' (Un\G10000 to Un\G19999) can be checked.

When the number of collected data points is less than 10000



When the number of collected data points is 10001 or greater



The number of logging data increases by one each time new data is stored.

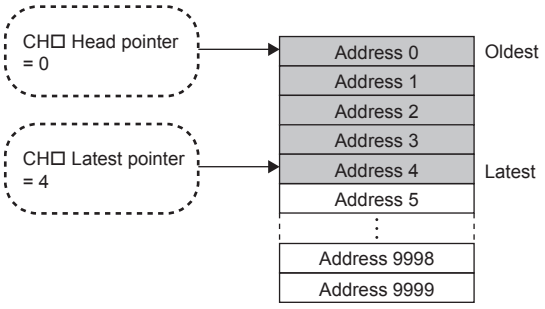
When CH1 Logging data (Un\G10000 to Un\G19999) becomes full (Number of logging data = 10000), the next data is stored in the head address of CH1 Logging data (Un\G10000 to Un\G19999), and the logging operation continues overwriting the existing data. In this case, the number of logging data is fixed to 10000.

■Head pointer and latest pointer

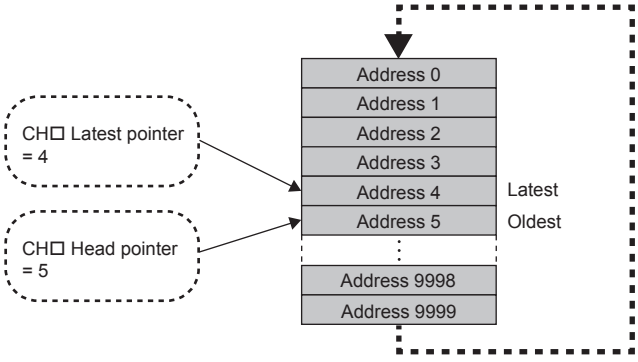
The storage location of the oldest data and the latest data in CH1 Logging data (Un\G10000 to Un\G19999) can be checked with the following buffer memory areas.

Buffer Memory Areas	Description
CH1 Head pointer (Un\G434)	The buffer memory address of the oldest data in CH1 Logging data (Un\G10000 to Un\G19999) can be checked with this buffer memory area. The offset value (0 to 9999) counted from the start address of CH1 Logging data (Un\G10000 to Un\G19999) is stored.
CH1 Latest pointer (Un\G435)	The buffer memory address of the latest data in CH1 Logging data (Un\G10000 to Un\G19999) can be checked with this buffer memory area. The offset value (0 to 9999) counted from the start address of CH1 Logging data (Un\G10000 to Un\G19999) is stored.

When the number of collected data points is less than 10000



When the number of collected data points is 10001 or greater



The head pointer does not change (fixed to 0) until CH1 Logging data (Un\G10000 to Un\G19999) becomes full after the logging start. (fixed to 0).

The head pointer moves by one point when CH1 Logging data (Un\G10000 to Un\G19999) becomes full and overwriting the data starts from the head address.

■Checking logging data without stopping the logging operation

Logging data can be checked during the logging operation with 'CH1 Head pointer' (Un\G434), 'CH1 Latest pointer' (Un\G435), and 'CH1 Number of logging data' (Un\G436).

To check logging data during logging operation, follow the precautions below because logging data may be refreshed while data is being read out.

- Set the cycle to 'CH1 Logging cycle setting value' (Un\G537) so that data checking and reading surely complete before logging data is refreshed. If the logging cycle is short, logging data may be refreshed during data checking and reading.
- After obtaining the logging data which needs to be checked, monitor the variation of the head pointer and the number of logging data, and obtain logging data just after the stored value has changed.
- If the data refreshed and the data being checked do not synchronize due to the relationship between the logging cycle and the scan time of the CPU module, adjust the logging cycle.

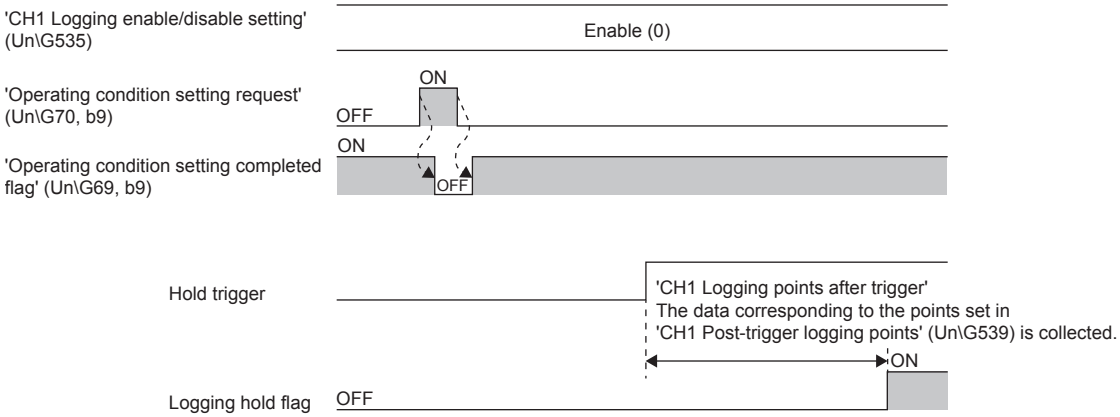
Stop the logging operation when the logging data needs to be checked without paying attention to the logging cycle. (☞ Page 64 Stopping the Logging Operation)

Stopping the Logging Operation

Logging operation stops (holds) when the preset trigger condition is satisfied and the set points of the data are collected.
A trigger that is generated when the condition is satisfied is called a hold trigger.
To generate a hold trigger, the following two methods are available.

☞ Page 67 Logging hold request
☞ Page 68 Level trigger

When a hold trigger is detected during data collection, the logging operation stops after the points of the data set in 'CH1 Post-trigger logging points' (Un\G539) are collected.



■Post-trigger logging points

Set the number of data collected in the period from the detection of a hold trigger to logging operation stop to 'CH1 Post-trigger logging points' (Un\G539).

■Checking that the logging has stopped

Check that 'CH1 Logging hold flag' (Un\G409) is ON (1).

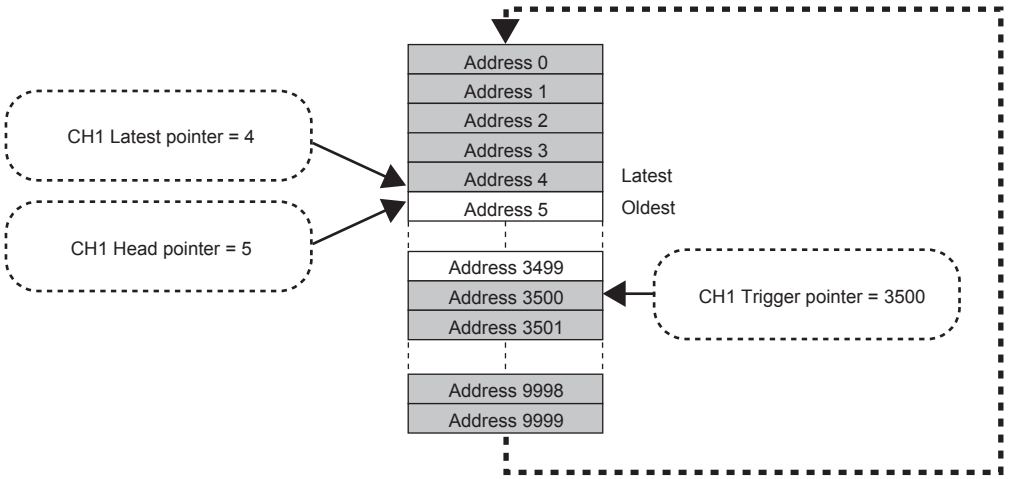
■Checking data when a hold trigger has occurred

The storage location of the data when a hold trigger has occurred can be checked with 'CH1 Trigger pointer' (Un\G437). The offset value counted from the start address of CH1 Logging data (Un\G10000 to Un\G19999) is stored in 'CH1 Trigger pointer' (Un\G437).

Ex.

The value stored in Trigger pointer when the logging operation stops under the following conditions

- 'CH1 Post-trigger logging points' (Un\G539): 6505 points
- The data location where a hold trigger has occurred: At the 3500th point.



• Checking the trigger generation time

The trigger generation time can be checked with 'CH1 Trigger generation time' (Un\G444 to Un\G448).

Even when the logging cycle is set to a period less than 1 millisecond (Example: 80 μs), the minimum time unit recorded in 'CH1 Trigger generation time' (Un\G444 to Un\G448) is millisecond. Use the trigger generation time as an indication to refer to the logging data.

Ex.

When 'CH1 Trigger generation time' (Un\G444 to Un\G448) is monitored

	b15 to b8	b7 to b0
'CH1 Trigger generation time (First/Last two digits of the year)' (Un\G444)	First two digits of the year	Last two digits of the year
'CH1 Trigger generation time (Month/Day)' (Un\G445)	Month	Day
'CH1 Trigger generation time (Hour/Minute)' (Un\G446)	Hour	Minute
'CH1 Trigger generation time (Second/Day of the week)' (Un\G447)	Second	Day of the week
'CH1 Trigger generation time (Millisecond)' (Un\G448)	Millisecond (upper)	Millisecond (lower)

Item	Storage contents	Storage example*1
First two digits of the year/Last two digits of the year	Stored in BCD code.	2017H
Month/Day		0130H
Hour/Minute		1035H
Second		40H
Day of the week	One of the following values is stored in BCD code. • Sunday: 00H • Monday: 01H • Tuesday: 02H • Wednesday: 03H • Thursday: 04H • Friday: 05H • Saturday: 06H	01H
Millisecond (higher-order digits)/Millisecond (lower-order digits)	Stored in BCD code.	0628H

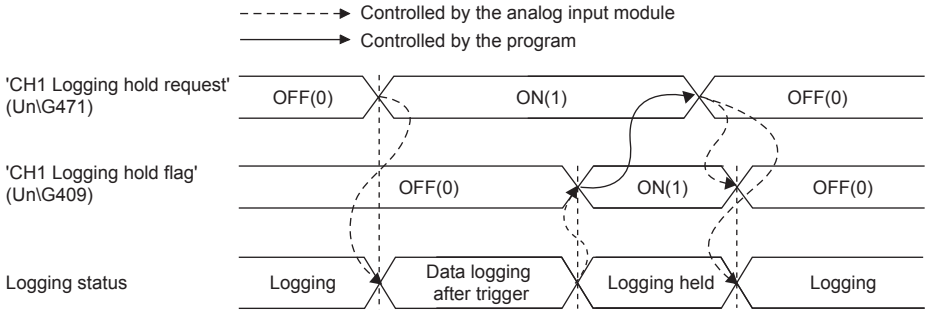
*1 These values assume that a trigger is generated at 10:35 and 40.628 seconds on Monday, January 30th, 2017.

■Resuming the logging

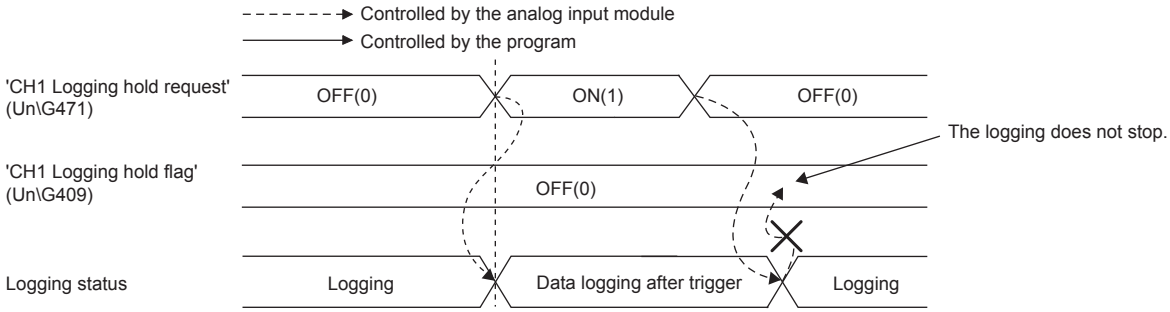
It may take time until ON (1) is stored in 'CH1 Logging hold flag' (Un\G409) after 'CH1 Logging hold request' (Un\G471) is changed off→on.

To resume logging, check that ON (1) is stored in 'CH1 Logging hold flag' (Un\G409) and 'CH1 Logging hold request' (Un\G471) is changed from on→off. After logging resumes, the value is stored from the head buffer memory area of CH1 Logging data (Un\G10000 to Un\G19999).

In addition, OFF (0) is stored in 'CH1 Logging hold flag' (Un\G409).



Logging does not stop when 'CH1 Logging hold request' (Un\G471) is changed on→off before ON (1) is stored in 'CH1 Logging hold flag' (Un\G409).



• Buffer memory area status when logging resumes

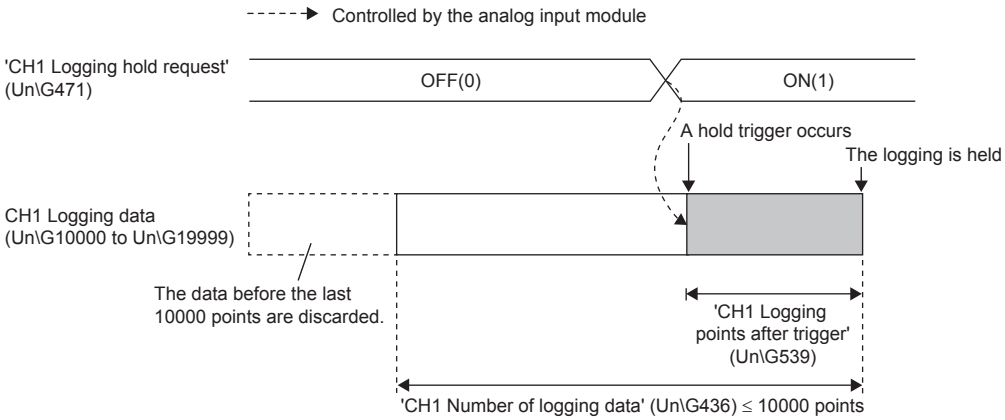
The following table shows the buffer memory area status when logging resumes.

Buffer Memory Areas	Value status
CH1 Head pointer (Un\G434)	Values are initialized.
CH1 Latest pointer (Un\G435)	
CH1 Number of logging data (Un\G436)	
CH1 Trigger pointer (Un\G437)	
CH1 Trigger generation time (Un\G444 to Un\G448)	
CH1 Logging data (Un\G10000 to Un\G19999)	The values before logging resumes are not initialized. After logging resumes, values are stored from the start address of CH1 Logging data (Un\G10000 to Un\G19999). To refer to the logging data, check which area has valid data with CH1 Number of logging data (Un\G436).

Logging hold request

A hold trigger is generated from a program at any timing.

Logging starts when ON (1) is set to 'CH1 Logging hold request' (Un\G471) and stops after a preset number of the data is collected.



Point

- The following delay time occurs until an analog input module receives a hold trigger after the value in 'CH1 Logging hold request' (Un\G471) is turned OFF (0) → ON (1).

Trigger delay = Logging cycle (Cycle at which logging is actually performed) + Scan time of the CPU module

- When 'CH1 Logging hold request' (Un\G471) is turned ON (1)→OFF (0) before 'CH1 Logging hold flag' (Un\G409) turns to ON (1), the data set in 'CH1 Post-trigger logging points' (Un\G539) is not held after logging, and logging resumes soon.

■Checking that the logging has stopped

Check that 'CH1 Logging hold flag' (Un\G409) is ON (1).

Level trigger

When a value in the monitored buffer memory area of an analog input module satisfies a preset condition, a hold trigger is generated.

A level trigger is monitored on the refreshing cycle of the digital output value or the digital operation value.

■Initial setting of a level trigger

[Setting a target to be monitored]

As a condition to generate a hold trigger, set the buffer memory address to be monitored to 'CH1 Trigger data' (Un\G541).

Item	Setting range
CH1 Trigger data (Un\G541)	0 to 9999

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

- Set a value between 90 and 99 (Level data☐ (Un\G90 to Un\G99)) to 'CH1 Trigger data' (Un\G541).
- Write a value of the monitored device to Level data☐ (Un\G90 to Un\G99) by using the MOV instruction.

Item	Setting range
Level data☐ (Un\G90 to Un\G99)*1	-32768 to +32767

*1 ☐ represents a number from 0 to 9.

Ex.

Application example of Level data☐ (Un\G90 to Un\G99)

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

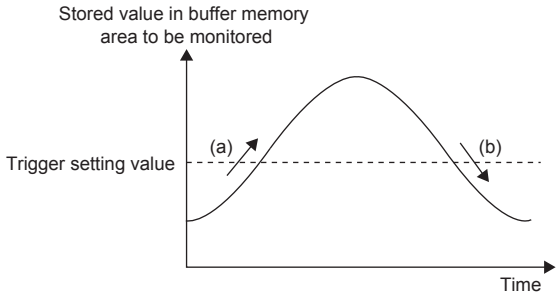
- Set 'CH1 Trigger data' (Un\G541) to 91 (buffer memory address of Level data 1) (when Level data 1 is used).
- Store the storage data of D100 in 'Level data 1' (Un\G91) by the program continuously.

Point

- Specify an appropriate data such as 'CH1 Digital output value' (Un\G400), 'CH1 Digital operation value' (Un\G402), or Level data☐ (Un\G90 to Un\G99) to 'CH1 Trigger data' (Un\G541). When a setting area or a system area is specified, the normal operation is not guaranteed.
- If other than 0 to 9999 is set for 'CH1 Trigger data' (Un\G541), an error occurs. A trigger data setting range error (error code: 1D6☐H) is stored in 'Latest error code' (Un\G0), 'Error flag' (Un\G69, b15) and the ERROR LED turns on.

[Setting the monitoring condition]

Set a condition to generate a hold trigger in 'CH1 Hold trigger condition setting' (Un\G540).

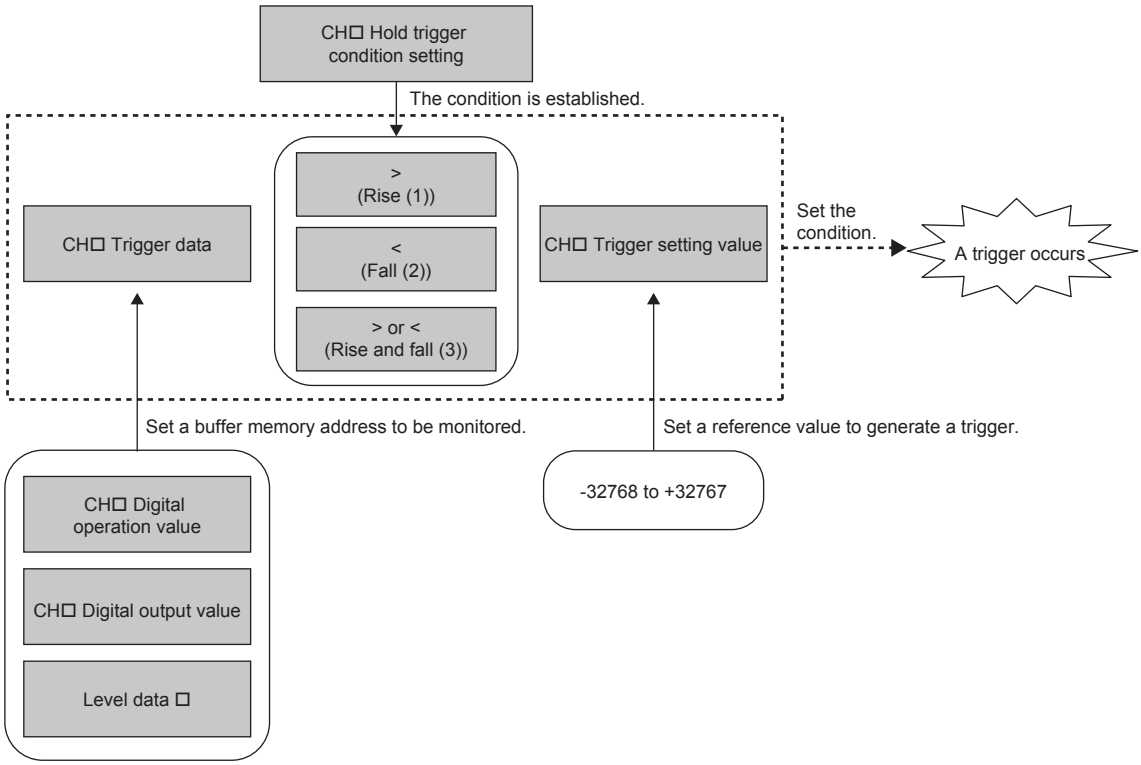
Setting value	Description	
Rise (1)	 (a) A hold trigger is generated when the relation between the values changes from "Stored value of a buffer memory area to be monitored ≤ Trigger setting value" to "Stored value of a buffer memory area to be monitored > Trigger setting value". (b) A hold trigger is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

• Set a value where a hold trigger is generated to 'CH1 Trigger setting value' (Un\G542).

Item	Setting range
CH1 Trigger setting value (Un\G542)	-32768 to +32767

Point

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



For example, to generate a hold trigger when a value in CH1 Digital output value exceeds 10000, set it as follows.

• 'CH1 Level trigger condition setting' (Un\G540): Rise (1)

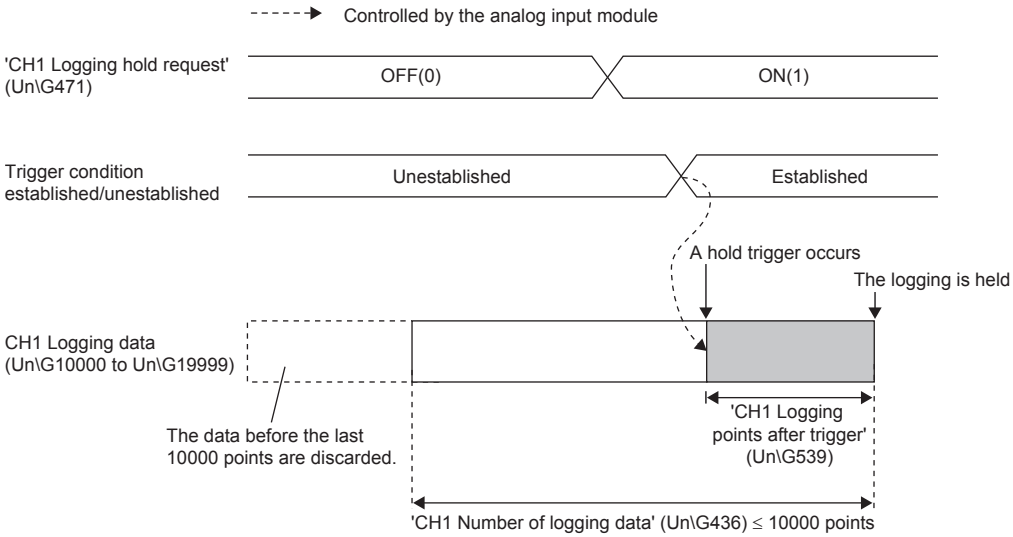
• 'CH1 Trigger data' (Un\G541): 400

• 'CH1 Trigger setting value' (Un\G542): 10000

■Operation of a level trigger

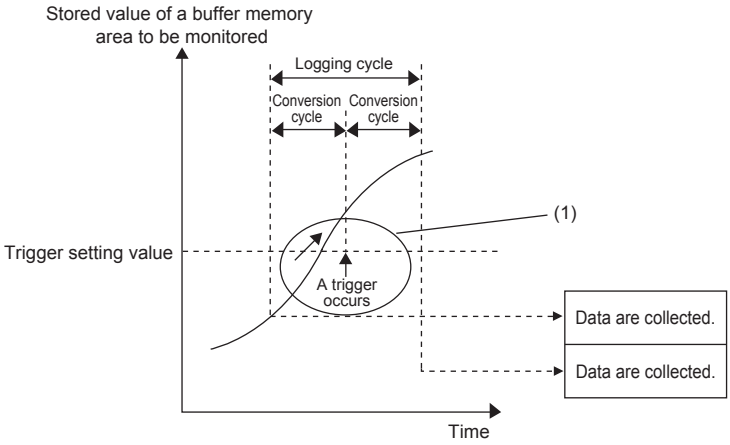
To use a level trigger, set ON (1) to 'CH1 Logging hold request' (Un\G471) in advance. At the point where ON (1) has been set to 'CH1 Logging hold request' (Un\G471), the module becomes the trigger condition wait status.

After the trigger condition has been satisfied, and the set points of the data have been collected from that point, the logging stops.



Point

A level trigger is detected on the refreshing cycle of the digital output value or the digital operation value. Therefore, the data when a hold trigger is generated may not be stored in CH1 Logging data (Un\G10000 to Un\G19999) depending on the setting of the logging cycle. To store the data at the timing when a hold trigger is generated in CH1 Logging data (Un\G10000 to Un\G19999), arrange related settings so that the conversion cycle of the monitoring target value (a trigger data) and the logging cycle (actual logging cycle) have the same time period.



(1) The data at the timing when a trigger is generated is not stored in the buffer memory area.

- Checking that the logging has stopped

Check that 'CH1 Logging hold flag' (Un\G409) is ON (1).

Initial settings of the logging function

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

■Setting procedure

1. Set "A/D conversion enable/disable setting" to "A/D conversion enable".

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Basic setting] ⇨ [A/D conversion enable/disable setting]

2. Set "Logging enable/disable setting" to "Enable".

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Application setting] ⇨ [Logging function]

3. Set the target data to be logged in "Logging data setting". Set either of "Digital output value" or "Digital operation value" for each channel.
4. Set the cycle to store the logging data to "Logging cycle setting value".
5. Select a unit of the logging cycle setting value in "Logging cycle unit setting".
6. Set a condition to generate a hold trigger in "Level trigger condition setting". To use 'CH1 Logging hold request' (Un\G471), set "Disable". To use the level trigger, set it to "Level trigger (Condition: Rise)", "Level trigger (Condition: Fall)" or "Level trigger (Condition: Rise and fall)".
7. Set a number of the data points to be collected for the time period from the occurrence of a hold trigger to logging stop in "Post-trigger logging points".
8. Set a buffer memory address to be monitored for a level trigger to "Trigger data".
9. Set whether to enable or disable the logging read function in "Logging loading enable/disable setting".
10. Set a level where a level trigger operates for "Trigger setting value".

Logging read function

After logging starts, an interrupt request is sent to the CPU module and an interrupt program is executed every time the preset number of data to be read is logged.

An analog input module has 16 points of the interrupt factor to correspond to the logging reading of each channel.

For the setting of interrupt pointers, refer to the following.

☞ Page 72 Setting interrupt pointers

Point

More than 10000 points of logging data can be stored by transferring the device data to the data register of the CPU module without stopping logging.

■Setting interrupt pointers

Assign the interrupt factors of an analog input module and interrupt pointers of the CPU module using the GX Works3 interrupt pointer setting.

The interrupt function must be set when the logging read function is used.

■Starting the logging read function

To use the logging read function, set 'CH1 Logging loading enable/disable setting' (Un\G544) to Enable (0) and set a number of logging points to generate an interrupt in 'CH1 Logging load points setting value' (Un\G545). This function starts when 'Operating condition setting request' (Un\G70, b9) is turned off→on→off.

- The number of logging read points

Set a value whose integral multiple is 10000 in 'CH1 Logging load points setting value' (Un\G545). The setting range is from 10 to 10000.

When a value whose integral multiple is not 10000 is set, the number of the actual logging read points is forced to become a maximum value whose integral multiple is 10000 within the set value. The value of the number of logging read points is stored in 'CH1 Logging read points monitor value' (Un\G440).

The number of logging read points	Logging read points monitor value
100	100
90	80
110	100
650	625
4000	2500

■Data checking method

[Current logging read pointer]

- The head pointer read from CH1 Logging data (Un\G10000 to Un\G19999) with the interrupt processing is stored in 'CH1 Current logging read pointer' (Un\G438).
- The default value of 'CH1 Current logging read pointer' (Un\G438) is -1.
- Every time the same number of data as the value stored in CH1 Logging read points monitor value (Un\G440) is logged, a value calculated by the following formula is stored in 'CH1 Current logging read pointer' (Un\G438).

CH1 Current logging read pointer = CH1 Latest pointer - CH1 Logging read points monitor value + 1

[Previous logging read pointer]

- 'CH1 Current logging read pointer' (Un\G438) at the timing when the previous read pointer detection interrupt occurs is stored in 'CH1 Previous logging read pointer' (Un\G439).
- The default value of 'CH1 Previous logging read pointer' (Un\G439) is -1.
- 'CH1 Previous logging read pointer' (Un\G439) is used to detect the overlap of the logging read pointer detection interrupt processing.

Ex.

The values to be stored in each pointer at every detection interrupt when the logging read detection starts with 'CH1 Logging load points setting value' (Un\G545) being set to 1000

Occurrence of read pointer detection interrupts	Previous logging read pointer	Current logging read pointer	Latest pointer	Buffer memory areas
Default value	-1	-1	0	1st data
1st time	-1	0	999	⋮
2nd time	0	1000	1999	1000th data
3rd time	1000	2000	2999	1001st data
⋮	⋮	⋮	⋮	⋮
				2000th data
10th time	8000	9000	9999	2001st data
11th time	9000	0	999	⋮
12th time	0	1000	1999	10000th data

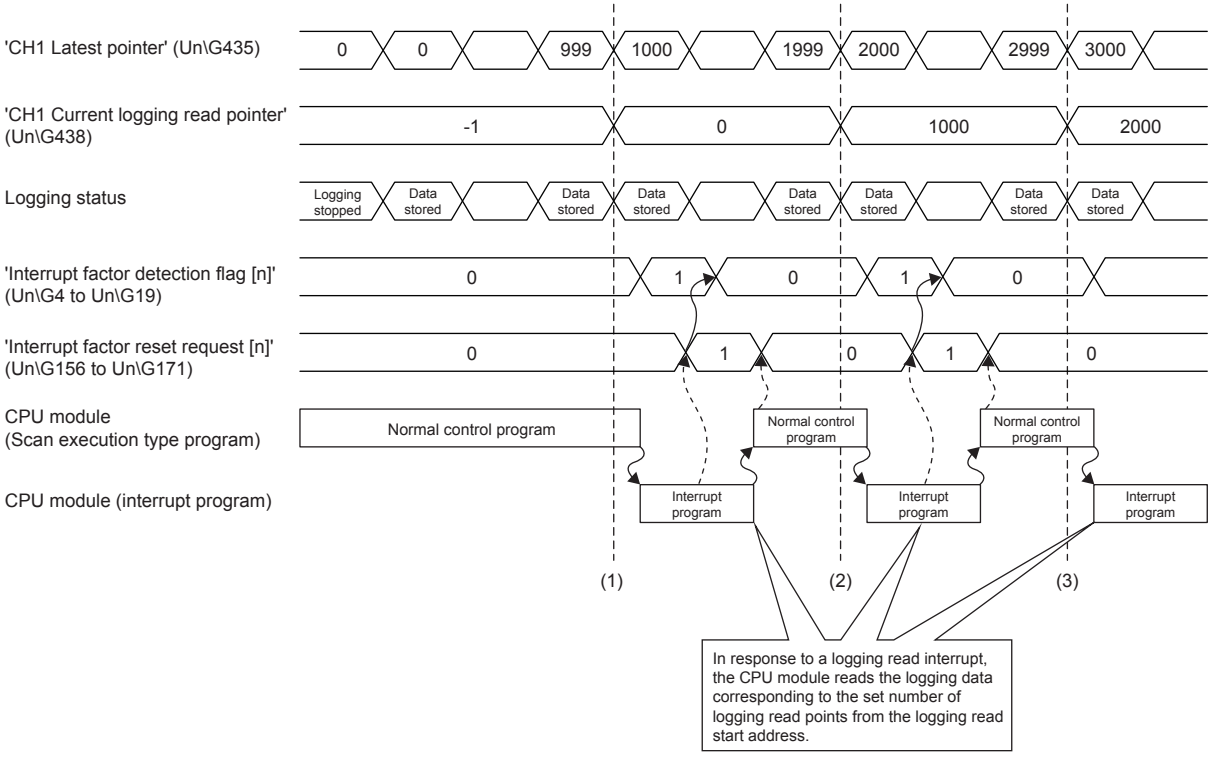
■Operation

The logging read function starts by setting interrupt pointers and turning off→on→off 'Operating condition setting request' (Un\G70, b9). This function repeats its operation every time the same number of data as the logging read points monitor value is logged.

Ex.

The following figure shows the operation when the logging read function is used under the following conditions.

- A/D conversion enable: CH1
- Logging load points setting value: 1000 points



(1) The timing that the 1st interrupt processing occurs

(2) The timing that the 2nd interrupt processing occurs

(3) The timing that the 3rd interrupt processing occurs

■Setting procedure

To use the logging read function, both the logging read function and the interrupt setting must be set.

1. Set "Condition target setting" to "Logging read".

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Interrupt setting]

2. Set "A/D conversion enable/disable setting" to "A/D conversion enable".

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Basic setting] ⇨ [A/D conversion enable/disable setting]

3. Set "Logging enable/disable setting" to "Enable".

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Application setting] ⇨ [Logging function]

4. Set the target data to be logged in "Logging data setting".

5. Set the cycle to store the logging data to "Logging cycle setting value".

6. Set "Read interrupt enable/disable setting" to "Enable".

7. Set the number of logging points that generate a read interrupt in "Logging load points setting value".

■Setting example

Ex.

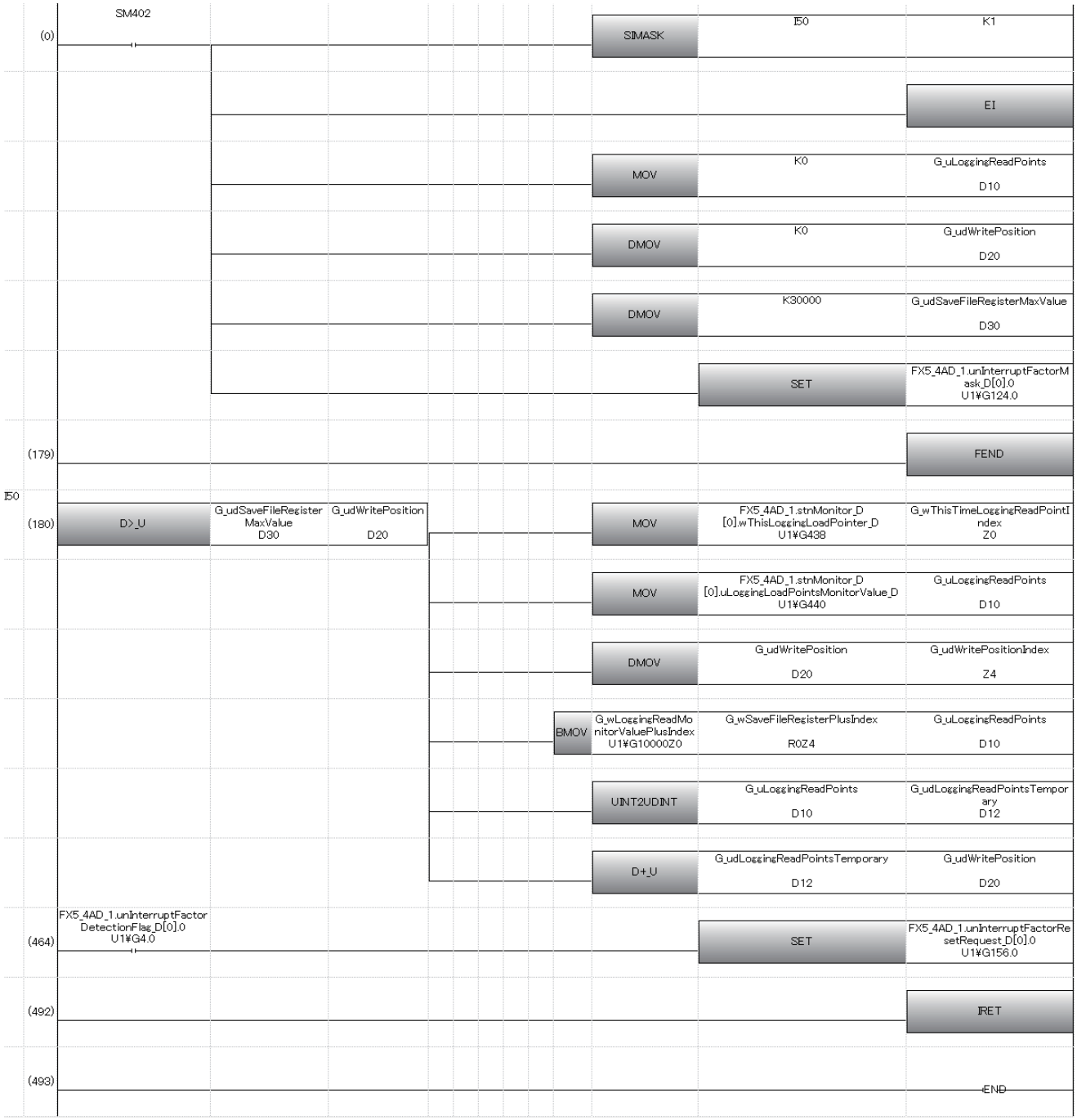
When an interrupt program that is executed when the logged data of CH1 Logging read points monitor value is assigned to the interrupt pointer I50

• Label settings

Classification	Device	Description	Device
Module label	FX5_4AD_1.unInterruptFactorMask_D[0]	Interrupt factor mask	U1\G124
	FX5_4AD_1.unInterruptFactorDetectionFlag_D[0]	Interrupt factor detection flag	U1\G4
	FX5_4AD_1.unInterruptFactorResetRequest_D[0]	Interrupt factor reset request	U1\G156
	FX5_4AD_1.stnMonitor_D[0].wThisLoggingLoadPointer_D	CH1 Current logging read pointer	U1\G438
	FX5_4AD_1.stnMonitor_D[0].uLoggingLoadPointsMonitorValue_D	CH1 Logging read points monitor value	U1\G440
Labels to be defined	Define global labels as shown below:		

Label Name	Data Type		Class	Assign (Device/Label)
G_uLoggingReadPoints	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D10
G_udLoggingReadPointsTemporary	Double Word [Unsigned]/Bit String [32-bit]	...	VAR_GLOBAL	D12
G_udWritePosition	Double Word [Unsigned]/Bit String [32-bit]	...	VAR_GLOBAL	D20
G_udSaveFileRegisterMaxValue	Double Word [Unsigned]/Bit String [32-bit]	...	VAR_GLOBAL	D30
G_wThisTimeLoggingReadPointIndex	Word [Signed]	...	VAR_GLOBAL	Z0
G_udWritePositionIndex	Double Word [Unsigned]/Bit String [32-bit]	...	VAR_GLOBAL	Z4
G_wLoggingReadMonitorValuePlusIndex	Word [Signed]	...	VAR_GLOBAL	U1¥G10000Z0
G_wSaveFileRegisterPlusIndex	Word [Signed]	...	VAR_GLOBAL	R024

• Program example



Interrupt function

Executes an interrupt program of the CPU module when an interrupt factor such as an input signal error or alarm output is detected.
The number of available interrupt pointers per analog input module is up to 16.

Operation

■Detecting an interrupt factor

When an interrupt factor occurs, an interrupt request is sent to the CPU module at the same time as 'Interrupt factor detection flag [n]' (Un\G4 to Un\G19) turns to Interrupt factor (1).

■How to reset an interrupt factor

When Reset request (1) is set to 'Interrupt factor reset request [n]' (Un\G156 to Un\G171) corresponding to the interrupt factor, the specified interrupt factor is reset and 'Interrupt factor detection flag [n]' (Un\G4 to Un\G19) changes to No interrupt factor (0).

Setting procedure

To use the interrupt function, set "Condition target setting", "Condition target channel setting", "Interrupt factor transaction setting", and "Interrupt pointer" in GX Works3.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module name ⇨ [Module Parameter] ⇨ [Interrupt setting]
The following table shows the setting items on the interrupt setting window.

Item	Description
Condition target setting	Select a factor of the target for the interrupt detection.
Condition target channel setting	Select a target channel when the condition target setting for the interrupt detection is channel specification.
Interrupt factor transaction setting	Set an interrupt request for when the same interrupt factor occurs during the interrupt factor detection.
Interrupt pointer	Specify the number of an interrupt pointer that is initiated at the detection of an interrupt factor.

■Condition target setting

Select a factor of the condition target setting for the interrupt detection.
For details on the factors to be detected, refer to the following.
☞ Page 141 Condition target setting [n]

■Condition target channel setting

Select a target channel when the condition target setting for the interrupt detection is channel specification.

Item	Setting value				
Condition target channel setting	0: All channels	1: CH1	2: CH2	3: CH3	4: CH4

■Interrupt factor transaction setting

Set an interrupt request for when the same interrupt factor occurs during the interrupt factor detection.

- With "Interrupt reissue requests (0)", if the same interrupt factor occurs during the interrupt factor detection, an interrupt request is sent to the CPU module again.
- With "No interrupt reissue request (1)", if the same interrupt factor occurs during the interrupt factor detection, an interrupt request is not sent to the CPU module.

■Interrupt pointer

Specify the number of an interrupt pointer that is initiated at the detection of an interrupt factor. For details on the interrupt pointers, refer to the following.
MELSEC iQ-F FX5 User's Manual (Application)

Point

- If 'Condition target setting [n]' (Un\G232 to Un\G247) is Disable (0), an interrupt request is not sent to the CPU module.
- To reset the interrupt factor, set Reset request (1) until 'Interrupt factor detection flag [n]' (Un\G4 to Un\G19) changes to No interrupt factor (0).
- Resetting interrupt factors is executed only when 'Interrupt factor reset request [n]' (Un\G156 to Un\G171) changes from No reset request (0) to Reset request (1).
- Multiple interrupt pointers can also share the same setting of 'Condition target setting [n]' (Un\G232 to Un\G247). When interrupts with the same settings in 'Condition target setting [n]' (Un\G232 to Un\G247) occur, the interrupt program is executed in order of the priority of the interrupt pointers. For the priority of the interrupt pointers, refer to the following.

MELSEC iQ-F FX5 User's Manual (Application)

- When All channels (0) is set for 'Condition target channel setting [n]' (Un\G264 to Un\G279) and an interrupt detection target is set for each channel of 'Condition target setting [n]' (Un\G232 to Un\G247), the interrupt requests that have the same interrupt factor are sent to the CPU module if alarms are issued in multiple channels. In this case, the CPU module executes multiple interrupt programs and judges that the program cannot be normally finished due to the scan monitoring function, and a CPU module error may occur. When a CPU module error occurs, review the CPU module parameter setting and the program.

Setting example

Ex.

If the interrupt program (I51) is executed when an error occurs in any channel

- Parameter settings

Set "Interrupt setting" of [Module Parameter] as follows.

No.	Condition target setting	Condition target channel setting	Interrupt pointer
2	Error flag	All channels	I51

- Label settings

Classification	Device	Description	Device
Module label	FX5CPU.stSM.bAlways_ON	Always ON	SM400
	FX5_4AD_1.unInterruptFactorMask_D[1]	Interrupt factor mask	U1\G125.0
	FX5_4AD_1.unInterruptFactorResetRequest_D[1]	Interrupt factor reset request	U1\G157.0
Labels to be defined	Define global labels as shown below: Label Name: G_bErrorDetection / Data Type: Bit / Class: VAR_GLOBAL / Assign (Device/Label): F0		

Error history function

Records up to 16 errors and alarms that occurred in an analog input module to store them in the buffer memory areas.

Operation

When an error occurs, the error code and the error time are stored from Error history No. 1 (Un\G3600 to Un\G3609) in order. When an alarm occurs, the alarm code and the alarm time are stored from Alarm history No. 1 (Un\G3760 to Un\G3769) in order.

- Detail of the error code assignment

	b15 to b8	b7 to b0
Un\G3600	Error code	
Un\G3601	First two digits of the year	Last two digits of the year
Un\G3602	Month	Day
Un\G3603	Hour	Minute
Un\G3604	Second	Day of the week
Un\G3605	Millisecond (upper)	Millisecond (lower)
Un\G3606	System area	
⋮		
Un\G3609		

- Detail of the alarm code assignment

	b15 to b8	b7 to b0
Un\G3760	Alarm code	
Un\G3761	First two digits of the year	Last two digits of the year
Un\G3762	Month	Day
Un\G3763	Hour	Minute
Un\G3764	Second	Day of the week
Un\G3765	Millisecond (upper)	Millisecond (lower)
Un\G3766	System area	
⋮		
Un\G3769		

Ex.

Example of error history and alarm history storage

Item	Storage contents	Storage example*1
First two digits of the year/Last two digits of the year	Stored in BCD code.	2017H
Month/Day		0130H
Hour/Minute		1035H
Second		40H
Day of the week	One of the following values is stored in BCD code. Sunday: 0, Monday: 1, Tuesday: 2, Wednesday: 3, Thursday: 4, Friday: 5, Saturday: 6	1H
Millisecond (upper)	Stored in BCD code.	06H
Millisecond (lower)		28H

*1 These values assume that an error occurs at 10:35 and 40.628 seconds on Monday, January 30th, 2017.

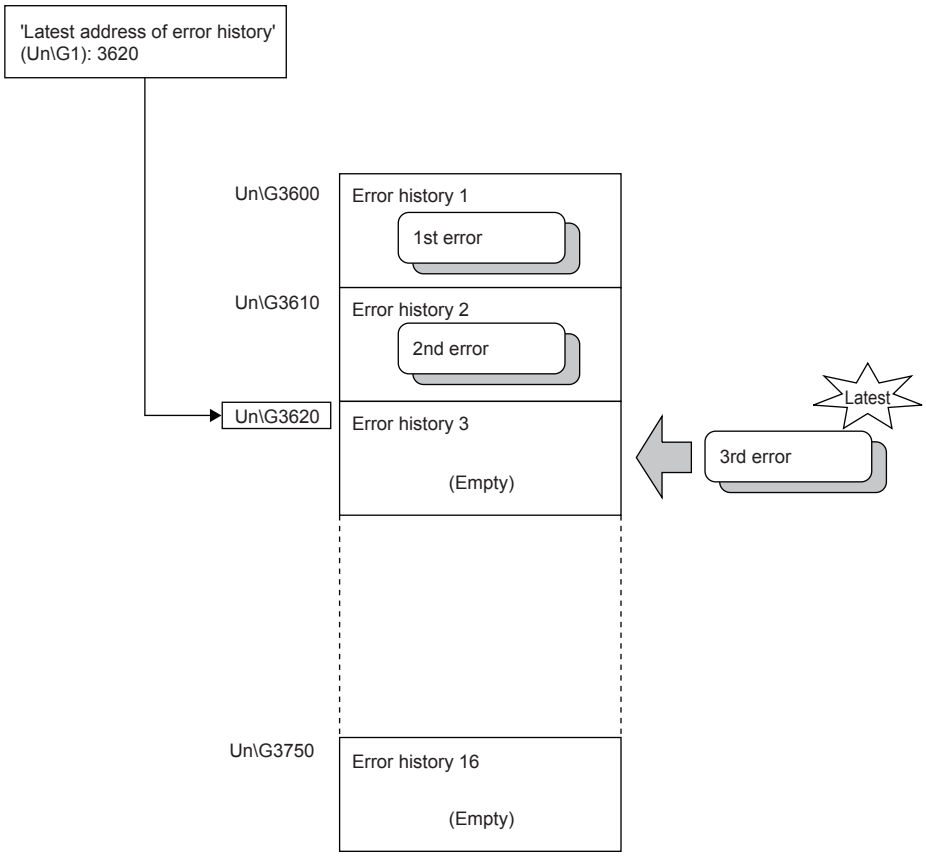
The start address of Error history where the latest error is stored, can be found in 'Latest address of error history' (Un\G1).

The start address of Alarm history where the latest alarm is stored, can be found in 'Latest address of alarm history' (Un\G3).

Ex.

When the 3rd error occurs:

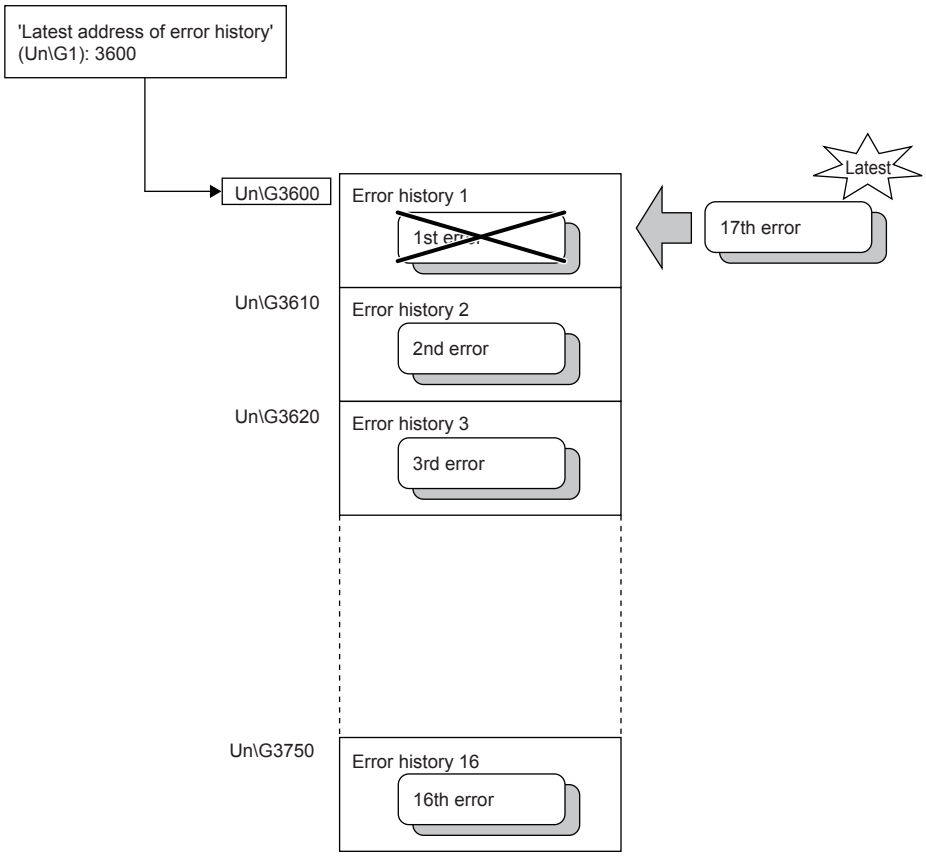
The 3rd error is stored in Error history No. 3, and the value 3620 (start address of Error history No. 3) is stored to Latest address of error history.



Ex.

When the 17th error occurs:

The 17th error is stored in Error history No. 1, and the value 3600 (start address of Error history No. 1) is stored to Latest address of error history.



Point

- Once the error history storage area becomes full, subsequent error information will overwrite the existing data, starting from Error history No. 1 (Un\G3600 to Un\G3609), and continues sequentially thereafter. The overwritten history is deleted.
- The same processing is performed for Alarm history when an alarm occurs.
- The stored error history is cleared when an analog input module is powered off or the CPU module is reset.

Offset/gain initialization function

Offset/gain initialization

This function initializes the offset and gain values adjusted by the offset/gain setting to the factory defaults.

1. Set the mode to the “Normal mode”.
2. For all channels, set A/D conversion enable/disable setting to A/D conversion disable (1) and turn off→on→off ‘Operating condition setting request’ (Un\G70, b9).
3. Set "E20FH" in 'Offset/gain initialization enabled code' (Un\G305).
4. Turn ON (1) 'Offset/gain initialization request' (Un\G70, b5).

Precautions

- The channels for which the offset and gain have been set are initialized to the factory defaults of the execution-time range type (voltage or current).
- The channels for which the offset and gain have not been set are initialized to the current range.

FX3 allocation mode function

This function operates the buffer memory areas of the analog input module with the same layout as the buffer memory addresses equivalent to FX3U-4AD.

Operation

In FX3 allocation mode, only allocation of buffer memory area is changed. The following buffer memory area is allocated the same as FX3U-4AD.

Buffer memory areas	Buffer memory area name
Un\G10 to 13	CH1 to 4 Digital operation value
Un\G26	Warning output flag (Process alarm upper limit/lower limit)
Un\G27	Warning output flag (Rate alarm upper limit/lower limit)
Un\G30	Type code
Un\G61 to 64	CH1 to 4 Conversion value shift amount
Un\G101 to 104	CH1 to 4 Minimum value
Un\G109	Minimum value reset request
Un\G111 to 114	CH1 to 4 Maximum value
Un\G119	Maximum value reset request

For buffer memories with different allocations from FX3U-4AD, it can be used by changing the program. For buffer memory in FX3 allocation mode, refer to the following.

☞ Page 121 In FX3 allocation function mode

Restriction

When reusing the program used by FX3U-4AD, delete the initial setting process and set the module parameters with GX Works3.

When performing the same operation as FX3U-4AD, it can be executed by the following function.

FX3U-4AD	FX5-4AD	Reference
Input mode specification	Range switching function	Page 27
Average count	A/D conversion method	Page 28
Digital filter function		
Setting change disabled	—	It is unnecessary because the setting is reflected in the operating condition setting request, and erroneous setting is prevented.
Input characteristics adjustment	Offset/gain setting function	Page 92
Data addition function	Shift function	Page 36
Upper lower limit value detection function	Alarm output function (process alarm)	Page 46
Sudden change detection function	Alarm output function (rate alarm)	Page 48
Peak value hold function	Maximum value/Minimum value hold function	Page 45
Scale over detection function	Input signal error detection function	Page 53
Data history function	Logging function	Page 59
Initialization function	Offset/gain initialization function	Page 81
Auto transfer function	Auto refresh	Page 91
Upper/lower limit error status auto transfer function	Auto refresh	Page 91
Sudden change detection status auto transfer function	Auto refresh	Page 91
Scale over status auto transfer function	Auto refresh	Page 91
Error status auto transfer function	Auto refresh	Page 91

Setting procedure

1. When adding a new module, select the module whose module model name has "(FX3)" at the end.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Right-click ⇨ [Add New Module]

2. Configure the same parameter setting as the one of when the Normal mode is used.
3. After writing the module parameter, turn off→on or reset the CPU module.

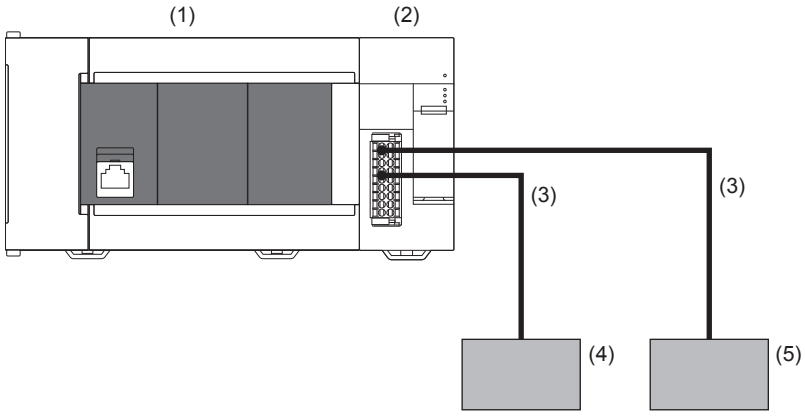
Point

Switching between normal mode and FX3 allocation mode is not possible during operation.

1.5 System Configuration

The following shows a system configuration using the analog input module.

- System configuration example



(1) FX5 CPU module
(2) Analog input module (FX5-4AD)
(3) Analog device connection cable
(4) Current sensor
(5) Voltage sensor

1.6 Wiring

This section describes the temperature input module wiring.

Spring clamp terminal block

Suitable wiring

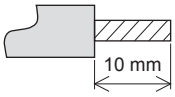
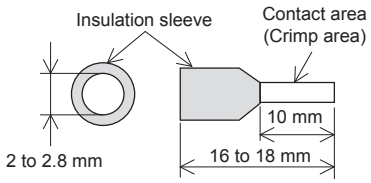
The wires to connect the spring clamp terminal block are described below.

No. of wire per terminal	Wire size	
	Single wire, strand wire	Ferrule with insulation sleeve
Single wiring	AWG24 to 16 (0.2 to 1.5 mm^2)	AWG23 to 19 (0.25 to 0.75 mm^2)

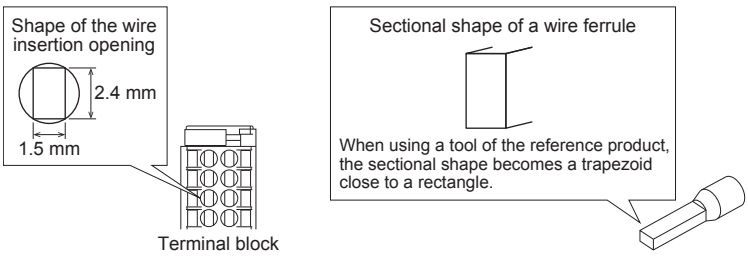
Wire end treatment

When not using a ferrule, strip the cable about 10 mm from the tip and connect it as a strand wire so that the wires do not separate. When using a ferrule, strip the cable about 10 mm from the tip to connect a wire ferrule at the striped area. Failure to do so may result in electric shock or short circuit between adjacent terminals because of the conductive part. If the wire strip length is too short, it may result in the poor contact to the spring clamp terminal part.

Depending on the thickness of the sheath, it may be difficult to insert into the insulation sleeve, so select the wires by referring to the appearance diagram.

Strand wire/single wire	Ferrule with insulation sleeve
	

Check the shape of the wire insertion opening with the following chart, and use the smaller wire ferrule than the described size. Also, insert the wire with care so that the wire ferrule is in proper orientation. Failure to do so may cause the bite of the terminal and the damage of the terminal block.



The following table shows wire ferrules and its associated tools compatible with the terminal block. The shape of the wire ferrule differs depending on the crimp tool to be used, use the reference product. If the product other than referenced products is used, the wire ferrule cannot be removed. Sufficiently confirm that the wire ferrule can be removed before use.

<Reference product>

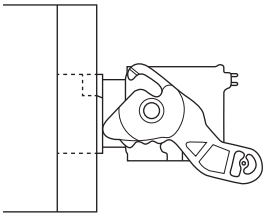
Manufacturer	Model	Wire size	Crimp tool
PHOENIX·CONTACT GmbH & Co. KG	AI 0.5-10 WH	0.5mm^2	CRIMPFOX 6
	AI 0.75-10 GY	0.75mm^2	
	A 1.0-10	1.0mm^2	
	A 1.5-10	1.5mm^2	

Removing and installing the terminal block

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

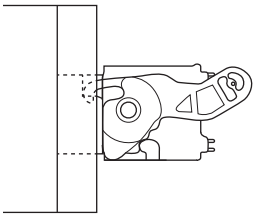
■Lever position to lock and release

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.



Lever position to release

■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.



Lever position to lock

■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.

■Removal procedure

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

■Installation procedure

Move the lever to the release 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

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

Precautions

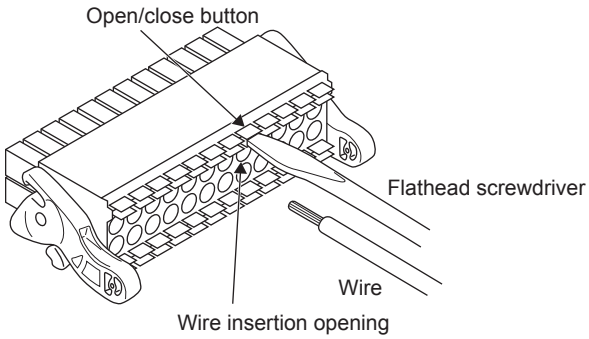
When installing the terminal block, check that the lever is in the release position. If installation is performed while the lever is in the lock position, it may cause damage to the lever.

Connection and disconnection of the cable

■Connection of the cable

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 open/close button with a flathead screwdriver having a tip width of 2.0 to 2.5 mm. After fully inserting the cable, remove the screwdriver.



<Reference>

Manufacturer	Model
PHOENIX·CONTACT GmbH & Co. KG	SZS 0.4 × 2.5 VDE

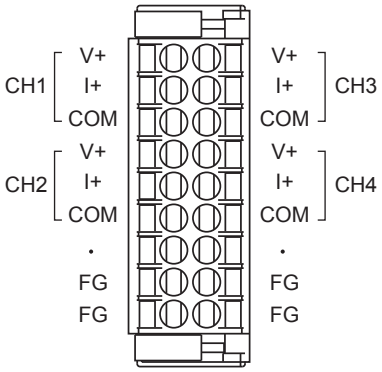
Precautions

Pull the cable or wire ferrule slightly to check that the cable is securely clamped.

■Disconnection of the cable

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

Terminal arrangement



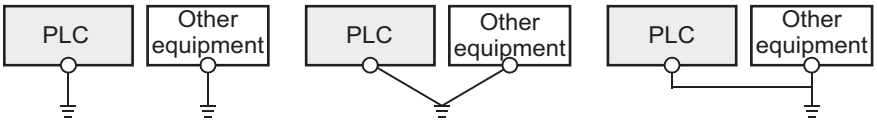
Left side of terminal arrangement		Right side of terminal arrangement	
Display name	**Description**	**Display name**	**Description**
V+	CH1 Voltage input	V+	CH3 Voltage input
I+	CH1 Current input	I+	CH3 Current input
COM	CH1 COM	COM	CH3 COM
V+	CH2 Voltage input	V+	CH4 Voltage input
I+	CH2 Current input	I+	CH4 Current input
COM	CH2 COM	COM	CH4 COM
·	Unused	·	Unused
FG	Frame ground	FG	Frame ground
FG	Frame ground	FG	Frame ground

Ground wiring

Grounding

Perform the following.

- Perform class D grounding (Grounding resistance: 100 Ω or less).
- Ground the programmable controller independently when possible.
- If the programmable controller cannot be grounded independently, perform the "Shared grounding" shown below.



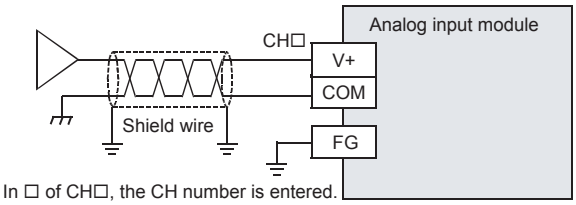
Independent grounding (Best condition) | Shared grounding (Good condition) | Common grounding (Not allowed)

- Bring the grounding point close to the PLC as much as possible so that the ground cable can be shortened.

External wiring example

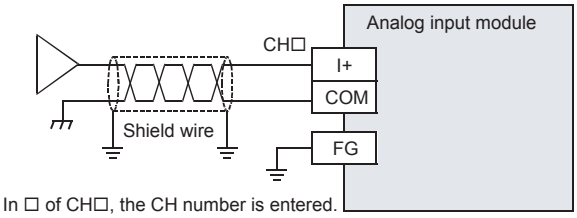
The followings show the examples of external wiring.

For the voltage input



In ☐ of CH☐, the CH number is entered.

For the current input



In ☐ of CH☐, the CH number is entered.

Precautions

Use a two-conductor shielded twisted pair cable for analog input lines and carry out the wiring while separating them from other power lines and lines susceptible to induction.

1.7 Parameter Settings

Set the parameters of each channel.
Setting parameters here eliminates the need to program them.

Point

When adding a new analog input module, if selecting the module whose module model name has "(FX3)" at the end, it can be used as FX3 allocation mode.

- FX5-4AD: Normal mode
- FX5-4AD(FX3): FX3 allocation mode

For details on the FX3 allocation mode function, refer to ☞ Page 82 FX3 allocation mode function.
This section describes the case in a normal mode..

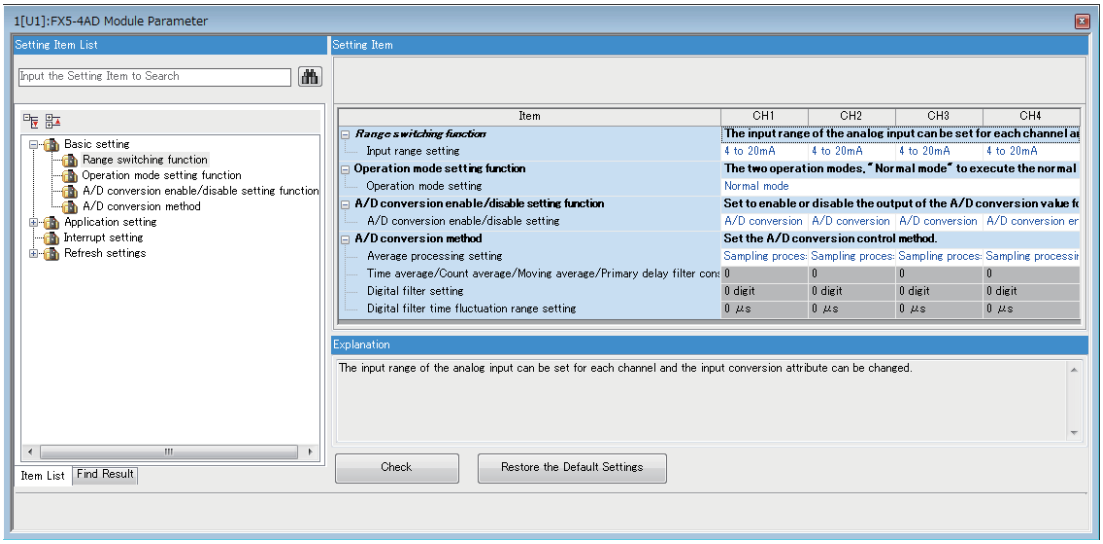
Basic setting

Setting procedure

Open "Basic setting" of GX Works3.

1. Start a module parameter.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name⇨ [Module Parameter] ⇨ [Basic setting]



2. Click the item to be changed to enter the setting value.

- Item where a value is selected from the pull-down list

Click [▼] button of the item to be set, and from the pull-down list that appears, select the value.

- Item where a value is entered into the text box

Double-click the item to be set to enter the numeric value.

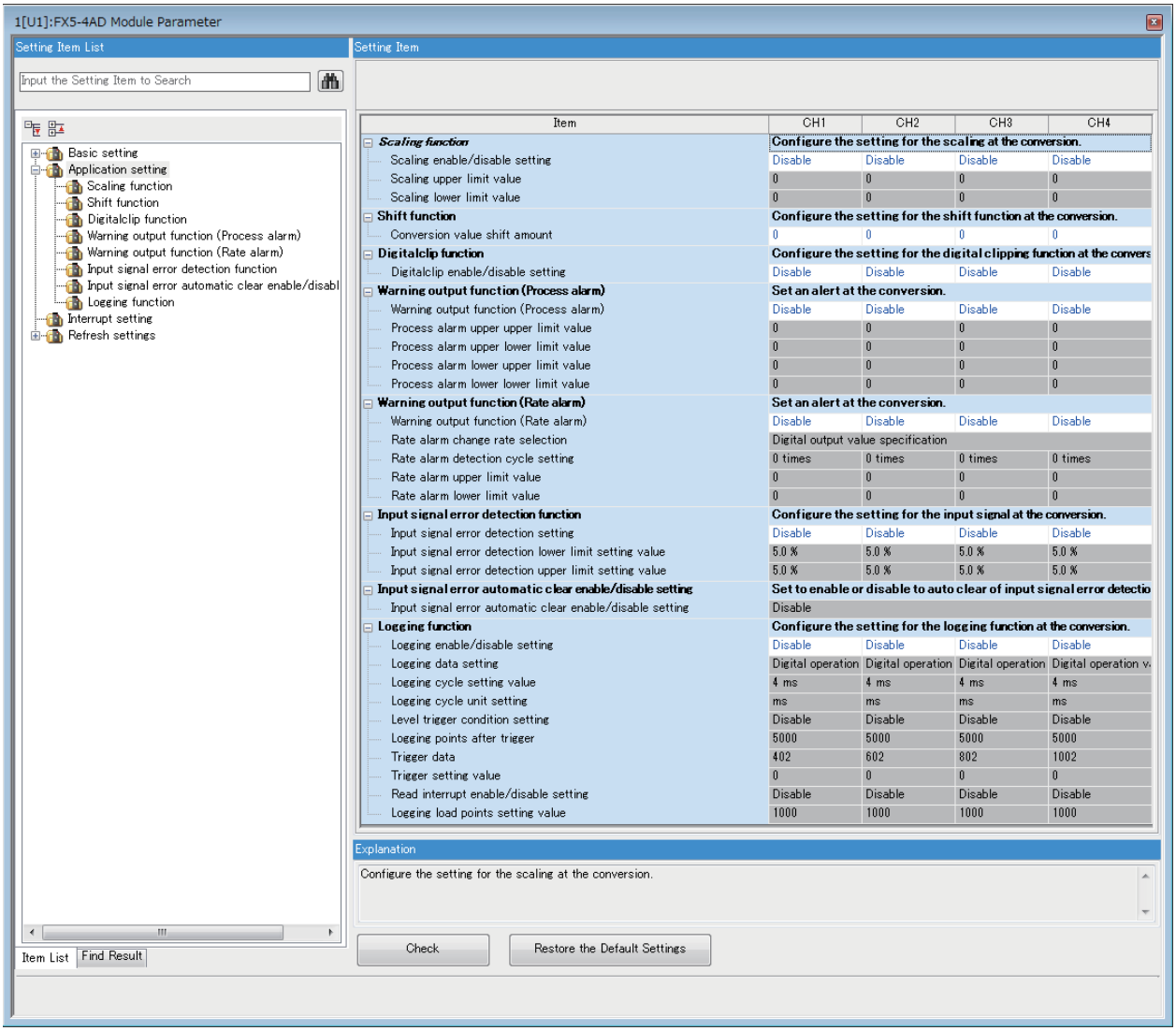
Application setting

Setting procedure

Open "Application setting" of GX Works3.

1. Start a module parameter.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Application setting]



2. Click the item to be changed to enter the setting value.

• Item where a value is selected from the pull-down list

Click [▼] button of the item to be set, and from the pull-down list that appears, select the value.

• Item where a value is entered into the text box

Double-click the item to be set to enter the numeric value.

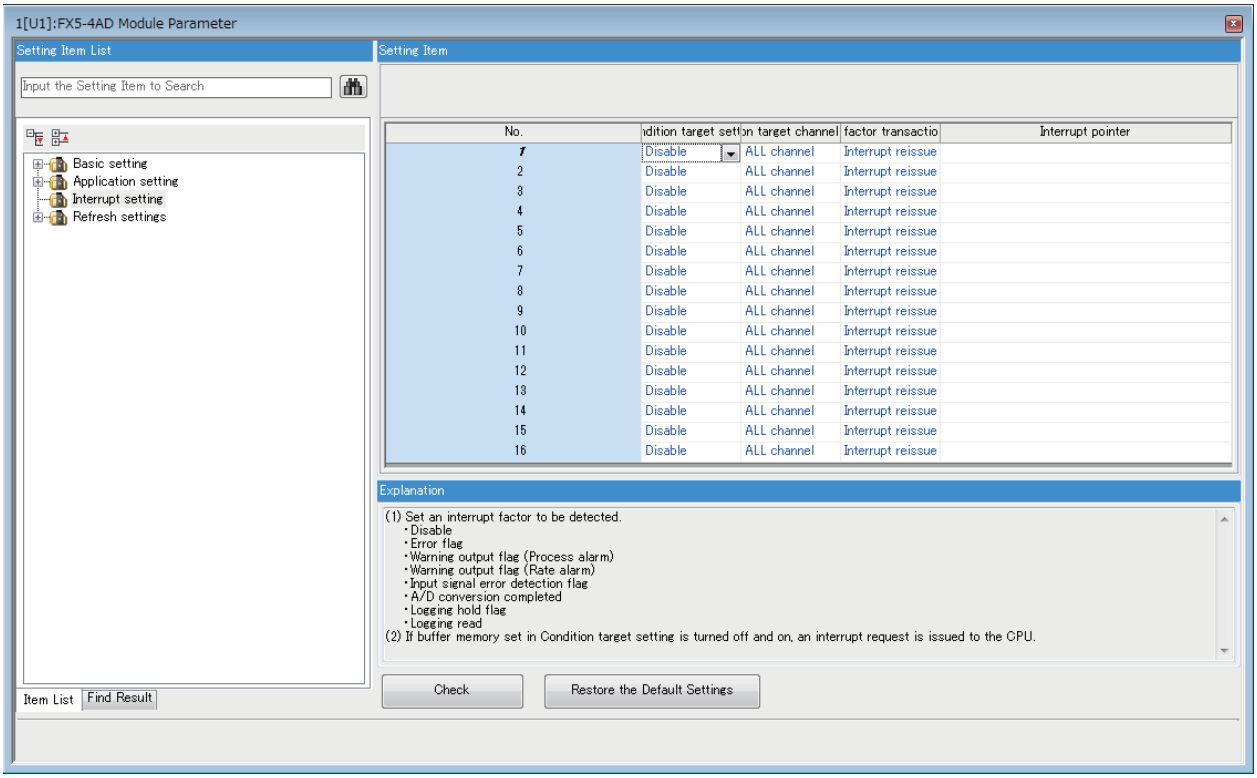
Interrupt setting

Setting procedure

Open "Interrupt setting" of GX Works3.

1. Start a module parameter.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Interrupt setting]



2. Click the interrupt setting number (No. 1 to 16) to be changed to enter the setting value.

• Item where a value is selected from the pull-down list

Click [▼] button of the item to be set, and from the pull-down list that appears, select the value.

• Item where a value is entered into the text box

Double-click the item to be set to enter the numeric value.

Refresh setting

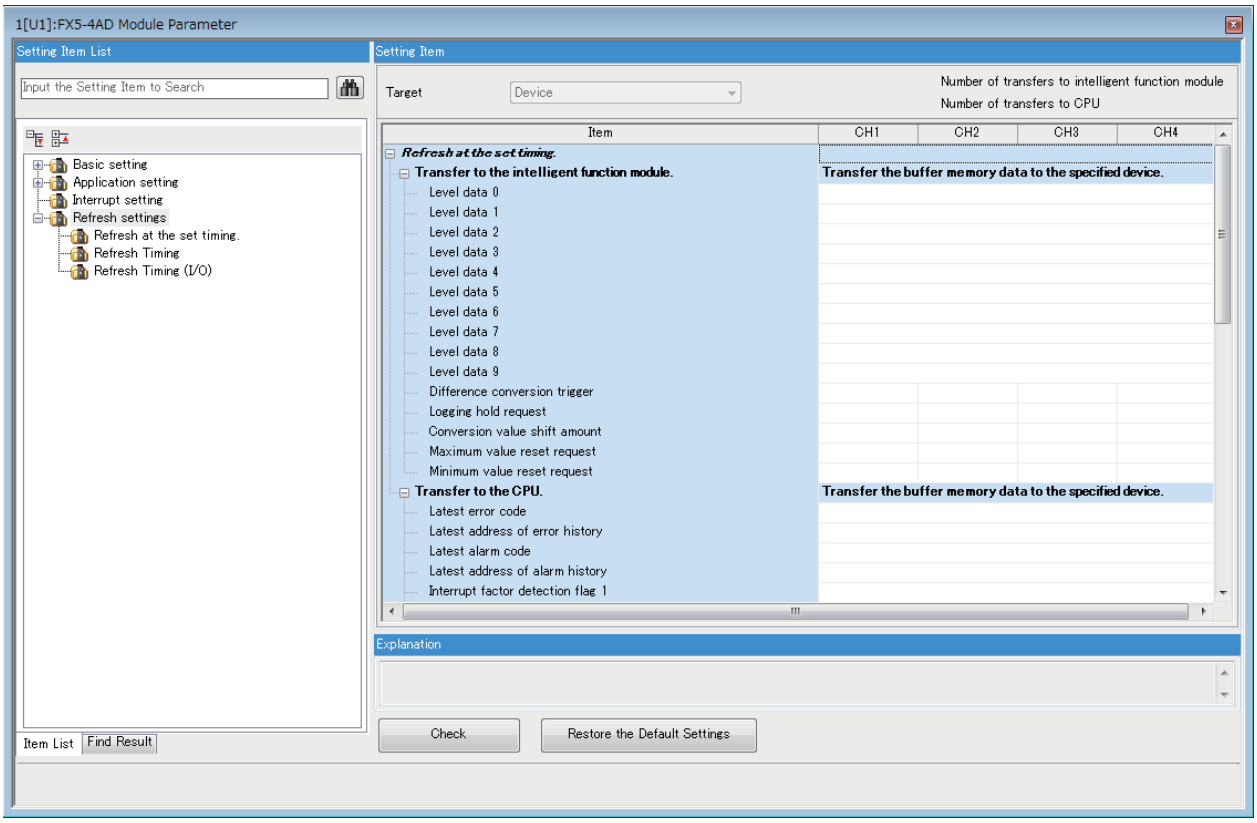
Setting procedure

Set the buffer memory area of an analog input module to be refreshed.

This refresh setting eliminates the need for reading/writing data by programming.

1. Start a module parameter.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Module model name ⇨ [Module Parameter] ⇨ [Refresh settings]



2. Double-click the item to be set to enter the device of refresh destination.

1.8 Offset/Gain Setting

Using the user range setting requires setting the offset and gain values.

The offset/gain setting can be performed by the following two methods.

- Settings from the module tool of GX Works3
- Setting from the program

The set offset/gain values are saved in the flash memory of the analog input module.

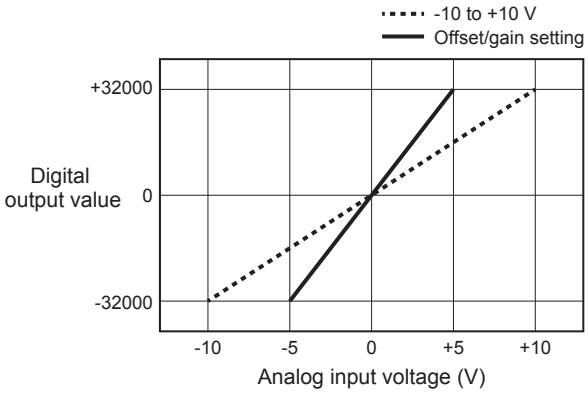
Setting example

An example of offset/gain setting is shown below.

Input conversion characteristics

Ex.

When CH1 is set to 0 V, offset is set to 0, and when set to 5 V, gain is set to 32000



User range	Digital output value	Resolution	Remarks
-5 to +5 V	-32000 to +32000	156.25 μV	(Gain value - Offset value) = 5 V As the result of (Gain value - Offset value) is not < 4 V, the calculated resolution is applied.

Module parameters

The module parameters used for CH1 are as follows. Parameters other than the following are defaults.

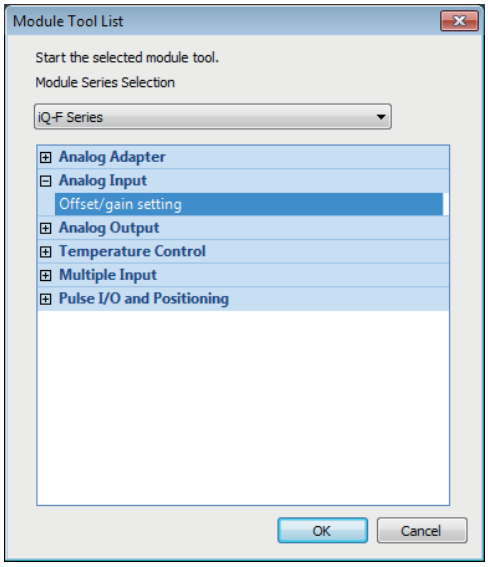
Item	Set conditions
Input range setting	User range
Operation mode setting	Normal mode
A/D conversion enable/disable setting	A/D conversion enable

Settings from the module tool of GX Works3

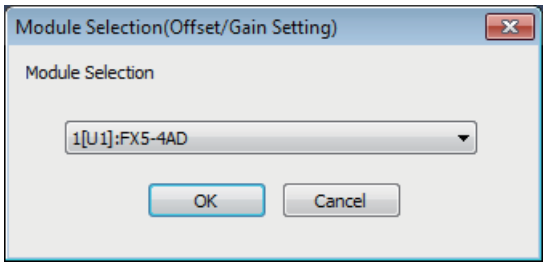
The following shows the procedure for setting the offset and gain from the module tool of GX Works3. (For CH1)

■Setting procedure

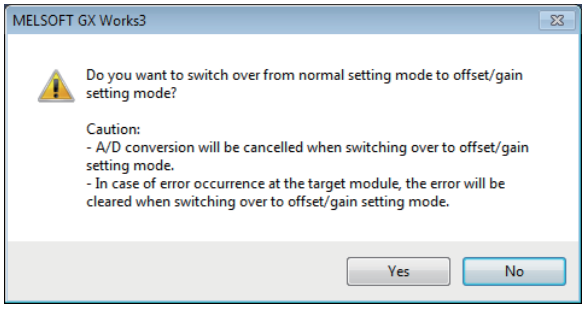
[Tool] ⇨ [Module Tool List]



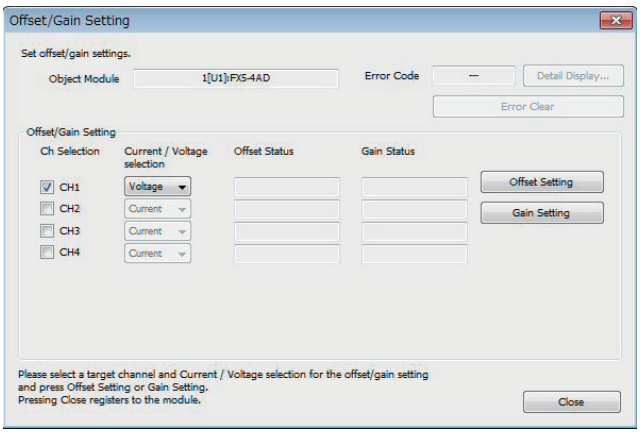
1. In "Analog Input", select "Offset/gain setting" and click the [OK] button.



2. Select the target module for the offset/gain setting, and click the [OK] button.

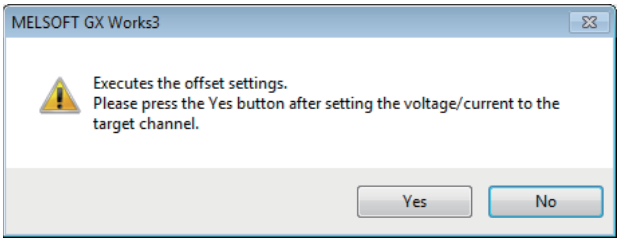


3. Click [Yes] button.

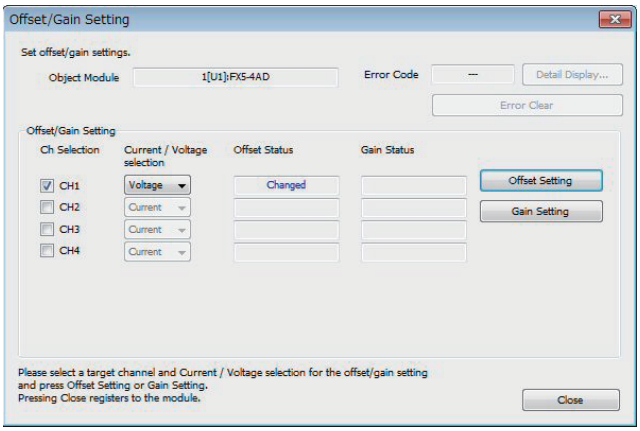


4. Mark the checkbox of the channel (CH1) where offset and gain values are to be set.

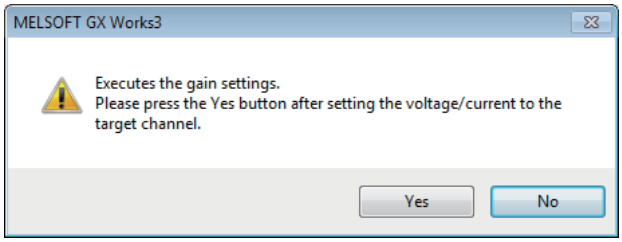
5. Select the voltage and click the [Offset Setting] button.



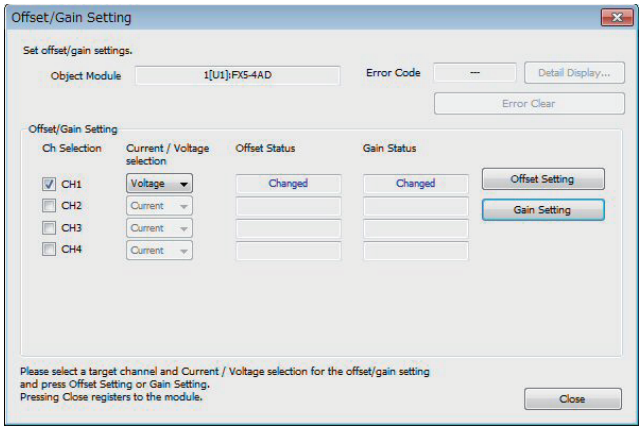
6. Input the offset value voltage "0 V" to the terminal of the target channel (CH1) and click the [Yes] button.



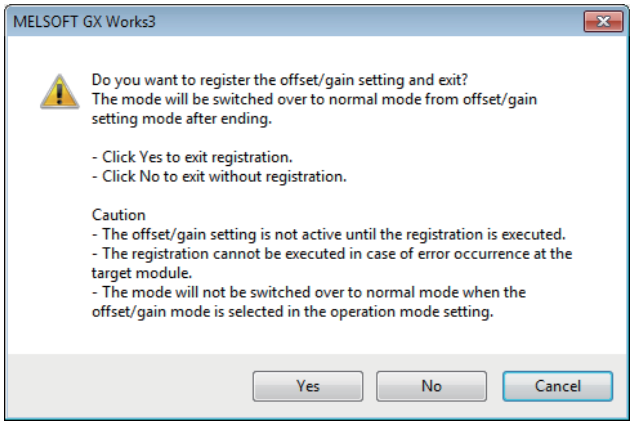
7. Check that "Offset Status" has changed to "Changed", and click [Gain Setting] button.



8. Input the Gain value voltage "5 V" to the terminal of the target channel (CH1) and click the [Yes] button.



9. Check that "Gain Status" has changed to "Changed", and click [Close] button.



10. Click [Yes] button.

Point

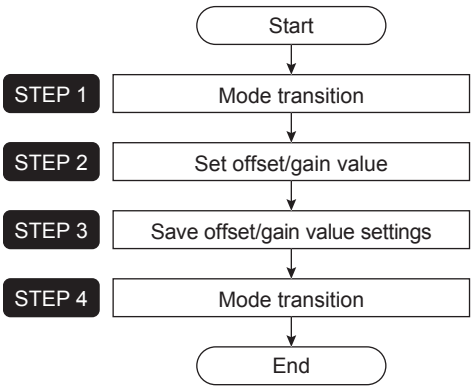
- All channels must satisfy the offset value < gain value.
- If there is a channel that does not satisfy the offset value < gain value, an offset/gain value inversion error (error code: 1E7□) occurs. Settings are not saved.
- Set the offset value and gain value in the user range setting within a range satisfying the following conditions. Failure to satisfy the conditions may not result in proper A/D conversion.

[Voltage]
Setting range of the offset value and gain value: -10 to +10 V
((Gain value) - (Offset value)) ≥ 2.0 V
[Current]
Setting range of the offset value and gain value: 0 to 20 mA
((Gain value) - (Offset value)) ≥ 6.0 mA

Setting from the program

The procedure for offset/gain setting from a program is shown below.

■Setting procedure



■STEP 1 Mode transition

Transition from normal mode to offset/gain setting mode.

1. Set "4144H" to 'Mode switching setting' (Un\G296) and "4658H" to 'Mode switching setting' (Un\G297).
2. Turn on 'Operating condition setting request' (Un\G70, b9).
3. Confirm that the 'Operating condition setting completed flag' (Un\G69, b9) is OFF and turn off 'Operating condition setting request' (Un\G70, b9).

When the transition to the offset/gain setting mode is completed, the RUN LED flashes.

■STEP 2 Set offset/gain value

Set the voltage or current input to the pin as an offset/gain value.

- Selection of voltage or current

1. Set voltage (0) to 'CH1 offset/gain setting mode (range specification)' (Un\G4164).
2. Turn on 'Range switching request' (Un\G70, b13).
3. Check that the 'Range switching completion flag' (Un\G69, b13) is ON, and turn off the 'Range switching request' (Un\G70, b13).

- Offset setting

4. Input the offset value voltage "0 V" to the CH1 terminal.
5. Set 'CH1 offset/gain setting mode (offset specification)' (Un\G4132) to set channel (1), and set 'CH1 offset/gain setting mode (gain specification)' (Un\G4133) to invalid (0).
6. Turn on 'Channel change request' (Un\G70, b11).
7. Confirm that 'Channel change completed flag' (Un\G69, b11) is ON, and turn off 'Channel change request' (Un\G70, b11).

- Gain setting

8. Input the gain value voltage "5 V" to the CH1 terminal.
9. Set 'CH1 offset/gain setting mode (offset specification)' (Un\G4132) to invalid (0), and set 'CH1 offset/gain setting mode (gain specification)' (Un\G4133) to set channel (1).
10. Turn on 'Channel change request' (Un\G70, b11).
11. Confirm that 'Channel change completed flag' (Un\G69, b11) is ON, and turn off 'Channel change request' (Un\G70, b11).
12. Set 'CH1 offset/gain setting mode (offset specification)' (Un\G4132) to invalid (0), and set 'CH1 offset/gain setting mode (gain specification)' (Un\G4133) to invalid (0).

■STEP 3 Save offset/gain value settings

Save the set offset/gain values in the flash memory of the module.

1. Turn on 'User range write request' (Un\G70, b10).
2. Check that 'Offset/gain setting mode status flag' (Un\G69, b10) is off and turn off 'User range write request' (Un\G70, b10).

Point

- All channels must satisfy the offset value < gain value.
- If there is a channel that does not satisfy the offset value < gain value, an offset/gain value inversion error (error code: 1E7☐) occurs. Settings are not saved.
- Set the offset value and gain value in the user range setting within a range satisfying the following conditions. Failure to satisfy the conditions may not result in proper A/D conversion.

[Voltage]
Setting range of the offset value and gain value: -10 to +10 V
((Gain value) - (Offset value)) ≥ 2.0 V
[Current]
Setting range of the offset value and gain value: 0 to 20 mA
((Gain value) - (Offset value)) ≥ 6.0 mA

■STEP 4 Mode transition

Shift from offset/gain setting mode to normal mode.

1. Set "4658H" to 'Mode switching setting' (Un\G296) and "4144H" to 'Mode switching setting' (Un\G297).
2. Turn on 'Operating condition setting request' (Un\G70, b9).
3. Confirm that the 'Operating condition setting completed flag' (Un\G69, b9) is OFF and turn off 'Operating condition setting request' (Un\G70, b9).

When the transition to the normal mode is completed, the RUN LED lights.

1.9 Programming

This section describes the programming procedure and the basic program of an analog input module.

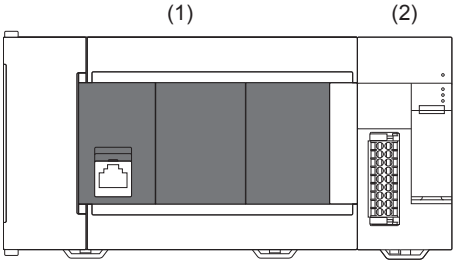
Programming procedure

Take the following steps to create a program for running an analog input module:

1. Set parameters.
2. Create a program.

System configuration example

■System configuration



(1) CPU module (FX5U CPU module)

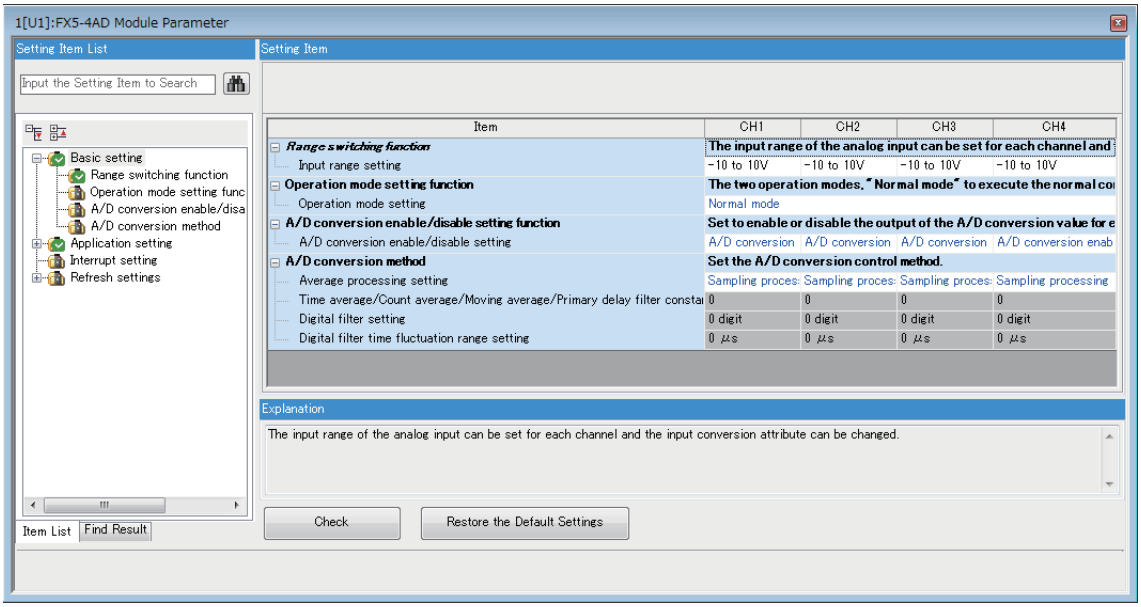
(2) Analog input module (FX5-4AD)

■Parameter settings

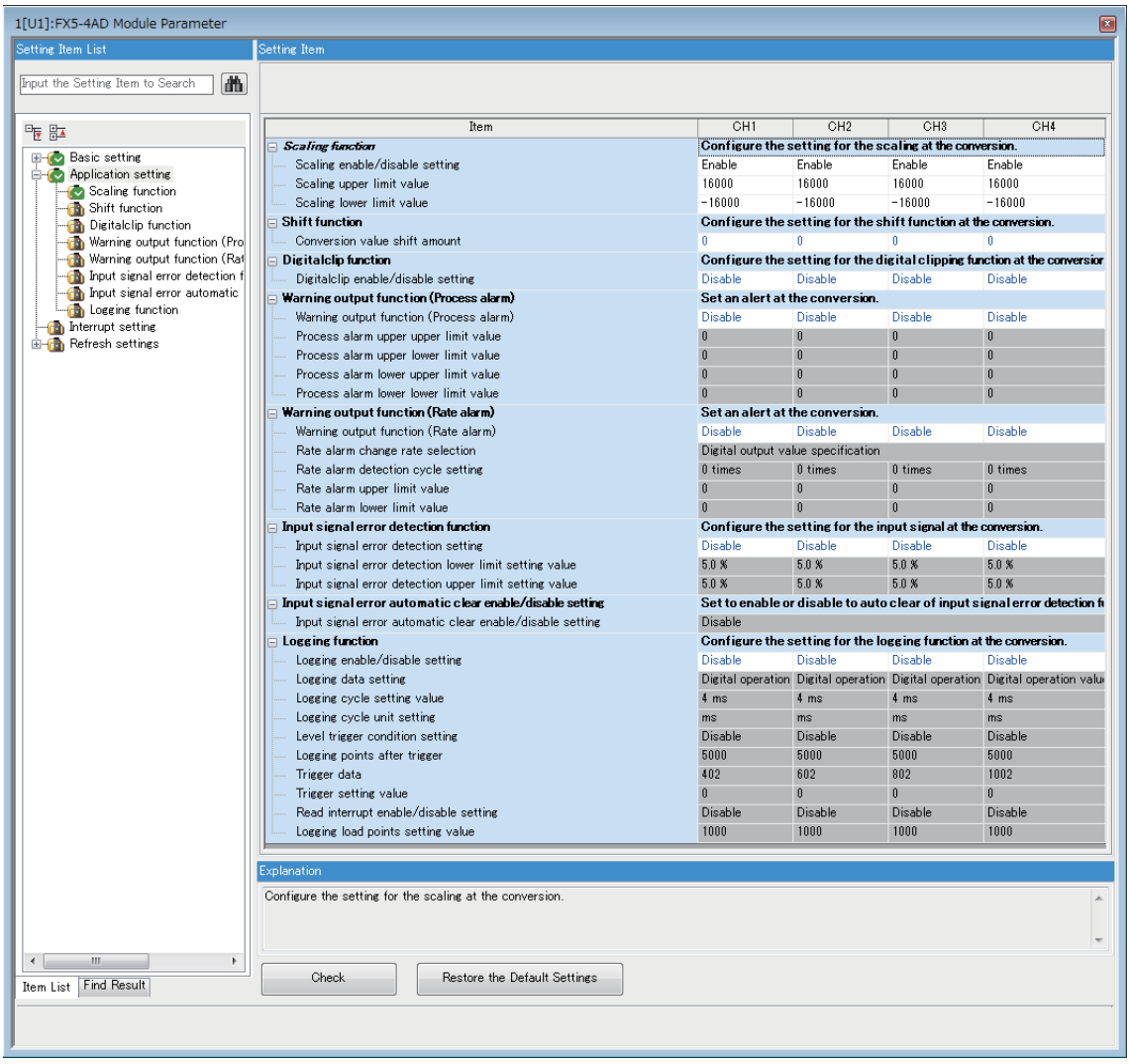
Perform an initial setting in the module parameter of GX Works3. The refresh settings do not need to be changed here.

For details on the parameter settings, refer to ☞ Page 88 Parameter Settings.

[Basic setting]



[Application setting]



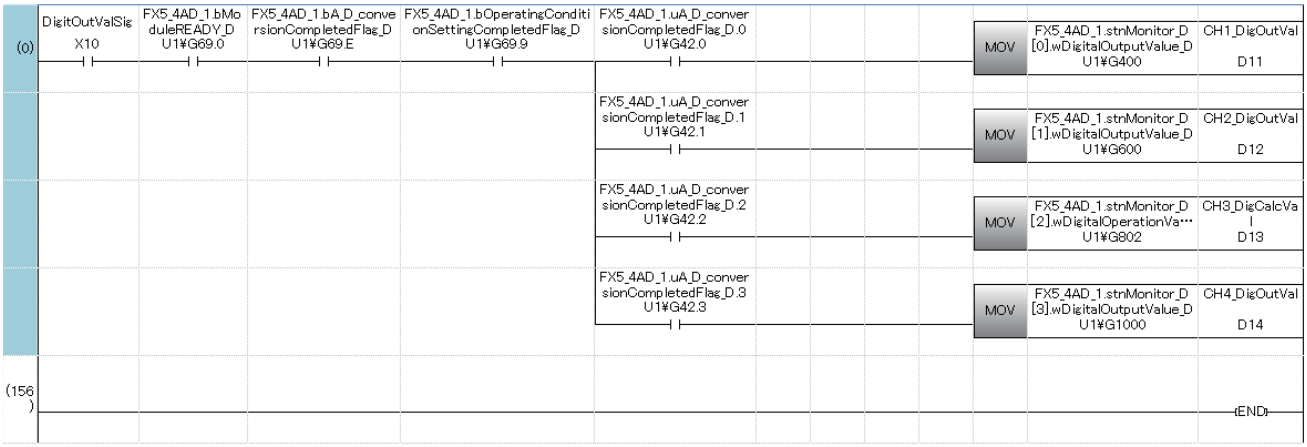
■Program example

Classification	Device	Description	Device
Module label	FX5_4AD_1.bA_D_conversionCompletedFlag_D	A/D conversion completed flag	U1\G69.E
	FX5_4AD_1.bErrorFlag_DI	Error flag	U1\G69.F
	FX5_4AD_1.bInputSignalErrorDetectionSignal_D	Input signal error detection signal	U1\G69.C
	FX5_4AD_1.bModuleREADY_D	Module READY	U1\G69.0
	FX5_4AD_1.bOperatingConditionSettingCompletedFlag_D	Operating condition setting completed flag	U1\G69.9
	FX5_4AD_1.stnControl_D[1].uMaxResetReq_D.0	Maximum value reset completed flag	U1\G673.0
	FX5_4AD_1.stnControl_D[1].uMinResetReq_D.0	Minimum value reset completed flag	U1\G674.0
	FX5_4AD_1.stnMonitor_D[0].wDigitalOutputValue_D	Digital output value	U1\G400
	FX5_4AD_1.stnMonitor_D[1].uMaxResetCmpFlg_D.0	Maximum value reset completed flag	U1\G622.0
	FX5_4AD_1.stnMonitor_D[1].uMinResetCmpFlg_D.0	Minimum value reset completed flag	U1\G623.0
	FX5_4AD_1.stnMonitor_D[1].wDigitalOutputValue_D	Digital output value	U1\G600
	FX5_4AD_1.stnMonitor_D[1].wMaxValue_D	Maximum value	U1\G604
	FX5_4AD_1.stnMonitor_D[1].wMinValue_D	Minimum value	U1\G606
	FX5_4AD_1.stnMonitor_D[2].wDigitalOperationValue_D	Digital operation value	U1\G802
	FX5_4AD_1.stnMonitor_D[3].wDigitalOutputValue_D	Digital output value	U1\G1000
	FX5_4AD_1.uA_D_conversionCompletedFlag_D.0	A/D conversion completed flag	U1\G42.0
	FX5_4AD_1.uA_D_conversionCompletedFlag_D.1	A/D conversion completed flag	U1\G42.1
	FX5_4AD_1.uA_D_conversionCompletedFlag_D.2	A/D conversion completed flag	U1\G42.2
	FX5_4AD_1.uA_D_conversionCompletedFlag_D.3	A/D conversion completed flag	U1\G42.3
	FX5_4AD_1.uInputSignalErrorDetectionFlag_D.0	Input signal error detection flag	U1\G40.0
	FX5_4AD_1.uWarningOutputFlagProcessAlarmLowerLimit_D.1	Warning output flag (Process alarm lower limit)	U1\G37.1
	FX5_4AD_1.uWarningOutputFlagProcessAlarmUpperLimit_D.1	Warning output flag (Process alarm upper limit)	U1\G36.1
	FX5_4AD_1.uWarningOutputFlagRateAlarmLowerLimit_D.0	Warning output flag (Rate alarm lower limit)	U1\G39.0
	FX5_4AD_1.uWarningOutputFlagRateAlarmUpperLimit_D.0	Warning output flag (Rate alarm upper limit)	U1\G38.0
Labels to be defined	Define global labels as shown below:		

Label Name	Data Type		Class	Assign (Device/Label)
CH1_DigOutVal	Word [Signed]	...	VAR_GLOBAL	D11
CH2_DigOutVal	Word [Signed]	...	VAR_GLOBAL	D12
CH3_DigCalcVal	Word [Signed]	...	VAR_GLOBAL	D13
CH4_DigOutVal	Word [Signed]	...	VAR_GLOBAL	D14
CH2_DigMaxVal	Word [Signed]	...	VAR_GLOBAL	D15
CH2_DigMinVal	Word [Signed]	...	VAR_GLOBAL	D16
CH2_ProcAlmUpLimit	Bit	...	VAR_GLOBAL	F0
CH2_ProcAlmLowLimit	Bit	...	VAR_GLOBAL	F1
CH1_RateAlmUpLimit	Bit	...	VAR_GLOBAL	F2
CH1_RateAlmLowLimit	Bit	...	VAR_GLOBAL	F3
CH1_InputSigErr	Bit	...	VAR_GLOBAL	F4
DigitOutValSig	Bit	...	VAR_GLOBAL	X10
MaxMinReadSig	Bit	...	VAR_GLOBAL	X11
MaxMinResetSig	Bit	...	VAR_GLOBAL	X12
ErrResetSig	Bit	...	VAR_GLOBAL	X13
ErrOperationEN	Bit	...	VAR_GLOBAL	
ErrOperationENO	Bit	...	VAR_GLOBAL	
ErrOperationOK	Bit	...	VAR_GLOBAL	
UnitErrFlg	Bit	...	VAR_GLOBAL	
UnitErrCode	Word [Signed]	...	VAR_GLOBAL	
UnitAlarmCode	Word [Signed]	...	VAR_GLOBAL	
ErrSet	Bit	...	VAR_GLOBAL	
ErrOutSig	Bit	...	VAR_GLOBAL	X14
UnitErrResetSig	Bit	...	VAR_GLOBAL	X15

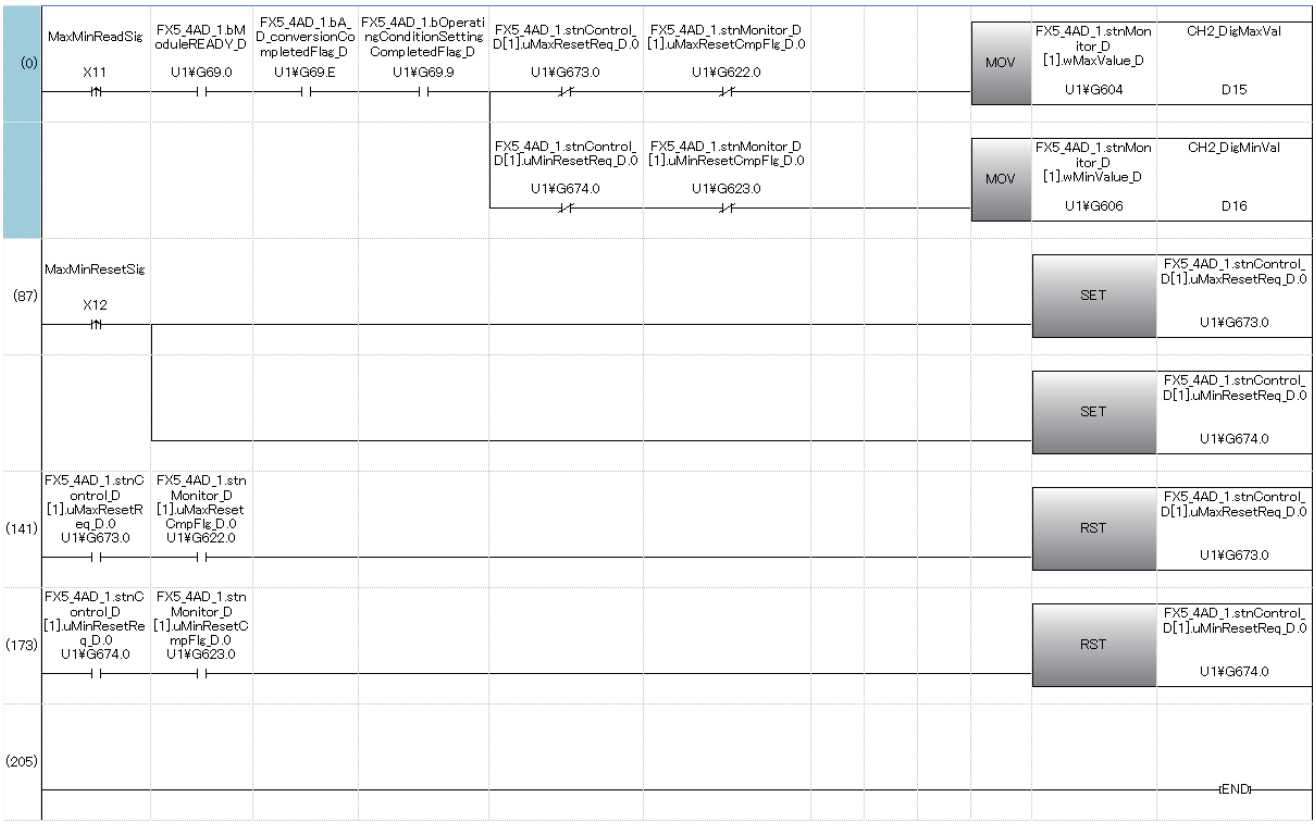
• Digital output value readout processing

This program is an example to read and save the digital output values of CH1, CH2, and CH4, and the digital operation value of CH3.



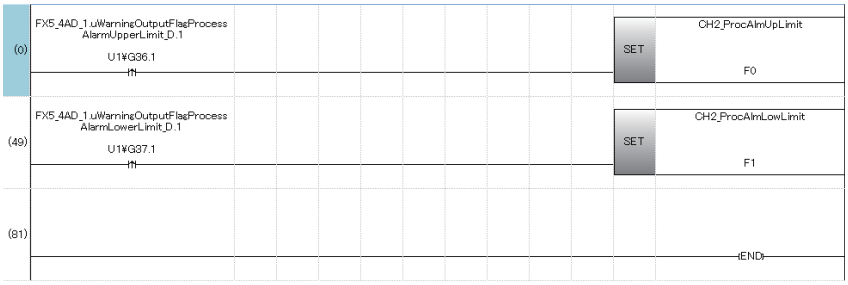
• Maximum/minimum value readout/clear processing

This program is an example to read and reset the maximum value and minimum values of CH2.



• Process alarm occurrence processing

This program is an example to perform the processing at the time of the issuance of a process alarm upper/lower limit alarm in CH2.

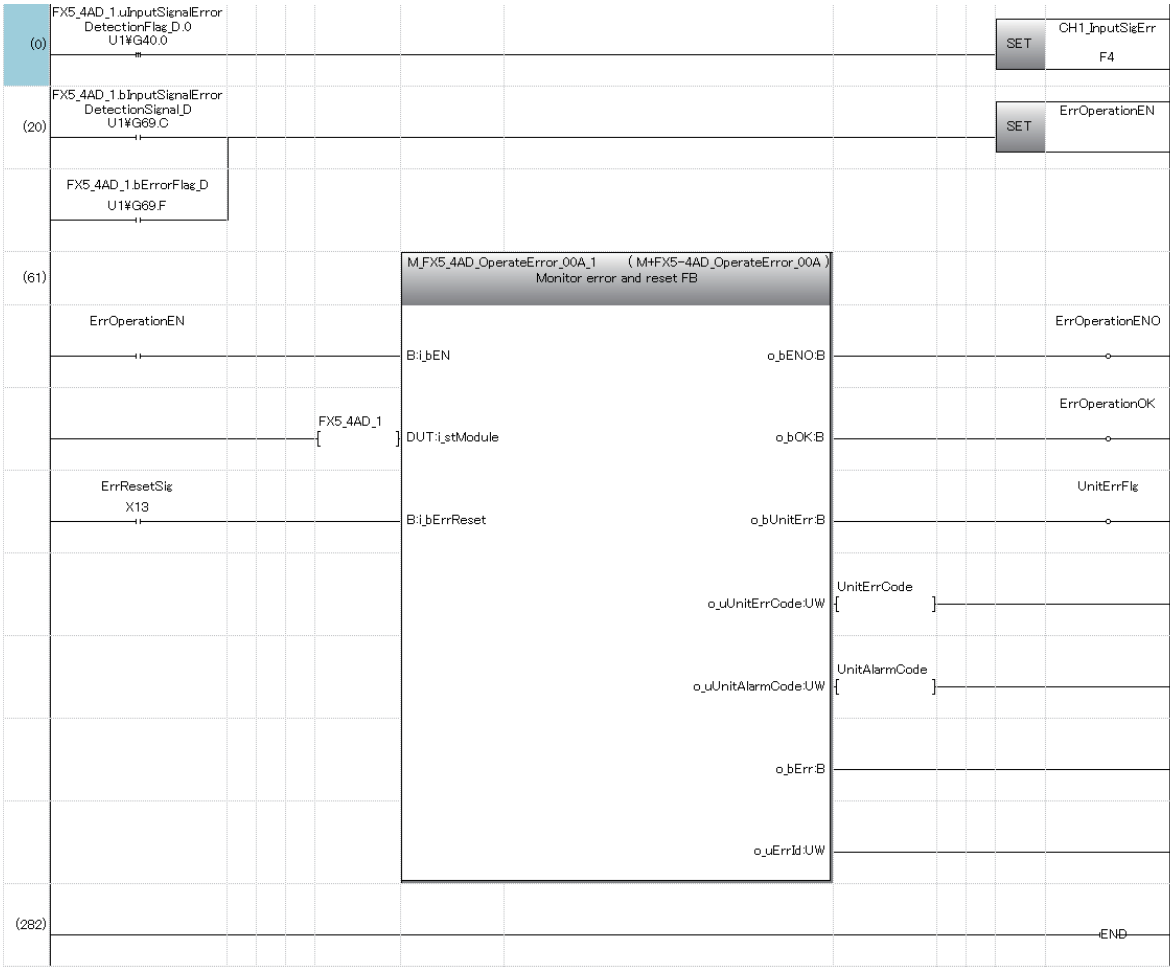


• Rate alarm occurrence processing

This program is an example to perform the processing at the time of the issuance of a rate alarm upper/lower limit alarm in CH1.

• Input signal error occurrence processing

This program is an example to make the latest error code appear when an input signal error is detected in CH1, or an error occurs. After this, the program clears the error flag and the stored error code.



1.10 Troubleshooting

This section describes errors that may occur in the use of an analog input module and those troubleshooting.

Troubleshooting with the LEDs

Check the state of the LEDs to narrow down the possible causes of the trouble. This step is the first diagnostics before using GX Works3.

The analog input module state can be checked with the POWER, RUN, ERROR, and ALM LEDs. The following table shows the correspondence between the LEDs and the analog input module state.

Name	Description
POWER LED	Indicates the power supply status. ON: Power ON OFF: Power off or module failure
RUN LED	Indicates the operating status. ON: Normal operation Flashing: Offset/gain setting mode OFF: Error
ERROR LED	Indicates the error status.*1 ON: Minor error Flashing: Moderate error or major error OFF: Normal operation
ALM LED	Indicates the alarm status.*2 ON: Process alarm or rate alarm issued Flashing: Input signal error OFF: Normal operation

*1 For details, refer to the following.
☞ Page 107 List of error codes

*2 For details, refer to the following.
☞ Page 110 List of alarm codes

Troubleshooting by symptom

When the POWER LED turns off

Check item	Corrective action
Check whether the power is supplied.	Check that power is supplied to the CPU and extension power supply modules.
Check whether the capacities of the CPU module extension power supply modules are enough.	Calculate the current consumption of the I/O modules, and intelligent function modules to check that the power supply capacity for the CPU module and extension power supply module is enough.
Check whether the module is mounted properly.	Check that the extension cable is inserted correctly.

When the RUN LED flashes or turns off

■When flashing

Check item	Cause	Corrective action
Check whether the module is in offset/gain setting mode.	In the GX Works3 module parameter setting, the CPU module was powered off→on or reset when the operation mode setting was the offset/gain setting mode.	In the GX Works3 module parameter setting, set the operation mode setting to normal and power off→on or reset the CPU module.
	The value in the mode switching setting has been changed and the mode has been switched to offset/gain setting mode.	Review the program that uses the mode switching setting to check whether the mode has been switched erroneously.

■When turns off

Check item	Corrective action
Check whether the power is supplied.	Check that power is supplied to the CPU and extension power supply modules.
Check whether the capacities of the CPU module extension power supply modules are enough.	Calculate the current consumption of the I/O modules, and intelligent function modules to check that the power supply capacity for the CPU module and extension power supply module is enough.
Check whether the module is mounted properly.	Check that the extension cable is inserted correctly.
Cases other than the above	Reset the CPU module, and check if the RUN LED turns on. If the RUN LED still remains off, the possible cause is a failure of the module. Please consult your local Mitsubishi representative.

When the ERROR LED flashes or turns on

■When flashing

Check item	Action
Check whether a moderate error has occurred.	Power off→on the module. If the error occurs again, the possible cause is a failure of the module. Please consult your local Mitsubishi representative.

■When turns on

Check item	Action
Check whether any error has occurred.	Check Latest error code and take actions described in the list of error codes. (☞ Page 107 List of error codes)

When the ALM LED turns on or flashes

■When turns on

Check item	Corrective action
Check whether any alert has been issued.	Check Alert output flag (Process alarm upper limit), Alert output flag (Process alarm lower limit), Alert output flag (Rate alarm upper limit), and Alert output flag (Rate alarm lower limit). Take actions described in the list of alarm codes. ☞ Page 110 List of alarm codes

■When flashing

Check item	Corrective action
Check whether any input signal error has occurred.	Check Input signal error detection signal or Input signal error detection flag. Take actions described in the list of alarm codes. ☞ Page 110 List of alarm codes

When a normal digital output value cannot be read

Check item	Corrective action
Check whether there is any problem with the wiring, such as looseness or disconnection of analog signal lines.	Identify the faulty area of signal lines by a visual inspection and continuity check.
Check whether the CPU module is in the STOP state.	Change the state of the CPU module to RUN.
Check whether the offset/gain setting in the user range setting is correct.	Check that the offset/gain setting is correct. If the user range setting is selected, change the input range to the factory default and check that the A/D conversion is performed. If the A/D conversion is correct, perform the offset/gain setting.
Check whether the input range setting is correct.	Check the CH☐ Input range setting monitor with GX Works3. If the input range setting is incorrect, retry the input range setting.
Check whether A/D conversion disable is set in A/D conversion enable/disable setting of the channel where a value is to be input.	Check CH☐ A/D conversion enable/disable setting and set it to A/D conversion enable using a sequence program or the GX Works3.
Check whether 'Operating condition setting request' (Un\G70, b9) has been executed.	Turn off→on→off[*1] 'Operating condition setting request' (Un\G70, b9) and check that a digital output value is stored in 'CH1 Digital output value' (Un\G400) using GX Works3. If the stored value is correct, check the program.
Check whether the setting value of the time average is correct when the time average is selected in Averaging process specification.	When the time average is selected for processing, set the time average value in CH☐ Time average/Count average/Moving average/Primary delay filter constant setting so that the value satisfies the following condition: Time averaging setting value ≥ 4 (times) × Conversion speed × Number of conversion enabled channels If the condition above is not satisfied, the digital output value results in 0.
Check whether there is any potential difference between the FG terminal and the external device ground.	A potential difference may occur between the FG terminal and the external device ground by a cause such as a long wiring distance, resulting in an incorrect A/D conversion. Connect the FG terminal and the external device ground to eliminate the potential difference.
Check whether external devices to be connected at each channel share the same ground.	If the external device ground is shared across channels, noise can sneak in between channels, which may cause some error in A/D conversion. Connect the FG terminal and the external device ground to eliminate the errors.
Check whether the program for reading digital output values has an error.	Check the CH☐ Digital output values with GX Works3. If the digital output value is stored without being converted from the analog input value, review and correct the read program.
Check whether the refresh setting is correct.	If the refresh is set so that the value in CH☐ Digital output value is transferred to the device of the CPU module, review and correct the auto refresh setting.
Check whether any input signal error has occurred.	The digital output value and digital operation value are not updated during the occurrence of an input signal error. If Input signal error detection flag indicates an input signal error, check the values in CH☐ Input signal error detection setting and CH☐ Input signal error detection setting value to examine the validity of the input signal error detection upper limit value and the input signal error detection lower limit value. ☞ Page 53 Input signal error detection function If the values are valid, change the analog input value so that an input signal error does not occur.

*1 The A/D conversion does not start when 'Operating condition setting request' (Un\G70, b9) is on. After turning off→on, check that 'Operating condition setting completed flag' (Un\G69, b9) is off, and then make sure to turn on→off.

When the digital output value does not fall within the range of accuracy

Check item	Corrective action
Check whether any measures have been taken to reduce noise.	To reduce noise, take measures such as the use of shielded cables for connection.
Check whether no external input has occurred to the conversion disabled channel.	Do not input anything to the A/D conversion disabled channel from an external device.

Digital output value varies

Check item	Corrective action
Check whether an A/D conversion method other than sampling processing is set.	Check the setting of average processing specification from the "Module parameter setting" screen of GX Works3. Review the setting of average processing specification and check the state of variation of CH□ Digital output value again.

The A/D conversion completed flag does not turn on

Check item	Corrective action
Check whether all channels are set to be A/D conversion disabled.	Check the A/D conversion enable/disable setting with GX Works3. If there are only A/D conversion enabled channels, set the A/D conversion enable/disable setting to "A/D conversion enabled" for one or more channel the sequence program.

List of error codes

If an error occurs during operation, an analog input module stores the error code into 'Latest error code' (Un\G0) of the buffer memory. In addition, 'Error flag' (Un\G69, b15) turns on. Turning on 'Error clear request' (Un\G70, b15) clears the error code in 'Latest error code' (Un\G0) and turns off 'Error flag' (Un\G69, b15).

Error codes of an analog input module are classified in minor and moderate errors.

- Minor error: This error is caused by the setting failure of programs and parameters, and after eliminating the error cause, each function normally executes. (1000H to 1FFFH)
- Moderate error: Hardware failures. The A/D conversion do not continue. (3000H to 3FFFH)

The following table lists the error codes that may be stored.

☐: This symbol indicates the number of the channel where an error has occurred. It represents one of numerical values 0 to 3, which correspond to CH1 to CH4.
(CH1: 0, CH2: 1, CH3: 2, CH4: 3)

△: For what this symbol indicates, refer to Description and cause of error.

Error code	Error name	Description and cause	Corrective action
0000H	—	There is no error.	—
1080H	Number of writes to offset/gain settings reach limit error	The number of the offset/gain settings has exceeded the guaranteed maximum number.	Any further setting of offset/gain values may not be reflected correctly.
180△H	Interrupt factor transaction setting range error	A value other than 0 to 1 is set in Interrupt factor transaction setting [n]. △ indicates the interrupt setting related in the error as below: 0: Setting 1 to F: Setting 16	Set 0 or 1 in Interrupt factor transaction setting [n].
181△H	Condition target setting range error	A value other than 0 to 7 is set in Condition target setting [n]. △ indicates the interrupt setting related in the error as below: 0: Setting 1 to F: Setting 16	Set a value of 0 to 7 in Condition target setting [n].
182△H	Condition target channel setting range error	A value other than 0 to 4 is set in Condition target channel setting [n]. △ indicates the interrupt setting related in the error as below: 0: Setting 1 to F: Setting 16	Set a value of 0 to 4 in Condition target channel setting [n].
1861H	Offset/gain setting continuous write occurrence error	The setting value has been continuously written to the flash memory 26 times or more in the offset/gain setting.	For the offset/gain setting, write the setting value only once per setting.
190☐H	Range setting range error	A value out of the range is set in CH☐ Range setting.	Set CH☐ Range setting to the value within the range again.
191☐H	Averaging process specification setting range error	A value other than 0 to 5 is set in CH☐ Average processing specification.	Set a value of 0 to 5 in CH☐ Average processing specification again.
192☐H	Time average setting range error	When Time average is selected in CH☐ Averaging process specification, a value other than 2 to 5000 is set in CH☐ Time average/Count average/Moving average/Primary delay filter constant setting.	Set a value of 2 to 5000 in CH☐ Time average/Count average/Moving average/Primary delay filter constant setting.
193☐H	Count average setting range error	When the count average is selected in CH☐ Averaging process specification, a value other than 4 to 62500 is set in CH☐ Time average/Count average/Moving average/Primary delay filter constant setting.	Set a value of 4 to 62500 in CH☐ Time average/Count average/Moving average/Primary delay filter constant setting.
194☐H	Moving average setting range error	When the moving average is selected in CH☐ Averaging process specification, a value other than 2 to 1000 is set in CH☐ Time average/Count average/Moving average/Primary delay filter constant setting.	Set a value of 2 to 1000 in CH☐ Time average/Count average/Moving average/Primary delay filter constant setting.
195☐H	Primary delay filter constant setting range error	When Primary delay filter is selected in CH☐ Averaging process specification, a value other than 1 to 500 is set in CH☐ Time average/Count average/Moving average/Primary delay filter constant setting.	Set a value of 1 to 500 in CH☐ Time average/Count average/Moving average/Primary delay filter constant setting.

Error code	Error name	Description and cause	Corrective action
19D□H	Digital filter setting range error	When the digital filter is set in CH□ Averaging processing specification, a value other than 1 to 1600 is set in CH□ Digital filter setting.	Set a value of 1 to 1600 in CH□ Digital filter setting.
19E□H	Digital filter fluctuation width setting range error	When the digital filter is set in CH□ Averaging processing specification, CH□ Digital filter fluctuation width setting is set to a value other than 80 to 200000 or a value below "Number of A/D conversion enabled channels × Conversion speed (μs)".	For the CH□ Digital filter fluctuation width setting, set a value of 80 to 200000 that equals to or larger than "Number of A/D conversion enabled channels × Conversion speed (μs)"
1A0□H	Scaling enable/disable setting range error	A value other than 0 and 1 is set in CH□ Scaling enable/disable setting.	Set 0 or 1 in CH□ Scaling enable/disable setting.
1A2□H	Scaling upper/lower limit value setting error	CH□ Scaling upper limit value and CH□ Scaling lower limit value are set as the scaling upper limit value = the scaling lower limit value.	Set CH□ Scaling upper limit value and CH□ Scaling lower limit value as the scaling upper limit value ≠ the scaling lower limit value.
1A5□H	Digital clipping enable/ disable setting range error	A value other than 0 and 1 is set in CH□ Digital clipping enable/disable setting.	Set CH□ Digital clipping enable/disable setting to 0 or 1.
1B0□H	Alert output setting (Process alarm) range error	A value other than 0 and 1 is set in CH□ Alert output setting (Process alarm).	Set 0 or 1 in CH□ Alert output setting (Process alarm).
1B△□H	Process alarm upper lower limit value setting range error	The values not satisfying the following condition are set in CH□ Process alarm upper upper limit value to CH□ Process alarm lower lower limit value: Upper upper limit value ≥ Upper lower limit value ≥ Lower upper limit value ≥ Lower lower limit value △indicates that the set values are as follows: 1: Process alarm lower lower limit value > Process alarm lower upper limit value 2: Process alarm lower upper limit value > Process alarm upper lower limit value 3: Process alarm upper lower limit value > Process alarm upper upper limit value	Set CH□ Process alarm upper upper limit value to CH□ Process alarm lower lower limit value so that the values satisfy the following condition: Upper upper limit value ≥ Upper lower limit value ≥ Lower upper limit value ≥ Lower lower limit value
1B8□H	Alert output setting (Rate alarm) range error	A value other than 0 and 1 is set in CH□ Alert output setting (Rate alarm).	Set 0 or 1 in CH□ Alert output setting (Rate alarm).
1B9□H	Rate alarm alert detection cycle setting range error	A value other than 1 to 32000 is set in CH□ Rate alarm alert detection cycle setting.	Set a value of 1 to 32000 in CH□ Rate alarm alert detection cycle setting.
1BA□H	Rate alarm upper/lower limit setting value inversion error	CH□ Rate alarm upper limit value and CH□ Rate alarm lower limit value are set as Lower limit value ≥ Upper limit value.	Set CH□ Rate alarm upper limit value and CH□ Rate alarm lower limit value as Lower limit value < Upper limit value again.
1C0□H	Input signal error detection setting range error	A value other than 0 to 4 is set in CH□ Input signal error detection setting.	Set CH□ Input signal error detection setting value to 0 to 4.
1C1□H	Input signal error detection setting value range error	A value other than 0 to 250 is set in CH□ Input signal error detection setting.	Set CH□ Input signal error detection setting value to 0 to 250.
1C6□H	Disconnection detection enabled range setting range error	CH□ Input signal error detection setting is set in Simple disconnection detection, and the Input range is set in other than the following: • 4 to 20 mA • 1 to 5 V	For channels for simple disconnection detection using the input signal error detection function, set Input range setting to either of the following again. • 4 to 20 mA • 1 to 5 V
1D0□H	Logging enable/disable setting range error	A value other than 0 and 1 is set in CH□ Logging enable/disable setting.	Set 0 or 1 in CH□ Logging enable/disable setting.
1D1□H	Logging cycle setting value range error	A value out of the range is set in CH□ Logging cycle setting value and/or CH□ Logging cycle unit setting.	Set the value(s) within the range in one or both of CH□ Logging cycle setting value and CH□ Logging cycle unit setting.
1D2□H	Logging cycle setting disable error	CH□ Logging cycle setting value and CH□ Logging cycle unit setting are set so that the set logging cycle falls below the conversion cycle.	Set CH□ Logging cycle setting value and CH□ Logging cycle unit setting so that the logging cycle is the conversion cycle of the object to be logged or more.
1D3□H	Logging data setting range error	A value other than 0 and 1 is set in CH□ Logging data setting.	Set 0 or 1 in CH□ Logging data setting.
1D4□H	Post-trigger logging points setting range error	A value other than 1 to 10000 is set in CH□ Post-trigger logging points.	Set a value of 1 to 10000 in CH□ Post-trigger logging points.
1D5□H	Level trigger condition setting range error	A value other than 0 to 3 is set in CH□ Level trigger condition setting.	Set a value of 0 to 3 in CH□ Level trigger condition setting.

Error code	Error name	Description and cause	Corrective action
1D6☐H	Trigger data setting range error	A value other than 0 to 9999 is set in CH☐ Trigger data.	Set a value of 0 to 9999 in CH☐ Trigger data.
1D8☐H	Logging loading enable/ disable setting range error	A value other than 0 and 1 is set in CH☐ Logging loading enable/disable setting.	Set CH☐ Logging loading enable/disable setting to 0 or 1.
1D9☐H	Logging load points setting value range error	A value other than 10 to 10000 is set in CH☐ Logging load points setting value.	Set CH☐ Logging load points setting value from the range between 10 to 10000.
1E50H	Offset/gain setting channel specification error	In the offset/gain setting, "1: Setting channel" is set for both CH☐ Offset/gain setting mode (offset specification) and CH☐ Offset/gain setting mode (gain specification), or "0: Disable" is set.	Correctly set CH☐ Offset/gain setting mode (offset specification) and CH☐ Offset/gain setting mode (gain specification).
1E51H	User range data invalid (CH identification disabled)	An invalid value is set in the offset/gain setting. The number of the channel in which this error occurs cannot be identified.	Perform the offset/gain setting again for all channels where the user range is set. If the error occurs again, the possible cause is a failure of the module. Please consult your local Mitsubishi representative.
1E6☐H	User range data invalid (CH identification enabled, the range setting of the CH where the error occurred is User range)	An invalid value is set in CH☐ Offset/gain setting.	Perform the offset/gain setting again for the channels 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.
1E7☐H	Offset/gain value inversion error	The offset value and gain value to be saved in the flash memory are as follows: Offset value ≥ Gain value	Perform the offset/gain setting again so that the following condition is satisfied: Offset value < Gain value
1E8☐H	Offset/gain setting channel range error	A value other than 0 and 1 is set in CH☐ Offset/ gain setting mode (offset specification) and CH☐ Offset/gain setting mode (gain specification).	Set CH☐ Offset/gain setting mode (offset specification) and CH☐ Offset/gain setting mode (gain specification) to 0 or 1.
1F00H	Hardware failure (minor)	A hardware failure (minor) has occurred in the module.	The module may be affected by noise. Review and adjust the cable wiring and the installation environment of the programmable controllers. After the adjustment, turn off→on→off Error clear request (Un\G70, b15) to eliminate this error and resume the conversion. If the error occurs again, the possible cause is a failure of the module. Please consult your local Mitsubishi representative.
1F08H	Module power supply error	The 24 V DC power supply is not normally supplied to the analog input module.	Check whether the configuration is designed to exceed the 24 V DC power capacity of the CPU or extension power supply module. If the error occurs again even after the check, the possible cause is a failure of the module. Please consult your local Mitsubishi representative.
3001H	Hardware failure (moderate)	A hardware failure (moderate) has occurred in the analog input module.	Power off→on the module. If the error occurs again, the possible cause is a failure of the module. Please consult your local Mitsubishi representative.
3030H	Flash memory error	The data in the flash memory is abnormal.	Check the digital output values. If the values are abnormal, please consult your local Mitsubishi representative.

List of alarm codes

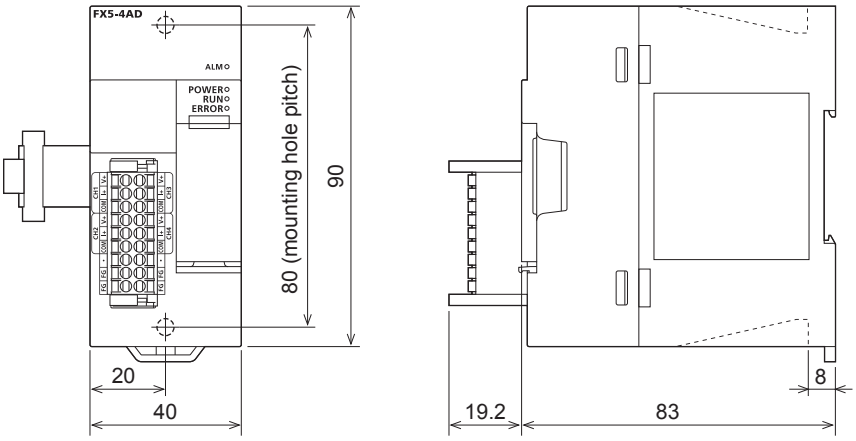
If an alarm occurs during operation, the analog input module stores the alarm code into 'Latest alarm code' (Un\G2) of the buffer memory. Turning on Error clear request (Un\G70, b15) clears the alarm code in 'Latest alarm code' (Un\G2).
The following table lists the alarm codes that may be stored.
☐: This symbol indicates the number of the channel where an alarm has occurred. It represents one of numerical values 0 to 3, which correspond to CH1 to CH4.
(CH1: 0, CH2: 1, CH3: 2, CH4: 3)

Alarm code	Alarm name	Description and cause	Corrective action
080☐H	Process alarm (upper limit)	The process alarm (upper limit) has occurred in CH☐.	Adjust CH☐ Digital operation value to fall within the range. As a result, the corresponding bit of Warning output flag (Process alarm upper limit) and/or Warning output flag (Process alarm lower limit), and Alarm output signal (Un\G69, b8) turn off automatically.
081☐H	Process alarm (lower limit)	The process alarm (lower limit) has occurred in CH☐.	
082☐H	Rate alarm (upper limit)	The rate alarm (upper limit) has occurred in CH☐.	Adjust the change rate in CH☐ Digital output value to fall within the range. As a result, the corresponding bit of Warning output flag (Rate alarm upper limit) or Warning output flag (Rate alarm lower limit), and Alarm output signal (Un\G69, b8) turn off automatically.
083☐H	Rate alarm (lower limit)	The rate alarm (lower limit) has occurred in CH☐.	
090☐H	Input signal error detection (upper limit)	An input signal error (upper limit) has been detected in CH☐.	Adjust the analog input value to fall within the range, and then turn off→on→off Error clear request (Un\G70, b15). As a result, the corresponding bit of Input signal error detection flag and Input signal error detection signal turn off.
091☐H	Input signal error detection (lower limit)	An input signal error (lower limit) has been detected in CH☐.	
092☐H	Input signal error detection (simple disconnection)	An input signal error (simple disconnection) has been detected in CH☐.	

APPENDIX

Appendix 1 External Dimensions

This chapter describes the external dimensions of the analog input module.



(Unit: mm)

A

Appendix 2 Standards

Certification of UL, cUL standards

The FX5-4AD supports UL (UL, cUL) standards.
For models that support UL standards, refer to the following.
UL, cUL file number: E95239

Compliance with EC directive (CE marking)

This note does not guarantee that an entire machine produced in accordance with the contents of this note will comply with the following standards.
Compliance to EMC directive and LVD directive of the entire mechanical module should be checked by the user/manufacturer. For more details please contact to the local Mitsubishi Electric sales site.

Requirement for compliance with EMC directive

The following products have shown compliance through direct testing (of the identified standards below) and design analysis (through the creation of a technical construction file) to the European Directive for Electromagnetic Compatibility (2014/30/EU) when used as directed by the appropriate documentation.

Attention

This product is designed for use in industrial applications.

Product compatibility

Type: Programmable controller (open type equipment)
Models: FX5 manufactured

from February 1st, 2018	FX5-4AD

Electromagnetic compatibility (EMC) directive	Remarks
EN61131-2:2007 Programmable controllers - Equipment requirements and tests	Compliance with all relevant aspects of the standard. EMI • Radiated emission • Conducted emission EMS • Radiated electromagnetic field • Fast transient burst • Electrostatic discharge • High-energy surge • Voltage drops and interruptions • Conducted RF • Power frequency magnetic field

Caution for compliance with EC directive

Caution for when the FX5-4AD is used

When the FX5-4AD is used, attach a ferrite core to the power supply of the CPU module.
Make 2 turns around the ferrite core and attach within approximately 200 mm from the terminal block and connectors of the power cable. Also, attach a ferrite core to the input/output cable pulled out to the outside of the control panel. Attach the ferrite core before the cable is pulled out to the outside of the control panel. (Ferrite core used in Mitsubishi Electric's test: E04SR401938 manufactured by SEIWA ELECTRIC MFG. CO., LTD.)

Point

If accuracy in measuring and control is required when using in an environment exposed to electrical stress, such as an EMS test, implementing the following details is recommended.
For users of proprietary cables (dedicated for sensors or actuators), these users should follow those manufacturers' installation requirements.
Mitsubishi Electric recommends that shielded cables be used. If no other EMC protection is provided, users may experience temporary loss of accuracy between +10%/-10% in very heavy industrial areas.
However, Mitsubishi Electric suggests that if adequate EMC precautions are followed with general good EMC practice for the user's complete control system, users should expect normal errors as specified in this manual.

- Sensitive analog cables should not be laid in the same trunking or cable conduit as high voltage cabling. Where possible, users should run analog cables separately.
- Good cable shielding should be used. When terminating the shield at Earth - ensure that both sides of the cable must be grounded.
- When reading analog values, EMC induced errors can be smoothed out by averaging the readings. This can be achieved either through functions on the analog devices or through a user's program.

Appendix 3 Module Label

The functions of the analog input module can be set by using module labels.

Module label

The module label name is defined with the following structure:
"Module name"_"Module number".b"Label name"_D

Ex.
FX5_4AD_1.bModuleREADY_D

■Module name

The character string of a module model name is given.

■Module number

A number starting from 1 is added to identify modules that have the same module name.

■Label name

The label identifier unique to a module is given.

■_D

This string indicates that the module label is for the direct access.

Module labels of buffer memory areas

The module label name of a buffer memory area is defined with the following structure:
"Module name"_"Module number"."Data type"_D["(Channel)"]."Data format" "Label name"_D

Ex.
FX5_4AD_1.stnMonitor_D[0].wDigitalOutputValue_D

■Module name

The character string of a module model name is given.

■Module number

A number starting from 1 is added to identify modules that have the same module name.

■Data type

The data type to sort a buffer memory area is given. Each data type is as follows:

Data type	Description
stnMonitor	Monitor
stnControl	Control
stnSetting	Setting

■Channel

The channel number corresponding to a module label is given. A numerical value of 0 to 3 is used to correspond to CH1 to 4. (CH1: 0, CH2: 1, CH3: 2, CH4: 3)

■Data format

The string that represents the data size of a buffer memory area is given. Each data type is as follows:

Data format	Description
b	Bit
u	Word [Unsigned]/Bit string [16-bit]
w	Word [Signed]

■Label name

The label identifier unique to a module is given.

■_D

This string indicates that the module label is for the direct access. Values that are read from or written to the module label is reflected in the module instantly.

Appendix 4 Buffer Memory Areas

List of buffer memory areas

This section contains the list of buffer memory addresses of the analog input module. For details on the buffer memory, refer to the following.

☞ Page 127 Details of buffer memory addresses

The buffer memory areas of the analog input module are classified into the data types described below.

Data type	Description	
Setting data	Description	The data to be customized to suit the connected devices and the purpose of the system.
	Read and write attributes	Read and write is possible.
	Setting procedure	Use GX Works3 or a program to set the data.
	Setting timing	After a change of value, turning off→on→off 'Operating condition setting request' (Un\G70, b9) allows the setting value to take effect.
Control data	Description	The data used for controlling the analog input module.
	Read and write attributes	Read and write is possible.
	Setting procedure	Use GX Works3 or a program to set the data.
	Setting timing	As soon as the values are changed, the set values become effective.
Monitor data	Description	The data used for checking the status of the analog input module.
	Read and write attributes	Only read is possible and write is not possible.
	Setting procedure	—
	Setting timing	—

Point

Do not write data to the system areas and areas whose data types are monitor in the buffer memory. Writing data into these areas can cause the malfunction of the module.

A

In the normal mode

○: With refresh setting, ×: Without refresh setting

■Un\G0 to Un\G399

Address (decimal)	Address (hexadecimal)	Name	Default value	Data type	Auto refresh
0	0H	Latest error code	0	Monitor	○
1	1H	Latest address of error history	0	Monitor	○
2	2H	Latest alarm code	0	Monitor	○
3	3H	Latest address of alarm history	0	Monitor	○
4 to 19	4H to 13H	Interrupt factor detection flag [n]*1	0	Monitor	○
20 to 29	14H to 1DH	System area	—	—	—
30	1EH	Module Information	6140H	Monitor	×
31	1FH	Firmware version	*2	Monitor	×
32 to 35	20H to 23H	System area	—	—	—
36	24H	Warning output flag (Process alarm upper limit)	0000H	Monitor	○
37	25H	Warning output flag (Process alarm lower limit)	0000H	Monitor	○
38	26H	Warning output flag (Rate alarm upper limit)	0000H	Monitor	○
39	27H	Warning output flag (Rate alarm lower limit)	0000H	Monitor	○
40	28H	Input signal error detection flag	0000H	Monitor	○
41	29H	System area	0000H	—	—
42	2AH	A/D conversion completed flag	0000H	Monitor	○
43 to 59	2BH to 3BH	System area	—	—	—
60	3CH	Operation mode monitor	0	Monitor	×

Address (decimal)	Address (hexadecimal)	Name	Default value	Data type	Auto refresh
61 to 68	3DH to 44H	System area	—	—	—
69	45H	Input signals	0	Monitor	×
70	46H	Output signals	0	Control	×
71 to 89	47H to 59H	System area	—	—	—
90	5AH	Level data 0	0	Control	○
91	5BH	Level data 1	0	Control	○
92	5CH	Level data 2	0	Control	○
93	5DH	Level data 3	0	Control	○
94	5EH	Level data 4	0	Control	○
95	5FH	Level data 5	0	Control	○
96	60H	Level data 6	0	Control	○
97	61H	Level data 7	0	Control	○
98	62H	Level data 8	0	Control	○
99	63H	Level data 9	0	Control	○
100 to 123	64H to 7BH	System area	—	—	—
124 to 139	7CH to 8BH	Interrupt factor mask [n]*1	0	Control	×
140 to 155	8CH to 9BH	System area	—	—	—
156 to 171	9CH to ABH	Interrupt factor reset request [n]*1	0	Control	×
172 to 199	ACH to C7H	System area	—	—	—
200 to 215	C8H to D7H	Interrupt factor transaction setting [n]*1	0	Setting	×
216 to 231	D8H to E7H	System area	—	—	—
232 to 247	E8H to F7H	Condition target setting [n]*1	0	Setting	×
248 to 263	F8H to 107H	System area	—	—	—
264 to 279	108H to 117H	Condition target channel setting [n]*1	0	Setting	×
280 to 295	118H to 127H	System area	—	—	—
296, 297	128H, 129H	Mode switching setting	0	Setting	×
298	12AH	System area	—	—	—
299	12BH	Rate alarm change rate selection	1	Setting	×
300 to 303	12CH to 12FH	System area	—	—	—
304	130H	Input signal error detect automatic clear enable/ disable setting	1	Setting	×
305	131H	Offset/gain initialization enable code	0	Setting	×
306 to 399	132H to 18FH	System area	—	—	—

*1 [n] in the table indicates an interrupt setting number. (n = 1 to 16)

*2 The firmware version of the analog input module is stored. For Ver. 1.000, 1000 is stored.

■Un\G400 to Un\G3599

Address: decimal (hexadecimal)				Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4				
400 (190H)	600 (258H)	800 (320H)	1000 (3E8H)	CH□ Digital output value	*1	Monitor	○
401 (191H)	601 (259H)	801 (321H)	1001 (3E9H)	System area	—	—	—
402 (192H)	602 (25AH)	802 (322H)	1002 (3EAH)	CH□ Digital operation value	*1	Monitor	○
403 (193H)	603 (25BH)	803 (323H)	1003 (3EBH)	System area	—	—	—
404 (194H)	604 (25CH)	804 (324H)	1004 (3ECH)	CH□ Maximum value	0	Monitor	○
405 (195H)	605 (25DH)	805 (325H)	1005 (3EDH)	System area	—	—	—
406 (196H)	606 (25EH)	806 (326H)	1006 (3EEH)	CH□ Minimum value	0	Monitor	○
407 (197H)	607 (25FH)	807 (327H)	1007 (3EFH)	System area	—	—	—
408 (198H)	608 (260H)	808 (328H)	1008 (3F0H)	CH□ Difference conversion state flag	0	Monitor	○
409 (199H)	609 (261H)	809 (329H)	1009 (3F1H)	CH□ Logging hold flag	0	Monitor	○
410 (19AH)	610 (262H)	810 (32AH)	1010 (3F2H)	System area	—	—	—
411 (19BH)	611 (263H)	811 (32BH)	1011 (3F3H)	CH□ Digital filter conversion cycle monitor	0	Monitor	×

Address: decimal (hexadecimal)				Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4				
412 to 419 (19CH to 1A3H)	612 to 619 (264H to 26BH)	812 to 819 (32CH to 333H)	1012 to 1019 (3F4H to 3FBH)	System area	—	—	—
420 (1A4H)	620 (26CH)	820 (334H)	1020 (3FCH)	CH□ A/D conversion status	0	Monitor	×
421 (1A5H)	621 (26DH)	821 (335H)	1021 (3FDH)	System area	—	—	—
422 (1A6H)	622 (26EH)	822 (336H)	1022 (3FEH)	CH□ Maximum value reset completed flag	0	Monitor	○
423 (1A7H)	623 (26FH)	823 (337H)	1023 (3FFH)	CH□ Minimum value reset completed flag	0	Monitor	○
424 to 429 (1A8H to 1ADH)	624 to 629 (270H to 275H)	824 to 829 (338H to 33DH)	1024 to 1029 (400H to 405H)	System area	—	—	—
430 (1AEH)	630 (276H)	830 (33EH)	1030 (406H)	CH□ Range setting monitor	0003H	Monitor	×
431 (1AFH)	631 (277H)	831 (33FH)	1031 (407H)	System area	—	—	—
432 (1B0H)	632 (278H)	832 (340H)	1032 (408H)	CH□ Difference conversion standard value	0	Monitor	×
433 (1B1H)	633 (279H)	833 (341H)	1033 (409H)	System area	—	—	—
434 (1B2H)	634 (27AH)	834 (342H)	1034 (40AH)	CH□ Head pointer	0	Monitor	×
435 (1B3H)	635 (27BH)	835 (343H)	1035 (40BH)	CH□ Latest pointer	0	Monitor	×
436 (1B4H)	636 (27CH)	836 (344H)	1036 (40CH)	CH□ Number of logging data	0	Monitor	×
437 (1B5H)	637 (27DH)	837 (345H)	1037 (40DH)	CH□ Trigger pointer	0	Monitor	×
438 (1B6H)	638 (27EH)	838 (346H)	1038 (40EH)	CH□ Current logging read pointer	-1	Monitor	×
439 (1B7H)	639 (27FH)	839 (347H)	1039 (40FH)	CH□ Previous logging read pointer	-1	Monitor	×
440 (1B8H)	640 (280H)	840 (348H)	1040 (410H)	CH□ Logging read points monitor value	0	Monitor	×
441 (1B9H)	641 (281H)	841 (349H)	1041 (411H)	CH□ Logging cycle monitor value (s)	0	Monitor	×
442 (1BAH)	642 (282H)	842 (34AH)	1042 (412H)	CH□ Logging cycle monitor value (ms)	0	Monitor	×
443 (1BBH)	643 (283H)	843 (34BH)	1043 (413H)	CH□ Logging cycle monitor value (μs)	0	Monitor	×
444 (1BCH)	644 (284H)	844 (34CH)	1044 (414H)	CH□ Trigger generation time (First/Last two digits of the year)	0	Monitor	×
445 (1BDH)	645 (285H)	845 (34DH)	1045 (415H)	CH□ Trigger generation time (Month/Day)	0	Monitor	×
446 (1BEH)	646 (286H)	846 (34EH)	1046 (416H)	CH□ Trigger generation time (Hour/Minute)	0	Monitor	×
447 (1BFH)	647 (287H)	847 (34FH)	1047 (417H)	CH□ Trigger generation time (Second/Day of the week)	0	Monitor	×
448 (1C0H)	648 (288H)	848 (350H)	1048 (418H)	CH□ Trigger generation time (Millisecond)	0	Monitor	×
449 to 469 (1C1H to 1D5H)	649 to 669 (289H to 29DH)	849 to 869 (351H to 365H)	1049 to 1069 (419H to 42DH)	System area	—	—	—
470 (1D6H)	670 (29EH)	870 (366H)	1070 (42EH)	CH□ Difference conversion trigger	0	Control	○
471 (1D7H)	671 (29FH)	871 (367H)	1071 (42FH)	CH□ Logging hold request	0	Control	○
472 (1D8H)	672 (2A0H)	872 (368H)	1072 (430H)	CH□ Conversion value shift amount	0	Control	○
473 (1D9H)	673 (2A1H)	873 (369H)	1073 (431H)	CH□ Maximum value reset request	0	Control	○
474 (1DAH)	674 (2A2H)	874 (36AH)	1074 (432H)	CH□ Minimum value reset request	0	Control	○
475 to 499 (1DBH to 1F3H)	675 to 699 (2A3H to 2BBH)	875 to 899 (36BH to 383H)	1075 to 1099 (433H to 44BH)	System area	—	—	—
500 (1F4H)	700 (2BCH)	900 (384H)	1100 (44CH)	CH□ A/D conversion enable/disable setting	0	Setting	×
501 (1F5H)	701 (2BDH)	901 (385H)	1101 (44DH)	CH□ Averaging process specification	0	Setting	×
502 (1F6H)	702 (2BEH)	902 (386H)	1102 (44EH)	CH□ Time average/Count average/Moving average/Primary delay filter constant setting	0	Setting	×
503 (1F7H)	703 (2BFH)	903 (387H)	1103 (44FH)	System area	—	—	—
504 (1F8H)	704 (2C0H)	904 (388H)	1104 (450H)	CH□ Scaling enable/disable setting	1	Setting	×

Address: decimal (hexadecimal)				Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4				
505 (1F9H)	705 (2C1H)	905 (389H)	1105 (451H)	System area	—	—	—
506 (1FAH)	706 (2C2H)	906 (38AH)	1106 (452H)	CH□ Scaling upper limit value (L)	0	Setting	×
507 (1FBH)	707 (2C3H)	907 (38BH)	1107 (453H)	CH□ Scaling upper limit value (H)			
508 (1FCH)	708 (2C4H)	908 (38CH)	1108 (454H)	CH□ Scaling lower limit value (L)	0	Setting	×
509 (1FDH)	709 (2C5H)	909 (38DH)	1109 (455H)	CH□ Scaling lower limit value (H)			
510 (1FEH)	710 (2C6H)	910 (38EH)	1110 (456H)	CH□ Digital clipping enable/disable setting	1	Setting	×
511 (1FFH)	711 (2C7H)	911 (38FH)	1111 (457H)	System area	—	—	—
512 (200H)	712 (2C8H)	912 (390H)	1112 (458H)	CH□ Alert output setting (Process alarm)	1	Setting	×
513 (201H)	713 (2C9H)	913 (391H)	1113 (459H)	CH□ Alert output setting (Rate alarm)	1	Setting	×
514 (202H)	714 (2CAH)	914 (392H)	1114 (45AH)	CH□ Process alarm upper upper limit value	0	Setting	×
515 (203H)	715 (2CBH)	915 (393H)	1115 (45BH)	System area	—	—	—
516 (204H)	716 (2CCH)	916 (394H)	1116 (45CH)	CH□ Process alarm upper lower limit value	0	Setting	×
517 (205H)	717 (2CDH)	917 (395H)	1117 (45DH)	System area	—	—	—
518 (206H)	718 (2CEH)	918 (396H)	1118 (45EH)	CH□ Process alarm lower upper limit value	0	Setting	×
519 (207H)	719 (2CFH)	919 (397H)	1119 (45FH)	System area	—	—	—
520 (208H)	720 (2D0H)	920 (398H)	1120 (460H)	CH□ Process alarm lower lower limit value	0	Setting	×
521 (209H)	721 (2D1H)	921 (399H)	1121 (461H)	System area	—	—	—
522 (20AH)	722 (2D2H)	922 (39AH)	1122 (462H)	CH□ Rate alarm alert detection cycle setting	0	Setting	×
523 (20BH)	723 (2D3H)	923 (39BH)	1123 (463H)	System area	—	—	—
524 (20CH)	724 (2D4H)	924 (39CH)	1124 (464H)	CH□ Rate alarm upper limit value	0	Setting	×
525 (20DH)	725 (2D5H)	925 (39DH)	1125 (465H)	System area	—	—	—
526 (20EH)	726 (2D6H)	926 (39EH)	1126 (466H)	CH□ Rate alarm lower limit value	0	Setting	×
527 (20FH)	727 (2D7H)	927 (39FH)	1127 (467H)	System area	—	—	—
528 (210H)	728 (2D8H)	928 (3A0H)	1128 (468H)	CH□ Input signal error detection setting	0	Setting	×
529 (211H)	729 (2D9H)	929 (3A1H)	1129 (469H)	CH□ Input signal error detection lower limit setting value	50	Setting	×
530 (212H)	730 (2DAH)	930 (3A2H)	1130 (46AH)	CH□ Input signal error detection upper limit setting value	50	Setting	×
531 to 534 (213H to 216H)	731 to 734 (2DBH to 2DEH)	931 to 934 (3A3H to 3A6H)	1131 to 1134 (46BH to 46EH)	System area	—	—	—
535 (217H)	735 (2DFH)	935 (3A7H)	1135 (46FH)	CH□ Logging enable/disable setting	1	Setting	×
536 (218H)	736 (2E0H)	936 (3A8H)	1136 (470H)	CH□ Logging data setting	1	Setting	×
537 (219H)	737 (2E1H)	937 (3A9H)	1137 (471H)	CH□ Logging cycle setting value	4	Setting	×
538 (21AH)	738 (2E2H)	938 (3AAH)	1138 (472H)	CH□ Logging cycle unit setting	1	Setting	×
539 (21BH)	739 (2E3H)	939 (3ABH)	1139 (473H)	CH□ Post-trigger logging points	5000	Setting	×
540 (21CH)	740 (2E4H)	940 (3ACH)	1140 (474H)	CH□ Level trigger condition setting	0	Setting	×
541 (21DH)	741 (2E5H)	941 (3ADH)	1141 (475H)	CH□ Trigger data	*2	Setting	×
542 (21EH)	742 (2E6H)	942 (3AEH)	1142 (476H)	CH□ Trigger setting value	0	Setting	×
543 (21FH)	743 (2E7H)	943 (3AFH)	1143 (477H)	System area	—	—	—
544 (220H)	744 (2E8H)	944 (3B0H)	1144 (478H)	CH□ Logging loading enable/ disable setting	1	Setting	×
545 (221H)	745 (2E9H)	945 (3B1H)	1145 (479H)	CH□ Logging load points setting value	1000	Setting	×
546 to 569 (222H to 239H)	746 to 769 (2EAH to 301H)	946 to 969 (3B2H to 3C9H)	1146 to 1169 (47AH to 491H)	System area	—	—	—
570 (23AH)	770 (302H)	970 (3CAH)	1170 (492H)	CH□ Digital filter setting	0	Setting	×
571 (23BH)	771 (303H)	971 (3CBH)	1171 (493H)	System area	—	—	—

Address: decimal (hexadecimal)				Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4				
572 (23CH)	772 (304H)	972 (3CCH)	1172 (494H)	CH□ Digital filter fluctuation width setting (L)	0	Setting	×
573 (23DH)	773 (305H)	973 (3CDH)	1173 (495H)	CH□ Digital filter fluctuation width setting (H)			
574 to 597 (23EH to 255H)	774 to 797 (306H to 31DH)	974 to 997 (3CEH to 3E5H)	1174 to 1197 (496H to 4ADH)	System area	—	—	—
598 (256H)	798 (31EH)	998 (3E6H)	1198 (4AEH)	CH□ Range setting	0003H	Setting	×
599 (257H)	799 (31FH)	999 (3E7H)	1199 (4AFH)	System area	—	—	—
1200 to 3599 (4B0H to E0FH)				System area	—	—	—

*1 The following shows the default values.
Converted value when range setting is "4 to 20 mA"

*2 The following shows the default values.
CH1:402, CH2:602, CH3:802, CH4:1020

■Error history (Un\G3600 to Un\G3759)

Address (decimal)	Address (hexadecimal)	Name				Default value	Data type	Auto refresh
3600	E10H	Error history 1	Error code			0	Monitor	×
3601	E11H		Error time	First two digits of the year	Last two digits of the year			
3602	E12H			Month	Day			
3603	E13H			Hour	Minute			
3604	E14H			Second	Day of the week			
3605	E15H			Millisecond				
3606 to 3609	E16H to E19H	System area				—	—	—
3610 to 3615	E1AH to E1FH	Error history 2	Same as error history 1			0	Monitor	×
3616 to 3619	E20H to E23H	System area				—	—	—
3620 to 3625	E24H to E29H	Error history 3	Same as error history 1			0	Monitor	×
3626 to 3629	E2AH to E2DH	System area				—	—	—
3630 to 3635	E2EH to E33H	Error history 4	Same as error history 1			0	Monitor	×
3636 to 3639	E34H to E37H	System area				—	—	—
3640 to 3645	E38H to E3DH	Error history 5	Same as error history 1			0	Monitor	×
3646 to 3649	E3EH to E41H	System area				—	—	—
3650 to 3655	E42H to E47H	Error history 6	Same as error history 1			0	Monitor	×
3656 to 3659	E48H to E4BH	System area				—	—	—
3660 to 3665	E4CH to E51H	Error history 7	Same as error history 1			0	Monitor	×
3666 to 3669	E52H to E55H	System area				—	—	—
3670 to 3675	E56H to E5BH	Error history 8	Same as error history 1			0	Monitor	×
3676 to 3679	E5CH to E5FH	System area				—	—	—
3680 to 3685	E60H to E65H	Error history 9	Same as error history 1			0	Monitor	×
3686 to 3689	E66H to E69H	System area				—	—	—
3690 to 3695	E6AH to E6FH	Error history 10	Same as error history 1			0	Monitor	×
3696 to 3699	E70H to E73H	System area				—	—	—
3700 to 3705	E74H to E79H	Error history 11	Same as error history 1			0	Monitor	×
3706 to 3709	E7AH to E7DH	System area				—	—	—
3710 to 3715	E7EH to E83H	Error history 12	Same as error history 1			0	Monitor	×
3716 to 3719	E84H to E87H	System area				—	—	—
3720 to 3725	E88H to E8DH	Error history 13	Same as error history 1			0	Monitor	×
3726 to 3729	E8EH to E91H	System area				—	—	—
3730 to 3735	E92H to E97H	Error history 14	Same as error history 1			0	Monitor	×
3736 to 3739	E98H to E9BH	System area				—	—	—
3740 to 3745	E9CH to EA1H	Error history 15	Same as error history 1			0	Monitor	×
3746 to 3749	EA2H to EA5H	System area				—	—	—
3750 to 3755	EA6H to EABH	Error history 16	Same as error history 1			0	Monitor	×

Address (decimal)	Address (hexadecimal)	Name	Default value	Data type	Auto refresh
3756 to 3759	EACH to EAFH	System area	—	—	—

■Alarm history (Un\G3760 to Un\G3999)

Address (decimal)	Address (hexadecimal)	Name				Default value	Data type	Auto refresh
3760	EB0H	Alarm history 1	Alarm code			0	Monitor	×
3761	EB1H		Alarm time	First two digits of the year	Last two digits of the year			
3762	EB2H			Month	Day			
3763	EB3H			Hour	Minute			
3764	EB4H			Second	Day of the week			
3765	EB5H			Millisecond				
3766 to 3769	EB6H to EB9H	System area				—	—	—
3770 to 3775	EBAH to EBFH	Alarm history 2	Same as alarm history 1			0	Monitor	×
3776 to 3779	EC0H to EC3H	System area				—	—	—
3780 to 3785	EC4H to EC9H	Alarm history 3	Same as alarm history 1			0	Monitor	×
3786 to 3789	ECAH to ECDH	System area				—	—	—
3790 to 3795	ECEH to ED3H	Alarm history 4	Same as alarm history 1			0	Monitor	×
3796 to 3799	ED4H to ED7H	System area				—	—	—
3800 to 3805	ED8H to EDDH	Alarm history 5	Same as alarm history 1			0	Monitor	×
3806 to 3809	EDEH to EE1H	System area				—	—	—
3810 to 3815	EE2H to EE7H	Alarm history 6	Same as alarm history 1			0	Monitor	×
3816 to 3819	EE8H to EEBH	System area				—	—	—
3820 to 3825	EECH to EF1H	Alarm history 7	Same as alarm history 1			0	Monitor	×
3826 to 3829	EF2H to EF5H	System area				—	—	—
3830 to 3835	EF6H to EFBH	Alarm history 8	Same as alarm history 1			0	Monitor	×
3836 to 3839	EFCH to EFFH	System area				—	—	—
3840 to 3845	F00H to F05H	Alarm history 9	Same as alarm history 1			0	Monitor	×
3846 to 3849	F06H to F09H	System area				—	—	—
3850 to 3855	F0AH to F0FH	Alarm history 10	Same as alarm history 1			0	Monitor	×
3856 to 3859	F10H to F13H	System area				—	—	—
3860 to 3865	F14H to F19H	Alarm history 11	Same as alarm history 1			0	Monitor	×
3866 to 3869	F1AH to F1DH	System area				—	—	—
3870 to 3875	F1EH to F23H	Alarm history 12	Same as alarm history 1			0	Monitor	×
3876 to 3879	F24H to F27H	System area				—	—	—
3880 to 3885	F28H to F2DH	Alarm history 13	Same as alarm history 1			0	Monitor	×
3886 to 3889	F2EH to F31H	System area				—	—	—
3890 to 3895	F32H to F37H	Alarm history 14	Same as alarm history 1			0	Monitor	×
3896 to 3899	F38H to F3BH	System area				—	—	—
3900 to 3905	F3CH to F41H	Alarm history 15	Same as alarm history 1			0	Monitor	×
3906 to 3909	F42H to F45H	System area				—	—	—
3910 to 3915	F46H to F4BH	Alarm history 16	Same as alarm history 1			0	Monitor	×
3916 to 3999	F4CH to F9FH	System area				—	—	—

■Offset/gain setting (Un\G4000 to Un\G9999)

Address: decimal (hexadecimal)				Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4				
4000 to 4131 (FA0H to 1023H)				System area	—	—	—
4132 (1024H)	4134 (1026H)	4136 (1028H)	4138 (102AH)	CH□ Offset/gain setting mode (offset specification)	0	Setting	×
4133 (1025H)	4135 (1027H)	4137 (1029H)	4139 (102BH)	CH□ Offset/gain setting mode (gain specification)	0	Setting	×
4140 to 4163 (102CH to 1043H)				System area	—	—	—
4164 (1044H)	4165 (1045H)	4166 (1046H)	4167 (1047H)	CH□ Offset/gain setting mode (range specification)	0	Setting	×
4168 to 9999 (1048H to 270FH)				System area	—	—	—

■Logging data (Un\G10000 to Un\G89999)

Address: decimal (hexadecimal)				Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4				
10000 to 19999 (2710H to 4E1FH)	20000 to 29999 (4E20H to 752FH)	30000 to 39999 (7530H to 9C3FH)	40000 to 49999 (9C40H to C34FH)	CH□ Logging data	0	Monitor	×
50000 to 89999 (C350H to 15F8FH)				System area	—	—	—

In FX3 allocation function mode

○: With refresh setting, ×: Without refresh setting

Address: decimal (hexadecimal)				Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4				
0 (0H)				Range setting	0000H	Setting	×
1 (1H)				System area	—	—	—
2 (2H)	3 (3H)	4 (4H)	5 (5H)	CH□ Time average/Count average/Moving average/ Primary delay filter constant setting	0000H	Setting	×
6 (6H)	7 (7H)	8 (8H)	9 (9H)	CH□ Digital filter setting	0	Setting	×
10 (AH)	11 (BH)	12 (CH)	13 (DH)	CH□ Digital operation value	*1	Monitor	○
14 to 25 (EH to 19H)				System area	—	—	—
26 (1AH)				Warning output flag (Process alarm upper limit/lower limit)	0000H	Monitor	○
27 (1BH)				Warning output flag (Rate alarm upper limit/lower limit)	0000H	Monitor	○
28 (1CH)				Input signal error detection flag	0000H	Monitor	○
29 (1DH)				Latest error code	0	Monitor	○
30 (1EH)				Module information	6144H	Monitor	×
31 to 60 (1FH to 3CH)				System area	—	—	—
61 (3DH)	62 (3EH)	63 (3FH)	64 (40H)	CH□ Conversion value shift amount	0	Control	○
65 to 68 (41H to 44H)				System area	—	—	—
69 (45H)				Input signals	0	Monitor	×
70 (46H)				Output signals	0	Control	×
71 (47H)	72 (48H)	73 (49H)	74 (4AH)	CH□ Process alarm lower lower limit value	0	Setting	×
75 to 80 (4BH to 50H)				System area	—	—	—
81 (51H)	82 (52H)	83 (53H)	84 (54H)	CH□ Process alarm upper upper limit value	0	Setting	×
85 to 90 (55H to 5AH)				System area	—	—	—
91 (5BH)	92 (5CH)	93 (5DH)	94 (5EH)	CH□ Rate alarm upper limit value	3200	Setting	×
95 to 100 (5FH to 64H)				System area	—	—	—

Address: decimal (hexadecimal)				Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4				
101 (65H)	102 (66H)	103 (67H)	104 (68H)	CH□ Minimum value	0	Monitor	○
105 to 108 (69H to 6CH)				System area	—	—	—
109 (6DH)				Minimum value reset request	0000H	Control	○
110 (6EH)				Minimum value reset completed flag	0000H	Monitor	○
111 (6FH)	112 (70H)	113 (71H)	114 (72H)	CH□ Maximum value	0	Monitor	○
115 to 118 (73H to 76H)				System area	—	—	—
119 (77H)				Maximum value reset request	0000H	Control	○
120 (78H)				Maximum value reset completed flag	0000H	Monitor	○
121 to 123 (79H to 7BH)				System area	—	—	—
124 (7CH)				A/D conversion completed flag	0000H	Monitor	○
125 to 129 (7DH to 81H)				System area	—	—	—
130 (82H)				Rate alarm change rate selection	0001H	Setting	×
131, 132 (83H, 84H)				System area	—	—	—
133 (85H)				Input signal error detect automatic clear enable/ disable setting	0001H	Setting	×
134 to 999 (86H to 3E7H)				System area	—	—	—
1000 (3E8H)	1002 (3EAH)	1004 (3ECH)	1006 (3EEH)	CH□ Digital output value	*1	Monitor	○
1001 (3E9H)	1003 (3EBH)	1005 (3EDH)	1007 (3EFH)	System area	—	—	—
1008 to 1020 (3F0H to 3FCH)				System area	—	—	—
1021 (3FDH)	1022 (3FEH)	1023 (3FFH)	1024 (400H)	CH□ A/D conversion status	0000H	Monitor	×
1025 to 1030 (401H to 406H)				System area	—	—	—
1031 (407H)	1032 (408H)	1033 (409H)	1034 (40AH)	CH□ Range setting monitor	0	Monitor	×
1035 to 1080 (40BH to 438H)				System area	—	—	—
1081 (439H)	1082 (43AH)	1083 (43BH)	1084 (43CH)	CH□ Averaging process specification	0000H	Setting	×
1085 to 1090 (43DH to 442H)				System area	—	—	—
1091 (443H)	1092 (444H)	1093 (445H)	1094 (446H)	CH□ Scaling enable/disable setting	0001H	Setting	×
1095 to 1099 (447H to 44BH)				System area	—	—	—
1100 (44CH)	1102 (44EH)	1104 (450H)	1106 (452H)	CH□ Scaling upper limit value (L)	0	Setting	×
1101 (44DH)	1103 (44FH)	1105 (451H)	1107 (453H)	CH□ Scaling upper limit value (H)		Setting	×
1108 to 1119 (454H to 45FH)				System area	—	—	—
1120 (460H)	1122 (462H)	1124 (464H)	1126 (466H)	CH□ Scaling lower limit value (L)	0	Setting	×
1121 (461H)	1123 (463H)	1125 (465H)	1127 (467H)	CH□ Scaling lower limit value (H)		Setting	×
1128 to 1140 (468H to 474H)				System area	—	—	—
1141 (475H)	1142 (476H)	1143 (477H)	1144 (478H)	CH□ Digital clipping enable/ disable setting	0001H	Setting	×
1145 to 1150 (479H to 47EH)				System area	—	—	—
1151 (47FH)	1152 (480H)	1153 (481H)	1154 (482H)	CH□ Input signal error detection setting	0001H	Setting	×
1155 to 1160 (483H to 488H)				System area	—	—	—
1161 (489H)	1162 (48AH)	1163 (48BH)	1164 (48CH)	CH□ Input signal error detection lower limit setting value	20	Setting	×
1165 to 1170 (48DH to 492H)				System area	—	—	—

Address: decimal (hexadecimal)				Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4				
1171 (493H)	1172 (494H)	1173 (495H)	1174 (496H)	CH□ Input signal error detection upper limit setting value	20	Setting	×
1175 to 1180 (497H to 49CH)				System area	—	—	—
1181 (49DH)	1182 (49EH)	1183 (49FH)	1184 (4A0H)	CH□ Alert output setting (Process alarm)	0001H	Setting	×
1185 to 1190 (4A1H to 4A6H)				System area	—	—	—
1191 (4A7H)	1192 (4A8H)	1193 (4A9H)	1194 (4AAH)	CH□ Process alarm upper lower limit value	0	Setting	×
1195 to 1200 (4ABH to 4B0H)				System area	—	—	—
1201 (4B1H)	1202 (4B2H)	1203 (4B3H)	1204 (4B4H)	CH□ Process alarm lower upper limit value	0	Setting	×
1205 to 1210 (4B5H to 4BAH)				System area	—	—	—
1211 (4BBH)	1212 (4BCH)	1213 (4BDH)	1214 (4BEH)	CH□ Alert output setting (Rate alarm)	0001H	Setting	×
1215 to 1220 (4BFH to 4C4H)				System area	—	—	—
1221 (4C5H)	1222 (4C6H)	1223 (4C7H)	1224 (4C8H)	CH□ Rate alarm alert detection cycle setting	0	Setting	×
1225 to 1230 (4C9H to 4CEH)				System area	—	—	—
1231 (4CFH)	1232 (4D0H)	1233 (4D1H)	1234 (4D2H)	CH□ Rate alarm lower limit value	-3200	Setting	×
1235 to 1320 (4D3H to 528H)				System area	—	—	—
1321 (529H)	1322 (52AH)	1323 (52BH)	1324 (52CH)	CH□ A/D conversion enable/ disable setting	0	Setting	×
1325 to 1330 (52DH to 532H)				System area	—	—	—
1331 (533H)	1332 (534H)	1333 (535H)	1334 (536H)	CH□ Digital filter conversion cycle monitor	0	Monitor	×
1335 to 1339 (537H to 53BH)				System area	—	—	—
1340 (53DH)	1342 (53FH)	1344 (541H)	1346 (543H)	CH□ Digital filter fluctuation width setting (L)	0	Setting	×
1341 (53DH)	1343 (53FH)	1345 (541H)	1347 (543H)	CH□ Digital filter fluctuation width setting (H)			
1348 to 1360 (544H to 550H)				System area	—	—	—
1361 (551H)	1362 (552H)	1363 (553H)	1364 (554H)	CH□ Difference conversion state flag	0000H	Monitor	○
1365 to 1370 (555H to 55AH)				System area	—	—	—
1371 (55BH)	1372 (55CH)	1373 (55DH)	1374 (55EH)	CH□ Difference conversion standard value	0	Monitor	×
1375 to 1380 (55FH to 564H)				System area	—	—	—
1381 (565H)	1382 (566H)	1383 (567H)	1384 (568H)	CH□ Difference conversion trigger	0000H	Control	○
1385 to 3100 (569H to C1CH)				System area	—	—	—
3101 (C1DH)				Latest address of error history	0	Monitor	○
3102 (C1EH)				Latest alarm code	0	Monitor	○
3103 (C1FH)				Latest address of alarm history	0	Monitor	○
3104 to 3130 (C20H to C3AH)				System area	—	—	—
3131 (C3BH)				Firmware version	0	Monitor	×
3132 to 3159 (C3CH to C57H)				System area	—	—	—
3160 (C58H)				Operation mode monitor	0	Monitor	○
3161 to 4000 (C59H to FA0H)				System area	—	—	—
4001 to 4016 (FA1H to FB0H)				Interrupt factor detection flag [n]*2	0	Monitor	○
4017 to 4020 (FB1H to FB4H)				System area	—	—	—
4021 to 4036 (FB5H to FC4H)				Interrupt factor mask [n]*2	0	Control	×

Address: decimal (hexadecimal)				Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4				
4037 to 4040 (FC5H to FC8H)				System area	—	—	—
4041 to 4056 (FC9H to FD8H)				Interrupt factor reset request [n]*2	0	Control	×
4057 to 4060 (FD9H to FDCH)				System area	—	—	—
4061 to 4076 (FDDH to FECH)				Interrupt factor transaction setting [n]*2	0	Setting	×
4077 to 4080 (FEDH to FF0H)				System area	—	—	—
4081 to 4096 (FF1H to 1000H)				Condition target setting [n]*2	0	Setting	×
4097 to 4100 (1001H to 1004H)				System area	—	—	—
4101 to 4116 (1005H to 1014H)				Condition target channel setting [n]*2	0	Setting	×
4117 to 4119 (1015H to 1017H)				System area	—	—	—
4120, 4121 (1018H, 1019H)				Mode switching setting	0	Setting	×
4122 to 4130 (101AH to 1022H)				System area	—	—	—
4131 (1023H)	4132 (1024H)	4133 (1025H)	4134 (1026H)	CH☐ Offset/gain setting mode (offset specification)	0	Setting	×
4135 to 4140 (1027H to 102CH)				System area	—	—	—
4141 (102DH)	4142 (102EH)	4143 (102FH)	4144 (1030H)	CH☐ Offset/gain setting mode (gain specification)	0	Setting	×
4145 to 4150 (1031H to 1036H)				System area	—	—	—
4151 (1037H)	4152 (1038H)	4153 (1039H)	4154 (103AH)	CH☐ Offset/gain setting mode (range specification)	0	Setting	×
4155 to 4159 (103BH to 103FH)				System area	—	—	—
4160 (1040H)				Offset/gain initialization enable code	0	Setting	×
4161 to 8599 (1041H to 2197H)				System area	—	—	—
8600 to 8609 (2198H to 21A1H)				Error history 1	0	Monitor	×
8610 to 8619 (21A2H to 21ABH)				Error history 2	0	Monitor	×
8620 to 8629 (21ACH to 21B5H)				Error history 3	0	Monitor	×
8630 to 8639 (21B6H to 21BFH)				Error history 4	0	Monitor	×
8640 to 8649 (21C0H to 21C9H)				Error history 5	0	Monitor	×
8650 to 8659 (21CAH to 21D3H)				Error history 6	0	Monitor	×
8660 to 8669 (21D4H to 21DDH)				Error history 7	0	Monitor	×
8670 to 8679 (21DEH to 21E7H)				Error history 8	0	Monitor	×
8680 to 8689 (21E8H to 21F1H)				Error history 9	0	Monitor	×
8690 to 8699 (21F2H to 21FBH)				Error history 10	0	Monitor	×
8700 to 8709 (21FCH to 2205H)				Error history 11	0	Monitor	×
8710 to 8719 (2206H to 220FH)				Error history 12	0	Monitor	×
8720 to 8729 (2210H to 2219H)				Error history 13	0	Monitor	×
8730 to 8739 (221AH to 2223H)				Error history 14	0	Monitor	×
8740 to 8749 (2224H to 222DH)				Error history 15	0	Monitor	×
8750 to 8759 (222EH to 2237H)				Error history 16	0	Monitor	×
8760 to 8769 (2238H to 2241H)				Alarm history 1	0	Monitor	×
8770 to 8779 (2242H to 224BH)				Alarm history 2	0	Monitor	×
8780 to 8789 (224CH to 2255H)				Alarm history 3	0	Monitor	×
8790 to 8799 (2256H to 225FH)				Alarm history 4	0	Monitor	×
8800 to 8809 (2260H to 2269H)				Alarm history 5	0	Monitor	×
8810 to 8819 (226AH to 2273H)				Alarm history 6	0	Monitor	×
8820 to 8829 (2274H to 227DH)				Alarm history 7	0	Monitor	×
8830 to 8839 (227EH to 2287H)				Alarm history 8	0	Monitor	×
8840 to 8849 (2288H to 2291H)				Alarm history 9	0	Monitor	×
8850 to 8859 (2292H to 229BH)				Alarm history 10	0	Monitor	×
8860 to 8869 (229CH to 22A5H)				Alarm history 11	0	Monitor	×
8870 to 8879 (22A6H to 22AFH)				Alarm history 12	0	Monitor	×

Address: decimal (hexadecimal)				Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4				
8880 to 8889 (22B0H to 22B9H)				Alarm history 13	0	Monitor	×
8890 to 8899 (22BAH to 22C3H)				Alarm history 14	0	Monitor	×
8900 to 8909 (22C4H to 22CDH)				Alarm history 15	0	Monitor	×
8910 to 8919 (22CEH to 22D7H)				Alarm history 16	0	Monitor	×
8920 to 9009 (22D8H to 2331H)				System area	—	—	—
9010 to 9019 (2332H to 233BH)				Level data 0 to 9	0	Control	○
9020 (233CH)				System area	—	—	—
9021 (233DH)	9022 (233EH)	9023 (233FH)	9024 (2340H)	CH□ Logging hold flag	0	Monitor	○
9025 to 9030 (2341H to 2346H)				System area	—	—	—
9031 (2347H)	9032 (2348H)	9033 (2349H)	9034 (234AH)	CH□ Head pointer	0	Monitor	×
9035 to 9040 (234BH to 2350H)				System area	—	—	—
9041 (2351H)	9042 (2352H)	9043 (2353H)	9044 (2354H)	CH□ Latest pointer	0	Monitor	×
9045 to 9050 (2355H to 235AH)				System area	—	—	—
9051 (235BH)	9052 (235CH)	9053 (235DH)	9054 (235EH)	CH□ Number of logging data	0	Monitor	×
9055 to 9060 (235FH to 2364H)				System area	—	—	—
9061 (2365H)	9062 (2366H)	9063 (2367H)	9064 (2368H)	CH□ Trigger pointer	0	Monitor	×
9065 to 9070 (2369H to 236EH)				System area	—	—	—
9071 (236FH)	9074 (2372H)	9077 (2375H)	9080 (2378H)	CH□ Logging cycle monitor value (s)	0	Monitor	×
9072 (2370H)	9075 (2373H)	9078 (2376H)	9081 (2379H)	CH□ Logging cycle monitor value (ms)	0	Monitor	×
9073 (2371H)	9076 (2374H)	9079 (2377H)	9082 (237AH)	CH□ Logging cycle monitor value (μs)	0	Monitor	×
9083 to 9100 (237BH to 238CH)				System area	—	—	—
9101 (238DH)	9106 (2392H)	9111 (2397H)	9116 (239CH)	CH□ Trigger generation time (First/Last two digits of the year)	0	Monitor	×
9102 (238EH)	9107 (2393H)	9112 (2398H)	9117 (239DH)	CH□ Trigger generation time (Month/Day)	0	Monitor	×
9103 (238FH)	9108 (2394H)	9113 (2399H)	9118 (239EH)	CH□ Trigger generation time (Hour/Minute)	0	Monitor	×
9104 (2390H)	9109 (2395H)	9114 (239AH)	9119 (239FH)	CH□ Trigger generation time (Second/Day of the week)	0	Monitor	×
9105 (2391H)	9110 (2396H)	9115 (239BH)	9120 (23A0H)	CH□ Trigger generation time (Millisecond)	0	Monitor	×
9121 to 9150 (23A1H to 23BEH)				System area	—	—	—
9151 (23BFH)	9152 (23C0H)	9153 (23C1H)	9154 (23C2H)	CH□ Logging hold request	0	Control	○
9155 to 9160 (23C3H to 23C8H)				System area	—	—	—
9161 (23C9H)	9162 (23CAH)	9163 (23CBH)	9164 (23CCH)	CH□ Logging enable/disable setting	1	Setting	×
9165 to 9170 (23CDH to 23D2H)				System area	—	—	—
9171 (23D3H)	9172 (23D4H)	9173 (23D5H)	9174 (23D6H)	CH□ Logging data setting	1	Setting	×
9175 to 9180 (23D7H to 23DCH)				System area	—	—	—
9181 (23DDH)	9182 (23DEH)	9183 (23DFH)	9184 (23E0H)	CH□ Logging cycle setting value	4	Setting	×
9185 to 9190 (23E1H to 23E6H)				System area	—	—	—
9191 (23E7H)	9192 (23E8H)	9193 (23E9H)	9194 (23EAH)	CH□ Logging cycle unit setting	1	Setting	×
9195 to 9200 (23EBH to 23F0H)				System area	—	—	—
9201 (23F1H)	9202 (23F2H)	9203 (23F3H)	9204 (23F4H)	CH□ Post-trigger logging points	5000	Setting	×
9205 to 9210 (23F5H to 23FAH)				System area	—	—	—
9211 (23FBH)	9212 (23FCH)	9213 (23FDH)	9214 (23FEH)	CH□ Level trigger condition setting	0	Setting	×
9215 to 9220 (23FFH to 2404H)				System area	—	—	—

Address: decimal (hexadecimal)				Name	Default value	Data type	Auto refresh
CH1	CH2	CH3	CH4				
9221 (2405H)	9222 (2406H)	9223 (2407H)	9224 (2408H)	CH☐ Trigger data	*3	Setting	×
9225 to 9230 (2409H to 240EH)				System area	—	—	—
9231 (240FH)	9232 (2410H)	9233 (2411H)	9234 (2412H)	CH☐ Trigger setting value	0	Setting	×
9235 to 9240 (2413H to 2418H)				System area	—	—	—
9241 (2419H)	9242 (241AH)	9243 (241BH)	9244 (241CH)	CH☐ Current logging read pointer	-1	Monitor	×
9245 to 9250 (241DH to 2422H)				System area	—	—	—
9251 (2423H)	9252 (2424H)	9253 (2425H)	9254 (2426H)	CH☐ Previous logging read pointer	-1	Monitor	×
9255 to 9260 (2427H to 242CH)				System area	—	—	—
9261 (242DH)	9262 (242EH)	9263 (242FH)	9264 (2430H)	CH☐ Logging read points monitor value	0	Monitor	×
9265 to 9270 (2431H to 2436H)				System area	—	—	—
9271 (2437H)	9272 (2438H)	9273 (2439H)	9274 (243AH)	CH☐ Logging loading enable/disable setting	1	Setting	×
9275 to 9280 (243BH to 2440H)				System area	—	—	—
9281 (2441H)	9282 (2442H)	9283 (2443H)	9284 (2444H)	CH☐ Logging load points setting value	1000	Setting	×
9285 to 9999 (2445H to 270FH)				System area	—	—	—
10000 to 19999 (2710H to 4E1FH)				CH1 Logging data	0	Monitor	×
20000 to 29999 (4E20H to 752FH)				CH2 Logging data	0	Monitor	×
30000 to 39999 (7530H to 9C3FH)				CH3 Logging data	0	Monitor	×
40000 to 49999 (9C40H to C34FH)				CH4 Logging data	0	Monitor	×
50000 - (C350H -)				System area	—	—	—

*1 The following shows the default values.
Converted value when range setting is "-10 to +10 V"

*2 [n] in the table indicates an interrupt setting number. (n = 1 to 16)

*3 The following shows the default values.
CH1: 10, CH2: 11, CH3: 12, CH4: 13

Details of buffer memory addresses

This section details the buffer memory areas of the analog input module.

Point

This section describes buffer memory addresses for CH1.

Latest error code

The latest error code detected in the analog input module is stored. For details, refer to the following.

☞ Page 107 List of error codes

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Latest error code	0			
Latest error code (in FX3 allocation mode function)	29			

■Clearing an error

Turn 'Error clear request' (Un\G70, b15) off→on→off.

Latest address of error history

Among Error history □ (Un\G3600 to Un\G3759), the buffer memory address which stores the latest error code is stored.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Latest address of error history	1			
Latest address of error history (in FX3 allocation mode function)	3101			

Latest alarm code

The latest alarm code detected in the analog input module is stored. For details, refer to the following.

☞ Page 110 List of alarm codes

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Latest alarm code	2			
Latest alarm code (in FX3 allocation mode function)	3102			

■Clearing an alarm

Turn 'Error clear request' (Un\G70, b15) off→on→off.

Latest address of alarm history

Among Alarm history □ (Un\G3760 to Un\G3999), a buffer memory address which stores the latest alarm code is stored.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Latest address of alarm history	3			
Latest address of alarm history (in FX3 allocation mode function)	3103			

Interrupt factor detection flag [n]

The detection status of the interrupt factor is stored.

Monitor value	Description
0	No interrupt factor
1	Interrupt factor

When an interrupt factor occurs, an interrupt request is sent to the CPU module at the same time as 'Interrupt factor detection flag [n]' (Un\G4 to Un\G19) turns to Interrupt factor (1).

"n" indicates an interrupt setting number. (n = 1 to 16)

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Interrupt factor detection flag [n]	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Interrupt factor detection flag [n] (in FX3 allocation mode function)	4001	4002	4003	4004	4005	4006	4007	4008	4009	4010	4011	4012	4013	4014	4015	4016

Module information

Module information of FX5-4AD is stored. For module information, 6140H (fixed hexadecimal value) is stored.

- In the normal mode: 6140H
- In the FX3 allocation mode: 6144H

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Module Information	30			
Module information (in FX3 allocation mode function)	30			

Firmware version

Firmware version is stored. Firmware version is stored in 4 digit decimal number.

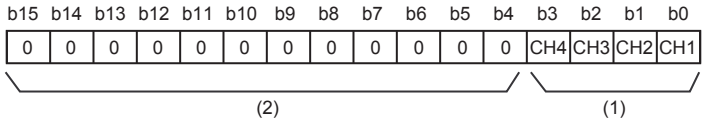
■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Firmware version	31			
Firmware version (in FX3 allocation mode function)	3131			

Warning output flag (Process alarm upper limit)

The upper limit alarm of the process alarm can be checked for each channel.



(1) 0: Normal, 1: Alarm ON

(2) The values of b4 to b15 are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Warning output flag (Process alarm upper limit)	36			

■Alert output flag status

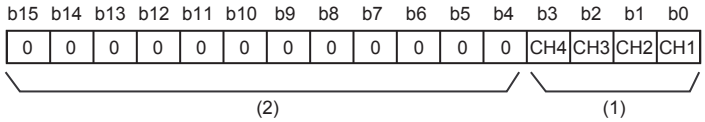
- If the limit specified by the process alarm upper upper limit value is equal to or exceeded, Alarm ON (1) is stored in 'Alert output flag (Process alarm upper limit)' (Un\G36) of the corresponding channel.
- If an alert is detected even in one channel, of the channels where conversion is enabled and the alert output setting (Process alarm) is enabled, 'Alert output signal' (Un\G69, b8) also turns on.

■Clearing Alert output flag

- When the digital operation value returns within the setting range, the flag is automatically cleared.
- Turning off→on→off 'Operating condition setting request' (Un\G70, b9) allows the flag to be cleared.

Warning output flag (Process alarm lower limit)

The lower limit alarm of the process alarm can be checked for each channel.



(1) 0: Normal, 1: Alarm ON

(2) The values of b4 to b15 are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Warning output flag (Process alarm lower limit)	37			

■Alert output flag status

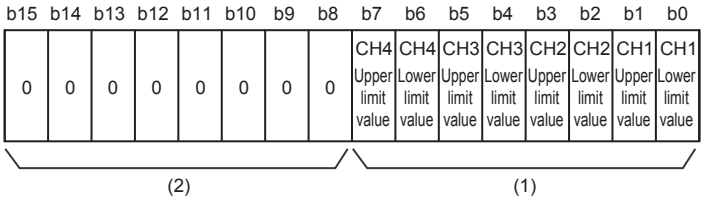
- If the limit specified by the process alarm lower lower limit value is equal to or exceeded, Alarm ON (1) is stored in 'Alert output flag (Process alarm lower limit)' (Un\G37) of the corresponding channel.
- If an alert is detected even in one channel, of the channels where conversion is enabled and the alert output setting (Process alarm) is enabled, 'Alert output signal' (Un\G69, b8) also turns on.

■Clearing Alert output flag

- When the digital operation value returns within the setting range, the flag is automatically cleared.
- Turning off→on→off 'Operating condition setting request' (Un\G70, b9) allows the flag to be cleared.

Warning output flag (Process alarm upper limit/lower limit) [FX3 allocation mode]

When the FX3 allocation mode function is used, the upper/lower limit alarm of the process alarm can be checked.



(1) 0: Normal, 1: Alarm ON

(2) The values of b8 to b15 are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Warning output flag (Process alarm) (in FX3 allocation mode function)	26			

■Alert output flag status

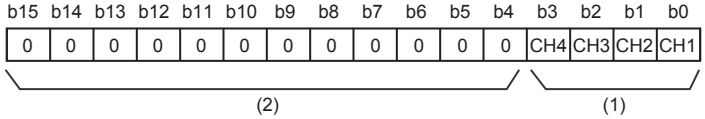
- When the value is equal to or exceeds the limit specified by the process alarm upper upper limit value or is equal to or falls below the process alarm lower lower limit value, Alarm ON (1) is stored in Warning output flag (Process alarm) corresponding to each channel.
- If an alert is detected even in one channel, of the channels where conversion is enabled and the alert output setting (Process alarm) is enabled, 'Alert output signal' (Un\G69, b8) also turns on.

■Clearing Alert output flag

- When the digital operation value returns within the setting range, the flag is automatically cleared.
- Turning off→on→off 'Operating condition setting request' (Un\G70, b9) allows the flag to be cleared.

Warning output flag (Rate alarm upper limit)

The upper limit alarm of the rate alarm can be checked for each channel.



(1) 0: Normal, 1: Alarm ON

(2) The values of b4 to b15 are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Warning output flag (Rate alarm upper limit)	38			

■Alert output flag status

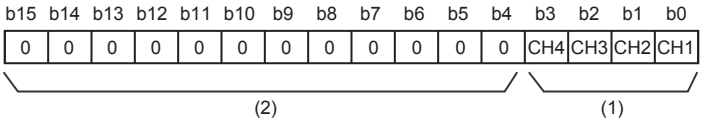
- If the limit specified in the rate alarm upper limit value is equal to or exceeded, Alarm ON (1) is stored in 'Alert output flag (Rate alarm upper limit)' (Un\G38) of the corresponding channel.
- If an alert is detected even in one channel, of the channels where conversion is enabled and the alert output setting (Rate alarm) is enabled, 'Alert output signal' (Un\G69, b8) also turns on.

■Clearing Alert output flag

- When the change rate of the digital output value returns within the setting range, the flag is automatically cleared.
- Turning off→on→off 'Operating condition setting request' (Un\G70, b9) allows the flag to be cleared.

Warning output flag (Rate alarm lower limit)

The lower limit alarm of the rate alarm can be checked for each channel.



(1) 0: Normal, 1: Alarm ON

(2) The values of b4 to b15 are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Warning output flag (Rate alarm lower limit)	39			

■Alert output flag status

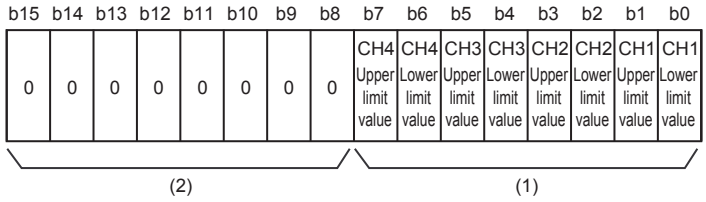
- When the value becomes equal to or smaller than the range specified in the rate alarm lower limit value, Alarm ON (1) is stored in 'Warning output flag (Rate alarm lower limit)' (Un\G39) corresponding to each channel.
- If an alert is detected even in one channel, of the channels where conversion is enabled and the alert output setting (Rate alarm) is enabled, 'Alert output signal' (Un\G69, b8) also turns on.

■Clearing Alert output flag

- When the change rate of the digital output value returns within the setting range, the flag is automatically cleared.
- Turning off→on→off 'Operating condition setting request' (Un\G70, b9) allows the flag to be cleared.

Warning output flag (Rate alarm upper limit/lower limit) [FX3 allocation mode]

When the FX3 allocation mode function is used, the upper/lower limit alarm of the rate alarm can be checked.



(1) 0: Normal, 1: Alarm ON

(2) The values of b8 to b15 are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Warning output flag (Rate alarm upper/lower limit) (in FX3 allocation mode function)	27			

■Alert output flag status

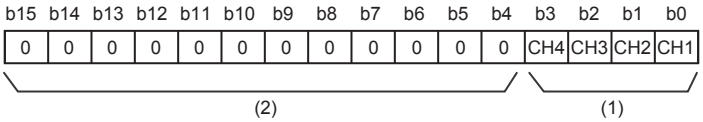
- When the value is equal to or exceeds the limit specified by the rate alarm upper limit value or is equal to or falls below the rate alarm lower limit value, Alarm ON (1) is stored in Warning output flag (rate alarm) corresponding to each channel.
- If an alert is detected even in one channel, of the channels where conversion is enabled and the alert output setting (Rate alarm) is enabled, 'Alert output signal' (Un\G69, b8) also turns on.

■Clearing Alert output flag

- When the change rate of the digital output value returns within the setting range, the flag is automatically cleared.
- Turning off→on→off 'Operating condition setting request' (Un\G70, b9) allows the flag to be cleared.

Input signal error detection flag

The status of an input signal can be checked for each channel.



(1) 0: Normal, 1: Input signal error

(2) The values of b4 to b15 are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Input signal error detection flag	40			

■Input signal error detection flag status

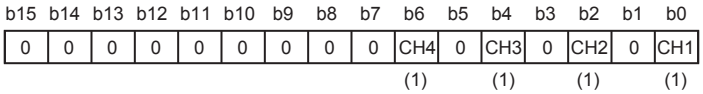
- When an analog input value out of the range specified in Input signal error detection setting value is detected, Input signal error (1) is stored in 'Input signal error detection flag' (Un\G40) corresponding to each channel.
- When an error is detected in any channel where the A/D conversion and the input signal error detection are enabled, 'Input signal error detection signal' (Un\G69, b12) turns on.

■Clearing Input signal error detection flag

- When ‘Input signal error detect automatic clear enable/disable setting’ (Un\G304) is set to Disable, Input signal error detection flag turns off by turning off→on→off ‘Error clear request’ (Un\G70, b15) after the analog input value returns to within the setting range. When 'Operating condition setting request' (Un\G70, b9) is turned off→on→off, the flag is cleared.
- When ‘Input signal error detect automatic clear enable/disable setting’ (Un\G304) is set to Disable, ‘Input signal error detection signal’ turns off after the analog input value returns to within the setting range.

Input signal error detection flag [FX3 allocation mode]

The status of an input signal can be checked for each channel.



(1) 0: Normal, 1: Input signal error

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Input signal error detection flag [In FX3 allocation mode function]	28			

■Input signal error detection flag status

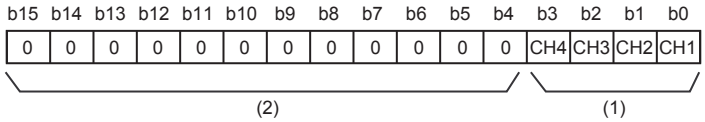
- When an analog input value out of the range specified in Input signal error detection setting value is detected, Input signal error (1) is stored in 'Input signal error detection flag’ corresponding to each channel.
- When an error is detected in any channel where the A/D conversion and the input signal error detection are enabled, 'Input signal error detection signal' (Un\G69, b12) turns on.

■Clearing Input signal error detection flag

- When ‘Input signal error detect automatic clear enable/disable setting’ is set to Disable, Input signal error detection flag turns off by turning off→on→off ‘Error clear request’ (Un\G70, b15) after the analog input value returns to within the setting range. When 'Operating condition setting request' (Un\G70, b9) is turned off→on→off, the flag is cleared.
- When ‘Input signal error detect automatic clear enable/disable setting’ is set to enable, ‘Input signal error detection signal’ turns off after the analog input value returns to within the setting range.

A/D conversion completed flag

The A/D conversion status can be checked.



(1) 0: During A/D conversion or unused, 1: A/D conversion completed

(2) The values of b4 to b15 are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
A/D conversion completed flag	42			
A/D conversion completed flag (in FX3 allocation mode function)	124			

■A/D conversion completed flag status

When the first A/D conversion is completed in the channel where the A/D conversion is enabled, the flag turns to A/D conversion completed (1). 'A/D conversion completed flag' (Un\G69, b14) turns on when the conversion of all the channels where the A/D conversion is enabled is completed.

■Clearing A/D conversion completed flag

Turning off→on→off 'Operating condition setting request' (Un\G70, b9) turns the flag back to the default (During A/D conversion or unused (0)), and when the first A/D conversion has completed, the flag turns to A/D conversion completed (1) again.

Operation mode monitor

The operation mode status in operation can be checked.

Monitor value	Description
0	Normal mode
1	Offset/gain setting mode

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Operation mode monitor	60			
Operation mode monitor (In FX3 allocation mode function)	3160			

Input signals

A state of an analog input module can be checked in the buffer memory area.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Input signals	69			
Input signal (In FX3 allocation mode function)	69			

■List of input signals

Buffer Memory Areas	Description
b0	Module READY
b1 to 4	Use not allowed
b5	Offset/gain initialization completed flag
b6	Use not allowed
b7	Use not allowed
b8	Warning output signal
b9	Operating condition setting completed flag
b10	Offset/gain setting mode status flag
b11	Channel change completed flag
b12	Input signal error detection signal
b13	Range switching complete flag
b14	A/D conversion completed flag
b15	Error flag

■Module READY (b0)

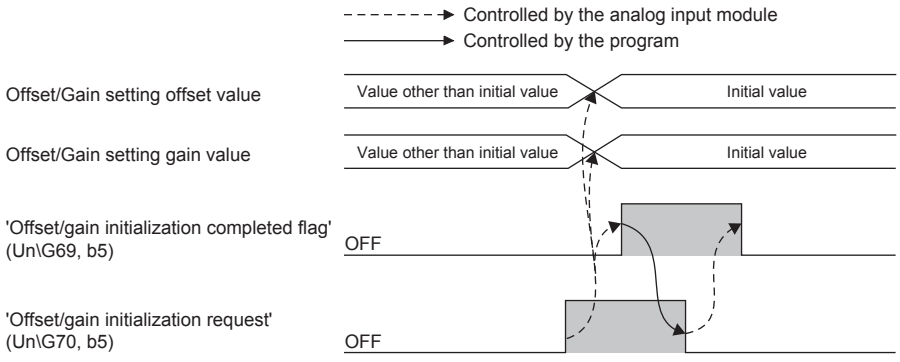
Module READY (X0) turns on to indicate the preparation for the A/D conversion is completed after the power-on or reset of the CPU module, and the A/D conversion is performed.

In the following cases, 'Module READY' turns off.

- In the offset/gain setting mode (In this case, the A/D conversion is performed.)
- When a watchdog timer error has occurred in the analog input module (In this case, the A/D conversion is not performed.)

■Offset/gain initialization completed flag (b5)

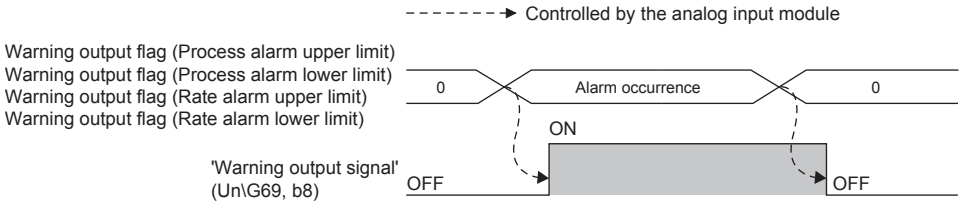
- Use as an interlock condition to turn off→on→off 'Offset/gain initialization request' (Un\G70, b5).
- Offset/gain initialization is not be performed unless ‘Offset/gain initialization enabled code '(Un\G305) is set to E20FH.
- It is possible to perform offset/gain initialization in offset/gain setting mode only.
- When 'Offset/gain initialization request' (Un\G70, b5) is off, 'Offset/gain initialization complete flag' (Un\G69, b5) turns off.



■Warning output signal (b8)

Alert output signal (Un\G69, b8) turns on when the process alarm or rate alarm has been detected. When the alert output function (process alarm/rate alarm) is disabled for all channels, 'Alert output signal' (Un\G69, b8) is always off.

Alarm	Operation
Process alarm	• The process alarm turns on when 'CH1 Digital operation value' is equal to or exceeds the setting range set in 'CH1 Process alarm upper upper limit value' (Un\G514) or is equal to or falls below the setting range set in 'CH1 Process alarm lower lower limit value' (Un\G520). The ALM LED also turns on along with the signal turning on. The target of alert output is the channels only where the alert output function (process alarm) and the A/D conversion are both enabled. • Process alarm turns off when 'CH1 Digital output value' falls within the setting range for all the channels where the A/D conversion is enabled. The ALM LED also turns off along with the off of the signal.
Rate alarm	• The process alarm turns on when the change rate of 'CH1 Digital operation value' is equal to or exceeds the setting range set in 'CH1 Rate alarm upper limit value' (Un\G524) or is equal to or falls below the setting range set in 'CH1 Rate alarm lower value' (Un\G526). The ALM LED also turns on along with the signal turning on. The target of alert output is the channels only where the alert output function (rate alarm) and the A/D conversion are both enabled. • Rate alarm turns off when the change rate of 'CH1 Digital output value' returns to within the setting range for all the channels where the A/D conversion is enabled. The ALM LED also turns off.



■Operating condition setting completed flag (b9)

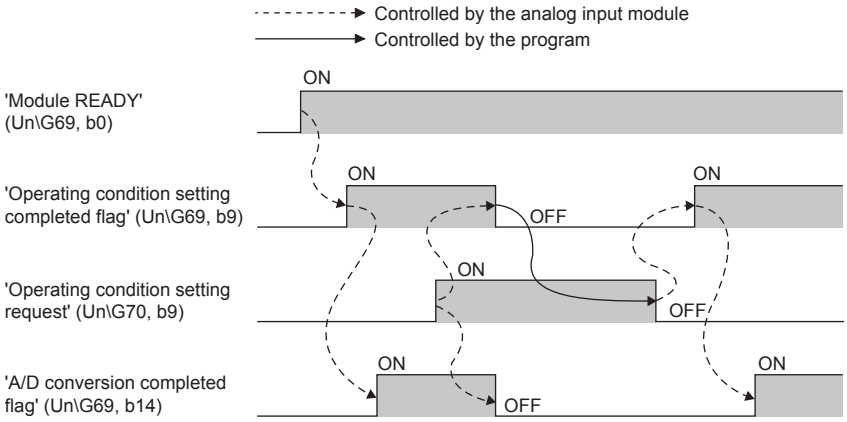
When changing values of the buffer memory, use as an interlock condition to turn off→on→off 'Operating condition setting request' (Un\G70, b9).

For the buffer memory areas which require turning off→on→off of 'Operating condition setting request' (Un\G70, b9) to enable the changed values, refer to the following.

☞ Page 115 Buffer Memory Areas

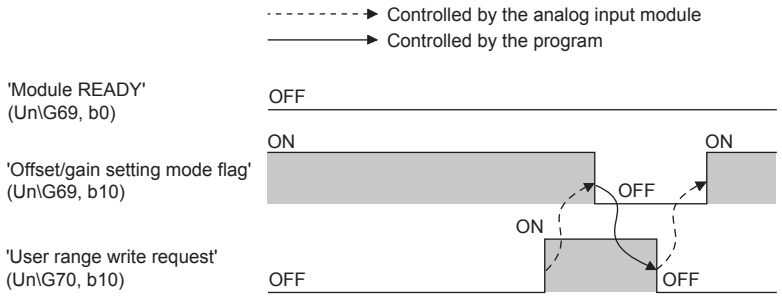
When 'Operating condition setting completed flag' (Un\G69, b9) is off, the A/D conversion is not performed.

When 'Operating condition setting request' (Un\G70, b9) is on, 'Operating condition setting completed flag' (Un\G69, b9) turns off.



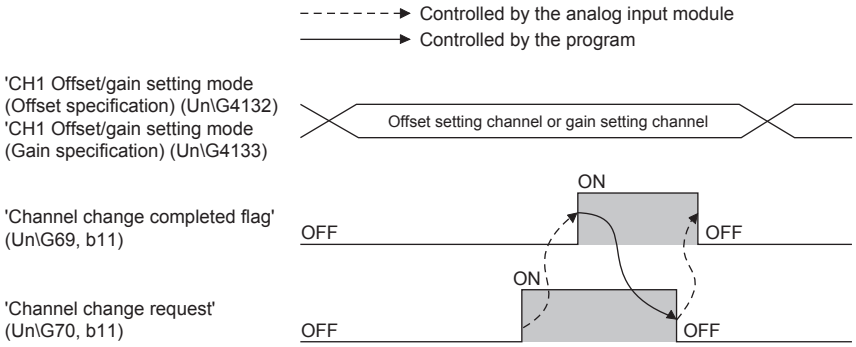
■Offset/gain setting mode status flag (b10)

When registering the value, which has been adjusted with the offset/gain setting, use as an interlock condition to turn off→on→off 'User range write request' (Un\G70, b10).



■Channel change completed flag (b11)

When changing a channel to perform the offset/gain setting, use as an interlock condition to turn off→on→off 'Channel change request' (Un\G70, b11).



■Input signal error detection signal (b12)

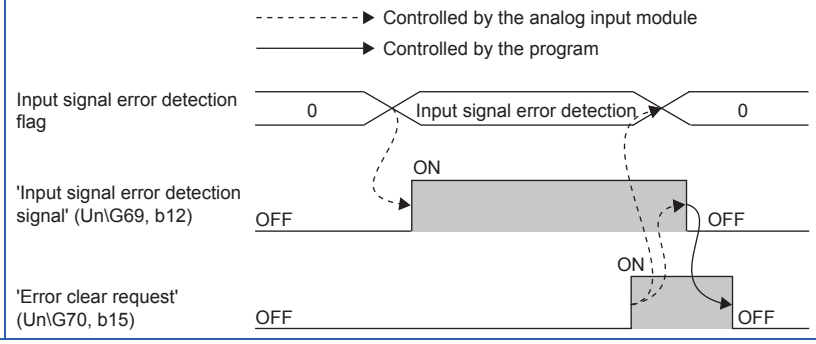
Set 'CH1 Input signal error detection setting' (Un\G528) to one of upper lower limit detection, upper limit detection, lower limit detection, and simple disconnection detection, and turns on if the analog input value exceeds the setting range that is set in 'CH1 Input signal error detection lower limit setting value (Un\G529) or 'CH1 Input signal error detection upper limit setting value' (Un\G530) in the channel where the A/D conversion has been enabled. For the cases where the simple disconnection detection is set, 'CH1 Input signal error detection lower limit setting value' (Un\G529) or 'CH1 Input signal error detection upper limit setting value' (Un\G530) is ignored and turns on at the disconnection detection.

When 'Input signal error detection signal' (Un\G69, b12) turns on, the following operations are performed.

- Digital output value and digital operation value of the relevant channel is held with the value just before the error was detected.
- The ALM LED flashes.

Turning off 'Input signal error detection signal' (Un\G69, b12) varies depending on Input signal error detect automatic clear enable/disable setting.

Input signal error detect automatic clear enable/ disable setting	Operations related to the turning off of input signal error detection signal (Un\G69, b12)
Enable (0)	If the input signal is within the setting range, 'Input signal error detection signal' (Un\G69, b12) and 'Input signal error detection flag' (Un\G40) automatically turn off, and ALM LED turns off.

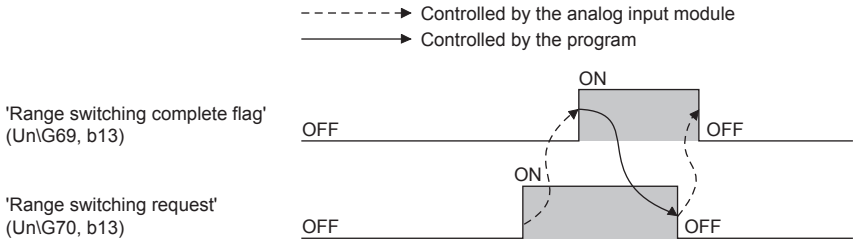
Input signal error detect automatic clear enable/ disable setting	Operations related to the turning off of input signal error detection signal (Un\G69, b12)
Disable (1)	Remove the cause of the input signal error and set the input signal within the setting range. Then turn the 'error clear request' (Un\G70, b15) OFF→ON→OFF. The input signal error detection signal '(Un\G69, b12) and the 'input signal error detection flag' (Un\G40) will turn OFF, and the ALM LED will turn off. The latest alarm code will also be cleared. The latest alarm code will also be cleared. 

Point

Averaging processing starts over after the A/D conversion resumes.

■Range switching complete flag (b13)

When changing a range of channel to perform the offset/gain setting, use as an interlock condition to turn off→on→off 'Range switching request' (Un\G70, b13).

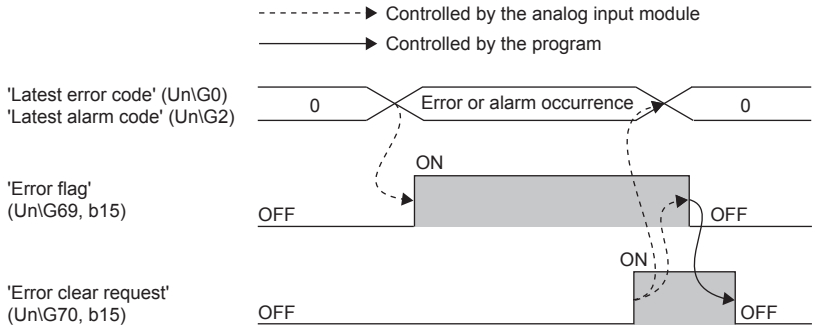


■A/D conversion completed flag (b14)

A/D conversion completed flag (Un\G70, b15) turns on when the first conversion has been completed for all A/D conversion enabled channels. When reading a digital output value, use this signal or 'A/D conversion completed flag' (Un\G42) as an interlock.

■Error occurrence flag (b15)

Error flag (Un\G69, b15) turns on when an error has occurred.



'Error flag' (Un\G69, b15), 'Latest error code' (Un\G0), and 'Latest alarm code' (Un\G2) are cleared at the timing when 'Error clear request' (Un\G70, b15) turns off→on.

Output signals

The operation request to an analog input module can be set with the buffer memory.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Output signals	70			
Output signal (In FX3 allocation mode function)	70			

■List of output signals

Buffer Memory Areas	Description
b0 to 4	Use not allowed
b5	Offset/gain initialization request
b6 to 8	Use not allowed
b9	Operating condition setting request
b10	User range write request
b11	Channel change request
b12	Use not allowed
b13	Range switching request
b14	Use not allowed
b15	Error clear request

■Offset/gain initialization request (b5)

Turn off→on→off to enable the settings of buffer memory areas.

Offset/gain initialization is not to be performed unless Offset/gain initialization enabled code is set to E20FH.

When 'Offset/gain initialization request' (Un\G70, b5) is off, 'Offset/gain initialization complete flag' (Un\G69, b5) turns off.

■Operating condition setting request (b9)

Turn off→on→off to enable the settings of buffer memory areas.

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

☞ Page 135 Operating condition setting completed flag (b9)

■User range write request (b10)

In the offset/gain setting mode, turn off→on→off this signal to register the values adjusted with the offset/gain setting in an analog input module. The data is written to the flash memory at the timing when this signal is turned off→on.

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

☞ Page 136 Offset/gain setting mode status flag (b10)

■Channel change request (b11)

Turn off→on→off Channel change request (b11) to change a channel to perform the offset/gain setting.

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

☞ Page 136 Channel change completed flag (b11)

■Range switching request (b13)

Turn off→on→off Range switching request (b13) to change a range of channel to perform the offset/gain setting.

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

☞ Page 137 Range switching complete flag (b13)

■Error clear request (b15)

Turn off→on→off Error clear request (b15) when Error flag (Un\G69, b15), Input signal error detection signal (Un\G69, b12), Latest error code (Un\G0), and Latest alarm code (Un\G2) are cleared.

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

☞ Page 137 Error occurrence flag (b15)

☞ Page 136 Input signal error detection signal (b12)

Level data 0 to 9

This area stores data to be monitored when a level trigger of the logging function is used. Ten types of data are available: 'Level data 0' (Un\G90) to 'Level data 9' (Un\G99). These are useful, for example, to generate triggers while monitoring the values of devices other than the analog input module.

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

☞ Page 59 Logging function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	0	1	2	3	4	5	6	7	8	9
Level data□	90	91	92	93	94	95	96	97	98	99
Level data□ (in FX3 allocation mode function)	9010	9011	9012	9013	9014	9015	9016	9017	9018	9019

■Setting range

The possible setting range is from -32768 to +32767.

■Default value

The default value is 0 for all channels.

Interrupt factor mask [n]

Set Interrupt factor mask to be used.

Setting value	Setting content
0	Mask (Interrupt unused)
1	Mask clear (Interrupt used)

When 'Interrupt factor mask [n]' (Un\G124 to Un\G139) is changed to Mask clear (Interrupt used) (1) and an interrupt factor occurs, an interrupt request is sent to the CPU module. When the set value is two or larger, the setting is regarded as Mask clear (Interrupt used) (1).

"n" indicates an interrupt setting number. (n = 1 to 16)

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Interrupt factor mask [n]	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139
Interrupt factor mask [n] (in FX3 allocation mode function)	4021	4022	4023	4024	4025	4026	4027	4028	4029	4030	4031	4032	4033	4034	4035	4036

■Default value

The default value is set to Mask (Interrupt unused) (0) for all channels.

Interrupt factor reset request [n]

An interrupt factor reset request is sent.

Setting value	Setting content
0	No reset request
1	Reset request

When Reset request (1) is set to 'Interrupt factor reset request [n]' (Un\G156 to Un\G171) corresponding to the interrupt factor, the interrupt factor corresponding to the specified interrupt is reset. After that, 'Interrupt factor detection flag [n]' (Un\G4 to Un\G19) turns to 'No interrupt factor' (0). When the set value is two or larger, the setting is regarded as Reset request (1).
"n" indicates an interrupt setting number. (n = 1 to 16)

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Interrupt factor reset request [n]	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171
Interrupt factor reset request [n] (in FX3 allocation mode function)	4064	4065	4066	4067	4068	4069	4070	4071	4072	4073	4074	4075	4076	4077	4078	4079

■Default value

The default value is 0 for all channels.

Interrupt factor transaction setting [n]

Set an interrupt request for when the same interrupt factor occurs during the interrupt factor detection.

Setting value	Setting content
0	Interrupt resend request
1	No interrupt resend request

- With 'Interrupt factor generation setting [n]' (Un\G200 to Un\G215) set to Interrupt resend request (0) and an interrupt factor being detected, an occurrence of the same interrupt factor results in an interrupt request being sent to the CPU module again.
- With 'Interrupt factor generation setting [n]' (Un\G200 to Un\G215) set to No interrupt resend request (1) and an interrupt factor being detected, an occurrence of the same interrupt factor does not result in an interrupt request being sent to the CPU module.

If a value other than the above is set, an interrupt factor generation setting error (error code: 180△H) occurs.
"n" indicates an interrupt setting number. (n = 1 to 16)

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Interrupt factor transaction setting [n]	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215
Interrupt factor transaction setting [n] (in FX3 allocation mode function)	4061	4062	4063	4064	4065	4066	4067	4068	4069	4070	4071	4072	4073	4074	4075	4076

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 0 for all channels.

Condition target setting [n]

Set an interrupt factor to be detected.

Setting value	Setting content
0	Disable
1	Error flag (Un\G69, b15)
2	Warning output flag (Process alarm)
3	Warning output flag (Rate alarm)
4	Input signal error detection flag
5	A/D conversion completed
6	Logging hold flag
7	Logging read

If a value other than the above is set, a condition target setting range error (error code: 181△H) occurs.

When the buffer memory set to 'Condition target setting [n]' (Un\G232 to Un\G247) turns off→on, an interrupt request is sent to the CPU module.

"n" indicates an interrupt setting number. (n = 1 to 16)

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Condition target setting [n]	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247
Condition target setting [n] (in FX3 allocation mode function)	4081	4082	4083	4084	4085	4086	4087	4088	4089	4090	4091	4092	4093	4094	4095	4096

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 0 for all channels.

Condition target channel setting [n]

Set a channel where an interrupt is detected.

Setting value	Setting content
0	All channels
1	CH1
2	CH2
3	CH3
4	CH4

When a factor for the channel specification is set to 'Condition target setting [n]' (Un\G232 to Un\G247), an interrupt factor in the channel set by this area is monitored.

If a value other than the above is set, a condition target setting range error (error code: 182△H) occurs.

"n" indicates an interrupt setting number. (n = 1 to 16)

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Condition target channel setting [n]	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279
Condition target channel setting [n] (in FX3 allocation mode function)	4101	4102	4103	4104	4105	4106	4107	4108	4109	4110	4111	4112	4113	4114	4115	4116

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 0 for all channels.

Mode switching setting

Set a setting value for the mode to be switched.

Destination mode	Buffer memory address	Setting value
Normal mode	296	4658H
	297	4144H
Offset/gain setting mode	296	4144H
	297	4658H

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Mode switching setting	296, 297			
Mode switching setting (in FX3 allocation mode function)	4120, 4121			

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■After the mode is switched

When the mode is switched, this area is cleared to 0 and 'Operating condition setting completed flag' (Un\G69, b9) turns off. After checking that 'Operating condition setting completed flag' (Un\G69, b9) is off, turn off 'Operating condition setting request' (Un\G70, b9).

Point

When a value out of the above is written and 'Operating condition setting request' (Un\G70, b9) is turned off→on→off, the mode setting is not performed and only the operating condition is changed. In this case, this area is cleared to 0.

Rate alarm change rate selection

Select rate alarm change rate. "Rate specification" that sets the rate alarm upper limit value and the rate alarm lower limit value in units of 0.1% with respect to (the maximum value of the digital output value) - (the minimum value of the digital output value), and "Digital output value specification" that sets in units of digits for the range of digital output values, can be selected.

Setting value	Description
0	Rate specification
1	Digital output value specification

When setting to a value other than the above table, it operates with digital output value specification (1).

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Rate alarm change rate selection	299			
Rate alarm change rate selection (in FX3 allocation mode function)	130			

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

Set to Digital output value specification (1).

Input signal error detect automatic clear enable/disable setting

Set whether to enable or disable automatic clearing of input signal errors by using the input signal error detection function.

Setting value	Description
0	Enable
1	Disable

Setting a value other than in the table above results in operation with Disable (1).

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Input signal error detect automatic clear enable/ disable setting	304			
Input signal error detect automatic clear enable/ disable setting (in FX3 allocation mode function)	133			

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is Disable (1).

Offset/gain initialization enable code

When the offset/gain initialization request (Un/G70, b5) turns off→on by setting the enable code "E20FH" in this area at the time of initialization of offset/gain, the offset value and the gain value in the flash memory of the analog input module are initialized.

When setting anything other than "E20FH" in this area, initialization is not executed.

When Offset/gain initialization is completed, the values are initialized to "0000H".

■Buffer memory address

The following shows the buffer memory address of this area.

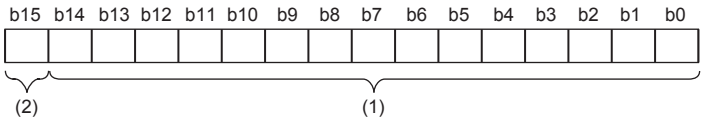
Buffer memory name	CH1	CH2	CH3	CH4
Offset/gain initialization enable code	305			
Offset/gain initialization enable code (In FX3 allocation mode function)	4160			

■Default value

The default value is set to 0.

CH1 Digital output value

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



(1) Data section

(2) Sign bit 0: Positive, 1: Negative

■Buffer memory address

The following shows the buffer memory address of this area.

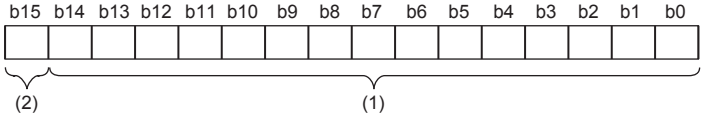
Buffer memory name	CH1	CH2	CH3	CH4
CH□ Digital output value	400	600	800	1000
CH□ Digital output value (in FX3 allocation mode function)	1000	1002	1004	1006

■Refreshing cycle

If averaging processing is performed, values are updated at every averaging process cycle, but if not performed, values are updated at every sampling cycle.

CH1 Digital operation value

A digital operation value obtained by the scaling function, shift function, digital clipping function, or difference conversion function is stored in 16-bit signed binary value.



(1) Data section

(2) Sign bit 0: Positive, 1: Negative

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Digital operation value	402	602	802	1002
CH☐ Digital operation value (in FX3 allocation mode function)	10	11	12	13

Point

When the scaling function, shift function, digital clipping function, or difference conversion function is not used, a value which is the same as the one in 'CH1 Digital output value' (Un\G400) is stored.

CH1 Maximum value

The maximum value of the digital operation value is stored in 16-bit signed binary value.

In the following cases, 'CH1 Maximum value' (Un\G404) is updated with the current value.

- When 'Operating condition setting request' (Un\G70, b9) is turned off→on→off, and the setting is changed
- When 'CH1 Maximum value reset request' (Un\G473) is turned off→on→off

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Maximum value	404	604	804	1004
CH☐ Maximum value (In FX3 allocation mode function)	111	112	113	114

CH1 Minimum value

The minimum value of the digital operation value is stored in 16-bit signed binary value.

In the following cases, 'CH1 Minimum value' (Un\G406) is updated with the current value.

- When 'Operating condition setting request' (Un\G70, b9) is turned off→on→off, and the setting is changed
- When 'Minimum value reset request' (Un\G474) is turned off→on→off

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Minimum value	406	606	806	1006
CH☐ Minimum value (In FX3 allocation function mode)	101	102	103	104

Point

- For the channel to which the averaging processing is specified, the maximum and minimum values are stored at every averaging processing time.
- When the scaling function, shift function, digital clipping function, or difference conversion function is used, values calculated by each function are stored in Maximum value and Minimum value.

CH1 Difference conversion state flag

The difference conversion status can be checked.

Monitor value	Description
0	Not converted
1	Converting difference

When the difference conversion starting after 'CH1 Difference conversion trigger' (Un\G470) is changed from No request (0) to Trigger request (1), 'CH1 Difference conversion state flag' (Un\G408) corresponding to the channel turns to Converting difference (1).

When 'CH1 Difference conversion trigger' (Un\G470) is changed from Trigger request (1) to No request (0), 'CH1 Difference conversion state flag' (Un\G408) is changed from Converting difference (1) to Not converted (0).

'CH1 Difference conversion state flag' (Un\G408) is Converting difference (1) during the difference conversion; Not converted (0) if not in the difference conversion state.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Difference conversion state flag	408	608	808	1008
CH☐ Difference conversion state flag (In FX3 allocation mode function)	1361	1362	1363	1364

CH1 Logging hold flag

The logging holding status can be checked.

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

☞ Page 59 Logging function

Monitor value	Description
0	OFF
1	ON

When a state that data is collected in 'CH1 Logging data' (Un\G10000 to Un\G19999) changes to the stop state, 'CH1 Logging hold flag' (Un\G409) is turned to ON (1).

When logging restarts by changing 'CH1 Logging hold request' (Un\G471) from ON (1) → OFF (0), 'CH1 Logging hold flag' (Un\G409) is turned to OFF (0).

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Logging hold flag	409	609	809	1009
CH□ Logging hold flag (in FX3 allocation mode function)	9021	9022	9023	9024

CH1 Digital filter conversion cycle monitor

The conversion cycle of the digital filter in operation is stored.

When something other than the digital filter (5) is set in 'CH1 Averaging processing specification' (Un\G501), 0 is stored.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Digital filter conversion cycle monitor	411	611	811	1011
CH□ Digital filter conversion cycle monitor (In FX3 allocation mode function)	1331	1332	1333	1334

CH1 A/D Conversion status

The conversion status is stored.

Monitor value	Conversion status	Setting content
0	A/D conversion disable	A status of A/D conversion disable. A/D conversion of the relevant channel has not been executed.
1	A/D conversion start	Status from when the A/D conversion is enabled to when the initial A/D conversion completes.
2	A/D conversion completed	A status after the initial A/D conversion completes. Conversion is being executed.
3	Input signal error detected	A status where an input signal error is being detected.

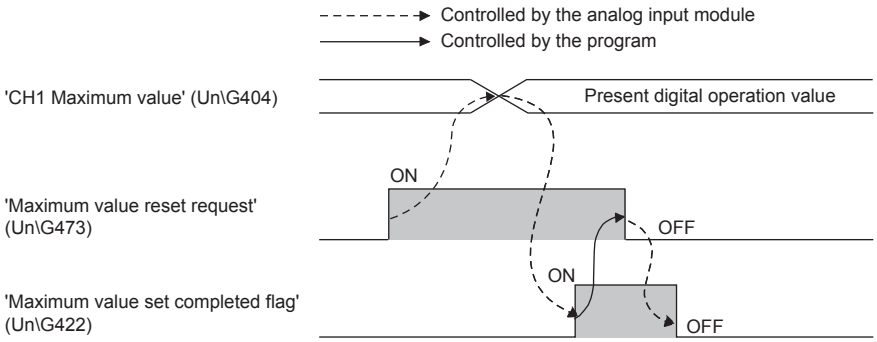
■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ A/D conversion status	420	620	820	1020
CH□ A/D conversion status (In FX3 allocation mode function)	1021	1022	1023	1024

CH1 Maximum value reset completed flag

The reset status of maximum value can be checked.



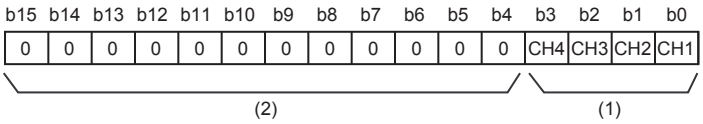
■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Maximum value reset completed flag	422	622	822	1022

Maximum value reset completed flag [FX3 allocation mode]

The reset status of maximum value in FX3 allocation mode can be checked.



(1) 0: Not completed, 1: Completed

(2) The values of b4 to b15 are fixed to 0.

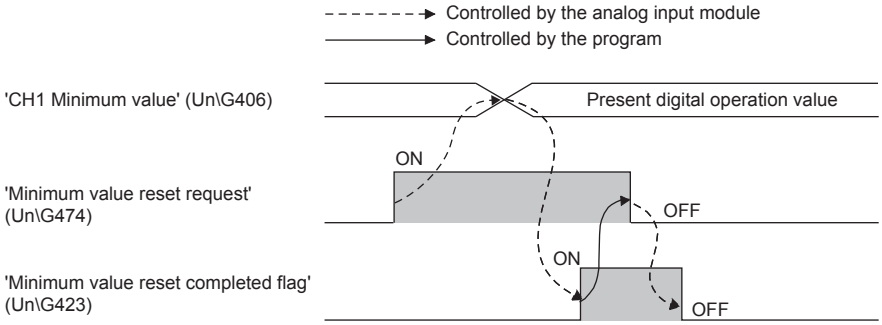
■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Maximum value reset completed flag (in FX3 allocation mode function)	120			

CH1 Minimum value reset completed flag

The reset status of minimum value can be checked.



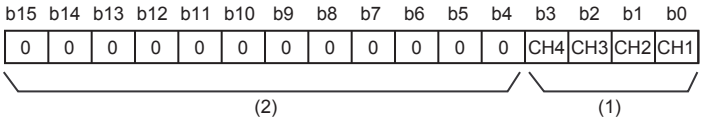
■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Minimum value reset completed flag	423	623	823	1023

Minimum value reset completed flag [FX3 allocation mode]

The reset status of minimum value in FX3 allocation mode can be checked.



(1) 0: Not completed, 1: Completed

(2) The values of b4 to b15 are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Minimum value reset completed flag (in FX3 allocation mode function)	110			

A

CH1 Range setting monitor

The input range value set to the input range setting or 'CH1 Range setting' (Un\G598) can be checked.

Monitor value	Description
0003H	4 to 20 mA
0009H	0 to 20 mA
0006H	-20 to +20m V
000AH	1 to 5 V
000BH	0 to 5 V
0000H	-10 to +10 V
000CH	0 to 10 V
000EH	User range setting

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Range setting monitor	430	630	830	1030

Range setting monitor [FX3 allocation mode]

When the FX3 allocation mode function is used, the input range set state in the input range setting can be checked.

Monitor value	Description
0000H	-10 to +10 V
0001H	
0002H	
0003H	4 to 20 mA
0004H	
0005H	
0006H	-20 to +20 mA
0007H	
0008H	
0009H	0 to 20 mA
000AH	1 to 5 V
000BH	0 to 5 V
000CH	0 to 10 V
000DH	Use not allowed
000EH	User range setting
000FH	Use not allowed

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Range setting monitor	1031	1032	1033	1034

CH1 Difference conversion reference value

This area stores 'CH1 Digital operation value' (Un\G402) at the start of the difference conversion as the difference conversion reference value.

The difference conversion reference value is updated when 'CH1 Difference conversion trigger' (Un\G470) is turned from No request (0) to Trigger request (1).

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Difference conversion standard value	432	632	832	1032
CH□ Difference conversion standard value (in FX3 allocation mode function)	1371	1372	1373	1374

Point

Even if 'CH1 Difference conversion state flag' (Un\G408) is turned from Converting difference (1) to Not converted (0), 'CH1 Difference conversion reference value' (Un\G432) is not cleared.

CH1 Head pointer

The buffer memory address of the oldest data in CH1 Logging data (Un\G10000 to Un\G19999) can be checked with this buffer memory area.

The offset value counted from the start address of CH1 Logging data (Un\G10000 to Un\G19999) is stored.

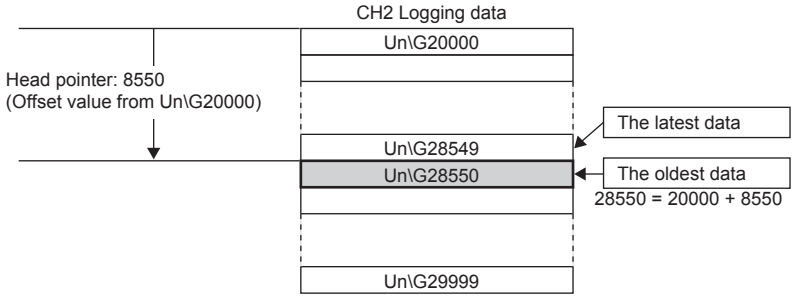
■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Head pointer	434	634	834	1034
CH□ Head pointer (in FX3 allocation mode function)	9031	9032	9033	9034

Ex.

When the value of 'CH2 Head pointer' (Un\G634) is 8550



■Default value

The default value is 0 for all channels.

Point

- The value in 'CH1 Head pointer' (Un\G434) is fixed to 0 since the oldest data is stored in the start address of CH1 Logging data (Un\G10000 to Un\G19999) while the data of the first 10000 points is being logged from beginning of the logging. On and after the 10001st data, 'CH1 Head pointer' (Un\G434) increases one by one each time data is stored.
- When 'CH1 Logging hold request' (Un\G471) is turned on→off, 'CH1 Head pointer' (Un\G434) is cleared to 0.

CH1 Latest pointer

The buffer memory address of the latest data in CH1 Logging data (Un\G10000 to Un\G19999) can be checked with this buffer memory area.

The offset value counted from the start address of CH1 Logging data (Un\G10000 to Un\G19999) is stored.

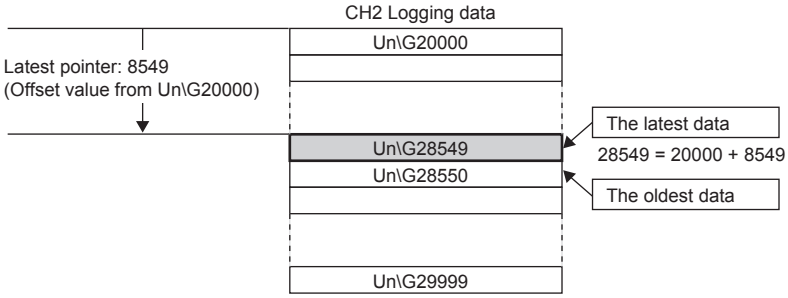
■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Latest pointer	435	635	835	1035
CH☐ Latest pointer (in FX3 allocation mode function)	9041	9042	9043	9044

Ex.

When the value of CH2 Latest pointer (Un\G635) is 8549



■Default value

The default value is 0 for all channels.

Point

- 'CH1 Latest pointer' (Un\G435) increases one by one each time data is stored from beginning of the logging.
- When 'CH1 Logging hold request' (Un\G471) is turned on→off, 'CH1 Latest pointer' (Un\G435) is cleared to 0.

CH1 Logging data points

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

'CH1 Number of logging data' (Un\G436) increases one by one each time data is stored from beginning of the logging.

When the value in the logging data storage area reaches 10000, 'CH1 Number of logging data points' (Un\G436) is fixed to 10000 since the value is overwritten from the head again.

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

☞ Page 59 Logging function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Number of logging data	436	636	836	1036
CH☐ Number of logging data (in FX3 allocation mode function)	9051	9052	9053	9054

Point

When 'CH1 Logging hold request' (Un\G471) is turned on→off, 'CH1 Number of logging data' (Un\G436) is cleared to 0.

CH1 Trigger pointer

The buffer memory address of the data of when a hold trigger is executed in CH1 Logging data (Un\G10000 to Un\G19999) can be checked with this buffer memory area.

The difference between the address of buffer memory which stores the data of when a hold trigger is executed and the start address in CH1 Logging data (Un\G10000 to Un\G19999) is stored.

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

☞ Page 59 Logging function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Trigger pointer	437	637	837	1037
CH☐ Trigger pointer (In FX3 allocation mode function)	9061	9062	9063	9064

■Default value

The default value is 0 for all channels.

Point

When 'CH1 Logging hold request' (Un\G471) is turned on→off, 'CH1 Trigger pointer' (Un\G437) is cleared to 0.

CH1 Current logging read pointer

Each time an amount equivalent to the logging read points monitor value is logged, a value calculated by the following formula is stored.

CH1 Current logging read pointer = CH1 Latest pointer - CH1 Logging read points monitor value + 1

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

☞ Page 59 Logging function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Current logging read pointer	438	638	838	1038
CH☐ Current logging read pointer (in FX3 allocation mode function)	9241	9242	9243	9244

■Default value

The default value is -1 for all channels.

CH1 Previous logging read pointer

At the time of generating an interrupt to the CPU module, the current logging read pointer just before the update by the interrupt is stored.

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

☞ Page 59 Logging function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Previous logging read pointer	439	639	839	1039
CH☐ Previous logging read pointer (in FX3 allocation mode function)	9251	9252	9253	9254

■Default value

The default value is -1 for all channels.

CH1 Logging read points monitor value

The number of the actual logging read points is stored.

When 'Operating condition setting request' (Un\G70, b9) is turned off→on→off, a value is not stored in the channel where the logging read function is disabled.

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

☞ Page 59 Logging function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Logging read points monitor value	440	640	840	1040
CH□ Logging read points monitor value (in FX3 allocation mode function)	9261	9262	9263	9264

CH1 Logging cycle monitor value

This area stores the actual logging cycle which is calculated from the refreshing cycle of data to be logged.

When 'Operating condition setting request' (Un\G70, b9) is turned off→on→off, the actual logging cycle is stored in Logging cycle monitor value in the corresponding channel where the logging function is enabled.

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

☞ Page 59 Logging function

The following values are stored in 'CH1 Logging cycle monitor value' (Un\G441 to Un\G443).

	b15 to b0
'CH1 Logging cycle Monitor value (Second)' (Un\G441)	s
'CH1 Logging cycle Monitor value (Milli second)' (Un\G442)	ms
'CH1 Logging cycle monitor value (μs)' (Un\G443)	μs

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Logging cycle monitor value (s)	441	641	841	1041
CH□ Logging cycle monitor value (ms)	442	642	842	1042
CH□ Logging cycle monitor value (μs)	443	643	843	1043
CH□ Logging cycle monitor value (s) (In FX3 allocation mode function)	9071	9074	9077	9080
CH□ Logging cycle monitor value (ms) (In FX3 allocation mode function)	9072	9075	9078	9081
CH□ Logging cycle monitor value (μs) (In FX3 allocation mode function)	9073	9076	9079	9082

CH1 Trigger generation time

The time when a trigger is generated is recorded.

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

☞ Page 59 Logging function

	b15 to b8	b7 to b0
'CH1 Trigger generation time (First/Last two digits of the year)' (Un\G444)	First two digits of the year	Last two digits of the year
'CH1 Trigger generation time (Month/Day)' (Un\G445)	Month	Day
'CH1 Trigger generation time (Hour/Minute)' (Un\G446)	Hour	Minute
'CH1 Trigger generation time (Second/Day of the week)' (Un\G447)	Second	Day of the week
'CH1 Trigger generation time (Millisecond)' (Un\G448)	Millisecond (upper)	Millisecond (lower)

Item	Storage contents	Storage example*1
First two digits of the year/Last two digits of the year	Stored in BCD code.	2017H
Month/Day		0130H
Hour/Minute		1035H
Second		40H
Day of the week	One of the following values is stored in BCD code. Sunday: 0, Monday: 1, Tuesday: 2, Wednesday: 3, Thursday: 4, Friday: 5, Saturday: 6	1H
Millisecond (upper)	Stored in BCD code.	06H
Millisecond (lower)		28H

*1 These values assume that an error occurs at 10:35 and 40.628 seconds on Monday, January 30th, 2017.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Trigger generation time (First/Last two digits of the year)	444	644	844	1044
CH☐ Trigger generation time (Month/Day)	445	645	845	1045
CH☐ Trigger generation time (Hour/Minute)	446	646	846	1046
CH☐ Trigger generation time (Second/Day of the week)	447	647	847	1047
CH☐ Trigger generation time (Millisecond)	448	648	848	1048
CH☐ Trigger generation time (First/Last two digits of the year) (In FX3 allocation mode function)	9101	9106	9111	9116
CH☐ Trigger generation time (Month/Day) (In FX3 allocation mode function)	9102	9107	9112	9117
CH☐ Trigger generation time (Hour/Minute) (In FX3 allocation mode function)	9103	9108	9113	9118
CH☐ Trigger generation time (Second/Day of the week) (in FX3 allocation mode function)	9104	9109	9114	9119
CH☐ Trigger generation time (Millisecond) (in FX3 allocation mode function)	9105	9110	9115	9120

Point

- Time units shorter than one millisecond are not recorded.
- When 'CH1 Logging hold request' (Un\G471) is turned on→off, 'CH1 Trigger generation time' (Un\G444 to Un\G448) is cleared to 0.

CH1 Difference conversion trigger

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

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

☞ Page 41 Difference operation function

Setting value	Setting content
0	No request
1	Trigger request

Setting a value other than the values in the table above results in operation with Trigger request (1).

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Difference conversion trigger	470	670	870	1070
CH□ Difference conversion trigger (in FX3 allocation mode function)	1381	1382	1383	1384

■Starting and stopping the difference conversion

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

■Default value

The default value is No request (0) for all channels.

CH1 Logging hold request

Use this buffer memory area as a trigger to hold (stop) logging at any timing during the logging.

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

☞ Page 59 Logging function

Logging hold request	Setting value
OFF	0
ON	1

Setting a value other than in the table above results in operation with ON (1).

When 'CH1 Logging enable/disable setting' (Un\G535) is set to Disable (1), the setting for 'CH1 Logging hold request' (Un\G471) is ignored.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Logging hold request	471	671	871	1071
CH□ Logging hold request (In FX3 allocation mode function)	9151	9152	9153	9154

■Operation of the logging hold processing

- When Disable (0) is set to 'CH1 Level trigger condition setting' (Un\G540), the logging hold processing starts by turning off→on 'CH1 Logging hold request' (Un\G471).
- When a value other than Disable (0) is set to 'CH1 Level trigger condition setting' (Un\G540), the logging hold processing starts after 'CH1 Logging hold request' (Un\G471) is turned off→on and the set trigger condition is satisfied. When the level trigger is enabled, use this buffer memory area as an interlock condition to operate the level trigger.
- If 'CH1 Logging hold request' (Un\G471) is turned on→off during the logging hold processing, the hold (stop) status is cleared and the logging restarts.

■Default value

The default value is OFF (0) for all channels.

Point

The stop status of the logging can be checked with 'CH1 Logging hold flag' (Un\G409).

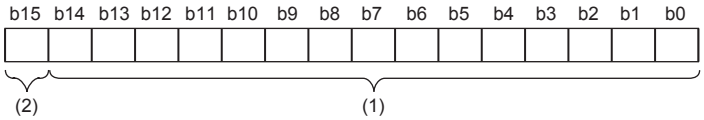
CH1 Conversion value shift amount

Set 'CH1 Conversion value shift amount' (Un\G472) used for the shift function.

The digital operation value to which the conversion value shift amount is applied is stored in 'CH1 Digital operation value' (Un\G402).

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

☞ Page 36 Shift function



(1) Data section

(2) Sign bit 0: Positive, 1: Negative

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Conversion value shift amount	472	672	872	1072
CH☐ Conversion value shift amount (In FX3 allocation mode function)	61	62	63	64

■Setting range

The possible setting range is from -32768 to +32767.

■Enabling the setting

Regardless of turning off→on→off 'Operating condition setting request' (Un\G70, b9), the set conversion value shift amount takes effect.

■Default value

The default value is 0 for all channels.

CH1 Maximum value reset request

When resetting the maximum value, and updating with the current value, turn off→on.

Maximum value reset request	Setting value
OFF	0
ON	1

Setting a value other than in the table above results in operation with ON (1).

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Maximum value reset request	473	673	873	1073

■Enabling the setting

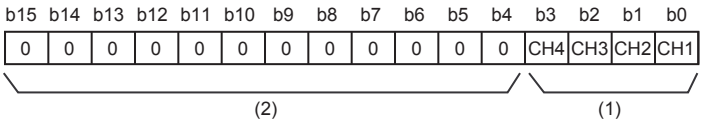
When ‘CH1 Maximum value reset request’ (Un\G473) turns off→on, ‘CH1 Maximum value’ (Un\G404) is reset regardless of turning off→on→off of ‘Operating condition setting request’ (Un\G70, b9), and updated with the current value.

■Default value

The default value is OFF (0) for all channels.

Maximum value reset request [FX3 allocation mode]

When resetting the maximum value, and updating with the current value in FX3 allocation mode, turn off→on.



(1) 0: No reset request, 1: Reset request

(2) The values of b4 to b15 are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Maximum value reset request (In FX3 allocation mode function)	119			

■Enabling the setting

When 'Maximum value reset request' (Un\G119) turns off→on, 'CH1 Maximum value' (Un\G111) is reset regardless of turning off→on→off of 'Operating condition setting request' (Un\G70, b9), and updated with the current value.

■Default value

The default value is off (0).

CH1 Minimum value reset request

When resetting the minimum value, and updating with the current value, turn off→on.

Minimum value reset request	Setting value
OFF	0
ON	1

Setting a value other than in the table above results in operation with ON (1).

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Minimum value reset request	474	674	874	1074

■Enabling the setting

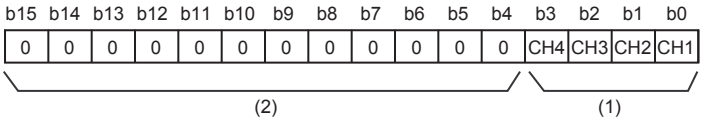
When 'CH1 Minimum value reset request' (Un\G474) turns off→on, 'CH1 Minimum value' (Un\G406) is reset regardless of turning off→on→off of 'Operating condition setting request' (Un\G70, b9), and updated with the current value.

■Default value

The default value is OFF (0) for all channels.

Minimum value reset request [In FX3 allocation mode]

When resetting the minimum value, and updating with the current value in FX3 allocation mode, turn off→on.



(1) 0: No reset request, 1: Reset request

(2) The values of b4 to b15 are fixed to 0.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
Minimum value reset request [In FX3 allocation mode function]	109			

■Enabling the setting

When 'Minimum value reset request' (Un\G109) turns off→on, 'CH1 Minimum value' (Un\G101) is reset regardless of turning off→on→off of 'Operating condition setting request' (Un\G70, b9), and updated with the current value.

■Default value

The default value is off (0).

CH1 A/D conversion enable/disable setting

Set whether to enable or disable the A/D conversion.

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

☞ Page 27 A/D conversion enable/disable setting function

Setting value	Setting content
0	A/D conversion enable
1	A/D conversion disable

When a value other than the ones above is set, the setting is turned to A/D conversion disable (1).

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ A/D conversion enable/disable setting	500	700	900	1100
CH□ A/D conversion enable/disable setting (in FX3 allocation mode function)	1321	1322	1323	1324

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is A/D conversion enable (0) for all channels.

CH1 Average processing specification

Select processing to be performed among the sampling processing, averaging processing, primary delay filter, and digital filter.

Averaging processing consists of time average, count average, and moving average.

Setting value	Setting content
0	Sampling processing
1	Time average
2	Count average
3	Moving average
4	Primary delay filter
5	Digital filter

Setting a value other than the above causes an averaging process specification setting range error (error code: 191□H).

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Averaging process specification	501	701	901	1101
CH□ Averaging process specification (In FX3 allocation mode function)	1081	1082	1083	1084

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is Sampling processing (0) for all channels.

CH1 Time average/Count average/Moving average/Primary delay filter constant setting

Configure the time (for averaging), count (for averaging), moving average count, and Primary delay filter constant for each channel where the averaging processing is specified.

The following table lists the setting ranges.

Setting value	Setting content
2 to 5000 (ms)	Time average
4 to 62500 (counts)	Count average
2 to 1000 (counts)	Moving average
1 to 500 (times)	Primary delay filter constant

Setting a value other than the above causes any of time average setting range error (error code: 192□H), count average setting range error (error code: 193□H), moving count setting range error (error code: 194□H), Primary delay filter range error (error code: 195□H), and the A/D conversion processing is executed with the setting before error.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Time average/Count average/Moving average/Primary delay filter constant setting	502	702	902	1102
CH□ Time average/Count average/Moving average/Primary delay filter constant setting (in FX3 allocation mode function)	2	3	4	5

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 0 for all channels.

Point

- Set a Primary delay filter constant for the Primary delay filter. The value of the time constant (ms) is the product of the Primary delay filter constant and the conversion cycle.
- Since the default value is 0, change the setting value according to the processing method.
- The setting for this area is ignored in the channel where Digital filter (5) is set to 'CH1 Averaging process specification' (Un\G501).

CH1 Scaling enable/disable setting

Set whether to enable or disable the scaling.

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

☞ Page 34 Scaling function

Setting value	Setting content
0	Enable
1	Disable

Setting a value other than the above causes a scaling enable/disable setting range error (error code: 1A0□H).

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Scaling enable/disable setting	504	704	904	1104
CH□ Scaling enable/disable setting (In FX3 allocation mode function)	1091	1092	1093	1094

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is Disable (1) for all the channels.

CH1 Scaling upper limit value

Set an upper limit value for the range of the scale conversion.

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

☞ Page 34 Scaling function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Scaling upper limit value	506, 507	706, 707	906, 907	1106, 1107
CH□ Scaling upper limit value (In FX3 allocation mode function)	1100, 1101	1102, 1103	1104, 1105	1106, 1107

■Setting range

The possible setting range is from -2147483648 to +2147483647.

In the channel where a set value does not satisfy the condition "the scaling upper limit value ≠ the scaling lower limit value", a scaling upper/lower limit value setting error (error code: 1A2□H) occurs.

When 'CH1 Scaling enable/disable setting' (Un\G504) is set to Disable (1), the setting for 'CH1 Scaling upper limit value' (Un\G506, 507) is ignored.

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 0 for all channels.

CH1 Scaling lower limit value

Set a lower limit value for the range of the scale conversion.

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

☞ Page 34 Scaling function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Scaling lower limit value	508, 509	708, 709	908, 909	1108, 1109
CH□ Scaling lower limit value (In FX3 allocation mode function)	1120, 1121	1122, 1123	1124, 1125	1126, 1127

■Setting range

The possible setting range is from -2147483648 to +2147483647.

In the channel where a set value does not satisfy the condition "the scaling upper limit value ≠ the scaling lower limit value", a scaling upper/lower limit value setting error (error code: 1A2□H) occurs.

When 'CH1 Scaling enable/disable setting' (Un\G504) is set to Disable (1), the setting for 'CH1 Scaling lower limit value' (Un\G508, 509) is ignored.

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 0 for all channels.

CH1 Digital clipping enable/disable setting

Set whether to enable or disable the digital clipping function.

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

☞ Page 39 Digital clipping function

Setting value	Setting content
0	Enable
1	Disable

If a value other than the above is set, a digital clipping enable/disable setting range error (error code: 1A5☐H) occurs.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Digital clipping enable/disable setting	510	710	910	1110
CH☐ Digital clipping enable/disable setting (In FX3 allocation mode function)	1141	1142	1143	1144

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is Disable (1) for all the channels.

CH1 Alert output setting (Process alarm)

Set whether to enable or disable the alert output of the process alarm.

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

☞ Page 46 Alert output function

Setting value	Setting content
0	Enable
1	Disable

Setting a value other than the above causes an alert output setting (Process alarm) range error (error code: 1B0☐H).

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Alert output setting (Process alarm)	512	712	912	1112
CH☐ Alert output setting (Process alarm) (In FX3 allocation mode function)	1181	1182	1183	1184

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is Disable (1) for all channels.

CH1 Alert output setting (Rate alarm)

Set whether to enable or disable the alert output of the rate alarm.

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

☞ Page 46 Alert output function

Setting value	Setting content
0	Enable
1	Disable

Setting a value other than the above causes an alert output setting (Rate alarm) range error (error code: 1B8☐H).

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Alert output setting (Rate alarm)	513	713	913	1113
CH☐ Alert output setting (Rate alarm) (in FX3 allocation mode function)	1211	1212	1213	1214

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is Disable (1) for all channels.

CH1 Process alarm upper upper limit value

Set an upper upper limit value of the alert output function (Process alarm).

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

☞ Page 46 Alert output function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Process alarm upper upper limit value	514	714	914	1114
CH☐ Process alarm upper upper limit value (in FX3 allocation mode function)	81	82	83	84

■Setting range

The possible setting range is from -32768 to +32767.

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 0 for all channels.

CH1 Process alarm upper lower limit value

Set an upper lower limit value of the alert output function (Process alarm).

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

☞ Page 46 Alert output function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Process alarm upper lower limit value	516	716	916	1116
CH☐ Process alarm upper lower limit value (in FX3 allocation mode function)	1191	1192	1193	1194

■Setting range

The possible setting range is from -32768 to +32767.

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 0 for all channels.

CH1 Process alarm lower upper limit value

Set a lower upper limit value of the alert output function (Process alarm).

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

☞ Page 46 Alert output function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Process alarm lower upper limit value	518	718	918	1118
CH☐ Process alarm lower upper limit value (in FX3 allocation mode function)	1201	1202	1203	1204

■Setting range

The possible setting range is from -32768 to +32767.

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 0 for all channels.

CH1 Process alarm lower lower limit value

Set a lower lower limit value of the alert output function (Process alarm).

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

☞ Page 46 Alert output function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Process alarm lower lower limit value	520	720	920	1120
CH□ Process alarm lower lower limit value (In FX3 allocation mode function)	71	72	73	74

■Setting range

The possible setting range is from -32768 to +32767.

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 0 for all channels.

Point

- When using the process alarm, configure the 4-step settings for the process alarm upper upper limit value, upper lower limit value, lower upper limit value, and lower lower limit value.
- A channel where the set values do not satisfy the condition "Upper upper limit value ≥ Upper lower limit value ≥ Lower upper limit value ≥ Lower lower limit value" causes a process alarm upper lower limit value setting range error (error code: 1B△□H).
- Since the default value is 0, change the setting value.
- When the scaling function, shift function, digital clipping function, or difference conversion function is used, alarm targets are digital operation values to which the operation of each function is reflected. Be sure to consider operation results of each function to set values.

CH1 Rate alarm alert detection cycle setting

Set the cycle to check the change rate of digital output values.

The value of the cycle to detect a rate alarm alert is the product of the value in 'CH1 Rate alarm alert detection cycle setting' (Un\G522) and the conversion cycle.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Rate alarm alert detection cycle setting	522	722	922	1122
CH□ Rate alarm alert detection cycle setting (In FX3 allocation mode function)	1221	1222	1223	1224

■Setting range

The possible setting range is from 1 to 32000 (times).

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 0 for all channels.

Point

- A channel where the set value is out of the range causes a rate alarm detection cycle setting range error (error code: 1B9☐H).
- Since the default value is 0, change the setting value when setting the rate alarm function.

CH1 Rate alarm upper limit value

Set an upper limit value of the change rate of digital output values to detect a rate alarm.

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

☞ Page 46 Alert output function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Rate alarm upper limit value	524	724	924	1124
CH☐ Rate alarm upper limit value (In FX3 allocation mode function)	91	92	93	94

■Setting range

The possible setting range is from -32768 to +32767.

Unit of the setting value varies depending on the setting of 'Rate alarm change rate selection' (Un\G299).

Rate alarm change rate selection (Un\G299)	Unit
Rate specification (0)	0.1%
Digital output value specification (1)	digit

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 0 for all channels.

CH1 Rate alarm lower limit value

Set a lower limit value of the change rate of digital output values to detect a rate alarm.

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

☞ Page 46 Alert output function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Rate alarm lower limit value	526	726	926	1126
CH☐ Rate alarm lower limit value (In FX3 allocation mode function)	1231	1232	1233	1234

■Setting range

The possible setting range is from -32768 to +32767.

Unit of the setting value varies depending on the setting of 'Rate alarm change rate selection' (Un\G299).

Rate alarm change rate selection (Un\G299)	Unit
Rate specification (0)	0.1%
Digital output value specification (1)	digit

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 0 for all channels.

Point

- When using the rate alarm, configure the 2-step settings for the rate alarm upper limit value and lower limit value.
- A channel where the set values satisfy the condition "Rate alarm lower limit value ≥ Rate alarm upper limit value" causes a rate alarm upper/lower limit setting value inversion error (error code: 1BA☐H).
- Since the default value is 0, change the setting value.

CH1 Input signal error detection setting

Set a condition for detecting an input signal error.

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

☞ Page 53 Input signal error detection function

Setting value	Setting content
0	Disable
1	Upper and lower limit detection
2	Lower limit detection
3	Upper limit detection
4	Simple disconnection detection

If a value other than the above is set, an input signal error detection setting range error (error code: 1C0☐H) occurs.

If Simple disconnection detection (4) is selected for the channel where the input range setting is other than 4 to 20 mA and 1 to 5 V, a disconnection detection enabled range setting range error (error code: 1C6☐H) occurs.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Input signal error detection setting	528	728	928	1128
CH☐ Input signal error detection setting (In FX3 allocation mode function)	1151	1152	1153	1154

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is Disable (0) for all the channels.

CH1 Input signal error detection lower limit setting value

Set a value to detect an error for the input analog value.

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

☞ Page 53 Input signal error detection function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Input signal error detection lower limit setting value	529	729	929	1129
CH□ Input signal error detection lower limit setting value (In FX3 allocation mode function)	1161	1162	1163	1164

■Setting range

The possible setting range is from 0 to 250 (0 to 25.0%). Set it in a unit of 1 (0.1%).

In the channel where a value out of the above setting range is set, an input signal error detection setting value range error (error code: 1C1□H) occurs.

The input signal error detection lower limit value is calculated by using the input signal error detection lower limit set value as the reference as follows. The input signal error detection lower limit value to be calculated varies depending on the input range used.

- Input signal error detection lower limit value = Lower limit value of each range - (Gain value of each range - Offset value of each range) × (Input signal error detection lower limit setting value/1000)

Detection conditions vary depending on 'CH1 Input signal error detection setting' (Un\G528) as follows:

- When Input signal error detection setting is set to Upper and lower limit detection (1), the detection is performed with both the input signal error detection upper limit value and input signal error detection lower limit value.
- When Input signal error detection setting is set to Lower limit detection (2), the detection is performed only with the input signal error detection lower limit value.
- When 'Input signal error detection setting' is set to Upper limit detection (3), the value set in this area is ignored.
- When Input signal error detection setting is set to Simple disconnection detection (4), the value set in this area is ignored.

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 50 for all channels. When the FX3 allocation mode function is used, 20 is set for all channels.

CH1 Input signal error detection upper limit setting value

Set a value to detect an error for the input analog value.

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

☞ Page 53 Input signal error detection function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Input signal error detection upper limit setting value	530	730	930	1130
CH□ Input signal error detection upper limit setting value (In FX3 allocation mode function)	1171	1172	1173	1174

■Setting range

The possible setting range is from 0 to 250 (0 to 25.0%). Set it in a unit of 1 (0.1%).

In the channel where a value out of the above setting range is set, an input signal error detection setting value range error (error code: 1C1□H) occurs.

The input signal error detection upper limit value is calculated by using the input signal error detection upper limit set value as the reference as follows. The input signal error detection upper limit value to be calculated varies depending on the input range used.

- Input signal error detection upper limit value = Gain value of each range + (Gain value of each range - Offset value of each range) × (Input signal error detection upper limit setting value/1000)

Detection conditions vary depending on 'CH1 Input signal error detection setting' (Un\G528) as follows:

- When Input signal error detection setting is set to Upper and lower limit detection (1), the detection is performed with both the input signal error detection upper limit value and input signal error detection lower limit value.
- When 'Input signal error detection setting' is set to Lower limit detection (2), the value set in this area is ignored.
- When Input signal error detection setting is set to Upper limit detection (3), the detection is performed only with the input signal error detection upper limit value.
- When Input signal error detection setting is set to Simple disconnection detection (4), the value set in this area is ignored.

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 50 for all channels. When the FX3 allocation mode function is used, 20 is set for all channels.

CH1 Logging enable/disable setting

Set whether to enable or disable the logging function.

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

☞ Page 59 Logging function

Setting value	Setting content
0	Enable
1	Disable

Setting a value other than the above causes a logging enable/disable setting range error (error code: 1D0□H).

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Logging enable/disable setting	535	735	935	1135
CH□ Logging enable/disable setting (In FX3 allocation mode function)	9161	9162	9163	9164

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is Disable (1) for all the channels.

CH1 Logging data setting

Determine the target to be collected: digital output value or digital operation value.

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

☞ Page 59 Logging function

Setting value	Setting content
0	Digital output value
1	Digital operation value

Setting a value other than the above causes a logging data setting range error (error code: 1D3☐H).

When 'CH1 Logging enable/disable setting' (Un\G535) is set to Disable (1), the setting for 'CH1 Logging data setting' (Un\G536) is ignored.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Logging data setting	536	736	936	1136
CH☐ Logging data setting (in FX3 allocation mode function)	9171	9172	9173	9174

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is Digital operation value (1) for all channels.

CH1 Logging cycle setting value

Set a cycle for storing the logging data.

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

☞ Page 59 Logging function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Logging cycle setting value	537	737	937	1137
CH☐ Logging cycle setting value (In FX3 allocation mode function)	9181	9182	9183	9184

■Setting range

The setting range varies depending on the setting in 'CH1 Logging cycle unit setting' (Un\G538).

CH1 Logging cycle unit setting (Un\G538)	Setting range
μs (0)	80 to 32767
ms (1)	1 to 32767
s (2)	1 to 3600

- Setting a value out of the above range causes a logging cycle setting value range error (error code: 1D1☐H). Logging cannot be performed.
- If the set logging cycle is below the update cycle of data to be logged, a logging cycle setting disable error (error code: 1D2☐H) occurs. Logging cannot be performed.

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 4 for all channels.

CH1 Logging cycle unit setting

Set a cycle unit for storing the logging data.

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

☞ Page 59 Logging function

Setting value	Setting content
0	μs
1	ms
2	s

- Setting a value out of the above range causes a logging cycle setting value range error (error code: 1D1□H). Logging cannot be performed.
- If the set logging cycle is below the update cycle of data to be logged, a logging cycle setting disable error (error code: 1D2□H) occurs. Logging cannot be performed.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Logging cycle unit setting	538	738	938	1138
CH□ Logging cycle unit setting (In FX3 allocation mode function)	9191	9192	9193	9194

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default is ms (1) for all channels.

CH1 Logging points after trigger

Set a number of data points collected for the time period from the occurrence of a hold trigger to the logging stop.

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

☞ Page 59 Logging function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Post-trigger logging points	539	739	939	1139
CH□ Post-trigger logging points (In FX3 allocation mode function)	9201	9202	9203	9204

■Setting range

The possible setting range is from 1 to 10000.

Setting a value out of the range causes a post-trigger logging points setting range error (error code: 1D4□H). Logging cannot be performed.

When 'CH1 Logging enable/disable setting' (Un\G535) is set to Disable (1), the setting for 'CH1 Post-trigger logging points' (Un\G539) is ignored.

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 5000 for all channels.

CH1 Level trigger condition setting

Set the condition for the occurrence of a hold trigger when using the level trigger in the logging function.

To use the level trigger, perform level trigger condition setting to one of Level trigger (Condition: Rise) (1), Level trigger (Condition: Fall) (2), or Level trigger (Condition: Rise and fall) (3).

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

☞ Page 59 Logging function

Setting value	Setting content
0	Disable
1	Level trigger (Condition: Rise)
2	Level trigger (Condition: Fall)
3	Level trigger (Condition: Rise and Fall)

Setting a value other than the above causes a level trigger condition setting range error (error code: 1D5☐H).

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Level trigger condition setting	540	740	940	1140
CH☐ Level trigger condition setting (In FX3 allocation mode function)	9211	9212	9213	9214

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is Disable (0) for all the channels.

CH1 Trigger data

Set a buffer memory address to be monitored using a level trigger.

Set the buffer memory address where the target data for monitoring is stored.

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

☞ Page 59 Logging function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Trigger data	541	741	941	1141
CH☐ Trigger data (In FX3 allocation mode function)	9221	9222	9223	9224

■Setting range

The possible setting range is from 0 to 9999.

Setting a value out of the range causes a trigger data setting range error (error code: 1D6☐H). Logging cannot be performed.

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default values are set as shown below.

Channel	Default value	Buffer memory area to be monitored
CH1	402	CH1 Digital operation value (Un\G402)
CH2	602	CH2 Digital operation value (Un\G602)
CH3	802	CH3 Digital operation value (Un\G802)
CH4	1002	CH4 Digital operation value (Un\G1002)

When the FX3 allocation mode function is used, the following applies.

Channel	Default value	Buffer memory area to be monitored
CH1	10	CH1 Digital operation value (Un\G10)
CH2	11	CH2 Digital operation value (Un\G11)
CH3	12	CH3 Digital operation value (Un\G12)
CH4	13	CH4 Digital operation value (Un\G13)

CH1 Trigger setting value

Set a level to generate a level trigger.

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

☞ Page 59 Logging function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Trigger setting value	542	742	942	1142
CH□ Trigger setting value (In FX3 allocation mode function)	9231	9232	9233	9234

■Setting range

The possible setting range is from -32768 to +32767.

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 0 for all channels.

CH1 Loading interrupt enable/disable setting

Set whether to enable or disable the logging read function.

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

☞ Page 59 Logging function

Setting value	Setting content
0	Enable
1	Disable

- Setting a value other than the above causes a read interrupt enable/disable setting error (error code: 1D8☐H). Logging cannot be performed.
- When set to Enable (0), an interrupt is generated and sent to the CPU module by setting a read pointer each time an amount equivalent to the logging read points setting value is logged.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Logging loading enable/disable setting	544	744	944	1144
CH☐ Logging loading enable/disable setting (in FX3 allocation mode function)	9271	9272	9273	9274

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is Disable (1) for all the channels.

CH1 Logging read points setting value

An interrupt is generated to the CPU module each time the data equal to the set data points is logged.

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

☞ Page 59 Logging function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Logging load points setting value	545	745	945	1145
CH☐ Logging load points setting value (in FX3 allocation mode function)	9281	9282	9283	9284

■Setting range

The possible setting range is from 10 to 10000.

Setting a value out of the range causes a logging load points setting value range error (error code: 1D9☐H). Logging cannot be performed.

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 1000 for all channels.

CH1 Digital filter setting

When Digital filter (5) is set in Average processing specification, Digital filter setting is executed.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Digital filter setting	570	770	970	1170
CH□ Digital filter setting (In FX3 allocation mode function)	6	7	8	9

■Setting range

The possible setting range is from 1 to 1600 (digits).

Setting a value out of the range causes a Digital filter setting range error (error code: 19D□H), and the A/D conversion processing is executed with the setting made before the error occurred.

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 0 for all channels.

CH1 Digital filter fluctuation width setting

The fluctuation width to be removed by digital filter processing is set.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH□ Digital filter fluctuation width setting	572, 573	772, 773	972, 973	1172, 1173
CH□ Digital filter fluctuation width setting (In FX3 allocation mode function)	1340, 1341	1342, 1343	1344, 1345	1346, 1347

■Setting range

The possible setting range is from 80 to 200000 (μs).

Set this value to Number of A/D conversion enabled channels × Conversion speed or more.

Setting a value out of the range causes a digital filter fluctuation width setting range error (error code: 19E□H), and the A/D conversion processing is executed with the setting made before the error occurred.

In the allowable setting range, when the value which is less than the value of "the Number of A/D conversion enable channels × Conversion speed" is set, "Digital filter fluctuation width setting range error" (error code: 19E□H) occurs and sampling processing is operated.

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 0 for all channels.

CH1 Range setting

This area is for setting an input range.

Setting value	Input range
0003H	4 to 20 mA
0009H	0 to 20 mA
0006H	-20 to +20 mA
000AH	1 to 5 V
000BH	0 to 5 V
0000H	-10 to +10 V
000CH	0 to 10 V
000EH	User range setting

Setting a value other than the above causes an input range setting range error (error code: 190☐H).

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Range setting	598	798	998	1198

■Enabling the setting

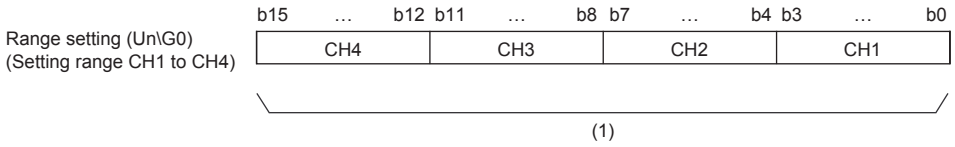
Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

■Default value

The default value is 0003H for all channels.

Range setting [FX3 allocation mode]

When the FX3 allocation mode function is used, this area is for setting an input range.



Set the following setting values for the bits corresponding to each CH.

Setting value	Input range
0H	-10 to +10 V
1H	
2H	
3H	4 to 20 mA
4H	
5H	
6H	-20 to +20 mA
7H	
8H	
9H	0 to 20 mA
AH	1 to 5 V
BH	0 to 5 V
CH	0 to 10 V
EH	User range setting

■Buffer memory address

Buffer memory name	CH1	CH2	CH3	CH4
Range setting (in FX3 allocation mode function)	0			

■Enabling the setting

Turn off→on→off 'Operating condition setting request' (Un\G70, b9) to enable the setting.

Error history

Up to 16 errors that occurred in the analog input module are logged.

	b15 to b8	b7 to b0
Un\G3600	Error code	
Un\G3601	First two digits of the year	Last two digits of the year
Un\G3602	Month	Day
Un\G3603	Hour	Minute
Un\G3604	Second	Day of the week
Un\G3605	Millisecond (upper)	Millisecond (lower)
Un\G3606	System area	
⋮		
Un\G3609		

Item	Storage contents	Storage example*1
First two digits of the year/Last two digits of the year	Stored in BCD code.	2017H
Month/Day		0130H
Hour/Minute		1035H
Second		40H
Day of the week	One of the following values is stored in BCD code. Sunday: 0, Monday: 1, Tuesday: 2, Wednesday: 3, Thursday: 4, Friday: 5, Saturday: 6	1H
Millisecond (upper)	Stored in BCD code.	06H
Millisecond (lower)		28H

*1 These values assume that an error occurs at 10:35 and 40.628 seconds on Monday, January 30th, 2017.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	No.1 to No.16
Error history	3600 to 3759
Error history (In FX3 allocation mode function)	8600 to 8759

A

Alarm history

Up to 16 alarms that occurred in the analog input module are logged.

	b15 to b8	b7 to b0
Un\G3760	Alarm code	
Un\G3761	First two digits of the year	Last two digits of the year
Un\G3762	Month	Day
Un\G3763	Hour	Minute
Un\G3764	Second	Day of the week
Un\G3765	Millisecond (upper)	Millisecond (lower)
Un\G3766	System area	
⋮		
Un\G3769		

Item	Storage contents	Storage example*1
First two digits of the year/Last two digits of the year	Stored in BCD code.	2017H
Month/Day		0130H
Hour/Minute		1035H
Second		40H
Day of the week	One of the following values is stored in BCD code. Sunday: 0, Monday: 1, Tuesday: 2, Wednesday: 3, Thursday: 4, Friday: 5, Saturday: 6	1H
Millisecond (upper)	Stored in BCD code.	06H
Millisecond (lower)		28H

*1 These values assume that an alarm occurs at 10:35 and 40.628 seconds on Monday, January 30th, 2017.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	No.1 to No.16
Alarm history	3760 to 3919
Alarm history (in FX3 allocation mode function)	8760 to 8919

CH1 Offset/gain setting mode

Specify the channel where the offset/gain setting is adjusted.

- Offset/gain setting mode (offset specification): Channel to adjust the offset
- Offset/gain setting mode (gain specification): Channel to adjust the gain

Setting	Setting content
0	Disable
1	Setting channel

Set one of the offset specification or gain specification to the Setting channel (1), and the other to Disable (0). Setting a value other than 0 and 1 causes an offset/gain setting channel range error (error code: 1E8☐H).

Multiple channels can be set at the same time. In that case, set the offset specification and gain specification separately. The offset specification and gain specification cannot be set at the same time.

In the following cases, an offset/gain setting channel specification error (error code: 1E50H) occurs.

- When both the offset specification and gain specification of the same channel are set to Setting channel (1)
- When both the offset specification and gain specification of the same channel are set to Disable (0)

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Offset/gain setting mode (offset specification)	4132	4134	4136	4138
CH☐ Offset/gain setting mode (gain specification)	4133	4135	4137	4139
CH☐ Offset/gain setting mode (offset specification) (in FX3 allocation mode function)	4131	4132	4133	4134
CH☐ Offset/gain setting mode (gain specification) (In FX3 allocation mode function)	4141	4142	4143	4144

■Enabling the setting

Turn off→on 'Channel change request' (Un\G70, b11).

■Default value

The default value is Disable (0) for all the channels.

CH1 Offset/gain setting mode (Range specification)

In the offset/gain setting, specify the current input or voltage input for each channel.

Setting value	Setting content
0	Voltage
1	Current

When a value other than 0 or 1 is set, the setting is regarded as Current (1).

- When an offset/gain value is written in the offset/gain setting mode (when 'User range write request' (Un\G70, b10) is turned off→on), this setting is written to the flash memory.

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Offset/gain setting mode (range specification)	4164	4165	4166	4167
CH☐ Offset/gain setting mode (range specification) (In FX3 allocation mode function)	4151	4152	4153	4154

■Default value

The default value is Voltage (0) for all channels.

When the mode changes to offset gain setting, the value saved in the flash memory is set.

CH1 Logging data

This area stores the data logged by the logging function.

Up to 10000 points of data can be stored per channel. After the number of stored data points reaches 10000, data collection continues with the data overwritten from the head.

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

☞ Page 59 Logging function

■Buffer memory address

The following shows the buffer memory address of this area.

Buffer memory name	CH1	CH2	CH3	CH4
CH☐ Logging data	10000 to 19999	20000 to 29999	30000 to 39999	40000 to 49999
CH☐ Logging data (In FX3 allocation mode function)	10000 to 19999	20000 to 29999	30000 to 39999	40000 to 49999

Point

- Turning off→on 'Operating condition setting request' (Un\G70, b9) allows the logging data in all the channels to be cleared.
- Turning on→off Logging hold request while Logging hold flag is on allows logging to resume. In this case, the logged data is not cleared.