

Programmable Controller

MELSEC iQ-F
series

MELSEC iQ-F

FX5 Analog Input Module/Output Module/

Multiple Input Module Function Block Reference



SAFETY PRECAUTIONS

(Read these precautions before use.)

Before using this product, please read this reference and the relevant manuals introduced in this reference carefully and pay full attention to safety in order to handle the product correctly.

The precautions given in this reference are concerned with this product only. For the safety precautions of the programmable controller system, refer to the User's Manual (Hardware) of the CPU module used.

This reference classifies the safety precautions into two categories: "⚠️ WARNING" and "⚠️ CAUTION".

 WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
 CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Depending on the circumstances, procedures indicated by "⚠️ CAUTION" may also cause severe injury

It is important to follow all precautions for personal safety.

Store this manual in a safe place so that it can be read whenever necessary. Always forward it to the end user.

INTRODUCTION

Thank you for purchasing the Mitsubishi MELSEC iQ-F series programmable controllers. This reference will guide the reader in module FBs for following target modules. Before using this product, please read this manual and the relevant manuals introduced in this specifications carefully and pay attention to safety in order to handle the product correctly. Always forward it to the end user.

Relevant products

- FX5-4AD
- FX5-4DA
- FX5-8AD

Regarding use of this product

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult Mitsubishi Electric.
- This product has been manufactured under strict quality control. However when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions into the system.

Note

- If in doubt at any stage during the installation of the product, always consult a professional electrical engineer who is qualified and trained to the local and national standards. If in doubt about the operation or use, please consult your local Mitsubishi Electric representative.
- Mitsubishi Electric will not accept responsibility for actual use of the product based on these illustrative examples. Please use it after confirming the function and safety of the equipment and system.
- The content, specification etc. of this manual may be changed, for improvement, without notice.
- The information in this manual has been carefully checked and is believed to be accurate; however, if you notice a doubtful point, an error, etc., please contact your local Mitsubishi Electric representative.

MEMO

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RELEVANT MANUALS

Manual name <manual number>	Description
MELSEC iQ-F FX5 User's Manual (Startup) <JY997D58201>	Performance specifications, procedures before operation, and troubleshooting of the CPU module.
MELSEC iQ-F FX5UJ User's Manual (Hardware) <SH-082206ENG>	Describes the details of hardware of the FX5UJ CPU module, including input/output specifications, wiring, installation, and maintenance.
MELSEC iQ-F FX5U User's Manual (Hardware) <JY997D55301>	Describes the details of hardware of the FX5U CPU module, including input/output specifications, wiring, installation, and maintenance.
MELSEC iQ-F FX5UC User's Manual (Hardware) <JY997D61401>	Describes the details of hardware of the FX5UC CPU module, including input/output specifications, wiring, installation, and maintenance.
MELSEC iQ-F FX5 User's Manual (Application) <JY997D55401>	Describes basic knowledge required for program design, functions of the CPU module, devices/labels, and parameters.
MELSEC iQ-F FX5 Programming Manual (Program Design) <JY997D55701>	Describes specifications of ladders, ST, FBD/LD, and other programs and labels.
MELSEC iQ-F FX5 Programming Manual (Instructions, Standard Functions/Function Blocks) <JY997D55801>	Describes specifications of instructions and functions that can be used in programs.
MELSEC iQ-F FX5 User's Manual (Analog Control - Intelligent function module) <SH-081802ENG>	Describes the analog input module, analog output module, and multiple input module.
GX Works3 Operating Manual <SH-081215ENG>	System configuration, parameter settings, and online operations of GX Works3.

TERMS

Unless otherwise specified, this manual uses the following terms.

For details on the FX3 devices that can be connected with the FX5, refer to the User's Manual (Hardware) of the CPU module to be used.

Terms	Description
FX5	Generic term for FX5UJ, FX5U and FX5UC PLCs
FX5 CPU module	Generic term for FX5UJ CPU module, FX5U CPU module and FX5UC CPU module
FX5UJ CPU module	Generic term for FX5UJ-24MR/ES, FX5UJ-24MT/ES, FX5UJ-24MT/ESS, FX5UJ-40MR/ES, FX5UJ-40MT/ES, FX5UJ-40MT/ESS, FX5UJ-60MR/ES, FX5UJ-60MT/ES, and FX5UJ-60MT/ESS
FX5U CPU module	Generic term for FX5U-32MR/ES, FX5U-32MT/ES, FX5U-32MT/ESS, FX5U-64MR/ES, FX5U-64MT/ES, FX5U-64MT/ESS, FX5U-80MR/ES, FX5U-80MT/ES, FX5U-80MT/ESS, FX5U-32MR/DS, FX5U-32MT/DS, FX5U-32MT/DSS, FX5U-64MR/DS, FX5U-64MT/DS, FX5U-64MT/DSS, FX5U-80MR/DS, FX5U-80MT/DS, and FX5U-80MT/DSS
FX5UC CPU module	Generic term for FX5UC-32MT/D, FX5UC-32MT/DSS, FX5UC-64MT/D, FX5UC-64MT/DSS, FX5UC-96MT/D, FX5UC-96MT/DSS, FX5UC-32MT/DS-TS, FX5UC-32MT/DSS-TS, and FX5UC-32MR/DS-TS
Engineering tool	A tool used for setting up programmable controllers, programming, debugging, and maintenance.
Module label	A label that represents one of memory areas (I/O signals and buffer memory areas) specific to each module in a given character string. For the module used, GX Works3 automatically generates this label, which can be used as a global label.
Hold trigger	When the set trigger conditions are met, logging is stopped (held) after the set number of data points is collected. The trigger occurs at this time.
Level trigger	The value is monitored in the digital output value or digital calculated value update cycle. When the set conditions are met, a hold trigger occurs.

GENERIC TERMS AND ABBREVIATIONS

Unless otherwise specified, this manual uses the following generic terms and abbreviations.

Generic terms and abbreviations	Description
FB	FB is the abbreviation for function block, in which the circuit blocks used repeatedly in a sequence program are broken down into parts so that the parts can be used for other purposes in the sequence program. This improves the program development efficiency, reduces program errors and improves the program quality.

1 OVERVIEW

The FBs listed in this reference are module FBs (for GX Works3) to use the MELSEC iQ-F series analog input module (FX5-4AD), multiple input module (FX5-8AD) and analog output module (FX5-4DA).

1.1 Function Block (FB) List

Shown below is the list of the module FBs cited in this reference.

Point

Note that this reference does not describe the FB version information which is displayed such as "_00A" at the end of FB name.

Analog input module, Multiple input module FB

■FX5-4AD

○: Required —: Not required

Name	Description	Necessity of parameter setting
M+FX5-4AD_RequestSetting (Validation of settings)	Enables the settings of each function.	—
M+FX5-4AD_OperateError (Error operation)	Monitors error codes and resets errors.	—
M+FX5-4AD_SetLoggingParam (Logging function setting)	Sets up the logging function of a specified channel.	—

■FX5-8AD

○: Required —: Not required

Name	Description	Necessity of parameter setting
M+FX5-8AD_RequestSetting (Validation of settings)	Enables the settings of each function.	—
M+FX5-8AD_OperateError (Error operation)	Monitors error codes and resets errors.	—
M+FX5-8AD_SetLoggingParam (Logging function setting)	Sets up the logging function of a specified channel.	—


Analog output module FB

■FX5-4DA

○: Required —: Not required

Name	Description	Necessity of parameter setting
M+FX5-4DA_RequestSetting (Validation of setting)	Enables the settings of each function.	—
M+FX5-4DA_OperateError (Error operation)	Monitors error codes and resets errors.	—
M+FX5-4DA_WaveOutputSetting (Waveform output setting)	Sets the wave output of a specified channel or all channels.	○
M+FX5-4DA_WaveOutputReqSetting (Waveform output operation)	Specifies whether to start, stop, or pause the wave output of a specified channel or all channels.	○

1.2 How to Obtain

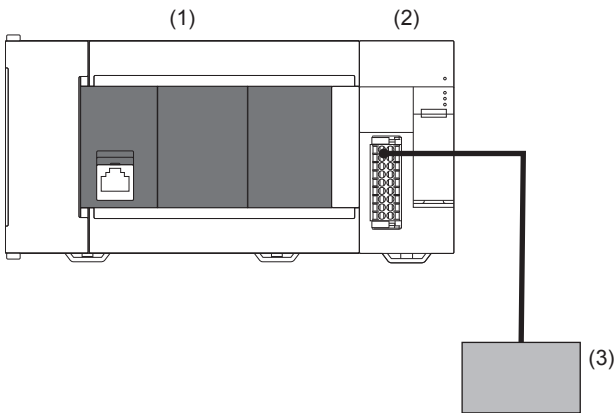
The analog input module FB, the multiple input module FB, and the analog output module FB described in this reference manual are incorporated into GX Works3^{*1}. For using the module FBs, refer to the  GX Works3 Operating Manual.

*1 Use appropriate GX Works3 compatible with the module FB used.

1.3 System Configuration

System configurations to use the module FBs for this reference is shown below.

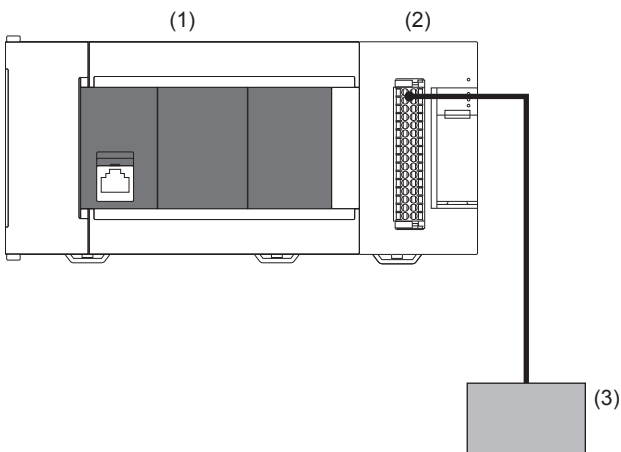
Analog input module FB



- (1) FX5 CPU module
- (2) Analog input module (FX5-4AD)
- (3) Current sensor, Voltage sensor

For specifications of the module used, refer to the [MELSEC iQ-F FX5 User's Manual\(Analog Control - Intelligent function module\)](#).

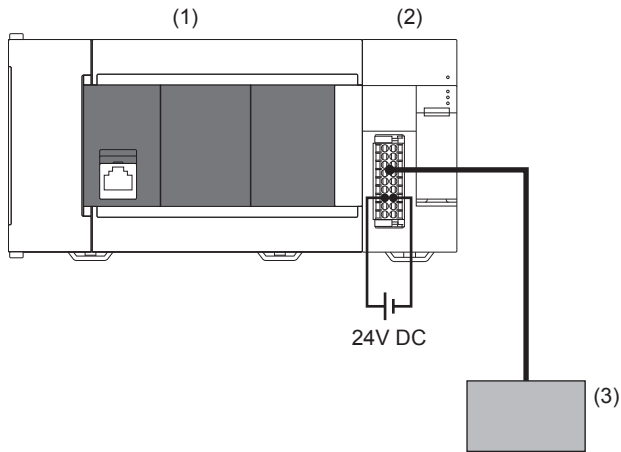
Multiple input module FB




- (1) FX5 CPU module
- (2) Multiple input module (FX5-8AD)
- (3) Current input, Voltage input, Resistance temperature detector input, Thermocouple input

For specifications of the module used, refer to the [MELSEC iQ-F FX5 User's Manual\(Analog Control - Intelligent function module\)](#).

Analog output module FB



- (1) FX5 CPU module
- (2) Analog output module (FX5-4DA)
- (3) Inverter, DC motor

For specifications of the module used, refer to the  MELSEC iQ-F FX5 User's Manual(Analog Control - Intelligent function module).

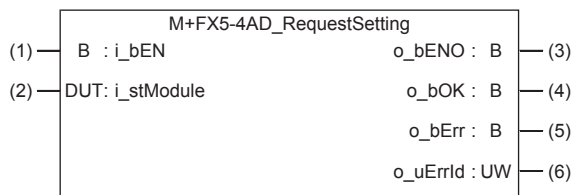
2 ANALOG INPUT MODULE, MULTIPLE INPUT MODULE FB

2.1 M+Model_RequestSetting (Validation of settings)

No.	Name	Target module
1	M+FX5-4AD_RequestSetting	FX5-4AD
2	M+FX5-8AD_RequestSetting	FX5-8AD

Overview

Turning on i_bEN (execution command) allows the settings of all channels to be enabled.



Labels

Input label

No.	Variable name	Name	Data type	Range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_stModule	Module label	Structure	The setting range differs depending on the module label.	Specifies the module label for the analog input/multiple input module.

Output label

No.	Variable name	Name	Data type	Default value	Description
(3)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(4)	o_bOK	Normal completion	Bit	OFF	The on state indicates that the operation to enable each setting is complete.
(5)	o_bErr	Error completion	Bit	OFF	Always OFF
(6)	o_uErrId	Error code	Word [Unsigned]/Bit String [16-bit]	0	Always 0

FB details

Available device

■Analog input module, Multiple input module

Target module	Firmware Version	Engineering tool
FX5-4AD	—	GX Works3 Version 1.040S or later
FX5-8AD	—	GX Works3 Version 1.040S or later

■CPU module

MELSEC iQ-F series

Basic specifications

Item	Description
Language	Ladder diagram
Number of steps	57 steps The number of FB steps integrated in the program varies depending on the CPU module used, the input/output definition, and the setting options of GX Works3. For the setting options of GX Works3, refer to GX Works3 Operating Manual .
The amount of label usage	<ul style="list-style-type: none"> Label: 0.01 K point (Word) Latch label: 0 K point (Word) The amount of labels used in the program varies depending on the CPU module used, the device specified in an argument and the option setting of GX Works3. For the option setting of GX Works3, refer to GX Works3 Operating Manual .
The number of index register usage	<ul style="list-style-type: none"> Index register:0 point Long index register:0 point
The amount of file register usage	0 point
FB dependence	No dependence
FB compilation method	Macro type
FB operation	Pulsed execution (multiple scan execution type)

Processing

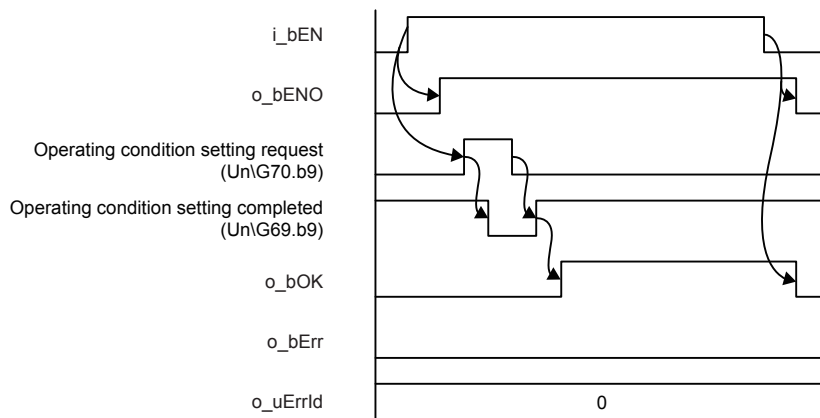
- Turning on i_bEN (execution command) allows the settings of all channels to be enabled. For what settings are enabled, refer to the following manuals.

For the analog input module setting procedure, refer to [MELSEC iQ-F FX5 User's Manual \(Analog Control - Intelligent function module\)](#).



For the multi-input module setting procedure, refer to [MELSEC iQ-F FX5 User's Manual \(Analog Control - Intelligent function module\)](#).

- This FB continues its execution until the completion of the settings of each function after i_bEN (execution command) turns on.

Timing chart of I/O signals



Restrictions or precautions

- This FB does not include the error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- As this FB is executed, the A/D conversion processing stops, and thereafter when o_bOK (normal completion) turns on, the conversion processing resumes.
- When operating the analog input module and multiple input module, the input range needs to be set according to the device and system to be connected. Set the GX Works3 module parameters according to the application. For the analog input module setting procedure, refer to  MELSEC iQ-F FX5 User's Manual (Analog Control - Intelligent function module). For the multi-input module setting procedure, refer to  MELSEC iQ-F FX5 User's Manual (Analog Control - Intelligent function module).

Parameter setting

No parameters are required to use this FB.

Performance value

CPU	Performance value		Number of scans
	Processing time	Maximum scan time	
FX5UJ	11.4 ms	0.752 ms	34 scan
FX5U, FX5UC ^{*1*2}	11.3 ms	0.526 ms	40 scan

*1 When the program capacity is set to 128 K steps, the processing speed may be reduced.

*2 The labels in the standard area are used.

Error code

Error code (hexadecimal)	Description	Action
None	None	None

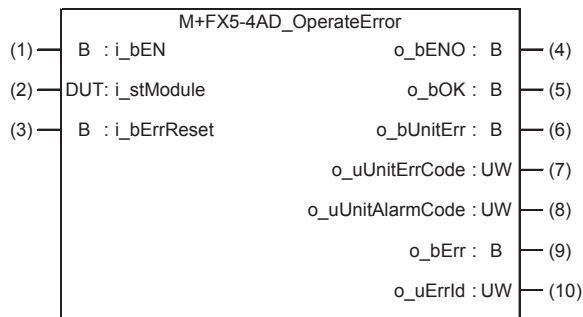
2.2 M+Model_OperateError (Error operation)

No.	Name	Target module
1	M+FX5-4AD_OperateError	FX5-4AD
2	M+FX5-8AD_OperateError	FX5-8AD

Overview

As i_bEN (execution command) turns on, errors in the target module are monitored.

After i_bEN (execution command) turns on, turning on i_bErrReset (error reset request) during an error allows the error to be reset.



Labels

Input label

No.	Variable name	Name	Data type	Range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_stModule	Module label	Structure	The setting range differs depending on the module label.	Specifies the module label for the analog input/multiple input module.
(3)	i_bErrReset	Error reset request	Bit	ON, OFF	Turn on this label to reset errors. After completion of the error reset, turn off the label.

Output label

No.	Variable name	Name	Data type	Default value	Description
(4)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(5)	o_bOK	Normal completion	Bit	OFF	The on state indicates that the error reset is complete.
(6)	o_bUnitErr	Module error outbreak flag	Bit	OFF	The on state indicates that a module error has occurred.
(7)	o_uUnitErrCode	Module error code	Word [Unsigned]/Bit String [16-bit]	0	The error code of an error occurred is stored.
(8)	o_uUnitAlarmCode	Module alarm code	Word [Unsigned]/Bit String [16-bit]	0	The alarm code of an alarm occurred is stored.
(9)	o_bErr	Error completion	Bit	OFF	Always OFF
(10)	o_uErrId	Error code	Word [Unsigned]/Bit String [16-bit]	0	Always 0

FB details

Available device

■Analog input module, Multiple input module

Target module	Firmware Version	Engineering tool
FX5-4AD	—	GX Works3 Version 1.040S or later
FX5-8AD	—	GX Works3 Version 1.040S or later

■CPU module

MELSEC iQ-F series

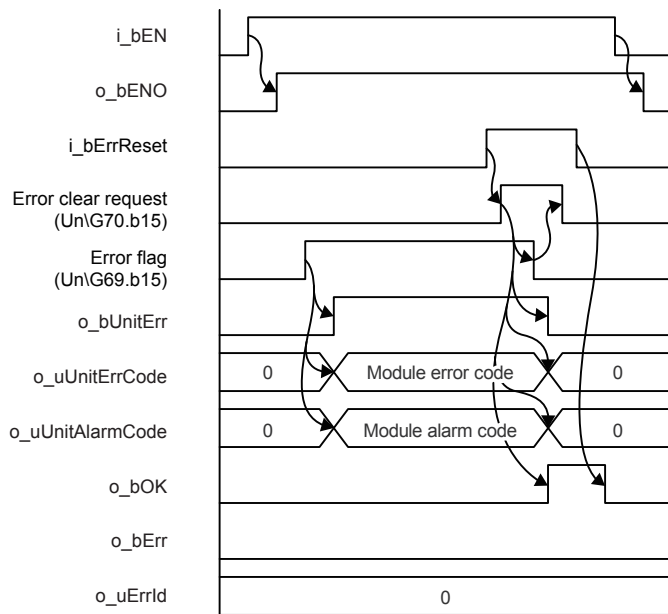
Basic specifications

Item	Description
Language	Ladder diagram
Number of steps	195 steps The number of FB steps integrated in the program varies depending on the CPU module used, the input/output definition, and the setting options of GX Works3. For the setting options of GX Works3, refer to GX Works3 Operating Manual.
The amount of label usage	<ul style="list-style-type: none"> Label: 0.01 K point (Word) Latch label: 0 K point (Word) The amount of labels used in the program varies depending on the CPU module used, the device specified in an argument and the option setting of GX Works3. For the option setting of GX Works3, refer to GX Works3 Operating Manual.
The number of index register usage	<ul style="list-style-type: none"> Index register:0 point Long index register:0 point
The amount of file register usage	0 point
FB dependence	No dependence
FB compilation method	Macro type
FB operation	Arbitrary execution type



Processing

For using the Processing, refer to the Page 14 Overview.

Timing chart of I/O signals



Restrictions or precautions

- This FB does not include the error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- When operating the analog input module and multiple input module, the input range needs to be set according to the device and system to be connected. Set the GX Works3 module parameters according to the application. For the analog input module setting procedure, refer to  MELSEC iQ-F FX5 User's Manual (Analog Control - Intelligent function module). For the multi-input module setting procedure, refer to  MELSEC iQ-F FX5 User's Manual (Analog Control - Intelligent function module).

Parameter setting

No parameters are required to use this FB.

Performance value

CPU	Performance value		Number of scans
	Processing time	Maximum scan time	
FX5UJ	0.62 ms	0.779 ms	1 scan
FX5U, FX5UC ^{*1*2}	5.05 ms	0.575 ms	1 scan

*1 When the program capacity is set to 128 K steps, the processing speed may be reduced.

*2 The labels in the standard area are used.

Error code

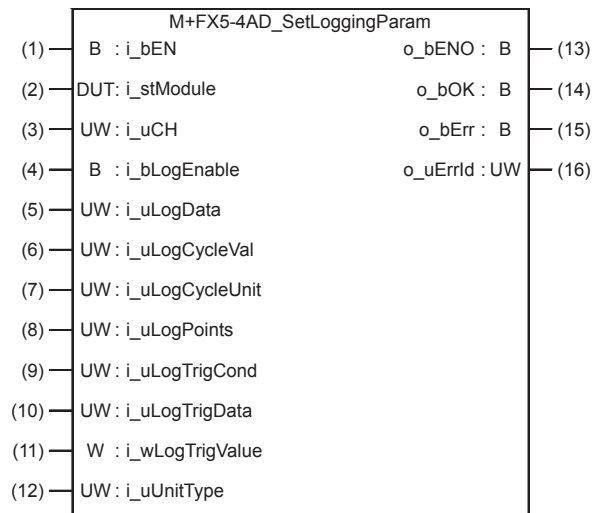
Error code (hexadecimal)	Description	Action
None	None	None

2.3 M+Model_SetLoggingParam (Logging function setting)

No.	Name	Target module
1	M+FX5-4AD_SetLoggingParam	FX5-4AD
2	M+FX5-8AD_SetLoggingParam	FX5-8AD

Overview

Turning on `i_bEN` (execution command) allows the logging function of a specified channel to be set.



Labels

Input label

No.	Variable name	Name	Data type	Range	Description				
(1)	<code>i_bEN</code>	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.				
(2)	<code>i_stModule</code>	Module label	Structure	The setting range differs depending on the module label.	Specifies the module label for the analog input/multiple input module.				
(3)	<code>i_uCH</code>	Target channel	Word [Unsigned]/Bit String [16-bit]	<table border="1"> <tr> <td>■FX5-4AD</td> <td>1 to 4</td> </tr> <tr> <td>■FX5-8AD</td> <td>1 to 8</td> </tr> </table>	■FX5-4AD	1 to 4	■FX5-8AD	1 to 8	Specifies a channel number.
■FX5-4AD	1 to 4								
■FX5-8AD	1 to 8								
(4)	<code>i_bLogEnable</code>	Logging enable/disable setting	Bit	ON, OFF	ON: Enables the logging function. OFF: Disables the logging function.				
(5)	<code>i_uLogData</code>	Logging data setting	Word [Unsigned]/Bit String [16-bit]	0: Digital output value 1: Digital operation value	Sets the data to be logged.				

No.	Variable name	Name	Data type	Range	Description
(6)	i_uLogCycleVal	Logging cycle setting value	Word [Unsigned]/Bit String [16-bit]	<p>■FX5-4AD When the logging cycle unit setting is 0: 80 to 32767 When the logging cycle unit setting is 1: 1 to 32767 When the logging cycle unit setting is 2: 1 to 3600</p> <p>■FX5-8AD When the logging cycle unit setting is 1 (current/voltage range): 1 to 32767 When the logging cycle unit setting is 1 (resistance temperature detector/thermocouple range): 40 to 32767 When the logging cycle unit setting is 2: 1 to 3600</p>	Sets the interval of cycles at which data is stored.
(7)	i_uLogCycleUnit	Logging cycle unit setting	Word [Unsigned]/Bit String [16-bit]	<p>■FX5-4AD 0: μs 1: ms 2: s</p> <p>■FX5-8AD 1: ms 2: s</p>	Specifies the unit of cycles at which data is stored.
(8)	i_uLogPoints	Number of posttrigger logging points	Word [Unsigned]/Bit String [16-bit]	1 to 10000	Specifies the number of data to be logged after a hold trigger occurs by one point.
(9)	i_uLogTrigCond	Level trigger condition setting	Word [Unsigned]/Bit String [16-bit]	0: Disable 1: Rise 2: Fall 3: Rise and fall	Sets the condition in which a level trigger is to be used. Set 0 if using no lever trigger.
(10)	i_uLogTrigData	Trigger data	Word [Unsigned]/Bit String [16-bit]	0 to 9999	Specifies a buffer memory address to be monitored by level trigger.
(11)	i_wLogTrigValue	Trigger setting value	Word [Signed]	-32768 to +32767	Sets the level at which a level trigger is generated.
(12)	i_uUnitType	Module type	Word [Unsigned]/Bit String [16-bit]	<p>■FX5-4AD 0: FX5-4AD</p> <p>■FX5-8AD 0: FX5-8AD</p>	Specifies a module type.

Output label

No.	Variable name	Name	Data type	Default value	Description
(13)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(14)	o_bOK	Normal completion	Bit	OFF	The on state indicates that the setting of the logging function parameters is completed.
(15)	o_bErr	Error completion	Bit	OFF	The on state indicates that an error has occurred in the FB.
(16)	o_uErrId	Error code	Word [Unsigned]/Bit String [16-bit]	0	The error code of an error occurred in the FB is stored.

FB details

Available device

■Analog input module, Multiple input module

Target module	Firmware Version	Engineering tool
FX5-4AD	—	GX Works3 Version 1.040S or later
FX5-8AD	—	GX Works3 Version 1.040S or later

■CPU module

MELSEC iQ-F series

Basic specifications

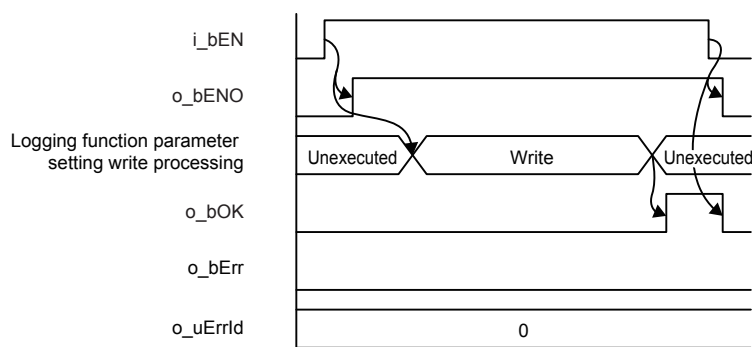
Item	Description
Language	Ladder diagram
Number of steps	226 steps The number of FB steps integrated in the program varies depending on the CPU module used, the input/output definition, and the setting options of GX Works3. For the setting options of GX Works3, refer to GX Works3 Operating Manual.
The amount of label usage	• Label: 0.02 K point (Word) • Latch label: 0 K point (Word) The amount of labels used in the program varies depending on the CPU module used, the device specified in an argument and the option setting of GX Works3. For the option setting of GX Works3, refer to GX Works3 Operating Manual.
The number of index register usage	• Index register:0 point • Long index register:0 point
The amount of file register usage	0 point
FB dependence	No dependence
FB compilation method	Macro type
FB operation	Pulse execution type (single scan execution type)

Processing

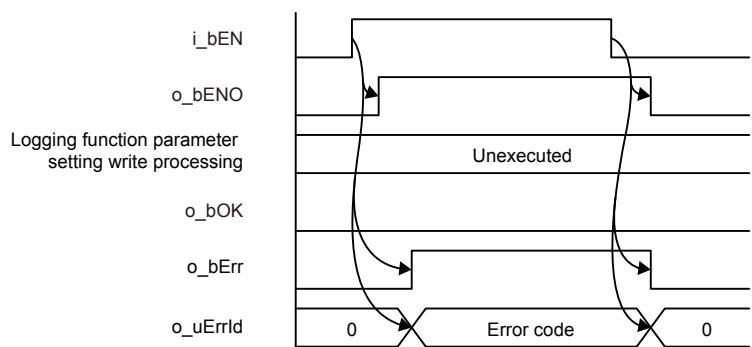
- Turning on i_bEN (execution command) allows the logging function of a specified channel to be set.
- This FB works for only one shot as i_bEN (execution command) turns on.
- The set value is enabled by turning on and off 'Operating condition setting request' (Un\G70.b9) or executing the operating condition setting request operation FB (M+Model_RequestSetting).
- When the setting values of target channel are out of range, o_bErr (Error completion) turns on, and the FB processing are stopped. Also, Error code 100 (Hexadecimal) is stored in o_uErrId (Error code). For the error code, refer to Page 21 Error code.
- When the setting values of module type are out of range, o_bErr (Error completion) turns on, and the FB processing are stopped. Also, Error code 101 (Hexadecimal) is stored in o_uErrId (Error code). For the error code, refer to Page 21 Error code.

Timing chart of I/O signals

■For normal completion



■For error completion



Restrictions or precautions

- This FB does not include the error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- Using the FB in a program that is to be executed only once, such as a subroutine program or a FOR-NEXT loop, has a problem that **i_bEN** (execution command) can no longer be turned off and normal operation is not possible; Always use the FB in a program that is capable of turning off the execution command.
- To use more than one of this FB, care must be taken to avoid duplication of the target channel.
- The FB requires the configuration of the ladder for every input label.
- If the parameters are set by means of the module parameters of GX Works3, this FB is not required.
- When operating the analog input module and multiple input module, the input range needs to be set according to the device and system to be connected. Set the GX Works3 module parameters according to the application. For the analog input module setting procedure, refer to [MELSEC iQ-F FX5 User's Manual \(Analog Control - Intelligent function module\)](#). For the multi-input module setting procedure, refer to [MELSEC iQ-F FX5 User's Manual \(Analog Control - Intelligent function module\)](#).

Parameter setting

No parameters are required to use this FB.

Performance value

CPU	Performance value		Number of scans
	Processing time	Maximum scan time	
FX5UJ	0.145 ms	0.764 ms	1 scan
FX5U, FX5UC ^{*1*2}	0.133 ms	0.567 ms	1 scan

*1 When the program capacity is set to 128 K steps, the processing speed may be reduced.

*2 The labels in the standard area are used.

Error code

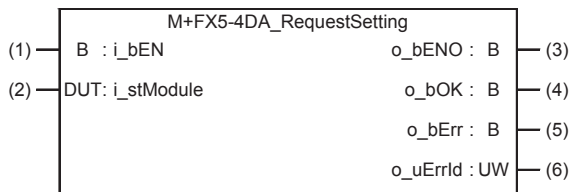
Error code (hexadecimal)	Description	Action
100	The target channel is set out of the range. Set the target channel within the following range. • FX5-4AD: 1 to 4 • FX5-8AD: 1 to 8	Review and correct the settings and then execute the FB again.
102	The module type is set out of the range. Set the module type to the following values. • FX5-4AD: 0 • FX5-8AD: 0	Review and correct the settings and then execute the FB again.

3 ANALOG OUTPUT MODULE FB

3.1 M+FX5-4DA_RequestSetting (Validation of settings)

Overview

Turning on i_bEN (execution command) allows the settings of all channels to be enabled.



Labels

Input label

No.	Variable name	Name	Data type	Range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_stModule	Module label	Structure	The setting range differs depending on the module label.	Specifies the module label for the analog output module.

Output label

No.	Variable name	Name	Data type	Default value	Description
(3)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(4)	o_bOK	Normal completion	Bit	OFF	The on state indicates that the operation to enable each setting is complete.
(5)	o_bErr	Error completion	Bit	OFF	Always OFF
(6)	o_uErrId	Error code	Word [Unsigned]/Bit String [16-bit]	0	Always 0

FB details

Available device

■Analog output module

Target module	Firmware Version	Engineering tool
FX5-4DA	—	GX Works3 Version 1.040S or later

■CPU module

MELSEC iQ-F series

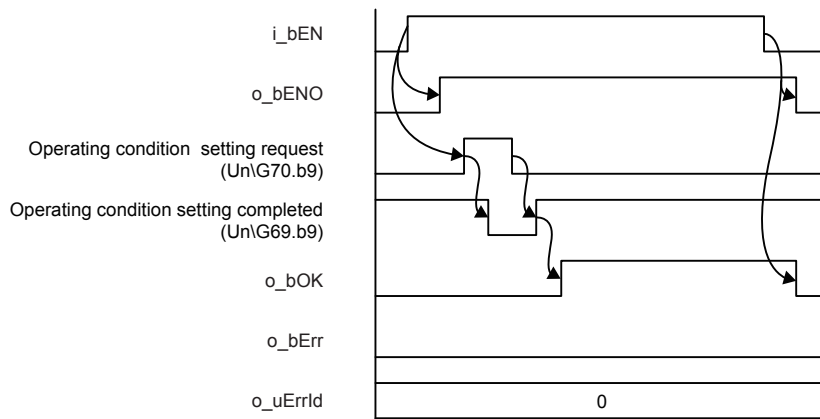
Basic specifications

Item	Description
Language	Ladder diagram
Number of steps	54 steps The number of FB steps integrated in the program varies depending on the CPU module used, the input/output definition, and the setting options of GX Works3. For the setting options of GX Works3, refer to GX Works3 Operating Manual .
The amount of label usage	<ul style="list-style-type: none"> Label: 0.01 K point (Word) Latch label: 0 K point (Word) The amount of labels used in the program varies depending on the CPU module used, the device specified in an argument and the option setting of GX Works3. For the option setting of GX Works3, refer to GX Works3 Operating Manual .
The number of index register usage	<ul style="list-style-type: none"> Index register:0 point Long index register:0 point
The amount of file register usage	0 point
FB dependence	No dependence
FB compilation method	Macro type
FB operation	Pulsed execution (multiple scan execution type)

Processing

- Turning on i_bEN (execution command) allows the settings of all channels to be enabled. For what settings are enabled, refer to [MELSEC iQ-F FX5 User's Manual \(Analog Control - Intelligent function module\)](#).
- This FB continues its execution until the completion of the settings of each function after i_bEN (execution command) turns on.

Timing chart of I/O signals



Restrictions or precautions

- This FB does not include the error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- This FB turns on or off Operating condition setting request (Un\G70.b9). Attention is required as D/A conversion stops during execution of this FB.
- When operating the analog output module, the output range setting, and operation mode setting need to be set according to the device and system to be connected. Set the GX Works3 module parameters according to the application. Refer to the [MELSEC iQ-F FX5 User's Manual \(Analog Control - Intelligent function module\)](#) for details on setting the module parameters.

Parameter setting

No parameters are required to use this FB.

Performance value

CPU	Performance value		Number of scans
	Processing time	Maximum scan time	
FX5UJ	0.527 ms	0.711 ms	1 scan
FX5U, FX5UC ^{*1*2}	0.433 ms	0.602 ms	1 scan

*1 When the program capacity is set to 128 K steps, the processing speed may be reduced.

*2 The labels in the standard area are used.

Error code

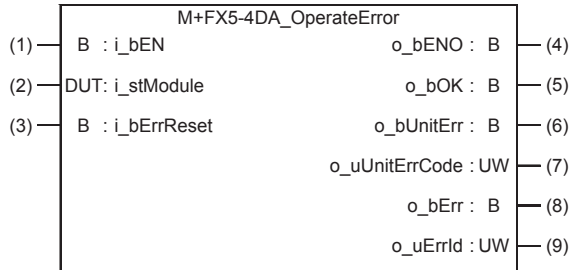
Error code (hexadecimal)	Description	Action
None	None	None

3.2 M+FX5-4DA_OperateError (Error operation)

Overview

As i_bEN (execution command) turns on, the error information in the target module is monitored.

After i_bEN (execution command) turns on, turning on i_bErrReset (error reset request) during an error allows the error to be reset.



Labels

Input label

No.	Variable name	Name	Data type	Range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_stModule	Module label	Structure	The setting range differs depending on the module label.	Specifies the module label for the analog output module.
(3)	i_bErrReset	Error reset request	Bit	ON, OFF	Turn on this label to reset the errors. Turn off this label after the error reset.

Output label

No.	Variable name	Name	Data type	Default value	Description
(4)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON.(Module errors are being monitored.) OFF: The execution command is OFF.
(5)	o_bOK	Normal completion	Bit	OFF	The on state indicates that executing the error reset instruction has been completed.
(6)	o_bUnitErr	Module error outbreak flag	Bit	OFF	The on state indicates that a module error has occurred.
(7)	o_uUnitErrCode	Module error code	Word [Unsigned]/Bit String [16-bit]	0	The error code of an error occurred is stored.
(8)	o_bErr	Error completion	Bit	OFF	Always OFF
(9)	o_uErrId	Error code	Word [Unsigned]/Bit String [16-bit]	0	Always 0

FB details

Available device

■Analog output module

Target module	Firmware Version	Engineering tool
FX5-4DA	—	GX Works3 Version 1.040S or later

■CPU module

MELSEC iQ-F series

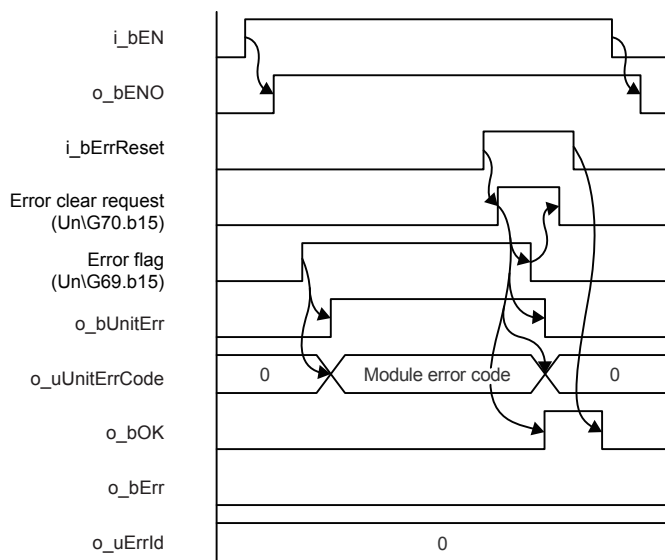
Basic specifications

Item	Description
Language	Ladder diagram
Number of steps	94 steps The number of FB steps integrated in the program varies depending on the CPU module used, the input/output definition, and the setting options of GX Works3. For the setting options of GX Works3, refer to GX Works3 Operating Manual .
The amount of label usage	<ul style="list-style-type: none"> Label: 0.01 K point (Word) Latch label: 0 K point (Word) The amount of labels used in the program varies depending on the CPU module used, the device specified in an argument and the option setting of GX Works3. For the option setting of GX Works3, refer to GX Works3 Operating Manual .
The number of index register usage	<ul style="list-style-type: none"> Index register:0 point Long index register:0 point
The amount of file register usage	0 point
FB dependence	No dependence
FB compilation method	Macro type
FB operation	Always executed


Processing

For using the Processing, refer to the [Page 25 Overview](#).

Timing chart of I/O signals



Restrictions or precautions

- This FB does not include the error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- When operating the analog output module, the output range setting, and operation mode setting need to be set according to the device and system to be connected. Set the GX Works3 module parameters according to the application. Refer to the  MELSEC iQ-F FX5 User's Manual (Analog Control - Intelligent function module) for details on setting the module parameters.

Parameter setting

No parameters are required to use this FB.

Performance value

CPU	Performance value		Number of scans
	Processing time	Maximum scan time	
FX5UJ	0.619 ms	0.722 ms	1 scan
FX5U, FX5UC ^{*1*2}	0.474 ms	0.569 ms	1 scan

*1 When the program capacity is set to 128 K steps, the processing speed may be reduced.

*2 The labels in the standard area are used.

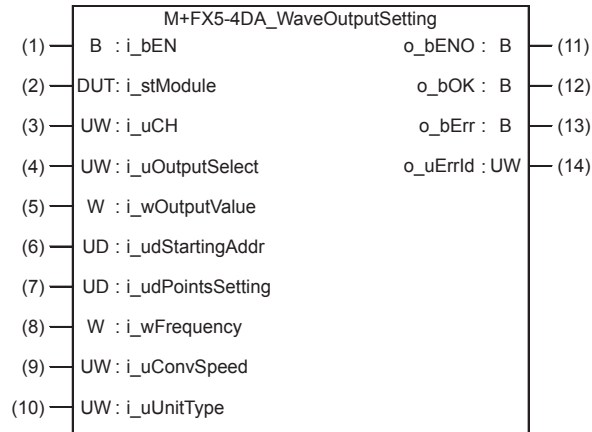
Error code

Error code (hexadecimal)	Description	Action
None	None	None

3.3 M+FX5-4DA_WaveOutputSetting (Waveform output setting)

Overview

As i_bEN (execution command) turns on, the wave output settings of a specified channel or all channels are written.



Labels

Input label

No.	Variable name	Name	Data type	Range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_stModule	Module label	Structure	The setting range differs depending on the module label.	Specifies the module label for the analog output module.
(3)	i_uCH	Target channel	Word [Unsigned]/Bit String [16-bit]	1 to 4, 15	<ul style="list-style-type: none"> • 1 to 4: The corresponding channel number is specified. • 15: All channels are specified.
(4)	i_uOutputSelect	Output selection during waveform output stop	Word [Unsigned]/Bit String [16-bit]	0: 0 V/0 mA 1: Offset value 2: Output setting value during waveform output stop	Specifies the output value during wave output stop.
(5)	i_wOutputValue	Output setting value during waveform output stop	Word [Signed]	<ul style="list-style-type: none"> ■When an output range is 0 to 5 V, 1 to 5 V, 0 to 10 V, 0 to 20 mA, or 4 to 20 mA 0 to 32767 ■When an output range is -10 to 10 V -32768 to +32767 	Sets the value to be output when 2 (Output setting value during waveform output stop) is selected in the output selection during waveform output stop.
(6)	i_udStartingAddr	Waveform pattern start address setting	Double word [Unsigned]/Bit String [32-bit]	10000 to 89999	Sets the start address of a wave pattern to be output.
(7)	i_udPointsSetting	Number of waveform pattern points setting	Double word [Unsigned]/Bit String [32-bit]	1 to 80000 (point)	Sets the number of data points of a wave pattern to be output.
(8)	i_wFrequency	Number of waveform outputs setting	Word [Signed]	-1: Infinite repetition output 1 to 32767: Specified number of times output	Sets the number of output times of a wave pattern.

No.	Variable name	Name	Data type	Range	Description
(9)	i_uConvSpeed	Waveform output conversion cycle constant	Word [Unsigned]/Bit String [16-bit]	1 to 5000	Sets the constant that defines the conversion cycle of wave output.
(10)	i_uUnitType	Module type	Word [Unsigned]/Bit String [16-bit]	0: FX5-4DA	Specifies a module type.

Output label

No.	Variable name	Name	Data type	Default value	Description
(11)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(12)	o_bOK	Normal completion	Bit	OFF	The on state indicates that setting the wave output has been completed.
(13)	o_bErr	Error completion	Bit	OFF	The on state indicates that an error has occurred in the FB.
(14)	o_uErrId	Error code	Word [Unsigned]/Bit String [16-bit]	0	The error code of an error occurred in the FB is stored.

FB details

Available device

■Analog output module

Target module	Firmware Version	Engineering tool
FX5-4DA	—	GX Works3 Version 1.040S or later

■CPU module

MELSEC iQ-F series

Basic specifications

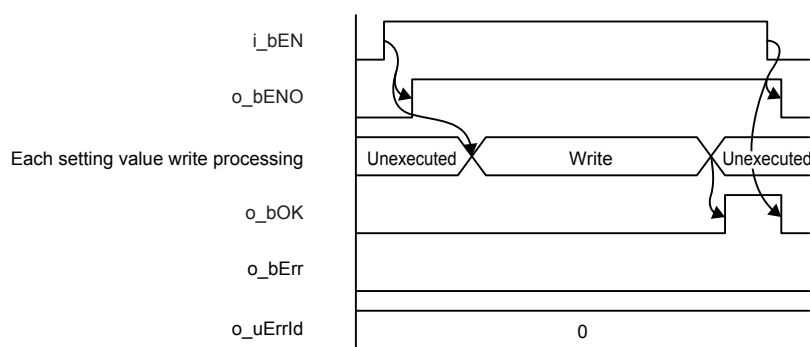
Item	Description
Language	Ladder diagram
Number of steps	295 steps The number of FB steps integrated in the program varies depending on the CPU module used, the input/output definition, and the setting options of GX Works3. For the setting options of GX Works3, refer to GX Works3 Operating Manual .
The amount of label usage	<ul style="list-style-type: none"> Label: 0.01 K point (Word) Latch label: 0 K point (Word) The amount of labels used in the program varies depending on the CPU module used, the device specified in an argument and the option setting of GX Works3. For the option setting of GX Works3, refer to GX Works3 Operating Manual .
The number of index register usage	<ul style="list-style-type: none"> Index register: 0 point Long index register: 0 point
The amount of file register usage	0 point
FB dependence	No dependence
FB compilation method	Macro type
FB operation	Pulsed execution (single scan execution type)

Processing

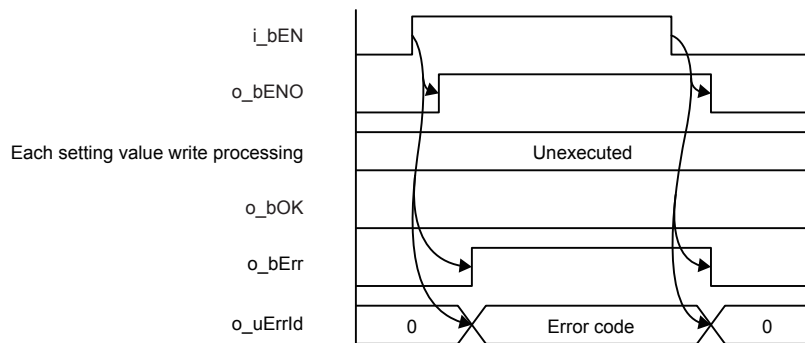
- As i_bEN (execution command) turns on, the wave output settings of a specified channel or all channels are written.
- The wave output setting is enabled only when the output mode setting is set to the wave output mode. The wave data for analog output is required to be set in advance.
- The set value is enabled by turning on and off 'Operating condition setting request' (Un\G70.b9) or executing the operating condition setting request operation FB (M+FX5-4DA_RequestSetting).
- When the setting values of target channel are out of range, o_bErr (Error completion) turns on, and the FB processing are stopped. Also, Error code 100 (Hexadecimal) is stored in o_uErrId (Error code). For the error code, refer to [Page 33 Error code](#).
- When the setting values of module type are out of range, o_bErr (Error completion) turns on, and the FB processing are stopped. Also, Error code 102 (Hexadecimal) is stored in o_uErrId (Error code). For the error code, refer to [Page 33 Error code](#).

Timing chart of I/O signals

■ For normal completion



■ For error completion



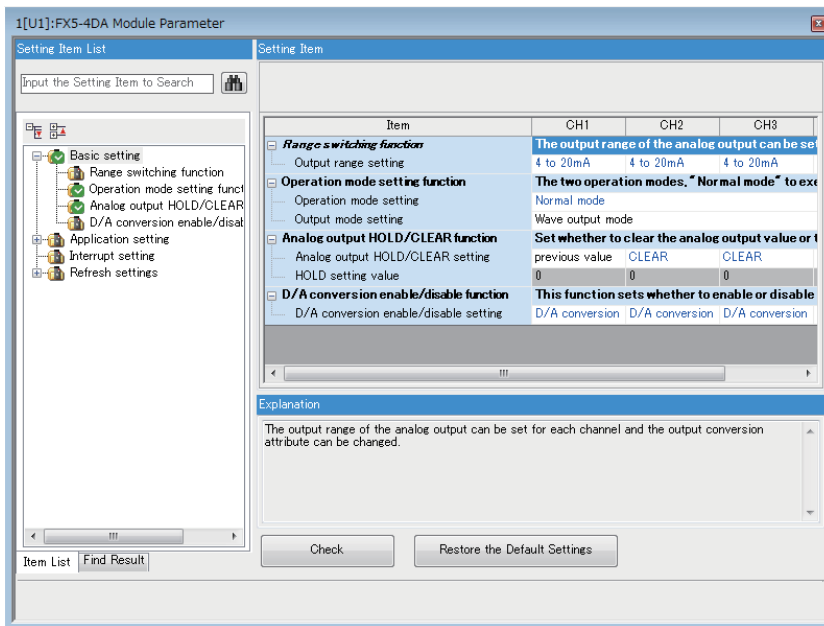
Restrictions or precautions

- This FB does not include the error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- Using the FB in a program that is to be executed only once, such as a subroutine program or a FOR-NEXT loop, has a problem that i_bEN (execution command) can no longer be turned off and normal operation is not possible; Always use the FB in a program that is capable of turning off the execution command.
- To use more than one of this FB, care must be taken to avoid duplication of the target channel.
- The FB requires the configuration of the ladder for every input label.
- When operating the analog output module, the output range setting needs to be set according to the device and system to be connected. Set the GX Works3 module parameters according to the application. Refer to the [MELSEC iQ-F FX5 User's Manual \(Analog Control - Intelligent function module\)](#) for details on setting the module parameters.

Parameter setting

It is necessary to set the output mode to "waveform output mode".

Navigation window ⇒ [Parameter] ⇒ [Module Information] ⇒ [FX5-4DA] ⇒ [Module Parameter] ⇒ "Basic setting" ⇒ "Operation mode setting function" ⇒ "Output mode setting"



For the parameter setting procedure, refer to MELSEC iQ-F FX5 User's Manual (Analog Control - Intelligent function module).

Example of use

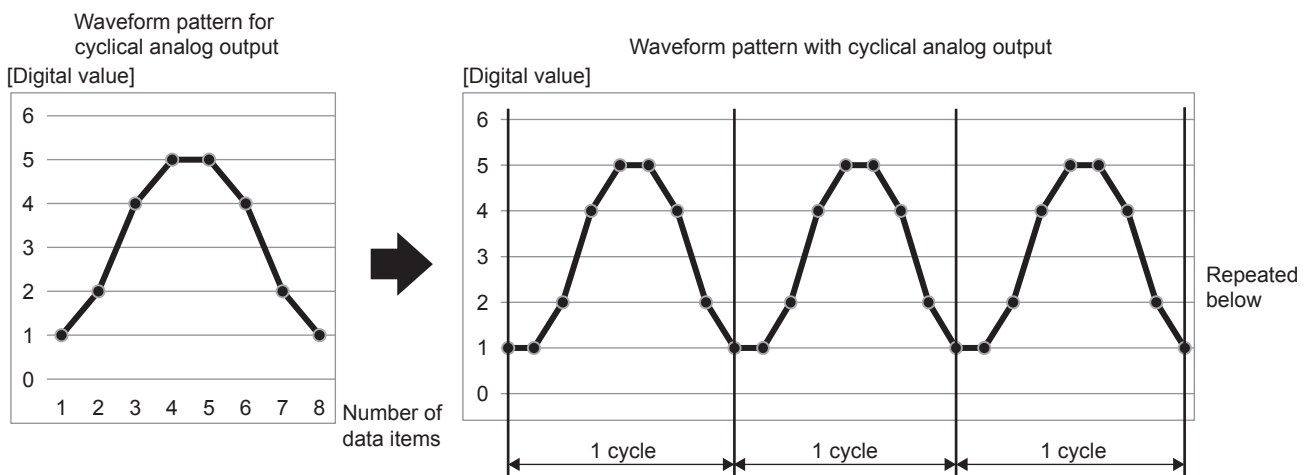
An example of the use of this FB is shown.

System Configuration

For an example of system configuration, refer to Page 10 Analog output module FB.

Outline of program

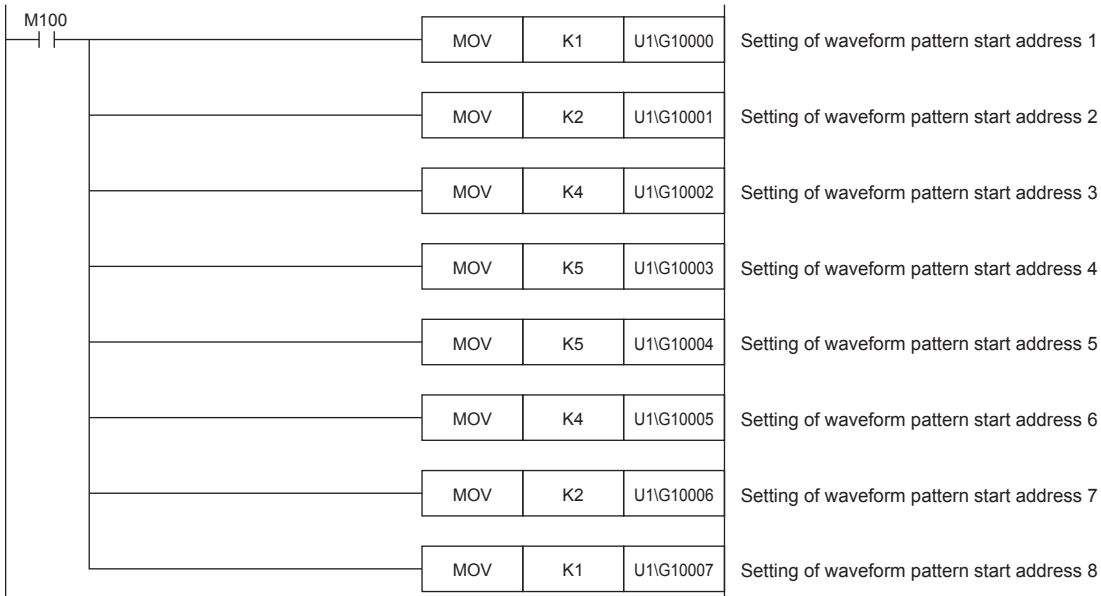
Set the waveform patterns using eight points from CH1 of FX5-4DA as shown below to repeat the output infinitely in a 500-ms cycle. CH2 to CH4 are not used.



Program

- Setting of waveform pattern

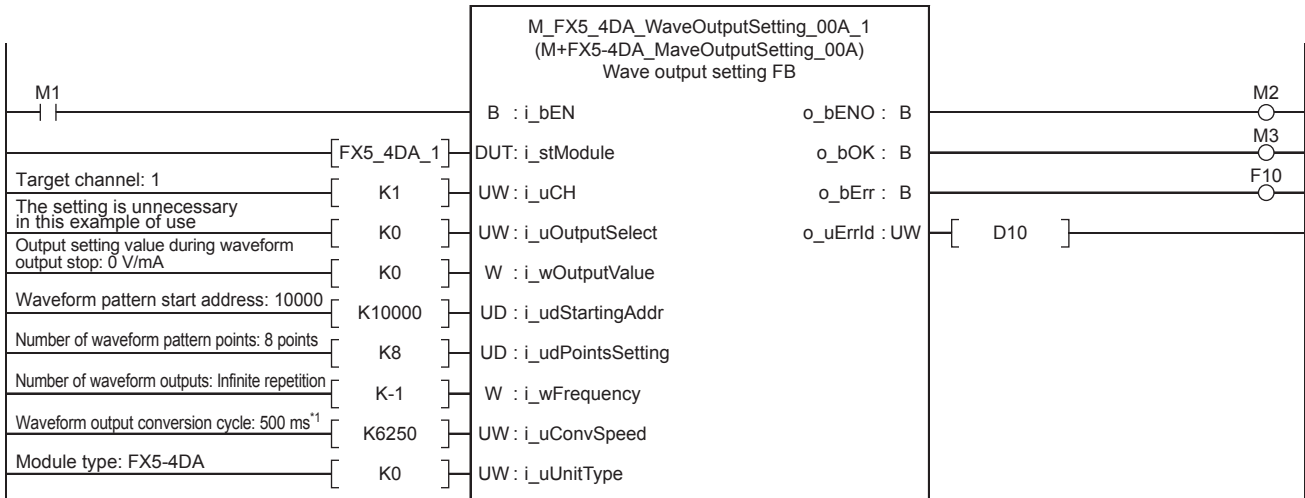
Set the waveform pattern for cyclical analog output in the buffer memory (U1\G10000 to 10007).



- Waveform output setting

Set the waveform output conversion cycle, etc. of the waveform pattern set in the buffer memory (U1\G10000 to 10007) by using M+FX5-4DA_WaveOutputSetting (waveform output setting).

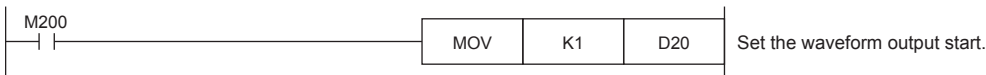
Program Example



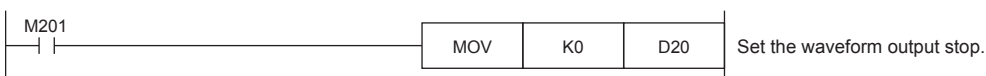
*1 Calculation of waveform output conversion cycle

Waveform output conversion cycle constant (K6250) = conversion cycle (500000 μs) ÷ number of channels permitting D/A conversion (1) ÷ reference conversion speed (80 μs)

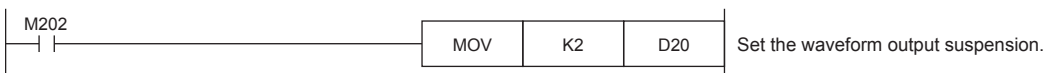
- Start of waveform output



- Stop of waveform output




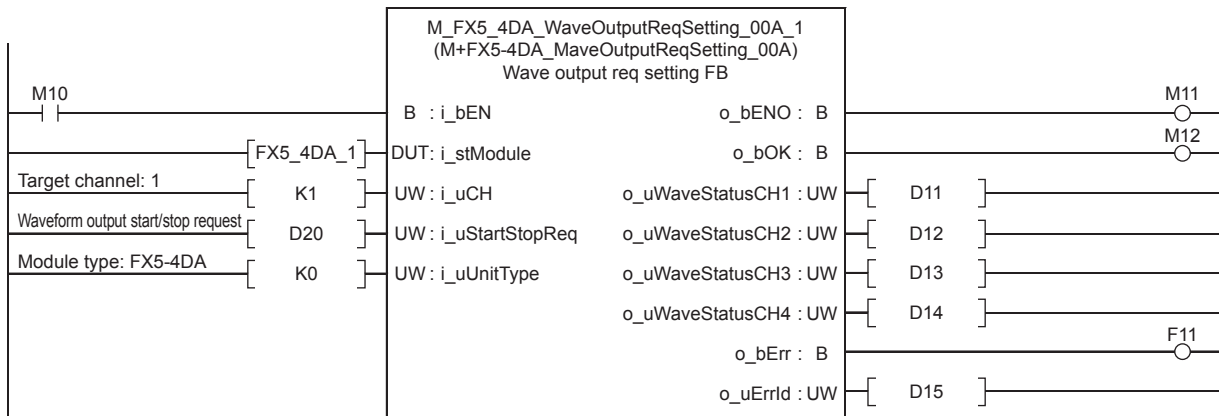
- Suspension of waveform output



- Operation of waveform output

Waveform output is started, stopped and suspended according to the values set in i_uStartStopReq.

For the details of the FB, refer to  Page 34 M+FX5-4DA_WaveOutputReqSetting (Waveform output operation).



Performance value

CPU	Performance value		Number of scans
	Processing time	Maximum scan time	
FX5UJ	0.152 ms	0.787 ms	1 scan
FX5U, FX5UC ^{*1*2}	0.129 ms	0.591 ms	1 scan

*1 When the program capacity is set to 128 K steps, the processing speed may be reduced.

*2 The labels in the standard area are used.

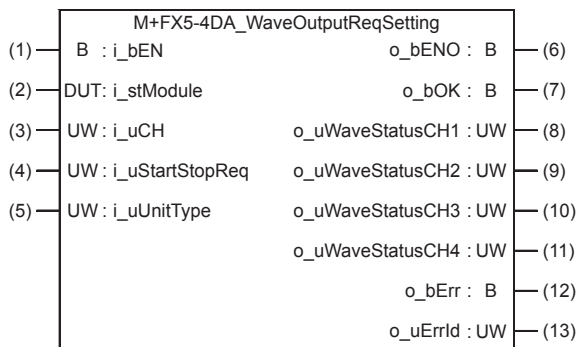
Error code

Error code (hexadecimal)	Description	Action
100	The target channel is set out of the range. Set the target channel within the following range. • FX5-4DA: 1 to 4, 15	Review and correct the settings and then execute the FB again.
102	The module type is set out of the range. Set the module type to the following values. • FX5-4DA: 0	Review and correct the settings and then execute the FB again.

3.4 M+FX5-4DA_WaveOutputReqSetting (Waveform output operation)

Overview

As i_bEN (execution command) turns on, a start or stop request for the wave output of a specified channel or all channels is written to the buffer memory.



Labels

Input label

No.	Variable name	Name	Data type	Range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_stModule	Module label	Structure	The setting range differs depending on the module label.	Specifies the module label for the analog output module.
(3)	i_uCH	Target channel	Word [Unsigned]/Bit String [16-bit]	1 to 4, 15	<ul style="list-style-type: none"> 1 to 4: The corresponding channel number is specified. 15: All channels are specified.
(4)	i_uStartStopReq	Waveform output start/stop request	Word [Unsigned]/Bit String [16-bit]	0: Waveform output stop request 1: Waveform output start request 2: Waveform output pause request	Specifies a start or stop request for the wave output.
(5)	i_uUnitType	Module type	Word [Unsigned]/Bit String [16-bit]	0: FX5-4DA	Specifies a module type.

Output label

No.	Variable name	Name	Data type	Default value	Description
(6)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(7)	o_bOK	Normal completion	Bit	OFF	The on state indicates that the execution of the FB is normal.
(8)	o_uWaveStatusCH1	CH1 Wave pattern output state monitor	Word [Unsigned]/Bit String [16-bit]	0	Outputs the value of the wave output status (stopped, output, or paused).
(9)	o_uWaveStatusCH2	CH2 Wave pattern output state monitor	Word [Unsigned]/Bit String [16-bit]	0	0: Waveform output stopped 1: Waveform output
(10)	o_uWaveStatusCH3	CH3 Wave pattern output state monitor	Word [Unsigned]/Bit String [16-bit]	0	2: Waveform output paused 3: Waveform output step execution
(11)	o_uWaveStatusCH4	CH4 Wave pattern output state monitor	Word [Unsigned]/Bit String [16-bit]	0	The FB is not capable of executing the wave output step action function. To execute the function, use the device/buffer memory batch monitor of GX Works3. For details, refer to MELSEC iQ-F FX5 User's Manual (Analog Control - Intelligent function module) .

No.	Variable name	Name	Data type	Default value	Description
(12)	o_bErr	Error completion	Bit	OFF	The on state indicates that an error has occurred in the FB.
(13)	o_uErrId	Error code	Word [Unsigned]	0	The error code of an error occurred in the FB is stored.

FB details

Available device

■Analog output module

Target module	Firmware Version	Engineering tool
FX5-4DA	—	GX Works3 Version 1.040S or later

■CPU module

MELSEC iQ-F series

Basic specifications

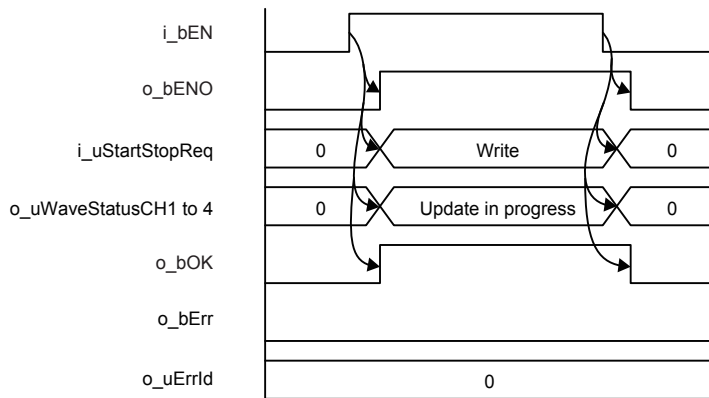
Item	Description
Language	Ladder diagram
Number of steps	256 steps The number of FB steps integrated in the program varies depending on the CPU module used, the input/output definition, and the setting options of GX Works3. For the setting options of GX Works3, refer to GX Works3 Operating Manual .
The amount of label usage	<ul style="list-style-type: none"> Label: 0.02 K point (Word) Latch label: 0 K point (Word) The amount of labels used in the program varies depending on the CPU module used, the device specified in an argument and the option setting of GX Works3. For the option setting of GX Works3, refer to GX Works3 Operating Manual .
The number of index register usage	<ul style="list-style-type: none"> Index register:0 point Long index register:0 point
The amount of file register usage	0 point
FB dependence	No dependence
FB compilation method	Macro type
FB operation	Always executed

Processing

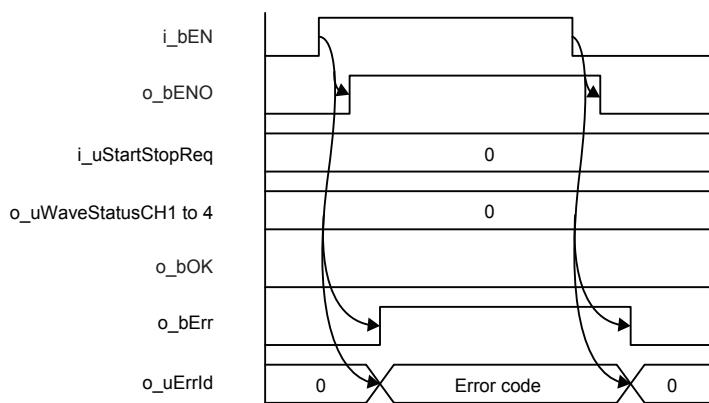
- As i_bEN (execution command) turns on, a start or stop request for the wave output of a specified channel or all channels is written to the buffer memory.
- As i_bEN (execution command) turns on, the FB outputs the values of 'CH□Waveform output status monitor' (Un\G401, Un\G601, Un\G801, Un\G1001) . When an individual channel is specified in the input label, only this specified channel updates a wave output status monitor value and the other channels output 0. When all channels are specified in the input label, all the channels output wave output status monitor values. The number of channels with all channels specified depends on the module type.
- As i_bEN (execution command) turns on, the FB always starts its execution.
- To start wave output once again, after the wave output ends, change i_uStartStopReq (waveform output start/stop request) from 1 (waveform output start request) to 0 (waveform output stop request), and then set 1 (waveform output start request) again.
- The wave output setting is enabled only when the output mode setting is set to the wave output mode.
- When the setting values of target channel are out of range, o_bErr (Error completion) turns on, and the FB processing are stopped. Also, Error code 100 (Hexadecimal) is stored in o_uErrId (Error code). For the error code, refer to [Page 37 Error code](#).
- When the setting values of module type are out of range, o_bErr (Error completion) turns on, and the FB processing are stopped. Also, Error code 102 (Hexadecimal) is stored in o_uErrId (Error code). For the error code, refer to [Page 37 Error code](#).

Timing chart of I/O signals

■For normal completion



■For error completion



Restrictions or precautions

- This FB does not include the error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- Using the FB in a program that is to be executed only once, such as a subroutine program or a FOR-NEXT loop, has a problem that i_bEN (execution command) can no longer be turned off and normal operation is not possible; Always use the FB in a program that is capable of turning off the execution command.
- To use more than one of this FB, care must be taken to avoid duplication of the target channel.
- The FB requires the configuration of the ladder for every input label.
- When operating the analog output module, the output range setting needs to be set according to the device and system to be connected. Set the GX Works3 module parameters according to the application. Refer to the MELSEC iQ-F FX5 User's Manual (Analog Control - Intelligent function module) for details on setting the module parameters.

Parameter setting

It is necessary to set the output mode to "waveform output mode".

For the parameter setting procedure, refer to MELSEC iQ-F FX5 User's Manual (Analog Control - Intelligent function module).

Example of use

For an example of use, refer to Page 28 M+FX5-4DA_WaveOutputSetting (Waveform output setting).

Performance value

CPU	Performance value		Number of scans
	Processing time	Maximum scan time	
FX5UJ	0.062 ms	0.880 ms	1 scan
FX5U, FX5UC ^{*1*2}	0.058 ms	0.753 ms	1 scan

*1 When the program capacity is set to 128 K steps, the processing speed may be reduced.

*2 The labels in the standard area are used.

Error code

Error code (hexadecimal)	Description	Action
100	The target channel is set out of the range. Set the target channel within the following range. • FX5-4DA: 1 to 4, 15	Review and correct the settings and then execute the FB again.
102	The module type is set out of the range. Set the module type to the following values. • FX5-4DA: 0	Review and correct the settings and then execute the FB again.

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REVISIONS

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October 2017	A	First Edition
October 2019	B	Added or modified parts SAFETY PRECAUTIONS, INTRODUCTION, RELEVANT MANUALS, TERMS, GENERIC TERMS AND ABBREVIATIONS, Chapter1, 2, 3

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