



Programmable Controller

MELSEC iQ-F
series



MELSEC iQ-F



FX5 High-Speed Counter Module Function Block
Reference


SAFETY PRECAUTIONS

(Read these precautions before use.)

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

This manual 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, failure to observe precautions 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 manual describes the module function blocks for the relevant products listed below.

Please read this manual and the relevant manuals and fully understand the specifications before attempting to use the module function blocks.

Please make sure that the end users read this manual.

Relevant products

- FX5-2HC/ES

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 in 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.

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RELEVANT MANUALS

Manual name	Description
MELSEC iQ-F FX5 High-Speed Counter Module User's Manual <SH-082631ENG>	Describes the specifications of the high-speed counter module.
MELSEC iQ-F FX5 High-Speed Counter Module Function Block Reference <SH-082652ENG> (this manual)	Describes the specifications of the high-speed counter module FBs.
MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware) <SH-082452ENG>	Describes the details of hardware of the 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 the specifications of ladder, ST, FBD/LD, and SFC 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.
GX Works3 Operating Manual <SH-081215ENG>	Describes the system configuration, parameter settings, and online operations of GX Works3.

TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
Engineering tool	A tool used for setting up programmable controllers, programming, debugging, and maintenance

GENERIC TERMS AND ABBREVIATIONS

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

Generic term/abbreviation	Description
FB	Function Block. An FB is used in a sequence program. It consists of individual circuit blocks which are used repeatedly in a sequence program. Using FBs helps to develop programs more efficiently, reduce mistakes, and improve quality of programs.
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, and FX5UC-32MT/DSS-TS
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, FX5UJ-60MT/ESS, FX5UJ-24MR/DS, FX5UJ-24MT/DS, FX5UJ-24MT/DSS, FX5UJ-40MR/DS, FX5UJ-40MT/DS, FX5UJ-40MT/DSS, FX5UJ-60MR/DS, FX5UJ-60MT/DS, and FX5UJ-60MT/DSS
High-speed counter module	Another name for FX5-2HC/ES

1 OVERVIEW

The FBs listed in this reference are module FBs (for GX Works3) to use the MELSEC iQ-F series high-speed counter module.

1.1 Features

This section describes the features of this function.

Shortening programming time

Programming time can be shortened by creating a configuration launch FB for each counter function.

1.2 Function Block (FB) List

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


○: Required, —: Not required

Name*1	Description	Necessity of parameter setting
M+FX5-2HC_CountEnable (Count enable operation)	Executes the count operation (Count start/stop) on a specified channel.	○
M+FX5-2HC_PulseMeasure (Pulse width measurement)	Starts the pulse measurement function and reads the measured pulse value.	○
M+FX5-2HC_PulseDensityMeasure (Pulse density measurement)	Starts the pulse density measurement function and reads the calculated pulse density value.	○
M+FX5-2HC_RotationSpeedMeasure (Rotation speed measurement)	Starts the rotation speed measurement function and reads the calculated rotation speed measurement value.	○
M+FX5-2HC_ErrorOperation (Error operation)	Monitors error codes and performs error resets.	—
M+FX5-2HC_DegreeToCountVal (Angle conversion)	Calculates count values from angles.	—

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

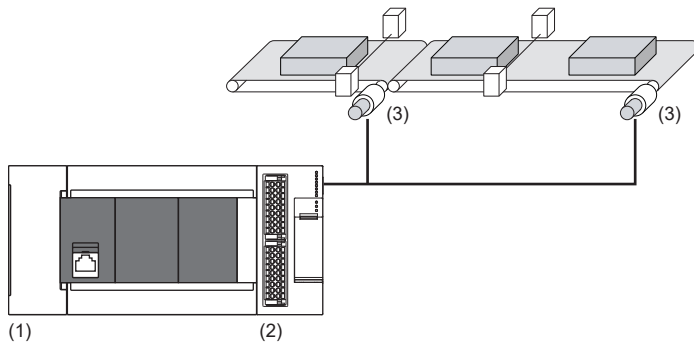
1.3 How to Obtain

The module FBs described in this reference are incorporated into GX Works3. For how to use the module FBs, refer to the following.

 GX Works3 Operating Manual

1.4 System Configuration

This shows the system configurations to use the FBs for this reference.



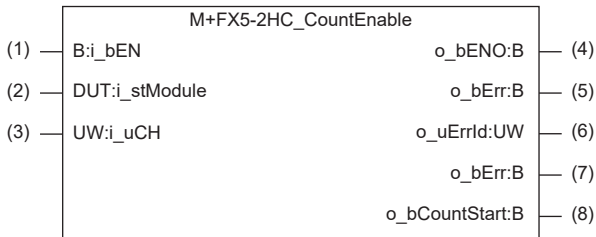
- (1) FX5UJ CPU module, FX5U CPU module, FX5UC CPU module
- (2) High-speed counter module
- (3) Sensor, controller, encoder

2 HIGH-SPEED COUNTER MODULE FB

2.1 M+FX5-2HC_CountEnable (Count Enable Operation)

Overview

This FB executes the count operation (Count start/stop) on a specified channel.



Labels

Input label

No.	Label	Label name	Data type	Import	Range	Description
(1)	i_bEN	Execution command	Bit	Always	On or off	On: The FB is activated. Off: The FB is not activated.
(2)	i_stModule	Module label	Structure	At FB start	—	Specify the module label of the MELSEC iQ-F high-speed counter module.
(3)	i_uCH	Target channel	Word [Unsigned]/Bit String [16-bit]	At FB start	1 to 2	1 or 2: Specify the channel number.

Output label

No.	Label	Label 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	When this label is on, it indicates that the FB has been completed normally.
(6)	o_bErr	Error completion	Bit	Off	When this label is on, it indicates that an error has occurred in the FB.
(7)	o_uErrId	Error code	Word [Unsigned]/Bit String [16-bit]	0	Stores the error code that occurred in the FB.
(8)	o_bCountStart	Count in operation flag	Bit	Off	On: The count operation is on. Off: The count operation is off.

FB details

Available device

Target module	Firmware Version	Engineering tool
FX5UJ CPU module	1.060 or later	GX Works3 Version 1.100E or later
FX5U CPU module	1.300 or later	GX Works3 Version 1.100E or later
FX5UC CPU module	1.300 or later	GX Works3 Version 1.100E or later
High-speed counter module	1.000 or later	GX Works3 Version 1.100E or later

Basic specifications

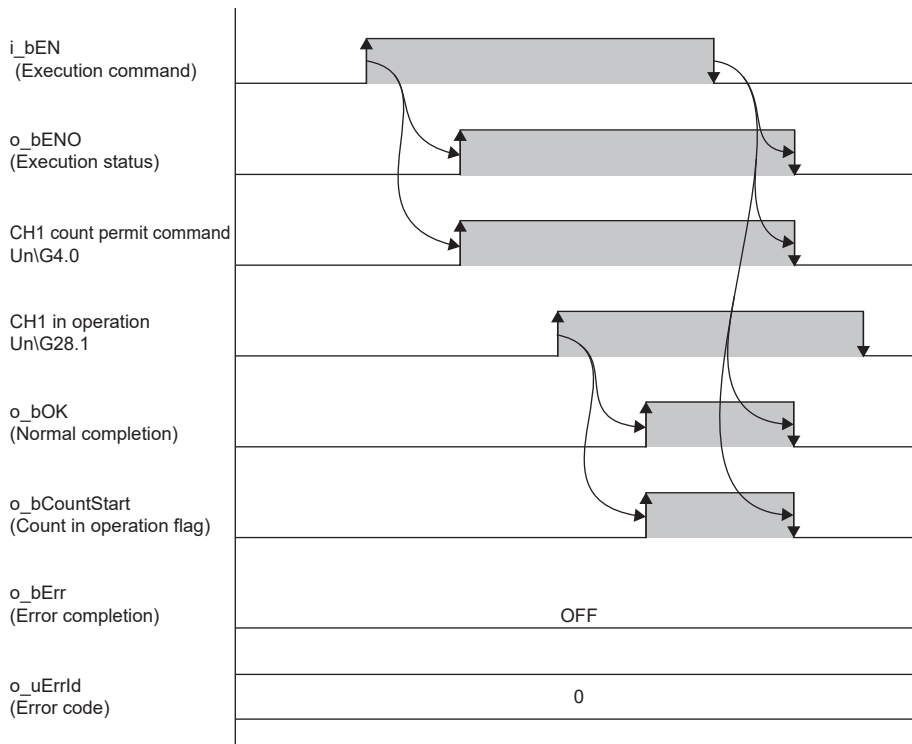
Item	Description
Language	Ladder diagram
Number of steps	410 steps The number of steps of the FB embedded in a program depends on the CPU module used, the input/output definitions, and the options setting of GX Works3. For the option settings of GX Works3, refer to the following. GX Works3 Operating Manual
The amount of label usage	<ul style="list-style-type: none">Label: 332 points (Word)Latch label: 0 points (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 settings of GX Works3, refer to the following. GX Works3 Operating Manual
The number of index register usage	<ul style="list-style-type: none">Index register: 0 pointsLong index register: 0 points
The amount of file register usage	File register: 0 points (Word)
FB dependence	No dependence
FB compilation method	Macro type
FB operation	Always executed

Processing

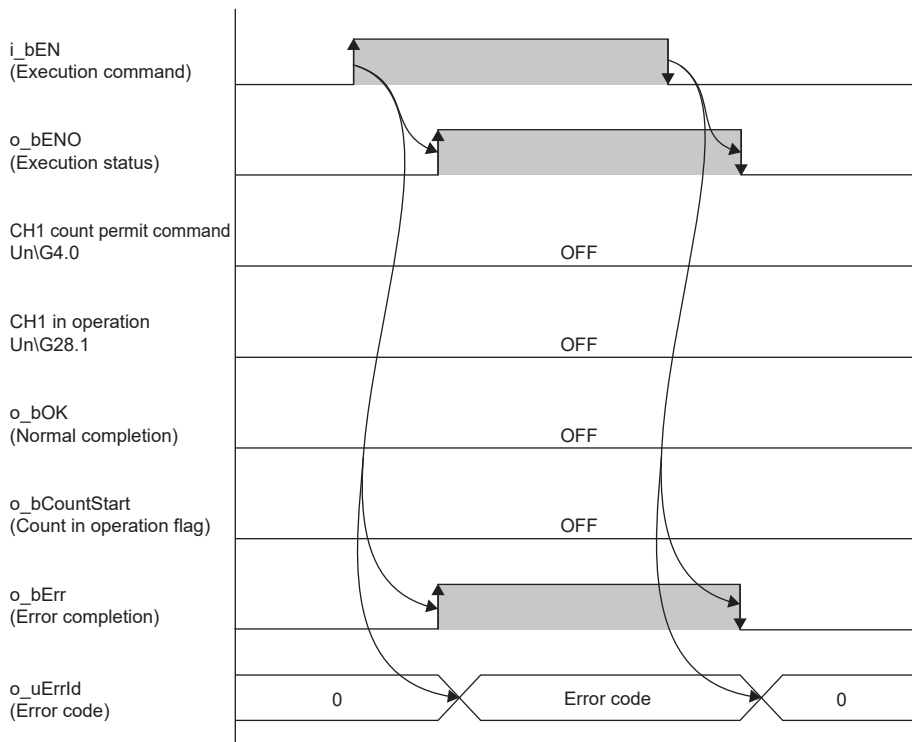
- By turning on or off i_bEN (Execution command), the count operation starts or stops.
- When i_bEN (Execution command) is on, the contents of CH1 in operation (Un\G28.1)/CH2 in operation (Un\G68.1) are output to o_bCountStart (Count in operation flag).
- After i_bEN (Execution command) turns on, o_bOK (Normal completion) turns on when the target channel starts operating.

Timing chart of I/O signals

Normal completion



Error completion



Precautions

- If a module error occurs after normal completion, this FB does not output error completion or module error. To check for module errors, use M+FX5-2HC_ErrorOperation (Error operation). (Page 28 M+FX5-2HC_ErrorOperation (Error Operation))

Parameter settings

For the parameter settings, refer to the following.

 MELSEC iQ-F FX5 High-Speed Counter Module User's Manual


Performance value

Module	Processing time	Maximum scan time	Number of scans
FX5UJ CPU module	0.773ms	0.651ms	2 scans
FX5U CPU module, FX5UC CPU module ^{*1*2}	0.599ms	0.549ms	2 scans

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

*2 The labels in the standard area are used.

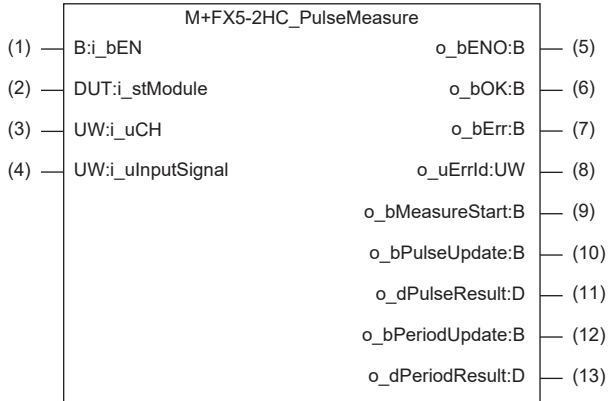
Error code

Error code	Description	Action
100H	The setting of i_uCH (Target channel) is out of the range. The target channel is not within the range of 1 to 2.	Execute the FB again after checking the setting.
101H	A module error occurred before the execution command was turned on.	Reset the module error, and then execute the FB again.
10BH	The operation mode is set to the pulse width measurement mode.	Execute the FB again after reviewing the operation mode setting.
Error other than the above	Error code on the module side	Refer to the following manual.  MELSEC iQ-F FX5 High-Speed Counter Module User's Manual

2.2 M+FX5-2HC_PulseMeasure (Pulse Width Measurement)

Overview

This FB starts the pulse measurement function and reads the measured pulse value.



Labels

Input label

No.	Label	Label name	Data type	Import	Range	Description
(1)	i_bEN	Execution command	Bit	Always	On or off	On: The FB is activated. Off: The FB is not activated.
(2)	i_stModule	Module label	Structure	At FB start	—	Specify the module label of the MELSEC iQ-F high-speed counter module.
(3)	i_uCH	Target channel	Word [Unsigned]/Bit String [16-bit]	At FB start	1 to 2	Specify the channel number.
(4)	i_uInputSignal	Input signal	Word [Unsigned]/Bit String [16-bit]	At FB start	1 to 2	Specify the input signal. 1: Phase A 2: Phase B

Output label



No.	Label	Label name	Data type	Default value	Description
(5)	o_bENO	Execution status	Bit	Off	On: The execution command is on. Off: The execution command is off.
(6)	o_bOK	Normal completion	Bit	Off	When this label is on, it indicates that the FB has been completed normally.
(7)	o_bErr	Error completion	Bit	Off	When this label is on, it indicates that an error has occurred in the FB.
(8)	o_uErrId	Error code	Word [Unsigned]/Bit String [16-bit]	0	Stores the error code that occurred in the FB.
(9)	o_bMeasureStart	Pulse under-measurement flag	Bit	Off	When this label is on, it indicates that pulses are being measured.
(10)	o_bPulseUpdate	Pulse width measurement value update flag	Bit	Off	When this label is on, it indicates that the pulse width measurement value has been updated.
(11)	o_dPulseResult	Pulse width measurement value	Double word [signed]	0	Stores the pulse width measurement value.
(12)	o_bPeriodUpdate	Period measurement value update flag	Bit	Off	When this label is on, it indicates that the period measurement value has been updated.
(13)	o_dPeriodResult	Period measurement value	Double word [signed]	0	Stores the period measurement value.

FB details

Available device

Target module	Firmware Version	Engineering tool
FX5UJ CPU module	1.060 or later	GX Works3 Version 1.100E or later
FX5U CPU module	1.300 or later	GX Works3 Version 1.100E or later
FX5UC CPU module	1.300 or later	GX Works3 Version 1.100E or later
High-speed counter module	1.000 or later	GX Works3 Version 1.100E or later

Basic specifications

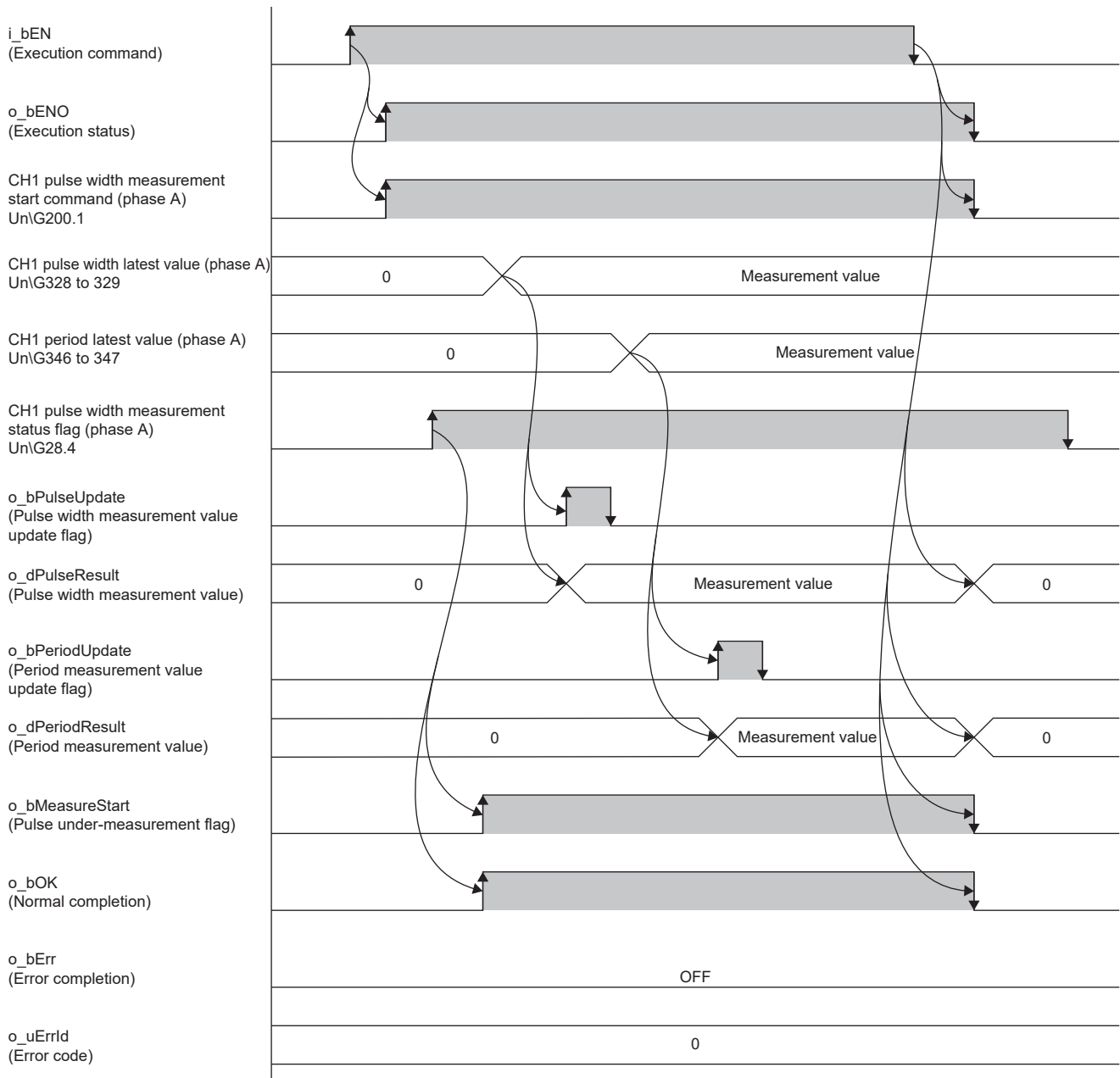
Item	Description
Language	Ladder diagram
Number of steps	832 steps The number of steps of the FB embedded in a program depends on the CPU module used, the input/output definitions, and the options setting of GX Works3. For the option settings of GX Works3, refer to the following.  GX Works3 Operating Manual
The amount of label usage	<ul style="list-style-type: none">Label: 340 points (Word)Latch label: 0 points (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 settings of GX Works3, refer to the following.  GX Works3 Operating Manual
The number of index register usage	<ul style="list-style-type: none">Index register: 0 pointsLong index register: 0 points
The amount of file register usage	File register: 0 points (Word)
FB dependence	No dependence
FB compilation method	Macro type
FB operation	Always executed

Processing

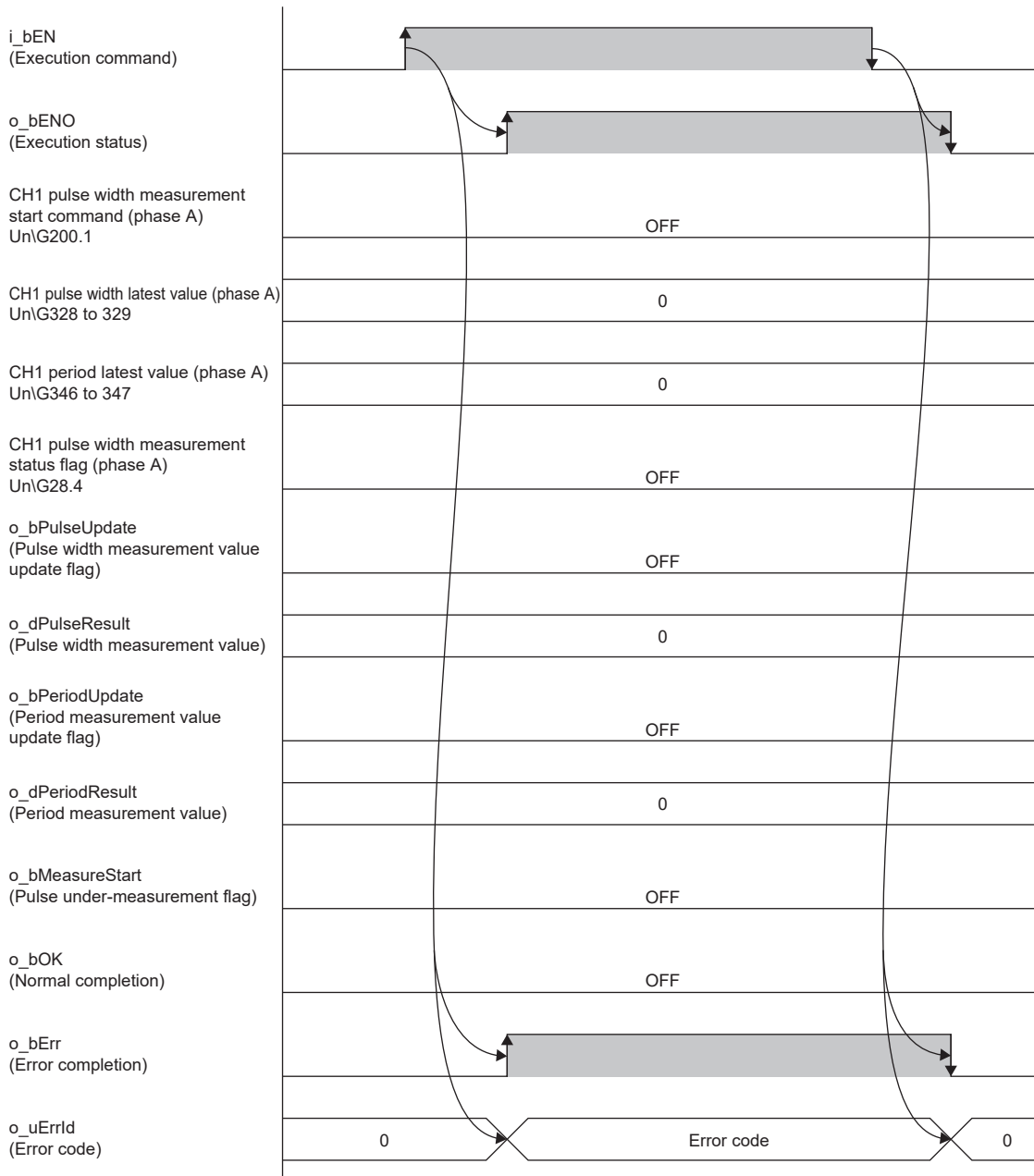
- By turning on `i_bEN` (Execution command), pulse measurement is performed as set in `i_uInputSignal` (Input signal).
- After `i_bEN` (Execution command) turns on, `o_bOK` (Normal completion) turns on when pulse width measurement of the target channel starts.
- When `o_bOK` (Normal completion) is on, if the pulse width measurement value of the target channel is updated, `o_bPulseUpdate` (Pulse width measurement update flag) is turned on, and the updated value is stored in `o_dPulseResult` (Pulse width measurement value).
- When `o_bOK` (Normal completion) is on, if the period measurement value of the target channel is updated, `o_bPeriodUpdate` (Period measurement value update flag) is turned on, and the updated value is stored in `o_dPeriodResult` (period measurement value).
- `o_bPulseUpdate` (Pulse width measurement update flag) and `o_bPeriodUpdate` (Period measurement value update flag) are on for only one scan.

Timing chart of I/O signals

Normal completion



■ Error completion



Precautions

- When the measurement unit time for the measurement target is shorter than the scan time, the measurement may not be performed properly. Adjust the measurement unit time to twice the scan time or longer.
- If a module error occurs after normal completion, this FB does not output error completion or module error. To check for module errors, use M+FX5-2HC_ErrorOperation (Error operation).

Parameter settings

For the parameter settings, refer to the following.

📖 MELSEC iQ-F FX5 High-Speed Counter Module User's Manual

Performance value

Module	Processing time	Maximum scan time	Number of scans
FX5UJ CPU module	1.27ms	0.983ms	2 scans
FX5U CPU module, FX5UC CPU module ^{*1*2}	1.06ms	0.809ms	2 scans

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

*2 The labels in the standard area are used.

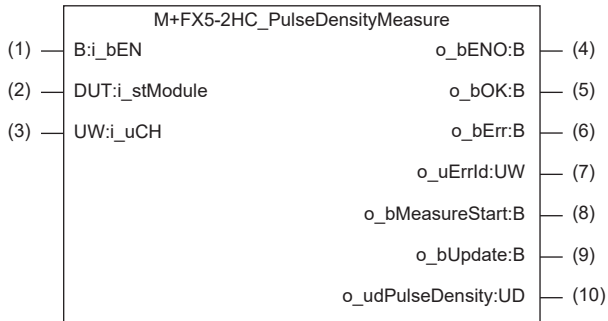
Error code

Error code	Description	Action
100H	The setting of i_uCH (Target channel) is out of the range. The target channel is not within the range of 1 to 2.	Execute the FB again after checking the setting.
101H	A module error occurred before the execution command was turned on.	Reset the module error, and then execute the FB again.
102H	The execution command was turned on while the pulse width measurement start command of the specified channel was on.	Turn off all pulse width measurement start commands for the specified channel before executing the FB.
107H	The operation mode is set to other than the pulse width measurement mode.	Execute the FB again after reviewing the operation mode setting.
10AH	The setting of i_uInputSignal (Input signal) is out of the range. The input signal is set to other than 1 or 2.	Execute the FB again after checking the setting.

2.3 M+FX5-2HC_PulseDensityMeasure (Pulse Density Measurement)

Overview

This FB starts the pulse density measurement function and reads the calculated pulse density value.



Labels

Input label

No.	Label	Label name	Data type	Import	Range	Description
(1)	i_bEN	Execution command	Bit	Always	On or off	On: The FB is activated. Off: The FB is not activated.
(2)	i_stModule	Module label	Structure	At FB start	—	Specify the module label of the MELSEC iQ-F high-speed counter module.
(3)	i_uCH	Target channel	Word [Unsigned]/Bit String [16-bit]	At FB start	1 to 2	Specify the channel number.

Output label

No.	Label	Label 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	When this label is on, it indicates that the FB has been completed normally.
(6)	o_bErr	Error completion	Bit	Off	When this label is on, it indicates that an error has occurred in the FB.
(7)	o_uErrld	Error code	Word [Unsigned]/Bit String [16-bit]	0	Stores the error code that occurred in the FB.
(8)	o_bMeasureStart	Pulse density under-measurement flag	Bit	Off	When this label is on, it indicates that the pulse density is being measured.
(9)	o_bUpdate	Pulse density update flag	Bit	Off	When this label is on, it indicates that the pulse density has been updated.
(10)	o_udPulseDensity	Pulse density	Double word [unsigned]/Bit string [32-bit]	0	Stores the pulse density.

FB details

Available device

Target module	Firmware Version	Engineering tool
FX5UJ CPU module	1.060 or later	GX Works3 Version 1.100E or later
FX5U CPU module	1.300 or later	GX Works3 Version 1.100E or later
FX5UC CPU module	1.300 or later	GX Works3 Version 1.100E or later
High-speed counter module	1.000 or later	GX Works3 Version 1.100E or later

Basic specifications

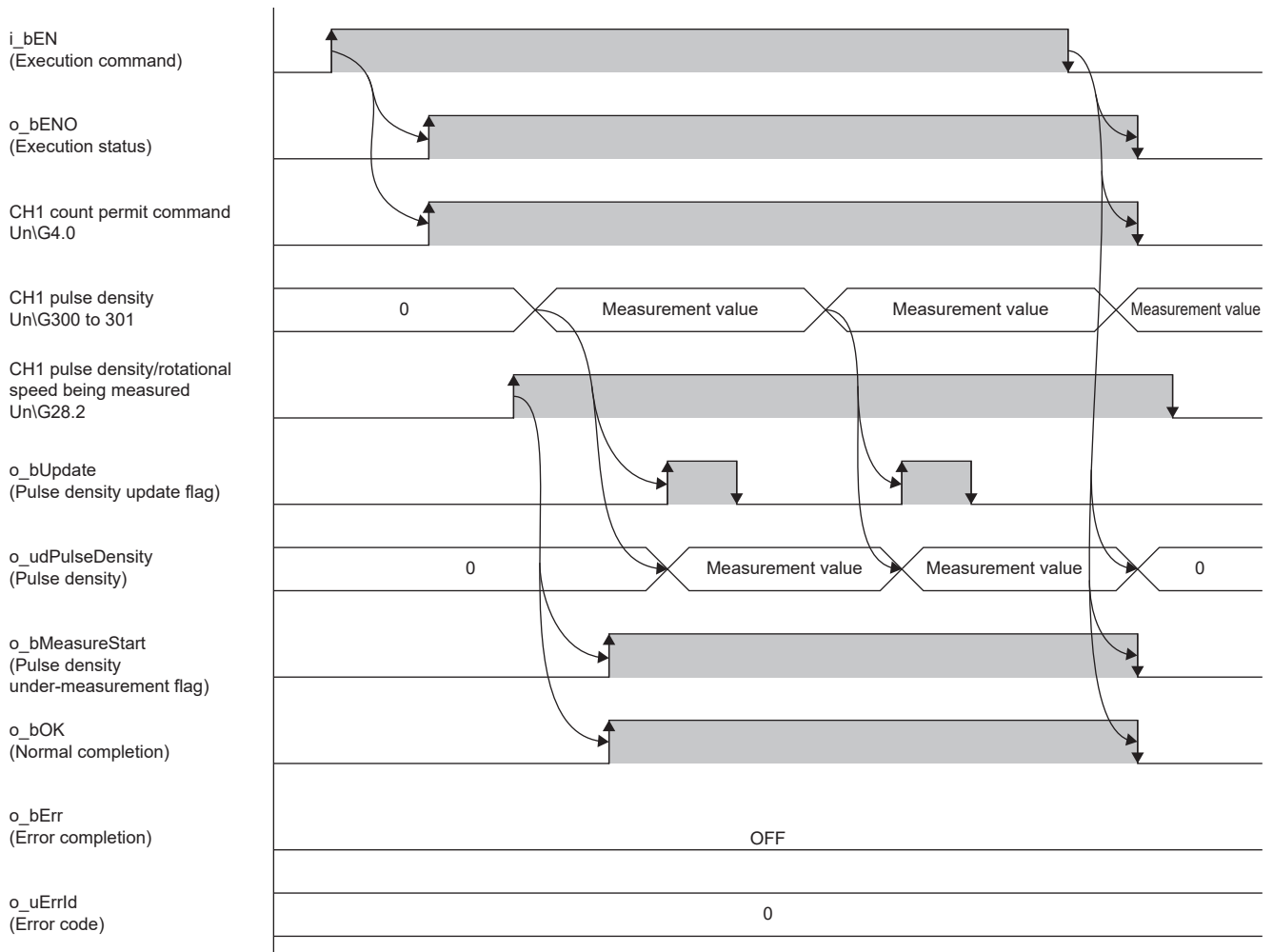
Item	Description
Language	Ladder diagram
Number of steps	578 steps The number of steps of the FB embedded in a program depends on the CPU module used, the input/output definitions, and the options setting of GX Works3. For the option settings of GX Works3, refer to the following. GX Works3 Operating Manual
The amount of label usage	<ul style="list-style-type: none"> Label: 336 points (Word) Latch label: 0 points (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 settings of GX Works3, refer to the following. GX Works3 Operating Manual
The number of index register usage	<ul style="list-style-type: none"> Index register: 0 points Long index register: 0 points
The amount of file register usage	File register: 0 points (Word)
FB dependence	No dependence
FB compilation method	Macro type
FB operation	Always executed

Processing

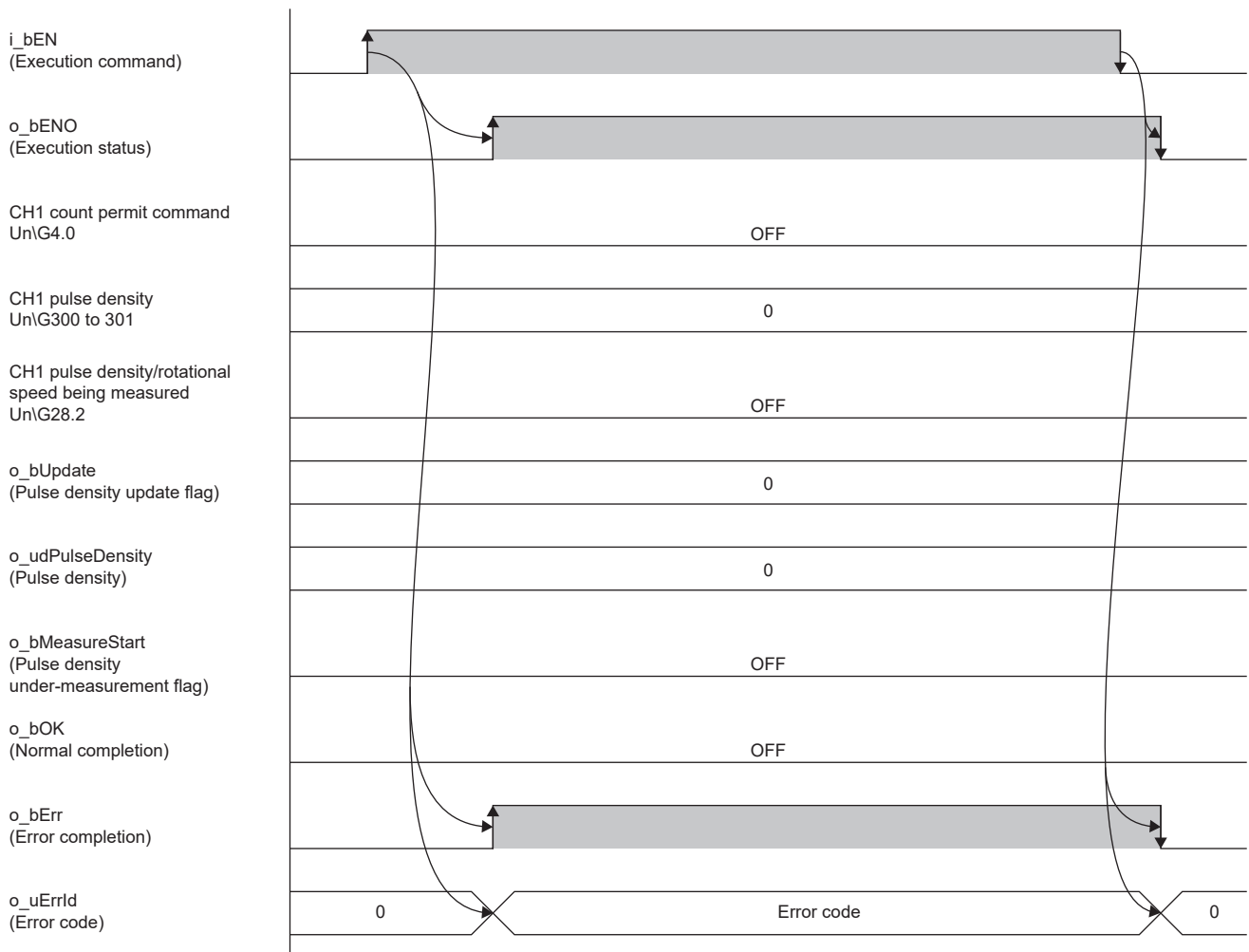
- By turning on i_bEN (Execution command), the pulse density calculated based on the values of CH1 measurement unit time (Un\G228 to Un\G229)/CH2 measurement unit time (Un\G428 to Un\G429) is read from the buffer memory.
- After i_bEN (Execution command) turns on, o_bOK (Normal completion) turns on when pulse density measurement of the target channel starts.
- When o_bOK (Normal completion) is on, if the pulse density of the target channel is updated, o_bUpdate (Pulse density update flag) is turned on, and the updated value is stored in o_udPulseDensity (Pulse density).
- o_bUpdate (Pulse density update flag) is on for only one scan.

Timing chart of I/O signals

■ Normal completion



■ Error completion



Precautions

- When the measurement unit time for the measurement target is shorter than the scan time, the measurement may not be performed properly. Adjust the measurement unit time to twice the scan time or longer.
- If a module error occurs after normal completion, this FB does not output error completion or module error. To check for module errors, use M+FX5-2HC_ErrorOperation (Error operation).

Parameter settings

For the parameter settings, refer to the following.

 MELSEC iQ-F FX5 High-Speed Counter Module User's Manual


Performance value

Module	Processing time	Maximum scan time	Number of scans
FX5UJ CPU module	1.09ms	1.01ms	2 scans
FX5U CPU module, FX5UC CPU module ^{*1*2}	0.910ms	0.809ms	2 scans

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

*2 The labels in the standard area are used.

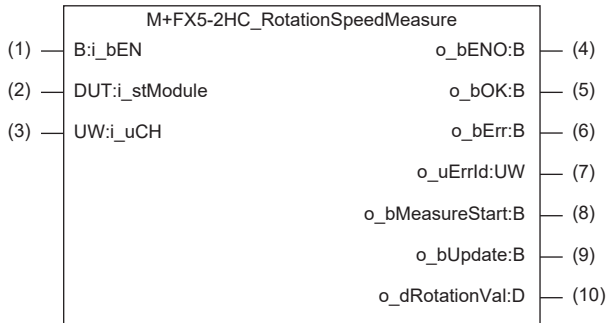
Error code

Error code	Description	Action
100H	The setting of i_uCH (Target channel) is out of the range. The target channel is not within the range of 1 to 2.	Execute the FB again after checking the setting.
101H	A module error occurred before the execution command was turned on.	Reset the module error, and then execute the FB again.
103H	The execution command was turned on while the count permit command of the specified channel was on.	Turn off all the count permit commands for the specified channel before executing the FB.
108H	The operation mode is set to other than the pulse density measurement mode or rotation speed measurement mode.	Execute the FB again after reviewing the operation mode setting.
Error other than the above	Error code on the module side	Refer to the following manual.  MELSEC iQ-F FX5 High-Speed Counter Module User's Manual

2.4 M+FX5-2HC_RotationSpeedMeasure (Rotation Speed Measurement)

Overview

This FB starts the rotation speed measurement function and reads the calculated rotation speed measurement value.



Labels

Input label

No.	Label	Label name	Data type	Import	Range	Description
(1)	i_bEN	Execution command	Bit	Always	On or off	On: The FB is activated. Off: The FB is not activated.
(2)	i_stModule	Module label	Structure	At FB start	—	Specify the module label of the MELSEC iQ-F high-speed counter module.
(3)	i_uCH	Target channel	Word [Unsigned]/Bit String [16-bit]	At FB start	1 to 2	Specify the channel number.

Output label

No.	Label	Label 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	When this label is on, it indicates that the FB has been completed normally.
(6)	o_bErr	Error completion	Bit	Off	When this label is on, it indicates that an error has occurred in the FB.
(7)	o_uErrld	Error code	Word [Unsigned]/Bit String [16-bit]	0	Stores the error code that occurred in the FB.
(8)	o_bMeasureStart	Rotation speed under-measurement flag	Bit	Off	When this label is on, it indicates that the rotation speed is being measured.
(9)	o_bUpdate	Rotation speed measurement value update flag	Bit	Off	When this label is on, it indicates that the rotation speed measurement value has been updated.
(10)	o_dRotationVal	Rotation speed measurement value	Double word [signed]	0	Stores the rotation speed measurement value.

FB details

Available device

Target module	Firmware Version	Engineering tool
FX5UJ CPU module	1.060 or later	GX Works3 Version 1.100E or later
FX5U CPU module	1.300 or later	GX Works3 Version 1.100E or later
FX5UC CPU module	1.300 or later	GX Works3 Version 1.100E or later
High-speed counter module	1.000 or later	GX Works3 Version 1.100E or later

Basic specifications

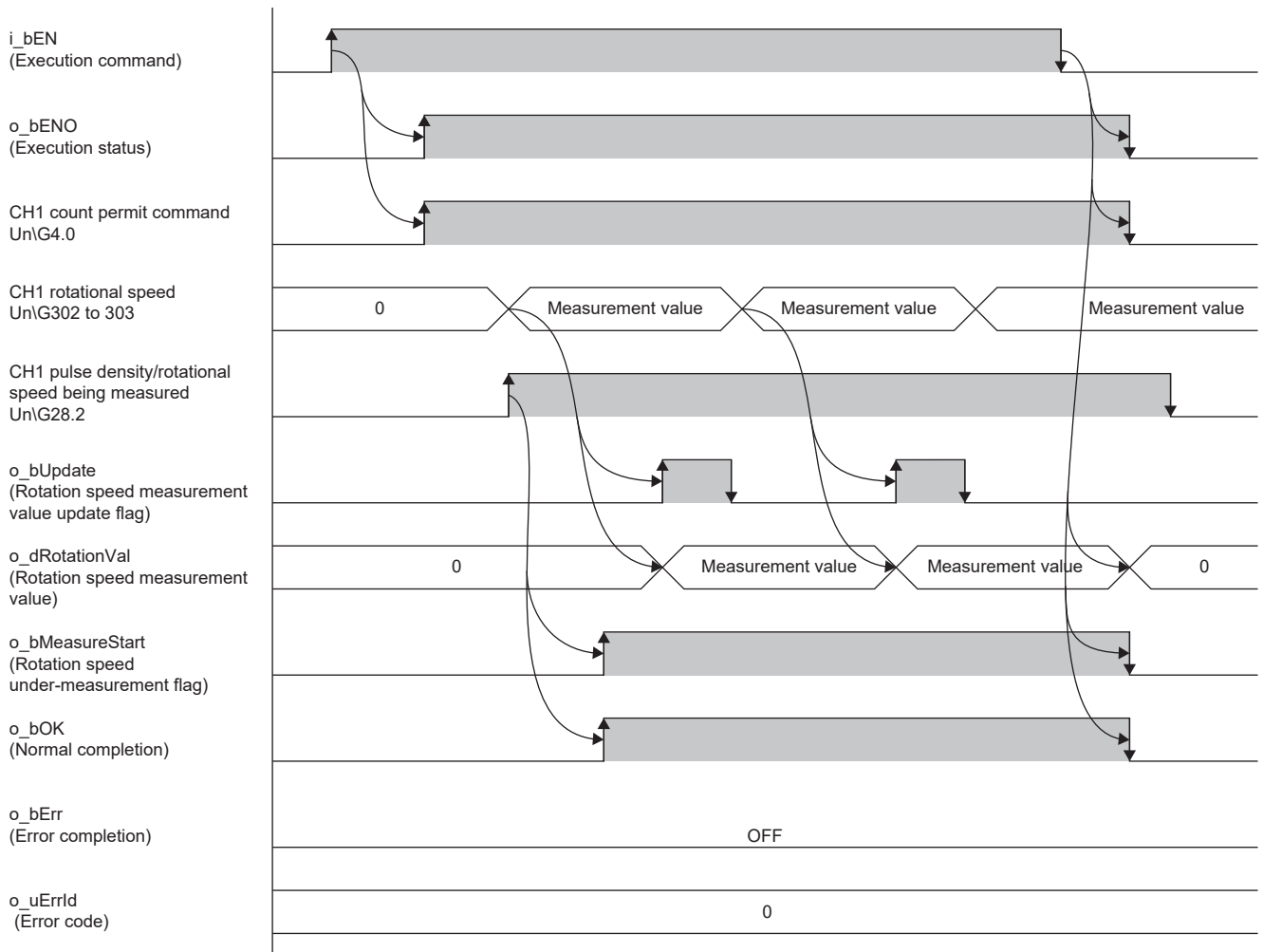
Item	Description
Language	Ladder diagram
Number of steps	570 steps The number of steps of the FB embedded in a program depends on the CPU module used, the input/output definitions, and the options setting of GX Works3. For the option settings of GX Works3, refer to the following. GX Works3 Operating Manual
The amount of label usage	<ul style="list-style-type: none">Label: 336 points (Word)Latch label: 0 points (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 settings of GX Works3, refer to the following. GX Works3 Operating Manual
The number of index register usage	<ul style="list-style-type: none">Index register: 0 pointsLong index register: 0 points
The amount of file register usage	File register: 0 points (Word)
FB dependence	No dependence
FB compilation method	Macro type
FB operation	Always executed

Processing

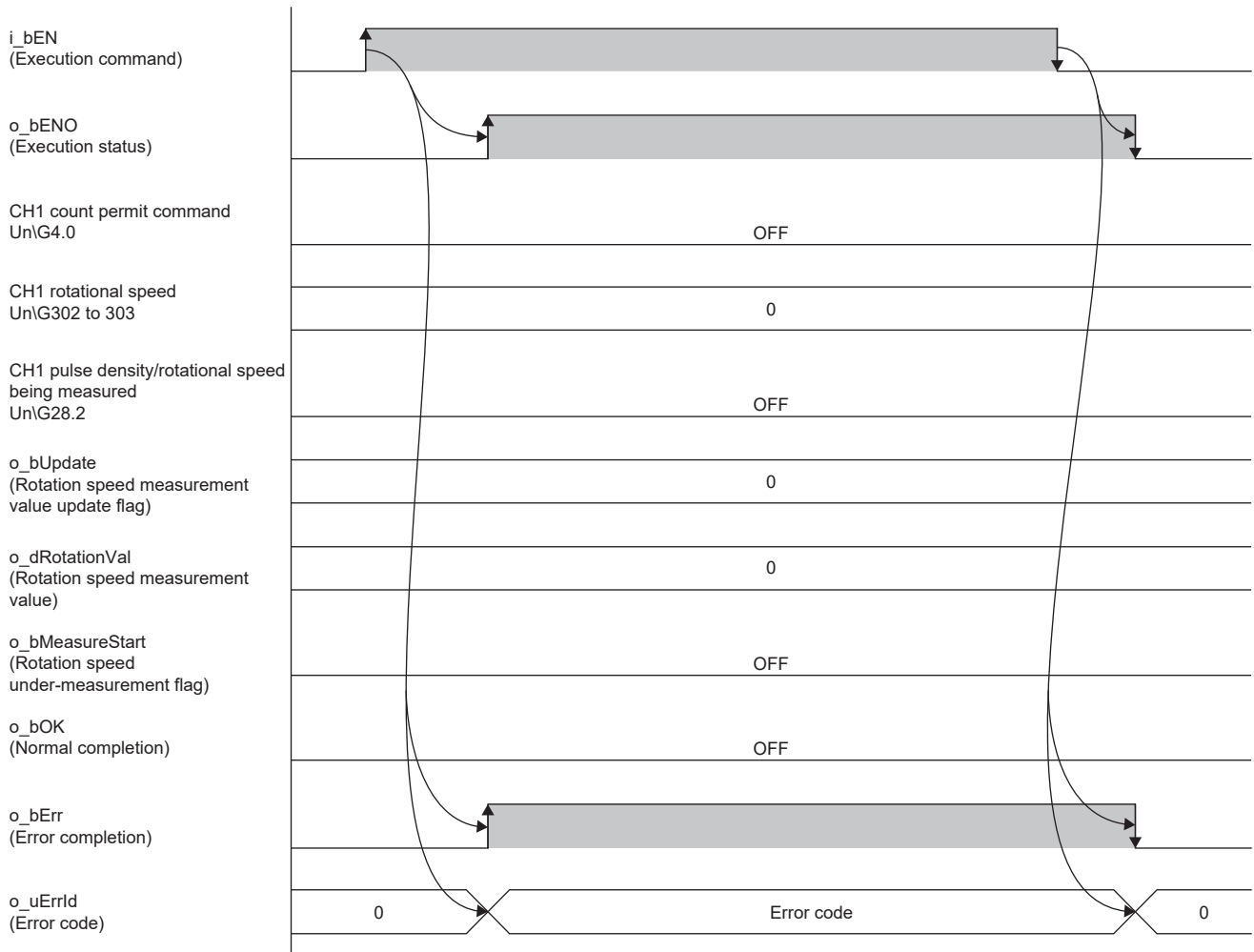
- By turning on `i_bEN` (Execution command), the rotation speed calculated based on the values of CH1 measurement unit time (`Un\G228` to `Un\G229`)/CH2 measurement unit time (`Un\G428` to `Un\G429`), CH1 number of pulses per rotation (`Un\G230` to `Un\G231`)/CH2 number of pulses per rotation (`Un\G430` to `Un\G431`) is read from the buffer memory.
- After `i_bEN` (Execution command) turns on, `o_bOK` (Normal completion) turns on when rotation speed measurement of the target channel starts.
- When `o_bOK` (Normal completion) is on, if the rotation speed of the target channel is updated, `o_bUpdate` (Rotation speed measurement value update flag) is turned on, and the updated value is stored in `o_dRotationVal` (Rotation speed measurement value).
- `o_bUpdate` (Rotation speed measurement value update flag) is on for only one scan.

Timing chart of I/O signals

Normal completion



■ Error completion



Precautions

- When the measurement unit time for the measurement target is shorter than the scan time, the measurement may not be performed properly. Adjust the measurement unit time to twice the scan time or longer.
- If a module error occurs after normal completion, this FB does not output error completion or module error. To check for module errors, use M+FX5-2HC_ErrorOperation (Error operation).

Parameter settings

For the parameter settings, refer to the following.

 MELSEC iQ-F FX5 High-Speed Counter Module User's Manual


Performance value

Module	Processing time	Maximum scan time	Number of scans
FX5UJ CPU module	1.02ms	0.923ms	2 scans
FX5U CPU module, FX5UC CPU module ^{*1*2}	0.768ms	0.676ms	2 scans

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

*2 The labels in the standard area are used.

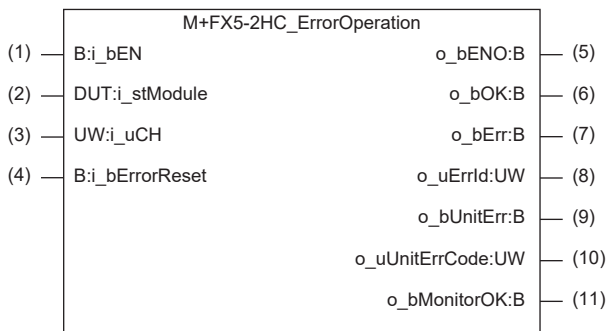
Error code

Error code	Description	Action
100H	The setting of i_uCH (Target channel) is out of the range. The target channel is not within the range of 1 to 2.	Execute the FB again after checking the setting.
101H	A module error occurred before the execution command was turned on.	Reset the module error, and then execute the FB again.
103H	The execution command was turned on while the count permit command of the specified channel was on.	Turn off all the count permit commands for the specified channel before executing the FB.
109H	The operation mode is set to other than the rotation speed measurement mode.	Execute the FB again after reviewing the operation mode setting.
Error other than the above	Error code on the module side	Refer to the following manual.  MELSEC iQ-F FX5 High-Speed Counter Module User's Manual

2.5 M+FX5-2HC_ErrorOperation (Error Operation)

Overview

This FB monitors error codes and performs error resets.



Labels

Input label

No.	Label	Label name	Data type	Import	Range	Description
(1)	i_bEN	Execution command	Bit	Always	On or off	On: The FB is activated. Off: The FB is not activated.
(2)	i_stModule	Module label	Structure	At FB start	—	Specify the module label of the MELSEC iQ-F high-speed counter module.
(3)	i_uCH	Target channel	Word [Unsigned]/Bit String [16-bit]	At FB start	1 to 2	Specify the channel number.
(4)	i_bErrorReset	Error reset request	Bit	Always	On or off	This label is turned on to execute error reset.

Output label

No.	Label	Label name	Data type	Default value	Description
(5)	o_bENO	Execution status	Bit	Off	On: The execution command is on. Off: The execution command is off.
(6)	o_bOK	Normal completion	Bit	Off	When this label is on, it indicates that error reset has been completed.
(7)	o_bErr	Error completion	Bit	Off	When this label is on, it indicates that an error has occurred in the FB.
(8)	o_uErrld	Error code	Word [Unsigned]/Bit String [16-bit]	0	Stores the error code that occurred in the FB.
(9)	o_bUnitErr	Module error flag	Bit	Off	When this label is on, it indicates that a module error has occurred.
(10)	o_uUnitErrCode	Module error code	Word [Unsigned]/Bit String [16-bit]	0	Stores the error code of the occurring error.
(11)	o_bMonitorOK	Monitoring status	Bit	Off	When this label is on, it indicates normal monitoring.

FB details

Available device

Target module	Firmware Version	Engineering tool
FX5UJ CPU module	1.060 or later	GX Works3 Version 1.100E or later
FX5U CPU module	1.300 or later	GX Works3 Version 1.100E or later
FX5UC CPU module	1.300 or later	GX Works3 Version 1.100E or later
High-speed counter module	1.000 or later	GX Works3 Version 1.100E or later

Basic specifications

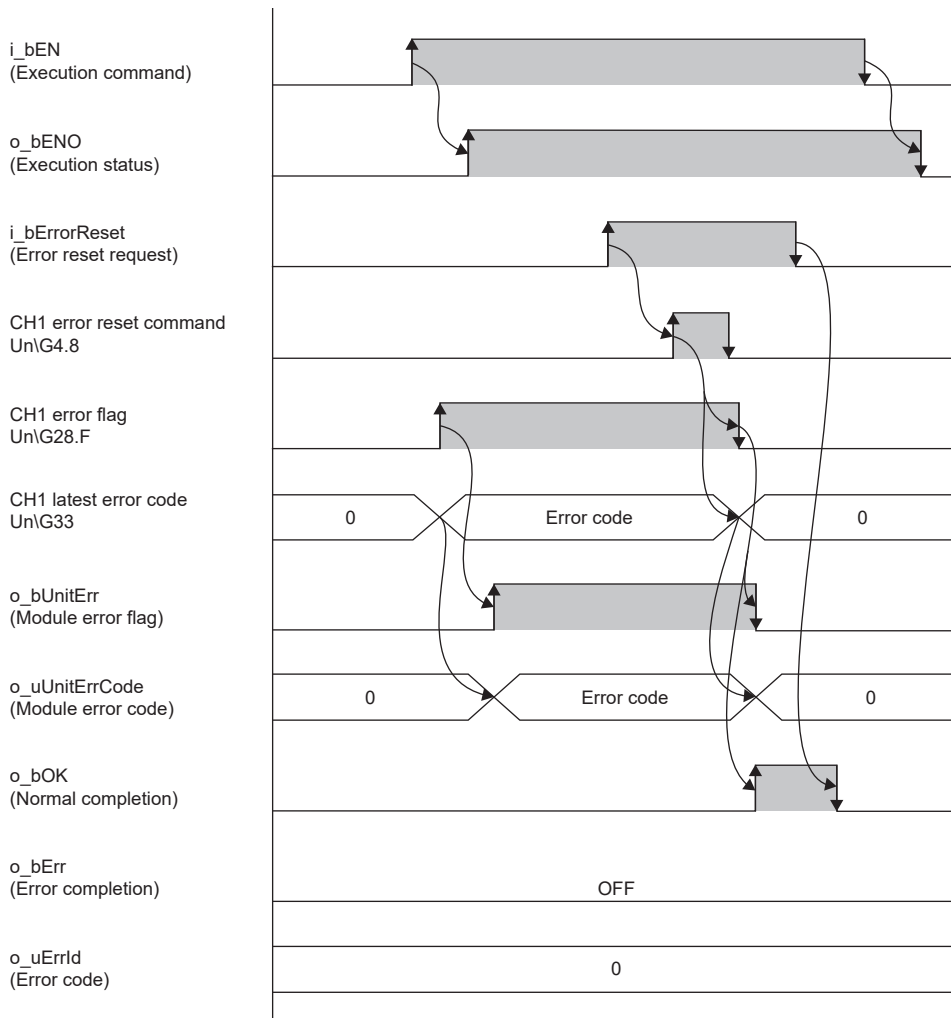
Item	Description
Language	Ladder diagram
Number of steps	305 steps The number of steps of the FB embedded in a program depends on the CPU module used, the input/output definitions, and the options setting of GX Works3. For the option settings of GX Works3, refer to the following. GX Works3 Operating Manual
The amount of label usage	<ul style="list-style-type: none">Label: 336 points (Word)Latch label: 0 points (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 settings of GX Works3, refer to the following. GX Works3 Operating Manual
The number of index register usage	<ul style="list-style-type: none">Index register: 0 pointsLong index register: 0 points
The amount of file register usage	File register: 0 points (Word)
FB dependence	No dependence
FB compilation method	Macro type
FB operation	Always executed

Processing

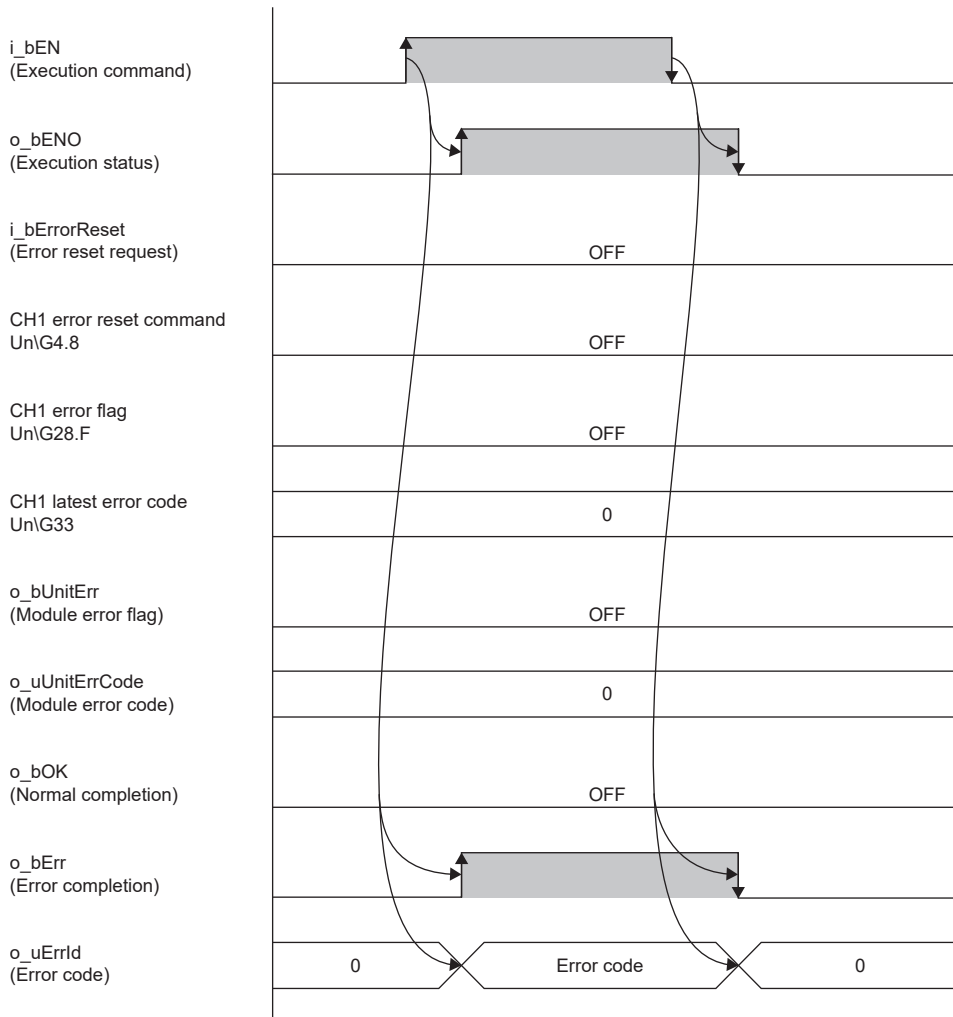
- By turning on i_bEN (Execution command), error monitoring of the target channel is executed.
- o_bMonitorOK (Monitoring status) turns on when the target channel is being monitored.
- If an error occurs, o_bUnitError (Module error detection) turns on, and the error code is stored in o_uUnitErrCode (Module error code).
- After i_bEN (Execution command) turns on, i_bErrorReset (Error reset command) is turned on while the error is occurring, and error reset is executed.
- After error reset is completed, o_bOK (Normal completion) turns on.

Timing chart of I/O signals

■ Normal completion



■ Error completion



Parameter settings

No parameter setting is required for this FB.

Performance value

Module	Processing time	Maximum scan time	Number of scans
FX5UJ CPU module	1.06ms	0.598ms	3 scans
FX5U CPU module, FX5UC CPU module ^{*1*2}	0.871ms	0.485ms	3 scans

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

*2 The labels in the standard area are used.

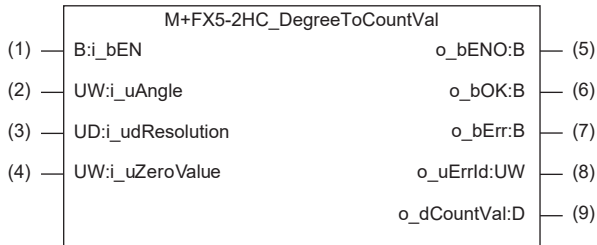
Error code

Error code	Description	Action
100H	The setting of i_uCH (Target channel) is out of the range. The target channel is not within the range of 1 to 2.	Execute the FB again after checking the setting.

2.6 M+FX5-2HC_DegreeToCountVal (Angle Conversion)

Overview

This FB calculates count values from angles.



Labels

Input label

No.	Label	Label name	Data type	Import	Range	Description
(1)	i_bEN	Execution command	Bit	Always	On or off	On: The FB is activated. Off: The FB is not activated.
(2)	i_uAngle	Angle	Word [Unsigned]/Bit String [16-bit]	Always	0 to 3599	Specify the angle. (Unit: 0.1 degree)
(3)	i_udResolution	Resolution	Double word [unsigned]/Bit string [32-bit]	Always	10 to 32768	Specify the resolution of the encoder.
(4)	i_uZeroValue	Zero degree setting value	Word [Unsigned]/Bit String [16-bit]	Always	0 to (i_udResolution-1)	Specify a value to set as 0 degree.

Output label

No.	Label	Label name	Data type	Default value	Description
(5)	o_bENO	Execution status	Bit	Off	On: The execution command is on. Off: The execution command is off.
(6)	o_bOK	Normal completion	Bit	Off	When this label is on, it indicates that a count value is being calculated.
(7)	o_bErr	Error completion	Bit	Off	When this label is on, it indicates that an error has occurred in the FB.
(8)	o_uErrId	Error code	Word [Unsigned]/Bit String [16-bit]	0	Stores the error code that occurred in the FB.
(9)	o_dCountVal	Count value	Double word [signed]	0	Stores the count value calculated from the angle.

FB details

Available device

Target module	Firmware Version	Engineering tool
FX5UJ CPU module	1.060 or later	GX Works3 Version 1.100E or later
FX5U CPU module	1.300 or later	GX Works3 Version 1.100E or later
FX5UC CPU module	1.300 or later	GX Works3 Version 1.100E or later
High-speed counter module	1.000 or later	GX Works3 Version 1.100E or later

Basic specifications

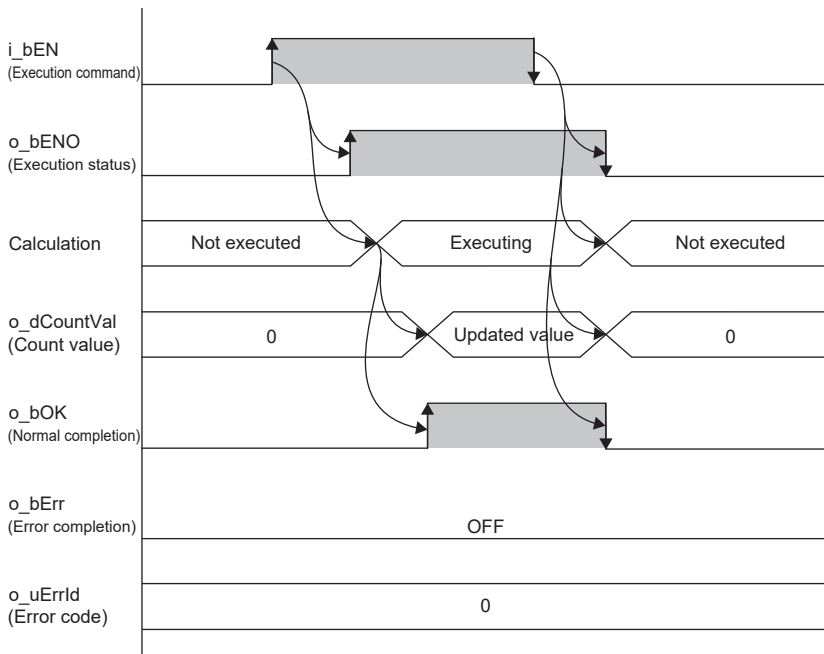
Item	Description
Language	Ladder diagram
Number of steps	299 steps The number of steps of the FB embedded in a program depends on the CPU module used, the input/output definitions, and the options setting of GX Works3. For the option settings of GX Works3, refer to the following. GX Works3 Operating Manual
The amount of label usage	<ul style="list-style-type: none">Label: 80 points (Word)Latch label: 0 points (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 settings of GX Works3, refer to the following. GX Works3 Operating Manual
The number of index register usage	<ul style="list-style-type: none">Index register: 0 pointsLong index register: 0 points
The amount of file register usage	File register: 0 points (Word)
FB dependence	No dependence
FB compilation method	Macro type
FB operation	Always executed

Processing

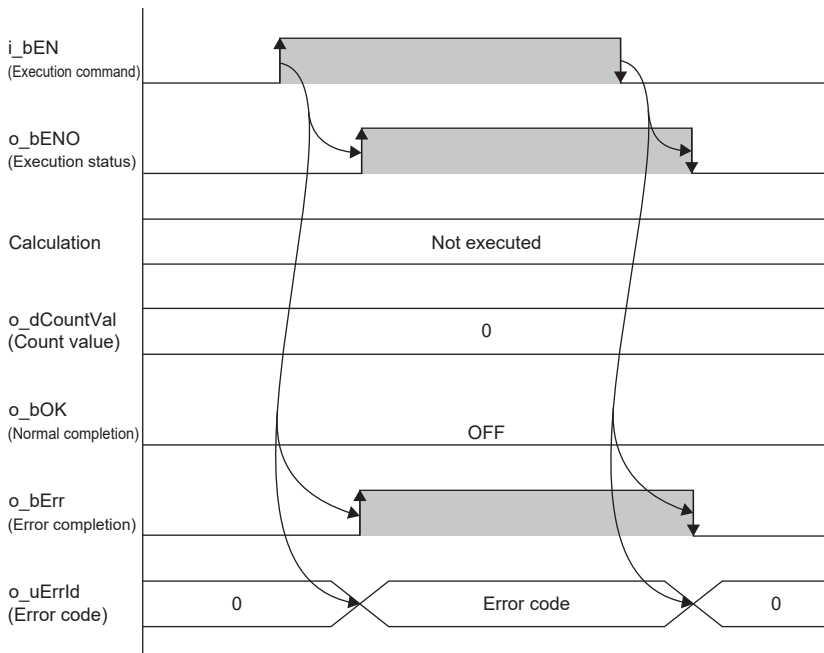
- By turning on `i_bEN` (Execution command), the count value is calculated from the angle (input in increments of 0.1 degrees). The value to be calculated is the one when the resolution is set as the ring counter upper limit value and 0 is set as the ring counter lower limit value.
- The calculation formula for `o_dCountVal` (count value) is as follows: $i_uAngle \div (3600 \div i_udResolution) + i_uZeroValue$. When a calculation value is greater than `i_udResolution` (Resolution), the `i_udResolution` (Resolution) value is subtracted from the calculation value and the result is stored in `o_dCountVal` (Count value).

Timing chart of I/O signals

Normal completion



Error completion



Parameter settings

No parameter setting is required for this FB.

Performance value

Module	Processing time	Maximum scan time	Number of scans
FX5UJ CPU module	0.025ms	0.532ms	1 scan
FX5U CPU module, FX5UC CPU module ^{*1*2}	0.029ms	0.451ms	1 scan

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

*2 The labels in the standard area are used.

Error code

Error code	Description	Action
104H	The setting of i_uAngle (Angle) is out of the range. The angle is not within the range of 1 to 3599.	Execute the FB again after checking the setting.
105H	The setting of i_udResolution (Resolution) is out of the range. The resolution is not within the range of 10 to 32768.	Execute the FB again after checking the setting.
106H	The setting of i_uZeroValue (Zero degree setting value) is out of the range. The zero degree setting value is not within the range of 0 to (i_udResolution - 1).	Execute the FB again after checking the setting.

3 PRECAUTIONS

This chapter describes the common precautions related to the FBs listed in this reference.

3.1 Precautions on FB Combinations

The following describes the influences when using multiple FBs listed in this reference in combination.

Influence matrix of the counter channel and target module

○: Simultaneous processing possible

Counter channel	Target module	
	Same module	Other module
Same channel	*1*2	○
Other channel	○	○

- *1 Do not execute the following FBs simultaneously: M+FX5-2HC_CountEnable (Count enable operation), M+FX5-2HC_PulseMeasure (Pulse width measurement), M+FX5-2HC_PulseDensityMeasure (Pulse density measurement), M+FX5-2HC_RotationSpeedMeasure (Rotation speed measurement).
- *2 For the use of more than one M+FX5-2HC_PulseMeasure (Pulse width measurement), the FBs can be simultaneously processed only when settings of i_uInputSignal (Input signal) of the FBs are different from each other.

3.2 Precautions When Using FBs

This section describes the common precautions when using the FBs listed in this reference.

Description
These FBs do not include the error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
These FBs cannot be used in interrupt programs.
Do not use these FBs in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because i_bEN (Execution command) cannot be turned off and the normal operation cannot be acquired. Always use these FBs in programs that can turn off the execution command.
The FBs require the configuration of a ladder for every input label.
If an error occurs, o_bErr (Error completion) turns on and the processing of this FB is interrupted. In addition, the error code is stored in o_uErrId (Error code).

For precautions specific to each FB, refer to the following FB details.

☞ Page 9 HIGH-SPEED COUNTER MODULE FB

4 APPLICATION EXAMPLE

4.1 Error Monitoring and Count Enable Operation

This section describes the procedure for executing the count enable operation while monitoring for errors.

The following FBs are used in this usage example.

- M+FX5-2HC_CountEnable (Count enable operation)
- M+FX5-2HC_ErrorOperation (Error operation)

Overview

Perform count enable operation while monitoring for module errors.


System configuration

For the system configuration, refer to the following.

 Page 8 System Configuration

Parameter settings

For the parameter settings, refer to the following.

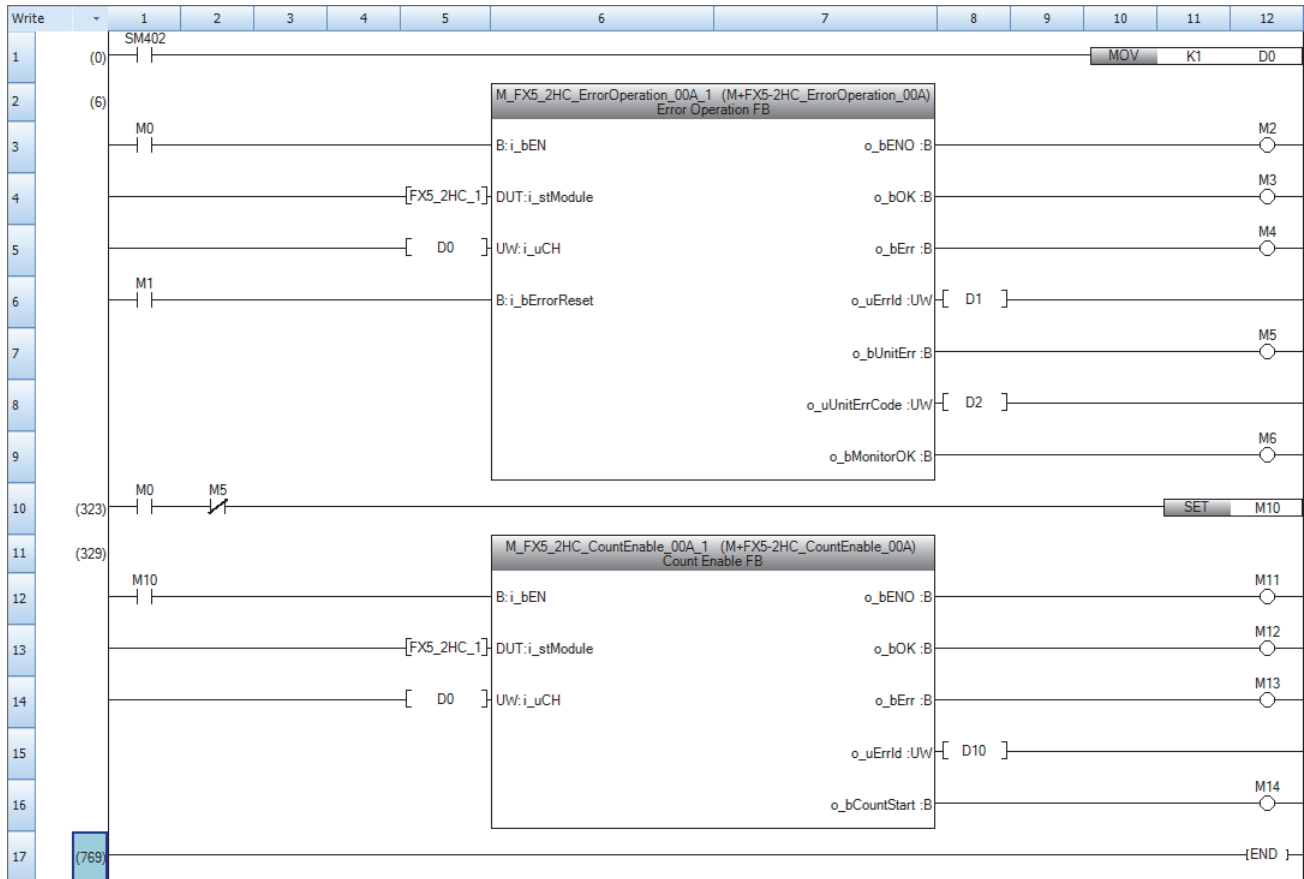
 MELSEC iQ-F FX5 High-Speed Counter Module User's Manual

Programming

After M0 (Execution command) is turned on, the error operation FB is executed.

When M5 (Module error flag) is off, M10 (Execution command) is turned on and the count permit command is turned on.

After M12 (Normal completion) is turned on, M14 (Count in operation) is turned on if the count operation is in progress.



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M

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MEMO

REVISIONS

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October 2023	A	First Edition
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