MITSUBISHI ELECTRIC

Programmable Controller

MELSEC iQ-F series

MELSEC iQ-F
Predefined Protocol Support for Positioning Function Block Reference (for ORIENTAL MOTOR)

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.

Precautions shown in this reference are only for this product. For safety precautions on the programmable controller system, refer to the user's manual (hardware) of the CPU module to be 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.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

INTRODUCTION

Thank you for purchasing the MELSEC iQ-F series.
This reference describes the module FBs for the applicable modules listed below.
Before using this product, please read this reference and the manuals of relevant products carefully and develop familiarity with the specifications to handle the product correctly.
Please make sure that the end users read this reference.

Applicable module

- FX5U
- FX5UC

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 in 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 the nearest Mitsubishi Electric representative.
- Since the examples indicated by this reference, technical bulletin, catalog, etc. are used as a reference, please use them after confirming the function and safety of the equipment and system. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.
- This reference content, specification etc. may be changed without a notice for improvement.
- The information in this reference has been carefully checked and is believed to be accurate; however, if you notice a doubtful point, an error, etc., please contact the nearest Mitsubishi Electric representative. When doing so, please provide the manual number given at the end of this reference.

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RELEVANT MANUALS

Manual name	Description
MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware) [SH-082452ENG]	Describes the details of hardware of the CPU module, including performance specifications, wiring, installation, and maintenance.
MELSEC iQ-F FX5 User's Manual (Application) [JY997D55401]	Basic knowledge required for program design, functions of the CPU module, devices/labels, and descriptions of parameters.
MELSEC iQ-F FX5 User's Manual (MODBUS Communication) [JY997D56101]	Information related to the MODBUS serial communication and MODBUS/TCP communication.
MELSEC iQ-F FX5 Programming Manual (Instructions, Standard Functions/ Function Blocks) [JY997D55801]	Specifications of instructions and functions that can be used in programs.
MELSEC iQ-F FX5 Programming Manual (Program Design) [JY997D55701]	Specifications of ladders, ST, FBD/LD, and other programs and labels.
GX Works3 Operating Manual [SH-081215ENG]	System configuration, parameter settings, and online function operations of GX Works3.
Predefined Protocol Support Tool For Positioning Operating Manual [SH-082176ENG]	System configuration, operation method of functions, and troubleshooting of Predefined Protocol Support Tool For Positioning.
Support software MEXE02 Version 3 OPERATING MANUAL [HM-60131]	Operation method, data editing/writing method, monitor functions, diagnosis functions, and troubleshooting of MEXE02.
AR Series/Motorized actuator equipped with AR Series AC power input/DC power input FLEX Built-in controller type USER MANUAL [HM-60340]	Functions, installation/connection method, operation method, OPX-2A operation method, troubleshooting, Modbus RTU control, and FA network control of the AR series motor and driver.
AZ Series/Motorized actuator equipped with AZ Series Function Edition [HM-60262]	Procedures before operation, Modbus RTU control, FA network control, and alarm/information function of the AZ series motor and driver.
RKⅡ Series/Motorized actuator equipped with RKⅡ Series FLEX Built-in Controller Type USER MANUAL [HM-60085]	Functions, installation/connection method, operation method, data setting method, OPX-2A operation method, troubleshooting, Modbus RTU control, and FA network control of the RKⅡ series motor and driver.

TERMS

Unless otherwise specified, this reference uses the following terms.

Term	Description
FX5	A generic term for FX5UJ, FX5U, and FX5UC programmable controllers.
FX5 CPU module	A generic term for FX5UJ, FX5U, and FX5UC CPU modules.
FX5UJ CPU module	A 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	A 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	A 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.
Engineering tool	A tool for configuring settings and performing programming, debugging, and maintenance for programmable controllers.
JOG operation	Pulses are output to the drive unit only while the JOG start signal is on.
Inching operation	Pulses for minute movement amount are output to the drive unit by manual operation.
Pushing operation	An operation that continuously applies pressure when pushing a load.
Motor driver	A controller manufactured by Oriental Motor.

GENERIC TERM/ABBREVIATION

Unless otherwise specified, this reference uses the following generic term and abbreviation.

Generic term/abbreviation	Description
FB	FB is the abbreviation for Function Block. The FB is a generalized circuit block that is repeatedly used in a sequence program and designed to be diverted in the sequence program. This improves the efficiency of the program development and reduces the programming errors, resulting in the improvement in the program quality.
Predefined Protocol Support Tool For Positioning	Predefined Protocol Support Tool For Positioning is a sample tool that has a function specialized for positioning control of an electric actuator connected via the MODBUS RTU communication.

1 OVERVIEW

The FBs in this reference are the FB libraries for connecting the MELSEC iQ-F FX5U or FX5UC series and motor driver through the MODBUS RTU connection, and using them.

1.1 Specification Overview

The following shows the features of this function.

Optimal system for low-price devices

In the easy drive control, easy and low-price system construction can be achieved by using Predefined Protocol Support Function For Positioning and Oriental Motor devices together.

Easy startup

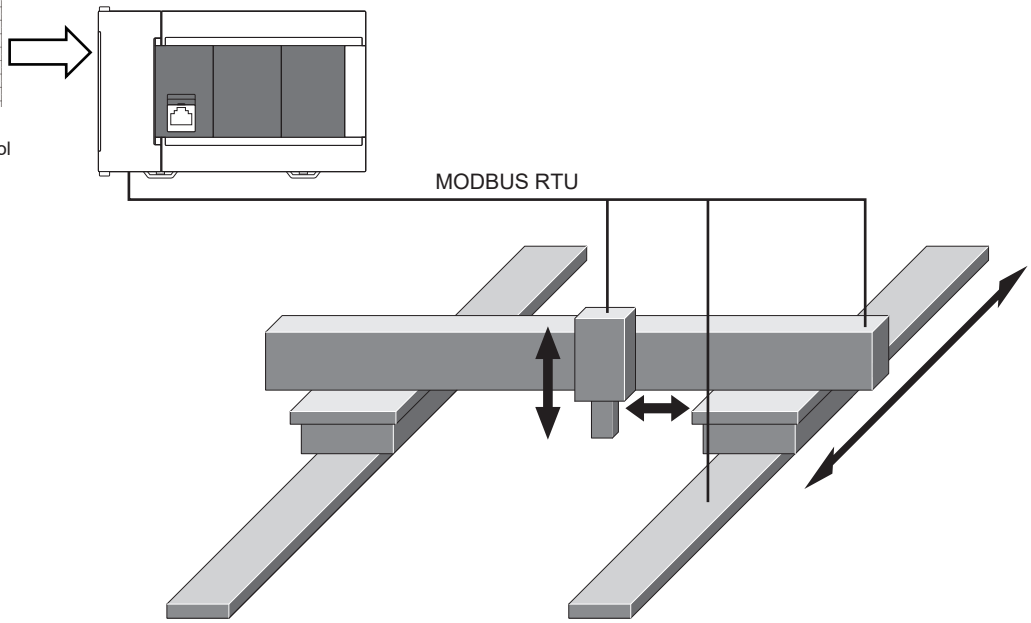
Using the program application example described in this reference enables the positioning operation without modifying the program.

Application example

The following shows an example of using this function in a sealing device. Use three motor drivers to perform the positioning control.



Controlled by the predefined protocol support FB for positioning



1.2 FB List

The following table lists the FB libraries in this reference.

Point

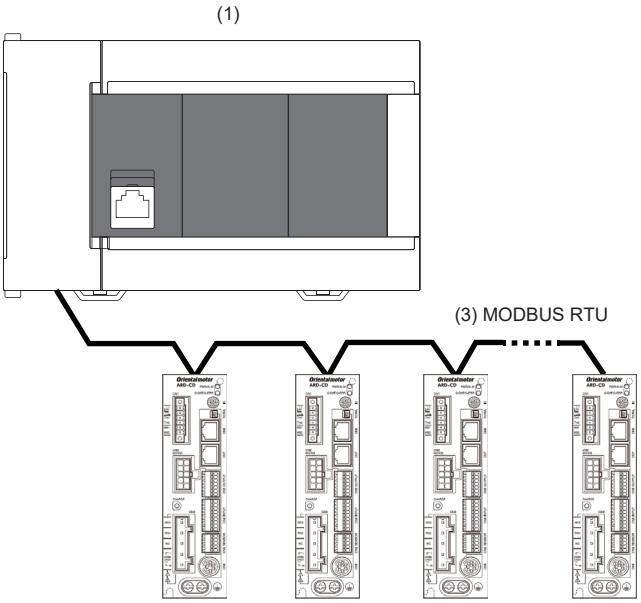
Note that this reference does not describe the FB version information such as "_00A" at the end of FB name.

○: Necessary, —: Unnecessary

Name	Description	Parameter setting necessity
M+OriStartHomePositioning_F (Home position return)	Performs the home position return.	○
M+OriJogInchContOp_F (JOG/inching/continuous operation)	Performs the JOG operation, inching operation, or continuous operation.	○
M+OriReadDriveData_F (Operation data reading)	Reads the operation data corresponding to the specified operation data No.	○
M+OriWriteDriveData_F (Operation data writing)	Writes the operation data corresponding to the specified operation data No.	○
M+OriStartPositioning_F (Positioning operation)	Starts the positioning operation for the specified operation data No.	○
M+OriMonitoring_F (Operation monitoring)	Monitors the current position and alarms, and performs the alarm reset.	○
M+OriServoControl_F (Exciting ON/OFF)	Controls the exciting ON/OFF.	○

1.3 System Configuration

The following shows a system configuration example for using the FBs described in this reference.



(2) Maximum number of connected modules: 31

No.	Device	
(1)	FX5U CPU, FX5UC CPU	Built-in RS-485 port
		FX5-485-BD
		FX5-485ADP
(2)	Motor driver	AR series
		AZ series
		RKⅡ series
(3)	Serial communication	RS-485 connection

2 DETAILS OF THE FB LIBRARY

2.1 Common Specifications

This section describes the common specifications in this FB library.

Structure list

The following table lists the structures to be used in this FB library.

stDriveData (Operation data)

Label	Label name	Data type	Setting range[*6]	Description
dPosition	Position	Double word [Signed]	-2147483648 to 2147483647	Stores the target position (movement amount) of the positioning operation.[*1] AR series: -8388608 to 8388607 AZ series: -2147483648 to 2147483647 RKⅡ series: -8388608 to 8388607
dSpeed	Operation speed	Double word [Signed]	-4000000 to 4000000	Stores the operation speed of the positioning operation.[*2] AR series: 0 to 1000000 AZ series: -4000000 to 4000000 RKⅡ series: 0 to 1000000
udUpSpeed	Acceleration	Double word [Unsigned]/Bit string [32-bit]	1 to 1000000000	Stores the acceleration rate (acceleration time) of the positioning operation.[*3] AR series: 1 to 1000000 AZ series: 1 to 1000000000 RKⅡ series: 1 to 1000000
udDownSpeed	Deceleration	Double word [Unsigned]/Bit string [32-bit]	1 to 1000000000	Stores the deceleration rate (deceleration time) of the positioning operation.[*3] AR series: 1 to 1000000 AZ series: 1 to 1000000000 RKⅡ series: 1 to 1000000
uMotionMethod	Operation method	Word [Unsigned]/Bit string [16-bit]	0 to 22	Stores the specification method of the position (movement amount) for the positioning operation. ■For AR series, RKⅡ series 0: INC (Incremental) 1: ABS (Absolute) ■For AZ series 1: Absolute positioning 2: Incremental positioning (Based on command position) 3: Incremental positioning (Based on feedback position) 7: Continuous operation (Position control) 8: Wrap absolute positioning 9: Wrap proximity positioning 10: Wrap forward direction absolute positioning 11: Wrap reverse direction absolute positioning 12: Wrap absolute pushing 13: Wrap proximity pushing 14: Wrap forward direction pushing 15: Wrap reverse direction pushing 16: Continuous operation (Speed control) 17: Continuous operation (Pushing) 18: Continuous operation (Torque control) 20: Absolute positioning pushing 21: Incremental positioning pushing (Based on command position) 22: Incremental positioning pushing (Based on feedback position)

Label	Label name	Data type	Setting range[*6]	Description
uMotionFunc	Operation function	Word [Unsigned]/Bit string [16-bit]	0 to 3	Stores the execution method of the positioning operation. ■For AR series, RKⅡ series 0: Single-motion 1: Link 2: Link 2 3: Pushing ■For AZ series 0: No link 1: Manual sequential 2: Automatic sequential 3: Type connection
uDwellTime	Dwell time	Word [Unsigned]/Bit string [16-bit]	0 to 65535	■For AR series, RKⅡ series Stores the stop waiting time of Link 2.[*4] 0 to 50000 ■For AZ series Stores the waiting time after the operation ends.[*4] 0 to 65535
uElecLimit	Operating current	Word [Unsigned]/Bit string [16-bit]	0 to 1000	■For AR series Stores the current ratio of the pushing operation.[*5] ■For AZ series Stores the motor operating current based on the base current being 100%. Represents the pushing current when pushing operation is performed.[*5] ■For RKⅡ series Not supported
uFwdPosOp	Sequential positioning	Word [Unsigned]/Bit string [16-bit]	0 and 1	Stores enable/disable of the sequential positioning operation. ■For AR series, RKⅡ series 0: Disable 1: Enable ■For AZ series Not supported
wCombTo	Next data number	Word [Signed]	-256, -2 to 255	■For AR series, RKⅡ series Not supported ■For AZ series Stores the next data number when the operation is linked. -256: Stop -2: ↓↓(+2) -1: ↓(+1) 0 to 255: Operation data No.
dOffsetArea	Offset (Area)	Double word [Signed]	-2147483648 to 2147483647	■For AR series, RKⅡ series Not supported ■For AZ series Stores the distance from the center position of the range in which the MAREA output is turned on to the target position of the positioning operation. Stores the distance to the operation start position in the case of continuous operation.[*1]
dWide	Width (Area)	Double word [Signed]	-1 to 4194303	■For AR series, RKⅡ series Not supported ■For AZ series Stores the range in which the MAREA output is turned on.[*1] -1: Disable 0 to 4194303: Setting range
uLoopCnt	Count (Loop)	Word [Unsigned]/Bit string [16-bit]	0, 2 to 255	■For AR series, RKⅡ series Not supported ■For AZ series Stores the number of times of loop. 0: None (No loop) 2 to 255: loop 2{to loop 255 ({Number of times of loop)

Label	Label name	Data type	Setting range*6	Description
dOffsetPosition	Position offset (Loop)	Double word [Signed]	-4194304 to 4194303	■For AR series, RKⅡ series Not supported ■For AZ series Offsets the position (movement amount) every time loop is executed.*1
uLoopEnd	End (Loop)	Word [Unsigned]/Bit string [16-bit]	0 and 1	■For AR series, RKⅡ series Not supported ■For AZ series Stores the operation data No. with which loop is ended. 0: None (Not the loop end point) 1: }L-End (Loop end point)
wWeakEvent	Weak event	Word [Signed]	-1 to 31	■For AR series, RKⅡ series Not supported ■For AZ series Stores the number of the operation I/O event to generate a weak event. Specifying an operation I/O event is the condition to generate the event. -1: -(Disable) 0 to 31: Operation I/O event number
wStrongEvent	Strong event	Word [Signed]	-1 to 31	■For AR series, RKⅡ series Not supported ■For AZ series Stores the number of the operation I/O event to generate a strong event. If a weak event and a strong event are generated simultaneously, the strong event is prioritized. Specifying an operation I/O event is the condition to generate the event. -1: -(Disable) 0 to 31: Operation I/O event number

*1 In units of step.
*2 In units of Hz.
*3 In units of 0.001 ms/kHz.
*4 In units of 0.001 s.
*5 In units of 0.1%.
*6 The setting range differs depending on the electric actuator.

stMonitoringTable (Monitoring table)

Label	Label name	Data type	Setting range	Description
uCurrentAlmCode	Current alarm	Word [Unsigned]/Bit string [16-bit]	0000H to FFFFH	Stores the occurring alarm code.
udCurrentWngInfCode	Current warning/ information	Double word [Unsigned]/Bit string [32-bit]	00000000H to FFFFFFFFH	Stores the occurring warning code/ information code.
uCommErrCode	Communication error code	Word [Unsigned]/Bit string [16-bit]	0000H to FFFFH	Stores the latest received communication error code.
uCurrentSctDataNo	Currently selected data No.	Word [Unsigned]/Bit string [16-bit]	0 to 63	Stores the selected operation data No.
wCurrentDriveDataNo	Current operation data No.	Word [Signed]	-1 to 63	■For AR series, RKⅡ series Stores the operation data No. during the positioning operation. It is used in the linked-motion operation and sequential positioning operation. While the operation is stopped, the data No. of the last operation is stored. Between power-on and execution of positioning operation, "-1" is stored. ■For AZ series Stores the operation data No. being executed in the stored data operation or continuous macro operation. In operation not using operation data, "-1" is stored. While the operation is stopped, "-1" is also stored.
dTargetPosition	Command position	Double word [Signed]	-2147483648 to 2147483647	Stores the current command position.*1
dTargetSpeed	Command speed	Double word [Signed]	-4000000 to 4000000	Stores the current command speed.*2
dDetectPosition	Feedback position	Double word [Signed]	-2147483648 to 2147483647	■For AR series Indicates the feedback position. The value in which the setting configured in the electronic gear is applied is stored.*2 ■For AZ series Stores the current feedback position. When the wrap function is enabled, the value on the wrap coordinate is stored.*2 ■For RKⅡ series Stores the feedback position. The value in which the setting configured in the electronic gear is applied is stored.*2*3
uRestDwellTime	Remaining dwell time	Word [Unsigned]/Bit string [16-bit]	0 to 65535	■For AR series, RKⅡ series Indicates the remaining dwell time used in Linked-motion operation 2.*4 ■For AZ series Indicates the remaining time in the drive-complete delay time or dwell time.*4
udDirectIOSts	Status of direct I/O	Double word [Unsigned]/Bit string [32-bit]	00000000H to FFFFFFFFH	■For AR series, RKⅡ series Indicates the status of the direct I/O and electromagnetic brake. ■For AZ series Indicates the status of the direct I/O, extended input, differential output, and virtual input.
uDriverInSig	Driver input signal	Word [Unsigned]/Bit string [16-bit]	0000H to FFFFH	Stores the remote I/O input signal of the motor driver. For the remote I/O assignment of the motor driver, refer to ☞ Page 71 Parameter setting. For the remote I/O input signal of the motor driver, refer to the manual of the motor driver to be used.

Label	Label name	Data type	Setting range	Description
uDriverOutSig	Driver output signal	Word [Unsigned]/Bit string [16-bit]	0000H to FFFFH	Stores the remote I/O output signal of the motor driver. For the remote I/O assignment of the motor driver, refer to ☞ Page 71 Parameter setting. For the remote I/O output signal of the motor driver, refer to the manual of the motor driver to be used.

*1 In units of step.
*2 In units of r/min.
*3 It is only for specifications with encoder.
*4 In units of ms.
*5 The setting range differs depending on the electric actuator.

Precautions on FB combinations

The following describes the influences when using multiple FBs of this FB library in combination.

Influence matrix of the communication channel and target axis

The following shows the influence matrices of the communication channel and target axis.

○: Simultaneous processing available, △: FB operation delayed

		Target axis	
		Same axis	Other axis
Communication channel	Same channel	Refer to the influence matrix when the same axis and channel are specified.	△
	Other channel	○	○

Influence matrix when the same axis and channel are specified

The following shows the influence matrices when the same axis and channel are specified.

△: FB operation delayed, ●: Depends on the controller

		Target FB						
		M+OriStartHomePositioning_F (Home position return)	M+OriJogInchContOp_F (JOG/inching/continuous operation)	M+OriReadDriveData_F (Operation data reading)	M+OriWriteDriveData_F (Operation data writing)	M+OriStartPositioning_F (Positioning operation)	M+OriMonitoring_F (Operation monitoring)	M+OriServoControl_F (Exciting ON/OFF)
Target FB	M+OriStartHomePositioning_F (Home position return)	●	●	△	△	●	△	●
	M+OriJogInchContOp_F (JOG/inching/continuous operation)	●	●	△	△	●	△	●
	M+OriReadDriveData_F (Operation data reading)	△	△	△	△	△	△	△
	M+OriWriteDriveData_F (Operation data writing)	△	△	△	△	△	△	△
	M+OriStartPositioning_F (Positioning operation)	●	●	△	△	●	△	●
	M+OriMonitoring_F (Operation monitoring)	△	△	△	△	△	△	△
	M+OriServoControl_F (Exciting ON/OFF)	●	●	△	△	●	△	●

Precautions

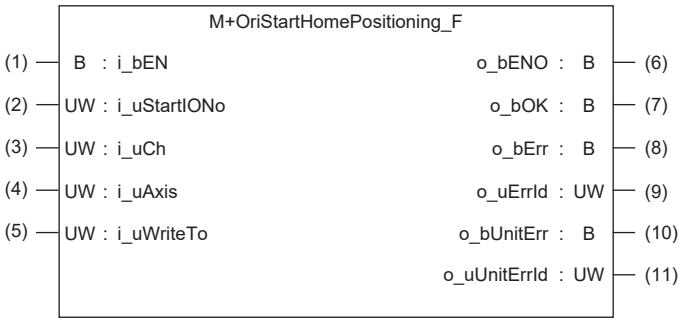
Check the following precautions before using this FB library.

No.	Condition
1	The external device for the serial communication and the motor driver support MODBUS RTU.
2	The MELSEC iQ-F series product and motor driver are connected by the serial communication.
3	R0 to R1903 (1904 points) of the file register (R) are used in this FB library.
4	Set the channel to be used in Predefined Protocol Support Tool For Positioning. For details, refer to 📖Predefined Protocol Support Tool For Positioning Operating Manual (6.4 Writing Predefined Protocol Information).
5	Use the configuration tool "MEXE02" manufactured by Oriental Motor to configure the remote I/O assignment setting of the motor driver. For details, refer to ☞ Page 71 Parameter setting.
6	When using the following FBs, be careful not to use them at the same time with the same target axis specified in i_uAxis (Target axis) or with the same communication channel specified in i_uCh (Target channel). Otherwise, they may not operate normally. • M+OriStartHomePositioning_F (Home position return) • M+OriJogInchContOp_F (JOG/inching/continuous operation) • M+OriStartPositioning_F (Positioning operation) • M+OriServoControl_F (Exciting ON/OFF)
7	When FBs are executed at the same time, specifying the same communication channel in i_uCh (Target axis) delays the FB operation.

2.2 M+OriStartHomePositioning_F (Home Position Return)

Overview

This FB performs the home position return.



Label

Input label

No.	Label	Label name	Data type	Setting range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_uStartIONo	Start I/O No.	Word [Unsigned]/Bit string [16-bit]	—	Setting this label is not required since it is not used in the program in this FB.
(3)	i_uCh	Target channel	Word [Unsigned]/Bit string [16-bit]	1 to 4	Specify the channel number. 1: Built-in RS485 port 2: FX5-485-BD 3, 4: FX5-485ADP
(4)	i_uAxis	Target axis	Word [Unsigned]/Bit string [16-bit]	1 to 31	Specify the axis number set in the motor driver.*1 Example: When setting 1 for the axis number of the motor driver, set 1 in i_uAxis (Target axis).
(5)	i_uWriteTo	Writing destination controller	Word [Unsigned]/Bit string [16-bit]	0 to 2	Specify the writing destination motor driver. AR series: 0 AZ series: 1 RKⅡ series: 2

*1 The axis number corresponds to the slave station number of MODBUS.

Output label

No.	Label	Label 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	When this label is on, it indicates that the home position return has been completed.
(8)	o_bErr	Error completion	Bit	OFF	When this label is on, it indicates that an error has occurred in the FB.
(9)	o_uErrId	Error code	Word [Unsigned]/Bit string [16-bit]	0	The error code that has occurred in the FB is stored.
(10)	o_bUnitErr	Module error completion	Bit	OFF	When this label is on, it indicates that an error has occurred in the module.
(11)	o_uUnitErrId	Module error code	Word [Unsigned]/Bit string [16-bit]	0	The error code that has occurred in the module is stored.

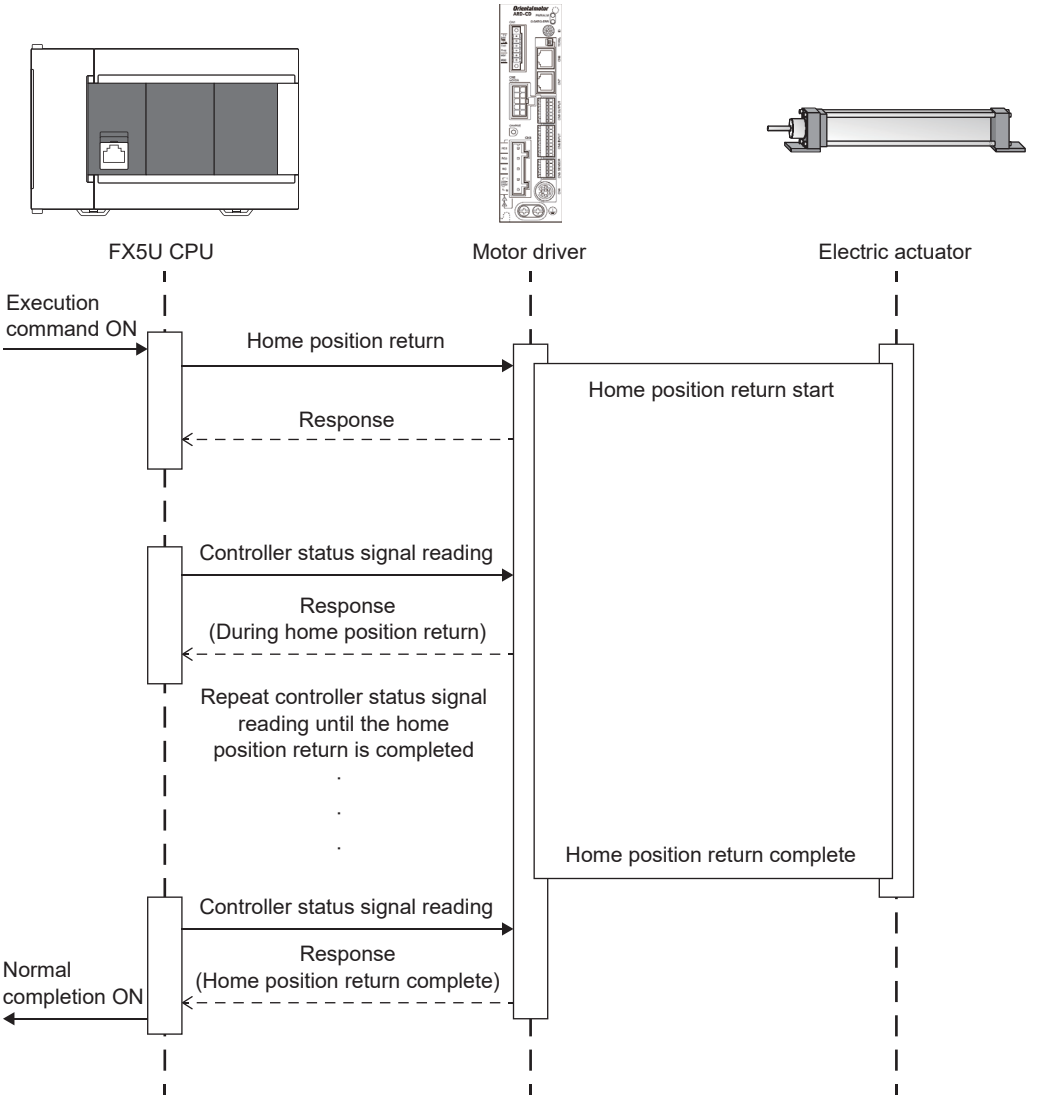
Function overview

Applicable hardware and software

■ Predefined Protocol Support FB For Positioning

Applicable module	Firmware version	Engineering tool
FX5U CPU	1.200 or later	GX Works3 Version 1.065T or later
FX5UC CPU	1.200 or later	GX Works3 Version 1.065T or later

Sequence diagram



Basic specifications

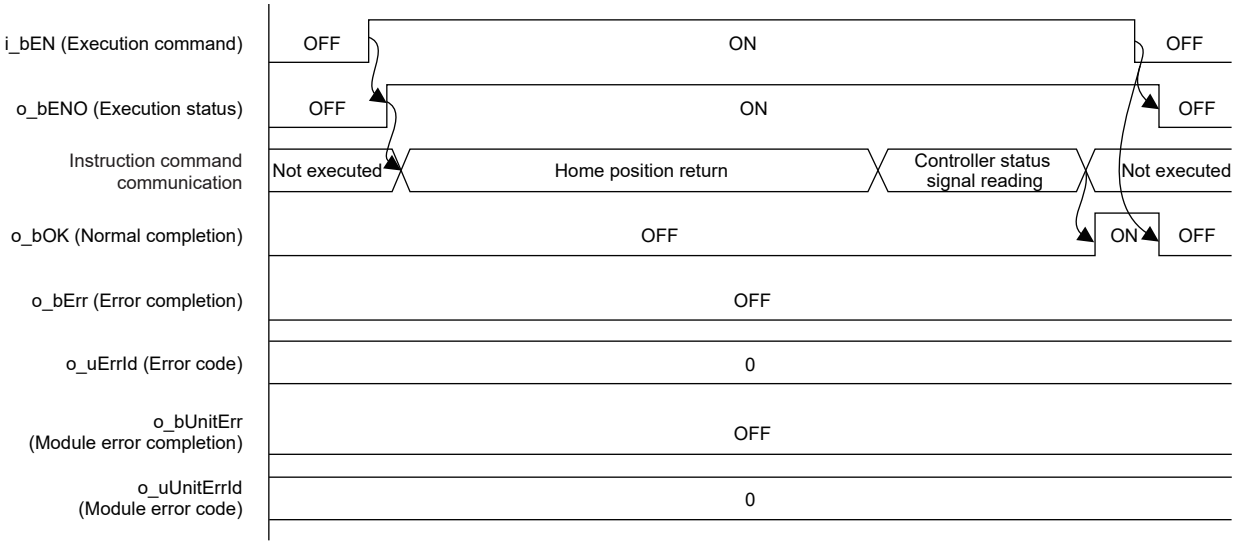
Item	Description
Programming language	—(The program in this FB is not open to the public.)
Number of steps	1232 steps The number of steps of the FB in a program depends on the CPU module used, input and output definition, and option settings of GX Works3. For the option settings of GX Works3, refer to 📖GX Works3 Operating Manual (2.9 Option Setting for Each Function).
Label amount used	• Label: 0.04K points (Word) • Latch label: 0K points (Word) The label amount used in a program depends on the CPU module used, device specified in the argument, and option settings of GX Works3. For the option settings of GX Works3, refer to 📖GX Works3 Operating Manual (2.9 Option Setting for Each Function).
Number of index register points used	• Index register: 2 points • Long index register: 0 points
File register amount used	File register: 1904 points (Word)
FB dependence	No dependence
FB compiling method	Subroutine type
FB operation type	Pulsed execution (multiple scan execution type)

Function description

- Set the axis number of the operation target in i_uAxis (Target axis).
- At rising edge of i_bEN (Execution command), this FB performs the home position return. When the remote I/O assignment is changed from HOME to ZHOME in the AZ series controller by Oriental Motor, the high-speed home position return is performed.
- In this FB, o_bOK (Normal completion) turns on by checking the ON state of HOME-P/HOME-END of the motor driver.
- If an error occurs while sending/receiving a predefined protocol, o_bErr (Error completion) turns on and the processing of the FB is interrupted. The error code is stored in o_uErrId (Error code). For details of the error code, refer to 📖MELSEC iQ-F FX5 User's Manual (Serial Communication/7.9 Troubleshooting/Checking absence/presence of errors).
- If an error occurs in the motor driver and this FB receives the error code, o_bUnitErr (Module error completion) turns on and the processing of the FB is interrupted. The received error code is stored in o_uUnitErrId (Module error code). For details of the error code, refer to the manuals described in "RELEVANT MANUALS".
- If any other error occurs, o_bErr (Error completion) turns on and the processing of the FB is interrupted. For details of the error code, refer to ☞ Page 21 Error code.

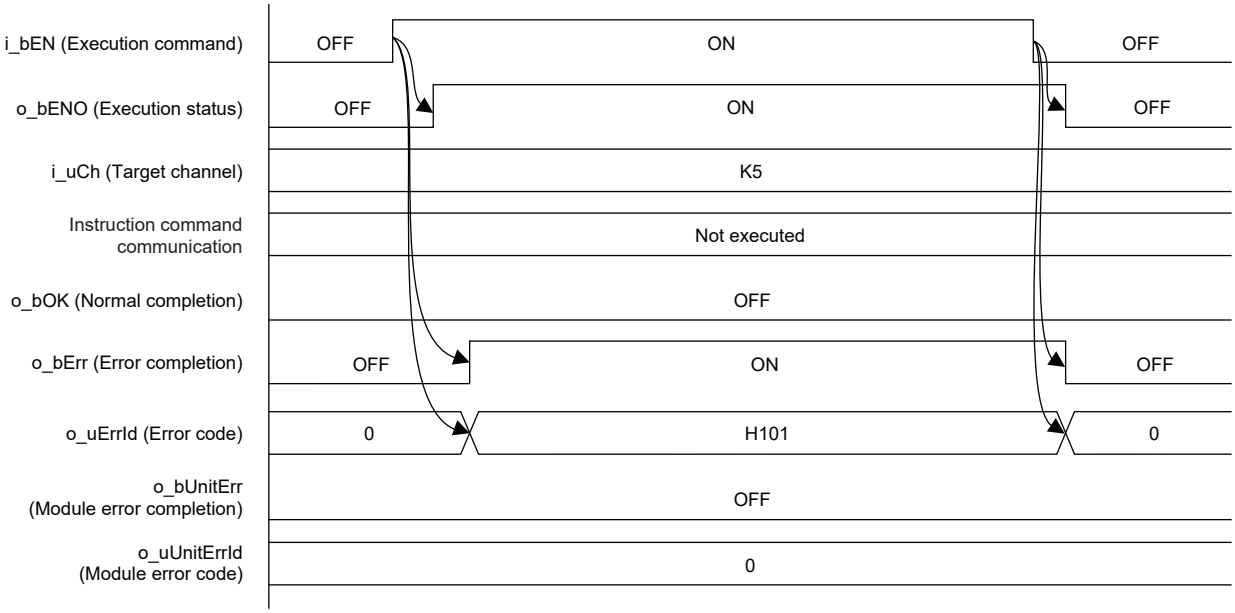
Timing chart of I/O signals

■ Normal completion



■ Error completion

• The target channel is out of range.



Restrictions and precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB uses the index registers Z0 and Z1. When using an interrupt program, do not use these index registers.
- 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.
- This FB requires the ladder to be configured for every input label.
- In this FB, if i_bEN (Execution command) is turned off after the home position return operation is started and before o_bOK (Normal completion), o_bErr (Error completion), or o_bUnitErr (Module error completion) turns on, the operation of the motor driver does not stop until the home position return operation is completed.
- This FB uses the CPRTCL instruction. For details, refer to 📖MELSEC iQ-F FX5 User's Manual (Serial Communication/ 7.8 Programming/Predefined protocol support instruction).
- To operate the motor driver, set the protocol type to the predefined protocol support type with the module parameter of GX Works3. For details of the parameter setting procedures, refer to ☞ Page 20 Parameter setting.
- Change the number of timeouts or retries of the communication in Predefined Protocol Support Tool For Positioning. For details of the setting procedures, refer to 📖Predefined Protocol Support Tool For Positioning Operating Manual (6.2 Setting a Connected Model). If the communication interval for the same channel is short, the command may not be received depending on the connected controller, and a serial communication timeout (CPU error) may occur. In this case, the situation can be avoided by increasing the "transmission standby time" in the protocol transmission/reception settings of the connected device setting.
- Before executing this FB, turn on exciting using M+OriServoControl_F (Exciting ON/OFF).

Parameter setting

Set the protocol type to the predefined protocol support type.
Configure the settings by selecting the following menu items in GX Works3.
[Navigation window] ⇨ [Parameter] ⇨ Communication port to be used ⇨ [Basic Settings] For the protocol type setting, select "Predefined Protocol Support Function" for "Communication Protocol Type".
Configure the following settings in the detail settings.

- Data Length: 8 (Default value: 7)
- Parity Bit: Even (Default value: Odd)
- Stop Bit: 1bit (Default value: 1bit)
- Baud Rate: 115200bps (Default value: 115200bps)

Set the other parameters to the default values.
For details of the parameter setting procedures, refer to 📖MELSEC iQ-F FX5 User's Manual (Serial Communication/7.5 Communication Settings).
In addition, set the channel to be used and write the data in Predefined Protocol Support Tool For Positioning.
For details, refer to 📖Predefined Protocol Support Tool For Positioning Operating Manual (6.4 Writing Predefined Protocol Information).

Performance value

CPU	Measurement condition	Processing time	Maximum scan time	Number of scans
FX5U, FX5UC*1*2	Axis 1, writing destination controller 0, current position -1000 steps	4680 ms	1.040 ms	17021
	Axis 1, writing destination controller 1*3, current position 1000 steps	1290 ms	1.010 ms	4671

*1 When the program capacity is set to 128K steps, the processing speed may be decreased.
*2 The standard area is used for the labels.
*3 Change the remote I/O assignment from HOME to ZHOME to perform the high-speed home position return.

Error code

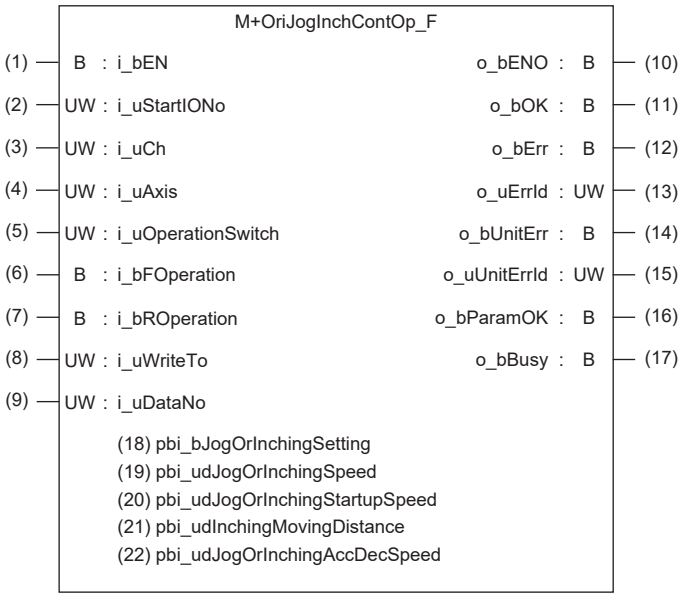
Error code (hexadecimal)	Description	Action
101H	The setting value of i_uCh (Target channel) is out of range. The target channel is not within the range of 1 to 4.	Review and correct the setting and then execute the FB again.
102H	The setting value of i_uAxis (Target axis) is out of range. The target axis is not within the range of 1 to 31.	Review and correct the setting and then execute the FB again.
106H	The setting value of i_uWriteTo (Writing destination controller) is out of range. The writing destination controller is not within the range of 0 to 2.	Review and correct the setting and then execute the FB again.
201H	The execution command has turned off during the processing.	Keep the ON state of the execution command until the normal completion, error completion, or module error completion turns on.*1
203H	An alarm, warning, or information is occurring.	Check the motor driver status in M+OriMonitoring_F (Operation monitoring). After checking the status, eliminate the error cause and then execute the FB again.
Predefined protocol error code	This error code occurs during communication.	Refer to MELSEC iQ-F FX5 User's Manual (Serial Communication/7.9 Troubleshooting/Checking absence/presence of errors).

*1 It is output only during one scan.

2.3 M+OriJogInchContOp_F (JOG/Inching/Continuous Operation)

Overview

This FB performs the JOG operation, inching operation, or continuous operation.



Label

Input label

No.	Label	Label name	Data type	Setting range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_uStartIONo	Start I/O No.	Word [Unsigned]/Bit string [16-bit]	—	Setting this label is not required since it is not used in the program in this FB.
(3)	i_uCh	Target channel	Word [Unsigned]/Bit string [16-bit]	1 to 4	Specify the channel number. 1: Built-in RS485 port 2: FX5-485-BD 3, 4: FX5-485ADP
(4)	i_uAxis	Target axis	Word [Unsigned]/Bit string [16-bit]	1 to 31	Specify the axis number set in the motor driver.*1 Example: When setting 1 for the axis number of the motor driver, set 1 in i_uAxis (Target axis).
(5)	i_uOperationSwitch	Operation switching	Word [Unsigned]/Bit string [16-bit]	0 to 2	Specify the operation method. 0: JOG operation 1: Inching operation 2: Continuous operation For the AR series or RKⅡ series, specifying the JOG operation operates the inching operation.
(6)	i_bFOperation	Forward operation command	Bit	ON, OFF	Turn on this label to perform the operation in the forward direction.
(7)	i_bROperation	Reverse operation command	Bit	ON, OFF	Turn on this label to perform the operation in the reverse direction.
(8)	i_uWriteTo	Writing destination controller	Word [Unsigned]/Bit string [16-bit]	0 to 2	Specify the writing destination motor driver. AR series: 0 AZ series: 1 RKⅡ series: 2

No.	Label	Label name	Data type	Setting range	Description
(9)	i_uDataNo	Operation data No.	Word [Unsigned]/Bit string [16-bit]	0 to 63	Specify the operation data No. to perform the continuous operation. The setting is ignored for the JOG operation or inching operation.

*1 The axis number corresponds to the slave station number of MODBUS.

Output label

No.	Label	Label name	Data type	Default value	Description
(10)	o_bENO	Execution status	Bit	OFF	ON: The execution command is on. OFF: The execution command is off.
(11)	o_bOK	Normal completion	Bit	OFF	When this label is on, it indicates that the execution of the JOG operation or continuous operation has been started without error or the execution of the inching operation has been completed without error.
(12)	o_bErr	Error completion	Bit	OFF	When this label is on, it indicates that an error has occurred in the FB.
(13)	o_uErrId	Error code	Word [Unsigned]/Bit string [16-bit]	0	The error code that has occurred in the FB is stored.
(14)	o_bUnitErr	Module error completion	Bit	OFF	When this label is on, it indicates that an error has occurred in the module.
(15)	o_uUnitErrId	Module error code	Word [Unsigned]/Bit string [16-bit]	0	The error code that has occurred in the module is stored.
(16)	o_bParamOK	Setting completion flag	Bit	OFF	When this label is on, it indicates that configuring the initial settings to enable the motor driver operation has been completed.
(17)	o_bBusy	Busy signal	Bit	OFF	When this label is on, it indicates that the motor driver is operating.

Global variable (operation parameter)

No.	Label	Label name	Data type	Setting range*4	Description
(18)	pbi_bJogOrInchingSetting	Parameter use setting	Bit	ON, OFF	ON: Set the JOG/inching operation speed, JOG/inching start speed, inching movement amount, and JOG/inching acceleration/deceleration to perform operation. OFF: Operation is performed with the values set in the motor driver.
(19)	pbi_udJogOrInchingSpeed	JOG/inching operation speed	Double word [Unsigned]/Bit string [32-bit]	1 to 4000000	Specify the JOG operation speed or inching operation speed.*1 AR series: 1 to 1000000 AZ series: 1 to 4000000 RKII series: 1 to 1000000 The setting is ignored for the continuous operation.
(20)	pbi_udJogOrInchingStartupSpeed	JOG/inching start speed	Double word [Unsigned]/Bit string [32-bit]	0 to 4000000	Specify the JOG start speed or inching start speed.*1 AR series: 0 to 1000000 AZ series: 0 to 4000000 RKII series: 0 to 1000000 The setting is ignored for the continuous operation.
(21)	pbi_udInchingMovingDistance	Inching movement amount	Double word [Unsigned]/Bit string [32-bit]	1 to 8388607	Specify the inching movement amount.*2 The setting is ignored for the JOG operation or continuous operation.
(22)	pbi_udJogOrInchingAccDecSpeed	JOG/inching acceleration	Double word [Unsigned]/Bit string [32-bit]	1 to 1000000	Specify the acceleration/deceleration rate (acceleration/deceleration time).*3 The setting is ignored for the continuous operation.

*1 In units of Hz.
*2 In units of step.
*3 In units of 0.001 mm/kHz.
*4 The setting range differs depending on the electric actuator.

Function overview

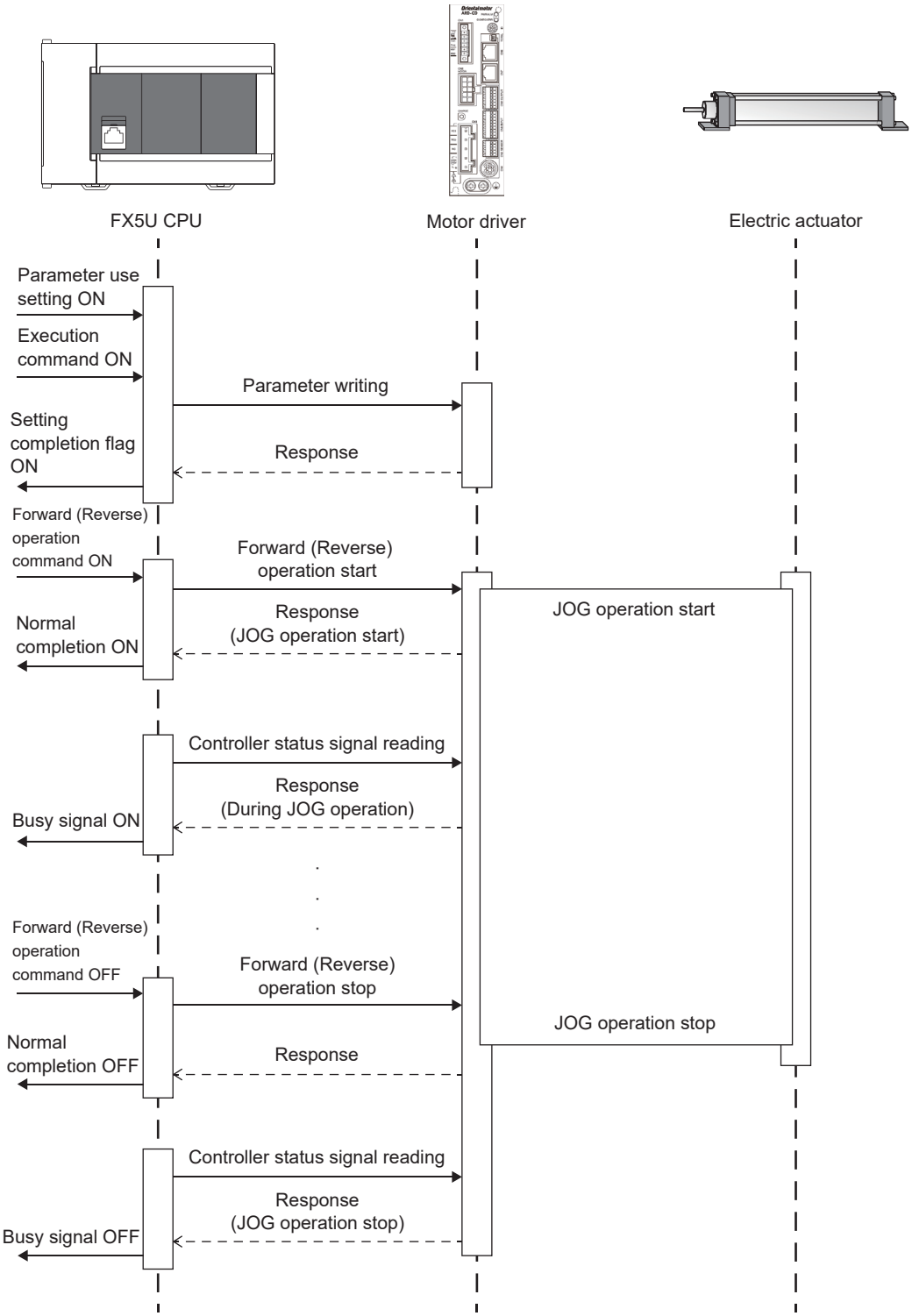
Applicable hardware and software

■ Predefined Protocol Support FB For Positioning

Applicable module	Firmware version	Engineering tool
FX5U CPU	1.200 or later	GX Works3 Version 1.065T or later
FX5UC CPU	1.200 or later	GX Works3 Version 1.065T or later

Sequence diagram

■ For JOG operation



Basic specifications

Item	Description
Programming language	—(The program in this FB is not open to the public.)
Number of steps	3010 steps The number of steps of the FB in a program depends on the CPU module used, input and output definition, and option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual (2.9 Option Setting for Each Function).
Label amount used	• Label: 0.06K points (Word) • Latch label: 0K points (Word) The label amount used in a program depends on the CPU module used, device specified in the argument, and option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual (2.9 Option Setting for Each Function).
Number of index register points used	• Index register: 2 points • Long index register: 0 points
File register amount used	File register: 1904 points (Word)
FB dependence	No dependence
FB compiling method	Subroutine type
FB operation type	Real-time execution

Function description

- Set the axis number of the operation target in i_uAxis (Target axis).
- At rising edge of i_bEN (Execution command), this FB writes the following parameter data to the motor driver.

i_uOperationSwitch (Operation switching)	pbi_bJogOrInchingSetting (Parameter use setting)	Data written to the motor driver
0: JOG operation*1	ON: Parameter specification	pbi_udJogOrInchingSpeed (JOG/inching operation speed) pbi_udJogOrInchingStartupSpeed (JOG/inching start speed) pbi_udJogOrInchingAccDecSpeed (JOG/inching acceleration/deceleration)
	OFF: Motor driver setting value	No data to be written
1: Inching operation	ON: Parameter specification	pbi_udJogOrInchingSpeed (JOG/inching operation speed) pbi_udJogOrInchingStartupSpeed (JOG/inching start speed) pbi_udInchingMovingDistance (Inching movement amount) pbi_udJogOrInchingAccDecSpeed (JOG/inching acceleration/deceleration)
	OFF: Motor driver setting value	No data to be written
2: Continuous operation	ON: Parameter specification	No data to be written
	OFF: Motor driver setting value	No data to be written

*1 For the AR series or RKII series, specifying the JOG operation operates the inching operation.

- o_bParamOK (Setting completion flag) turns on when the JOG/inching/continuous operation is enabled.
- While the motor driver is operating, o_bBusy (Busy signal) is on.
- The inching operation starts when both the following conditions are satisfied.

· i_uOperationSwitch (Operation switching) is 1.

· i_bFOperation (Forward operation command) or i_bROperation (Reverse operation command) is turned on from the state in which both of them are OFF.

- For the inching operation, the operation decelerates to stop when both i_bFOperation (Forward operation command) and i_bROperation (Reverse operation command) are turned on. To start the operation again, turn off both i_bFOperation (Forward operation command) and i_bROperation (Reverse operation command) once.
- For the inching operation, o_bOK (Normal completion) turns on by checking the OFF state of MOVE of the motor driver.
- The JOG operation starts and o_bOK (Normal completion) turns on when both the following conditions are satisfied.

· i_uOperationSwitch (Operation switching) is 0.

· i_bFOperation (Forward operation command) or i_bROperation (Reverse operation command) is on.

- The operation decelerates to stop and o_bOK (Normal completion) turns off when i_bFOperation (Forward operation command) or i_bROperation (Reverse operation command) is turned off during the JOG operation.
- For the JOG operation, the operation decelerates to stop when both i_bFOperation (Forward operation command) and i_bROperation (Reverse operation command) are turned on. If either of these commands is turned off, the operation which remains on is started.

• The continuous operation starts and o_bOK (Normal completion) turns on when both the following conditions are satisfied.
·i_uOperationSwitch (Operation switching) is 2.
·i_bFOperation (Forward operation command) or i_bROperation (Reverse operation command) is on.
The operation decelerates to stop and o_bOK (Normal completion) turns off when i_bFOperation (Forward operation command) or i_bROperation (Reverse operation command) is turned off during the continuous operation.

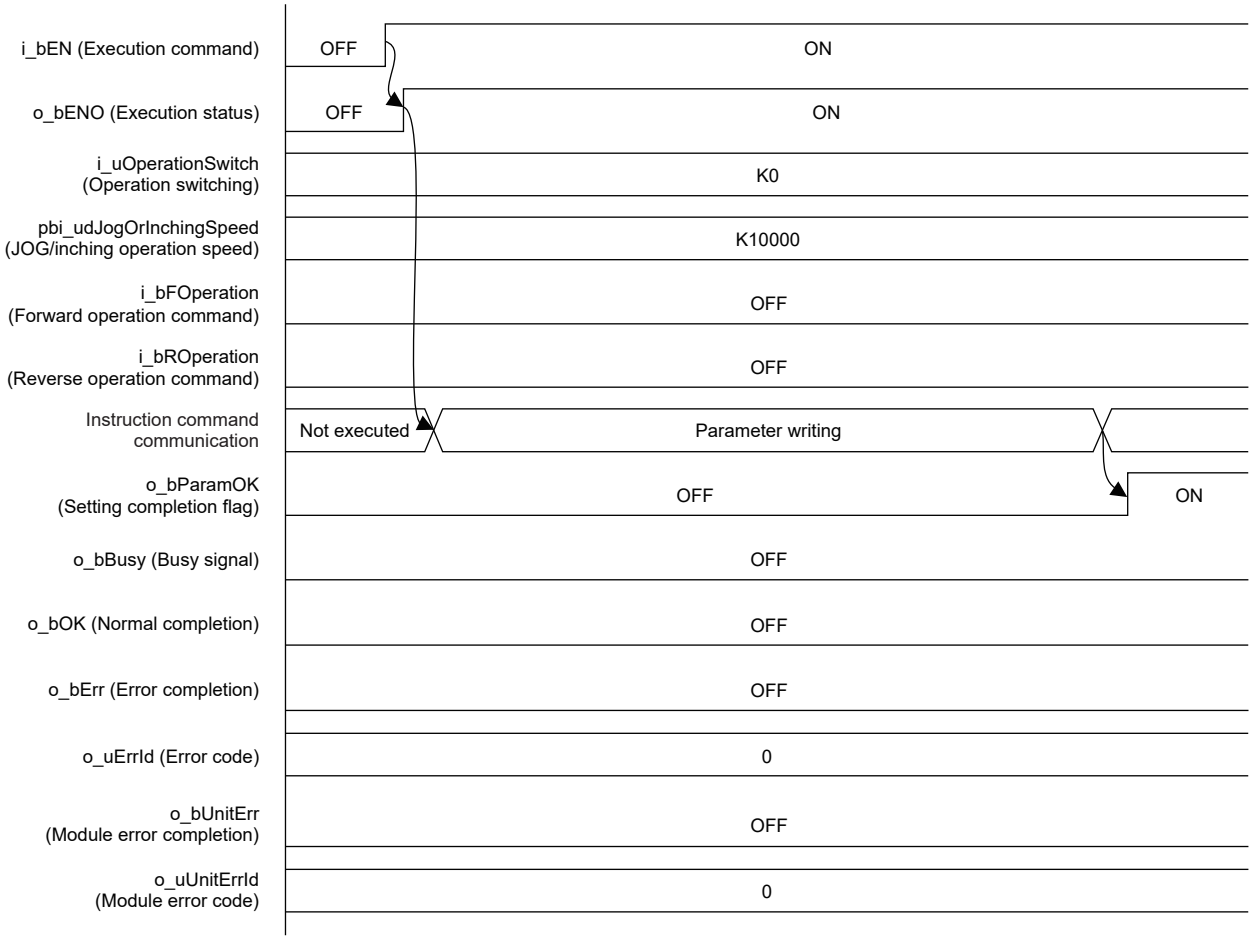
- For the continuous operation, the operation decelerates to stop when both i_bFOperation (Forward operation command) and i_bROperation (Reverse operation command) are turned on. If either of these commands is turned off, the operation which remains on is started.
- For the continuous operation, when i_uDataNo (Operation data No.) is changed while i_bFOperation (Forward operation command) or i_bROperation (Reverse operation command) is operating, the operation is performed with the operation data of the changed i_uDataNo (Operation data No.).
- If an error occurs while sending/receiving a predefined protocol, o_bErr (Error completion) turns on and the processing of the FB is interrupted. The error code is stored in o_uErrId (Error code). For details of the error code, refer to 🕮MELSEC iQ-F FX5 User's Manual (Serial Communication/7.9 Troubleshooting/Checking absence/presence of errors).
- If an error occurs in the motor driver and this FB receives the error code, o_bUnitErr (Module error completion) turns on and the processing of the FB is interrupted. The received error code is stored in o_uUnitErrId (Module error code). For details of the error code, refer to the manuals described in "RELEVANT MANUALS".
- If any other error occurs, o_bErr (Error completion) turns on and the processing of the FB is interrupted. For details of the error code, refer to ☞ Page 37 Error code.

Timing chart of I/O signals

■ Normal completion

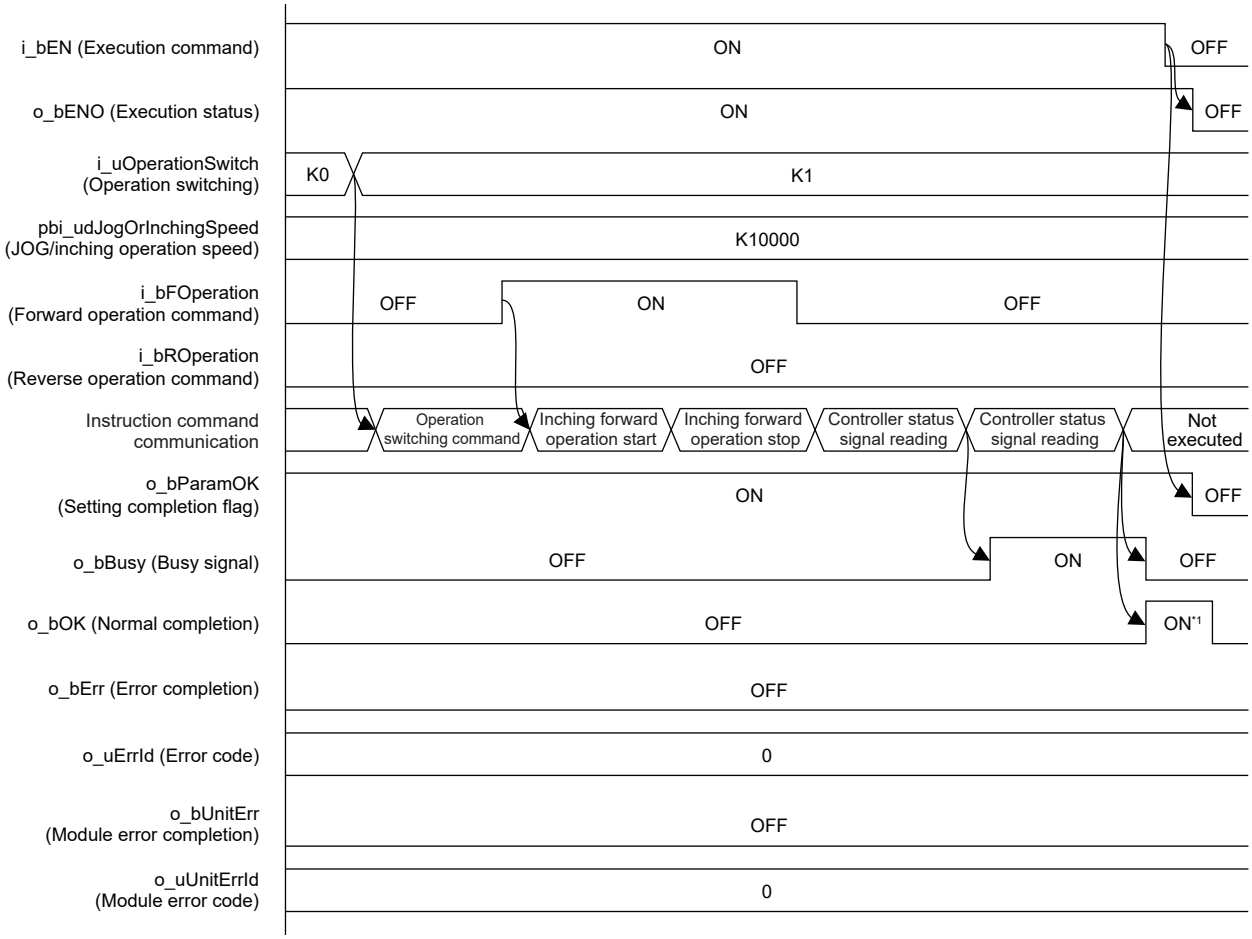
- From rising edge of the execution command ON to parameter data writing

The following processing is executed only once at rising edge of the execution command ON.



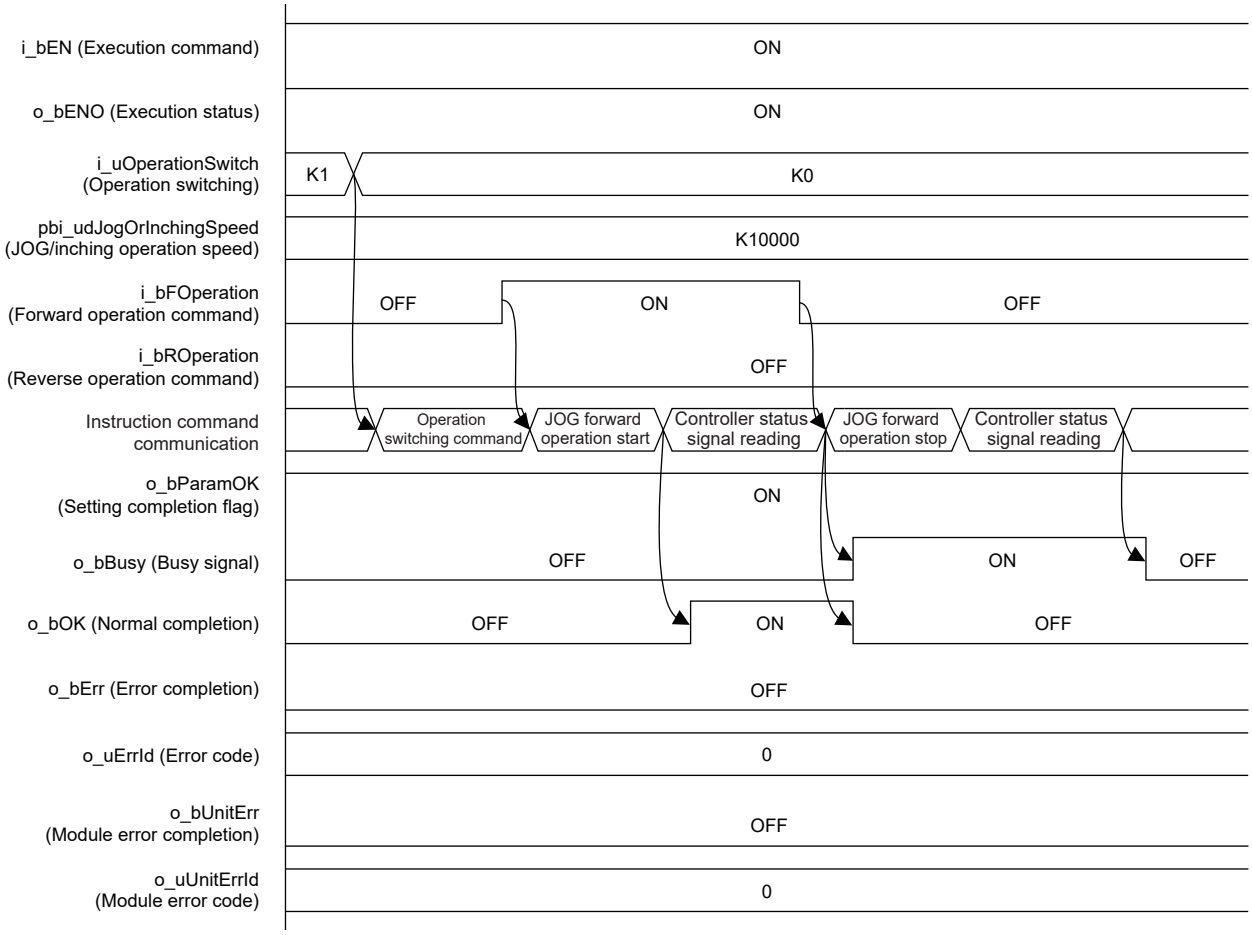
- From operation switching to execution command OFF (Example: Switching from the JOG operation to the inching operation)

The following processing is performed every time i_uOperationSwitch (Operation switching) is changed while i_bEN (Execution command) is on.

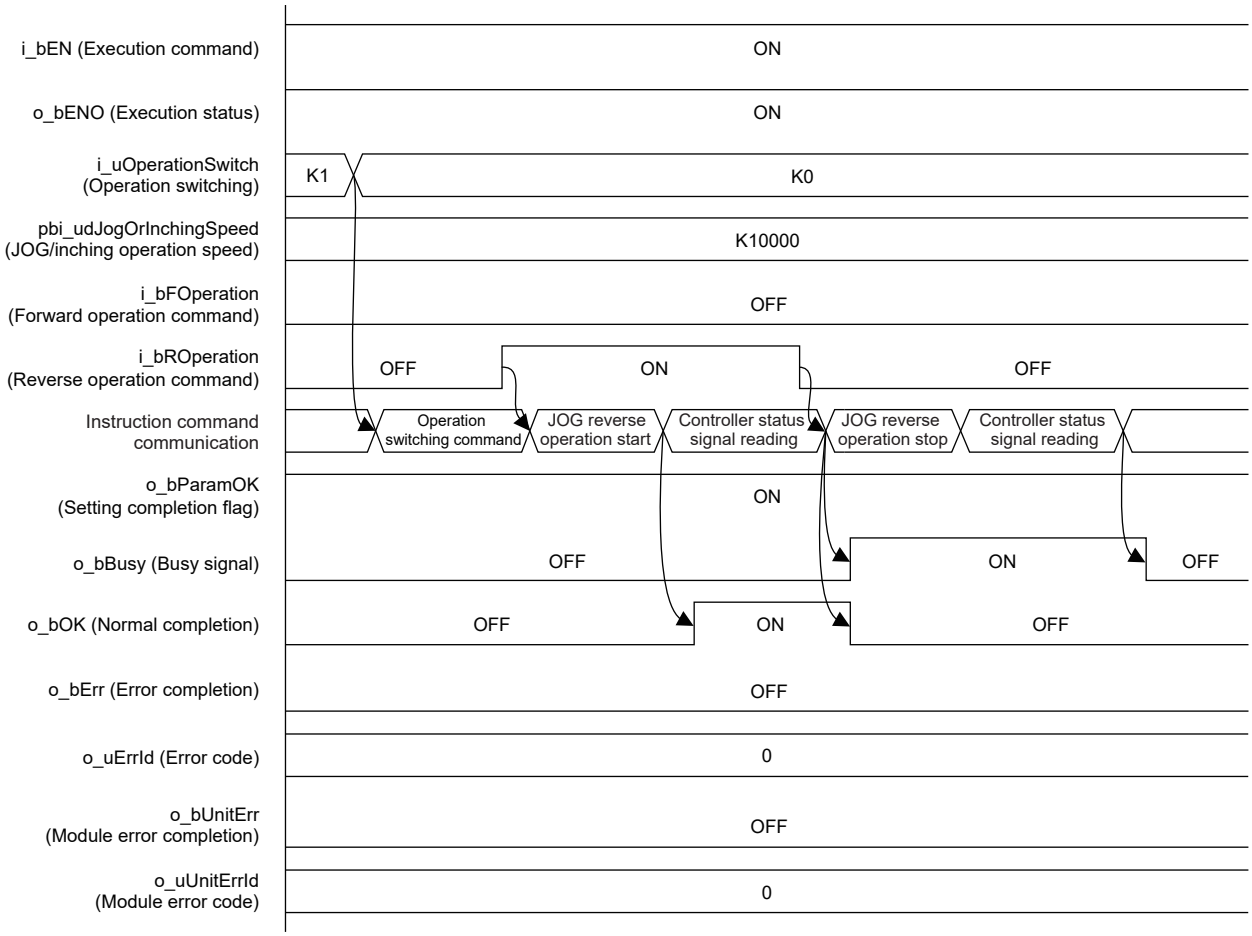


*1 It turns on for only one scan.

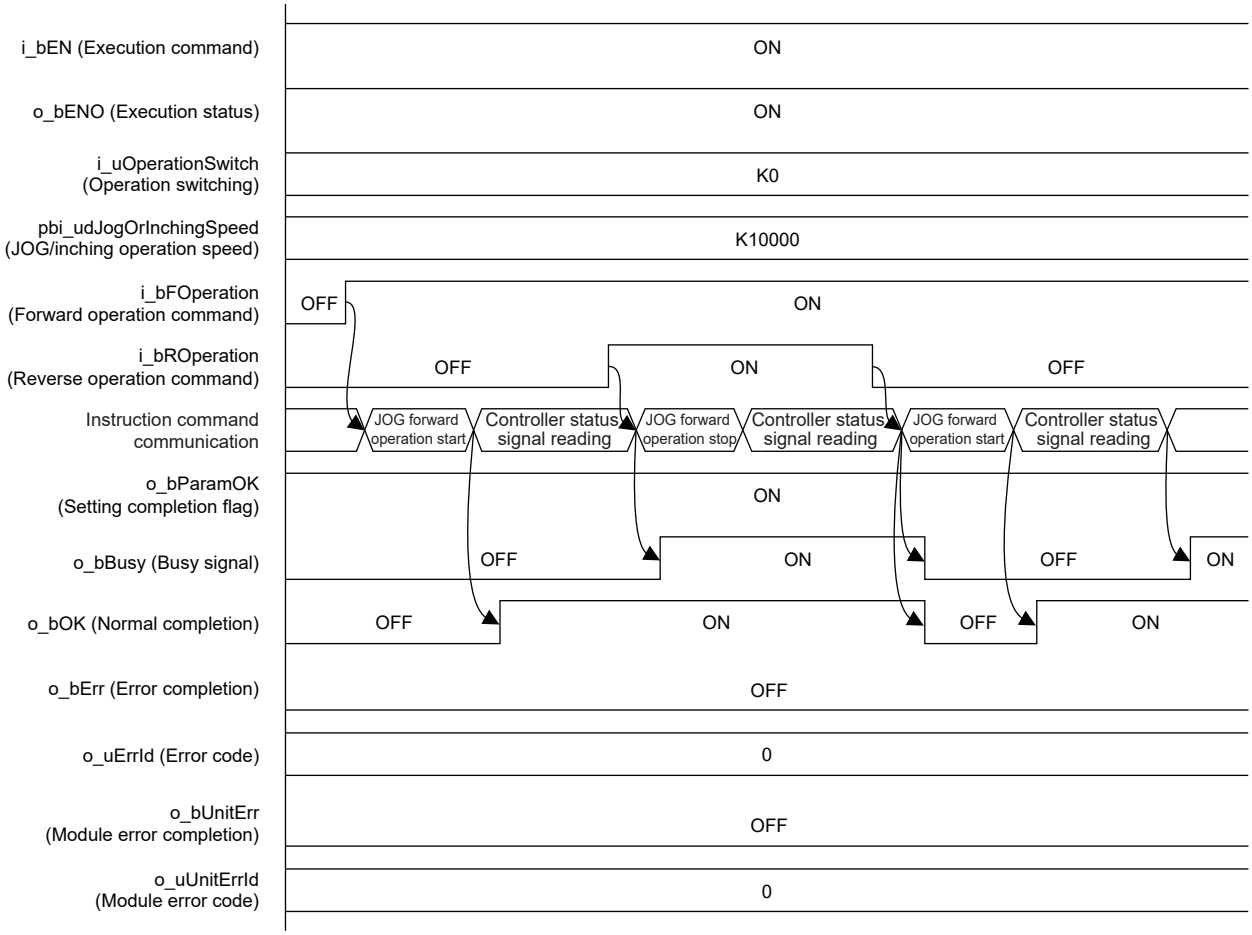
• JOG operation (Forward operation command)



• JOG operation (Reverse operation command)

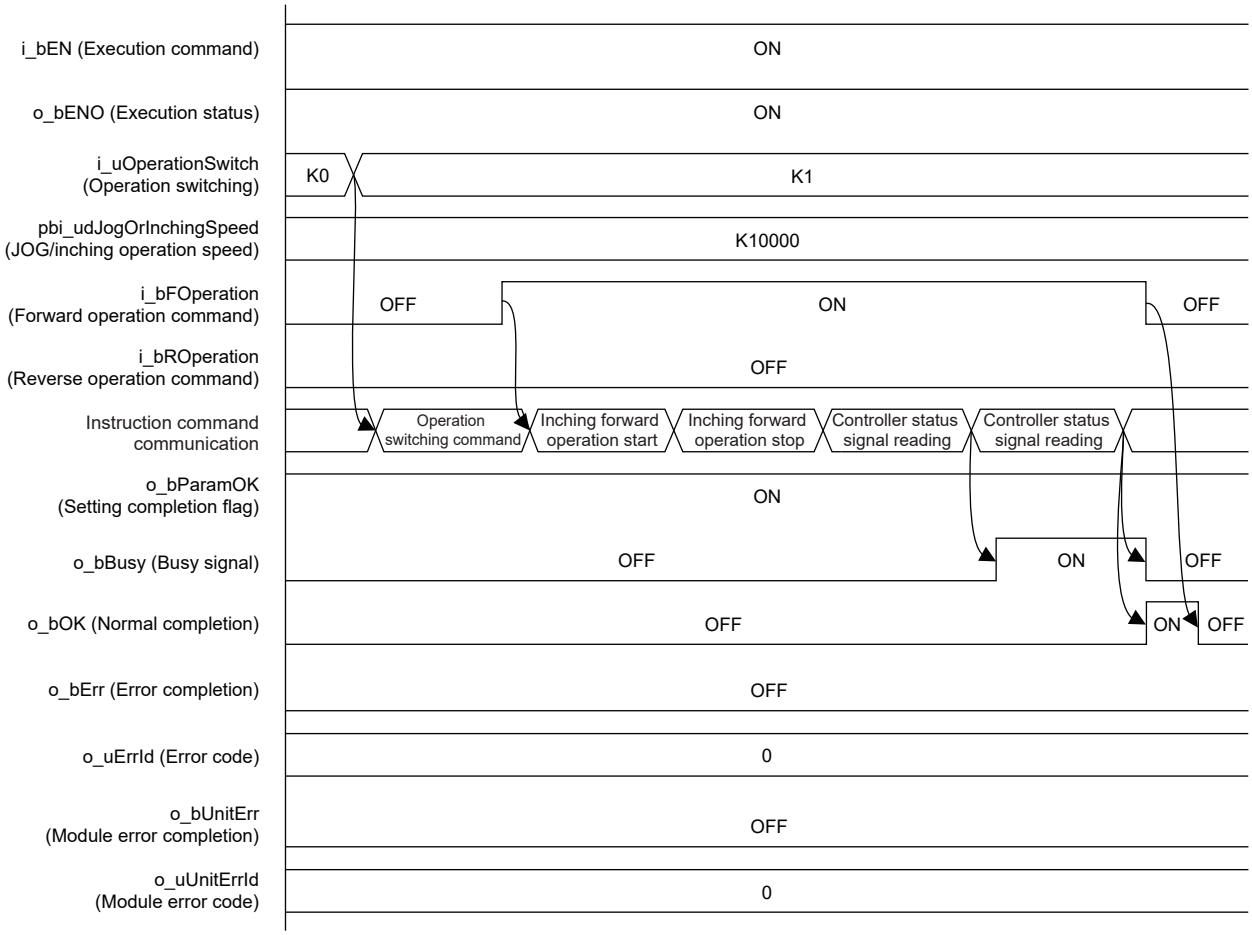


• JOG operation (When both forward operation command and reverse operation command are simultaneously turned on)



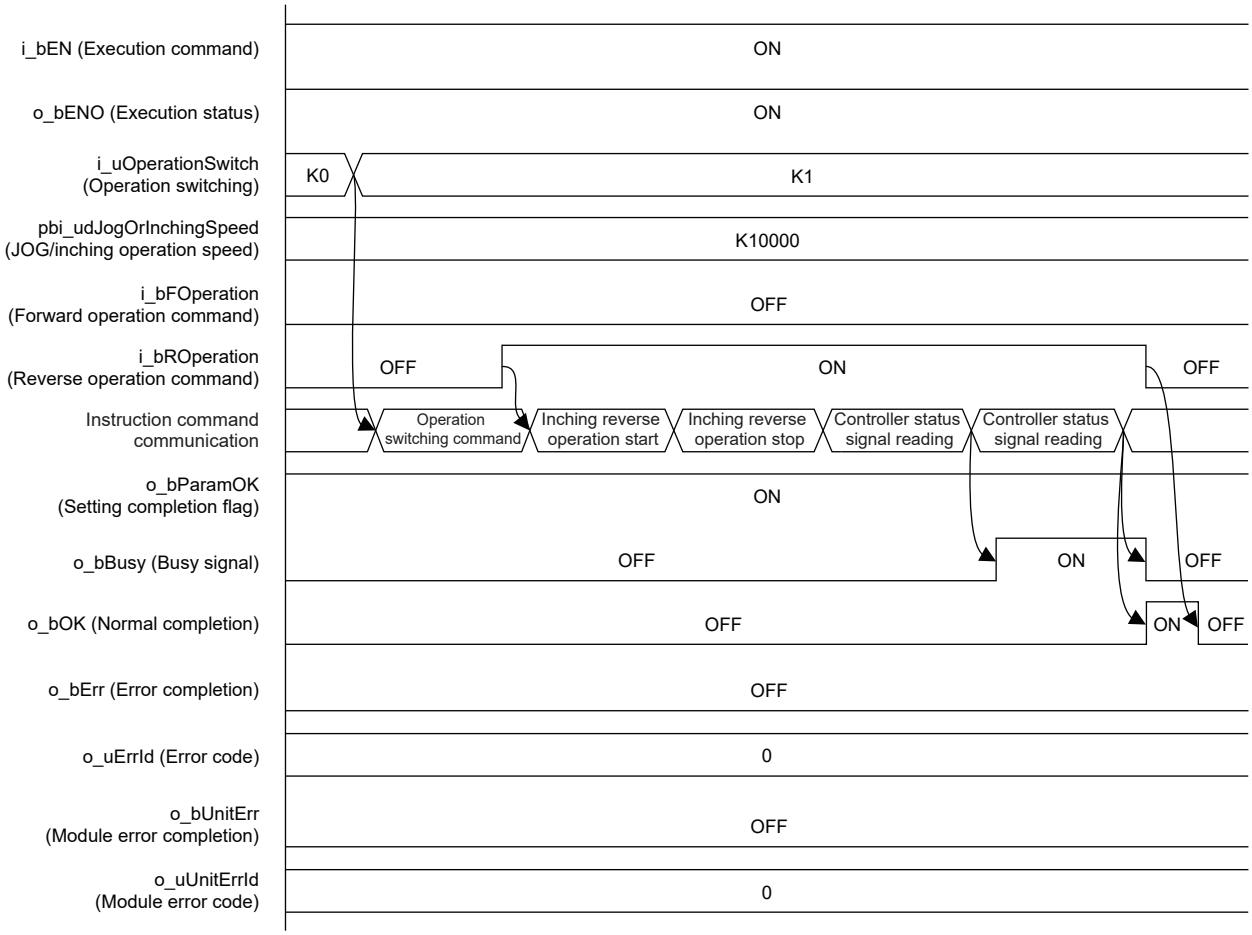
• Inching operation (Forward operation)

When i_bFOperation (Forward operation command) is turned off before o_bOK (Normal completion) turns on, o_bOK (Normal completion) turns on for only one scan.

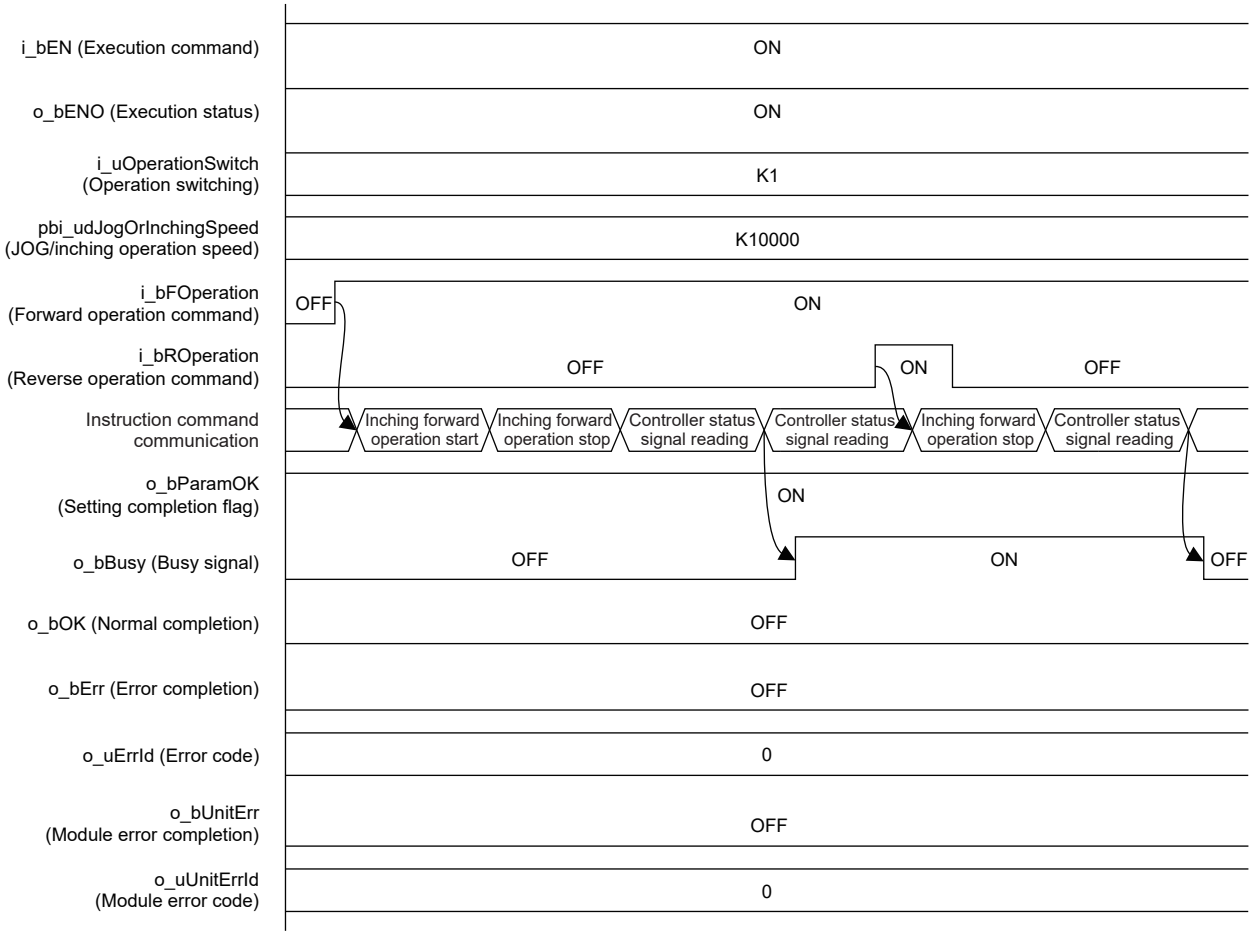


• Inching operation (Reverse operation command)

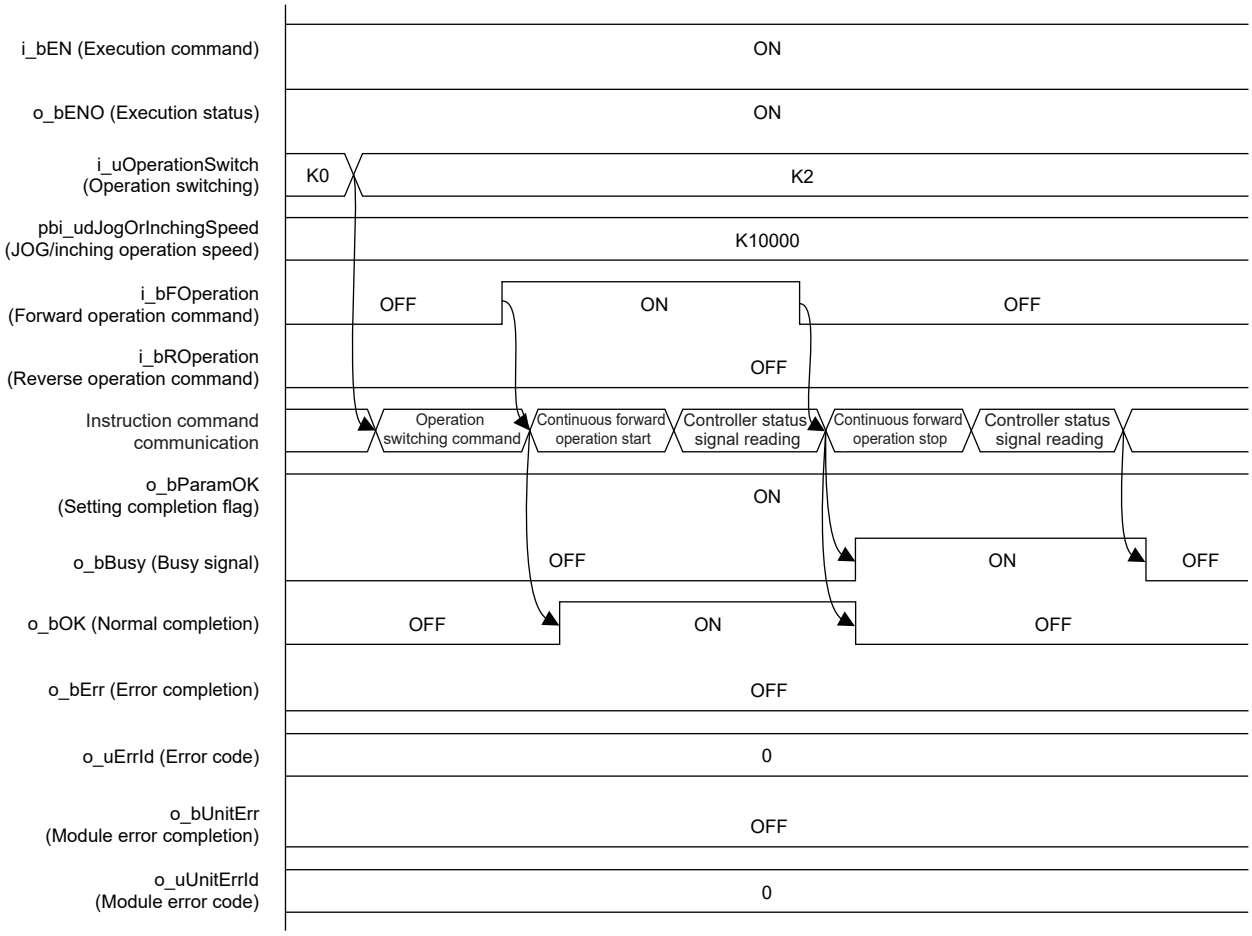
When i_bROperation (Reverse operation command) is turned off before o_bOK (Normal completion) turns on, o_bOK (Normal completion) turns on for only one scan.



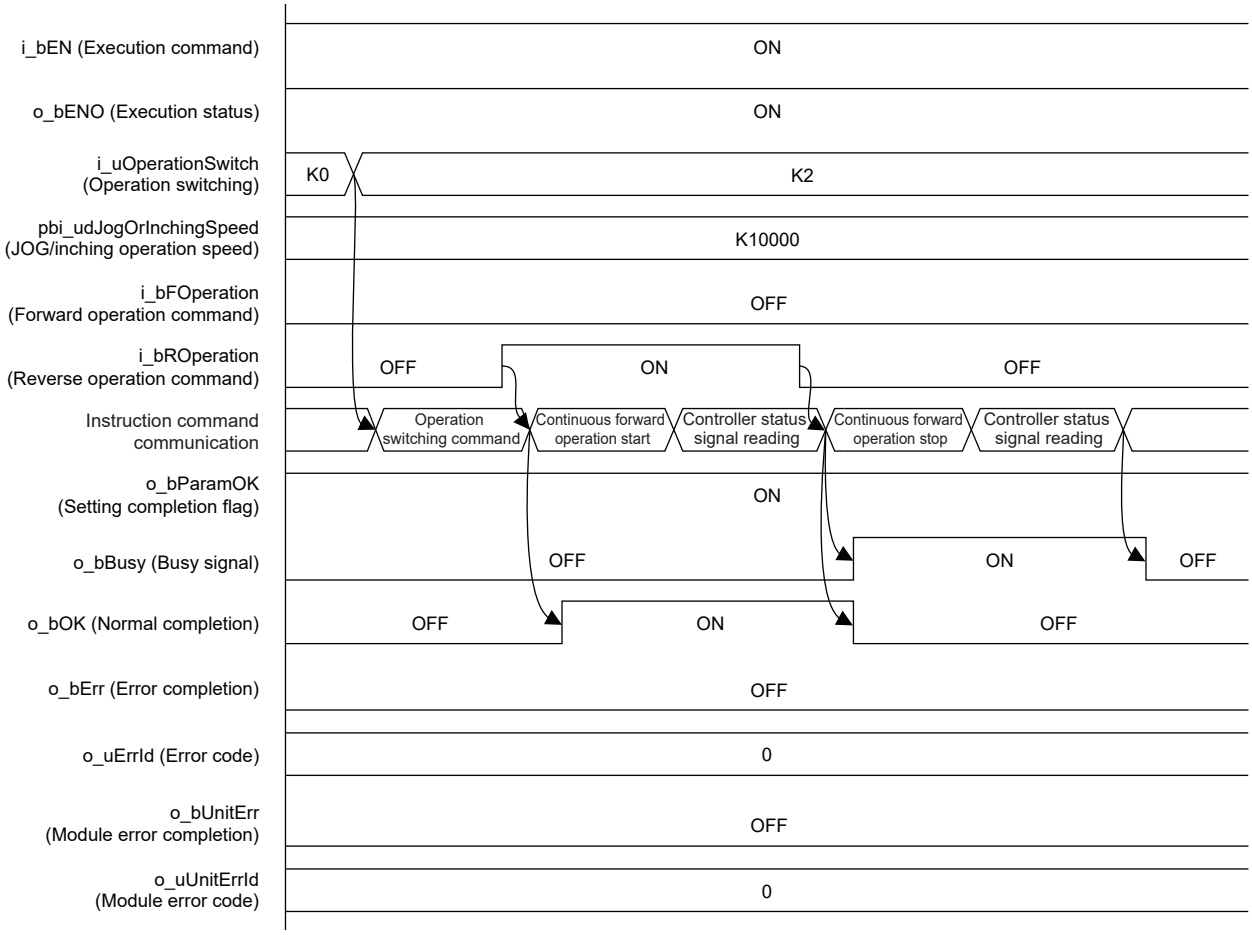
• Inching operation (When both forward operation command and reverse operation command are simultaneously turned on)



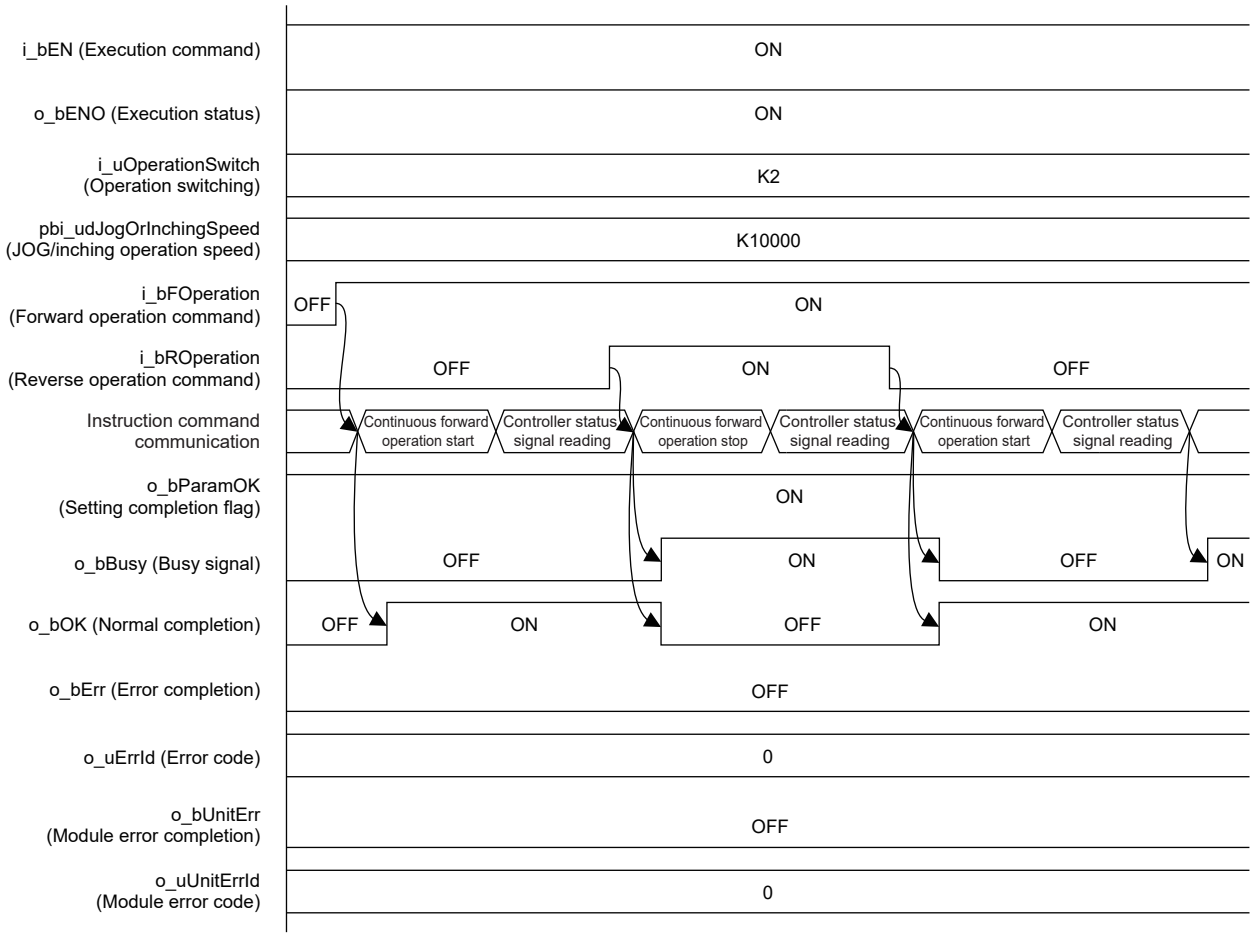
• Continuous operation (Forward operation command)



• Continuous operation (Reverse operation command)

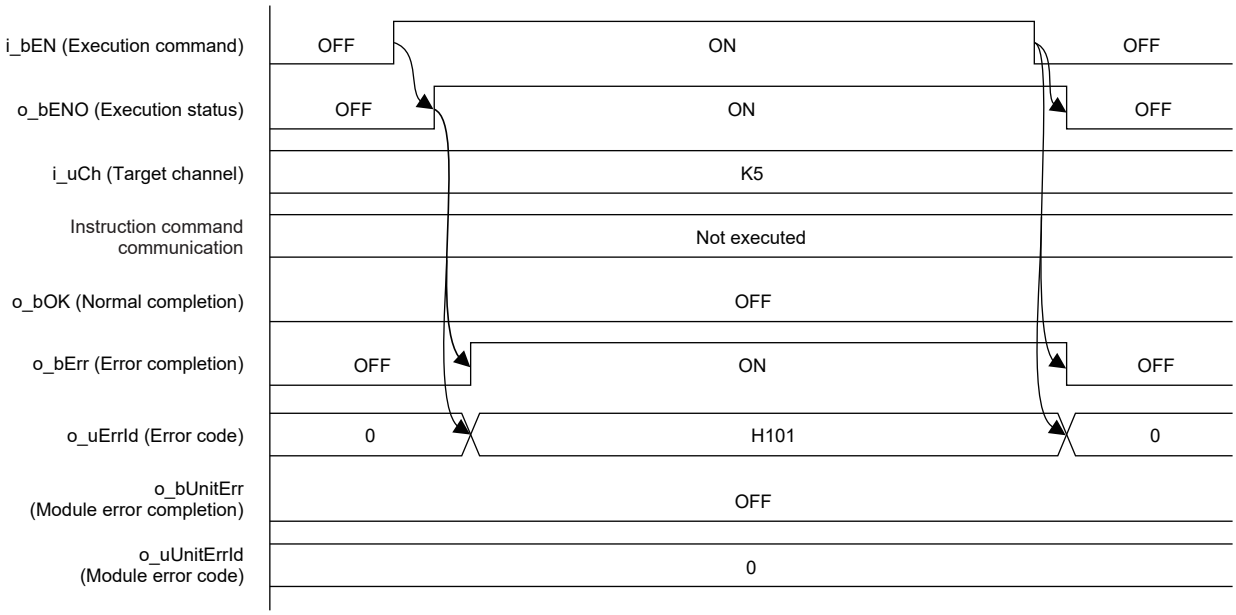


• Continuous operation (When both forward operation command and reverse operation command are simultaneously turned on)



■ Error completion

• The target channel is out of range.



Restrictions and precautions

- Do not change i_uOperationSwitch (Operation switching) during the operation of i_bFOperation (Forward operation command) or i_bROperation (Reverse operation command). The operation is not guaranteed when i_uOperationSwitch (Operation switching) is changed during the operation. The following table lists the status and operation if i_uOperationSwitch (Operation switching) is changed during the operation.

i_uOperationSwitch (Operation switching)		Output label status*2	Electric actuator operation*2
Before change	After change		
0: JOG operation	1: Inching operation	o_bOK (Normal completion): ON o_bBusy (Busy signal): OFF	Deceleration stop*1
	2: Continuous operation	o_bOK (Normal completion): ON o_bBusy (Busy signal): OFF	Deceleration stop
	Out of setting range	o_bOK (Normal completion): OFF o_bBusy (Busy signal): OFF	Deceleration stop
1: Inching operation	0: JOG operation	o_bOK (Normal completion): OFF o_bBusy (Busy signal): OFF	Deceleration stop*1
	2: Continuous operation	o_bOK (Normal completion): OFF o_bBusy (Busy signal): OFF	Deceleration stop
	Out of setting range	o_bOK (Normal completion): OFF o_bBusy (Busy signal): OFF	Deceleration stop
2: Continuous operation	0: JOG operation	o_bOK (Normal completion): ON o_bBusy (Busy signal): OFF	Deceleration stop
	1: Inching operation	o_bOK (Normal completion): ON o_bBusy (Busy signal): OFF	Deceleration stop
	Out of setting range	o_bOK (Normal completion): OFF o_bBusy (Busy signal): OFF	Deceleration stop

*1 For the AR series or RKⅡ series, the operation does not decelerate to stop since it operates as the inching operation.

*2 The above shows the check results in our environment. The status and operation may differ depending on the device configuration and others.

- When the JOG/inching/continuous operation is completed in a very short time, o_bBusy (Busy signal) and o_bOK (Normal completion) may not turn on.
- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB uses the index registers Z0 and Z1. When using an interrupt program, do not use these index registers.
- 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.
- This FB requires the ladder to be configured for every input label.
- This FB may write data to the non-volatile memory of the motor driver. For writing data, refer to ☞ Page 25 Function description. For details, refer to the manual of each motor driver.
- The JOG/inching operation speed, JOG/inching start speed, inching movement amount, or JOG/inching acceleration/deceleration cannot be changed while i_bEN (Execution command) is on. When changing any of them, execute the FB again.
- When i_bFOperation (Forward operation command) or i_bROperation (Reverse operation command) is turned on before o_bParamOK (Setting completion flag) turns on, the forward operation (reverse operation) command is ignored. Turn on the forward operation (reverse operation) command again after o_bParamOK (Setting completion flag) turns on.
- When i_bEN (Execution command) is turned off while the motor driver is operating, the motor driver operation does not stop. Program the processing separately in accordance with the required system operation.
- This FB uses the CPRTCL instruction. For details, refer to 📖MELSEC iQ-F FX5 User's Manual (Serial Communication/ 7.8 Programming/Predefined protocol support instruction).
- To operate the motor driver, set the protocol type to the predefined protocol support type with the module parameter of GX Works3. For details of the parameter setting procedures, refer to ☞ Page 20 Parameter setting.

- Change the number of timeouts or retries of the communication in Predefined Protocol Support Tool For Positioning. For details of the setting procedures, refer to 📖Predefined Protocol Support Tool For Positioning Operating Manual (6.2 Setting a Connected Model). If the communication interval for the same channel is short, the command may not be received depending on the connected controller, and a serial communication timeout (CPU error) may occur. In this case, the situation can be avoided by increasing the "transmission standby time" in the protocol transmission/reception settings of the connected device setting.
- Before executing this FB, turn on exciting using M+OriServoControl_F (Exciting ON/OFF).

Parameter setting

For details of the parameter setting procedures, refer to ☞ Page 20 Parameter setting.

Performance value

CPU	Measurement condition							Processing time	Maximum scan time	Number of scans
	Writing destination controller	JOG/inching/continuous operation	Forward operation/reverse operation	JOG/inching operation speed (Unit: Hz)	JOG/inching start speed (Unit: Hz)	Inching movement amount (Unit: Step)	JOG/inching acceleration/deceleration (Unit: Hz)			
FX5U, FX5UC*1*2	0	Inching operation	Forward operation	100	500	100	1000	237 ms	0.958 ms	761
				100	500	500	1000	1040 ms	1.120 ms	3337
				100	500	1000	1000	2050 ms	0.937 ms	6578
			Reverse operation	100	500	100	1000	236 ms	0.923 ms	760
				100	500	500	1000	1040 ms	1.060 ms	3341
				100	500	1000	1000	2040 ms	0.918 ms	6577
	1	JOG operation	Forward operation	100	500	—	1000	8.610 ms	1.210 ms	26
				1000	500	—	1000	8.560 ms	1.170 ms	26
				10000	500	—	1000	8.690 ms	1.220 ms	26
			Reverse operation	100	500	—	1000	8.580 ms	1.160 ms	26
				1000	500	—	1000	8.570 ms	1.190 ms	26
				10000	500	—	1000	8.570 ms	1.200 ms	26
		Inching operation	Forward operation	100	500	100	1000	1030 ms	1.150 ms	6311
				100	500	500	1000	5040 ms	1.150 ms	15538
				100	500	1000	1000	10100 ms	1.180 ms	30973
			Reverse operation	100	500	100	1000	1030 ms	1.170 ms	3164
				100	500	500	1000	5040 ms	1.190 ms	15520
				100	500	1000	1000	10100 ms	1.210 ms	30992

*1 When the program capacity is set to 128K steps, the processing speed may be decreased.
*2 The standard area is used for the labels.

CPU	Measurement condition							Processing time	Maximum scan time	Number of scans
	Writing destination controller	JOG/inching/continuous operation	Forward operation/reverse operation	Operation speed (Unit: Hz)	Acceleration (Unit: 0.001 ms/kHz)	Deceleration (Unit: 0.001 ms/kHz)	Operating current (Unit: 0.1%)			
FX5U, FX5UC*1*2	0	Continuous operation	Forward operation	100	100	100	1000	16.000 ms	0.915 ms	50
				1000	100	100	1000	16.000 ms	0.956 ms	50
				10000	100	100	1000	15.800 ms	0.942 ms	50
			Reverse operation	100	100	100	1000	15.700 ms	0.932 ms	50
				1000	100	100	1000	16.100 ms	0.949 ms	50
				10000	100	100	1000	15.800 ms	0.927 ms	50
	1	Continuous operation	Forward operation	100	100	100	1000	18.200 ms	1.180 ms	55
				1000	100	100	1000	18.200 ms	1.210 ms	55
				10000	100	100	1000	18.200 ms	1.190 ms	55
			Reverse operation	100	100	100	1000	18.200 ms	1.210 ms	55
				1000	100	100	1000	18.200 ms	1.190 ms	55
				10000	100	100	1000	18.200 ms	1.200 ms	55

*1 When the program capacity is set to 128K steps, the processing speed may be decreased.
*2 The standard area is used for the labels.

Error code

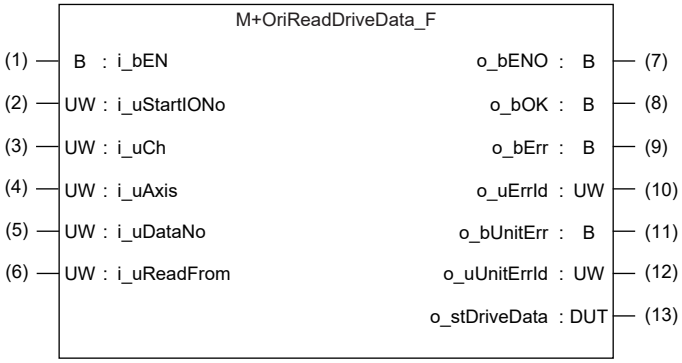
Error code (hexadecimal)	Description	Action
101H	The setting value of i_uCh (Target channel) is out of range. The target channel is not within the range of 1 to 4.	Review and correct the setting and then execute the FB again.
102H	The setting value of i_uAxis (Target axis) is out of range. The target axis is not within the range of 1 to 31.	Review and correct the setting and then execute the FB again.
105H	The setting value of i_uDataNo (Operation data No.) is out of range. The operation data No. is not within the range of 0 to 63.	Review and correct the setting and then execute the FB again.
106H	The setting value of i_uWriteTo (Writing destination controller) is out of range. The writing destination controller is not within the range of 0 to 2.	Review and correct the setting and then execute the FB again.
107H	The setting value of i_uOperationSwitch (Operation switching) is out of range. The operation switching is not within the range of 0 to 2.	Review and correct the setting and then execute the FB again.
201H	The execution command has turned off during the processing.	Keep the ON state until the setting completion flag turns on.*1
203H	An alarm, warning, or information is occurring.	Check the motor driver status in M+OriMonitoring_F (Operation monitoring). After checking the status, eliminate the error cause and then execute the FB again.
Predefined protocol error code	This error code occurs during communication.	Refer to MELSEC iQ-F FX5 User's Manual (Serial Communication/7.9 Troubleshooting/Checking absence/presence of errors).

*1 It is output only during one scan.

2.4 M+OriReadDriveData_F (Operation Data Reading)

Overview

This FB reads the operation data corresponding to the specified operation data No.



Label

Input label

No.	Label	Label name	Data type	Setting range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_uStartIONo	Start I/O No.	Word [Unsigned]/Bit string [16-bit]	—	Setting this label is not required since it is not used in the program in this FB.
(3)	i_uCh	Target channel	Word [Unsigned]/Bit string [16-bit]	1 to 4	Specify the channel number. 1: Built-in RS485 port 2: FX5-485-BD 3, 4: FX5-485ADP
(4)	i_uAxis	Target axis	Word [Unsigned]/Bit string [16-bit]	1 to 31	Specify the axis number set in the motor driver.*1 Example: When setting 1 for the axis number of the motor driver, set 1 in i_uAxis (Target axis).
(5)	i_uDateNo	Operation data No.	Word [Unsigned]/Bit string [16-bit]	0 to 63	Specify the operation data No. to be read.
(6)	i_uReadFrom	Reading source controller	Word [Unsigned]/Bit string [16-bit]	0 to 2	Specify the reading source motor driver. AR series: 0 AZ series: 1 RKⅡ series: 2

*1 The axis number corresponds to the slave station number of MODBUS.

Output label

No.	Label	Label name	Data type	Default value	Description
(7)	o_bENO	Execution status	Bit	OFF	ON: The execution command is on. OFF: The execution command is off.
(8)	o_bOK	Normal completion	Bit	OFF	When this label is on, it indicates that reading the operation data has been completed.
(9)	o_bErr	Error completion	Bit	OFF	When this label is on, it indicates that an error has occurred in the FB.
(10)	o_uErrId	Error code	Word [Unsigned]/Bit string [16-bit]	0	The error code that has occurred in the FB is stored.
(11)	o_bUnitErr	Module error completion	Bit	OFF	When this label is on, it indicates that an error has occurred in the module.
(12)	o_uUnitErrId	Module error code	Word [Unsigned]/Bit string [16-bit]	0	The error code that has occurred in the module is stored.
(13)	o_stDriveData	Operation data	stDriveData	—	The operation data is stored. For details of the structure, refer to ☞ Page 10 Structure list.

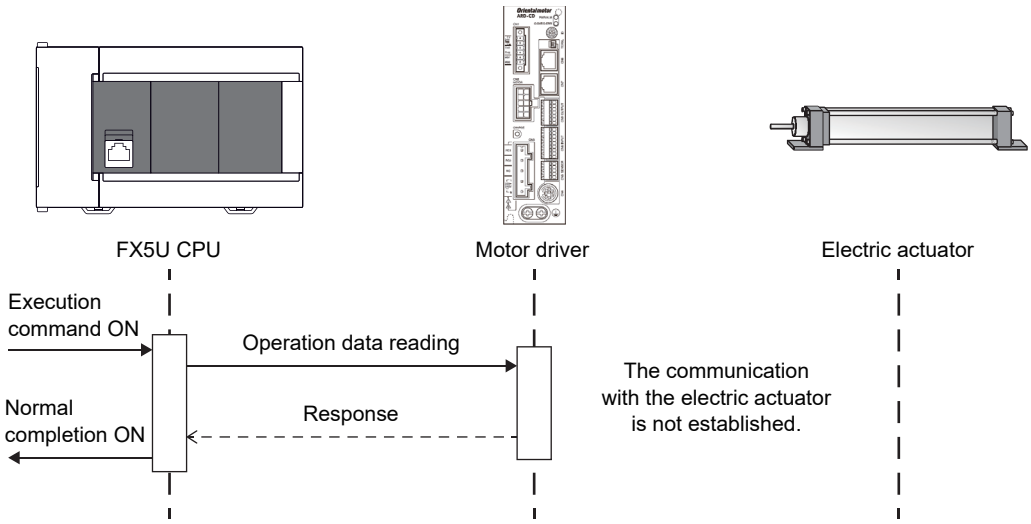
Function overview

Applicable hardware and software

■ Predefined Protocol Support FB For Positioning

Applicable module	Firmware version	Engineering tool
FX5U CPU	1.200 or later	GX Works3 Version 1.065T or later
FX5UC CPU	1.200 or later	GX Works3 Version 1.065T or later

Sequence diagram



Basic specifications

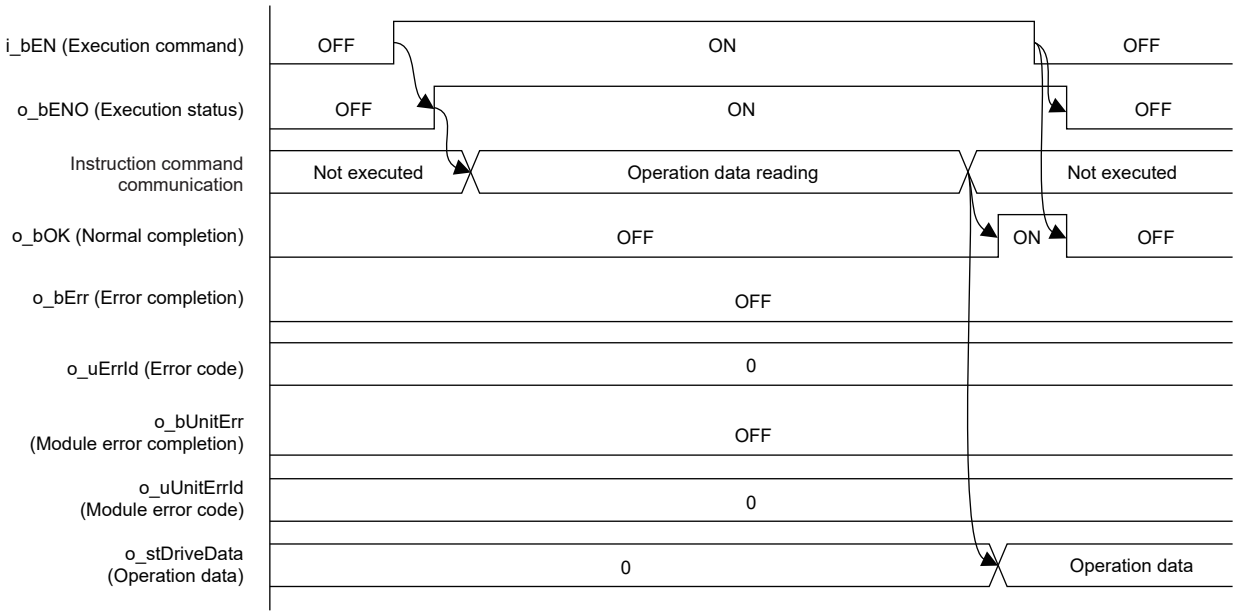
Item	Description
Programming language	—(The program in this FB is not open to the public.)
Number of steps	1709 steps The number of steps of the FB in a program depends on the CPU module used, input and output definition, and option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual (2.9 Option Setting for Each Function).
Label amount used	• Label: 0.07K points (Word) • Latch label: 0K points (Word) The label amount used in a program depends on the CPU module used, device specified in the argument, and option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual (2.9 Option Setting for Each Function).
Number of index register points used	• Index register: 2 points • Long index register: 0 points
File register amount used	File register: 1904 points (Word)
FB dependence	No dependence
FB compiling method	Subroutine type
FB operation type	Pulsed execution (multiple scan execution type)

Function description

- Set the axis number of the operation target in i_uAxis (Target axis).
- At rising edge of i_bEN (Execution command), this FB reads the operation data in the specified operation data No. of the motor driver.
- o_bOK (Normal completion) turns on when reading the operation data is completed.
- If an error occurs while sending/receiving a predefined protocol, o_bErr (Error completion) turns on and the processing of the FB is interrupted. The error code is stored in o_uErrId (Error code). For details of the error code, refer to 📖MELSEC iQ-F FX5 User's Manual (Serial Communication/7.9 Troubleshooting/Checking absence/presence of errors).
- If an error occurs in the motor driver and this FB receives the error code, o_bUnitErr (Module error completion) turns on and the processing of the FB is interrupted. The received error code is stored in o_uUnitErrId (Module error code). For details of the error code, refer to the manuals described in "RELEVANT MANUALS".
- If any other error occurs, o_bErr (Error completion) turns on and the processing of the FB is interrupted. For details of the error code, refer to ☞ Page 42 Error code.

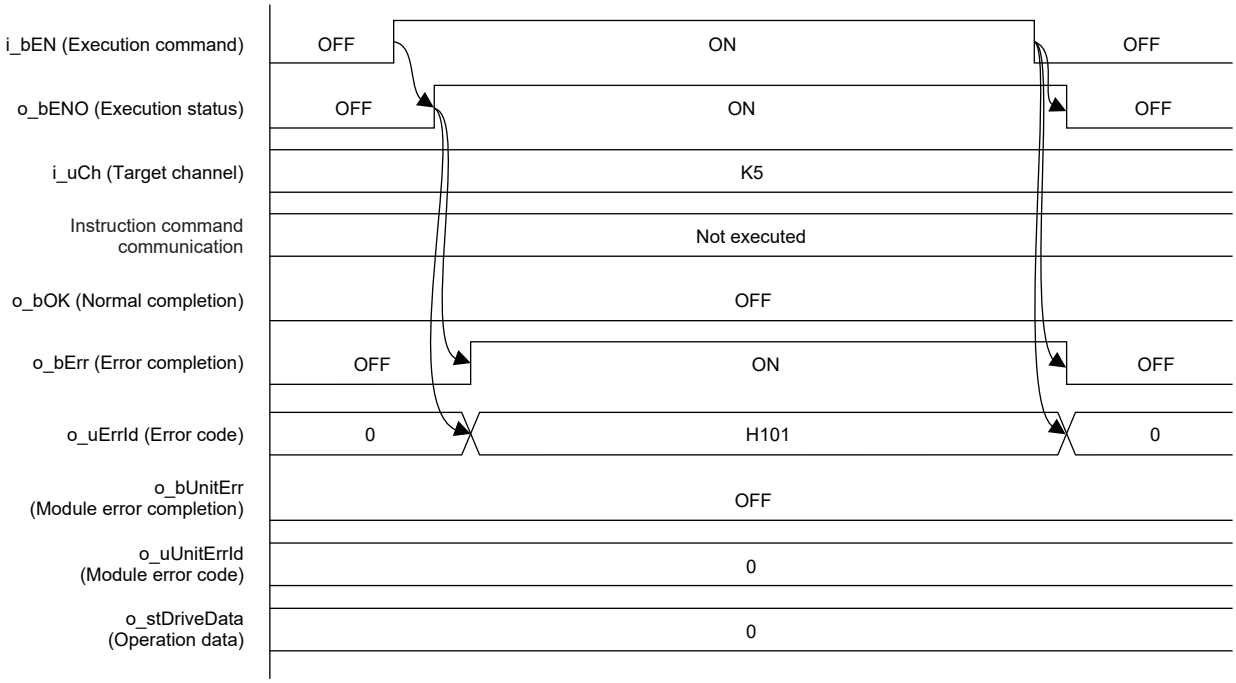
Timing chart of I/O signals

■ Normal completion



■ Error completion

- The target channel is out of range.



Restrictions and precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB uses the index registers Z0 and Z1. When using an interrupt program, do not use these index registers.
- 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.
- This FB requires the ladder to be configured for every input label.
- This FB uses the CPRTCL instruction. For details, refer to 📖MELSEC iQ-F FX5 User's Manual (Serial Communication/ 7.8 Programming/Predefined protocol support instruction).
- To operate the motor driver, set the protocol type to the predefined protocol support type with the module parameter of GX Works3. For details of the parameter setting procedures, refer to ☞ Page 20 Parameter setting.
- Change the number of timeouts or retries of the communication in Predefined Protocol Support Tool For Positioning. For details of the setting procedures, refer to 📖Predefined Protocol Support Tool For Positioning Operating Manual (6.2 Setting a Connected Model). If the communication interval for the same channel is short, the command may not be received depending on the connected controller, and a serial communication timeout (CPU error) may occur. In this case, the situation can be avoided by increasing the "transmission standby time" in the protocol transmission/reception settings of the connected device setting.

Parameter setting

For details of the parameter setting procedures, refer to ☞ Page 20 Parameter setting.

Performance value

CPU	Measurement condition	Processing time	Maximum scan time	Number of scans
FX5U, FX5UC*1*2	Axis 1, operation data No. 1, reading source controller	142 ms	0.895 ms	516

*1 When the program capacity is set to 128K steps, the processing speed may be decreased.
*2 The standard area is used for the labels.

Error code

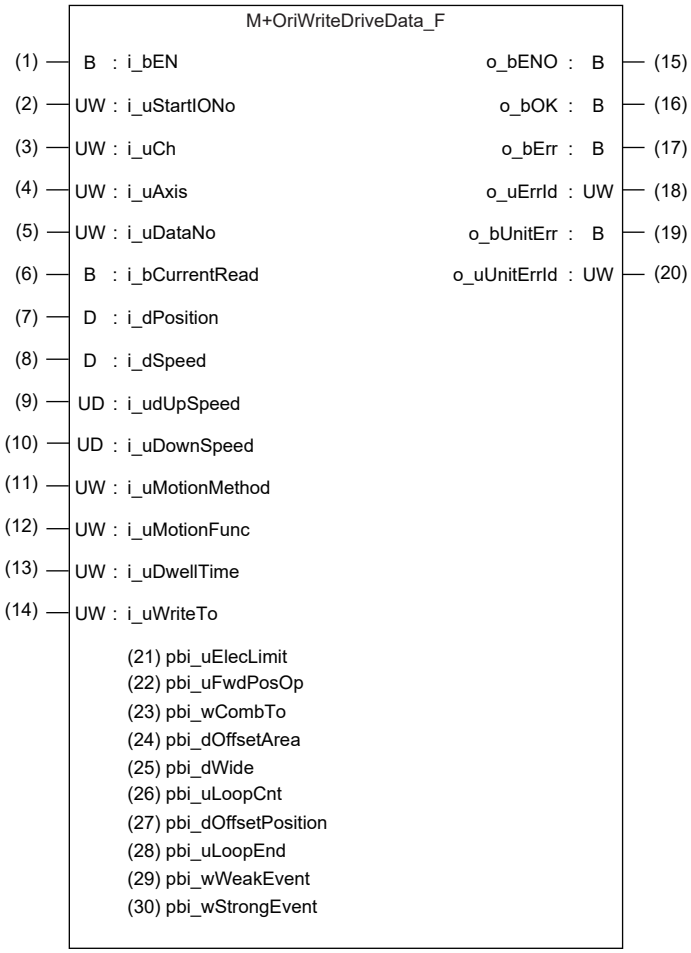
Error code (hexadecimal)	Description	Action
101H	The setting value of i_uCh (Target channel) is out of range. The target channel is not within the range of 1 to 4.	Review and correct the setting and then execute the FB again.
102H	The setting value of i_uAxis (Target axis) is out of range. The target axis is not within the range of 1 to 31.	Review and correct the setting and then execute the FB again.
105H	The setting value of i_uDataNo (Operation data No.) is out of range. The operation data No. is not within the range of 0 to 63.	Review and correct the setting and then execute the FB again.
106H	The setting value of i_uReadFrom (Reading source controller) is out of range. The reading source controller is not within the range of 0 to 2.	Review and correct the setting and then execute the FB again.
201H	The execution command has turned off during the processing.	Keep the ON state of the execution command until the normal completion, error completion, or module error completion turns on.*1
Predefined protocol error code	This error code occurs during communication.	Refer to MELSEC iQ-F FX5 User's Manual (Serial Communication/7.9 Troubleshooting/Checking absence/presence of errors).

*1 It is output only during one scan.

2.5 M+OriWriteDriveData_F (Operation Data Writing)

Overview

This FB writes the operation data corresponding to the specified operation data No.



Label

Input label

No.	Label	Label name	Data type	Setting range*6	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_uStartIONo	Start I/O No.	Word [Unsigned]/Bit string [16-bit]	—	Setting this label is not required since it is not used in the program in this FB.
(3)	i_uCh	Target channel	Word [Unsigned]/Bit string [16-bit]	1 to 4	Specify the channel number. 1: Built-in RS485 port 2: FX5-485-BD 3, 4: FX5-485ADP
(4)	i_uAxis	Target axis	Word [Unsigned]/Bit string [16-bit]	1 to 31	Specify the axis number set in the motor driver.*1 Example: When setting 1 for the axis number of the motor driver, set 1 in i_uAxis (Target axis).
(5)	i_uDataNo	Operation data No.	Word [Unsigned]/Bit string [16-bit]	0 to 63	Specify the operation data No. to which the setting value is written.
(6)	i_bCurrentRead	Current position reading	Bit	ON, OFF	ON: The current position of the motor driver is set as the target position. OFF: Each setting value is written to the motor driver.

No.	Label	Label name	Data type	Setting range[*6]	Description
(7)	i_dPosition	Position	Double word [Signed]	-2147483648 to 2147483647	Specify the target position (movement amount) of the positioning operation.[*2] AR series: -8388608 to 8388607 AZ series: -2147483648 to 2147483647 RKⅡ series: -8388608 to 8388607
(8)	i_dSpeed	Operation speed	Double word [Signed]	-4000000 to 4000000	Specify the operation speed of the positioning operation.[*3] AR series: 0 to 1000000 AZ series: -4000000 to 4000000 RKⅡ series: 0 to 1000000
(9)	i_uUpSpeed	Acceleration	Double word [Unsigned]/Bit string [32-bit]	1 to 1000000000	Specify the acceleration rate (acceleration time) of the positioning operation.[*4] AR series: 1 to 1000000 AZ series: 1 to 1000000000 RKⅡ series: 1 to 1000000
(10)	i_uDownSpeed	Deceleration	Double word [Unsigned]/Bit string [32-bit]	1 to 1000000000	Specify the deceleration rate (deceleration time) of the positioning operation.[*4] AR series: 1 to 1000000 AZ series: 1 to 1000000000 RKⅡ series: 1 to 1000000
(11)	i_uMotionMethod	Operation method	Word [Unsigned]/Bit string [16-bit]	0 to 22	Specify the specification method of the position (movement amount) of the positioning operation. ■For AR series, RKⅡ series 0: INC (Incremental) 1: ABS (Absolute) ■For AZ series 1: Absolute positioning 2: Incremental positioning (Based on command position) 3: Incremental positioning (Based on feedback position) 7: Continuous operation (Position control) 8: Wrap absolute positioning 9: Wrap proximity positioning 10: Wrap forward direction absolute positioning 11: Wrap reverse direction absolute positioning 12: Wrap absolute pushing 13: Wrap proximity pushing 14: Wrap forward direction pushing 15: Wrap reverse direction pushing 16: Continuous operation (Speed control) 17: Continuous operation (Pushing) 18: Continuous operation (Torque control) 20: Absolute positioning pushing 21: Incremental positioning pushing (Based on command position) 22: Incremental positioning pushing (Based on feedback position)
(12)	i_uMotionFunc	Operation function	Word [Unsigned]/Bit string [16-bit]	0 to 3	Specify the execution method of the positioning operation. ■For AR series, RKⅡ series 0: Single-motion 1: Link 2: Link 2 3: Pushing ■For AZ series 0: No link 1: Manual sequential 2: Automatic sequential 3: Type connection

No.	Label	Label name	Data type	Setting range*6	Description
(13)	i_uDwellTime	Dwell time	Word [Unsigned]/Bit string [16-bit]	0 to 65535	■For AR series, RKⅡ series Specify the stop waiting time of Link 2.*5 0 to 50000 ■For AZ series Specify the waiting time after the operation end.*5 0 to 65535
(14)	i_uWriteTo	Writing destination controller	Word [Unsigned]/Bit string [16-bit]	0 to 2	Specify the writing destination motor driver. AR series: 0 AZ series: 1 RKⅡ series: 2

*1 The axis number corresponds to the slave station number of MODBUS.
*2 In units of step.
*3 In units of Hz.
*4 In units of 0.001 ms/kHz.
*5 In units of 0.001 s.
*6 The setting range differs depending on the electric actuator.

Output label

No.	Label	Label name	Data type	Default value	Description
(15)	o_bENO	Execution status	Bit	OFF	ON: The execution command is on. OFF: The execution command is off.
(16)	o_bOK	Normal completion	Bit	OFF	When this label is on, it indicates that setting the operation data has been completed.
(17)	o_bErr	Error completion	Bit	OFF	When this label is on, it indicates that an error has occurred in the FB.
(18)	o_uErrId	Error code	Word [Unsigned]/Bit string [16-bit]	0	The error code that has occurred in the FB is stored.
(19)	o_bUnitErr	Module error completion	Bit	OFF	When this label is on, it indicates that an error has occurred in the module.
(20)	o_uUnitErrId	Module error code	Word [Unsigned]/Bit string [16-bit]	0	The error code that has occurred in the module is stored.

Global variable (operation parameter)

No.	Label	Label name	Data type	Setting range*3	Description
(21)	pbi_uElecLimit	Operating current	Word [Unsigned]/Bit string [16-bit]	0 to 1000	■For AR series Specify the current ratio of the pushing operation.*1 ■For AZ series Set the motor operating current based on the base current being 100%. It is a pushing current when pushing operation is performed.*1 ■For RKⅡ series Not supported
(22)	pbi_uFwdPosOp	Sequential positioning	Word [Unsigned]/Bit string [16-bit]	0 and 1	Specify enable/disable of the sequential positioning operation. ■For AR series, RKⅡ series 0: Disable 1: Enable ■For AZ series Not supported
(23)	pbi_wCombTo	Next data number	Word [Signed]	-256, -2 to 255	■For AR series, RKⅡ series Not supported ■For AZ series Specify the next data number when the operation is linked. -256: Stop -2: ↓↓(+2) -1: ↓(+1) 0 to 255: Operation data No.

No.	Label	Label name	Data type	Setting range*3	Description
(24)	pbi_dOffsetArea	Offset (Area)	Double word [Signed]	-2147483648 to 2147483647	■For AR series, RKⅡ series Not supported ■For AZ series Specify the distance from the center position of the range in which the MAREA output is turned on to the target position of the positioning operation. Specify the distance to the operation start position in the case of continuous operation.*2
(25)	pbi_dWide	Width (Area)	Double word [Signed]	-1 to 4194303	■For AR series, RKⅡ series Not supported ■For AZ series Specify the range in which the MAREA output is turned on.*2 -1: Disable 0 to 4194303: Setting range
(26)	pbi_uLoopCnt	Count (Loop)	Word [Unsigned]/Bit string [16-bit]	0, 2 to 255	■For AR series, RKⅡ series Not supported ■For AZ series Specify the number of times of loop. 0: None (No loop) 2 to 255: loop 2{to loop 255 ({Number of times of loop)
(27)	pbi_dOffsetPosition	Position offset (Loop)	Double word [Signed]	-4194304 to 4194303	■For AR series, RKⅡ series Not supported ■For AZ series Offsets the position (movement amount) every time loop is executed.*2
(28)	pbi_uLoopEnd	End (Loop)	Word [Unsigned]/Bit string [16-bit]	0 and 1	■For AR series, RKⅡ series Not supported ■For AZ series Specify the operation data No. with which loop is ended. 0: None (Not the loop end point) 1: }L-End (Loop end point)
(29)	pbi_wWeakEvent	Weak event	Word [Signed]	-1 to 31	■For AR series, RKⅡ series Not supported ■For AZ series Set the number of the operation I/O event to generate a weak event. Specifying an operation I/O event is the condition to generate the event. -1: -(Disable) 0 to 31: Operation I/O event number
(30)	pbi_wStrongEvent	Strong event	Word [Signed]	-1 to 31	■For AR series, RKⅡ series Not supported ■For AZ series Set the number of the operation I/O event to generate a strong event. If a weak event and a strong event are generated simultaneously, the strong event is prioritized. Specifying an operation I/O event is the condition to generate the event. -1: -(Disable) 0 to 31: Operation I/O event number

*1 In units of 0.1%.
*2 In units of step.
*3 The setting range differs depending on the electric actuator.

Function overview

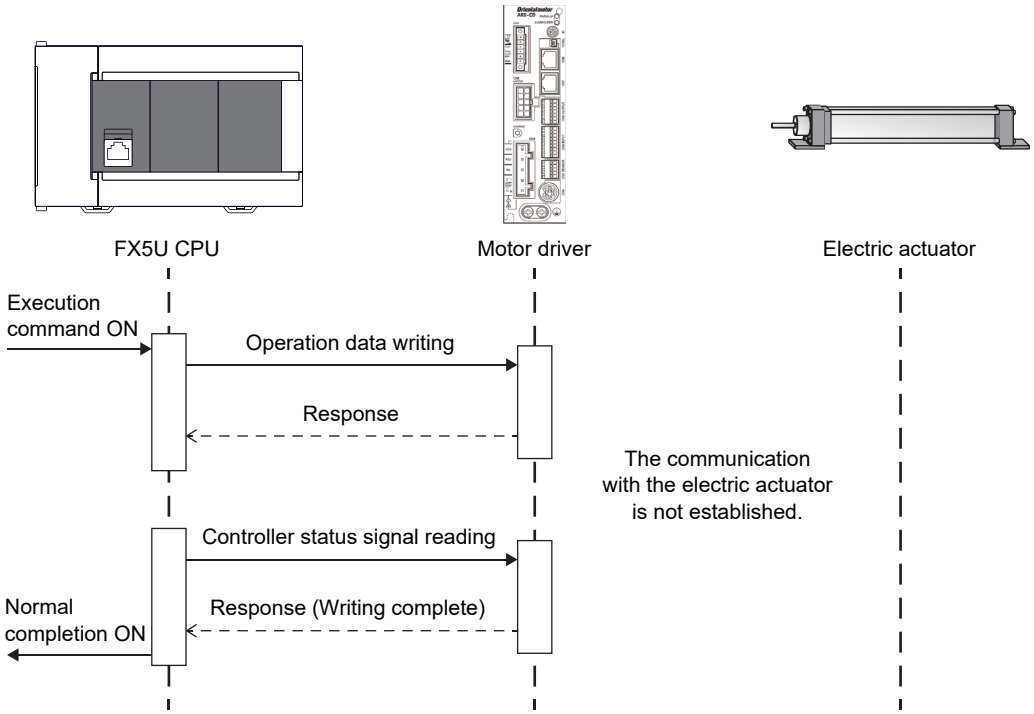
Applicable hardware and software

■ Predefined Protocol Support FB For Positioning

Applicable module	Firmware version	Engineering tool
FX5U CPU	1.200 or later	GX Works3 Version 1.065T or later
FX5UC CPU	1.200 or later	GX Works3 Version 1.065T or later

Sequence diagram

■ When the current position reading is off



Basic specifications

Item	Description
Programming language	—(The program in this FB is not open to the public.)
Number of steps	2251 steps The number of steps of the FB in a program depends on the CPU module used, input and output definition, and option settings of GX Works3. For the option settings of GX Works3, refer to 📖GX Works3 Operating Manual (2.9 Option Setting for Each Function).
Label amount used	• Label: 0.1K points (Word) • Latch label: 0K points (Word) The label amount used in a program depends on the CPU module used, device specified in the argument, and option settings of GX Works3. For the option settings of GX Works3, refer to 📖GX Works3 Operating Manual (2.9 Option Setting for Each Function).
Number of index register points used	• Index register: 2 points • Long index register: 0 points
File register amount used	File register: 1904 points (Word)
FB dependence	No dependence
FB compiling method	Subroutine type
FB operation type	Pulsed execution (multiple scan execution type)

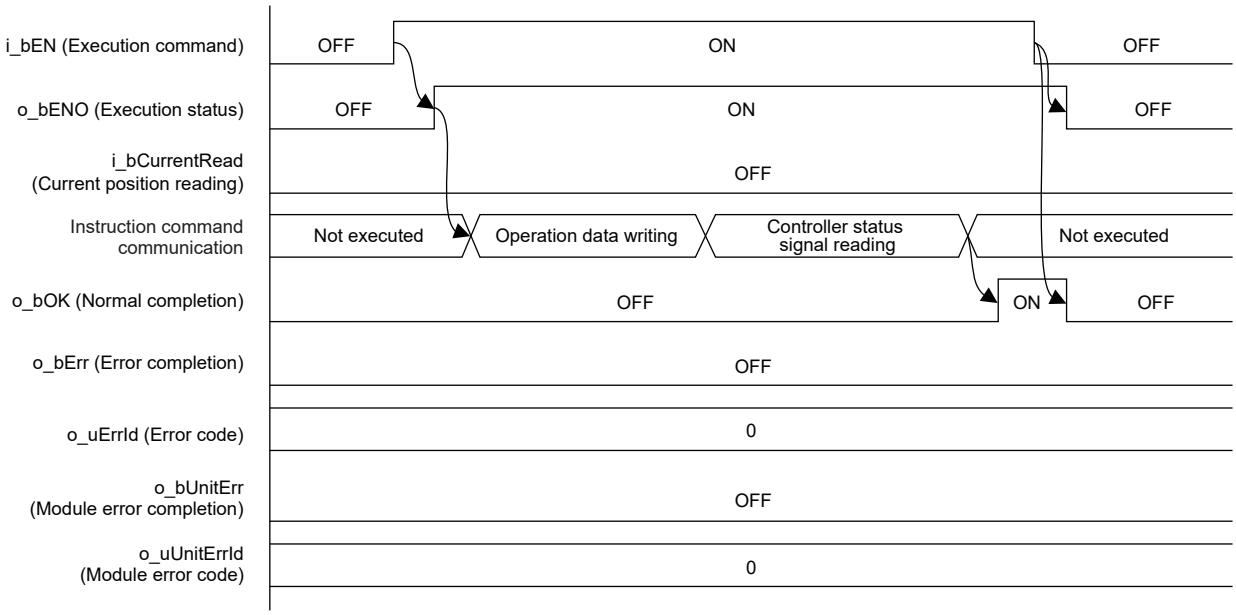
Function description

- By turning on i_bEN (Execution command), this FB writes the operation data to the specified operation data No. of the motor driver. For details of the operation data, refer to the manual of each motor driver.
- When i_bCurrentRead (Current value reading) is on, set the current position as the position.
- This FB writes the operation data to the non-volatile memory of the motor driver. For details, refer to the manual of each motor driver.
- In this FB, o_bOK (Normal completion) turns on by checking the OFF state of S-BSY/SYS-BSY of the motor driver after the operation data writing command is issued.
- If an error occurs in the motor driver and this FB receives the error code, o_bUnitErr (Module error completion) turns on and the processing of the FB is interrupted. The received error code is stored in o_uUnitErrId (Module error code).
- If any other error occurs, o_bErr (Error completion) turns on and the processing of the FB is interrupted. For details of the error code, refer to ☞ Page 50 Error code.

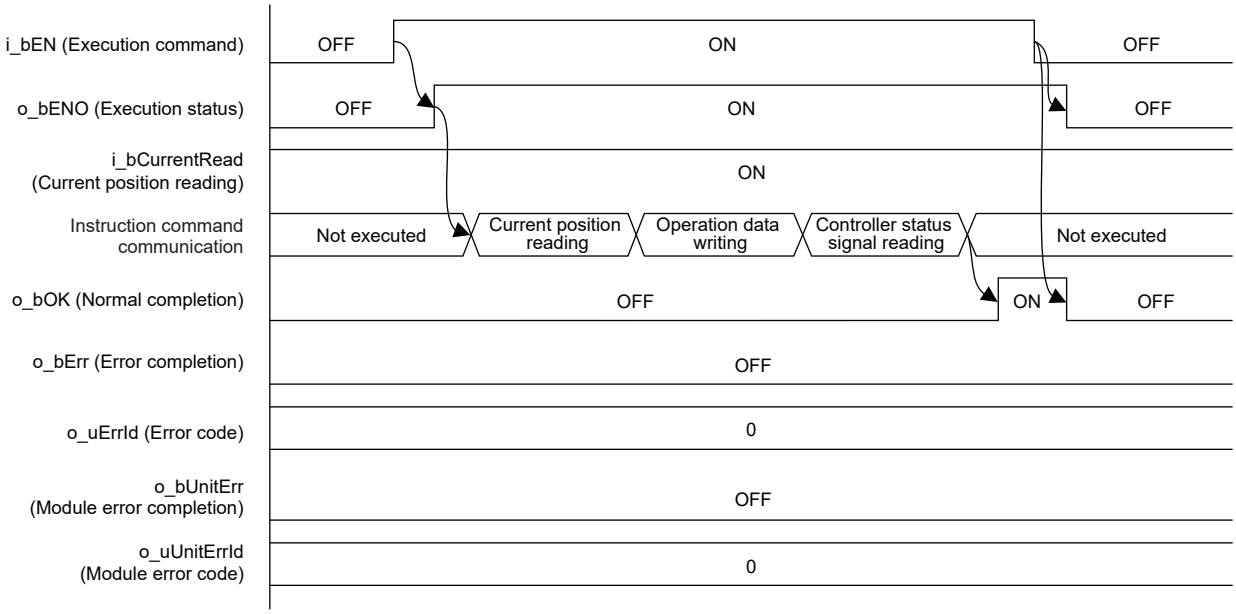
Timing chart of I/O signals

■ Normal completion

- When the current position reading is off

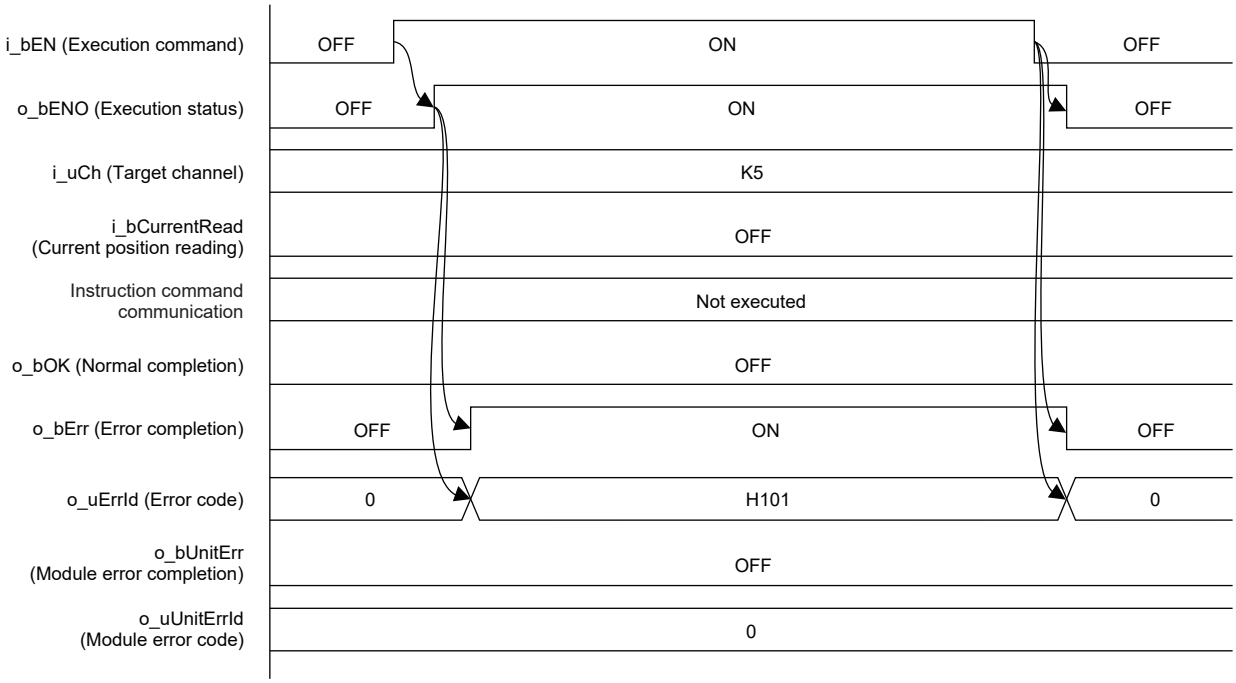


- When the current position reading is on



■ Error completion

- The target channel is out of range.



Restrictions and precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB uses the index registers Z0 and Z1. When using an interrupt program, do not use these index registers.
- 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.
- This FB requires the ladder to be configured for every input label.
- This FB uses the CPRTCL instruction. For details, refer to 📖MELSEC iQ-F FX5 User's Manual (Serial Communication/ 7.8 Programming/Predefined protocol support instruction).
- To operate the motor driver, set the protocol type to the predefined protocol support type with the module parameter of GX Works3. For details of the parameter setting procedures, refer to ☞ Page 20 Parameter setting.
- Change the number of timeouts or retries of the communication in Predefined Protocol Support Tool For Positioning. For details of the setting procedures, refer to 📖Predefined Protocol Support Tool For Positioning Operating Manual (6.2 Setting a Connected Model). If the communication interval for the same channel is short, the command may not be received depending on the connected controller, and a serial communication timeout (CPU error) may occur. In this case, the situation can be avoided by increasing the "transmission standby time" in the protocol transmission/reception settings of the connected device setting.

Parameter setting

For details of the parameter setting procedures, refer to ☞ Page 20 Parameter setting.

Performance value

CPU	Measurement condition[*3*4]		Processing time[*5]	Maximum scan time	Number of scans
FX5U, FX5UC[*1*2]	Current position reading: ON	Axis 1, operation data No. 0, writing destination controller 0	4450 ms	1.730 ms	15233
	Current position reading: OFF	Axis 1, operation data No. 0, writing destination controller 0	332 ms	1.090 ms	1046
	Current position reading: ON	Axis 1, operation data No. 1, writing destination controller 0	3960 ms	1.690 ms	13564
	Current position reading: OFF	Axis 1, operation data No. 1, writing destination controller 0	297 ms	1.100 ms	968

*1 When the program capacity is set to 128K steps, the processing speed may be decreased.
*2 The standard area is used for the labels.
*3 The operation data is as follows. The current position at the start of the measurement is 0 when the current position reading is off and 1000 when the current position reading is on.

Position	Operation speed	Acceleration	Deceleration	Operation method	Operation function	Dwell time
1000	500	100	100	1	0	0

*4 When the current position reading is on, perform the positioning operation in advance so that the current position becomes 1000.
*5 The processing time is the period from the execution command is turned on until the normal completion turns on.

Error code

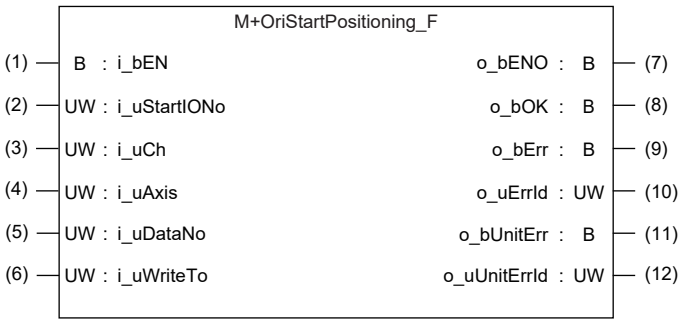
Error code (hexadecimal)	Description	Action
101H	The setting value of i_uCh (Target channel) is out of range. The target channel is not within the range of 1 to 4.	Review and correct the setting and then execute the FB again.
102H	The setting value of i_uAxis (Target axis) is out of range. The target axis is not within the range of 1 to 31.	Review and correct the setting and then execute the FB again.
105H	The setting value of i_uDataNo (Operation data No.) is out of range. The operation data No. is not within the range of 0 to 63.	Review and correct the setting and then execute the FB again.
106H	The setting value of i_uWriteTo (Writing destination controller) is out of range. The writing destination controller is not within the range of 0 to 2.	Review and correct the setting and then execute the FB again.
201H	The execution command has turned off during the processing.	Keep the ON state of the execution command until the normal completion, error completion, or module error completion turns on.[*1]
204H	The internal processing in the motor driver is being performed.	Execute the FB again after the internal processing in the motor driver ends.
Predefined protocol error code	This error code occurs during communication.	Refer to MELSEC iQ-F FX5 User's Manual (Serial Communication/7.9 Troubleshooting/Checking absence/presence of errors).

*1 It is output only during one scan.

2.6 M+OriStartPositioning_F (Positioning Operation)

Overview

This FB starts the positioning operation for the specified operation data No.



Label

Input label

No.	Label	Label name	Data type	Setting range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_uStartIONo	Start I/O No.	Word [Unsigned]/Bit string [16-bit]	—	Setting this label is not required since it is not used in the program in this FB.
(3)	i_uCh	Target channel	Word [Unsigned]/Bit string [16-bit]	1 to 4	Specify the channel number. 1: Built-in RS485 port 2: FX5-485-BD 3, 4: FX5-485ADP
(4)	i_uAxis	Target axis	Word [Unsigned]/Bit string [16-bit]	1 to 31	Specify the axis number set in the motor driver.*1 Example: When setting 1 for the axis number of the motor driver, set 1 in i_uAxis (Target axis).
(5)	i_uDataNo	Operation data No.	Word [Unsigned]/Bit string [16-bit]	0 to 63	Specify the operation data No. for which the positioning operation is performed.
(6)	i_uWriteTo	Writing destination controller	Word [Unsigned]/Bit string [16-bit]	0 to 2	Specify the writing destination motor driver. AR series: 0 AZ series: 1 RKII series: 2

*1 The axis number corresponds to the slave station number of MODBUS.

Output label

No.	Label	Label name	Data type	Default value	Description
(7)	o_bENO	Execution status	Bit	OFF	ON: The execution command is on. OFF: The execution command is off.
(8)	o_bOK	Normal completion	Bit	OFF	When this label is on, it indicates that the positioning operation has been completed.
(9)	o_bErr	Error completion	Bit	OFF	When this label is on, it indicates that an error has occurred in the FB.
(10)	o_uErrId	Error code	Word [Unsigned]/Bit string [16-bit]	0	The error code that has occurred in the FB is stored.
(11)	o_bUnitErr	Module error completion	Bit	OFF	When this label is on, it indicates that an error has occurred in the module.
(12)	o_uUnitErrId	Module error code	Word [Unsigned]/Bit string [16-bit]	0	The error code that has occurred in the module is stored.

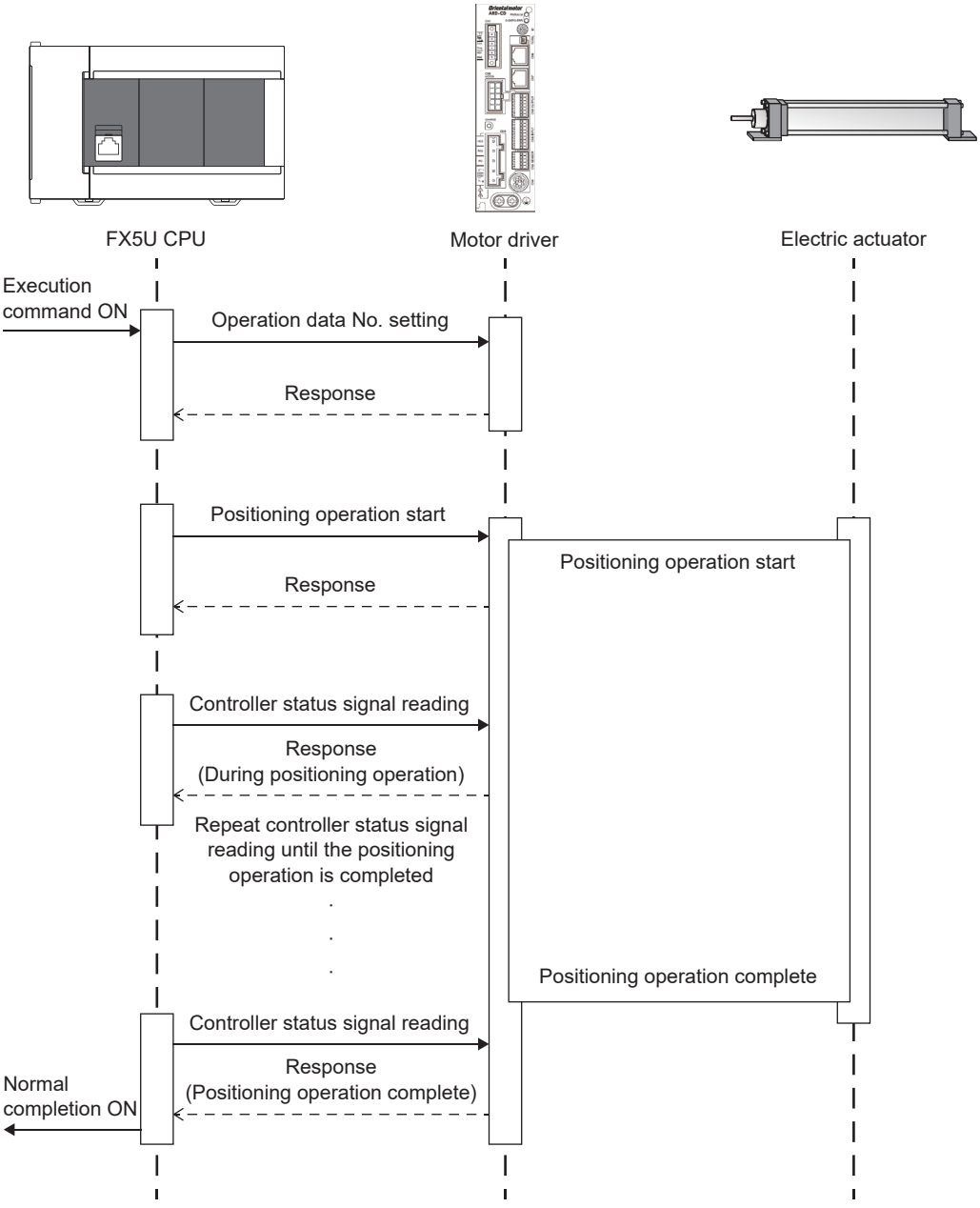
Function overview

Applicable hardware and software

■ Predefined Protocol Support FB For Positioning

Applicable module	Firmware version	Engineering tool
FX5U CPU	1.200 or later	GX Works3 Version 1.065T or later
FX5UC CPU	1.200 or later	GX Works3 Version 1.065T or later

Sequence diagram



Basic specifications

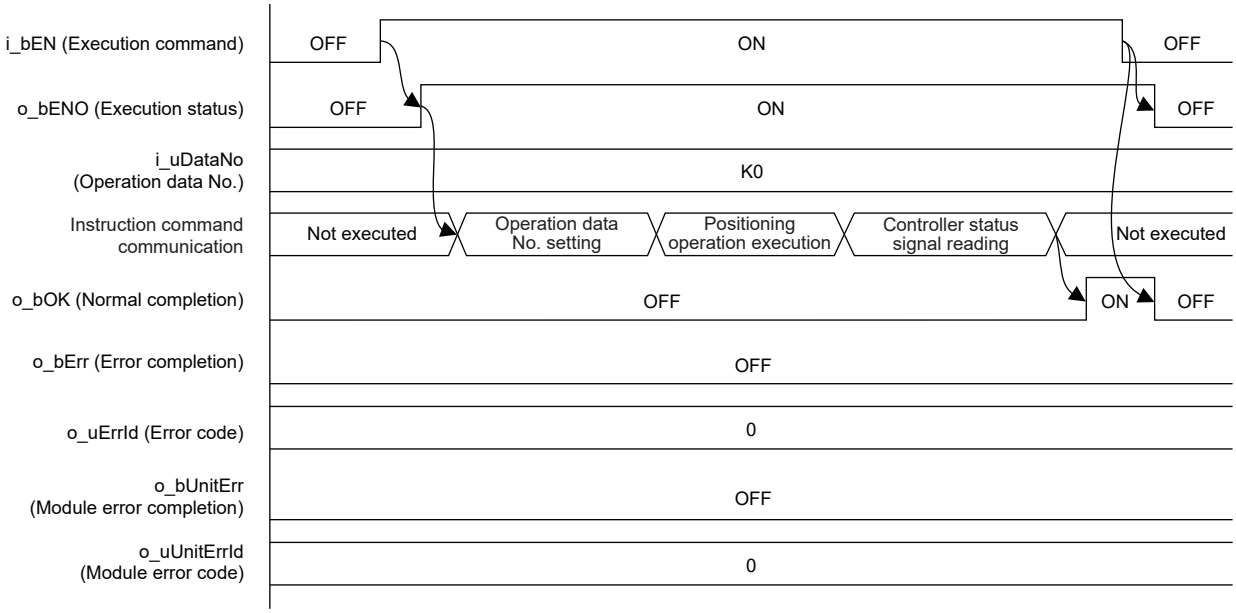
Item	Description
Programming language	—(The program in this FB is not open to the public.)
Number of steps	1380 steps The number of steps of the FB in a program depends on the CPU module used, input and output definition, and option settings of GX Works3. For the option settings of GX Works3, refer to 📖GX Works3 Operating Manual (2.9 Option Setting for Each Function).
Label amount used	• Label: 0.04K points (Word) • Latch label: 0K points (Word) The label amount used in a program depends on the CPU module used, device specified in the argument, and option settings of GX Works3. For the option settings of GX Works3, refer to 📖GX Works3 Operating Manual (2.9 Option Setting for Each Function).
Number of index register points used	• Index register: 2 points • Long index register: 0 points
File register amount used	File register: 1904 points (Word)
FB dependence	No dependence
FB compiling method	Subroutine type
FB operation type	Pulsed execution (multiple scan execution type)

Function description

- Specify the axis number of the operation target in i_uAxis (Target axis).
- Set the operation data No. to be executed in i_uDataNo (Operation data No.).
- At rising edge of i_bEN (Execution command), this FB starts the positioning operation.
- In this FB, o_bOK (Normal completion) turns on by checking the ON state of READY of the motor driver after the positioning operation starts.
- If an error occurs while sending/receiving a predefined protocol, o_bErr (Error completion) turns on and the processing of the FB is interrupted. The error code is stored in o_uErrId (Error code). For details of the error code, refer to 📖MELSEC iQ-F FX5 User's Manual (Serial Communication/7.9 Troubleshooting/Checking absence/presence of errors).
- If an error occurs in the motor driver and this FB receives the error code, o_bUnitErr (Module error completion) turns on and the processing of the FB is interrupted. The received error code is stored in o_uUnitErrId (Module error code). For details of the error code, refer to the manuals described in "RELEVANT MANUALS".
- If any other error occurs, o_bErr (Error completion) turns on and the processing of the FB is interrupted. For details of the error code, refer to ☞ Page 56 Error code.

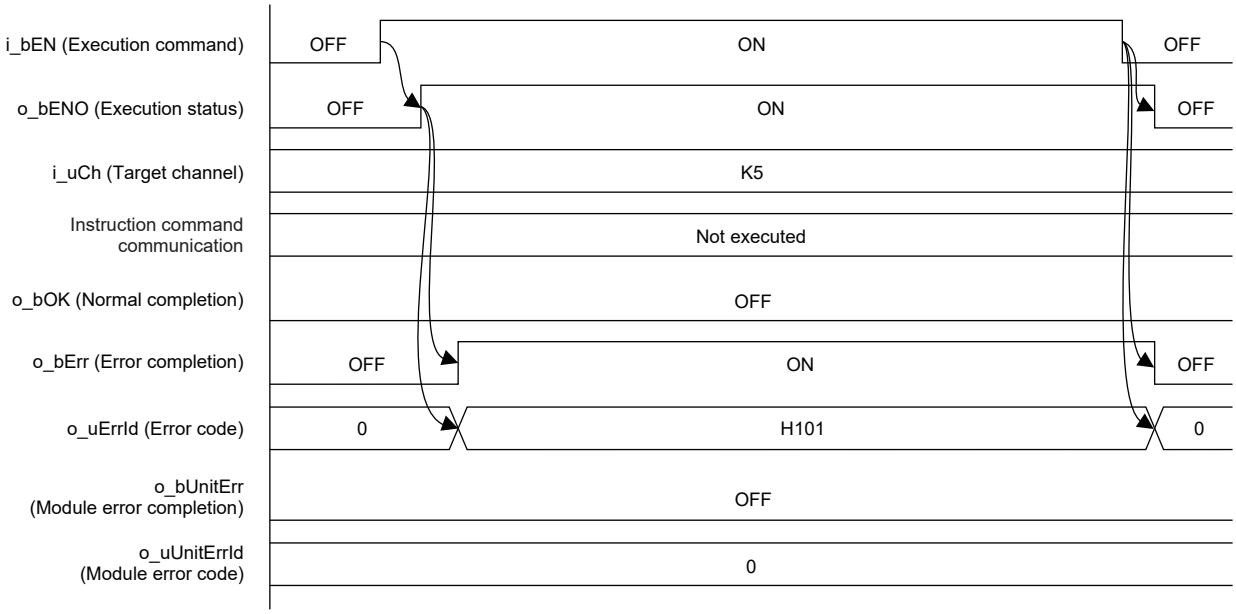
Timing chart of I/O signals

■ Normal completion



■ Error completion

• The target channel is out of range.



Restrictions and precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB uses the index registers Z0 and Z1. When using an interrupt program, do not use these index registers.
- 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.
- This FB requires the ladder to be configured for every input label.
- When the operation method of the operation data is continuous operation, o_bOK (Normal completion) may not turn on. To stop the continuous operation, turn off exciting by using M+OriServoControl_F (Exciting ON/OFF).
- When the sequential positioning of the operation data is enabled, assign SSTART to the direct I/O of the motor driver. After o_bOK (Normal completion) turns on, the positioning operation for the next operation data No. is executed by turning on SSTART for 4 ms or longer and off.
- In this FB, if i_bEN (Execution command) is turned off after the positioning operation is started and before o_bOK (Normal completion), o_bErr (Error completion), or o_bUnitErr (Module error completion) turns on, the operation of the motor driver does not stop until the positioning operation is completed.
- This FB uses the CPRTCL instruction. For details, refer to 📖MELSEC iQ-F FX5 User's Manual (Serial Communication/ 7.8 Programming/Predefined protocol support instruction).
- To operate the motor driver, set the protocol type to the predefined protocol support type with the module parameter of GX Works3. For details of the parameter setting procedures, refer to ☞ Page 20 Parameter setting.
- Change the number of timeouts or retries of the communication in Predefined Protocol Support Tool For Positioning. For details of the setting procedures, refer to 📖Predefined Protocol Support Tool For Positioning Operating Manual (6.2 Setting a Connected Model). If the communication interval for the same channel is short, the command may not be received depending on the connected controller, and a serial communication timeout (CPU error) may occur. In this case, the situation can be avoided by increasing the "transmission standby time" in the protocol transmission/reception settings of the connected device setting.
- Before executing this FB, turn on exciting using M+OriServoControl_F (Exciting ON/OFF).

Parameter setting

For details of the parameter setting procedures, refer to ☞ Page 20 Parameter setting.

Performance value

CPU	Measurement condition*3	Processing time	Maximum scan time	Number of scans
FX5U, FX5UC*1*2	Axis 1, operation data No. 0, writing destination controller 0	2070 ms	1.180 ms	7819

*1 When the program capacity is set to 128K steps, the processing speed may be decreased.
*2 The standard area is used for the labels.
*3 The operation data is as follows. The current position at the start of the measurement is 0 steps.

Position	Operation speed	Acceleration	Deceleration	Operation method	Operation function	Dwell time
1000	500	100	100	1	0	0

Error code

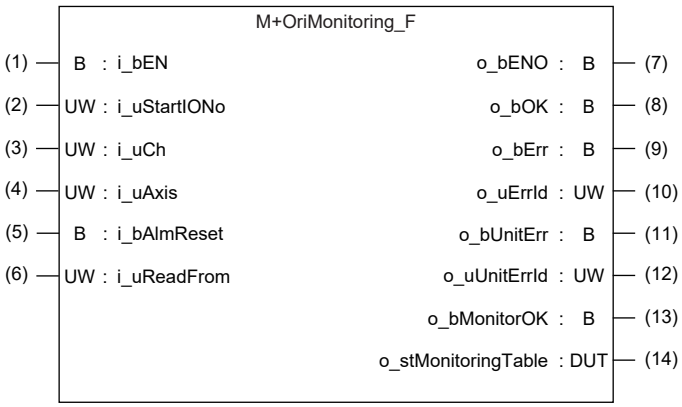
Error code (hexadecimal)	Description	Action
101H	The setting value of i_uCh (Target channel) is out of range. The target channel is not within the range of 1 to 4.	Review and correct the setting and then execute the FB again.
102H	The setting value of i_uAxis (Target axis) is out of range. The target axis is not within the range of 1 to 31.	Review and correct the setting and then execute the FB again.
105H	The setting value of i_uDataNo (Operation data No.) is out of range. The operation data No. is not within the range of 0 to 63.	Review and correct the setting and then execute the FB again.
106H	The setting value of i_uWriteTo (Writing destination controller) is out of range. The writing destination controller is not within the range of 0 to 2.	Review and correct the setting and then execute the FB again.
201H	The execution command has turned off during the processing.	Keep the ON state of the execution command until the normal completion, error completion, or module error completion turns on.*1
203H	An alarm, warning, or information is occurring.	Check the motor driver status in M+OriMonitoring_F (Operation monitoring). After checking the status, eliminate the error cause and then execute the FB again.
Predefined protocol error code	This error code occurs during communication.	Refer to MELSEC iQ-F FX5 User's Manual (Serial Communication/7.9 Troubleshooting/Checking absence/presence of errors).

*1 It is output only during one scan.

2.7 M+OriMonitoring_F (Operation Monitoring)

Overview

This FB monitors the current position and alarms, and performs the alarm reset.



Label

Input label

No.	Label	Label name	Data type	Setting range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_uStartIONo	Start I/O No.	Word [Unsigned]/Bit string [16-bit]	—	Setting this label is not required since it is not used in the program in this FB.
(3)	i_uCh	Target channel	Word [Unsigned]/Bit string [16-bit]	1 to 4	Specify the channel number. 1: Built-in RS485 port 2: FX5-485-BD 3, 4: FX5-485ADP
(4)	i_uAxis	Target axis	Word [Unsigned]/Bit string [16-bit]	1 to 31	Specify the axis number set in the motor driver.*1 Example: When setting 1 for the axis number of the motor driver, set 1 in i_uAxis (Target axis).
(5)	i_bAlmReset	Alarm reset	Bit	ON, OFF	ON: The alarm is reset. OFF: No operation is performed.
(6)	i_uReadFrom	Reading source controller	Word [Unsigned]/Bit string [16-bit]	0 to 2	Specify the reading source motor driver. AR series: 0 AZ series: 1 RKII series: 2

*1 The axis number corresponds to the slave station number of MODBUS.

Output label

No.	Label	Label name	Data type	Default value	Description
(7)	o_bENO	Execution status	Bit	OFF	ON: The execution command is on. OFF: The execution command is off.
(8)	o_bOK	Normal completion	Bit	OFF	When this label is on, it indicates that the alarm has been cleared without error.
(9)	o_bErr	Error completion	Bit	OFF	When this label is on, it indicates that an error has occurred in the FB.
(10)	o_uErrId	Error code	Word [Unsigned]/Bit string [16-bit]	0	The error code that has occurred in the FB is stored.
(11)	o_bUnitErr	Module error completion	Bit	OFF	When this label is on, it indicates that an error has occurred in the module.
(12)	o_uUnitErrId	Module error code	Word [Unsigned]/Bit string [16-bit]	0	The error code that has occurred in the module is stored.

No.	Label	Label name	Data type	Default value	Description
(13)	o_bMonitorOK	Monitoring status	Bit	OFF	When this label is on, it indicates that the operation is being monitored without error.
(14)	o_stMonitoringTable	Monitoring table	stMonitoringTable	—	The monitoring table information is stored. For details of the structure, refer to ☞ Page 10 Structure list.

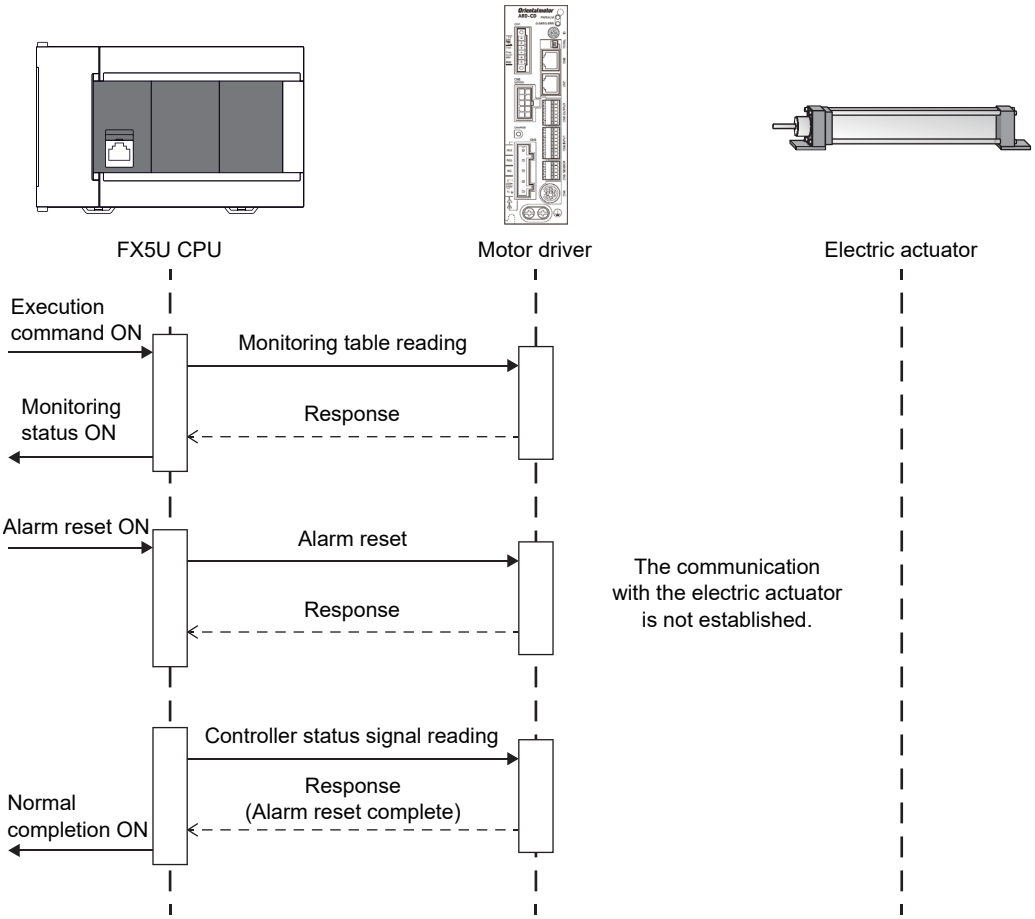
Function overview

Applicable hardware and software

■ Predefined Protocol Support FB For Positioning

Applicable module	Firmware version	Engineering tool
FX5U CPU	1.200 or later	GX Works3 Version 1.065T or later
FX5UC CPU	1.200 or later	GX Works3 Version 1.065T or later

Sequence diagram



Basic specifications

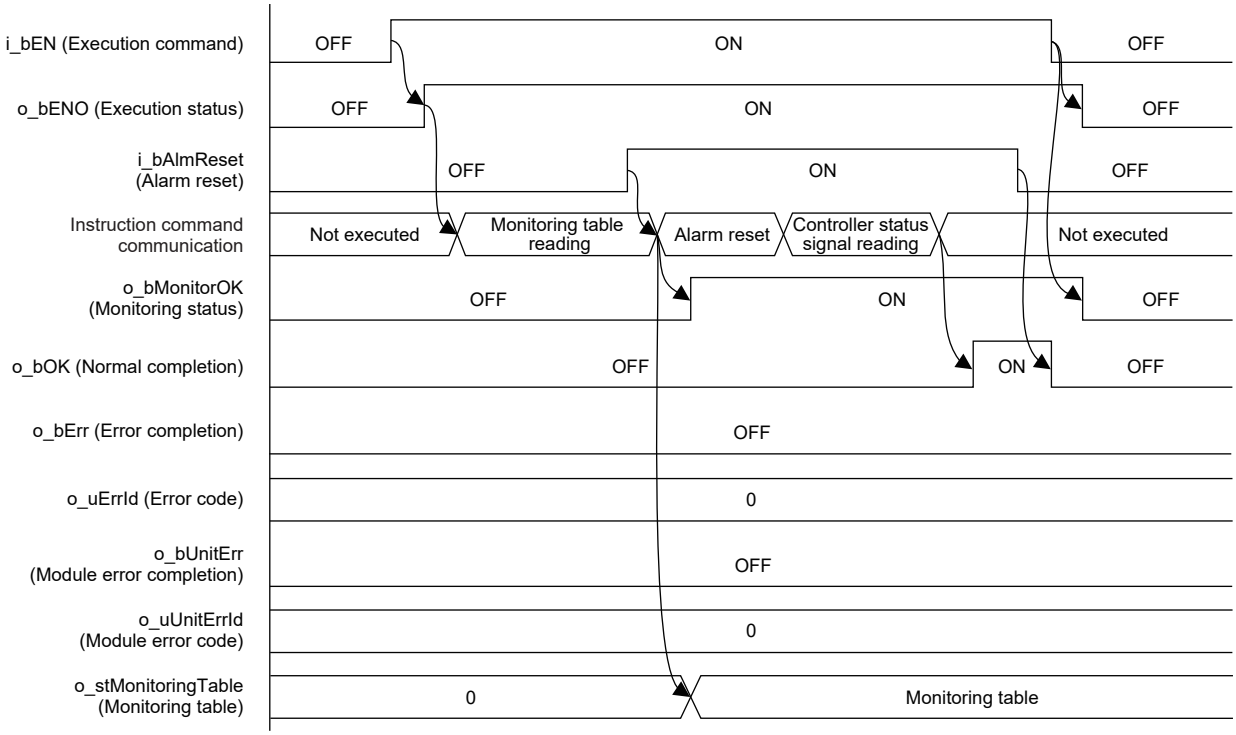
Item	Description
Programming language	—(The program in this FB is not open to the public.)
Number of steps	1589 steps The number of steps of the FB in a program depends on the CPU module used, input and output definition, and option settings of GX Works3. For the option settings of GX Works3, refer to 📖GX Works3 Operating Manual (2.9 Option Setting for Each Function).
Label amount used	• Label: 0.07K points (Word) • Latch label: 0K points (Word) The label amount used in a program depends on the CPU module used, device specified in the argument, and option settings of GX Works3. For the option settings of GX Works3, refer to 📖GX Works3 Operating Manual (2.9 Option Setting for Each Function).
Number of index register points used	• Index register: 2 points • Long index register: 0 points
File register amount used	File register: 1904 points (Word)
FB dependence	No dependence
FB compiling method	Subroutine type
FB operation type	Real-time execution

Function description

- Specify the axis number of the operation target in i_uAxis (Target axis).
- At rising edge of i_bEN (Execution command), this FB starts monitoring the target axis of the motor driver. The monitoring data (such as the feedback position and current alarm) is stored in o_stMonitoringTable (Monitoring table).
- While the target axis is being monitored, o_bMonitorOK (Monitoring status) is on.
- After i_bEN (Execution command) is turned on, the alarm is reset by turning on i_bAlmReset (Alarm reset command) while the alarm is occurring.
- In this FB, o_bOK (Normal completion) turns on by checking the OFF state of S-BSY/SYS-BSY of the motor driver after the alarm reset is executed.
- If an error occurs while sending/receiving a predefined protocol, o_bErr (Error completion) turns on and the processing of the FB is interrupted. The error code is stored in o_uErrId (Error code). For details of the error code, refer to 📖MELSEC iQ-F FX5 User's Manual (Serial Communication/7.9 Troubleshooting/Checking absence/presence of errors).
- If an error occurs in the motor driver and this FB receives the error code, o_bUnitErr (Module error completion) turns on and the processing of the FB is interrupted. The received error code is stored in o_uUnitErrId (Module error code). For details of the error code, refer to the manuals described in "RELEVANT MANUALS".
- If any other error occurs, o_bErr (Error completion) turns on and the processing of the FB is interrupted. For details of the error code, refer to ☞ Page 61 Error code.

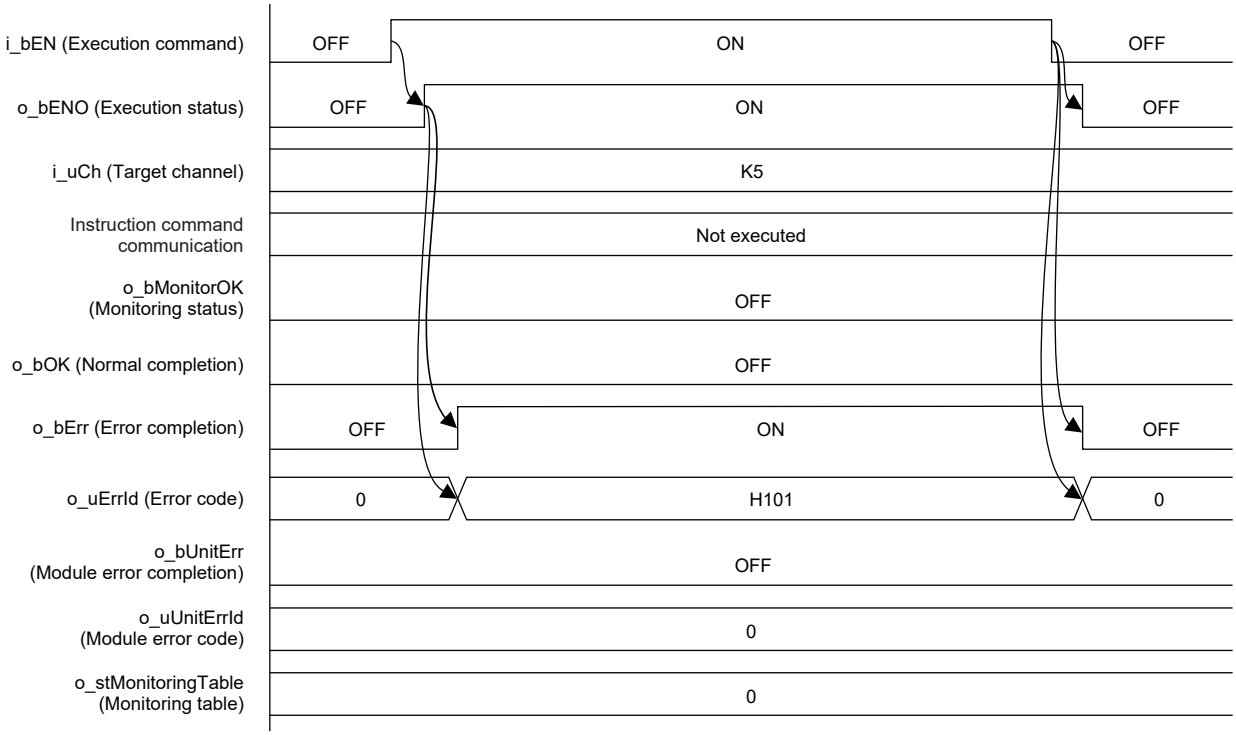
Timing chart of I/O signals

■ Normal completion



■ Error completion

- The target channel is out of range.



Restrictions and precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB uses the index registers Z0 and Z1. When using an interrupt program, do not use these index registers.
- 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.
- This FB requires the ladder to be configured for every input label.
- This FB uses the CPRTCL instruction. For details, refer to 📖MELSEC iQ-F FX5 User's Manual (Serial Communication/ 7.8 Programming/Predefined protocol support instruction).
- To operate the motor driver, set the protocol type to the predefined protocol support type with the module parameter of GX Works3. For details of the parameter setting procedures, refer to ☞ Page 20 Parameter setting.
- Change the number of timeouts or retries of the communication in Predefined Protocol Support Tool For Positioning. For details of the setting procedures, refer to 📖Predefined Protocol Support Tool For Positioning Operating Manual (6.2 Setting a Connected Model). If the communication interval for the same channel is short, the command may not be received depending on the connected controller, and a serial communication timeout (CPU error) may occur. In this case, the situation can be avoided by increasing the "transmission standby time" in the protocol transmission/reception settings of the connected device setting.

Parameter setting

For details of the parameter setting procedures, refer to ☞ Page 20 Parameter setting.

Performance value

CPU	Measurement condition		Processing time	Maximum scan time	Number of scans
FX5U, FX5UC*1*2	Axis 1, channel 1, writing destination controller 0	From execution command ON to monitoring status ON	129 ms	1.110 ms	443
		From alarm reset ON to normal completion	1120 ms	1.090 ms	3818
	Axis 1, channel 1, writing destination controller 1	From execution command ON to monitoring status ON	72.000 ms	1.150 ms	236
		From alarm reset ON to normal completion	1070 ms	1.090 ms	3501

*1 When the program capacity is set to 128K steps, the processing speed may be decreased.
*2 The standard area is used for the labels.

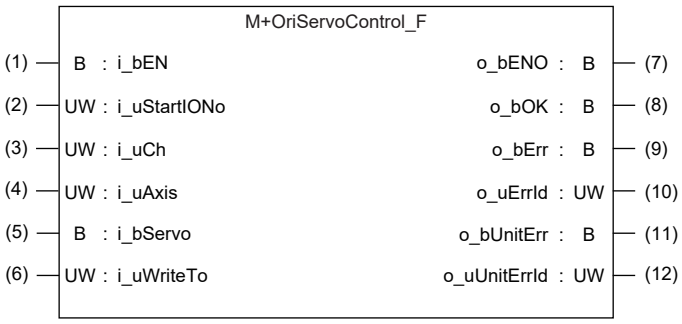
Error code

Error code (hexadecimal)	Description	Action
101H	The setting value of i_uCh (Target channel) is out of range. The target channel is not within the range of 1 to 4.	Review and correct the setting and then execute the FB again.
102H	The setting value of i_uAxis (Target axis) is out of range. The target axis is not within the range of 1 to 31.	Review and correct the setting and then execute the FB again.
106H	The setting value of i_uReadFrom (Reading source controller) is out of range. The reading source controller is not within the range of 0 to 2.	Review and correct the setting and then execute the FB again.
204H	The internal processing in the motor driver is being performed.	Execute the FB again after the internal processing in the motor driver ends.
Predefined protocol error code	This error code occurs during communication.	Refer to 📖MELSEC iQ-F FX5 User's Manual (Serial Communication/7.9 Troubleshooting/Checking absence/presence of errors).

2.8 M+OriServoControl_F (Exciting ON/OFF)

Overview

This FB controls the exciting ON/OFF.



Label

Input label

No.	Label	Label name	Data type	Setting range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_uStartIONo	Start I/O No.	Word [Unsigned]/Bit string [16-bit]	—	Setting this label is not required since it is not used in the program in this FB.
(3)	i_uCh	Target channel	Word [Unsigned]/Bit string [16-bit]	1 to 4	Specify the channel number. 1: Built-in RS485 port 2: FX5-485-BD 3, 4: FX5-485ADP
(4)	i_uAxis	Target axis	Word [Unsigned]/Bit string [16-bit]	1 to 31	Set the axis number set in the motor driver.*1 Example: When setting 1 for the axis number of the motor driver, set 1 in i_uAxis (Target axis).
(5)	i_bServo	Exciting ON/OFF switching	Bit	ON, OFF	ON: Exciting ON OFF: Exciting OFF
(6)	i_uWriteTo	Writing destination controller	Word [Unsigned]/Bit string [16-bit]	0 to 2	Specify the writing destination motor driver. AR series: 0 AZ series: 1 RKII series: 2

*1 The axis number corresponds to the slave station number of MODBUS.

Output label

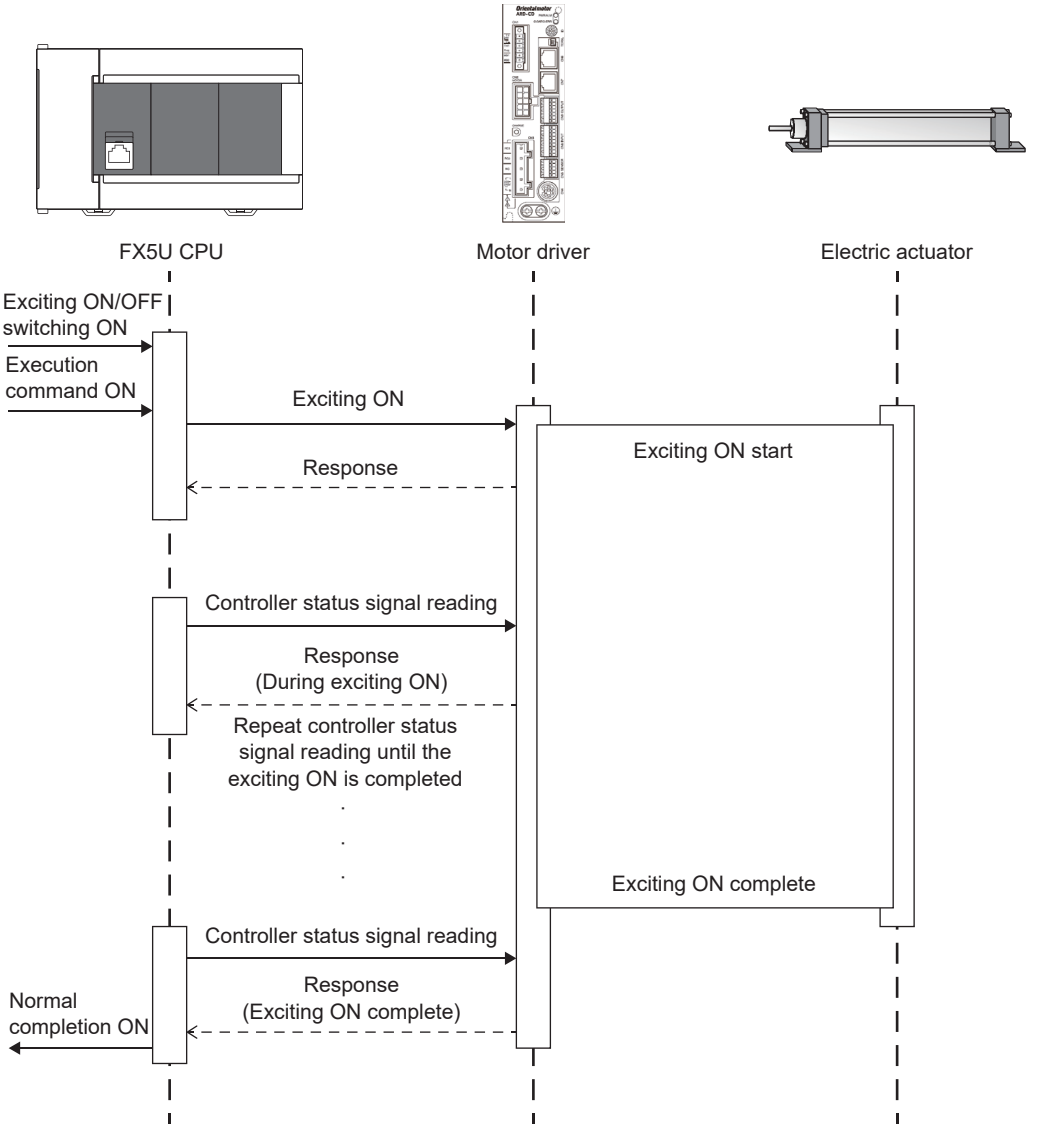
No.	Label	Label name	Data type	Default value	Description
(7)	o_bENO	Execution status	Bit	OFF	ON: The execution command is on. OFF: The execution command is off.
(8)	o_bOK	Normal completion	Bit	OFF	When this label is on, it indicates that the exciting ON/OFF has been completed.
(9)	o_bErr	Error completion	Bit	OFF	When this label is on, it indicates that an error has occurred in the FB.
(10)	o_uErrId	Error code	Word [Unsigned]/Bit string [16-bit]	0	The error code that has occurred in the FB is stored.
(11)	o_bUnitErr	Module error completion	Bit	OFF	When this label is on, it indicates that an error has occurred in the module.
(12)	o_uUnitErrId	Module error code	Word [Unsigned]/Bit string [16-bit]	0	The error code that has occurred in the module is stored.

Applicable hardware and software

■ Predefined Protocol Support FB For Positioning

Applicable module	Firmware version	Engineering tool
FX5U CPU	1.200 or later	GX Works3 Version 1.065T or later
FX5UC CPU	1.200 or later	GX Works3 Version 1.065T or later

Sequence diagram



Basic specifications

Item	Description
Programming language	—(The program in this FB is not open to the public.)
Number of steps	1196 steps The number of steps of the FB in a program depends on the CPU module used, input and output definition, and option settings of GX Works3. For the option settings of GX Works3, refer to 📖GX Works3 Operating Manual (2.9 Option Setting for Each Function).
Label amount used	• Label: 0.04K points (Word) • Latch label: 0K points (Word) The label amount used in a program depends on the CPU module used, device specified in the argument, and option settings of GX Works3. For the option settings of GX Works3, refer to 📖GX Works3 Operating Manual (2.9 Option Setting for Each Function).
Number of index register points used	• Index register: 2 points • Long index register: 0 points
File register amount used	File register: 1904 points (Word)
FB dependence	No dependence
FB compiling method	Subroutine type
FB operation type	Pulsed execution (multiple scan execution type)

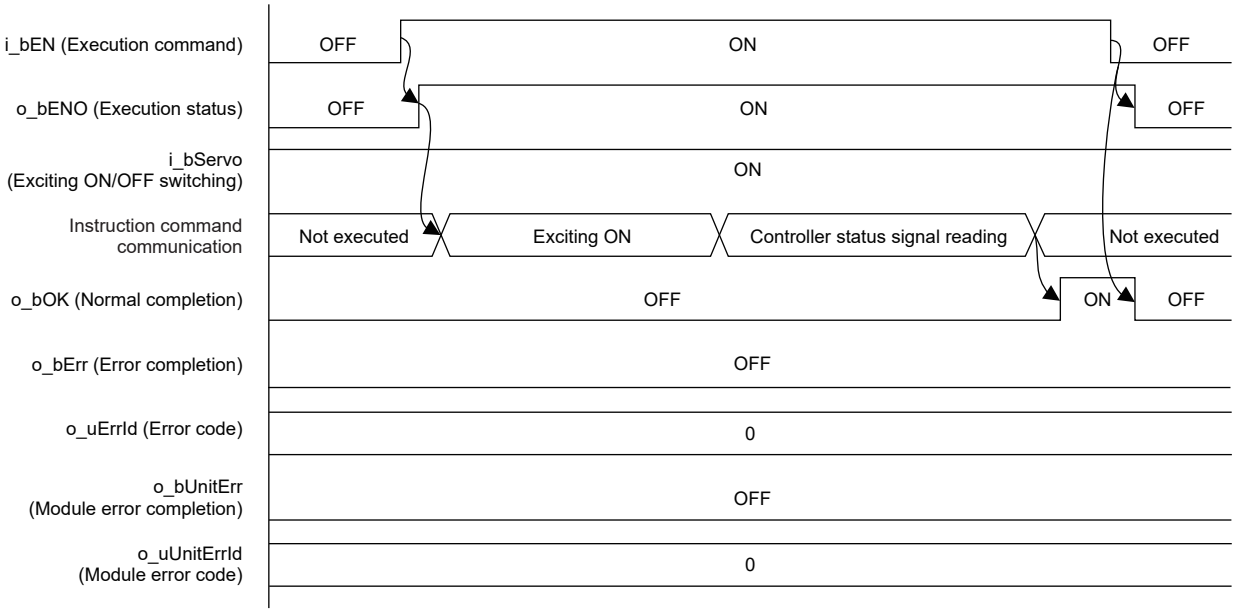
Function description

- Specify the axis number of the operation target in i_uAxis (Target axis).
- At rising edge of i_bEN (Execution command), this FB issues an exciting ON request when i_bServo (Exciting ON/OFF) is on or an exciting OFF request when the label is off.
- In this FB, o_bOK (Normal completion) turns on by checking the ON state of READY of the motor driver after the exciting ON request is issued when exciting is ON. o_bOK (Normal completion) turns on by checking the OFF state of READY of the motor driver after the exciting OFF request is issued when exciting is OFF.
- If an error occurs while sending/receiving a predefined protocol, o_bErr (Error completion) turns on and the processing of the FB is interrupted. The error code is stored in o_uErrId (Error code). For details of the error code, refer to 📖MELSEC iQ-F FX5 User's Manual (Serial Communication/7.9 Troubleshooting/Checking absence/presence of errors).
- If an error occurs in the motor driver and this FB receives the error code, o_bUnitErr (Module error completion) turns on and the processing of the FB is interrupted. The received error code is stored in o_uUnitErrId (Module error code). For details of the error code, refer to the manuals described in "RELEVANT MANUALS".
- If any other error occurs, o_bErr (Error completion) turns on and the processing of the FB is interrupted. For details of the error code, refer to ☞ Page 66 Error code.

Timing chart of I/O signals

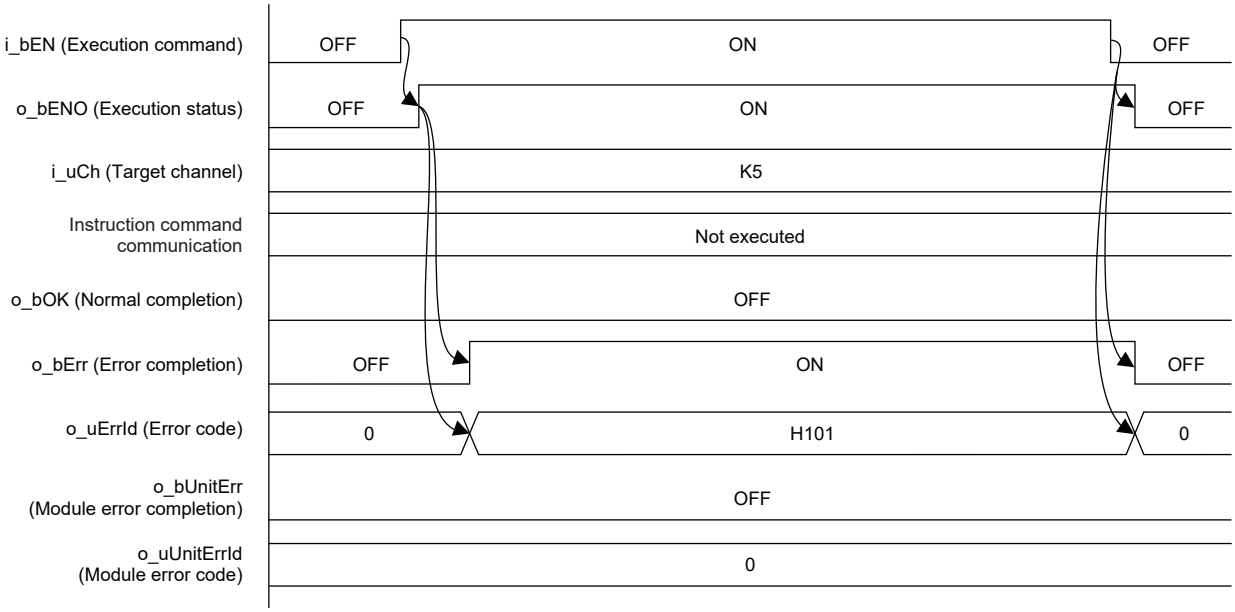
■ Normal completion

• Exciting ON



■ Error completion

• The target channel is out of range.



Restrictions and precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB uses the index registers Z0 and Z1. When using an interrupt program, do not use these index registers.
- 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.
- This FB requires the ladder to be configured for every input label.
- This FB uses the CPRTCL instruction. For details, refer to 📖MELSEC iQ-F FX5 User's Manual (Serial Communication/ 7.8 Programming/Predefined protocol support instruction).
- To operate the motor driver, set the protocol type to the predefined protocol support type with the module parameter of GX Works3. For details of the parameter setting procedures, refer to ☞ Page 20 Parameter setting.
- Change the number of timeouts or retries of the communication in Predefined Protocol Support Tool For Positioning. For details of the setting procedures, refer to 📖Predefined Protocol Support Tool For Positioning Operating Manual (6.2 Setting a Connected Model). If the communication interval for the same channel is short, the command may not be received depending on the connected controller, and a serial communication timeout (CPU error) may occur. In this case, the situation can be avoided by increasing the "transmission standby time" in the protocol transmission/reception settings of the connected device setting.

Parameter setting

For details of the parameter setting procedures, refer to ☞ Page 20 Parameter setting.

Performance value

CPU	Measurement condition		Processing time	Maximum scan time	Number of scans
FX5U, FX5UC*1*2	Axis 1, channel 1, writing destination controller 0	Switching the exciting ON state to the exciting OFF state	46.800 ms	0.927 ms	176
		Switching the exciting OFF state to the exciting ON state	171 ms	0.857 ms	651

*1 When the program capacity is set to 128K steps, the processing speed may be decreased.
*2 The standard area is used for the labels.

Error code

Error code (hexadecimal)	Description	Action
101H	The setting value of i_uCh (Target channel) is out of range. The target channel is not within the range of 1 to 4.	Review and correct the setting and then execute the FB again.
102H	The setting value of i_uAxis (Target axis) is out of range. The target axis is not within the range of 1 to 31.	Review and correct the setting and then execute the FB again.
106H	The setting value of i_uWriteTo (Writing destination controller) is out of range. The writing destination controller is not within the range of 0 to 2.	Review and correct the setting and then execute the FB again.
201H	The execution command has turned off during the processing.	Keep the ON state of the execution command until the normal completion, error completion, or module error completion turns on.*1
203H	An alarm, warning, or information is occurring.	Check the motor driver status in M+OriMonitoring_F (Operation monitoring). After checking the status, eliminate the error cause and then execute the FB again.
Predefined protocol error code	This error code occurs during communication.	Refer to 📖MELSEC iQ-F FX5 User's Manual (Serial Communication/7.9 Troubleshooting/Checking absence/presence of errors).

*1 It is output only during one scan.

3 FB LIBRARY USE PROCEDURE

3.1 Operation Data Writing and Positioning Operation

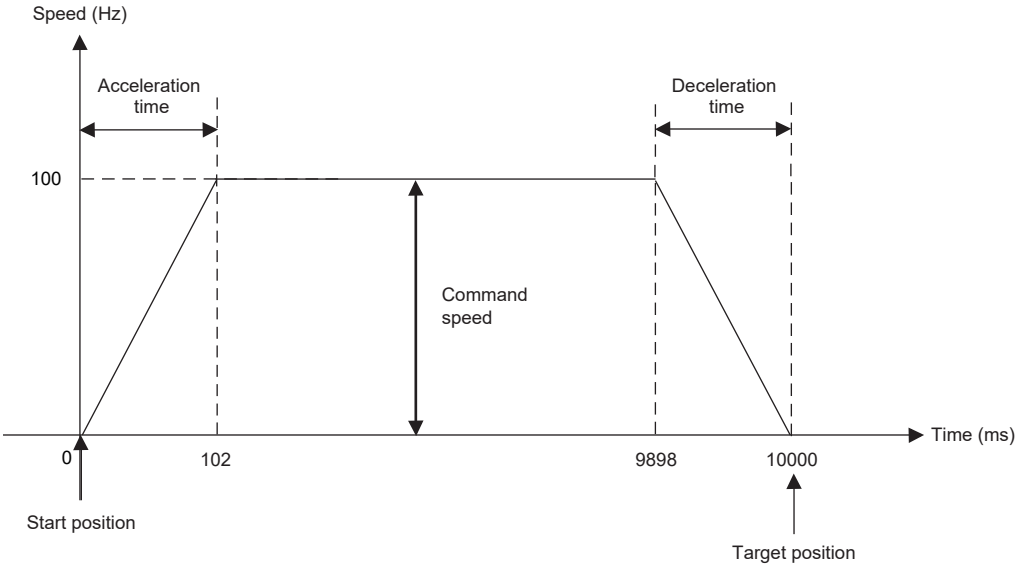
The following shows an example of using this FB library for writing the operation data to the motor driver, and performing the home position return and positioning operation after exciting turns on. The following FBs are used in this example.

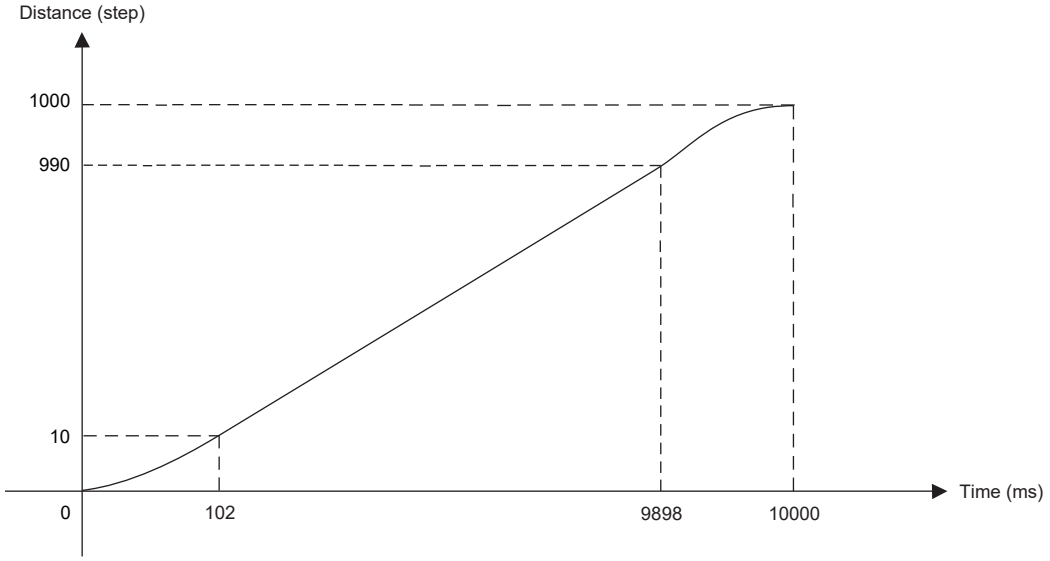
- M+OriMonitoring_F (Operation monitoring)
- M+OriWriteDriveData_F (Operation data writing)
- M+OriServoControl_F (Exciting ON/OFF)
- M+OriStartHomePositioning_F (Home position return)
- M+OriStartPositioning_F (Positioning operation)

Overview of program example

Perform monitoring to check the status of the AR series controller by Oriental Motor. Then, write the operation data to the axis 1, operation data No. 0 and the axis 2, operation data No. 0 of the motor driver with the following settings. After writing the data, turn on exciting and perform the home position return, then move the electric actuator to the position which is 1000 steps away from the home position. When the error code 203H occurs during the operation, clear the alarm occurred in the motor driver.

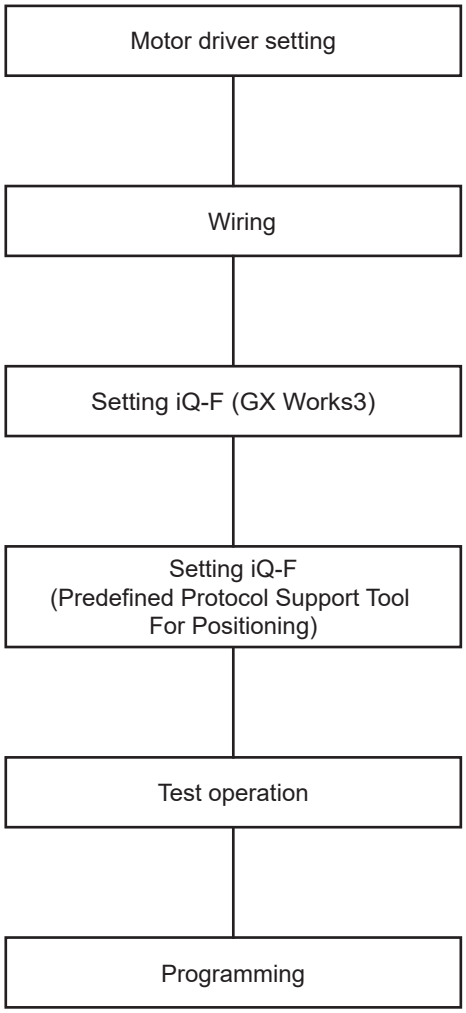
- Position: 1000 steps
- Operation speed: 100 Hz
- Acceleration: 100 Hz (0.001k Hz × 100)
- Deceleration: 100 Hz (0.001k Hz × 100)
- Operation method: 1 (ABS)
- Operation function: 0 (Single-motion)
- Dwell time: 0 ms
- Writing destination controller: 0 (AR series)




Distance (step)
1000
990
10
0
102
9898
10000
Time (ms)

Operation flow

The following shows the operation flow from the parameter setting and wiring of the motor driver and programmable controller to using Predefined Protocol Support FB For Positioning.



1. Motor driver setting

- Axis No. setting
- Communication setting
- Remote I/O assignment

For the setting procedure, refer to the manual of the motor driver to be used.

2. Wiring

- Wiring setting

For the wiring procedure, refer to ☞ Page 70 Wiring.

3. Setting iQ-F (GX Works3)

- Protocol type setting
- Detail setting

For the setting procedure, refer to ☞ Page 20 Parameter setting.

4. Setting iQ-F (Predefined Protocol Support Tool For Positioning)

- Setting the channel to be used
- Motor driver operation (number of retries and time)

For the setting procedure, refer to 📖Predefined Protocol Support Tool For Positioning Operating Manual (6.2 Setting a Connected Model).

5. Test operation

- Setting the operation data No. to be executed

This setting is not necessary when the test operation is not performed.

For the setting procedure, refer to 📖Predefined Protocol Support Tool For Positioning Operating Manual (9 POSITIONING TEST).

6. Programming

For the programming procedure, refer to ☞ Page 74 Program contents.

System configuration

Refer to ☞ Page 9 System Configuration.

Wiring

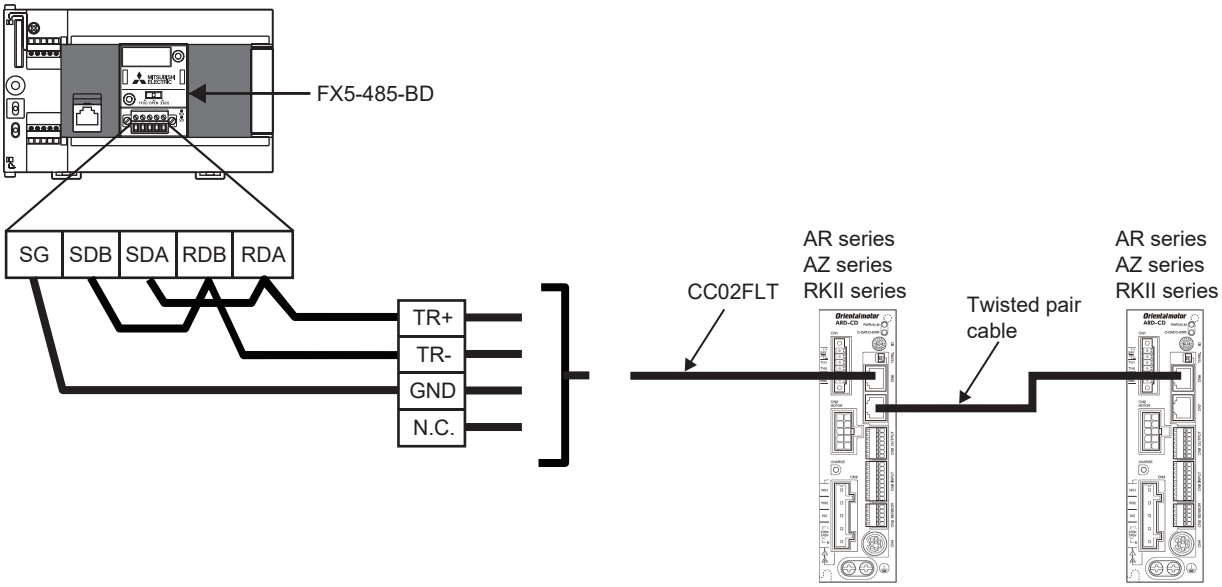
In this example, perform wiring as follows.

For details, refer to the following.

📖AR Series/Motorized actuator equipped with AR Series AC power input/DC power input FLEX Built-in controller type USER MANUAL

📖AZ Series/Motorized actuator equipped with AZ Series Function Edition

📖RKⅡ Series/Motorized actuator equipped with RKⅡ Series FLEX Built-in Controller Type USER MANUAL



Pre-setting

Set the termination resistor in the FX5U CPU module. Set the termination resistor to 110 Ω using the termination resistor selector switch.

Parameter setting

The following tables list the remote I/O assignment of the motor driver for using the FBs.
In this example, perform the remote I/O assignment following the contents in ☞ Page 71 Remote I/O assignment (ARD-AD/CD/KD) to use the AR series.
Use the configuration tool "MEXE02" manufactured by Oriental Motor to perform the remote I/O assignment.
For the remote I/O assignment procedure, refer to 🕮Support software MEXE02 Version 3 OPERATING MANUAL.

Remote I/O assignment (ARD-AD/CD/KD)

The following table lists the remote I/O assignment (ARD-AD/CD/KD).

■ Input signal

Setting item	Description
NET-IN0 input function selection	M0
NET-IN1 input function selection	M1
NET-IN2 input function selection	M2
NET-IN3 input function selection	M3
NET-IN4 input function selection	M4
NET-IN5 input function selection	M5
NET-IN6 input function selection	START
NET-IN7 input function selection	HOME
NET-IN8 input function selection	STOP
NET-IN9 input function selection	C-ON
NET-IN10 input function selection	FWD
NET-IN11 input function selection	RVS
NET-IN12 input function selection	+JOG
NET-IN13 input function selection	-JOG
NET-IN14 input function selection	Optional
NET-IN15 input function selection	Optional

■ Output signal

Setting item	Description
NET-OUT0 output function selection	HOME-P
NET-OUT1 output function selection	READY
NET-OUT2 output function selection	C-ON_R
NET-OUT3 output function selection	WNG
NET-OUT4 output function selection	ALM
NET-OUT5 output function selection	MOVE
NET-OUT6 output function selection	S-BSY
NET-OUT7 output function selection	Optional
NET-OUT8 output function selection	Optional
NET-OUT9 output function selection	Optional
NET-OUT10 output function selection	Optional
NET-OUT11 output function selection	Optional
NET-OUT12 output function selection	Optional
NET-OUT13 output function selection	Optional
NET-OUT14 output function selection	Optional
NET-OUT15 output function selection	Optional

Remote I/O assignment (RKSD503-AD/CD, RKSD507-AD/CD)

The following table lists the remote I/O assignment (RKSD503-AD/CD, RKSD507-AD/CD).

■ Input signal

Setting item	Description
NET-IN0 input function selection	M0
NET-IN1 input function selection	M1
NET-IN2 input function selection	M2
NET-IN3 input function selection	M3
NET-IN4 input function selection	M4
NET-IN5 input function selection	M5
NET-IN6 input function selection	START
NET-IN7 input function selection	HOME
NET-IN8 input function selection	STOP
NET-IN9 input function selection	AWO
NET-IN10 input function selection	FWD
NET-IN11 input function selection	RVS
NET-IN12 input function selection	+JOG
NET-IN13 input function selection	-JOG
NET-IN14 input function selection	Optional
NET-IN15 input function selection	Optional

■ Output signal

Setting item	Description
NET-OUT0 output function selection	HOME-P
NET-OUT1 output function selection	READY
NET-OUT2 output function selection	AWO_R
NET-OUT3 output function selection	WNG
NET-OUT4 output function selection	ALM
NET-OUT5 output function selection	MOVE
NET-OUT6 output function selection	S-BSY
NET-OUT7 output function selection	Optional
NET-OUT8 output function selection	Optional
NET-OUT9 output function selection	Optional
NET-OUT10 output function selection	Optional
NET-OUT11 output function selection	Optional
NET-OUT12 output function selection	Optional
NET-OUT13 output function selection	Optional
NET-OUT14 output function selection	Optional
NET-OUT15 output function selection	Optional

Remote I/O assignment (AZD-AD/CD/KD)

The following table lists the remote I/O assignment (AZD-AD/CD/KD).

■ Input signal

Setting item	Description
R-IN0 input function selection	START
R-IN1 input function selection	HOME*1
R-IN2 input function selection	STOP
R-IN3 input function selection	C-ON
R-IN4 input function selection	FW-JOG
R-IN5 input function selection	RV-JOG
R-IN6 input function selection	FW-JOG-P
R-IN7 input function selection	RV-JOG-P
R-IN8 input function selection	FW-POS
R-IN9 input function selection	RV-POS
R-IN10 input function selection	Optional
R-IN11 input function selection	Optional
R-IN12 input function selection	Optional
R-IN13 input function selection	Optional
R-IN14 input function selection	Optional
R-IN15 input function selection	Optional

*1 To use the high-speed home position return, assign ZHOME.

■ Output signal

Setting item	Description
R-OUT0 output function selection	HOME-END
R-OUT1 output function selection	READY
R-OUT2 output function selection	C-ON_R
R-OUT3 output function selection	INFO
R-OUT4 output function selection	ALM-A
R-OUT5 output function selection	MOVE
R-OUT6 output function selection	SYS-BSY
R-OUT7 output function selection	Optional
R-OUT8 output function selection	Optional
R-OUT9 output function selection	Optional
R-OUT10 output function selection	Optional
R-OUT11 output function selection	Optional
R-OUT12 output function selection	Optional
R-OUT13 output function selection	Optional
R-OUT14 output function selection	Optional
R-OUT15 output function selection	Optional

For the parameter setting procedure of the FX5 CPU module, refer to ☞ Page 20 Parameter setting.

FB library registration

For the operating procedure to register the FB library to GX Works3, refer to 📖GX Works3 Operating Manual (10.4 Enhanced Use of Application Library/MELSOFT Library).

Enhanced use of FB library

For the operating procedure to use FBs and structures included in the registered FB library in the program, refer to 📖GX Works3 Operating Manual (10.3 Enhancing Use of User Library/Enhanced use of libraries/Utilizing an element).

Program contents

Target channel setting



Sets the target channel to 2

Target axis setting



Sets the axis Nos. to 1 and 2

Operation data No. setting



Sets the operation data Nos. to 0 (axis 1) and 0 (axis 2)

Writing destination/reading source controller setting



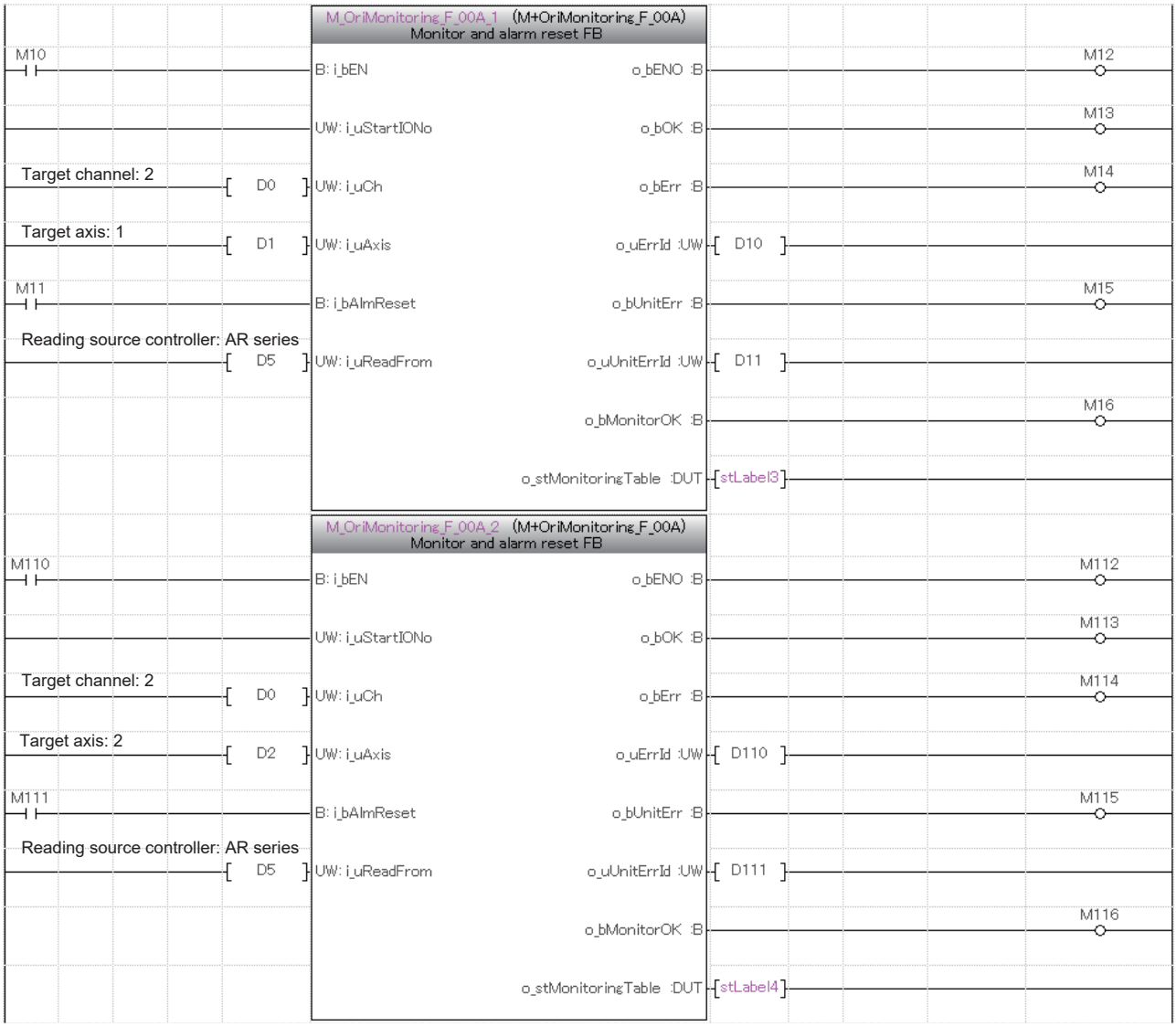
Sets the writing destination/reading source controller to the AR series

Motor driver monitoring

By turning on i_bEN (Execution command), the status of the motor driver is monitored in M+OriMonitoring_F (Operation monitoring).

When o_bMonitorOK (Monitoring status) is ON, the monitoring table information of the motor driver is stored in o_stMonitoringTable (Monitoring table).

For procedures to access the local labels stLabel3 and stLabel4, of the structure type (stMonitoringTable), refer to ☞ Page 81 Acquiring the alarm that has occurred in the motor driver.



For o_stMonitoringTable (Monitoring table), refer to ☞ Page 10 Structure list.

Operation data (external public label) setting

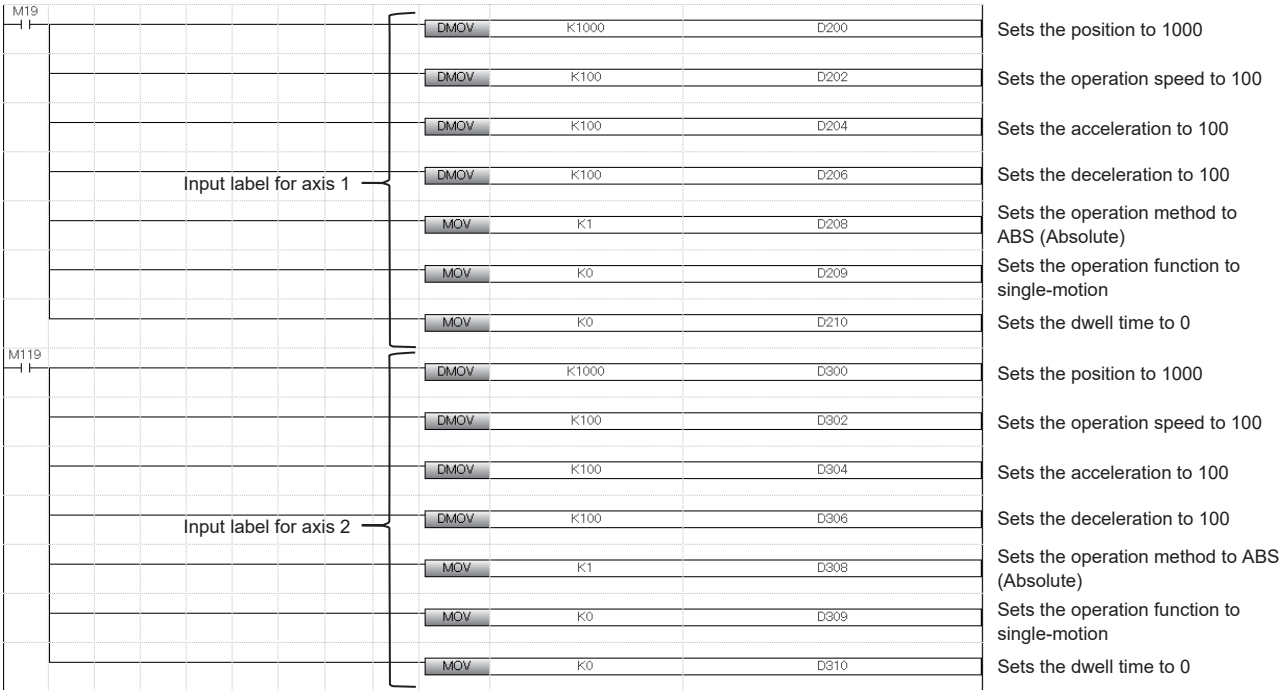
The following shows an example of setting the external public label of M+OriWriteDriveData_F (Operation data writing) by turning on M18 and M118.

In this example, only the setting values of the operating current and sequential positioning are applied since i_uWriteTo (Writing destination controller) is the AR series.



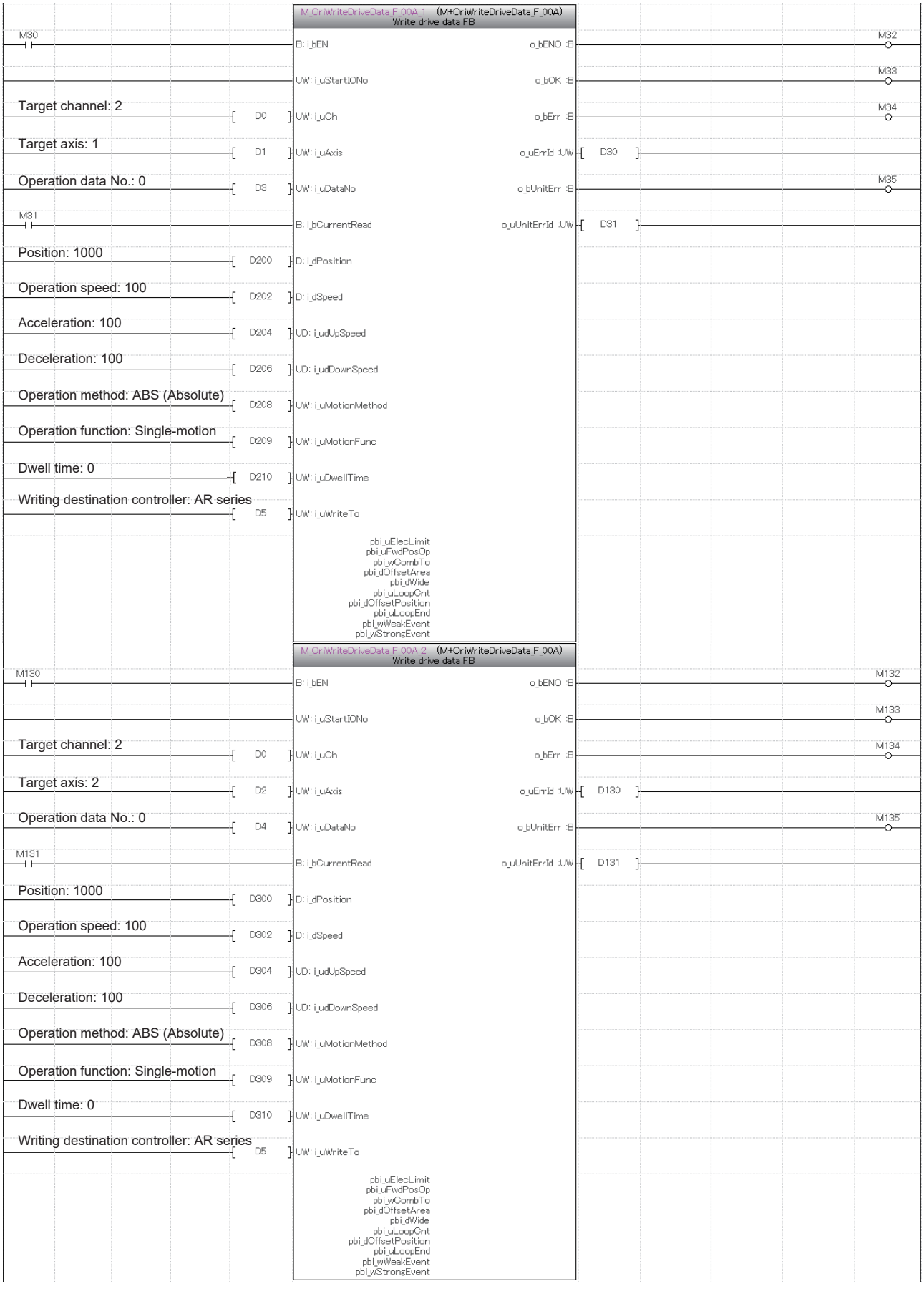
Operation data (input label) setting

The following shows an example of setting the input label of M+OriWriteDriveData_F (Operation data writing) by turning on M19 and M119.



Operation data writing

By turning on i_bEN (Execution command), the positioning operation information is written to the operation data of the target axis in M+OriWriteDriveData_F (Operation data writing).

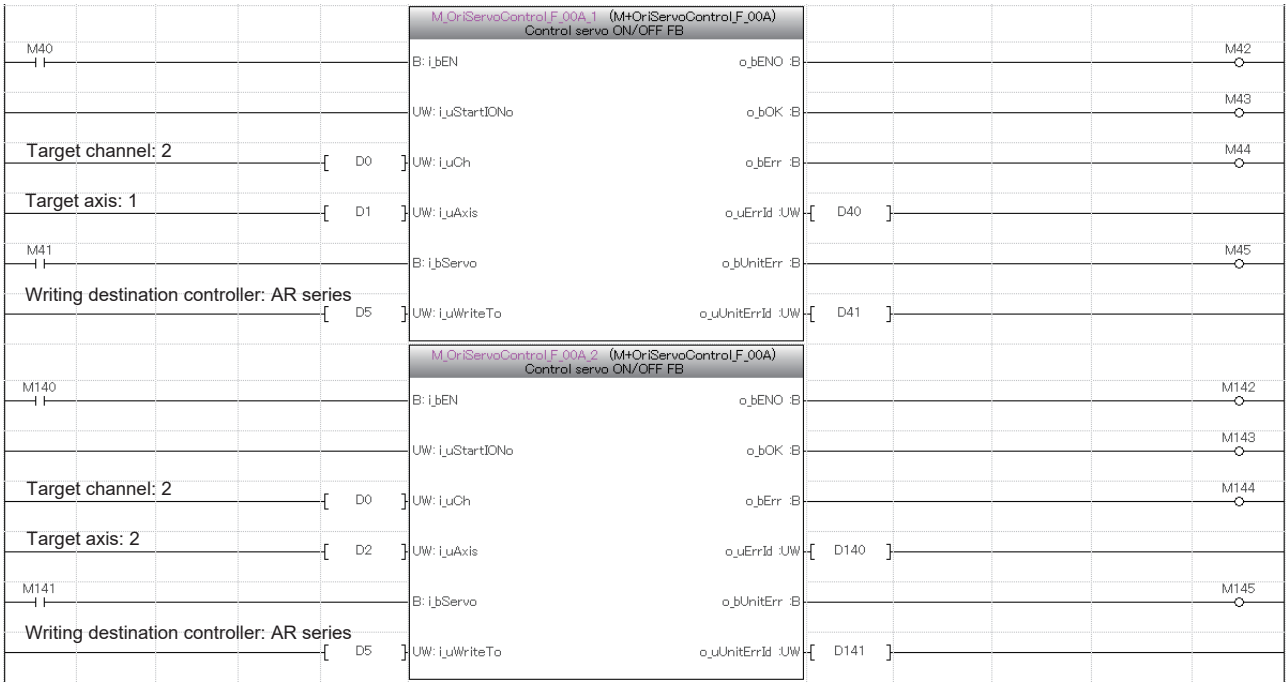


Point

The operation data can be set by using Predefined Protocol Support Tool For Positioning as well. In that case, setting by M+OriIWriteDriveData_F (Operation data writing) is not necessary. For the setting procedure using the tool, refer to Predefined Protocol Support Tool For Positioning Operating Manual (7.2 Setting and Editing Positioning Data).

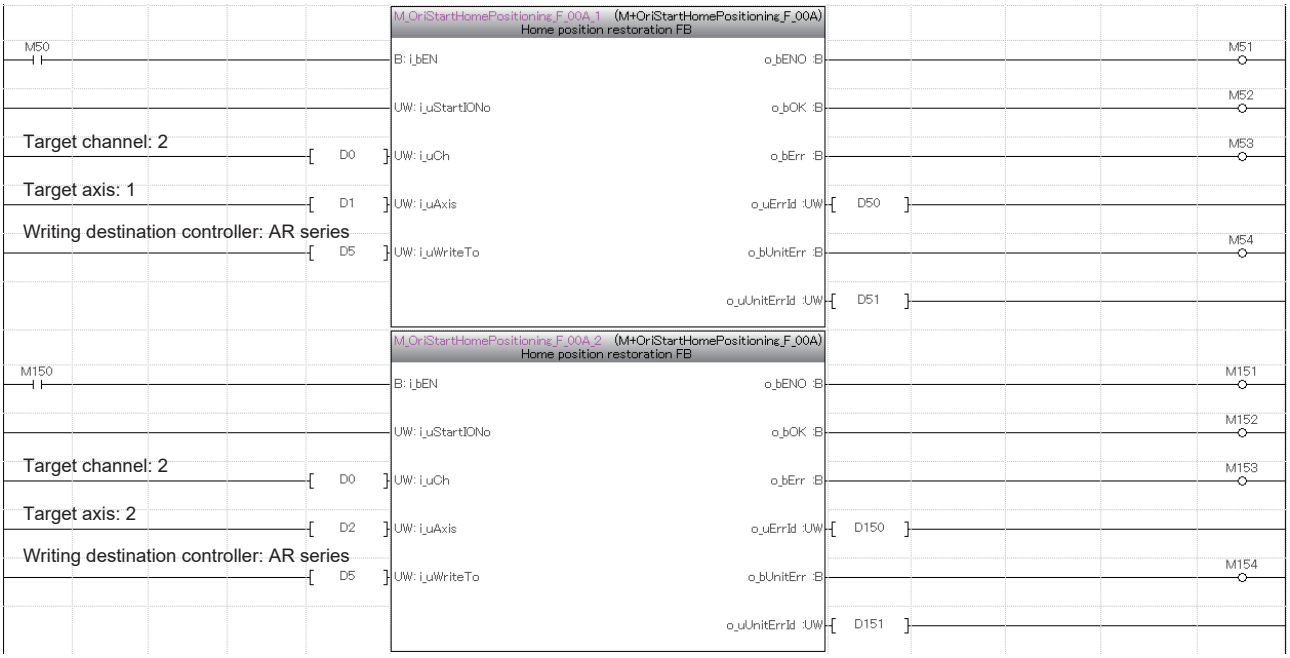
Exciting ON

By turning on i_bEN (Execution command) after turning on i_bServo (Exciting ON/OFF), exciting is turned on by M+OriServoControl_F (Exciting ON/OFF). When performing maintenance of the target axis, turn off exciting.



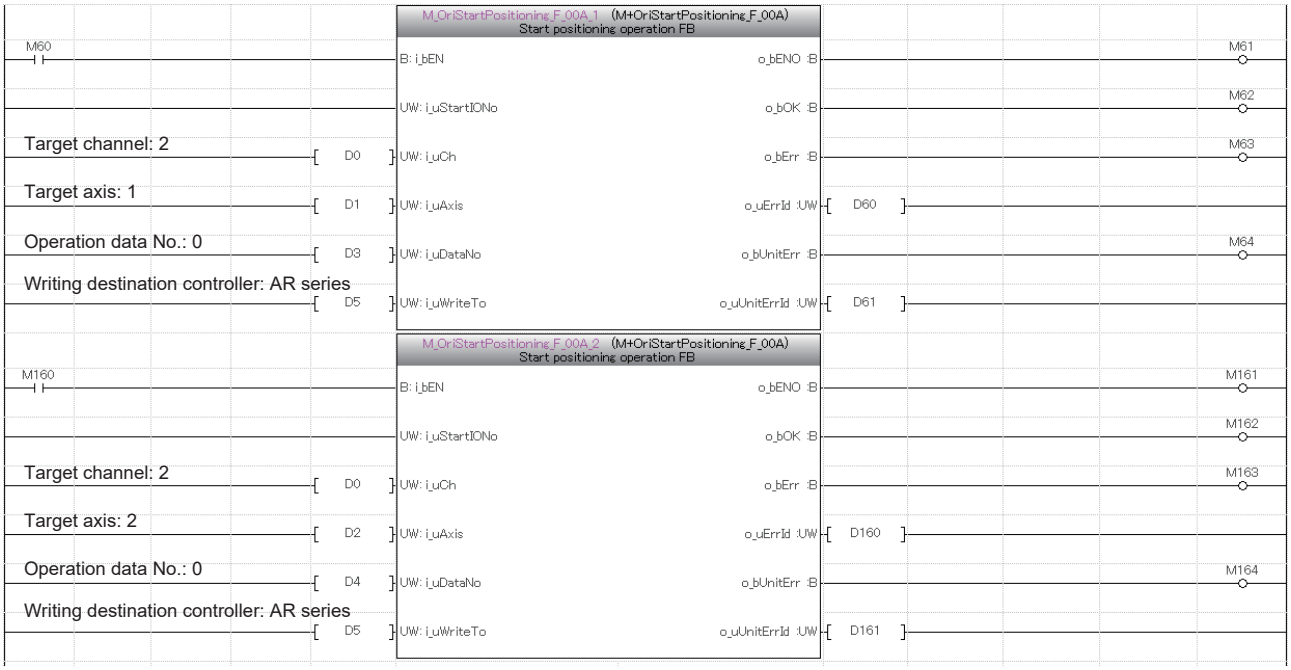
Performing the home position return

By turning on i_bEN (Execution command), the home position return is performed by M+OriStartHomePositioning_F (Home position return).



Performing the positioning operation

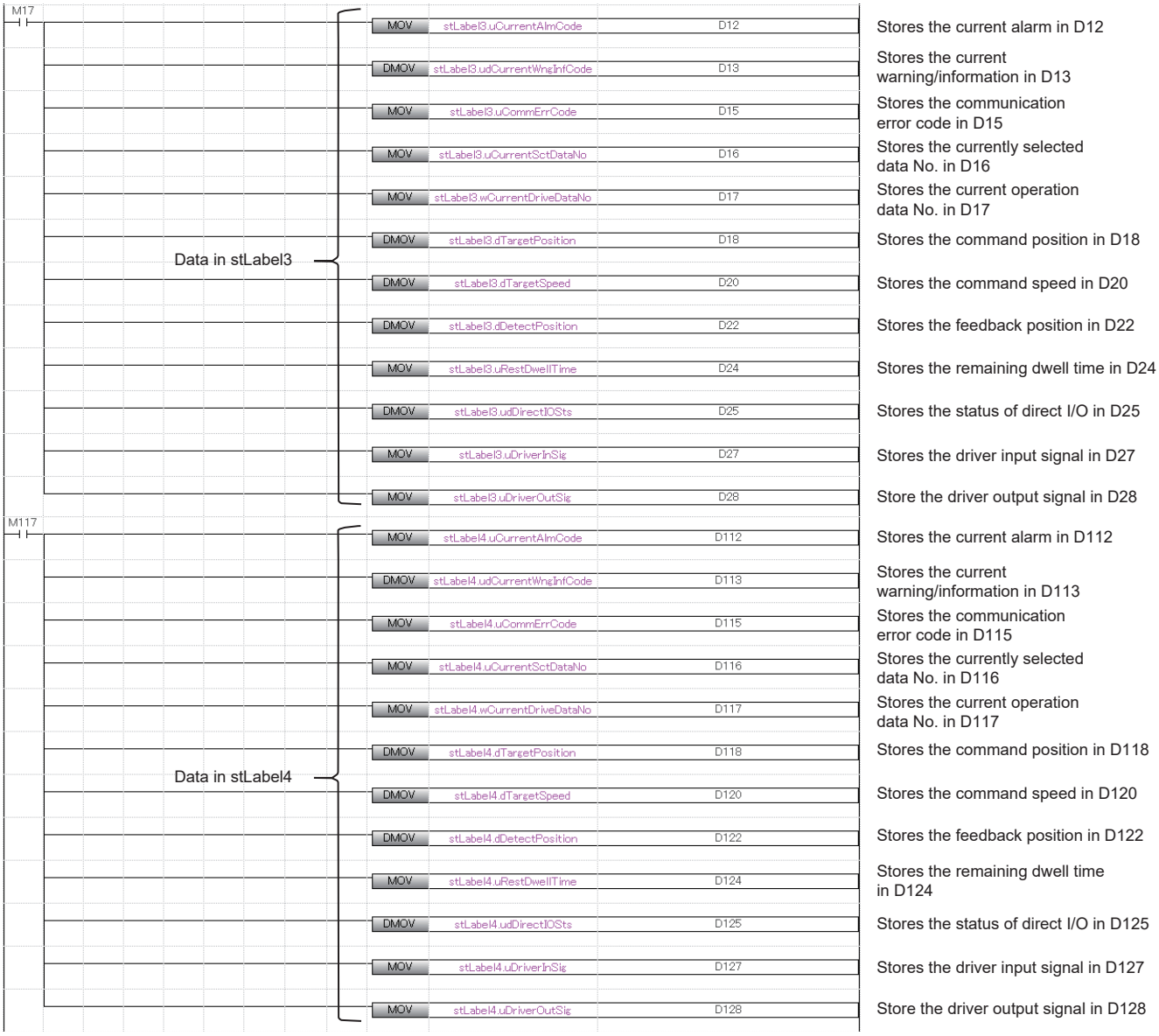
By turning on i_bEN (Execution command), the positioning operation of the set operation data No. is performed by M+OriStartPositioning_F (Positioning operation).



Acquiring the alarm that has occurred in the motor driver

If the 203H error occurs in the home position return or positioning operation, an alarm, warning, or information has occurred in the motor driver.

The following shows an example of storing the data in the local labels stLabel3 and stLabel4 of the structure type (stMonitoringTable) to the data register (D) by turning on M17 and M117.



Stores the current alarm in D12

Stores the current warning/information in D13

Stores the communication error code in D15

Stores the currently selected data No. in D16

Stores the current operation data No. in D17

Stores the command position in D18

Stores the command speed in D20

Stores the feedback position in D22

Stores the remaining dwell time in D24

Stores the status of direct I/O in D25

Stores the driver input signal in D27

Store the driver output signal in D28

Stores the current alarm in D112

Stores the current warning/information in D113

Stores the communication error code in D115

Stores the currently selected data No. in D116

Stores the current operation data No. in D117

Stores the command position in D118

Stores the command speed in D120

Stores the feedback position in D122

Stores the remaining dwell time in D124

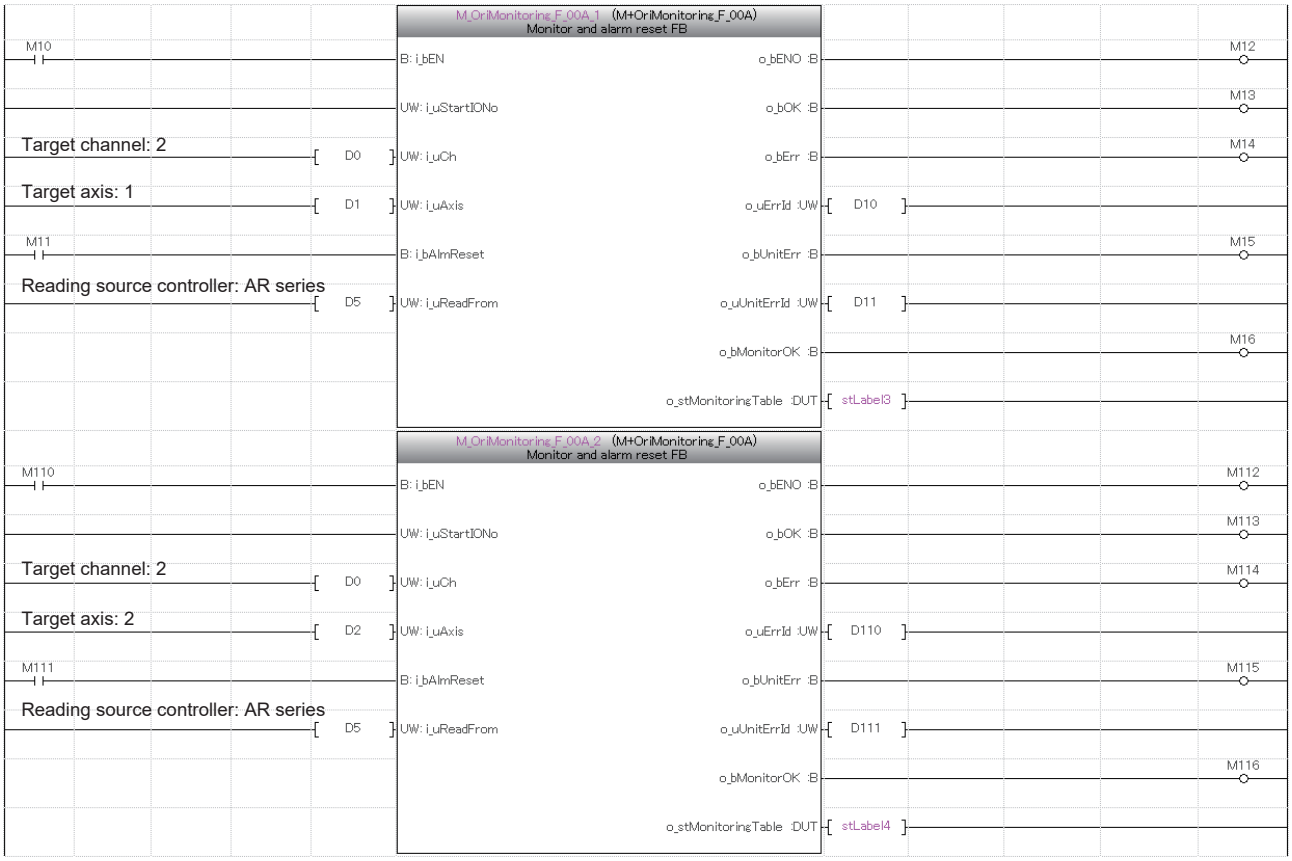
Stores the status of direct I/O in D125

Stores the driver input signal in D127

Store the driver output signal in D128

Resetting the alarm that has occurred in the motor driver

When an error code is stored in D12 or D112, the alarm that has occurred in the motor driver is reset with M+OriMonitoring_F (Operation monitoring) by turning on i_bAlmReset (Alarm reset).



3.2 JOG Operation and Current Position Reading

The following shows an example of using this FB library for performing the JOG/inching operation. The following FBs are used in this example.

- M+OriMonitoring_F (Operation monitoring)
- M+OriServoControl_F (Exciting ON/OFF)
- M+OriJogInchContOp_F (JOG/inching/continuous operation)
- M+OriWriteDriveData_F (Operation data writing)
- M+OriReadDriveData_F (Operation data reading)

Overview of program example

Perform monitoring to check the status of the AZ series controller by Oriental Motor. Then, turn on exciting, and perform the JOG operation on the axis 1 of the motor driver by the parameter set to the motor driver. The current position after the movement by JOG operation is read and set to the target position of the operation data No. 0.
The position of the set operation data is read.

Operation flow

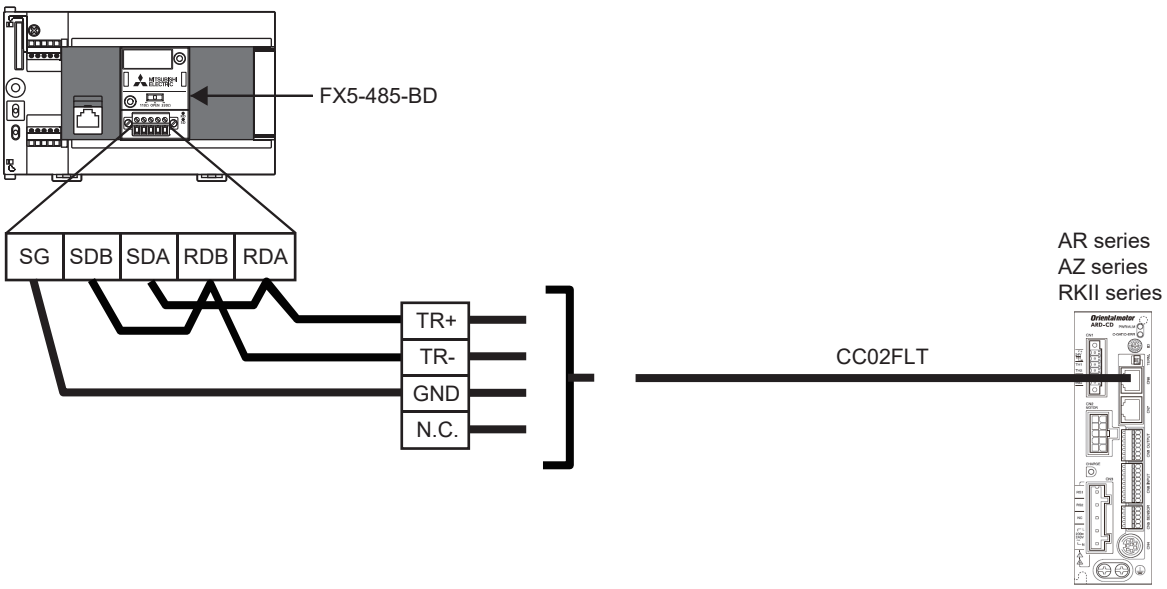
Refer to ☞ Page 69 Operation flow.

System configuration

Refer to ☞ Page 9 System Configuration.

Wiring

In this example, perform wiring as follows.
For details, refer to the following.
📖AR Series/Motorized actuator equipped with AR Series AC power input/DC power input FLEX Built-in controller type USER MANUAL
📖AZ Series/Motorized actuator equipped with AZ Series Function Edition
📖RKⅡ Series/Motorized actuator equipped with RKⅡ Series FLEX Built-in Controller Type USER MANUAL



Parameter setting

Refer to ☞ Page 71 Parameter setting.

FB library registration

For the operating procedure to register the FB library to GX Works3, refer to 🕮GX Works3 Operating Manual (10.4 Enhanced Use of Application Library/MELSOFT Library).

Enhanced use of FB library

For the operating procedure to use FBs and structures included in the registered FB library in the program, refer to 🕮GX Works3 Operating Manual (10.3 Enhancing Use of User Library/Enhanced use of libraries/Utilizing an element).

Program contents

Target channel setting



Sets the target channel to 2

Target axis setting



Sets the target axis to 1

Operation data No. setting



Sets the operation data No. to 0

Writing destination controller (reading source controller) setting

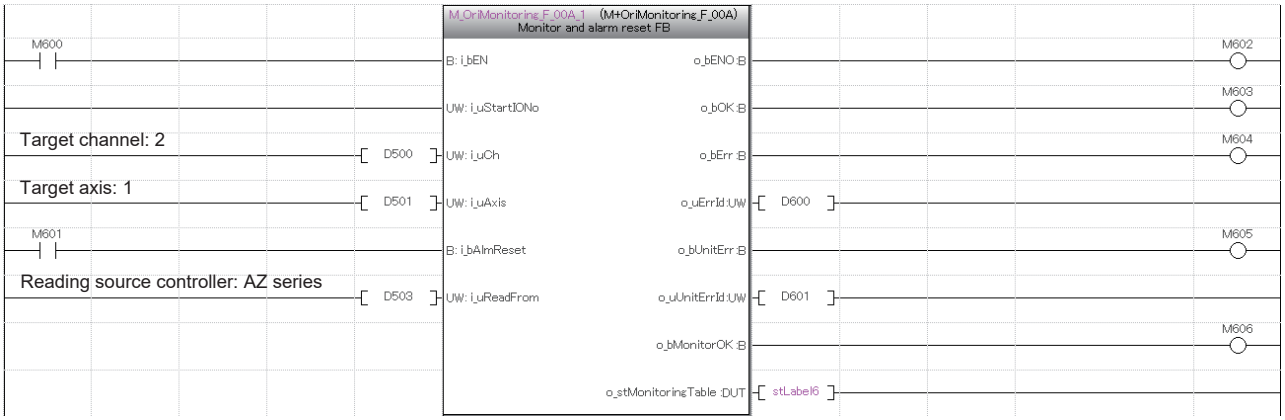


Sets the writing destination controller (reading source controller) to the AZ series

Motor driver monitoring

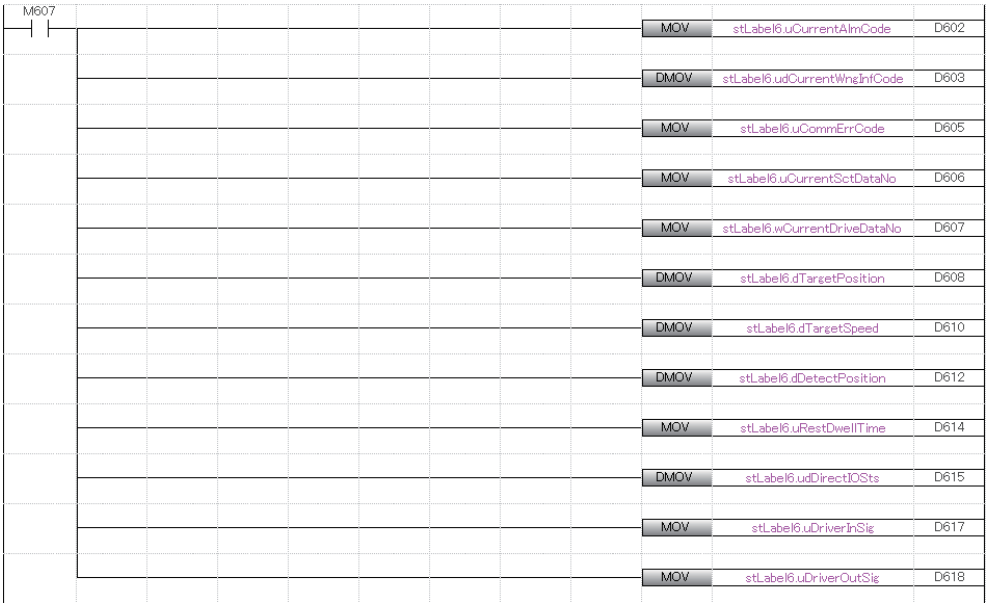
By turning on i_bEN (Execution command), the status of the motor driver is monitored in M+OriMonitoring_F (Operation monitoring).

When o_bMonitorOK (Monitoring status) is ON, the monitoring table information of the motor driver is stored in o_stMonitoringTable (Monitoring table).



For o_stMonitoringTable (Monitoring table), refer to ☞ Page 10 Structure list.

The following shows an example of storing the data in the local label stLabel6 of the structure type (stMonitoringTable) to the data register (D) by turning on M607.



Stores the current alarm in D602

Stores the current warning/information in D603

Stores the communication error code in D605

Stores the currently selected data No. in D606

Stores the current operation data No. in D607

Stores the command position in D608

Stores the command speed in D610

Stores the feedback position in D612

Stores the remaining dwell time in D614

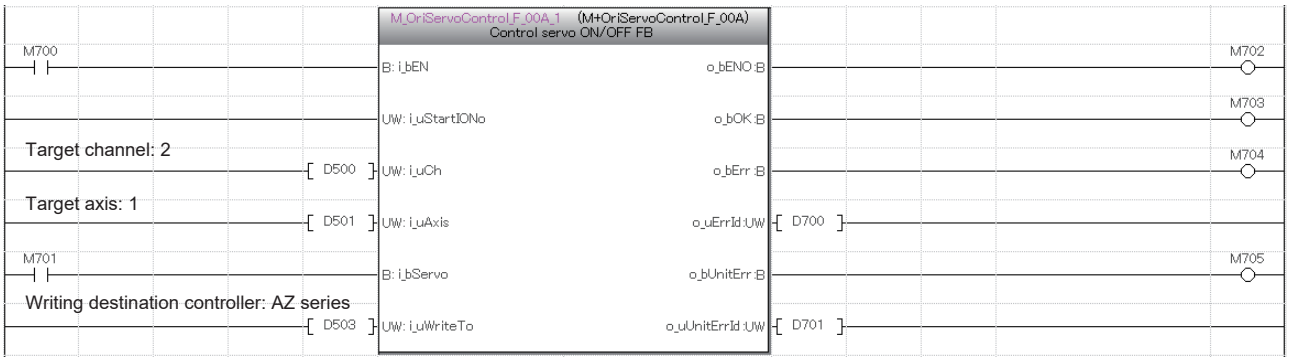
Stores the status of direct I/O in D615

Stores the driver input signal in D617

Store the driver output signal in D618

Exciting ON

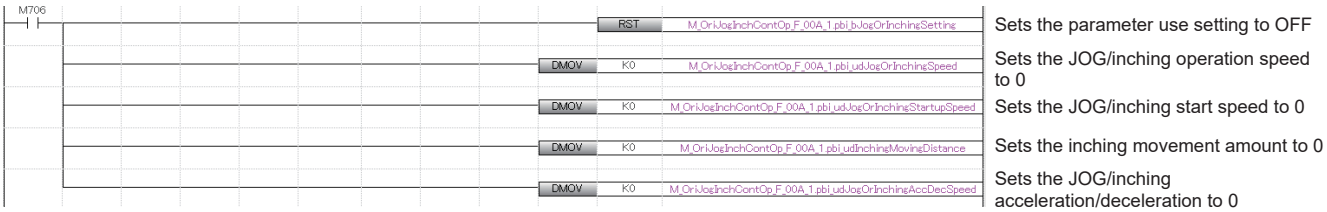
By turning on i_bEN (Execution command) after turning on i_bServo (Exciting ON/OFF), exciting is turned on by M+OriServoControl_F (Exciting ON/OFF). When performing maintenance of the target axis, turn off exciting.



JOG operation (external public label) setting

The following shows an example of setting the external public label of M+OriJogInchContOp_F (JOG/inching/continuous operation) by turning on M706.

In this example, the setting values are ignored.



Operation switching setting

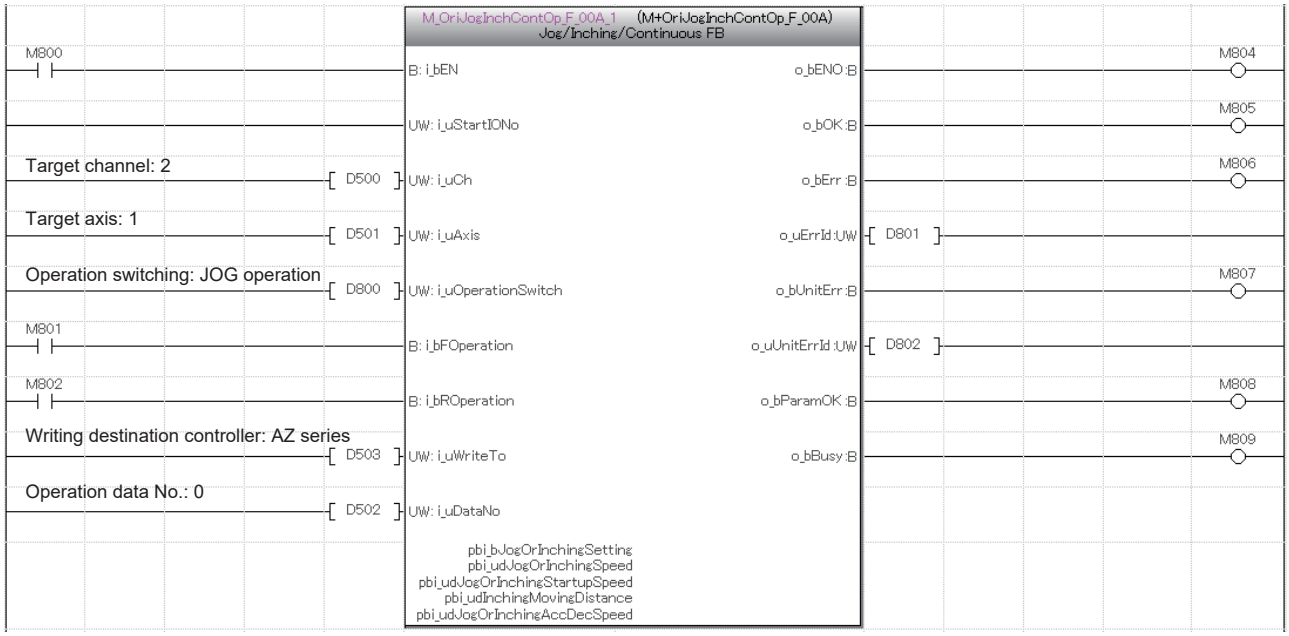
The following shows an example of setting the input label of M+OriJogInchContOp_F (JOG/inching/continuous operation) by turning on M707.



Performing the JOG operation

Turn on i_bEN (Execution command) and execute M+OriJogInchContOp_F (JOG/inching/continuous operation).

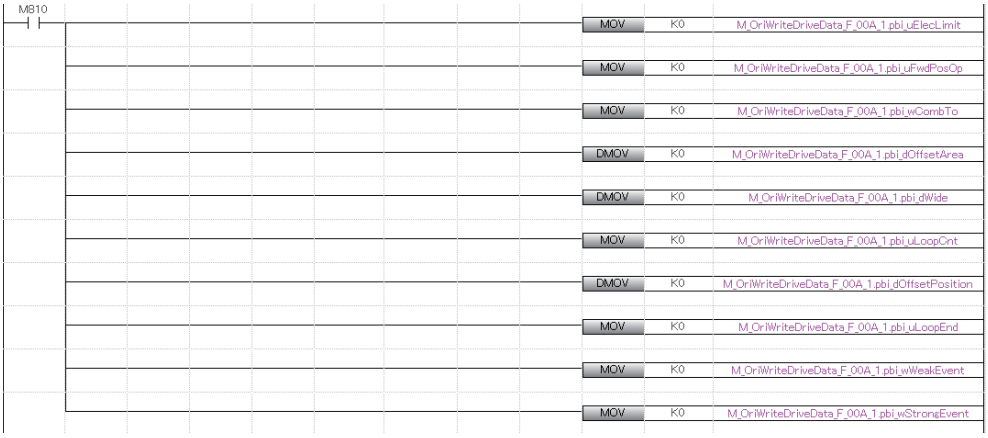
After o_bParamOK (Setting completion flag) is turned on, turn on i_bFOperation (Forward operation command) or i_bROperation (Reverse operation command) to perform JOG operation.



Operation data (external public label) setting

The following shows an example of setting the external public label of M+OriWriteDriveData_F (Operation data writing) by turning on M810.

In this example, the setting value of the sequential positioning is ignored since i_uWriteTo (Writing destination controller) is the AZ series.



Sets the operating current to 1000

Sets the sequential positioning to 0

Sets the next data number to 256

Sets the offset (area) to 0

Sets the width (area) to 1

Sets the count (Loop) to 0

Sets the position offset (Loop) to 0

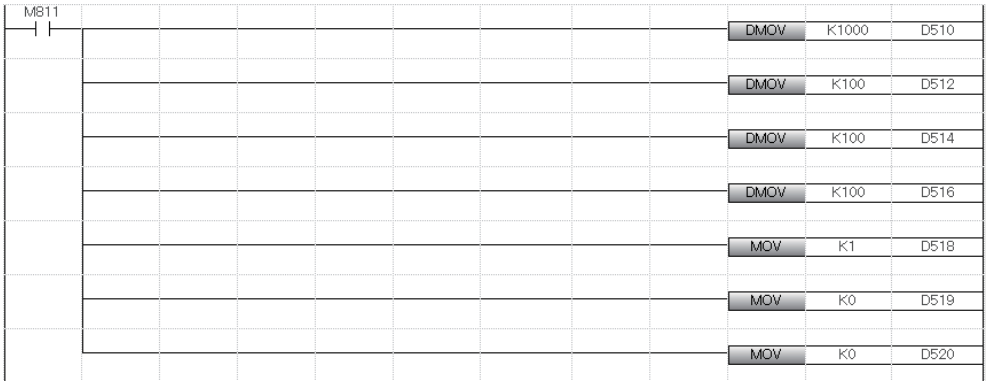
Sets the end (Loop) to 0

Sets the low event to 1

Sets the high event to 1

Operation data (input label) setting

The following shows an example of setting the input label of M+OriWriteDriveData_F (Operation data writing) by turning on M811.



Sets the position to 1000

Sets the operation speed to 100

Sets the acceleration to 100

Sets the deceleration to 100

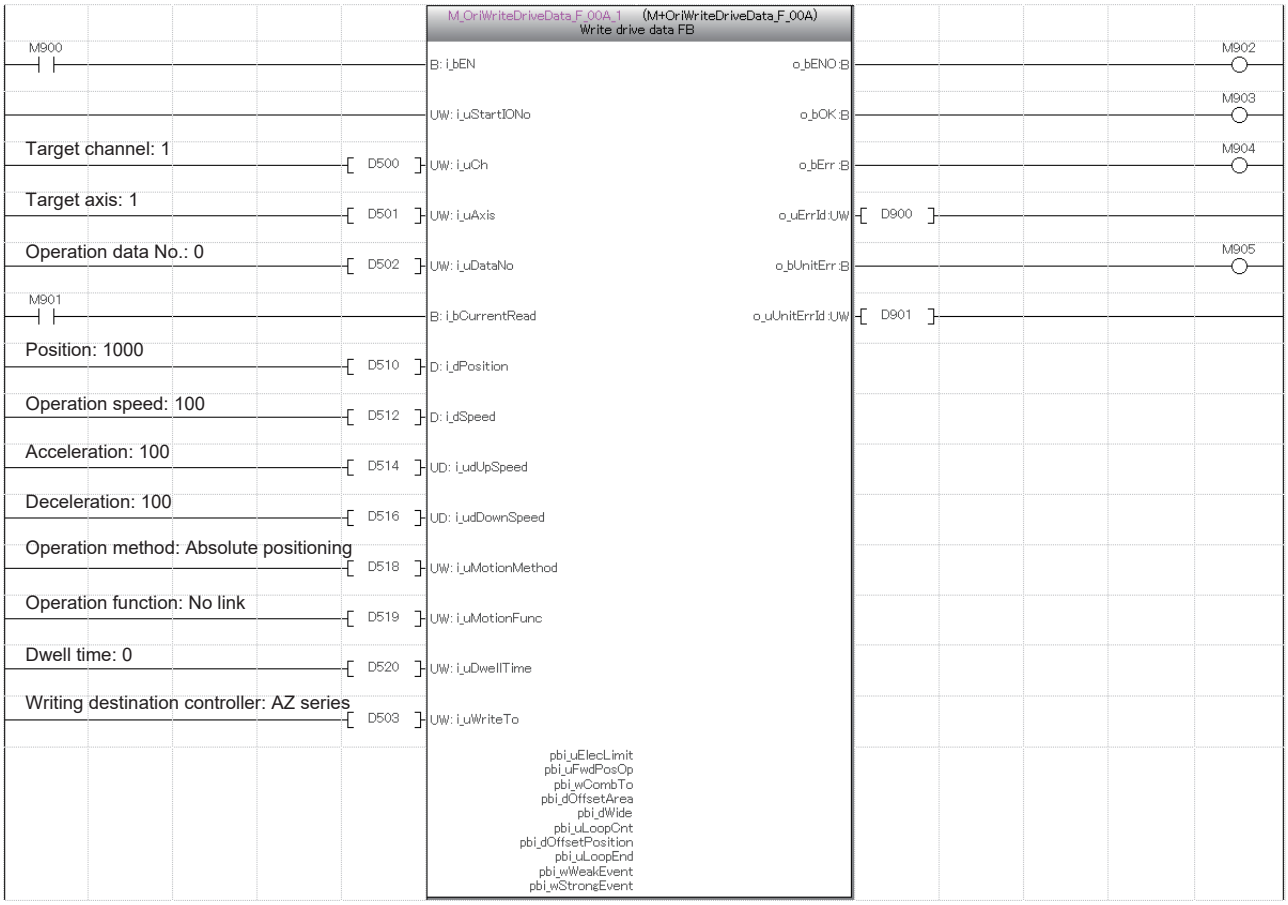
Sets the operation method to absolute positioning

Sets the operation function to no link

Sets the dwell time to 0

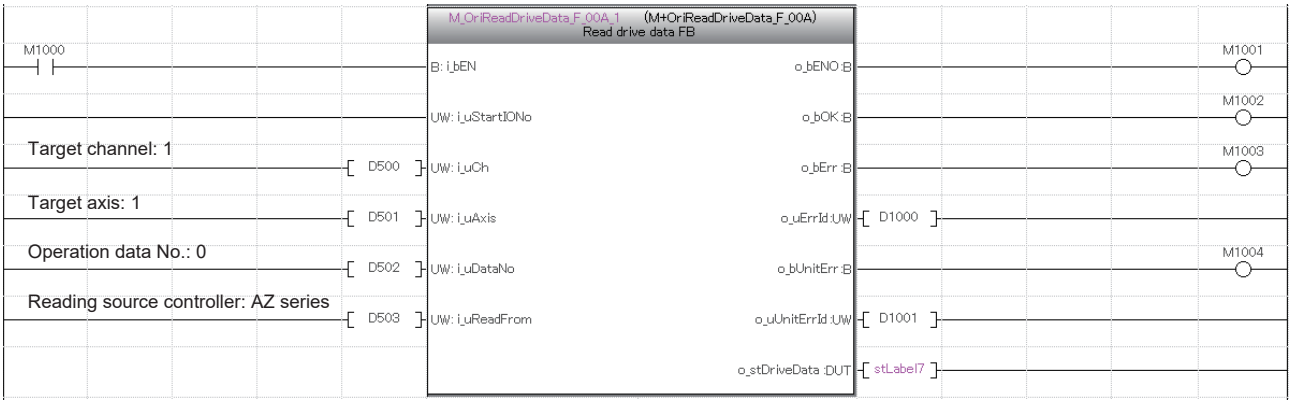
Current position reading

By turning on i_bEN (Execution command) after turning on i_bCurrentRead (Current position reading), the current position after the JOG operation is set to the position by M+OriIWriteDriveData_F (Operation data writing).
Because i_bCurrentRead (Current position reading) is turned on, the value of i_dPosition (Position) is ignored.



Operation data reading

By turning on i_bEN (Execution command), the set position is read by M+OriReadDriveData_F (Operation data reading).
The read operation data is stored in the local label stLabel7 of the structure type (stDriveData).



The following shows an example of storing the data in the local label stLabel7 of the structure type (stDriveData) to the data register (D) by turning on M1005.



Stores the position in D1002
Stores the operation speed in D1004
Stores the acceleration in D1006
Stores the deceleration in D1008
Stores the operation method in D1010
Stores the operation function in D1011
Stores the dwell time in D1012
Stores the operating current in D1013
Stores the sequential positioning in D1014
Stores the next data number in D1015
Stores the offset (area) in D1016
Stores the width (area) in D1018
Stores the count (Loop) in D1020
Stores the position offset (Loop) in D1021
Stores the end (Loop) in D1023
Stores the low event in D1024
Stores the high event in D1025

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REVISIONS

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

Revision date	*Manual number	Description
November 2020	SH(NA)-082357ENG-A	First edition
April 2022	SH(NA)-082357ENG-B	■Added or modified parts RELEVANT MANUALS, Section 2.2, Section 2.6, Section 2.8, Chapter 3 ■Deleted parts Appendix 1

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