MITSUBISHI ELECTRIC

Programmable Controller

MELSEC iQ-F series

MELSEC iQ-F
PLCopen Motion Control FB Reference

PLCopen® motion control

SAFETY PRECAUTIONS

(Read these precautions before use.)

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

This manual classifies the safety precautions into two categories: [⚠ WARNING] and [⚠ CAUTION].

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

Depending on the circumstances, procedures indicated by [⚠ CAUTION] may also cause severe injury.

It is important to follow all precautions for personal safety.

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

INTRODUCTION

Thank you for purchasing the Mitsubishi Electric MELSEC iQ-F series programmable controllers.
This manual describes the module function blocks for the relevant products listed below.
It should be read and understood before attempting to install or use the module.
Always forward it to the end user.

Target module

- FX5S CPU module
- FX5UJ CPU module
- FX5U CPU module
- FX5UC CPU modules
- FX5-ENET

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 manual, technical bulletin, catalog, etc. are used as a reference, please use it 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 manual content, specification etc. may be changed, without a notice, for improvement.
- The information in this manual has been carefully checked and is believed to be accurate; however, if you notice a doubtful point, an error, etc., please consult your local Mitsubishi Electric representative. When doing so, please provide the manual number given at the end of this manual.

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RELEVANT MANUALS

Manual name	Description
MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware) <SH-082452ENG>	Details of hardware of the CPU module, including I/O specifications, wiring, installation, and maintenance
MELSEC iQ-F FX5 User's Manual (Application) <JY997D55401>	Basic knowledge about programming, functions of the CPU module, devices/labels, and parameter settings
MELSEC iQ-F FX5 Programming Manual (Program Design) <JY997D55701>	Program specifications (ladder, ST, FBD/LD, and SFC programs) and labels
MELSEC iQ-F FX5 Programming Manual (Instructions, Standard Functions/Function Blocks) <JY997D55801>	Specifications of the instructions and functions that can be used in programs
MELSEC iQ-F FX5 User's Manual (Communication) <SH-082625ENG>	Descriptions of the communication function of the built-in CPU module and the Ethernet module
MELSEC iQ-F FX5-ENET User's Manual <SH-082026ENG>	Description of the Ethernet module
CC-Link IE Field Network Basic Reference Manual <SH-081684ENG>	Specifications, procedures before operation, system configuration, programming, functions, parameter settings, and troubleshooting of CC-Link IE Field Network Basic
GX Works3 Operating Manual <SH-081215ENG>	Explanation of system configuration, parameter settings, and online operations of GX Works3
MR-JET-G User's Manual (Introduction) <IB-0300448ENG>	Explanation of specifications, function list, and maintenance and inspection of the servo amplifiers
MR-JET User's Manual (Hardware) <IB-0300453ENG>	Details of hardware of the servo amplifiers, including wiring, installation, and maintenance
MR-JET User's Manual (Function) <IB-0300458ENG>	Explanation of control mode, monitoring function, network function, and positioning mode of the servo amplifiers
MR-JET-G User's Manual (Communication Function) <IB-0300463ENG>	Description of communications with the servo amplifiers using CC-Link IE TSN/CC-Link IE Field Network Basic
MR-JET-G User's Manual (Parameters) <IB-0300478ENG>	Explanation of servo parameters for the servo amplifiers
MR-JET-G User's Manual (Object Dictionary) <IB-0300468ENG>	Descriptions of object dictionary necessary for using the servo amplifiers for CC-Link IE TSN/CC-Link IE Field Network Basic communications
MR-JET User's Manual (Troubleshooting) <IB-0300483ENG>	Explanation of troubleshooting of the servo amplifiers
MR-J5-G/MR-J5W-G User's Manual (Introduction) <SH-030294ENG>	Explanation of specifications, function list, and maintenance and inspection of the servo amplifiers
MR-J5D-G User's Manual (Introduction) <IB-0300538ENG>	Explanation of specifications, function list, and maintenance and inspection of the servo amplifiers
MR-J5 User's Manual (Hardware) <SH-030298ENG>	Details of wiring, installation and maintenance, and hardware of the servo amplifiers
MR-J5 User's Manual (Function) <SH-030300ENG>	Explanation of control mode, monitoring function, positioning mode of the servo amplifiers
MR-J5-G/MR-J5W-G User's Manual (Communication Function) <SH-030302ENG>	Description of communications with the servo amplifiers using CC-Link IE TSN/CC-Link IE Field Network Basic
MR-J5-G/MR-J5W-G User's Manual (Parameters) <SH-030308ENG>	Explanation of servo parameters for the servo amplifiers
MR-J5-G/MR-J5W-G User's Manual (Object Dictionary) <SH-030304ENG>	Description of object dictionary necessary for the servo amplifiers to be used for CC-Link IE TSN/CC-Link IE Field Network Basic communications
MR-J5 User's Manual (Troubleshooting) <SH-030312ENG>	Explanation of troubleshooting of the servo amplifiers

TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
Absolute value positioning	This positioning method sets positioning data using an absolute value from the home position. (Absolute system)
GAP	Free area for adjusting the mapping position of an object
Homing	A type of control that establishes the starting position for positioning control (home position) and performs positioning in relation to that point. This function is used when returning a machine system not in the home position to the home position, such as when the system is powered on and after positioning operation stops.
Link device	A device in a CPU module to communicate with remote stations (RX, RY, RWr, or RWw)
Master station	A station that controls the entire CC-Link IE Field Network Basic. Only one master station can be used in a network.
Relative value positioning	This positioning method sets positioning data using a relative value from the current command position. (Incremental system)
Remote station	A station that performs cyclic transmission with the master station on CC-Link IE Field Network Basic. This station exchanges I/O signals in units of bits and I/O data in units of words.
Servo amplifier	A device responsible for servo motor control
Target position change	This function changes, in any timing, the target position during positioning to the newly specified target position.
Torque control	This function increases the torque up to the command torque, and continues operation with the command torque until a stop instruction is executed.
Velocity control	This function accelerates the speed up to the command speed, and continues operation at the command speed until a stop instruction is executed.

GENERIC TERMS AND ABBREVIATIONS

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

Generic term/abbreviation	Description
Axis operation FB	A generic term for MCv_Home_CCLinkIEFBasic_F, MC_MoveAbsolute_CCLinkIEFBasic_F, MC_MoveRelative_CCLinkIEFBasic_F, MC_Additive_CCLinkIEFBasic_F, MC_Halt_CCLinkIEFBasic_F, MC_MoveVelocity_CCLinkIEFBasic_F, and MC_TorqueControl_CCLinkIEFBasic_F
Continuous control FB	A generic term for MC_MoveVelocity_CCLinkIEFBasic_F and MC_TorqueControl_CCLinkIEFBasic_F
Device	A generic term for devices (X, Y, M, D, or others) in a CPU module
Engineering tool	A generic term for GX Works3 and MR Configurator2
Ethernet module	An FX5-ENET Ethernet module (hereinafter referred to as FX5-ENET)
Ethernet-equipped module	A generic term for the following modules when the Ethernet communication function is used: FX5 CPU module, FX5-ENET
FB	An abbreviation for "Function Block". A function block is created from a ladder block repeatedly used in a sequence program so that it can be used as a component in a sequence program. Using FBs helps to develop programs more efficiently, reduce mistakes, and improve quality of programs.
FX5 CPU module	A generic term for the FX5S CPU module, FX5UJ CPU module, FX5U CPU module, and FX5UC CPU module
MR-J5	A generic term for the following servo amplifiers. □□ are numerical values indicating the capacity. MR-J5-□G_, MR-J5W□-□G_, MR-J5D□-□G_, MR-J5-□A_
MR-JET-G	A generic term for MR-JET-□□G servo amplifiers. □□ are numerical values indicating the capacity.
Object read/write FB	A generic term for MCv_ReadMultiObject_FX5CPUEN, MCv_WriteMultiObject_FX5CPUEN, MCv_ChangeMapping_FX5CPUEN, MCv_ReadMultiObject_FX5ENET, MCv_WriteMultiObject_FX5ENET, MCv_ChangeMapping_FX5ENET
Position control	A generic term for absolute positioning, relative positioning, and target position change
Positioning control FB	A generic term for MC_MoveAbsolute_CCLinkIEFBasic_F, MC_MoveRelative_CCLinkIEFBasic_F, MC_Additive_CCLinkIEFBasic_F, and MC_Halt_CCLinkIEFBasic_F
SLMP	An abbreviation for SeamLess Message Protocol. This protocol is used to access an SLMP-compatible device or a programmable controller connected to an SLMP-compatible device from an external device.

1 OVERVIEW

The function blocks in this reference manual mean the FB libraries for using the MELSEC iQ-F series FX5 CPU module and the MELSERVO MR-JET-G/MR-J5-G by connecting them via CC-Link IE Field Network Basic.

1.1 Features

This section describes the features of this function.

Controlling multiple axes through CC-Link IE Field Network Basic communications

Multiple axes can be controlled by communicating with servo amplifiers through CC-Link IE Field Network Basic communications.

Shortening programming time

The Motion Control FB specifications standardized by PLCopen are supported to help create programs without having to consider the communication interface with servo amplifiers.

1.2 List of FB Libraries

The following table lists the FB libraries in this reference manual.

Point

To use these FB libraries, set the parameters using the engineering tool. (☞ Page 19 Parameter Settings)

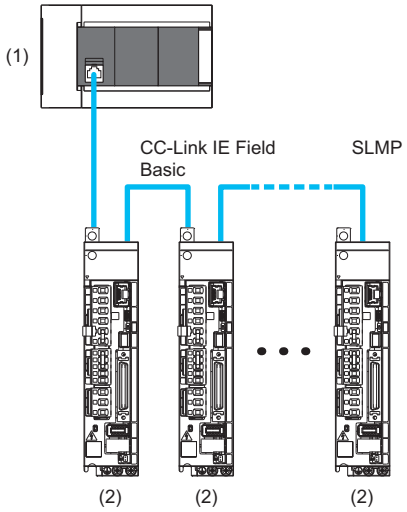
○: Required, —: Not required

Name	Description	Parameter setting
MC_Power_CCLinkIEFBasic_F (Operation possible)	Switches the status of the servo amplifier for the specified axis to the operable state.	○
MCv_Home_CCLinkIEFBasic_F (Homing)	Executes the homing of the specified axis.	○
MC_Stop_CCLinkIEFBasic_F (Forced stop)	Forcibly stops the specified axis.	○
MC_Halt_CCLinkIEFBasic_F (Stop)	Stops the specified axis.	○
MC_MoveAbsolute_CCLinkIEFBasic_F (Absolute positioning)	Specifies the target absolute position of the specified axis and executes positioning.	○
MC_MoveRelative_CCLinkIEFBasic_F (Relative positioning)	Moves the specified axis for the set distance from its current command position.	○
MC_MoveAdditive_CCLinkIEFBasic_F (Target position change)	Adds a specified relative position in the previous positioning command of the specified axis and executes positioning.	○
MC_MoveVelocity_CCLinkIEFBasic_F (Velocity control)	Controls the speed of the specified axis to the target speed.	○
MC_TorqueControl_CCLinkIEFBasic_F (Torque control)	Controls the specified axis with the specified torque.	○
MC_Reset_CCLinkIEFBasic_F (Axis error reset)	Clears the error of the specified axis.	○
MCv_ReadMultiObject_Model (Multiple Object Read)	Reads multiple objects from the servo amplifiers.	○
MCv_WriteMultiObject_Model (Multiple Object Write)	Writes multiple objects of the servo amplifiers.	○
MCv_ChangeMapping_Model (Mapping Change)	Changes the mapping of the servo amplifier that communicates via CC-Link IE Field Network Basic.	○

1.3 System Configuration

The following figure shows an example of system configuration for using the FB libraries in this reference manual.

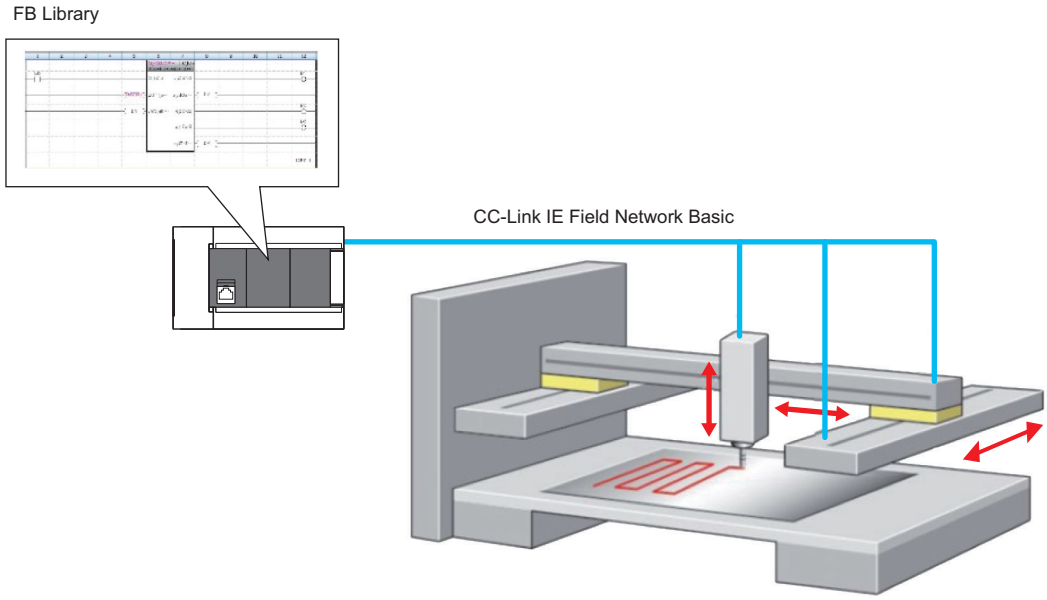
System configuration with the FX5 CPU module



(1) FX5 CPU module
(2) Servo amplifier

Application example

The following figure shows an application example in sealing equipment. Three servo amplifiers are used and positioning is controlled with FB.



2 SPECIFICATIONS

This chapter describes the common specifications of the FB libraries in this reference manual.

2.1 FB Library Specifications

The following table lists the FB libraries in this reference manual.

Item		Description
Ethernet-equipped module*2		FX5 CPU module, FX5-ENET
Servo amplifier*4		MR-JET-G, MR-J5-G
Communication type		CC-Link IE Field Network Basic, SLMP*1
Topology		Line topology, star topology
Maximum number of connectable servo amplifiers	FX5S CPU module FX5UJ CPU module*6	8
	FX5U CPU module*6 FX5UC CPU module*6	16
Unit*7	Control unit	Degree,*5 pulse
	Positioning range	-360000 to 360000 [× 10^{-3} degree]*3 -2147483648 to 2147483647 [pulse]
	Speed command	[Pr.PT01.1] = Encoder unit • Rotary servo motor: -2147483648 to 2147483647 [×10^{-2}r/min]*3 • Linear servo motor: -2147483648 to 2147483647 [×10^{-2}mm/s]*3 Set a value not greater than the maximum speed of the servo motor used.
	Acceleration/deceleration time	[Pr.PT01.1] = Encoder unit*8 Position control: 0 to 20000 [ms] Velocity control: 0 to 50000 [ms]
	Torque	-32768 to 32767 [× 10^{-1}%]*3 Set a value not greater than the maximum torque of the servo motor used.

*1 The FX5-ENET does not support SLMP clients, however, SLMP communications can be performed by socket communications in FBs.
*2 The FX5 CPU unit and FX5-ENET cannot be used together for the FBs in this reference manual.
*3 A value set in the servo amplifier is an exponentiation value of the value set in the FB. For example, when the speed command value [× 10^{-2}r/min] is input, the value will be as follows.
A value input to the FB = 100000, the speed command to the servo amplifier = 1000.00 [r/min]
*4 The multi-axis servo amplifiers are not supported.
*5 "degree" cannot be set in the linear servo motors. For restrictions on setting "degree", refer to the user's manual for the servo amplifier used.
*6 The maximum number of servo amplifiers that can be connected when the FX5-ENET is connected depends on the maximum number of CPU modules that have been connected.
*7 Set the units to be used in the servo parameters [Pr. PT01 Command mode selection] and [Pr. PA01 Operation mode].
*8 Acceleration time taken by a servo motor to reach the rated speed from. The rated speed can be checked with [Motor rated speed (Obj. 2D28H)].

Project performance values

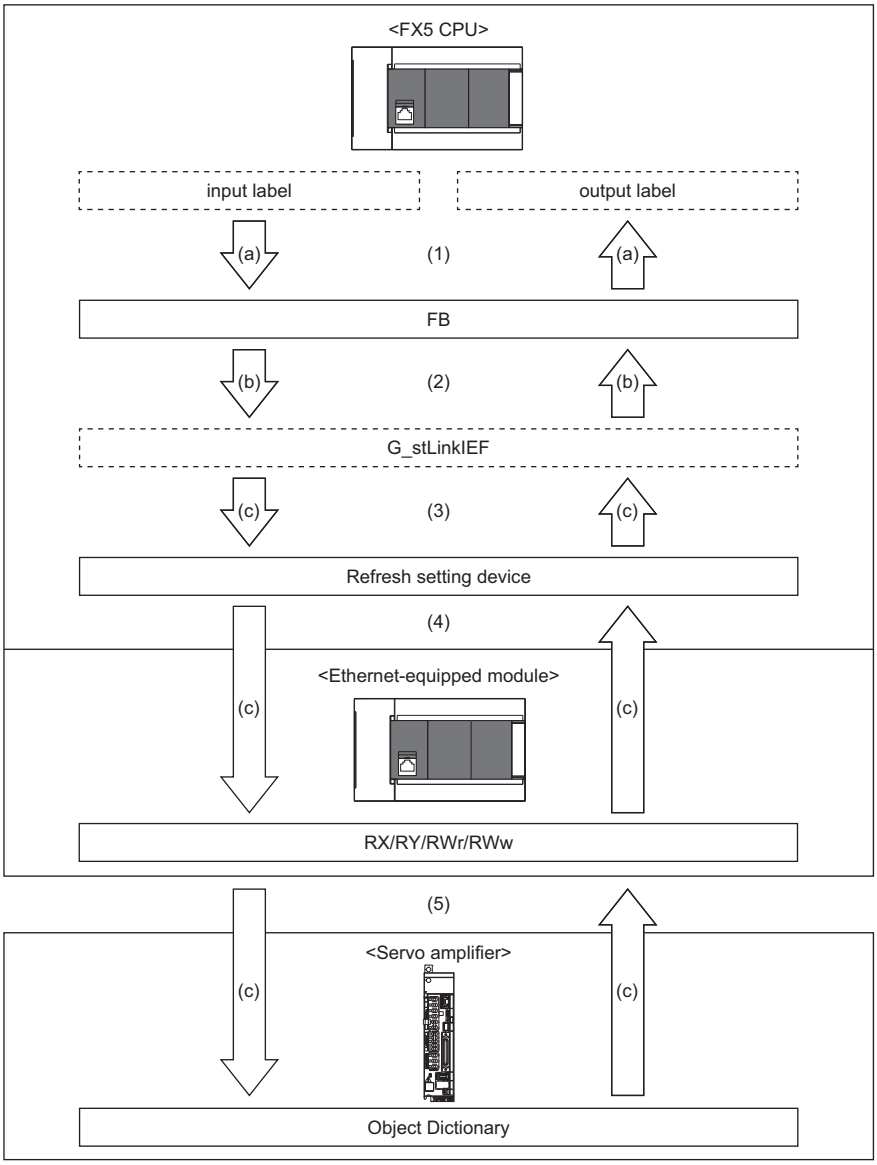
The following table lists the performance values in the project data of the FB libraries.

Project performance value*1*2*3	Minimum scan time (ms)	2.419
	Maximum scan time (ms)	4.303
	Number of steps in a project*1	13.86K steps
	Label capacity of a project*1	1.98K points [Word]
	Latch label capacity of a project*1	0K points [Word]

*1 Performance values for the program described below.
☞ Page 83 OPERATION EXAMPLES
*2 Measured with the program capacity set to 128K steps.
*3 The standard area is used for labels.

2.2 FB Library Correlations

The following figure shows the correlations of the FB libraries.



(1) User-created program processing
(2) FB processing
(3) Global label definition (device assignment)*1
(4) Link refresh*2
(5) CC-Link IE Field Network Basic

(a) Data processing by user
(b) Data processing by FB
(c) Data processing performed by other than users and FB

*1 For details on the setting method, refer to the following.
☞ Page 23 Global label settings

*2 For details on the setting method, refer to the following.
☞ Page 22 Refresh parameter settings

2.3 List of Global Labels

The following table lists the global labels used for the FB libraries.

Name	Description
MC_DIRECTION_CCLinkIEFBasic_F	Used to specify the travel direction in absolute positioning, velocity control, or torque control.
MASTER_MODULE_REF_CCLinkIEFBasic_F	Used to specify the master module to be controlled.
OBJECT_RW_FX5ENET	Used to shared information of the object read/write FBs. (For the FX5-ENET)
Global	Defined by the user according to their usage environment.

MC_DIRECTION_CCLinkIEFBasic_F

The data cannot be changed by the user.

Label name	Name	Data type	Class	Constant	Description
mcPositiveDirection	Address increase direction	Word [signed]	VAR_GLOBAL_CONSTANT	0080H	Travels by rotating in the address increase direction regardless of the sign of the position data.
mcNegativeDirection	Address decrease direction	Word [signed]	VAR_GLOBAL_CONSTANT	0040H	Travels by rotating in the address decrease direction regardless of the sign of the position data.
mcShortestWay	Shortcut	Word [signed]	VAR_GLOBAL_CONSTANT	00C0H	Travels by rotating and shortcutting in the direction of the shortest distance from the current position to the target position. In addition, travels by rotating in the CCW direction when the distance from the current position to the target position is the same both in the CCW direction and in the CW direction.
mcCurrentDirection	Position data sign direction	Word [signed]	VAR_GLOBAL_CONSTANT	0000H	Travels by rotating in the direction specified by the sign of the position data to the target position.

MASTER_MODULE_REF_CCLinkIEFBasic_F

The data cannot be changed by the user.

Label name	Name	Data type	Class	Constant	Description
MasterFX5CPUEN	FX5 CPU	Word [signed]	VAR_GLOBAL_CONSTANT	1	Specifies the FX5 CPU module for the master module.
MasterFX5ENET	FX5-ENET	Word [signed]	VAR_GLOBAL_CONSTANT	2	Specifies the FX5-ENET for the master module.

OBJECT_RW_FX5ENET

This global label is set only by the manufacturer. Do not allow access by any user program.

Label name	Name	Data type	Class	Description
ObjectRW	For manufacturer setting	Bit (0..31)	VAR_GLOBAL	—

Global

The global labels should be defined by the user according to their usage environment.

Label name	Name	Data type	Class	Description
Axis1	Axis 1 information	AXIS_REF_CCLinkIEFBasic_F*1	VAR_GLOBAL	Stores axis information of axis 1. To add an axis numbered 2 or greater, change the label name according to the axis number.
G_stLinkIEF	Link device	stRemoteReg*1	VAR_GLOBAL	Stores link device information exchanged in communications with servo amplifiers.

*1 For details on the structure, refer to the following.

☞ Page 13 Project performance values

2.4 List of Structures

The following table lists the structures used for the FB libraries.

Name	Description
AXIS_REF_CCLinkIEFBasic_F	Axis information
MC_Setting_CCLinkIEFBasic_F	Stores the member for servo amplifier setting.
MC_Monitor_CCLinkIEFBasic_F	Stores the member for servo amplifier monitoring.
MC_SystemArea_CCLinkIEFBasic_F	Stores the member for system area, "manufacturer setting".
stRemoteReg	Stores link device information exchanged in communications with servo amplifiers. Defined by the user according to their usage environment.

AXIS_REF_CCLinkIEFBasic_F

This structure is used for various settings and monitoring during FB control.

Label name	Name	Data type	Description
Setting	Setting information	MC_Setting_CCLinkIEFBasic_F	Stores the member for servo amplifier setting.
Monitor	Monitoring information	MC_Monitor_CCLinkIEFBasic_F	Stores the member for servo amplifier monitoring.
SystemArea	System area	MC_SystemArea_CCLinkIEFBasic_F	Stores the member for system area, "manufacturer setting".

MC_Setting_CCLinkIEFBasic_F

This structure used as a setting area for data used for FB control. Data can be written to and read from this area.

Label name	Name	Data type	Description
AxisNo	Axis number	Word [signed]	Specifies the axis number of the axis to be controlled. FX5U CPU module, FX5UC CPU module: 1 to 16 FX5S CPU module, FX5UJ CPU module: 1 to 8
MasterModule	Master module specification	Word [signed]	Specifies the master module to be controlled. The definition MASTER_MODULE_REF_CCLinkIEFBasic_F can be used. If a value out of the range is set, operation is performed with the value set as FX5 CPU module.
StartIO	Module number	Word [signed]	Specify the module number of the FX5-ENET when it is specified for the master module. This is ignored regardless of the setting value when the FX5 CPU module is used. FX5U CPU module, FX5UC CPU module: 01H to 10H FX5S CPU module, FX5UJ CPU module: 01H to 08H

MC_Monitor_CCLinkIEFBasic_F

This structure is used as a monitoring area for the axis to be controlled. This area is read-only.

Label name	Name	Data type	Description
AxisStatus	Axis status	Word [signed]	Outputs the status of the selected axis based on the PLCopen state transition.

MC_SystemArea_CCLinkIEFBasic_F

This structure is set only by the manufacturer. Do not allow access by any user program.

Label name	Name	Data type	Description
uFbExecCount	For manufacturer setting	Word [unsigned]	—
uWaitTime	For manufacturer setting	Word [unsigned]	—

stRemoteReg

This structure should be defined by the user according to their usage environment.

Label name	Name	Data type	Description
bnRX	RX information	Bit (0..n)*1	Stores information of RX.
bnRY	RY information	Bit (0..n)*1	Stores information of RY.
unRWr	RWr information	Word [unsigned] (0..n)*1	Stores information of RWr.
unRWw	RWw information	Word [unsigned] (0..n)*1	Stores information of RWw.

*1 Define a number of array elements equal to the number of points of link devices according to the usage environment. For details, refer to the following.
☞ Page 19 Parameter Settings

2.5 Link Devices

The following tables list the link devices accessed using the FB libraries.

○: Can be changed, ×: Cannot be changed

MR-JET-G

■RY/RX mapping

Master station → servo amplifier (RY)				Servo amplifier → master station (RX)			
Device No.	Name		Mapping	Device No.	Name		Mapping
RY0 to RY3E	Cannot be used.	—	×	RX0 to RX3D	Cannot be used.	—	×
				RX3E	For manufacturer setting	—	×
RY3F	Cyclic communication ready command	CSR	×	RX3F	Cyclic communication ready	SSR	×

■RWw/RWr mapping

Master station → servo amplifier (RWw)				Servo amplifier → master station (RWr)			
Device No.	Index	Name	Mapping	Device No.	Index	Name	Mapping
RWw0	6060H	Modes of operation	×	RWr0	6061H	Mode of operation on display	×
RWw1	6040H	Controlword	×	RWr1	6041H	Statusword	×
RWw2	2D01H	Control DI 1	○	RWr2	2D11H	Status DO 1	×
RWw3	2D02H	Control DI 2	×	RWr3	2D12H	Status DO 2	×
RWw4	2D03H	Control DI 3	○	RWr4	2D13H	Status DO 3	○
RWw5	2D05H	Control DI 5	○	RWr5	0000H	—	○
RWw6	607AH	Target position	×	RWr6	6064H	Position actual value	○
RWw7				RWr7			
RWw8	60FFH	Target velocity	×	RWr8	606CH	Velocity actual value	×
RWw9				RWr9			
RWwA	2D20H	Velocity limit value	×	RWrA	60F4H	Following error actual value	○
RWwB				RWrB			
RWwC	6071H	Target torque	×	RWrC	6077H	Torque actual value	×
RWwD	0000H	—	○	RWrD	0000H	—	○
RWwE	6081H	Profile Velocity	×	RWrE	2A41H	Current alarm	○
RWwF				RWrF			
RWw10	6083H	Profile acceleration	×	RWr10	0000H	—	○
RWw11				RWr11	0000H	—	○
RWw12	6084H	Profile deceleration	×	RWr12	0000H	—	○
RWw13				RWr13	0000H	—	○
RWw14	6087H	Torque slope	×	RWr14	0000H	—	○
RWw15				RWr15	0000H	—	○
RWw16	60F2H	Positioning option	×	RWr16	0000H	—	○
RWw17	0000H	—	○	RWr17	0000H	—	○
RWw18	0000H	—	○	RWr18	0000H	—	○
RWw19	0000H	—	○	RWr19	0000H	—	○
RWw1A	0000H	—	○	RWr1A	0000H	—	○
RWw1B	0000H	—	○	RWr1B	0000H	—	○
RWw1C	0000H	—	○	RWr1C	0000H	—	○
RWw1D	0000H	—	○	RWr1D	0000H	—	○
RWw1E	0000H	—	○	RWr1E	0000H	—	○
RWw1F	0000H	—	○	RWr1F	0000H	—	○

MR-J5-G

■RY/RX mapping

Master station → servo amplifier (RY)				Servo amplifier → master station (RX)			
Device No.	Name		Mapping	Device No.	Name		Mapping
RY0 to RY3E	Cannot be used.	—	×	RX0 to RX3D	Cannot be used.	—	×
				RX3E	For manufacturer setting	—	×
RY3F	Cyclic communication ready command	CSR	×	RX3F	Cyclic communication ready	SSR	×

■RWw/RWr mapping

Master station → servo amplifier (RWw)				Servo amplifier → master station (RWr)			
Device No.	Index	Name	Mapping	Device No.	Index	Name	Mapping
RWw0	6060H	Modes of operation	×	RWr0	6061H	Mode of operation on display	×
RWw1	6040H	Controlword	×	RWr1	6041H	Statusword	×
RWw2	2D01H	Control DI 1	○	RWr2	2D11H	Status DO 1	×
RWw3	2D02H	Control DI 2	×	RWr3	2D12H	Status DO 2	×
RWw4	2D03H	Control DI 3	○	RWr4	2D13H	Status DO 3	○
RWw5	2D05H	Control DI 5	○	RWr5	0000H	—	○
RWw6	607AH	Target position	×	RWr6	6064H	Position actual value	○
RWw7				RWr7			
RWw8	60FFH	Target velocity	×	RWr8	606CH	Velocity actual value	×
RWw9				RWr9			
RWwA	2D20H	Velocity limit value	×	RWrA	60F4H	Following error actual value	○
RWwB				RWrB			
RWwC	6071H	Target torque	×	RWrC	6077H	Torque actual value	×
RWwD	0000H	—	○	RWrD	0000H	—	○
RWwE	6081H	Profile Velocity	×	RWrE	2A41H	Current alarm	○
RWwF				RWrF			
RWw10	6083H	Profile acceleration	×	RWr10	60B9H	Touch probe status	○
RWw11				RWr11	0000H	—	○
RWw12	6084H	Profile deceleration	×	RWr12	60BAH	Touch probe 1 positive edge	○
RWw13				RWr13			○
RWw14	6087H	Torque slope	×	RWr14	60BCH	Touch probe 1 negative edge	○
RWw15				RWr15			○
RWw16	60F2H	Positioning option	×	RWr16	60BCH	Touch probe 2 positive edge	○
RWw17	60B8H	Touch probe function	○	RWr17			○
RWw18	0000H	—	○	RWr18	60BDH	Touch probe 2 negative edge	○
RWw19	0000H	—	○	RWr19			○
RWw1A	0000H	—	○	RWr1A	0000H	—	○
RWw1B	0000H	—	○	RWr1B	0000H	—	○
RWw1C	0000H	—	○	RWr1C	0000H	—	○
RWw1D	0000H	—	○	RWr1D	0000H	—	○
RWw1E	0000H	—	○	RWr1E	0000H	—	○
RWw1F	0000H	—	○	RWr1F	0000H	—	○

Point

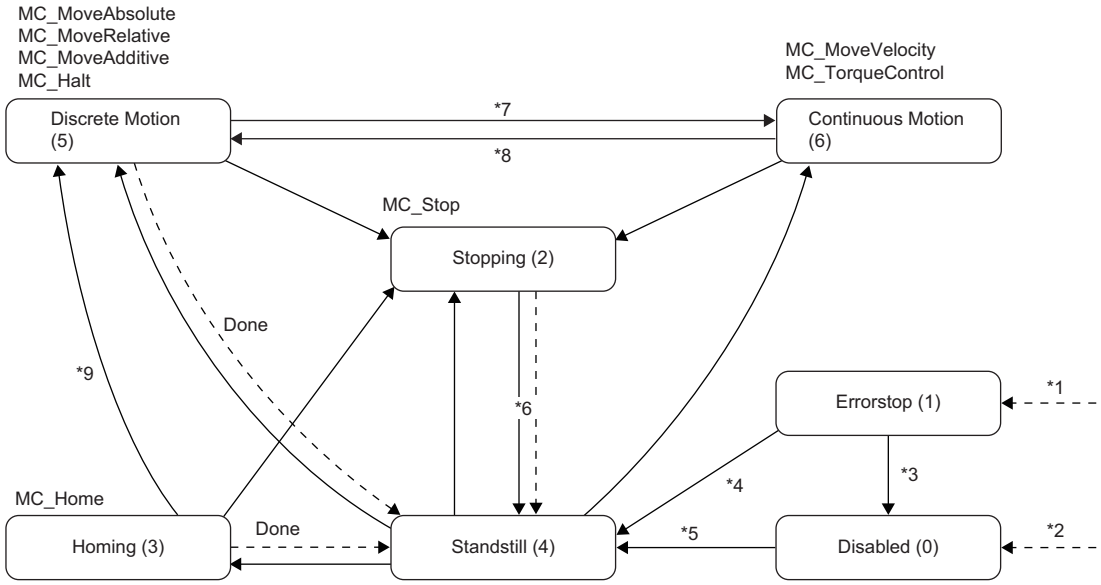
For the mapping change FB, refer to the following.

☞ Page 78 MCv_ChangeMapping_Model (Mapping Change)

2.6 State Transition Diagram

The following figure shows the state transition of an FB library.

An axis is in any of the defined states. A solid line arrow in the state transition diagram indicates a state transition by FB activation. A dashed line arrow indicates a transition brought on by the ending of a command for an axis or by the system.



*1 When an error occurs in an axis, a transition is made from any state.

*2 A transition is made when Enable for MC_Power = OFF, and there is no error in an axis.

*3 A transition is made when MC_Reset is executed and Status for MC_Power = OFF.

*4 A transition is made when MC_Reset is executed, Enable for MC_Power = ON, and Status for MC_Power = ON.

*5 A transition is made when Enable for MC_Power = ON, and Status for MC_Power = ON.

*6 A transition is made when Done for MC_Stop = ON and Execute for MC_Stop = OFF.

*7 Transition is possible only when ContinuousMotion changes to DiscreteMotion by MC_Halt.

*8 The type of control being executed (position/velocity/torque control) can be switched to another type, such as torque control → position control, only when the speed is zero. When the speed is not zero, if the type of control is switched between position control and another type of control, an error occurs. For the zero speed, refer to the following.
MR-JET-G User's Manual (Parameters)
MR-J5-G/MR-J5W-G User's Manual (Parameters)

*9 When MC_Halt has been executed during Homing. (This stops homing.)

Status	Description
Disabled	Shows the initial state of the axis. Enable for MC_Power is off, and no error occurred. If Cyclic communication ready (RX3F) is off, the state remains in this state.
ErrorStop	The state transitions to this state when an error occurs. The state remains in this state while an error is continuing.
Stopping	The state transitions to this state when MC_Stop is executed. While Execute for MC_Stop is ON, the state remains to be Stopping.
Homing	Indicates that homing is being executed.
Standstill	Indicates that MC_Power is ON, and no error occurred.
DiscreteMotion	Indicates that the positioning control FB is being executed. The state transitions to this state when MC_MoveAbsolute, MC_MoveRelative, MC_MoveAdditive, or MC_Halt is executed.
ContinuousMotion	Indicates that the continuous control FB is being executed. The state transitions to this state when MC_MoveVelocity and MC_TorqueControl are executed.

The following table lists the FB libraries executable in each state. Set items such as interlocking according to your system and the expected operation.

○: Executable, ×: Not executable

FB Library	Disabled (0)	ErrorStop (1)	Stopping (2)	Homing (3)	Standstill (4)	DiscreteMotion (5)		ContinuousMotion (6)
						Other than Halt	Halt	
MC_Power_CCLinkIEFBasic_F	○*1	×	○*1	○*1	○*1	○*1	○*1	○*1
MCv_Home_CCLinkIEFBasic_F	×	×	×	×	○	×	×	×
MC_Stop_CCLinkIEFBasic_F	×	×	○	○*6	○	○*6	○*6	○*6
MC_Halt_CCLinkIEFBasic_F	×	×	×	○*6	○	○*6	×*3	○*6
MC_MoveAbsolute_CCLinkIEFBasic_F	×	×	×	×	○	○*6	×	○*2*6
MC_MoveRelative_CCLinkIEFBasic_F	×	×	×	×	○	×	×	○*2*6
MC_MoveAdditive_CCLinkIEFBasic_F	×	×	×	×	○	○*6	×	○*2*6
MC_MoveVelocity_CCLinkIEFBasic_F	×	×	×	×	○	×	○*4*6	○*6
MC_TorqueControl_CCLinkIEFBasic_F	×	×	×	×	○	×	○*4*6	○*6
MC_Reset_CCLinkIEFBasic_F	○	○	○	○	○	○	○	○
MCv_ReadMultiObject_Model	○	○	○	○	○	○	○	○
MCv_WriteMultiObject_Model	○	○	○	○	○	○	○	○
MCv_ChangeMapping_Model	○*5	×	×	×	×	×	×	×

*1 When using this FB library (except for object read/write FBs), always execute MC_Power_CCLinkIEFBasic_F.

*2 Executable when the speed is zero.

*3 While MC_Halt_CCLinkIEFBasic_F is being executed, MC_Halt_CCLinkIEFBasic_F cannot be executed again.

*4 Executable only when Halt is executed while the continuous control FB is being executed.

*5 To change the mapping, CC-Link IE Field Network Basic communications must be stopped (by turning RY3F off), so execution is possible only in the Disabled state.

*6 When a new FB is executed, CommandAborted (execution aborted) turns on for the FB running in each state, and control is aborted.

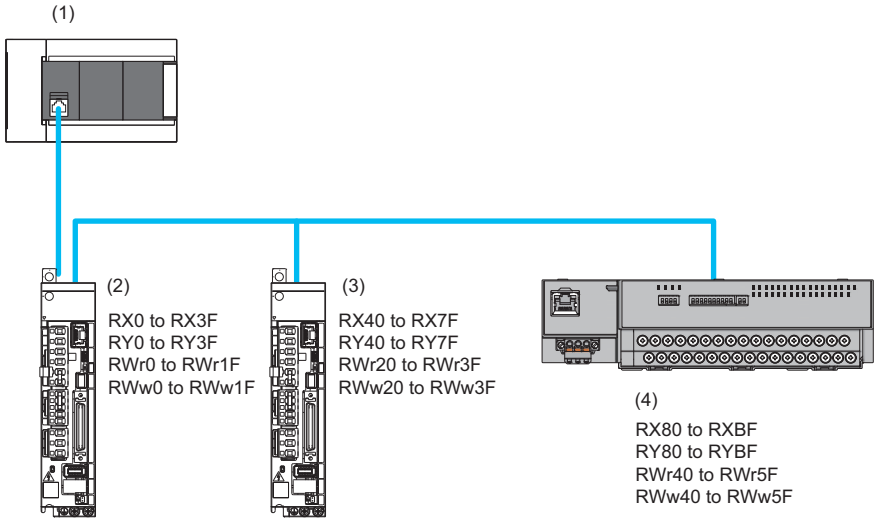
2.7 Parameter Settings

This section describes the parameter settings common to each FB. For details on the parameter settings specific to each FB, refer to the "Parameter Settings" section in "FB LIBRARY DETAILS".

CC-Link IE Field Network Basic settings

This section describes the setting method for connecting an Ethernet-equipped module and servo amplifiers using GX Works3 through CC-Link IE Field Network Basic.

The example below shows the setting method in a system configuration of two servo amplifiers (station numbers 1 and 2) and one AC input module (station number 3) connected together.



(1) FX5U CPU module (station number 0, master station)
(2) Servo amplifier (station number 1, axis 1)
(3) Servo amplifier (station number 2, axis 2)
(4) AC input module (station number 3)

- Link device and global label (G_stLinkIEF) assignment examples

Station No.	Link device (RX)	Refresh target device (M)	Global label (bnRX)
1	RX0 to RX3F	M0 to M63	bnRX [0] to bnRX [63]
2	RX40 to RX7F	M64 to M127	bnRX [64] to bnRX [127]
3	RX80 to RXBF	M128 to M191	bnRX [128] to bnRX [191]

Station No.	Link device (RY)	Refresh target device (M)	Global label (bnRY)
1	RY0 to RY3F	M192 to M255	bnRY [0] to bnRY [63]
2	RY40 to RY7F	M256 to M319	bnRY [64] to bnRY [127]
3	RY80 to RYBF	M320 to M383	bnRY [128] to bnRY [191]

Station No.	Link device (RWr)	Refresh target device (R)	Global label (unRWr)
1	RWr0 to RWr1F	R0 to R31	unRWr [0] to unRWr [31]
2	RWr20 to RWr3F	R32 to R63	unRWr [32] to unRWr [63]
3	RWr40 to RWr5F	R64 to R95	unRWr [64] to unRWr [95]

Station No.	Link device (RWw)	Refresh target device (R)	Global label (unRWw)
1	RWw0 to RWw1F	R96 to R127	unRWw [0] to unRWw [31]
2	RWw20 to RWw3F	R128 to R159	unRWw [32] to unRWw [63]
3	RWw40 to RWw5F	R160 to R191	unRWw [64] to unRWw [95]

Adding a module

■CPU module

A module does not need to be added when using a CPU module only.

■FX5-ENET

1. Open the "Module Configuration" window.

[Navigation] ⇨ [Module Configuration]

2. Mount the FX5-ENET to the CPU module.

[Element Selection] ⇨ [Information Module] ⇨ [FX5-ENET]. Drag and drop the FX5-ENET next to the CPU module.

3. Set the parameters.

[Edit] ⇨ [Parameter] ⇨ [Fix]

4. Check the parameters.

[Tool] ⇨ [Check Parameter]

Network configuration settings

For items other than "CC-Link IEF Basic Setting", such as "IP Address" refer to the following.

CC-Link IE Field Network Basic Reference Manual

■CPU module

1. Open the Ethernet port setting window.

[Navigation window] ⇨ [Parameter] ⇨ CPU module ⇨ [Module Parameter] ⇨ [Ethernet port]

2. Set [To Use or Not to Use CC-Link IEF Basic Setting] to "Enable".

[Basic Settings] ⇨ [CC-Link IEF Basic Setting] ⇨ [To Use or Not to Use CC-Link IEF Basic Setting]

3. Open the network configuration window.

[CC-Link IEF Basic Setting] ⇨ [Network Configuration Settings] ⇨ [Detailed Settings]

4. Add servo amplifiers.

Select a servo amplifier to be used in "Module List", and drag and drop it to the network map or the list of stations.

■FX5-ENET

1. Open the module parameter setting window.

Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ [FX5-ENET]

2. Set the station-based block data assurance setting to "Enable".

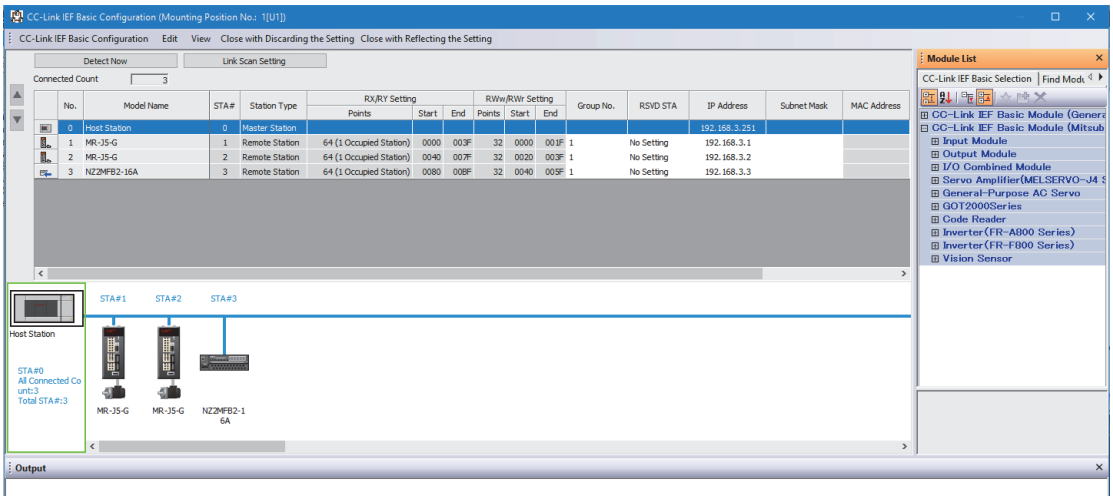
[Basic Settings] ⇨ [CC-Link IEF Basic Setting] ⇨ [Station-based Block Data Assurance]

3. Open the network configuration window.

[CC-Link IEF Basic Setting] ⇨ [Network Configuration Settings] ⇨ [Detailed Settings]

4. Add servo amplifiers.

Select a servo amplifier to be used in "Module List", and drag and drop it to the network map or the list of stations.



Restriction

Set the target stations (servo amplifiers) to be controlled by this library left-aligned, starting with station number 1. If the target stations are set with another station put in between, FB cannot access link devices correctly and fails to operate correctly.

Refresh parameter settings

■CPU module

1. Open the Ethernet port setting window.

[Navigation window] ⇨ [Parameter] ⇨ CPU module ⇨ [Module Parameter] ⇨ [Ethernet port]

2. Open the refresh setting window.

[Basic Settings] ⇨ [CC-Link IEF Basic Setting] ⇨ [Refresh Settings] ⇨ [Detailed Settings]

3. Specify the devices to be assigned to RX/RY and RWw/RWr.* 1*2

■FX5-ENET

1. Open the module parameter setting window.

Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Ethernet module name

2. Open the network configuration window.

[Basic Settings] ⇨ [CC-Link IEF Basic Setting] ⇨ [Refresh Settings] ⇨ [Detailed Settings]

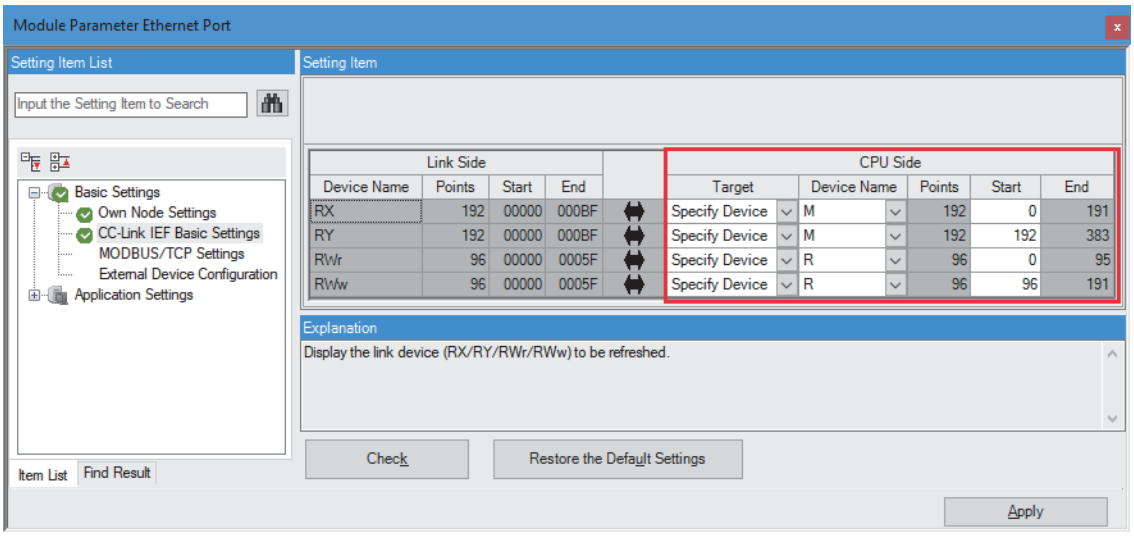
3. Specify the devices to be assigned to RX/RY and RWw/RWr.* 1*2

*1 If necessary, change the device settings or change the device to be assigned so that the refresh target device has link points equal to or more than those on the link side.

*2 If necessary, change the latch range setting or change the device to be assigned so that the refresh target device is not latch set.

The following shows a setting example.

- RX0 to RXBF ⇔ M0 to M191 (192 points)
- RY0 to RYBF ⇔ M192 to M383 (192 points)
- RWr0 to RWr5F ⇔ R0 to R95 (96 points)
- RWw0 to RWw5F ⇔ R96 to R191 (96 points)



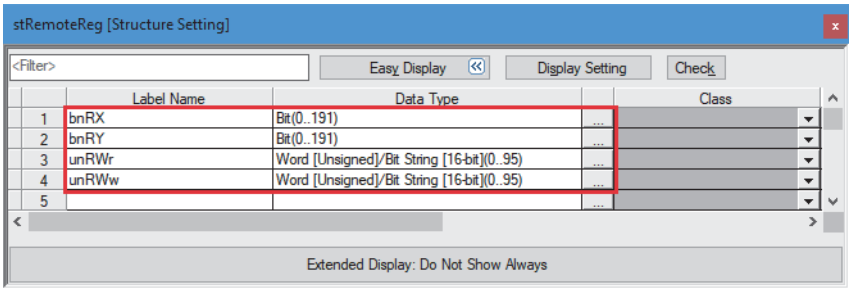
Global label settings

1. Define the structure.

[Navigation window] ⇨ [Label] ⇨ Right-click ⇨ [Add New Data]

According to the refresh settings (☞ Page 22 Refresh parameter settings), define the stRemoteReg structure.

- Data Type: Structure
- Data Name: stRemoteReg
- bnRX, bnRY = 192 points
- unRWr, unRWw = 96 points



Point

For the number of array elements in each label, set the corresponding number of device points in the refresh settings. (If a station, such as an I/O module, which the FB libraries do not control, exists, define the structure according to the entire refresh settings including that station.)

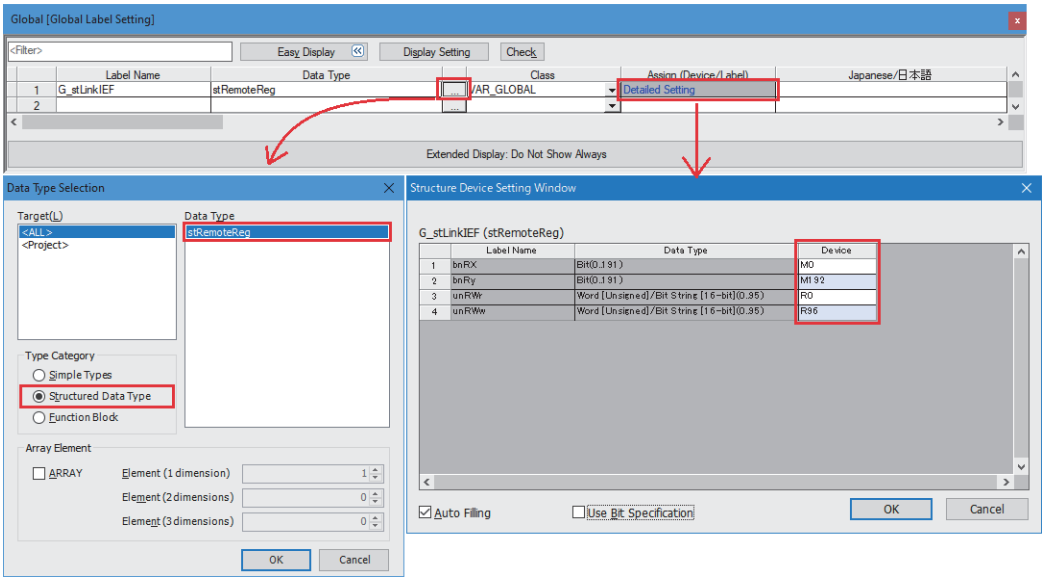
2. Set the global label.

[Navigation window] ⇨ [Label] ⇨ [Global Label] ⇨ [Global]

Set the global label by using the structure defined in step 1, as follows.

- Label Name: G_stLinkIEF
- Data Type: stRemoteReg
- Class: VAR_GLOBAL
- Assign (Device/Label)*1: bnRX=M0, bnRY=M192, unRWr=R0, unRWr=R96

*1 If devices are entered for bnRX and unRWr with the [Auto Filling] checkbox selected and the [Use Bit Specification] checkbox unselected, other devices are entered automatically according to the number of elements.



Point

The FB library operates by using the data refreshed to the global label "G_stLinkIEF". Therefore, assign the refresh data correctly. If the settings are made incorrectly, FB does not function correctly.

Servo amplifier setting

Use MR Configurator2 to set the servo parameters.

For the other settings of the servo amplifiers, refer to the manuals for the servo amplifiers used.

1. Set a network.

Set the servo parameter [Pr. PN13.0-3 Network protocol setting] to "0004H: CC-Link IEF Basic".

2. Set an operation mode.[*1]

Set the servo parameter [Pr. PA01.1 Control mode selection] to "0: Network standard mode".

3. Set default mapping.[*1]

Set the servo parameter [Pr. PN22.0 Default mapping mode selection] to "0".

4. Set an ON condition of the INP output signal.[*2]

Set the servo parameter [Pr. PD13.2 INP output signal ON condition selection] to "1: Within the in-position range and at the completion of command output".

5. Set an output range and filtering time of in-position 2.[*3]

Adjust [Pr.PC70 In-position 2 output range] and [Pr.PC71 In-position 2 output filter time] of the servo parameters to prevent In-position 2 from turning off due to overshoot, vibration, or oscillation when the axis is in the stop (Standstill) state.

*1 Since the initial value is 0, it is usually not necessary to set it.

*2 For the initial value of "0: Within the in-position range", the FB cannot correctly determine the stop state due to Halt, so it will not operate correctly when trying to operate the axis anew.

*3 Because the FB determines that the status is stop when the in-position 2 is on, it will not operate correctly if the in-position 2 is turned off.

2.8 Precautions

Before using the FB libraries in this reference manual, check the following precautions.

For precautions specific to each FB, refer to "Precautions" in FB LIBRARY DETAILS.

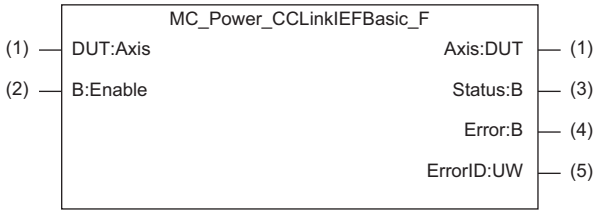
Description
The FBs in this reference manual do not include the error recovery processing. Prepare the error recovery processing separately to suit the user's system and the expected operation.
The FBs do not detect an alarm or warning that occurs in servo amplifiers. Separately create the alarm and warning monitoring processing for the servo amplifiers used. For alarms and warnings that occurred in the servo amplifiers, refer to the manuals for the servo amplifiers used.
The FB cannot be used in an interrupt program.
If the FB is used in a program that is to be executed only once, such as a subroutine program or a FOR-NEXT loop, the processing for turning off an execution command (such as Execute and Enable) cannot be executed and normal operation is not possible. Always use the FB in a program that is capable of turning off the execution command.
The number of steps of the FB embedded in a program depends on the CPU module used and the input/output definitions.
Although a double coil warning may occur during compilation, it does not cause any problem when using the FB.
The FB requires the configuration of a ladder block for every input label.
To use more than one FB, care must be taken to avoid duplication of the target axis to prevent more than one program for the target axis from starting at the same time.
Set the input label before turning on an execution command. In addition, do not change the input label data while Busy (executing) is on.
For the memory/device settings of the CPU parameters, change the capacities to the capacities required to use the FB libraries. Change the latch range so that the device assigned to link device is not latch set. Otherwise, an error may occur in GX Works3.
FB does not execute a range check for input labels. If an incorrect value is set, due to such a cause as access to another label, the CPU module can stop with an error. Check that the setting value is correct.
For an FB with Axis (axis information) in the I/O label, set the following items in advance before executing the FB. • AxisNo (Axis number) • MasterModule (Master module specification) • StartIO (Module number) For details on each item, refer to the following. ☞ Page 13 MC_Setting_CCLinkIEFBasic_F
Because AxisStatus (axis status) of Axis (axis information) is updated by the communication data received from the servo amplifier, there may be a delay of one scan or more after FB is executed until it is updated. When interlocking between FBs, use the output labels of the FBs.
For an FB with Axis in the I/O label, be sure to set the same label for input and output. If only input is set, the axis information will not be updated and the FB will not operate normally.
Adjust [Pr.PC70 In-position 2 output range] and [Pr.PC71 In-position 2 output filter time] of the servo parameters to prevent In-position 2 from turning off due to overshoot, vibration, or oscillation when the axis is in the stop (Standstill) state.
If the FB terminated with an error, turn off the execution condition of the FB that terminated with an error before executing a new FB. If the execution condition of the FB that terminated with an error remains on, the termination processing will not be performed and the newly executed FB will not operate normally.
When executing the object reading FB using FX5-ENET, make sure that the module READY (Un\G34b0) is on before the execution.
While the FB is being executed, do not perform the online change.

3 DETAILS of FB LIBRARIES

3.1 MC_Power_CCLinkIEFBasic_F (Operation Possible)

Overview

This FB switches the status of the servo amplifier for the specified axis to the operable state.



Labels

I/O label

No.	Label	Name	Data type	Setting range	Description
(1)	Axis	Axis information	AXIS_REF_CCLinkIEFBasic_F	—	☞ Page 13 AXIS_REF_CCLinkIEFBasic_F

Input label

No.	Label	Name	Data type	Setting range	Description
(2)	Enable	Enable	Bit	ON, OFF	While Enable input is on, axis control is enabled.

Output labels

No.	Label	Name	Data type	Default value	Description
(3)	Status	Operable	Bit	OFF	The on state indicates the operable state.
(4)	Busy	Operable	Bit	OFF	The on state indicates that the FB is operating.
(5)	Error	Error	Bit	OFF	The on state indicates that an error has occurred in the FB.
(6)	ErrorID	Error code	Word [unsigned]	0	The error code of an error that occurred in the FB is returned.

Global labels

Refer to the following.

☞ Page 12 List of Global Labels

Function details

Applicable hardware and software

Module	Firmware version	Engineering tool
FX5S CPU module	1.000 or later	GX Works3 Version 1.080J or later
FX5UJ CPU module	1.002 or later	GX Works3 Version 1.070Y or later
FX5U CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5UC CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5-ENET	1.100 or later	GX Works3 Version 1.070Y or later
MR-JET-G	C0 or later	MR Configurator2 Version 1.125F or later
MR-J5-G	C0 or later	MR Configurator2 Version 1.125F or later

Basic specifications

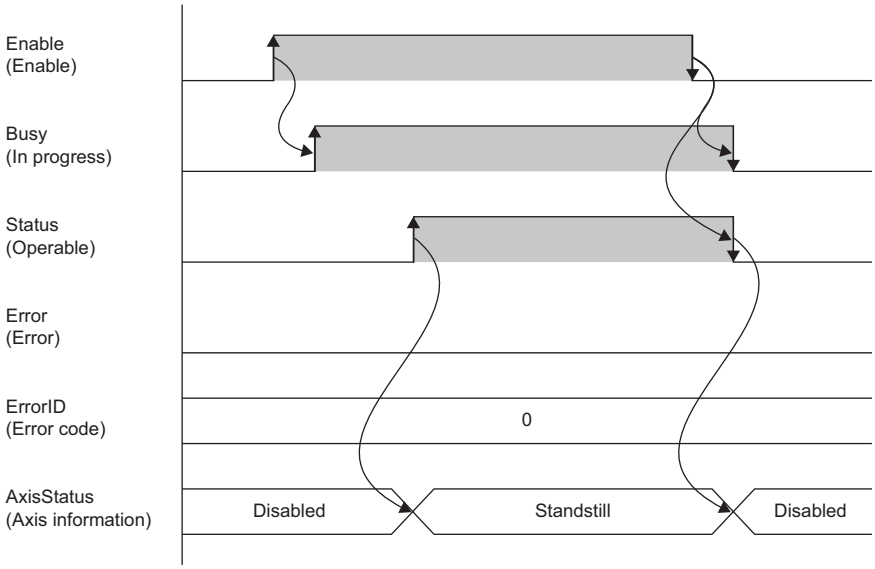
Item	Description
Number of steps	969 steps The number of steps of the FB embedded in a program depends on the input/output definitions and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. GX Works3 Operating Manual
Points of labels used	• Label: 0.03K points (Word) • Latch Label: 0K points (Word) The points of labels embedded in a program depend on the devices specified for arguments and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. GX Works3 Operating Manual
Points of index registers used	• Index register: 0 points • Long index register: 0 points
Points of file registers used	File register: 0 points (Word)
FB dependency	No dependency
FB compilation method	Subroutine type
FB operation	Pulse execution type (multiple scan execution type)

Function description

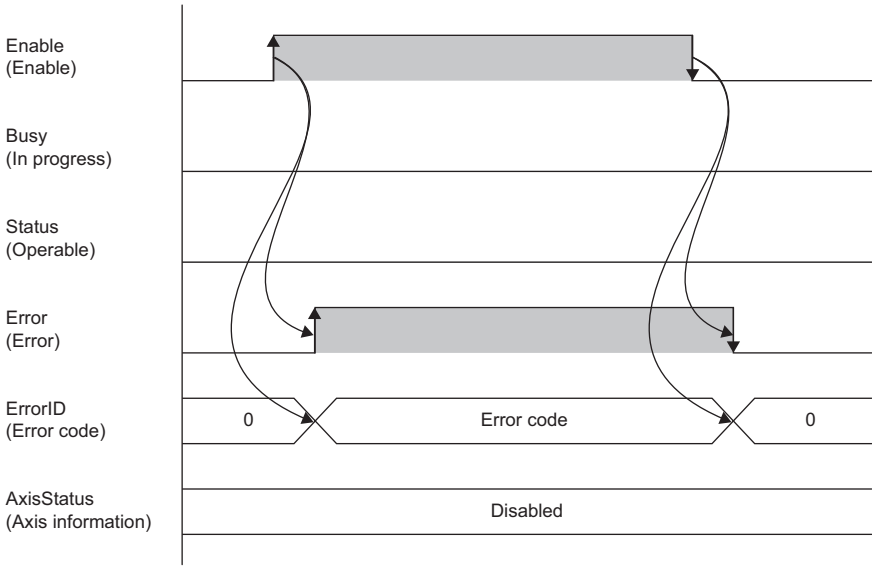
- This FB initializes the information of the axis selected at the rising edge of Enable (enable) and switches to the servo on state. When the process starts normally, Busy (executing) turns on. When the status is switched to the servo on state completely, Status (operable) turns on, and the AxisStatus (axis status) of Axis (axis information) transitions from Disabled to Standstill. (☞ Page 17 State Transition Diagram) In addition, the servo status LED (SON) of the servo amplifier turns on.
- Turning Enable off switches the status of the axis to the servo off state, and Status turns off. The AxisStatus (axis status) of Axis transitions from Standstill to Disabled. (☞ Page 17 State Transition Diagram)
- If the servo amplifier is powered off, AxisStatus transitions to ErrorStop. (☞ Page 17 State Transition Diagram)
- If an error occurs in the FB, the FB turns on Error (error), and stores the error code in ErrorID (error code). (☞ Page 29 Error code)

Timing chart of I/O signals

■Completed successfully



■Completed with an error



Precautions

- Before using this FB library (except for object read/write FBs), always execute this FB. This FB initializes the axis information and switches to the servo on state.
- Use only one instance of this FB for one axis. If multiple instances are used for one axis, whether to operate may not be controlled normally.

Parameter settings

There are no parameter settings specific to this FB. For details on the common parameter settings, refer to the following.

☞ Page 19 Parameter Settings

Performance values

Module	Measurement condition	Processing time	Maximum scan time	Number of scans
FX5S, FX5UJ	Axis 1	329ms	0.92ms	710 scans
FX5U, FX5UC*1*2	Axis 1	330ms	0.9ms	588 scans

*1 Measured with the program capacity set to 128K steps.

*2 The standard area is used for labels.

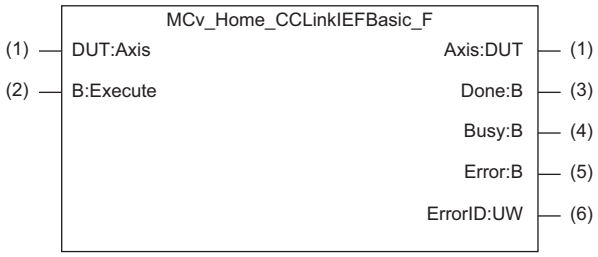
Error code

Error code	Description	Action
1200H	The READY signal is off.	• Turn on the cyclic communication ready command (RY3F). • Clear the error in the Ethernet-equipped module, and execute the FB again.

3.2 MCv_Home_CCLinkIEFBasic_F (Homing)

Overview

This FB executes homing on the specified axis.



Labels

I/O label

No.	Label	Name	Data type	Setting range	Description
(1)	Axis	Axis information	AXIS_REF_CCLinkIEFBasic_F	—	☞ Page 13 AXIS_REF_CCLinkIEFBasic_F

Input label

No.	Label	Name	Data type	Setting range	Description
(2)	Execute	Execution command	Bit	ON, OFF	When the value is on, the FB is executed.

Output labels

No.	Label	Name	Data type	Default value	Description
(3)	Done	Completed	Bit	OFF	Indicates that homing is completed successfully.
(4)	Busy	Executing	Bit	OFF	The on state indicates that homing is being executed.
(5)	CommandAborted	Execution aborted	Bit	OFF	Indicates that execution is aborted by another FB.
(5)	Error	Error	Bit	OFF	The on state indicates that an error has occurred in the FB.
(6)	ErrorID	Error code	Word [unsigned]	0	The error code of an error that occurred in the FB is returned.

Global labels

Refer to the following.

☞ Page 12 List of Global Labels

Function details

Applicable hardware and software

Module	Firmware version	Engineering tool
FX5S CPU module	1.000 or later	GX Works3 Version 1.080J or later
FX5UJ CPU module	1.002 or later	GX Works3 Version 1.070Y or later
FX5U CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5UC CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5-ENET	1.100 or later	GX Works3 Version 1.070Y or later
MR-JET-G	C0 or later	MR Configurator2 Version 1.125F or later
MR-J5-G	C0 or later	MR Configurator2 Version 1.125F or later

Basic specifications

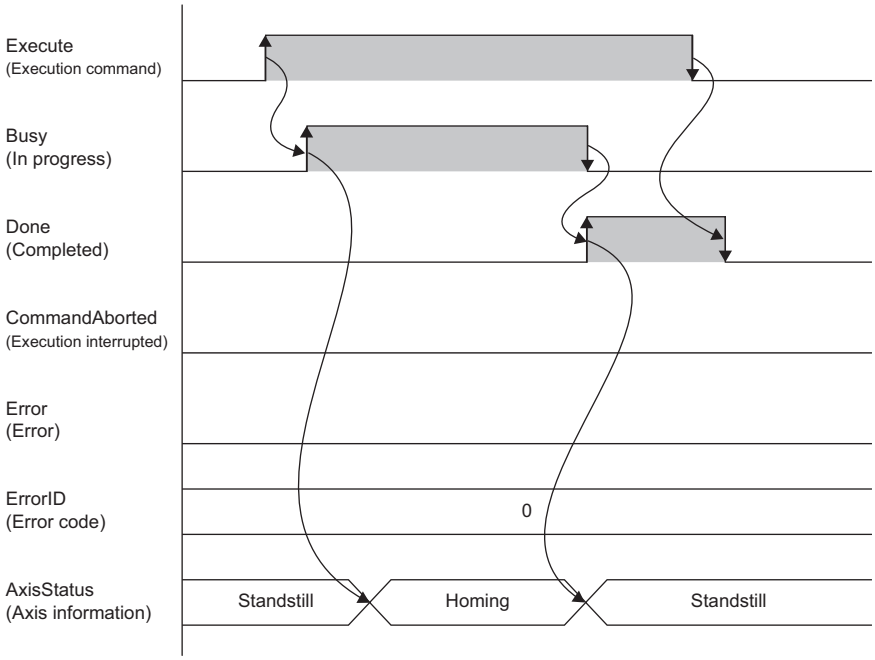
Item	Description
Number of steps	1305 steps The number of steps of the FB embedded in a program depends on the input/output definitions and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. 📖 GX Works3 Operating Manual
Points of labels used	• Label: 0.04K points (Word) • Latch Label: 0K points (Word) The points of labels embedded in a program depend on the devices specified for arguments and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. 📖 GX Works3 Operating Manual
Points of index registers used	• Index register: 0 points • Long index register: 0 points
Points of file registers used	File register: 0 points (Word)
FB dependency	No dependency
FB compilation method	Subroutine type
FB operation	Pulse execution type (multiple scan execution type)

Function description

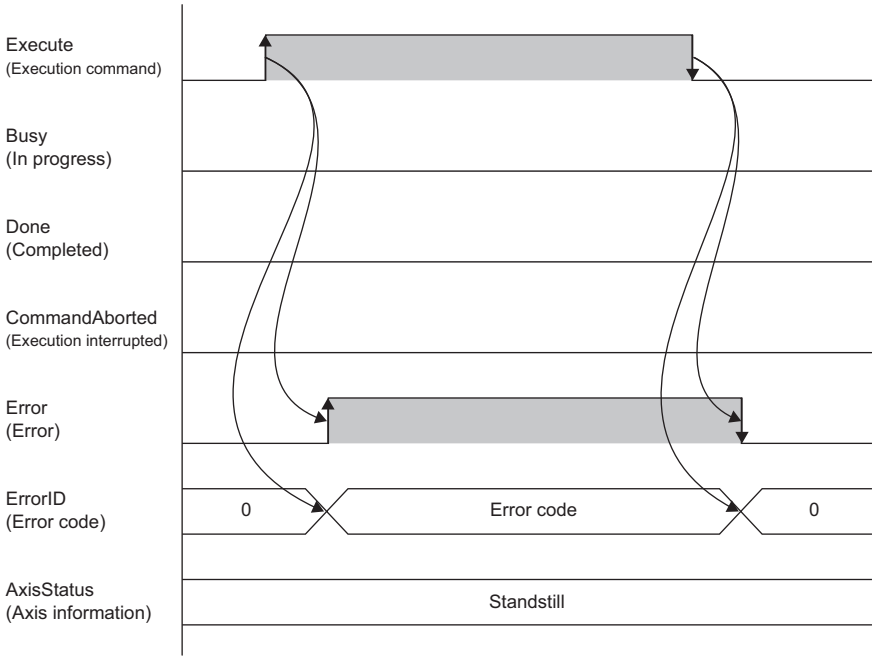
- When Execute (execution command) is turned on, this FB executes homing on the specified axis according to the set parameters for homing. Busy (executing) is turned on during homing, and the AxisStatus (axis status) of Axis (axis information) transitions from Standstill to Homing. When the process is completed successfully, Busy turns off and Done (completed) turns on, and at the same time, the AxisStatus returns from Homing to Standstill. (☞ Page 17 State Transition Diagram)
- If an error occurs in the FB, the FB turns on Error (error), and stores the error code in ErrorID (error code). (☞ Page 33 Error codes)

Timing chart of I/O signals

■Completed successfully



■Completed with an error



Precautions

The parameters for homing must be set in advance to the servo amplifiers with MR Configurator2.

Parameter settings

To execute this FB, the parameters that correspond to objects such as the [Homing method (Obj.6098H)] object must be set to the servo amplifiers. For details, refer to the following.

📖MR-JET User's Manual (Function)

📖MR-J5 User's Manual (Function)

For details on the common parameter settings, refer to the following.

☞ Page 19 Parameter Settings

Performance values

Module	Measurement condition*3	Processing time	Maximum scan time	Number of scans
FX5S, FX5UJ	Axis 1	39.6ms	0.99ms	57 scans
FX5U, FX5UC*1*2	Axis 1	49.7ms	1.20ms	46 scans

*1 Measured with the program capacity set to 128K steps.

*2 The standard area is used for labels.

*3 This is the result of executing homing for the first time with the homing method (data set type setting).

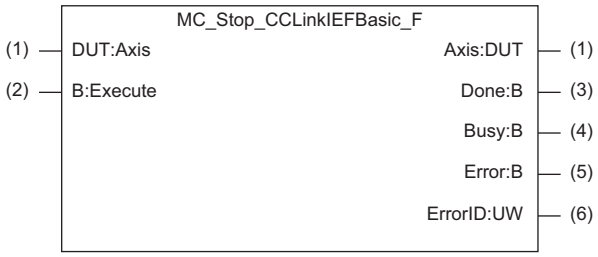
Error codes

Error code	Description	Action
1200H	The READY signal is off.	• Turn on the cyclic communication ready command (RY3F). • Clear the error in the Ethernet-equipped module, and execute the FB again.
1202H	An error occurred in the servo amplifier.	Clear the error in the servo amplifier, and execute the FB again.
1203H	The FB is in the execution disabled state.	• For the axis operation FB, execute it again after the active control operation is completed. • Execute MC_Power_CCLinkIEFBasic_F to enable operation, and then execute the FB again. • If a warning occurs in the servo amplifier, remove the cause of the warning, and execute the FB again.
1204H	The axis is in the Stopping state.	Change the status of the axis to the StandStill state, and execute the FB again.

3.3 MC_Stop_CCLinkIEFBasic_F (Forced Stop)

Overview

This FB forcibly stops the specified axis.



Labels

I/O label

No.	Label	Name	Data type	Setting range	Description
(1)	Axis	Axis information	AXIS_REF_CCLinkIEFBasic_F	—	☞ Page 13 AXIS_REF_CCLinkIEFBasic_F

Input label

No.	Label	Name	Data type	Setting range	Description
(2)	Execute	Execution command	Bit	ON, OFF	When the value is on, the FB is executed.

Output labels

No.	Label	Name	Data type	Default value	Description
(3)	Done	Completed	Bit	OFF	The on state indicates that the speed has reached zero.
(4)	Busy	Executing	Bit	OFF	The on state indicates that the speed is decreasing to zero.
(5)	Error	Error	Bit	OFF	The on state indicates that an error has occurred in the FB.
(6)	ErrorID	Error code	Word [unsigned]	0	The error code of an error that occurred in the FB is returned.

Global labels

Refer to the following.

☞ Page 12 List of Global Labels

Function details

Applicable hardware and software

Module	Firmware version	Engineering tool
FX5S CPU module	1.000 or later	GX Works3 Version 1.080J or later
FX5UJ CPU module	1.002 or later	GX Works3 Version 1.070Y or later
FX5U CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5UC CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5-ENET	1.100 or later	GX Works3 Version 1.070Y or later
MR-JET-G	C0 or later	MR Configurator2 Version 1.125F or later
MR-J5-G	C0 or later	MR Configurator2 Version 1.125F or later

Basic specifications

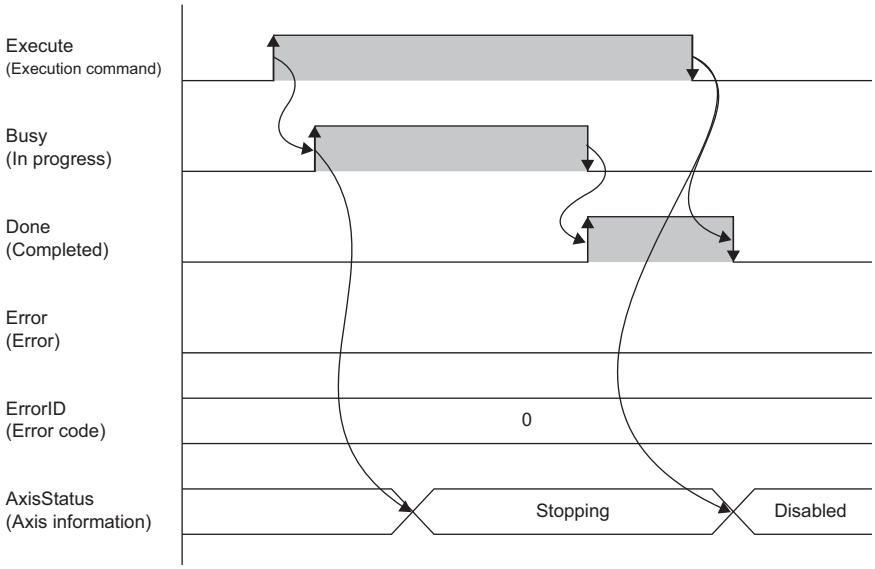
Item	Description
Number of steps	824 steps The number of steps of the FB embedded in a program depends on the input/output definitions and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. GX Works3 Operating Manual
Points of labels used	• Label: 0.03K points (Word) • Latch Label: 0K points (Word) The points of labels embedded in a program depend on the devices specified for arguments and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. GX Works3 Operating Manual
Points of index register used	• Index register: 0 points • Long index register: 0 points
Points of file registers used	File register: 0 points (Word)
FB dependency	No dependency
FB compilation method	Subroutine type
FB operation	Pulse execution type (multiple scan execution type)

Function description

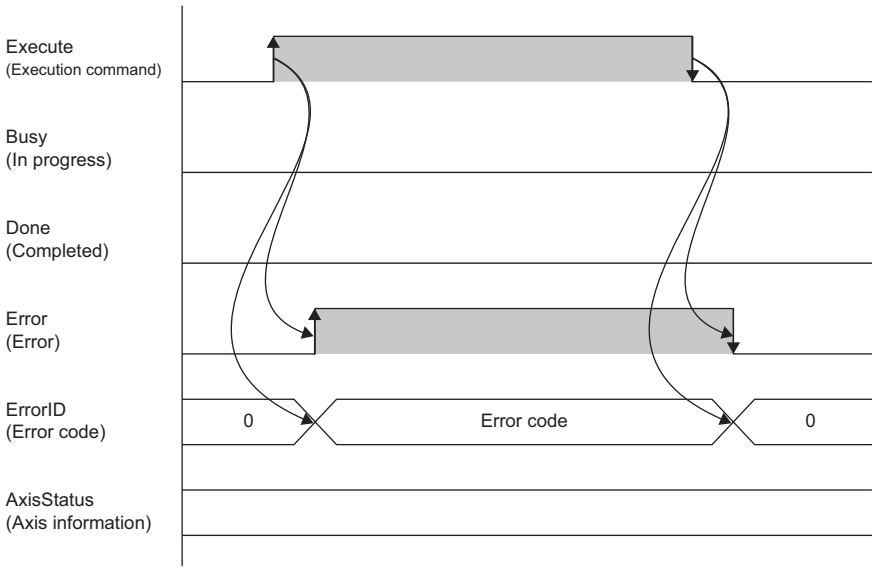
- When Execute (execution command) is turned on, this FB forcibly stops controlling the selected axis, and aborts the axis operation FB being executed. Busy (executing) is turned on during stop processing, and the AxisStatus (axis status) of Axis (axis information) transitions to Stopping. (☞ Page 17 State Transition Diagram) After that, when the axis stops (the speed reaches zero), Done (completed) turns on, and the status of the servo amplifier becomes Switch On Disabled (servo off). AxisStatus then becomes Disabled.
- The axis is decelerated and stopped according to the settings of [Quick stop deceleration (Obj.6085H)]. However, only for torque control, the Switch On Disabled state arises immediately, and the axis stops through dynamic braking.
- While Execute is on, or while the speed has not reached zero yet, the Stopping state is held.
- When Execute is turned off after Done turns on, AxisStatus transitions to Standstill. (☞ Page 17 State Transition Diagram)
- If an error occurs in the FB, the FB turns on Error (error), and stores the error code in ErrorID (error code). (☞ Page 37 Error codes)

Timing chart of I/O signals

■Completed successfully



■Completed with an error



Precautions

- No other FB can be executed for the relevant axis until the axis reaches zero speed.
- Use only one instance of this FB for one axis. If multiple instances are used for one axis, forced stop may not be controlled normally.

Parameter settings

To execute this FB, the parameters that correspond to objects such as the [Quick stop deceleration (Obj.6085H)] object must be set to the servo amplifiers. For details, refer to the following.

📖MR-JET User's Manual (Function)

📖MR-J5 User's Manual (Function)

For details on the common parameter settings, refer to the following.

☞ Page 19 Parameter Settings

Performance values

Module	Measurement condition*3	Processing time	Maximum scan time	Number of scans
FX5S, FX5UJ	Axis 1	111ms	1.16ms	171 scans
FX5U, FX5UC*1*2	Axis 1	117ms	1.37ms	123 scans

*1 Measured with the program capacity set to 128K steps.

*2 The standard area is used for labels.

*3 This is the result of executing forced stop with the forced stop time and deceleration time constant (100ms) set during operation at the operating speed (1000r/min).

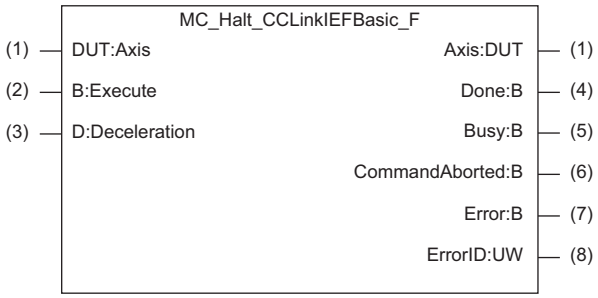
Error codes

Error code	Description	Action
1200H	The READY signal is off.	• Turn on the cyclic communication ready command (RY3F). • Clear the error in the Ethernet-equipped module, and execute the FB again.
1202H	An error occurred in the servo amplifier.	Clear the error in the servo amplifier, and execute the FB again.
1203H	The FB is in the execution disabled state.	Execute MC_Power_CCLinkIEFBasic_F to enable operation, and then execute the FB again.

3.4 MC_Halt_CCLinkIEFBasic_F (Stop)

Overview

This FB stops the specified axis.



Labels

I/O label

No.	Label	Name	Data type	Setting range	Description
(1)	Axis	Axis information	AXIS_REF_CCLinkIEFBasic_F	—	☞ Page 13 AXIS_REF_CCLinkIEFBasic_F

Input labels

No.	Label	Name	Data type	Setting range	Description
(2)	Execute	Execution command	Bit	ON, OFF	When the value is on, the FB is executed.
(3)	Deceleration	Deceleration time	Double word [signed]	☞ Page 10 FB Library Specifications	Set the time to be taken by the servo motor to stop rotation from the rated rotation speed.

Output labels

No.	Label	Name	Data type	Default value	Description
(4)	Done	Completed	Bit	OFF	Indicates that the speed reached zero.
(5)	Busy	Executing	Bit	OFF	Indicates that the speed is decreasing to zero.
(6)	CommandAborted	Execution aborted	Bit	OFF	Indicates that execution is aborted by another FB.
(7)	Error	Error	Bit	OFF	The on state indicates that an error has occurred in the FB.
(8)	ErrorID	Error code	Word [unsigned]	0	The error code of an error that occurred in the FB is returned.

Global labels

Refer to the following.

☞ Page 12 List of Global Labels

Function details

Applicable hardware and software

Module	Firmware version	Engineering tool
FX5S CPU module	1.000 or later	GX Works3 Version 1.080J or later
FX5UJ CPU module	1.002 or later	GX Works3 Version 1.070Y or later
FX5U CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5UC CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5-ENET	1.100 or later	GX Works3 Version 1.070Y or later
MR-JET-G	C0 or later	MR Configurator2 Version 1.125F or later
MR-J5-G	C0 or later	MR Configurator2 Version 1.125F or later

Basic specifications

Item	Description
Number of steps	945 steps The number of steps of the FB embedded in a program depends on the input/output definitions and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. GX Works3 Operating Manual
Points of labels used	• Label: 0.04K points (Word) • Latch Label: 0K points (Word) The points of labels embedded in a program depend on the devices specified for arguments and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. GX Works3 Operating Manual
Points of index registers used	• Index register: 0 points • Long index register: 0 points
Points of file registers used	File register: 0 points (Word)
FB dependency	No dependency
FB compilation method	Subroutine type
FB operation	Pulse execution type (multiple scan execution type)

Function description

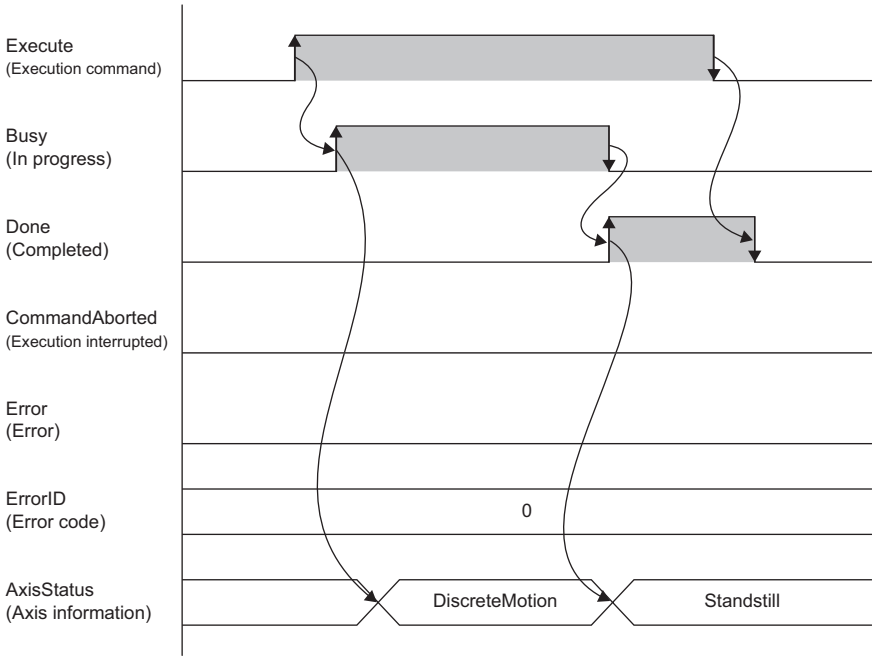
- When Execute (execution command) is turned on, this FB controls speed of the specified axis at the set speed. When processing starts normally, Busy (executing) turns on, and the AxisStatus (axis status) of Axis (axis information) transitions to DiscreteMotion. (☞ Page 17 State Transition Diagram)
- When the speed reached zero, Busy (executing) turns off, Done (completed) turns on, and the AxisStatus transitions to Standstill. (☞ Page 17 State Transition Diagram)
- When the continuous control FB is executed while this FB is being executed, operation depends on the control before this FB is executed.

Control before FB execution	Operation
Position control	An error occurs in the continuous control FB and the FB stops operation.
Velocity control or torque control	The control of this FB is switched to the continuous control FB when CommandAborted (execution aborted) turns on after deceleration stop.

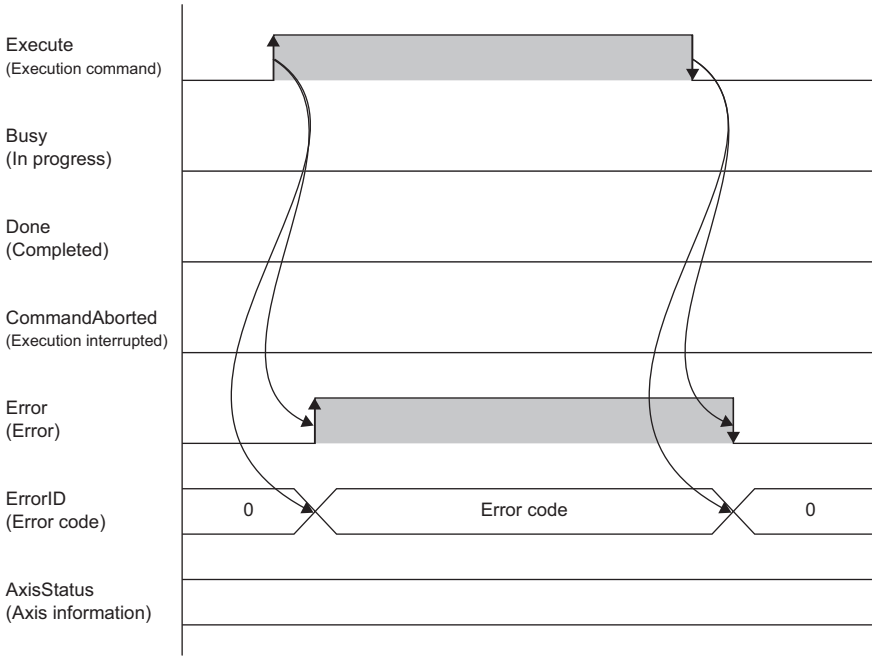
- When Execute is turned off while this FB is operating, the stop operation continues.
- If an error occurs in the FB, the FB turns on Error (error), and stores the error code in ErrorID (error code). (☞ Page 41 Error codes)

Timing chart of I/O signals

■Completed successfully



■Completed with an error



Precautions

- The deceleration time input label is enabled only when executing velocity control. When executing positioning control, the deceleration time specified for the positioning control FB being executed is applied. For homing, the axis decelerates and stops according to the setting of [Homing acceleration (Obj.609AH)]. For torque control, the axis decelerates and stops based on the torque change amount set in [Torque slope (Obj.6087H)].
- While this FB is being executed, a new instance of MC_Halt_CCLinkIEFBasic_F cannot be executed.
- While this FB is being executed, homing or positioning control FB cannot be executed.

Parameter settings

To execute this FB, the parameters that correspond to objects such as the [Halt option code (Obj.605DH)] object must be set to the servo amplifiers. For details, refer to the following.

📖MR-JET User's Manual (Function)

📖MR-J5 User's Manual (Function)

For details on the common parameter settings, refer to the following.

☞ Page 19 Parameter Settings

Performance values

Module	Measurement condition*3	Processing time	Maximum scan time	Number of scans
FX5S, FX5UJ	Axis 1	520ms	1.18ms	846 scans
FX5U, FX5UC*1*2	Axis 1	520ms	1.45ms	545 scans

*1 Measured with the program capacity set to 128K steps.

*2 The standard area is used for labels.

*3 This is the result of executing stop with the deceleration time (1500ms) set during operation at the operating speed (1000r/min).

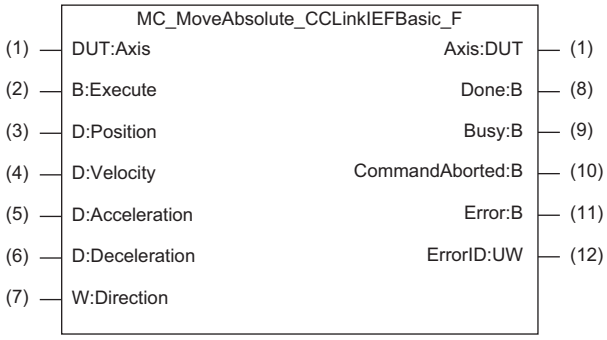
Error codes

Error code	Description	Action
1200H	The READY signal is off.	• Turn on the cyclic communication ready command (RY3F). • Clear the error in the Ethernet-equipped module, and execute the FB again.
1202H	An error occurred in the servo amplifier.	Clear the error in the servo amplifier, and execute the FB again.
1203H	The FB is in the execution disabled state.	• For the axis operation FB, execute it again after the active control operation is completed. • While MC_Halt is being executed, do not execute another instance of MC_Halt. • Execute MC_Power_CCLinkIEFBasic_F to enable operation, and then execute the FB again.
1204H	The axis is in the Stopping state.	Change the status of the axis to the StandStill state, and execute the FB again.

3.5 MC_MoveAbsolute_CCLinkIEFBasic_F (Absolute Positioning)

Overview

This FB sets the target position based on the absolute position for the specified axis and executes positioning.



Labels

I/O label

No.	Label	Name	Data type	Setting range	Description
(1)	Axis	Axis information	AXIS_REF_CCLinkIEFBasic_F	—	☞ Page 13 AXIS_REF_CCLinkIEFBasic_F

Input labels

No.	Label	Name	Data type	Setting range	Description
(2)	Execute	Execution command	Bit	ON, OFF	When the value is on, the FB is executed.
(3)	Position	Target position	Double word [signed]	☞ Page 10 FB Library Specifications	Specify the target position based on the absolute position.
(4)	Velocity	Velocity	Double word [signed]	☞ Page 10 FB Library Specifications	Set the speed command value.
(5)	Acceleration	Acceleration time	Double word [signed]	☞ Page 10 FB Library Specifications	Set the time to be taken by the servo motor to reach the rated rotation speed.
(6)	Deceleration	Deceleration time	Double word [signed]	☞ Page 10 FB Library Specifications	Set the time to be taken by the servo motor to stop rotation from the rated rotation speed.
(7)	Direction	Rotation direction	Word [signed]	☞ Page 12 MC_DIRECTION_CCLinkIEFBasic_F	Specify the rotation direction. (☞ Page 12 MC_DIRECTION_CCLinkIEFBasic_F)

Output labels

No.	Label	Name	Data type	Default value	Description
(8)	Done	Completed	Bit	OFF	The on state indicates that the axis reached the target position.
(9)	Busy	Executing	Bit	OFF	The on state indicates that the FB is operating.
(10)	CommandAborted	Execution aborted	Bit	OFF	The on state indicates that execution is aborted by another FB.
(11)	Error	Error	Bit	OFF	The on state indicates that an error has occurred in the FB.
(12)	ErrorID	Error code	Word [unsigned]	0	The error code of an error that occurred in the FB is returned.

Global labels

Refer to the following.

☞ Page 12 List of Global Labels

Function details

Applicable hardware and software

Module	Firmware version	Engineering tool
FX5S CPU module	1.000 or later	GX Works3 Version 1.080J or later
FX5UJ CPU module	1.002 or later	GX Works3 Version 1.070Y or later
FX5U CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5UC CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5-ENET	1.100 or later	GX Works3 Version 1.070Y or later
MR-JET-G	C0 or later	MR Configurator2 Version 1.125F or later
MR-J5-G	C0 or later	MR Configurator2 Version 1.125F or later

Basic specifications

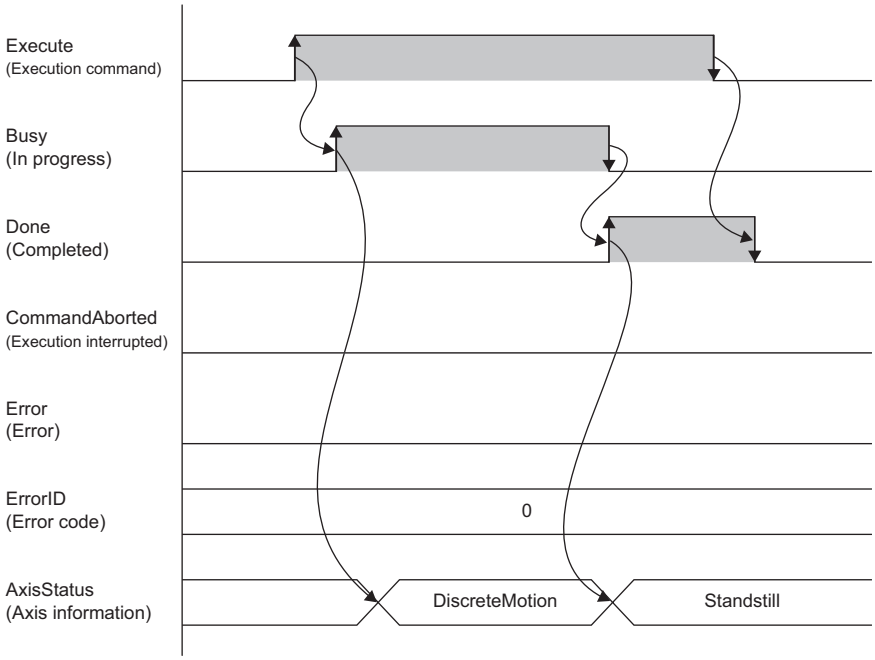
Item	Description
Number of steps	1492 steps The number of steps of the FB embedded in a program depends on the input/output definitions and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. 📖 GX Works3 Operating Manual
Points of labels used	• Label: 0.06K points (Word) • Latch Label: 0K points (Word) The points of labels embedded in a program depend on the devices specified for arguments and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. 📖 GX Works3 Operating Manual
Points of index registers used	• Index register: 0 points • Long index register: 0 points
Points of file registers used	File register: 0 points (Word)
FB dependency	No dependency
FB compilation method	Subroutine type
FB operation	Pulse execution type (multiple scan execution type)

Function description

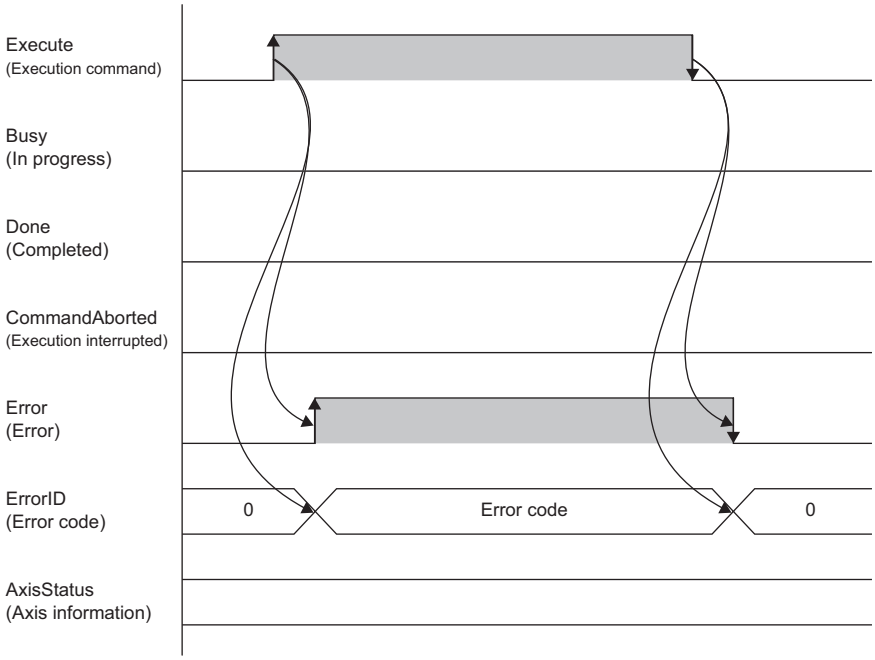
- When Execute (execution command) is turned on, this FB positions the specified axis in the target position set based on the absolute position. While absolute positioning is being executed, Busy (executing) turns on, and AxisStatus (axis status) of Axis (axis information) transitions to DiscreteMotion. When the axis is positioned completely, Busy turns off, Done (completed) turns on, and the AxisStatus transitions to Standstill. (☞ Page 17 State Transition Diagram)
- Direction (rotation direction) is enabled only when the control unit is degree. It is ignored when the control unit is other than degree.
- If an error occurs in the FB, the FB turns on Error (error), and stores the error code in ErrorID (error code). (☞ Page 45 Error codes)
- This FB can be used in the following conditions.
  - Standstill
  - DiscreteMotion (It cannot be used during deceleration by MC_HaltCCLinkIEFBasic_F.)
  - ContinuousMotion and zero speed

Timing chart of I/O signals

■Completed successfully



■Completed with an error



Precautions

- To turn on and then turn off Execute, turn it off after Busy (executing) turns on.
- If MC_MoveAbsolute is executed when the control unit is degree and this FB is operating, Direction (rotation direction) is disabled and the active rotation direction is transferred.
- Because this FB does not check the range of input labels, even if a value out of the range is set and executed, Error (error) does not turn on and Done (completed) turns on without executing positioning. In this case, a positioning warning (alarm number: F4) will occur in the servo amplifier, so turn Execute off once, remove the cause of the alarm, and then turn Execute on again.

Parameter settings

There are no parameter settings specific to this FB. For details on the common parameter settings, refer to the following.
☞ Page 19 Parameter Settings

Performance values

Module	Measurement condition*3	Processing time	Maximum scan time	Number of scans
FX5S, FX5UJ	Axis 1	2399ms	1.45ms	3327 scans
FX5U, FX5UC*1*2	Axis 1	2408ms	1.64ms	2186 scans

*1 Measured with the program capacity set to 128K steps.
*2 The standard area is used for labels.
*3 This is the result of executing absolute positioning immediately after homing, with the settings of the current position (0 pulse), number of command input pulses per rotation (10000 pulses/rev), target position (300000 pulses), target speed (1000r/min), acceleration time (1500ms), and deceleration time (1500ms).

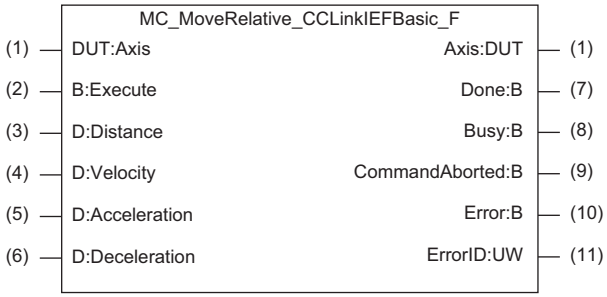
Error codes

Error code	Description	Action
1200H	The READY signal is off.	• Turn on the cyclic communication ready command (RY3F). • Clear the error in the Ethernet-equipped module, and execute the FB again.
1202H	An error occurred in the servo amplifier.	Clear the error in the servo amplifier, and execute the FB again.
1203H	The FB is in the execution disabled state.	• For the axis operation FB, execute it again after the active control operation is completed. • Execute MC_Power_CCLinkIEFBasic_F to enable operation, and then execute the FB again. • If a warning occurs in the servo amplifier, remove the cause of the warning, and execute the FB again.
1204H	The axis is in the Stopping state.	Change the status of the axis to the StandStill state, and execute the FB again.

3.6 MC_MoveRelative_CCLinkIEFBasic_F (Relative Positioning)

Overview

This FB moves the specified axis the set distance from its current command position.



Labels

I/O label

No.	Label	Name	Data type	Setting range	Description
(1)	Axis	Axis information	AXIS_REF_CCLinkIEFBasic_F	—	☞ Page 13 AXIS_REF_CCLinkIEFBasic_F

Input labels

No.	Label	Name	Data type	Setting range	Description
(2)	Execute	Execution command	Bit	ON, OFF	When the value is on, the FB is executed.
(3)	Distance	Travel distance	Double word [signed]	☞ Page 10 FB Library Specifications	Set the travel distance.
(4)	Velocity	Velocity	Double word [signed]	☞ Page 10 FB Library Specifications	Set the speed command value.
(5)	Acceleration	Acceleration time	Double word [unsigned]	☞ Page 10 FB Library Specifications	Set the time to be taken by the servo motor to reach the rated rotation speed.
(6)	Deceleration	Deceleration time	Double word [unsigned]	☞ Page 10 FB Library Specifications	Set the time to be taken by the servo motor to stop rotation from the rated rotation speed.

Output labels

No.	Label	Name	Data type	Default value	Description
(8)	Done	Completed	Bit	OFF	The on state indicates that the axis reached the target position.
(9)	Busy	Executing	Bit	OFF	The on state indicates that the FB is operating.
(10)	CommandAborted	Execution aborted	Bit	OFF	The on state indicates that execution is aborted by another FB.
(11)	Error	Error	Bit	OFF	The on state indicates that an error has occurred in the FB.
(12)	ErrorID	Error code	Word [unsigned]	0	The error code of an error that occurred in the FB is returned.

Global labels

Refer to the following.

☞ Page 12 List of Global Labels

Function details

Applicable hardware and software

Module	Firmware version	Engineering tool
FX5S CPU module	1.000 or later	GX Works3 Version 1.080J or later
FX5UJ CPU module	1.002 or later	GX Works3 Version 1.070Y or later
FX5U CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5UC CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5-ENET	1.100 or later	GX Works3 Version 1.070Y or later
MR-JET-G	C0 or later	MR Configurator2 Version 1.125F or later
MR-J5-G	C0 or later	MR Configurator2 Version 1.125F or later

Basic specifications

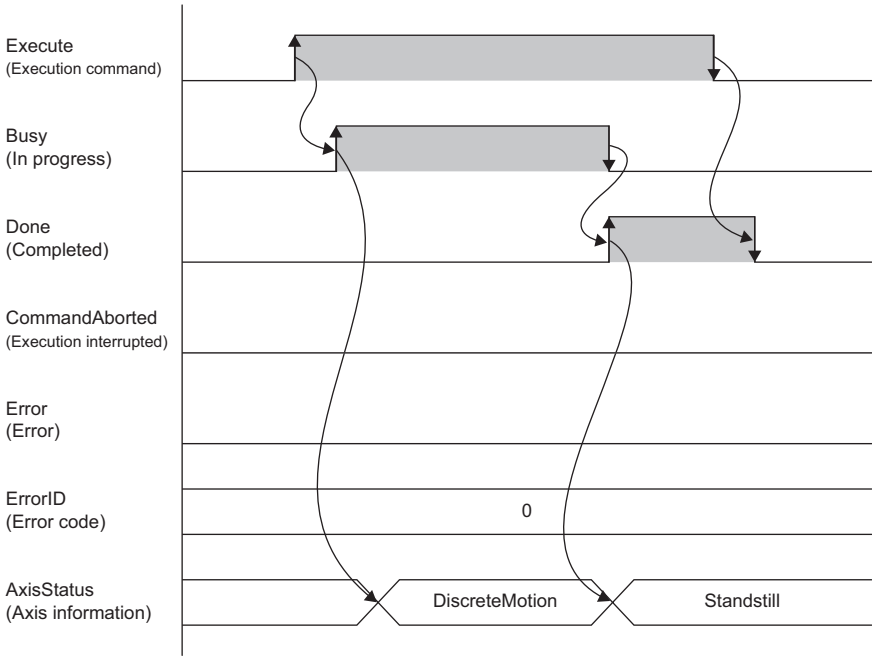
Item	Description
Number of steps	1463 steps The number of steps of the FB embedded in a program depends on the input/output definitions and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. GX Works3 Operating Manual
Points of labels used	• Label: 0.06K points (Word) • Latch Label: 0K points (Word) The points of labels embedded in a program depend on the devices specified for arguments and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. GX Works3 Operating Manual
Points of index registers used	• Index register: 0 points • Long index register: 0 points
Points of file registers used	File register: 0 points (Word)
FB dependency	No dependency
FB compilation method	Subroutine type
FB operation	Pulse execution type (multiple scan execution type)

Function description

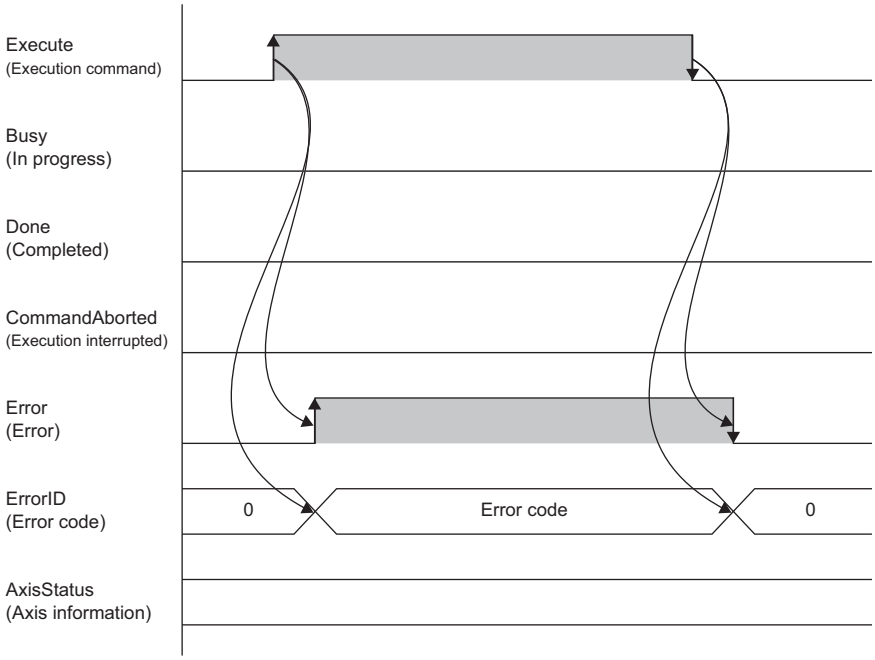
- When Execute (execution command) is turned on, this FB moves the specified axis the specified distance from its current command position. While relative positioning is being executed, Busy (executing) turns on, and AxisStatus (axis status) of Axis (axis information) transitions to DiscreteMotion. When the axis is positioned completely, Busy turns off, Done (completed) turns on, and the AxisStatus transitions to Standstill. (☞ Page 17 State Transition Diagram)
- If an error occurs in the FB, the FB turns on Error (error), and stores the error code in ErrorID (error code). (☞ Page 49 Error codes)
- This FB can be used in the following conditions.
  - Standstill
  - ContinuousMotion and zero speed

Timing chart of I/O signals

■Completed successfully



■Completed with an error



Precautions

- To turn on and then turn off Execute, turn it off after Busy (executing) turns on.
- Because this FB does not check the range of input labels, even if a value out of the range is set and executed, Error (error) does not turn on and Done (completed) turns on without executing positioning. In this case, a positioning warning (alarm number: F4) will occur in the servo amplifier, so turn Execute off once, remove the cause of the alarm, and then turn Execute on again.
- This FB cannot be used to control an axis with the unit set to degree.
- This FB cannot be executed while the positioning control FB is being executed.

Parameter settings

There are no parameter settings specific to this FB. For details on the common parameter settings, refer to the following.

☞ Page 19 Parameter Settings

Performance values

Module	Measurement condition*3	Processing time	Maximum scan time	Number of scans
FX5S, FX5UJ	Axis 1	2394ms	1.46ms	3332 scans
FX5U, FX5UC*1*2	Axis 1	2404ms	1.67ms	2185 scans

*1 Measured with the program capacity set to 128K steps.

*2 The standard area is used for labels.

*3 This is the result of executing relative positioning immediately after homing, with the settings of the current position (0 pulse), number of command input pulses per rotation (10000 pulses/rev), target position (300000 pulses), target speed (1000r/min), acceleration time (1500ms), and deceleration time (1500ms).

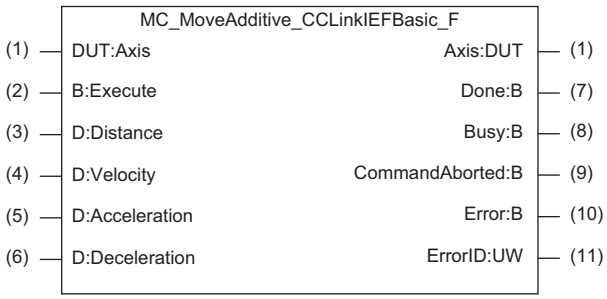
Error codes

Error code	Description	Action
1200H	The READY signal is off.	• Turn on the cyclic communication ready command (RY3F). • Clear the error in the Ethernet-equipped module, and execute the FB again.
1202H	An error occurred in the servo amplifier.	Clear the error in the servo amplifier, and execute the FB again.
1203H	The FB is in the execution disabled state.	• For the axis operation FB, execute it again after the active control operation is completed. • Execute MC_Power_CCLinkIEFBasic_F to enable operation, and then execute the FB again. • If a warning occurs in the servo amplifier, remove the cause of the warning, and execute the FB again.
1204H	The axis is in the Stopping state.	Change the status of the axis to the StandStill state, and execute the FB again.

3.7 MC_MoveAdditive_CCLinkIEFBasic_F (Target Position Change)

Overview

This FB adds the set relative position to the positioning command for the position just before the specified axis and executes positioning.



Labels

I/O label

No.	Label	Name	Data type	Setting range	Description
(1)	Axis	Axis information	AXIS_REF_CCLinkIEFBasic_F	—	☞ Page 13 AXIS_REF_CCLinkIEFBasic_F

Input labels

No.	Label	Name	Data type	Setting range	Description
(2)	Execute	Execution command	Bit	ON, OFF	When the value is on, the FB is executed.
(3)	Distance	Travel distance	Double word [signed]	☞ Page 10 FB Library Specifications	Set the travel distance based on the relative position.
(4)	Velocity	Velocity	Double word [signed]	☞ Page 10 FB Library Specifications	Set the speed command value.
(5)	Acceleration	Acceleration time	Double word [signed]	☞ Page 10 FB Library Specifications	Set the time to be taken by the servo motor to reach the rated rotation speed.
(6)	Deceleration	Deceleration time	Double word [signed]	☞ Page 10 FB Library Specifications	Set the time to be taken by the servo motor to stop rotation from the rated rotation speed.

Output labels

No.	Label	Name	Data type	Default value	Description
(7)	Done	Completed	Bit	OFF	The on state indicates that the axis reached the target position.
(8)	Busy	Executing	Bit	OFF	The on state indicates that the FB is operating.
(9)	CommandAborted	Execution aborted	Bit	OFF	The on state indicates that execution is aborted by another FB.
(10)	Error	Error	Bit	OFF	The on state indicates that an error has occurred in the FB.
(11)	ErrorID	Error code	Word [unsigned]	0	The error code of an error that occurred in the FB is returned.

Global labels

Refer to the following.

☞ Page 12 List of Global Labels

Function details

Applicable hardware and software

Module	Firmware version	Engineering tool
FX5S CPU module	1.000 or later	GX Works3 Version 1.080J or later
FX5UJ CPU module	1.002 or later	GX Works3 Version 1.070Y or later
FX5U CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5UC CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5-ENET	1.100 or later	GX Works3 Version 1.070Y or later
MR-JET-G	C0 or later	MR Configurator2 Version 1.125F or later
MR-J5-G	C0 or later	MR Configurator2 Version 1.125F or later

Basic specifications

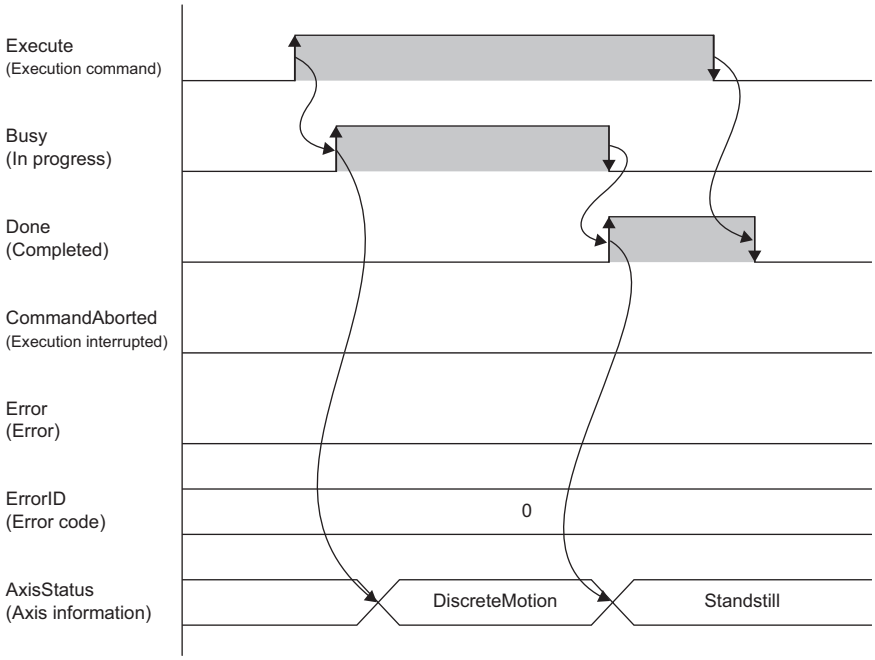
Item	Description
Number of steps	1467 steps The number of steps of the FB embedded in a program depends on the input/output definitions and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. GX Works3 Operating Manual
Points of labels used	• Label: 0.06K points (Word) • Latch Label: 0K points (Word) The points of labels embedded in a program depend on the devices specified for arguments and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. GX Works3 Operating Manual
Points of index registers used	• Index register: 0 points • Long index register: 0 points
Points of file registers used	File register: 0 points (Word)
FB dependency	No dependency
FB compilation method	Subroutine type
FB operation	Pulse execution type (multiple scan execution type)

Function description

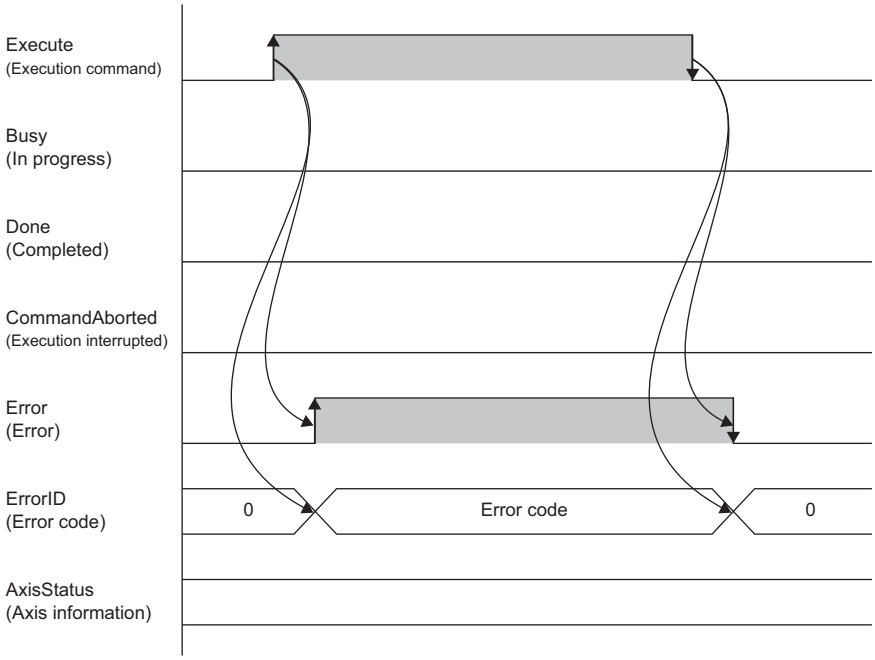
- When Execute (execution command) is turned on, this FB adds the set relative position to the positioning command for the position just before the specified axis and executes positioning. While positioning is being executed, Busy (executing) turns on, and AxisStatus (axis status) of Axis (axis information) transitions to DiscreteMotion. When the axis is positioned completely, Busy turns off, Done (completed) turns on, and the AxisStatus transitions to Standstill. (☞ Page 17 State Transition Diagram)
- If an error occurs in the FB, the FB turns on Error (error), and stores the error code in ErrorID (error code). (☞ Page 53 Error codes)
- This FB can be used in the following conditions.
  - Standstill
  - DiscreteMotion (It cannot be used during deceleration by MC_HaltCCLinkIEFBasic_F.)
  - ContinuousMotion and zero speed

Timing chart of I/O signals

■Completed successfully



■Completed with an error



Precautions

- To turn on and then turn off Execute, turn it off after Busy (executing) turns on.
- Because this FB does not check the range of input labels, even if a value out of the range is set and executed, Error (error) does not turn on and Done (completed) turns on without executing positioning. In this case, a positioning warning (alarm number: F4) will occur in the servo amplifier, so turn Execute off once, remove the cause of the alarm, and then turn Execute on again.
- This FB cannot be used to control an axis with the control unit set to degree.

Parameter settings

There are no parameter settings specific to this FB. For details on the common parameter settings, refer to the following.

☞ Page 19 Parameter Settings

Performance values

Module	Measurement condition*3	Processing time	Maximum scan time	Number of scans
FX5S, FX5UJ	Axis 1	2395ms	1.43ms	3333 scans
FX5U, FX5UC*1*2	Axis 1	2409ms	1.66ms	2188 scans

*1 Measured with the program capacity set to 128K steps.

*2 The standard area is used for labels.

*3 This is the result of executing target position change immediately after homing, with the settings of the current position (0 pulse), number of command input pulses per rotation (10000 pulses/rev), target position (300000 pulses), target speed (1000r/min), acceleration time (1500ms), and deceleration time (1500ms).

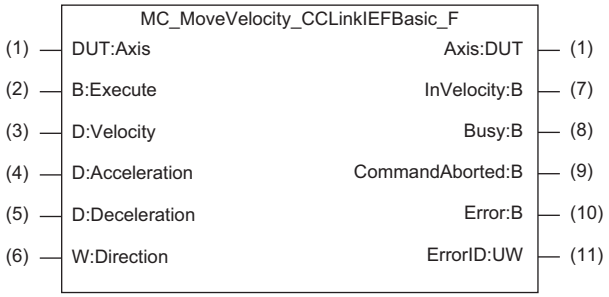
Error codes

Error code	Description	Action
1200H	The READY signal is off.	• Turn on the cyclic communication ready command (RY3F). • Clear the error in the Ethernet-equipped module, and execute the FB again.
1202H	An error occurred in the servo amplifier.	Clear the error in the servo amplifier, and execute the FB again.
1203H	The FB is in the execution disabled state.	• For the axis operation FB, execute it again after the active control operation is completed. • Execute MC_Power_CCLinkIEFBasic_F to enable operation, and then execute the FB again. • If a warning occurs in the servo amplifier, remove the cause of the warning, and execute the FB again.
1204H	The axis is in the Stopping state.	Change the status of the axis to the StandStill state, and execute the FB again.

3.8 MC_MoveVelocity_CCLinkIEFBasic_F (Velocity Control)

Overview

This FB controls speed of the specified axis at the set speed.



Labels

I/O label

No.	Label	Name	Data type	Setting range	Description
(1)	Axis	Axis information	AXIS_REF_CCLinkIEFBasic_F	—	☞ Page 13 AXIS_REF_CCLinkIEFBasic_F

Input labels

No.	Label	Name	Data type	Setting range	Description
(2)	Execute	Execution command	Bit	ON, OFF	When the value is on, the FB is executed.
(3)	Velocity	Target speed	Double word [signed]	☞ Page 10 FB Library Specifications	Set the speed command value. A value can be set as signed.
(4)	Acceleration	Acceleration time	Double word [signed]	☞ Page 10 FB Library Specifications	Set the time to be taken by the servo motor to reach the rated rotation speed.
(5)	Deceleration	Deceleration time	Double word [signed]	☞ Page 10 FB Library Specifications	Set the time to be taken by the servo motor to stop rotation from the rated rotation speed.
(6)	Direction	Rotation direction	Word [signed]	☞ Page 12 MC_DIRECTION_CCLinkIEFBasic_F	Specify the rotation direction. Select the direction from the following two options in MC_DIRECTION_CCLinkIEFBasic_F. • mcPositiveDirection positive direction • mcNegativeDirection negative direction

Output labels

No.	Label	Name	Data type	Default value	Description
(7)	InVelocity	Target speed reached	Bit	OFF	Indicates that the specified speed was reached.
(8)	Busy	Executing	Bit	OFF	The on state indicates that the FB is operating.
(9)	CommandAborted	Execution aborted	Bit	OFF	The on state indicates that execution is aborted by another FB.
(10)	Error	Error	Bit	OFF	The on state indicates that an error has occurred in the FB.
(11)	ErrorID	Error code	Word [unsigned]	0	The error code of an error that occurred in the FB is returned.

Global labels

Refer to the following.

☞ Page 12 List of Global Labels

Function details

Applicable hardware and software

Module	Firmware version	Engineering tool
FX5S CPU module	1.000 or later	GX Works3 Version 1.080J or later
FX5UJ CPU module	1.002 or later	GX Works3 Version 1.070Y or later
FX5U CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5UC CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5-ENET	1.100 or later	GX Works3 Version 1.070Y or later
MR-JET-G	C5 or later	MR Configurator2 Version 1.125F or later
MR-J5-G	C5 or later	MR Configurator2 Version 1.125F or later

Basic specifications

Item	Description
Number of steps	1389 steps The number of steps of the FB embedded in a program depends on the input/output definitions and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. GX Works3 Operating Manual
Points of labels used	• Label: 0.07K points (Word) • Latch Label: 0K points (Word) The points of labels embedded in a program depend on the devices specified for arguments and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. GX Works3 Operating Manual
Points of index registers used	• Index register: 0 points • Long index register: 0 points
Points of file registers used	File register: 0 points (Word)
FB dependency	No dependency
FB compilation method	Subroutine type
FB operation	Pulse execution type (multiple scan execution type)

Function description

- When Execute (execution command) is turned on, this FB executes velocity control on the specified axis at the set speed. When processing starts normally, Busy (executing) turns on, and the AxisStatus (axis status) of Axis (axis information) transitions to ContinuousMotion. When the axis operates in the velocity control mode and the target speed is reached, InVelocity (target speed reached) turns on. Busy and InVelocity are held until Execute is turned off or control is aborted. (☞ Page 17 State Transition Diagram)
- For the actual rotation direction, the operation is as follows depending on the combination of Velocity (target speed) and Direction (rotation direction).

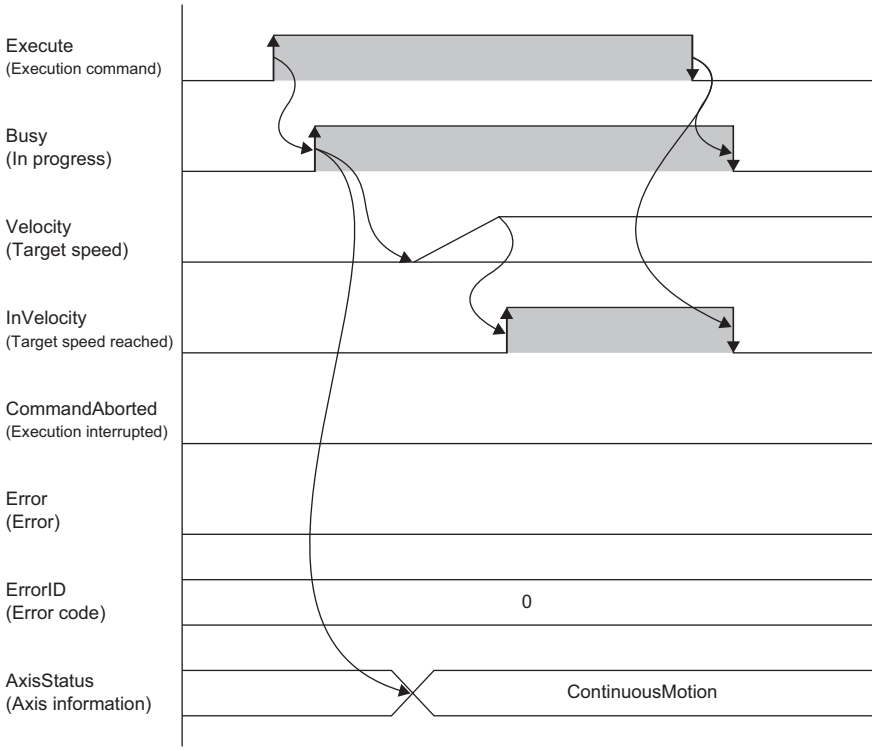
Velocity (target speed)	Direction (rotation direction)	
	mcPositiveDirection	mcNegativeDirection
Positive value	Forward rotation	Reverse rotation
Negative value	Reverse rotation	Forward rotation*1

*1 If Velocity is set to -2147483648, operation is performed with the target speed of 2147483647.

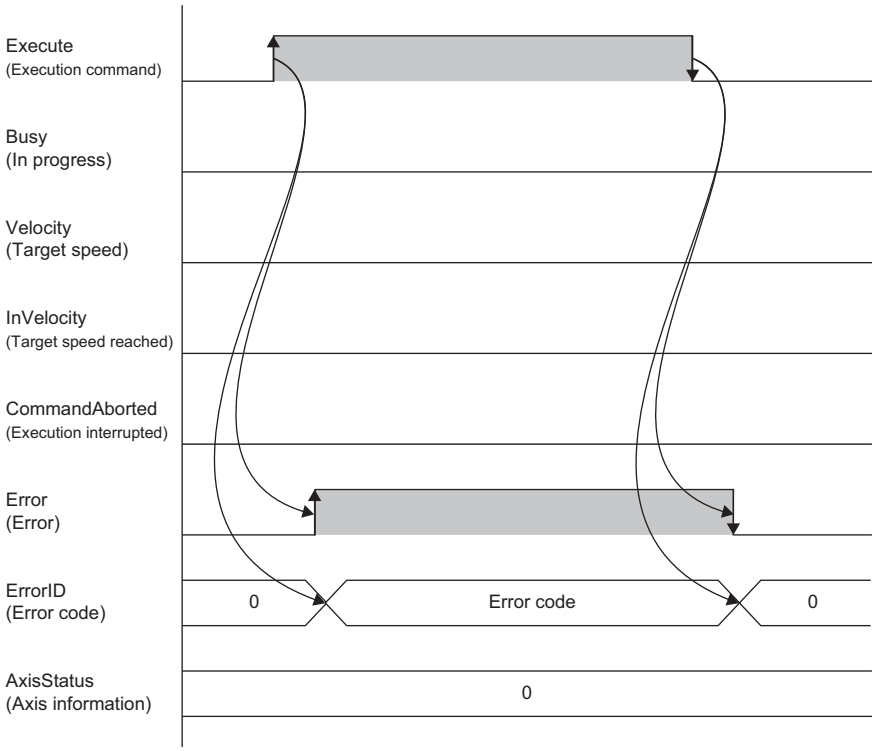
- When a new instance of MC_MoveVelocity_CCLinkIEFBasic_F or MC_TorqueControl_CCLinkIEFBasic_F is executed, the current execution is aborted to switch control.
- To stop the operation, MC_Halt_CCLinkIEFBasic_F or MC_Stop_CCLinkIEFBasic_F is used. When the operation is aborted, CommandAborted (execution aborted) turns on. Note that CommandAborted is turned off by turning off Execute.
- If an error occurs in the FB, the FB turns on Error (error), and stores the error code in ErrorID (error code). (☞ Page 57 Error codes)

Timing chart of I/O signals

■Completed successfully



■Completed with an error



Precautions

- To execute this FB while the positioning control FB is being executed, execute it when the axis is stopped. If this FB is executed before the axis stops, an error occurs.
- When switching the mode from the velocity control mode to the torque control mode, the motor speed may fluctuate momentarily. Therefore, it is recommended to switch the mode from the velocity control mode to the torque control mode after stopping the motor.
- InVelocity (target speed reached) turns on when the following condition is satisfied:

Velocity (target speed) - α*1 ≤ Velocity actual value (current speed) ≤ Velocity (target speed) + α*1

*1 α: Velocity (target speed) × 0.05 + 2000 [$\times 10^{-2}$r/min]

If InVelocity does not turn on even after the specified time (acceleration time or deceleration time) has elapsed, check Velocity actual value (current speed) and the values input to the input labels of this FB. For Velocity actual value (current speed), refer to the following.

☞ Page 15 Link Devices

Parameter settings

There are no parameter settings specific to this FB. For details on the common parameter settings, refer to the following.

☞ Page 19 Parameter Settings

Performance values

Module	Measurement condition*3	Processing time	Maximum scan time	Number of scans
FX5S, FX5UJ	Axis 1	511ms	1.21ms	795 scans
FX5U, FX5UC*1*2	Axis 1	513ms	1.36ms	526 scans

*1 Measured with the program capacity set to 128K steps.
*2 The standard area is used for labels.
*3 This is the result of executing speed time for the first time, with the settings of the target speed (1000r/min) and acceleration time (1500ms).

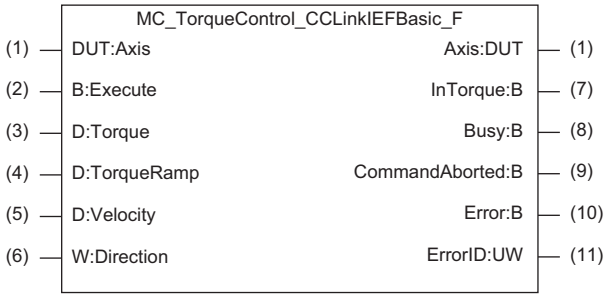
Error codes

Error code	Description	Action
1200H	The READY signal is off.	• Turn on the cyclic communication ready command (RY3F). • Clear the error in the Ethernet-equipped module, and execute the FB again.
1202H	An error occurred in the servo amplifier.	Clear the error in the servo amplifier, and execute the FB again.
1203H	The FB is in the execution disabled state.	• For the axis operation FB, execute it again after the active control operation is completed. • Execute MC_Power_CCLinkIEFBasic_F to enable operation, and then execute the FB again. • Use the servo amplifier with firmware version C5 or later.
1204H	The axis is in the Stopping state.	Change the status of the axis to the StandStill state, and execute the FB again.

3.9 MC_TorqueControl_CCLinkIEFBasic_F (Torque Control)

Overview

This FB executes torque control on the specified axis with the set torque.



Labels

I/O label

No.	Label	Name	Data type	Setting range	Description
(1)	Axis	Axis information	AXIS_REF_CCLinkIEFBasic_F	—	☞ Page 13 AXIS_REF_CCLinkIEFBasic_F

Input labels

No.	Label	Name	Data type	Setting range	Description
(2)	Execute	Execution command	Bit	ON, OFF	When the value is on, the FB is executed.
(3)	Torque	Target control	Double word [signed]	☞ Page 10 FB Library Specifications	Set the specified torque. Set the ratio against the rated torque of the servo motor used in increments of %.
(4)	TorqueRamp	Torque change amount	Double word [signed]	0 to 10000000 [$\times 10^{-1}$%/s]	Set the torque variation amount per one second of torque command in increments of 0.1%/s.
(5)	Velocity	Speed limit	Double word [signed]	☞ Page 10 FB Library Specifications	Set the speed limit value in torque control mode.
(6)	Direction	Rotation direction	Word [signed]	☞ Page 12 List of Global Labels	Specify the rotation direction. Select the direction from the following two options in MC_DIRECTION_CCLinkIEFBasic_F. • mcPositiveDirection positive direction • mcNegativeDirection negative direction

Output labels

No.	Label	Name	Data type	Default value	Description
(7)	InTorque	Target torque reached	Bit	OFF	Indicates that the specified torque was reached.
(8)	Busy	Executing	Bit	OFF	The on state indicates that the FB is operating.
(9)	Active	Controlling	Bit	OFF	The on state indicates that the FB is controlling the axis.
(10)	CommandAborted	Execution aborted	Bit	OFF	The on state indicates that execution is aborted by another FB.
(11)	Error	Error	Bit	OFF	The on state indicates that an error has occurred in the FB.
(12)	ErrorID	Error code	Word [unsigned]	0	The error code of an error that occurred in the FB is returned.

Global labels

Refer to the following.

☞ Page 12 List of Global Labels

Function details

Applicable hardware and software

Module	Firmware version	Engineering tool
FX5S CPU module	1.000 or later	GX Works3 Version 1.080J or later
FX5UJ CPU module	1.002 or later	GX Works3 Version 1.070Y or later
FX5U CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5UC CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5-ENET	1.100 or later	GX Works3 Version 1.070Y or later
MR-JET-G	C5 or later	MR Configurator2 Version 1.125F or later
MR-J5-G	C5 or later	MR Configurator2 Version 1.125F or later

Basic specifications

Item	Description
Number of steps	1323 steps The number of steps of the FB embedded in a program depends on the input/output definitions and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. GX Works3 Operating Manual
Points of labels used	• Label: 0.06K points (Word) • Latch Label: 0K points (Word) The points of labels embedded in a program depend on the devices specified for arguments and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. GX Works3 Operating Manual
Points of index registers used	• Index register: 0 points • Long index register: 0 points
Points of file registers used	File register: 0 points (Word)
FB dependency	No dependency
FB compilation method	Subroutine type
FB operation	Pulse execution type (multiple scan execution type)

Function description

- When Execute (execution command) is turned on, this FB controls torque on the specified axis with the set torque. When processing starts normally, Busy (executing) turns on, and the AxisStatus (axis status) of Axis (axis information) transitions to ContinuousMotion. When the axis operates in the torque control mode and the target torque is reached, InTorque (target torque reached) turns on. Busy (executing) and InTorque are held until Execute is turned off or control is aborted. (☞ Page 17 State Transition Diagram)
- For the actual rotation direction, the operation is as follows depending on the combination of Torque (target torque) and Direction (rotation direction).

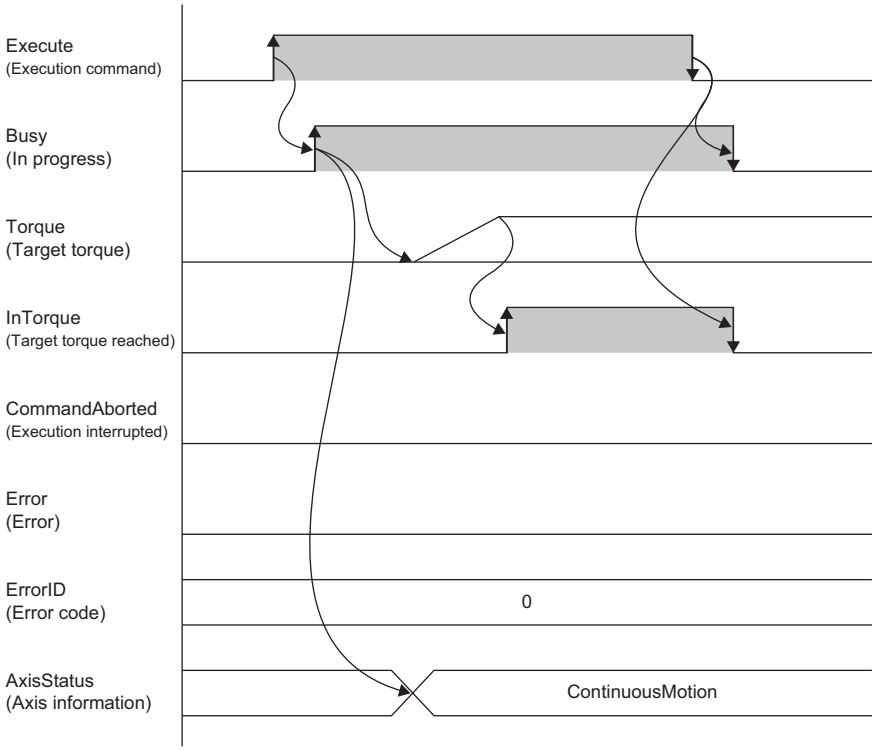
Torque (target torque)	Direction (rotation direction)	
	mcPositiveDirection	mcNegativeDirection
Positive value	Forward rotation	Reverse rotation
Negative value	Reverse rotation	Forward rotation*1

*1 If Torque is set to -32768, operation is performed with the target torque of 32767.

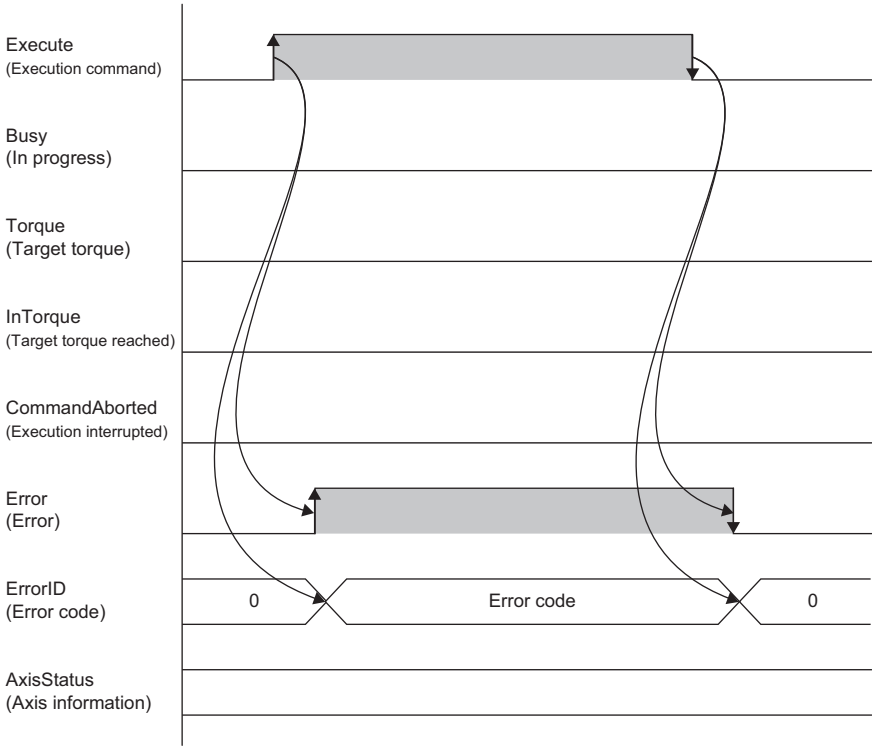
- When a new instance of MC_MoveVelocity_CCLinkIEFBasic_F or MC_TorqueControl_CCLinkIEFBasic_F is executed, the current execution is aborted to switch control.
- To stop the operation, MC_Halt_CCLinkIEFBasic_F is used. When the operation is aborted, CommandAborted (execution aborted) turns on. Note that CommandAborted is turned off by turning off Execute.
- If an error occurs in the FB, the FB turns on Error (error), and stores the error code in ErrorID (error code). (☞ Page 62 Error codes)

Timing chart of I/O signals

■Completed successfully



■Completed with an error



Precautions

To execute this FB while the positioning control FB is being executed, execute it when the axis is stopped. If this FB is executed before the axis stops, an error occurs.

Parameter settings

There are no parameter settings specific to this FB. For details on the common parameter settings, refer to the following.

☞ Page 19 Parameter Settings

Performance values

Module	Measurement condition*3	Processing time	Maximum scan time	Number of scans
FX5S, FX5UJ	Axis 1	16.8ms	0.90ms	20 scans
FX5U, FX5UC*1*2	Axis 1	13.5ms	1.15ms	12 scans

*1 Measured with the program capacity set to 128K steps.

*2 The standard area is used for labels.

*3 This is the result of executing torque control for the first time, with the settings of the target torque (0.1%) and torque change amount (100%/s).

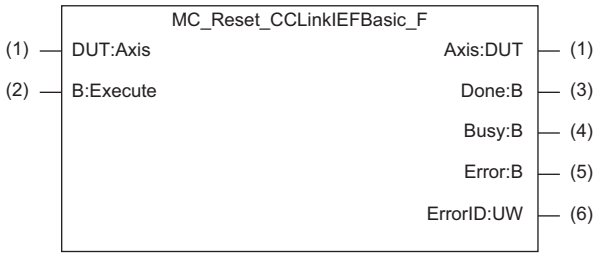
Error codes

Error code	Description	Action
1200H	The READY signal is off.	• Turn on the cyclic communication ready command (RY3F). • Clear the error in the Ethernet-equipped module, and execute the FB again.
1202H	An error occurred in the servo amplifier.	Clear the error in the servo amplifier, and execute the FB again.
1203H	The FB is in the execution disabled state.	• For the axis operation FB, execute it again after the active control operation is completed. • Execute MC_Power_CCLinkIEFBasic_F to enable operation, and then execute the FB again. • Use the servo amplifier with firmware version C5 or later.
1204H	The axis is in the Stopping state.	Change the status of the axis to the StandStill state, and execute the FB again.

3.10 MC_Reset_CCLinkIEFBasic_F (Axis Error Reset)

Overview

This FB clears the error in the specified axis.



Labels

I/O label

No.	Label	Name	Data type	Setting range	Description
(1)	Axis	Axis information	AXIS_REF_CCLinkIEFBasic_F	—	☞ Page 13 AXIS_REF_CCLinkIEFBasic_F

Input label

No.	Label	Name	Data type	Setting range	Description
(2)	Execute	Execution command	Bit	ON, OFF	When the value is on, the FB is executed.

Output labels

No.	Label	Name	Data type	Default value	Description
(3)	Done	Completed	Bit	OFF	The on state indicates that reset is completed.
(4)	Busy	Executing	Bit	OFF	The on state indicates that the FB is operating.
(5)	Error	Error	Bit	OFF	The on state indicates that an error has occurred in the FB.
(6)	ErrorID	Error code	Word [unsigned]	0	The error code of an error that occurred in the FB is returned.

Global labels

Refer to the following.

☞ Page 12 List of Global Labels

Function details

Applicable hardware and software

Module	Firmware version	Engineering tool
FX5S CPU module	1.000 or later	GX Works3 Version 1.080J or later
FX5UJ CPU module	1.002 or later	GX Works3 Version 1.070Y or later
FX5U CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5UC CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5-ENET	1.100 or later	GX Works3 Version 1.070Y or later
MR-JET-G	C0 or later	MR Configurator2 Version 1.125F or later
MR-J5-G	C0 or later	MR Configurator2 Version 1.125F or later

Basic specifications

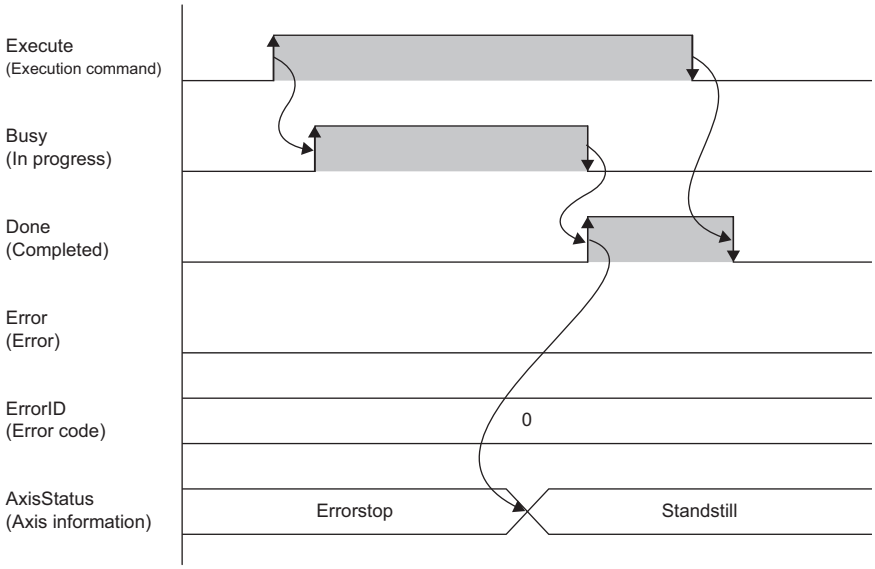
Item	Description
Number of steps	583 steps The number of steps of the FB embedded in a program depends on the input/output definitions and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. GX Works3 Operating Manual
Points of labels used	• Label: 0.03K points (Word) • Latch Label: 0K points (Word) The points of labels embedded in a program depend on the devices specified for arguments and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. GX Works3 Operating Manual
Points of index registers used	• Index register: 0 points • Long index register: 0 points
Points of file registers used	File register: 0 points (Word)
FB dependency	No dependency
FB compilation method	Subroutine type
FB operation	Pulse execution type (multiple scan execution type)

Function description

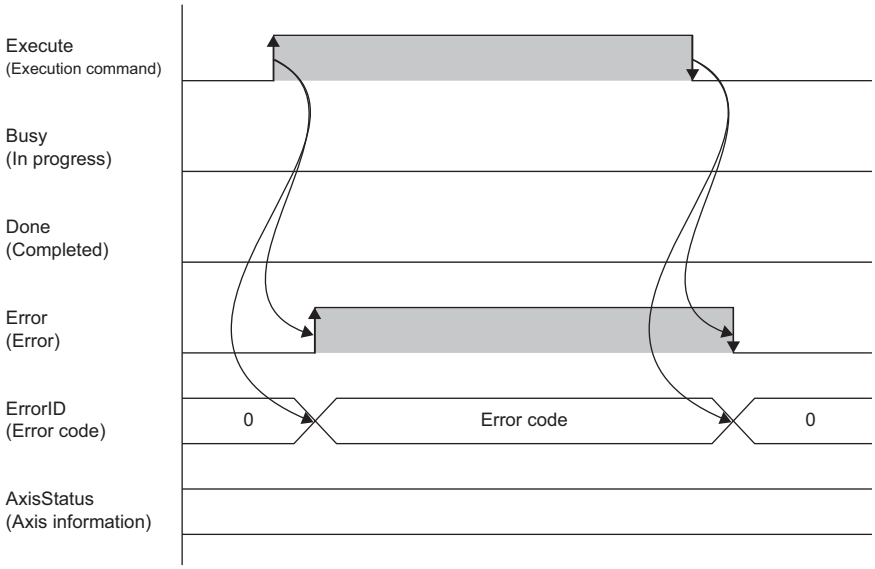
- When Execute (execution command) is turned on, this FB clears the error (alarm) in the specified axis. When this FB starts clearing the error, Busy (executing) turns on, and when the error is cleared completely, Busy turns off, Done (completed) turns on, and AxisStatus (access status) of Axis (axis information) transitions from Errorstop according to the following conditions. (☞ Page 17 State Transition Diagram)
  - If MC_Power_CCLinkIEFBasic_F is being executed: Standstill
  - If MC_Power_CCLinkIEFBasic_F is not being executed: Disabled
- Even if Execute is turned on while the cause of the error in the axis remains, the error will not be cleared. In this case, Busy remains turned on. Turn off Execute once, clear the cause of the error, and then turn on Execute again.
- If an error occurs in the FB, the FB turns on Error (error), and stores the error code in ErrorID (error code). (☞ Page 66 Error code)

Timing chart of I/O signals

■Completed successfully



■Completed with an error



Precautions

- For details on how to clear an error cause, refer to the manuals for the servo amplifiers used.
- In this FB, if the error cannot be cleared, Busy (executing) remains turned on and Done (completed) does not turn on. Create separate time-out processing for when errors cannot be cleared.

Parameter settings

There are no parameter settings specific to this FB. For details on the common parameter settings, refer to the following.

☞ Page 19 Parameter Settings

Performance values

Module	Measurement condition*3	Processing time	Maximum scan time	Number of scans
FX5S, FX5UJ	Axis 1	11.1ms	0.59ms	25 scans
FX5U, FX5UC*1*2	Axis 1	16.1ms	0.57ms	27 scans

*1 Measured with the program capacity set to 128K steps.
*2 The standard area is used for labels.
*3 This is the result of axis error reset while an amplifier error is occurring.

Error code

Error code	Description	Action
1200H	The READY signal is off.	• Turn on the cyclic communication ready command (RY3F). • Clear the error in the Ethernet-equipped module, and execute the FB again.

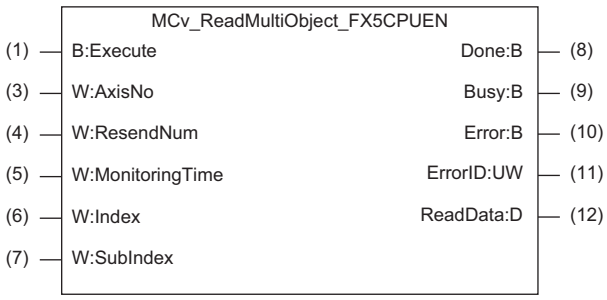
3.11 MCv_ReadMultiObject_Model (Multiple Object Read)

Name	Module
MCv_ReadMultiObject_FX5CPUEN	FX5 CPU module
MCv_ReadMultiObject_FX5ENET	FX5-ENET

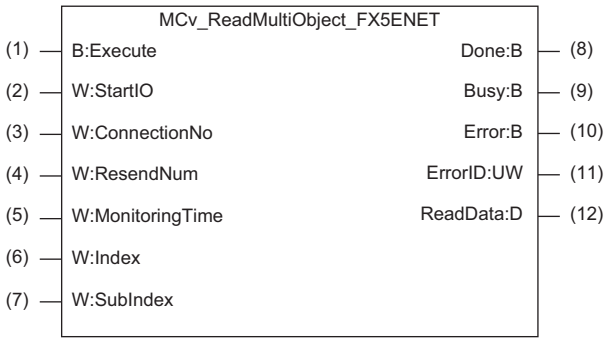
Overview

This FB reads multiple objects from the servo amplifiers.

• FX5 CPU module



• FX5-ENET



Labels

Input labels

No.	Label	Name	Data type	Setting range	Description
(1)	Execute	Execution command	Bit	ON, OFF	When the value is on, the FB is executed.
(2)	StartIO	Module number	Word [signed]	The setting range varies depending on the CPU modules.*2	Specify the module number of the FX5-ENET. ■FX5UJ CPU module 01H to 08H ■FX5U CPU module, FX5UC CPU module 01H to 10H
(3)	AxisNo [FX5 CPU module]	Axis number	Word [signed]	The setting range varies depending on the CPU modules.	Specifies the axis number of the axis to be controlled. ■FX5S CPU module, FX5UJ CPU module 1 to 8 [axis] ■FX5U CPU module, FX5UC CPU module 1 to 16 [axis]
	ConnectionNo [FX5-ENET]	Connection number	Word [signed]	1 to 32	Specifies the axis number of the axis to be controlled.
(4)	ResendNum	Number of resends	Word [signed]	0 to 15 [time]	Set the number of resends for SLMP frame transmission.
(5)	MonitoringTime	Arrival monitoring time	Word [signed]	1 to 32767 [second]	Set the arrival monitoring time for SLMP frame transmission.

No.	Label	Name	Data type	Setting range	Description
(6)	Index	Index number	Word [signed] (0..31)	0000H to FFFFH[*1]	Set the index number of the object using an array of 32 elements. An array for which 0 is specified is ignored.
(7)	SubIndex	Subindex number	Word [signed] (0..31)	0 to 255[*1]	Set the subindex number of the object using an array of 32 elements. If the size of the object is less than 4 bytes, the sign-extended value is stored.

*1 For details on the object dictionary, refer to the following.
MR-JET-G User's Manual (Object Dictionary)
MR-J5-G/MR-J5W-G User's Manual (Object Dictionary)

*2 The FX5-ENET cannot be mounted to the FX5S CPU module.

Output labels

No.	Label	Name	Data type	Default value	Description
(8)	Done	Completed	Bit	OFF	The on state indicates that reading has been completed.
(9)	Busy	Executing	Bit	OFF	The on state indicates that the FB is operating.
(10)	Error	Error	Bit	OFF	The on state indicates that an error has occurred in the FB.
(11)	ErrorID	Error code	Word [unsigned]	0	The error code of an error that occurred in the FB is returned.
(12)	ReadData	Read data storage destination	Double word [signed] (0..31)	0	Stores the data of the object using an array of 32 elements.

Global labels

Refer to the following.

☞ Page 12 List of Global Labels

Function details

Applicable hardware and software

Module	Firmware version	Engineering tool
FX5S CPU module	1.000 or later	GX Works3 Version 1.080J or later
FX5UJ CPU module	1.002 or later	GX Works3 Version 1.070Y or later
FX5U CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5UC CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5-ENET	1.100 or later	GX Works3 Version 1.070Y or later
MR-JET-G	C0 or later	MR Configurator2 Version 1.125F or later
MR-J5-G	C0 or later	MR Configurator2 Version 1.125F or later

Basic specifications

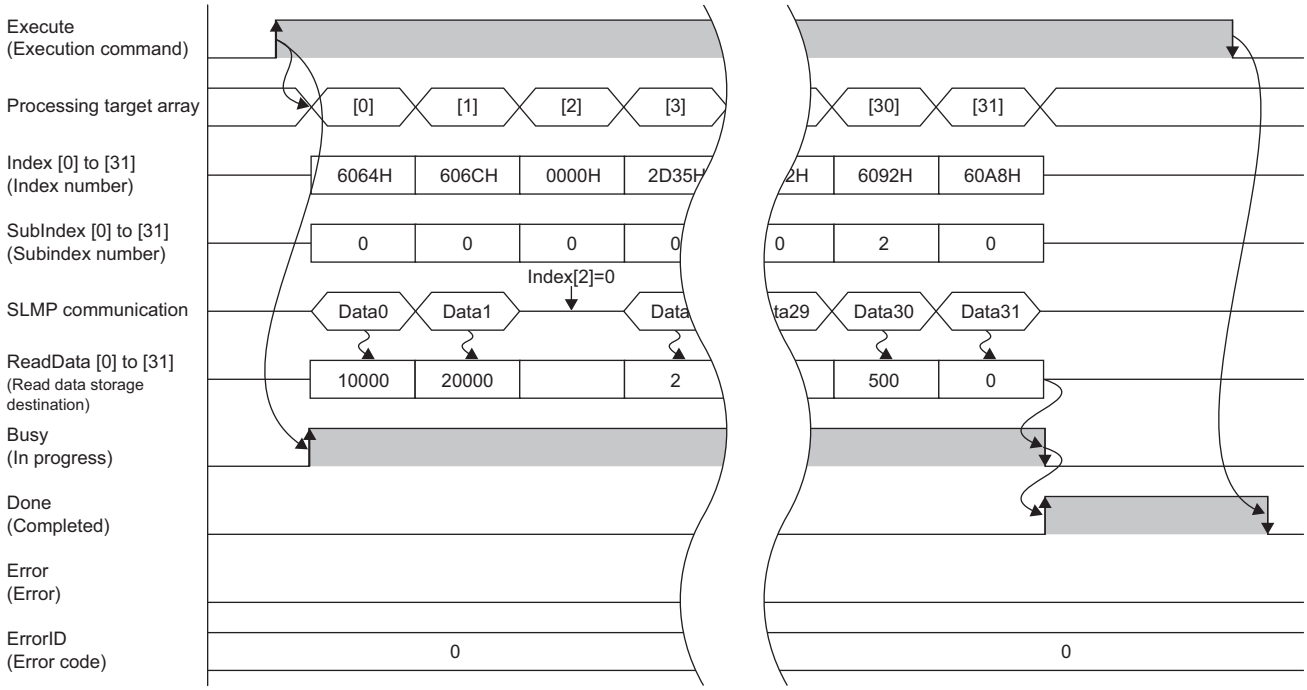
Item	Description
Number of steps	■FX5 CPU module 786 steps ■FX5-ENET 1260 steps The number of steps of the FB embedded in a program depends on the input/output definitions and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. 📖 GX Works3 Operating Manual
Points of labels used	■FX5 CPU module • Label: 0.20K points (Word) • Latch Label: 0K points (Word) ■FX5-ENET • Label: 0.20K points (Word) • Latch Label: 0K points (Word) The points of labels embedded in a program depend on the devices specified for arguments and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. 📖 GX Works3 Operating Manual
Points of index registers used	• Index register: 0 points • Long index register: 0 points
Points of file registers used	File register: 0 points (Word)
FB dependency	No dependency
FB compilation method	Subroutine type
FB operation	Pulse execution type (multiple scan execution type)

Function description

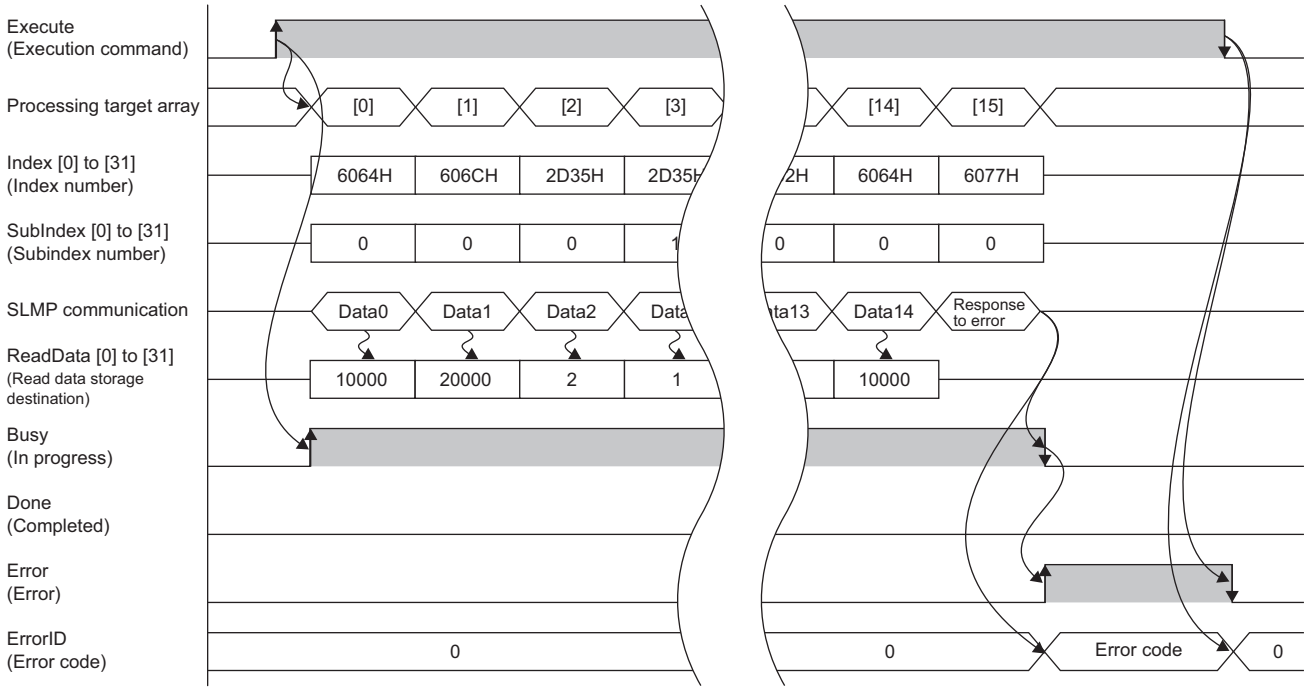
- When Execute (execution command) is turned on, this FB reads multiple objects from the selected servo amplifier. This FB reads 32 objects through SLMP communications according to the data set in the arrays of Index (index number) and SubIndex (subindex number). An array with 0 specified for Index is ignored, and read processing is not performed.
- During read processing, Busy (executing) turns on, and objects are read in order from the beginning of the array. When all the reads are completed successfully, the read data is stored in ReadData (read data storage destination), Busy is turned off, and Done (completed) turns on.
- If an error occurs in the FB, the FB stops reading, turns Error (error) on, and stores the error code in ErrorID (error code). (For example, if an error occurs in the read processing for Index [15], the FB does not read the remaining Indexes [16] to [31].) (☞ Page 72 Error codes)

Timing chart of I/O signals

■Completed successfully



■Completed with an error



Precautions

• This FB uses the following instructions.

Module	Instruction
FX5 CPU module	SLMPSND instruction*1
FX5-ENET	GP.SOCSND instruction, GP.SOCRCV instruction*2

*1 Timing when communications start varies depending on the conditions with which the SP.SLMPSND instructions are executed. If the SP.SLMPSND instruction is executed independently, communications start immediately. If multiple SP.SLMPSND instructions are executed at the same time, communications by the SP.SLMPSND instruction executed earlier are completed, and then communications by the SP.SLMPSND instruction executed later start. Therefore, do not turn off the execution condition of the SP.SLMPSND instruction of this FB or the user program until communications are completed.

*2 This FB and the GP.SOCSND instruction or the GP.SOCRCV instruction cannot be executed at the same time using the same connection number. Release the interlock if they are executed at the same time because communications cannot be performed normally.

• Do not change while this FB is being executed because this FB uses the following special registers.

Module	Special register
FX5 CPU module	• SD11126 (diagnostic information display request) • SD11127 (diagnostic request information) • SD11131 (IP address [lower]) • SD11132 (IP address [upper])
FX5-ENET	SD412 (one-second counter)

Parameter settings

For details on the common parameter settings, refer to the following.

☞ Page 19 Parameter Settings

SLMP communication setting

Since the object read/write FB reads/writes servo amplifier objects through SLMP, perform the SLMP communication setting.

■CPU module

1. Open the Ethernet port setting window.

[Navigation window] ⇨ [Parameter] ⇨ CPU module ⇨ [Module Parameter] ⇨ [Ethernet port]

2. Set the communication data code to "Binary".* 1

[Basic Settings] ⇨ [Own Node Settings] ⇨ [Communication Data Code]

*1 Since the initial value of the communication data code is "binary", it is usually not necessary to set it.

■FX5-ENET

1. Open the Ethernet port setting window.

Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Ethernet module name

2. Open the Ethernet configuration (built-in Ethernet port) window.

[Basic Settings] ⇨ [External Device Configuration] ⇨ "Detailed Setting"

3. Add UDP connection devices.

Add the same number of the UDP connection devices as the number of the servo amplifiers controlled by the object reading FB.

4. Set a port number for an Ethernet-equipped module and IP addresses and port numbers for the UDP connection devices (axis 1 and axis 2).

Connection number	Programmable controller	Sensor/Device	
	Port No.*1	IP Address	Port No.
1	2000	192.168.3.1	5010
2	2001	192.168.3.2	5010

*1 Can be changed within the setting range of the Ethernet-equipped module.

Performance values

Module	Measurement condition*3	Processing time	Maximum scan time	Number of scans
FX5S, FX5UJ	Axis 1	269ms	0.84ms	672 scans
FX5U, FX5UC*1*2	Axis 1	273ms	0.88ms	625 scans

*1 Measured with the program capacity set to 128K steps.
*2 The standard area is used for labels.
*3 This is the result of executing the multiple object read processing for 32 objects (Index: 6064H, SubIndex: 0H).

Error codes

Error code	Description	Action
1208H	Response to a request has not been received.	• Correct the arrival monitoring time. • Check if the connection cable is disconnected. • Set the port number on the servo amplifier side of the connection to be used to 5010.

For other error codes, refer to the following.

MELSEC iQ-F FX5 User's Manual (Communication)
MR-JET-G User's Manual (Communication Function)
MR-J5-G/MR-J5W-G User's Manual (Communication Function)

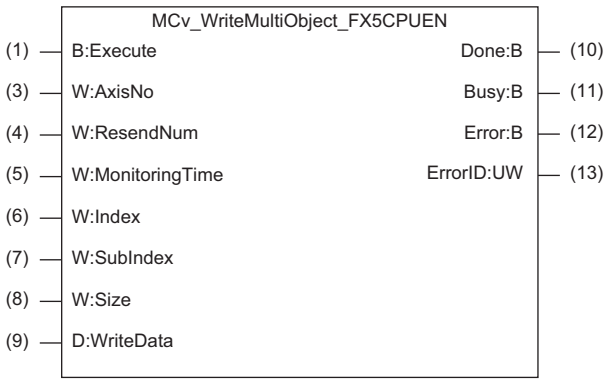
3.12 MCv_WriteMultiObject_Model (Multiple Object Write)

Name	Module
MCv_WriteMultiObject_FX5CPUEN	FX5 CPU module
MCv_WriteMultiObject_FX5ENET	FX5-ENET

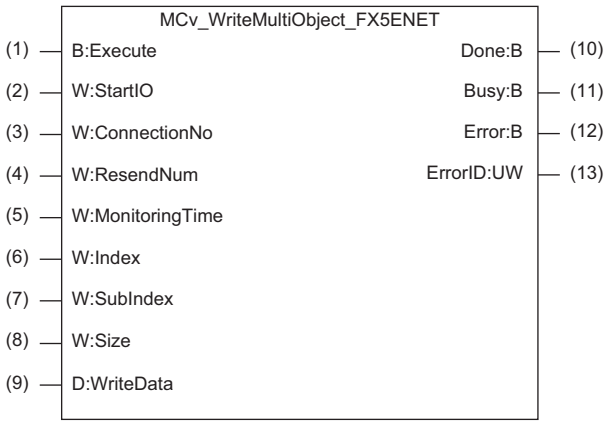
Overview

This FB writes multiple objects of the servo amplifiers.

- FX5 CPU module



- FX5-ENET



Labels

Input labels

No.	Label	Name	Data type	Setting range	Description
(1)	Execute	Execution command	Bit	ON, OFF	When the value is on, the FB is executed.
(2)	StartIO	Module number	Word [signed]	The setting range varies depending on the CPU modules.*2	Specify the module number of the FX5-ENET. ■FX5UJ CPU module 01H to 08H ■FX5U CPU module, FX5UC CPU module 01H to 10H
(3)	AxisNo [FX5 CPU module]	Axis number	Word [signed]	The setting range varies depending on the CPU modules.	Specifies the axis number of the axis to be controlled. ■FX5S CPU module, FX5UJ CPU module 1 to 8 [axis] ■FX5U CPU module, FX5UC CPU module 1 to 16 [axis]
	ConnectionNo [FX5-ENET]	Connection number	Word [signed]	1 to 32	Specifies the axis number of the axis to be controlled.

No.	Label	Name	Data type	Setting range	Description
(4)	ResendNum	Number of resends	Word [signed]	0 to 15 [time]	Set the number of resends for SLMP frame transmission.
(5)	MonitoringTime	Arrival monitoring time	Word [signed]	1 to 32767 [second]	Set the arrival monitoring time for SLMP frame transmission.
(6)	Index	Index number	Word [signed] (0..31)	0,1000H to 9FFFH*1	Set the index number of the object using an array of 32 elements. An array for which 0 is specified is ignored.
(7)	SubIndex	Subindex number	Word [signed] (0..31)	1 to 32*1	Set the subindex number of the object using an array of 32 elements.
(8)	Size	Data size	Word [signed] (0..31)	1 to 4 [bytes]	Set the data size of the object using an array of 32 elements.
(9)	WriteData	Write data storage destination	Double word [signed] (0..31)	—	Stores the data of the object using an array of 32 elements.

*1 For details on the object dictionary, refer to the following.
MR-JET-G User's Manual (Object Dictionary)
MR-J5-G/MR-J5W-G User's Manual (Object Dictionary)

*2 The FX5-ENET cannot be mounted to the FX5S CPU module.

Output labels

No.	Label	Name	Data type	Default value	Description
(10)	Done	Completed	Bit	OFF	The on state indicates that writing has been completed.
(11)	Busy	Executing	Bit	OFF	The on state indicates that the FB is operating.
(12)	Error	Error	Bit	OFF	The on state indicates that an error has occurred in the FB.
(13)	ErrorID	Error code	Word [unsigned]	0	The error code of an error that occurred in the FB is returned.

Global labels

Refer to the following.

☞ Page 12 List of Global Labels

Function details

Applicable hardware and software

Module	Firmware version	Engineering tool
FX5S CPU module	1.000 or later	GX Works3 Version 1.080J or later
FX5UJ CPU module	1.002 or later	GX Works3 Version 1.070Y or later
FX5U CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5UC CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5-ENET	1.100 or later	GX Works3 Version 1.070Y or later
MR-JET-G	C0 or later	MR Configurator2 Version 1.125F or later
MR-J5-G	C0 or later	MR Configurator2 Version 1.125F or later

Basic specifications

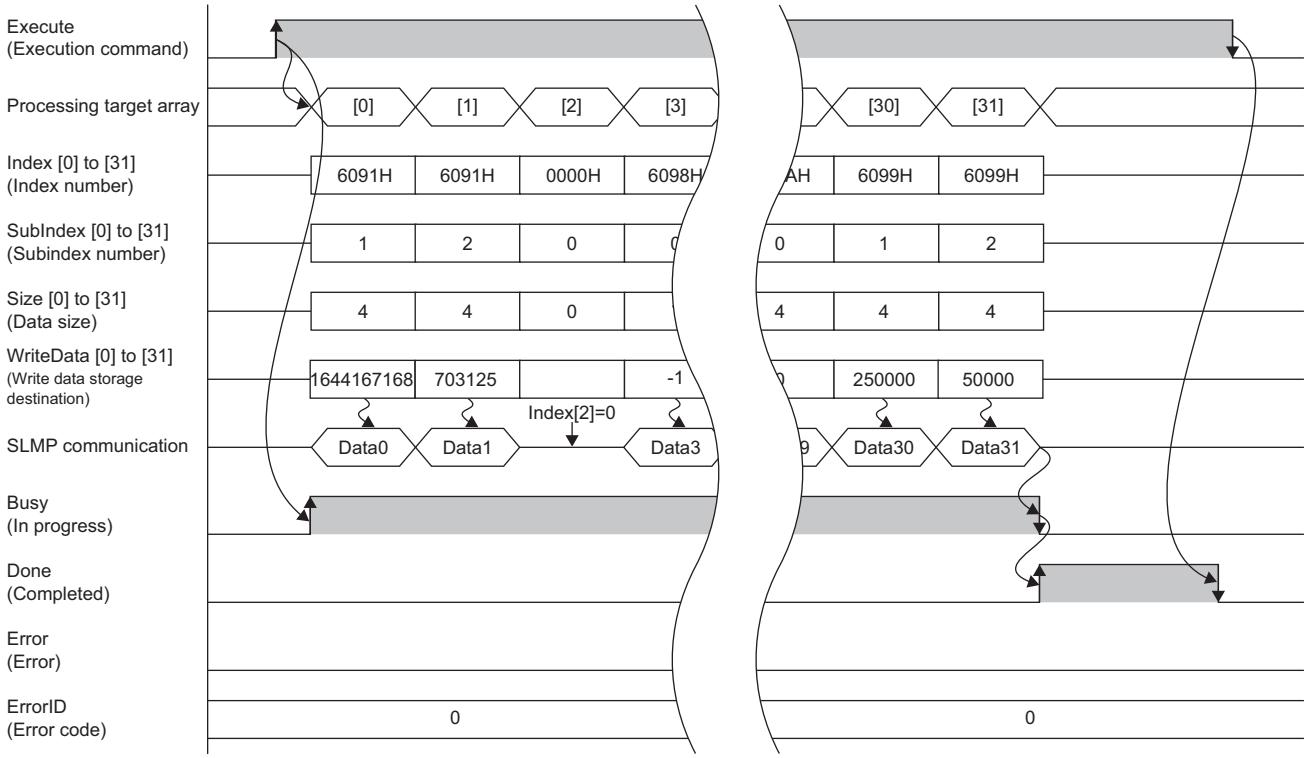
Item	Description
Number of steps	■FX5 CPU module 724 steps ■FX5-ENET 1192 steps The number of steps of the FB embedded in a program depends on the input/output definitions and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. 📖 GX Works3 Operating Manual
Points of labels used	■FX5 CPU module • Label: 0.23K points (Word) • Latch Label: 0K points (Word) ■FX5-ENET • Label: 0.24K points (Word) • Latch Label: 0K points (Word) The points of labels embedded in a program depend on the devices specified for arguments and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. 📖 GX Works3 Operating Manual
Points of index registers used	• Index register: 0 points • Long index register: 0 points
Points of file registers used	File register: 0 points (Word)
FB dependency	No dependency
FB compilation method	Subroutine type
FB operation	Pulse execution type (multiple scan execution type)

Function description

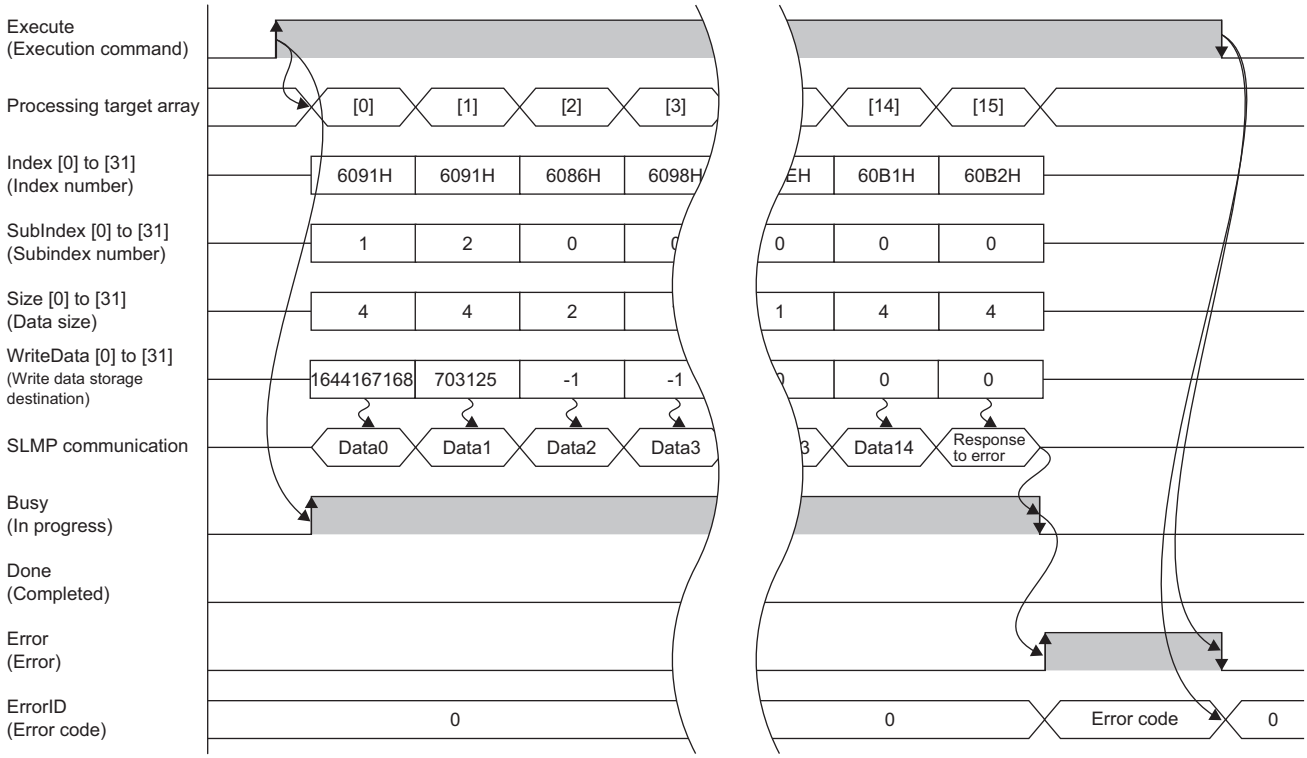
- When Execute (execution command) is turned on, this FB writes multiple objects to the selected servo amplifier. This FB writes 32 objects through SLMP communications according to the data set in the arrays of Index (index number), SubIndex (subindex number), Size (data size), and WriteData (write data storage destination). An array with 0 specified for Index is ignored, and write processing is not performed.
- During write processing, Busy (executing) turns on, and when the processing is completed successfully, Busy turns off and Done (completed) turns on.
- If an error occurs in the FB, the FB stops write processing, turns Error (error) on, and stores the error code in ErrorID (error code). (For example, if an error occurs in the write processing for Index [15], the FB does not write the remaining Indexes [16] to [31].) (☞ Page 77 Error codes)

Timing chart of I/O signals

■Completed successfully



■Completed with an error



Precautions

• This FB uses the following instructions.

Module	Instruction
FX5 CPU module	SLMPSND instruction*1
FX5-ENET	GP.SOCSND instruction, GP.SOCRCV instruction*2

*1 Timing when communications start varies depending on the conditions with which the SP.SLMPSND instructions are executed. If the SP.SLMPSND instruction is executed independently, communications start immediately. If multiple SP.SLMPSND instructions are executed at the same time, communications by the SP.SLMPSND instruction executed earlier are completed, and then communications by the SP.SLMPSND instruction executed later start. Therefore, do not turn off the execution condition of the SP.SLMPSND instruction of this FB or the user program until communications are completed.

*2 This FB and the GP.SOCSND instruction or the GP.SOCRCV instruction cannot be executed at the same time using the same connection number. Release the interlock if they are executed at the same time because communications cannot be performed normally.

• Do not change while this FB is being executed because this FB uses the following special registers.

Module	Special register
FX5 CPU module	• SD11126 (diagnostic information display request) • SD11127 (diagnostic request information) • SD11131 (IP address [lower]) • SD11132 (IP address [upper])
FX5-ENET	SD412 (one-second counter)

Parameter settings

• For details on the parameter settings required for the object read/write FB, refer to the following.

☞ Page 71 Parameter settings

• For details on the common parameter settings, refer to the following.

☞ Page 19 Parameter Settings

Performance values

Module	Measurement condition*3	Processing time	Maximum scan time	Number of scans
FX5S, FX5UJ	Axis 1	274ms	0.91ms	608 scans
FX5U, FX5UC*1*2	Axis 1	286ms	0.96ms	568 scans

*1 Measured with the program capacity set to 128K steps.

*2 The standard area is used for labels.

*3 This is the result of executing the multiple object write processing for 32 objects (Index: 607EH, SubIndex: 0H).

Error codes

Error code	Description	Action
1208H	Response to a request has not been received.	• Correct the arrival monitoring time. • Check if the connection cable is disconnected. • Set the port number on the servo amplifier side of the connection to be used to 5010.

For other error codes, refer to the following.

MELSEC iQ-F FX5 User's Manual (Communication)
MR-JET-G User's Manual (Communication Function)
MR-J5-G/MR-J5W-G User's Manual (Communication Function)

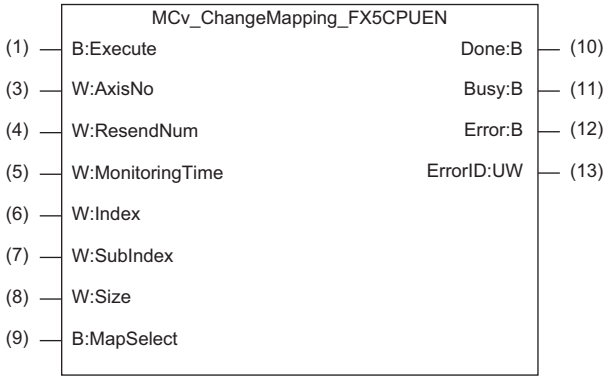
3.13 MCv_ChangeMapping_Model (Mapping Change)

Name	Module
MCv_ChangeMapping_FX5CPUEN	FX5 CPU module
MCv_ChangeMapping_FX5ENET	FX5-ENET

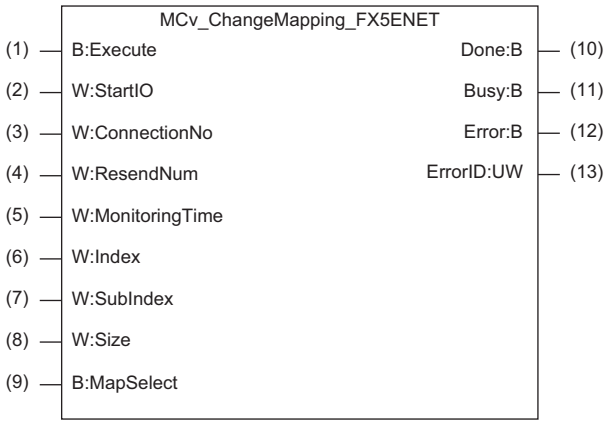
Overview

This FB changes the mapping of the servo amplifier.

• FX5 CPU module



• FX5-ENET



Labels

Input labels

No.	Label	Name	Data type	Setting range	Description
(1)	Execute	Execution command	Bit	ON, OFF	When the value is on, the FB is executed.
(2)	StartIO	Module number	Word [signed]	The setting range varies depending on the CPU modules.*2	Specify the module number of the FX5-ENET. ■FX5UJ CPU module 01H to 08H ■FX5U CPU module, FX5UC CPU module 01H to 10H
(3)	AxisNo [FX5 CPU module]	Axis number	Word [signed]	The setting range varies depending on the CPU modules.	Specifies the axis number of the axis to be controlled. ■FX5S CPU module, FX5UJ CPU module 1 to 8 [axis] ■FX5U CPU module, FX5UC CPU module 1 to 16 [axis]
	ConnectionNo [FX5-ENET]	Connection number	Word [signed]	1 to 32	Specifies the axis number of the axis to be controlled.

No.	Label	Name	Data type	Setting range	Description
(4)	ResendNum	Number of resends	Word [signed]	0 to 15 [time]	Set the number of resends for SLMP frame transmission.
(5)	MonitoringTime	Arrival monitoring time	Word [signed]	1 to 32767 [second]	Set the arrival monitoring time for SLMP frame transmission.
(6)	Index	Index number	Word [signed] (0..31)	0,1000H to 9FFFH*1	Set the index number of the object to be mapped using an array of 32 elements.
(7)	SubIndex	Subindex number	Word [signed] (0..31)	1 to 32*1	Set the subindex number of the object to be mapped using an array of 32 elements.
(8)	Size	Data size	Word [signed] (0..31)	1 to 4 [bytes]	Set the object data size of the object to be mapped using an array of 32 elements.
(9)	MapSwitch	Map switching	Bit	ON, OFF	Switches mapping change targets. OFF: [1st Transmit PDO Mapping (Obj.1A00H)] ON: [1st Receive PDO Mapping (Obj.1600H)]

*1 For details on the object dictionary, refer to the following.
MR-JET-G User's Manual (Object Dictionary)
MR-J5-G/MR-J5W-G User's Manual (Object Dictionary)

*2 The FX5-ENET cannot be mounted to the FX5S CPU module.

Output labels

No.	Label	Name	Data type	Default value	Description
(10)	Done	Completed	Bit	OFF	The on state indicates that mapping change has been completed.
(11)	Busy	Executing	Bit	OFF	The on state indicates that the FB is operating.
(12)	Error	Error	Bit	OFF	The on state indicates that an error has occurred in the FB.
(13)	ErrorID	Error code	Word [unsigned]	0	The error code of an error that occurred in the FB is returned.

Global labels

Refer to the following.

☞ Page 12 List of Global Labels

Function details

Applicable hardware and software

Module	Firmware version	Engineering tool
FX5S CPU module	1.000 or later	GX Works3 Version 1.080J or later
FX5UJ CPU module	1.002 or later	GX Works3 Version 1.070Y or later
FX5U CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5UC CPU module	1.220 or later	GX Works3 Version 1.070Y or later
FX5-ENET	1.100 or later	GX Works3 Version 1.070Y or later
MR-JET-G	C0 or later	MR Configurator2 Version 1.125F or later
MR-J5-G	C0 or later	MR Configurator2 Version 1.125F or later

Basic specifications

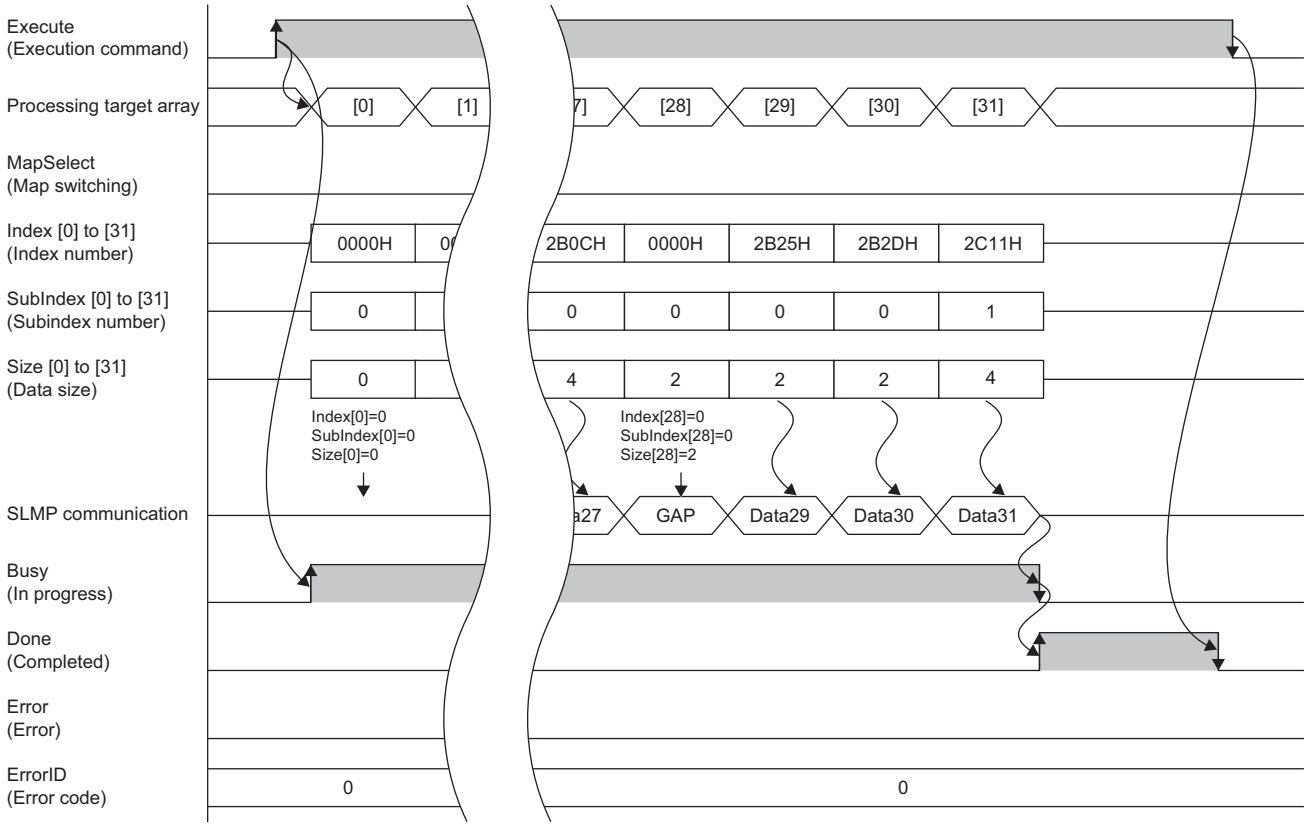
Item	Description
Number of steps	■FX5 CPU module 894 steps ■FX5-ENET 1414 steps The number of steps of the FB embedded in a program depends on the input/output definitions and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. 📖 GX Works3 Operating Manual
Points of labels used	■FX5 CPU module • Label: 0.17K points (Word) • Latch Label: 0K points (Word) ■FX5-ENET • Label: 0.19K points (Word) • Latch Label: 0K points (Word) The points of labels embedded in a program depend on the devices specified for arguments and the option setting of GX Works3. For the option setting of GX Works3, refer to the following. 📖 GX Works3 Operating Manual
Points of index registers used	• Index register: 0 points • Long index register: 0 points
Points of file registers used	File register: 0 points (Word)
FB dependency	No dependency
FB compilation method	Subroutine type
FB operation	Pulse execution type (multiple scan execution type)

Function description

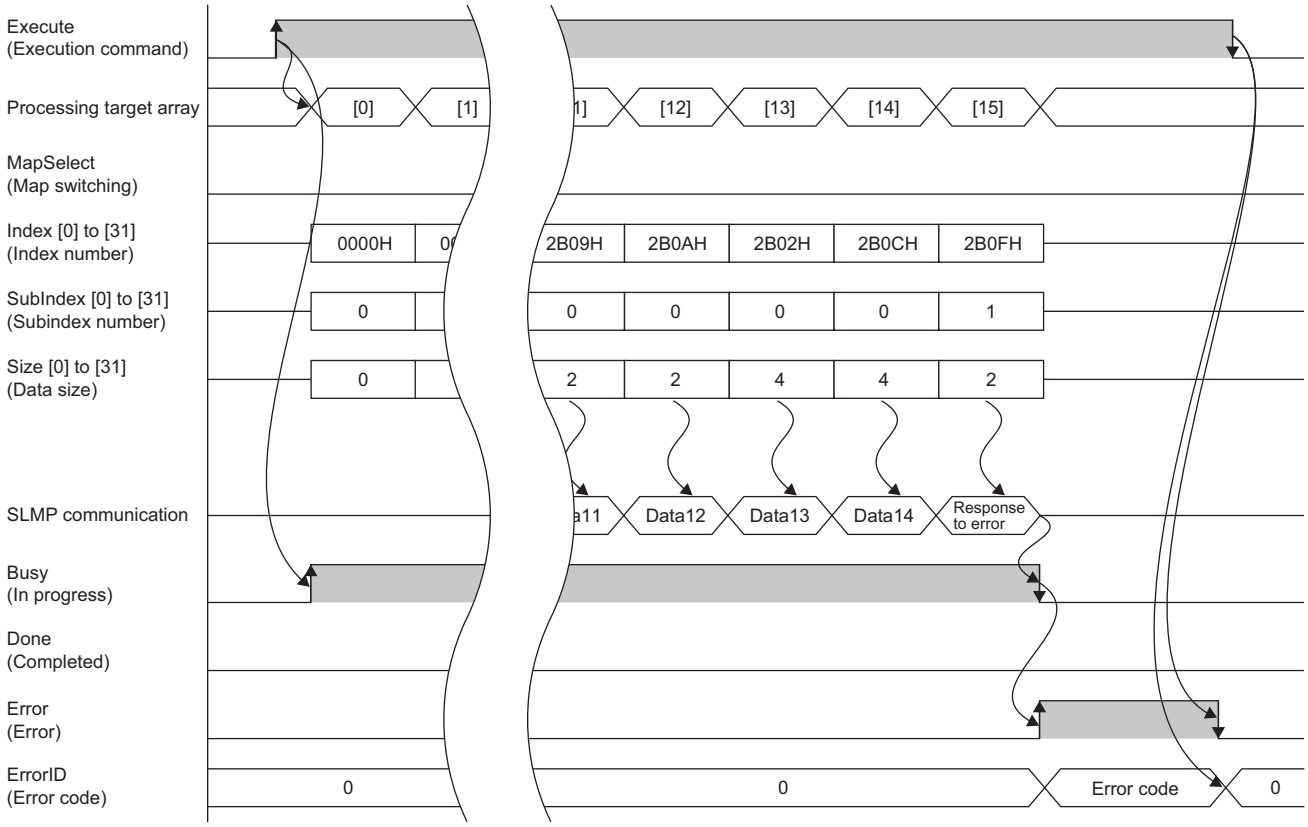
- When Execute (execution command) is turned on, this FB changes the mapping of the selected servo amplifier. This FB changes the mapping of up to 32 objects through SLMP communications according to the data set in the arrays of Index (index number), SubIndex (subindex number), and Size (data size). To insert GAP, set 0 for Index and SubIndex and specify the size of GAP in Size (data size). To not change the mapping, set 0 for Index, SubIndex, and Size.
- To add a new object to the servo amplifier mapping, expand the total number of objects mapped by the FB.
- To redo the mapping, power on the servo amplifier again to restore the default mapping.
- During change, Busy (executing) turns on, and when the process is completed successfully, Busy turns off, and Done (completed) turns on.
- If an error occurs in the FB, the FB stops mapping change, turns Error (error) on, and stores the error code in ErrorID (error code). (If an error occurs in Index [15], the FB does not execute mapping change on the remaining Indexes [16] to [31].) (☞ Page 82 Error codes)

Timing chart of I/O signals

■Completed successfully



■Completed with an error



Precautions

- The total size of the objects to be mapped should be no more than 64 bytes.
- Before executing the FB, stop CC-Link IE Field Network Basic communications for the target axis (turn off RY3F). To resume communications, start CC-Link IE Field Network Basic communications (turn on RY3F) after Done (completed) turns on for this FB.
- The backup power cannot retain the mapping data. Set the mapping data again every time the servo amplifiers are powered on again.
- This FB uses the following instructions.

Module	Instruction
FX5 CPU module	SLMPSND instruction*1
FX5-ENET	GP.SOCSND instruction, GP.SOCRCV instruction*2

*1 Timing when communications start varies depending on the conditions with which the SP.SLMPSND instructions are executed. If the SP.SLMPSND instruction is executed independently, communications start immediately. If multiple SP.SLMPSND instructions are executed at the same time, communications by the SP.SLMPSND instruction executed earlier are completed, and then communications by the SP.SLMPSND instruction executed later start. Therefore, do not turn off the execution condition of the SP.SLMPSND instruction of this FB or the user program until communications are completed.

*2 This FB and the GP.SOCSND instruction or the GP.SOCRCV instruction cannot be executed at the same time using the same connection number. Release the interlock if they are executed at the same time because communications cannot be performed normally.

- Do not change while this FB is being executed because this FB uses the following special registers.

Module	Special register
FX5 CPU module	• SD11126 (diagnostic information display request) • SD11127 (diagnostic request information) • SD11131 (IP address [lower]) • SD11132 (IP address [upper])
FX5-ENET	SD412 (one-second counter)

Parameter settings

- For details on the parameter settings required for the object read/write FB, refer to the following.

☞ Page 71 Parameter settings

- For details on the common parameter settings, refer to the following.

☞ Page 19 Parameter Settings

Performance values

Module	Measurement condition*3	Processing time	Maximum scan time	Number of scans
FX5S, FX5UJ	Axis 1	230ms	0.87ms	515 scans
FX5U, FX5UC*1*2	Axis 1	242ms	0.89ms	487 scans

*1 Measured with the program capacity set to 128K steps.

*2 The standard area is used for labels.

*3 This is the result of executing mapping change for 32 objects (Index: 2A42H, SubIndex: 0H, Size: 2H).

Error codes

Error code	Description	Action
1208H	Response to a request has not been received.	• Correct the arrival monitoring time. • Check if the connection cable is disconnected. • Set the port number on the servo amplifier side of the connection to be used to 5010.

For other error codes, refer to the following.

MELSEC iQ-F FX5 User's Manual (Communication)
MR-JET-G User's Manual (Communication Function)
MR-J5-G/MR-J5W-G User's Manual (Communication Function)

4 OPERATION EXAMPLES

4.1 Positioning Operation

This section describes the usage procedure for positioning operation on three servo motor axes by taking an unloader as an example.

In this operation, the following FBs are used.

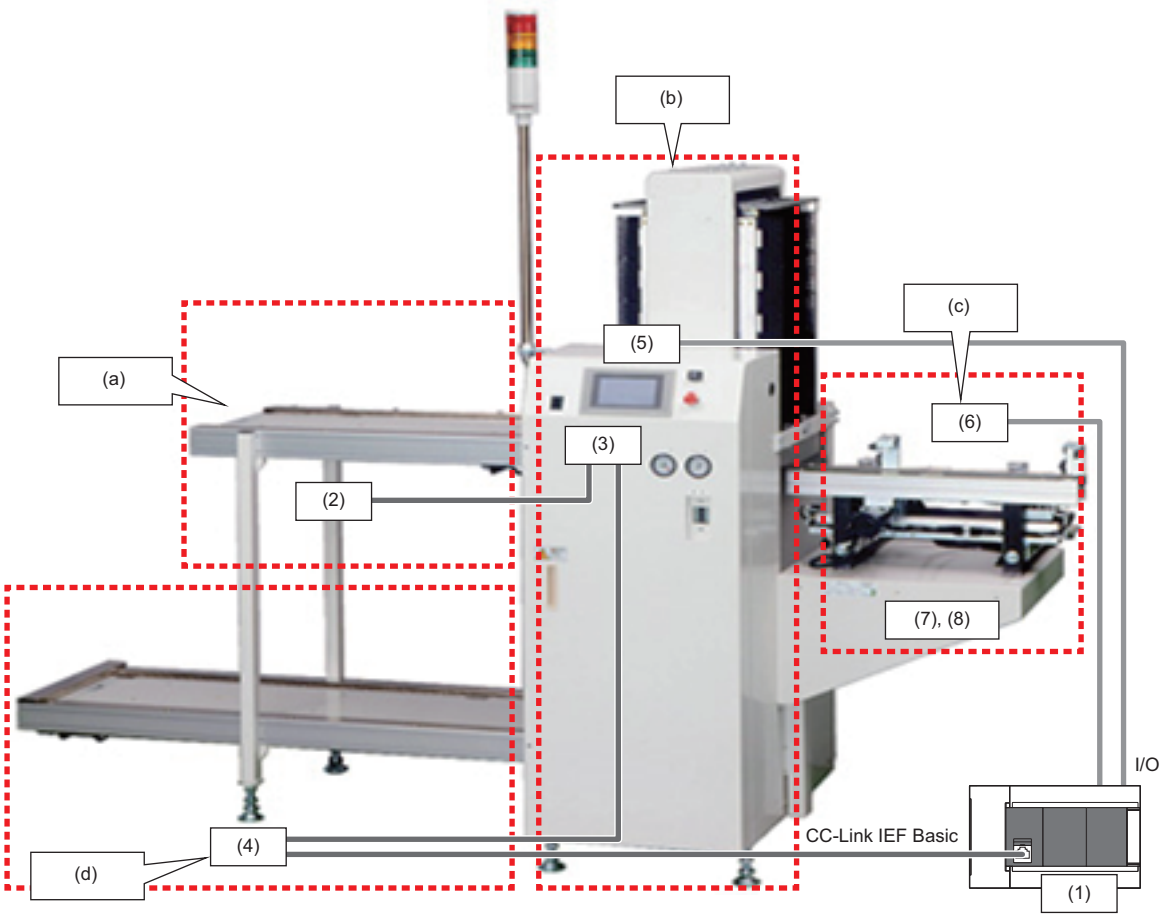
- MC_Power_CCLinkIEFBasic_F (Operation possible)
- MCv_Home_CCLinkIEFBasic_F (Homing)
- MC_Stop_CCLinkIEFBasic_F (Forced stop)
- MC_Halt_CCLinkIEFBasic_F (Stop)
- MC_MoveAbsolute_CCLinkIEFBasic_F (Absolute positioning)
- MC_MoveRelative_CCLinkIEFBasic_F (Relative positioning)
- MC_MoveAdditive_CCLinkIEFBasic_F (Target position change)
- MC_MoveVelocity_CCLinkIEFBasic_F (Velocity control)*1
- MC_TorqueControl_CCLinkIEFBasic_F (Torque control)*1
- MC_Reset_CCLinkIEFBasic_F (Axis error reset)

*1 The FB can be used with the servo amplifier with firmware version C5 or later.

Overview

This application example shows the operation of an unloader for surface mounting lines to load and unload a magazine rack and printed circuit boards into a magazine rack by using this FB library. Three axes are controlled by communicating with three servo amplifiers.

System configuration



(a) Magazine rack loading conveyor
(b) Magazine rack mount section
(c) Printed circuit board loading conveyor
(d) Magazine rack unloading conveyor

No.	Device	Description	Device assignment	Station number
(1)	FX5U CPU module	Programmable controller	—	Master station
(2)	Servo amplifier (axis 1)	Drives the magazine rack loading conveyor.	—	1
(3)	Servo amplifier (axis 2)	Moves the magazine rack mount section up and down.	—	2
(4)	Servo amplifier (axis 3)	Drives the magazine rack unloading conveyor.	—	3
(5)	Sensor 1	Sensor for detecting a magazine rack in the mount section	X0	—
(6)	Sensor 2	Sensor for detecting printed circuit boards on the printed circuit board conveyors	X1	—
(7)	Cylinder (output)	Printed circuit board storage request signal (CPU module → Cylinder)	Y0	—
(8)	Cylinder (input)	Printed circuit board storage completion signal (Cylinder → CPU module)	X2	—

Program configuration

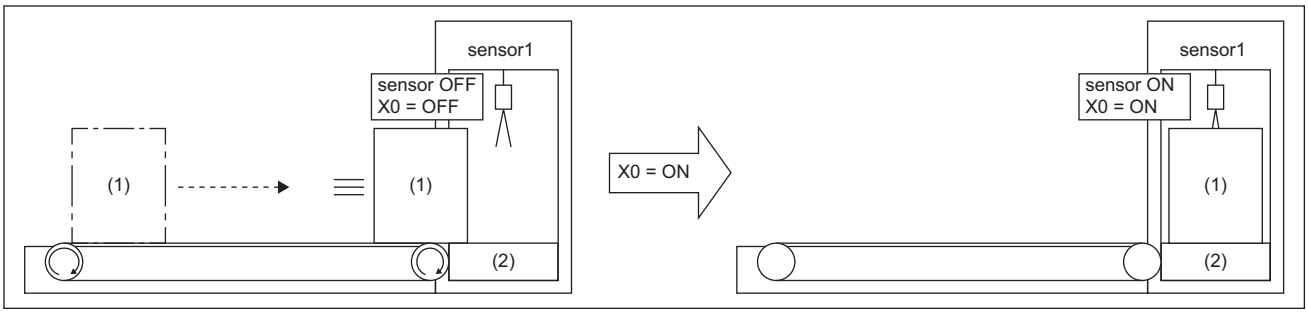
No.	Item	Description	FB to be used
1	Device initial setting	Sets initial values relating to manual operation and automatic operation.	None
2	Preparation for operation	Transitions the status of the device to the operable state.	MC_Power_CCLinkIEFBasic_F
3	Manual operation	Creates programs for the following operations to be performed manually for purposes such as maintenance. Homing, JOG operation, inching operation, operation to clear errors, forced stop	MCv_Home_CCLinkIEFBasic_F MC_MoveAbsolute_CCLinkIEFBasic_F MC_MoveRelative_CCLinkIEFBasic_F MC_Halt_CCLinkIEFBasic_F MC_Reset_CCLinkIEFBasic_F MC_Stop_CCLinkIEFBasic_F
4	Automatic operation	(1) Carries a magazine rack into the mount section.	MC_MoveVelocity_CCLinkIEFBasic_F MC_Halt_CCLinkIEFBasic_F
		(2) Stores printed circuit boards into a magazine rack.	MC_MoveRelative_CCLinkIEFBasic_F
		(3) Unload a magazine rack from the mount section.	MC_MoveVelocity_CCLinkIEFBasic_F MC_Halt_CCLinkIEFBasic_F
		(4) Returns the mount section into a position in which a magazine rack can be mounted.	MC_MoveAbsolute_CCLinkIEFBasic_F
5	Target position change	Changes the target position during execution of relative positioning.	MC_MoveRelative_CCLinkIEFBasic_F MC_MoveAdditive_CCLinkIEFBasic_F
6	Torque control	Executes torque control and pause operation.	MC_TorqueControl_CCLinkIEFBasic_F MC_Halt_CCLinkIEFBasic_F

■Loading a magazine rack (axis 1)

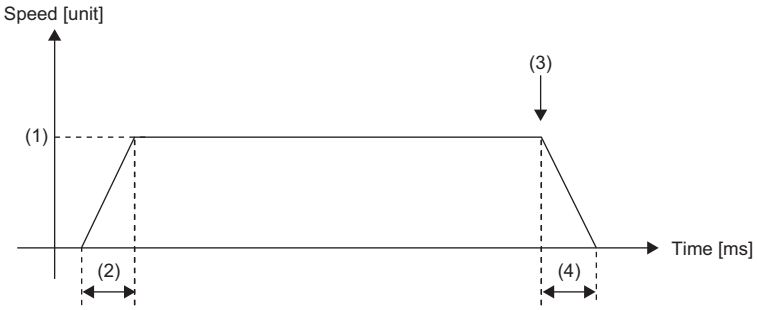
Velocity control is executed on the servo amplifier for axis 1 (magazine rack loading conveyor) to transfer a magazine rack.
Axis 1 is stopped by detection of the magazine rack mounted into the magazine rack mount section (sensor 1 turned on).

FB to be used	Control details
MC_MoveVelocity_CCLinkIEFBasic_F	Mounts the magazine rack into the magazine rack mount section using the loading conveyor.
MC_Halt_CCLinkIEFBasic_F	Stops the loading conveyor when the magazine rack is mounted completely.

• Example of loading the magazine rack



(1) Magazine rack
(2) Magazine rack mount section

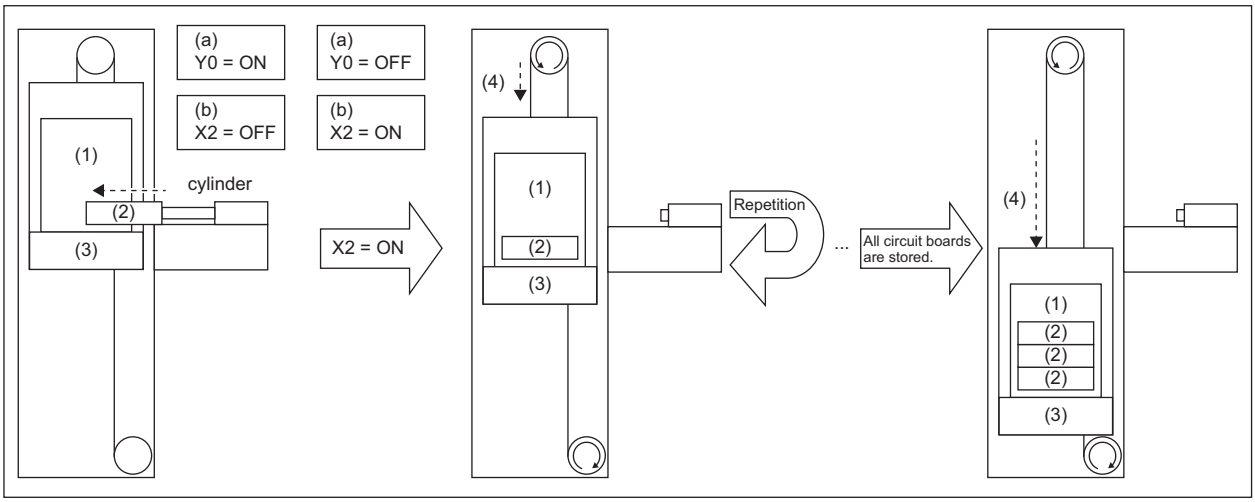


(1) Command speed
(2) Acceleration time
(3) Deceleration and stop when sensor 1 is turned on
(4) Deceleration time

■Storing printed circuit boards (axis 2)

When the storage request signal is turned on, the cylinder stores a printed circuit board into the magazine rack. After the cylinder operation is completed and the storage completion signal is turned on, the magazine rack mount section is moved down by executing relative positioning to axis 2 of the servo amplifier. This operation is repeated, and when all the printed circuit boards are stored, the magazine rack mount section is moved down to the unloading position.
(Printed circuit board detection and cylinder control are not included in this program.)

FB to be used	Control details
None	Stores printed circuit boards into a magazine rack with the cylinder.
MC_MoveRelative_CCLinkIEFBasic_F	Moves down the magazine rack when the printed circuit board is stored completely. (fixed-distance descent)



(1) Magazine rack
(2) Printed circuit board
(3) Magazine rack mount section
(4) Relative positioning

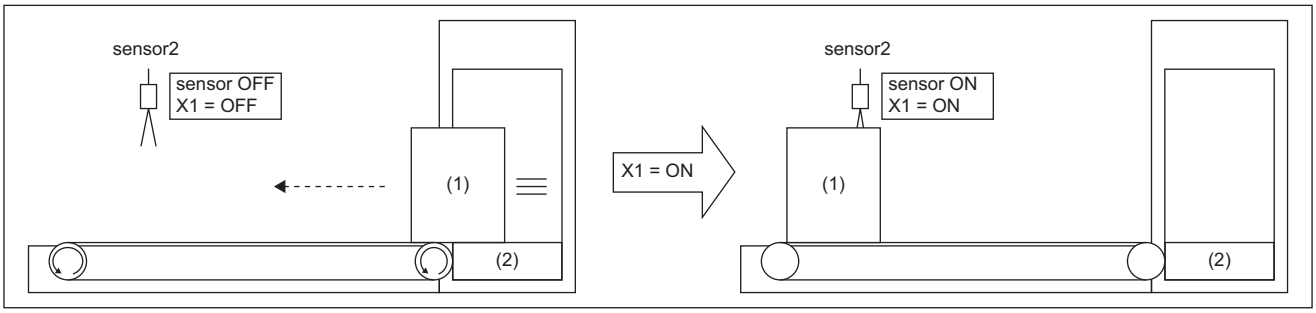
(a) Storage request signal
(b) Storage completion signal

■Unloading the magazine rack (axis 3)

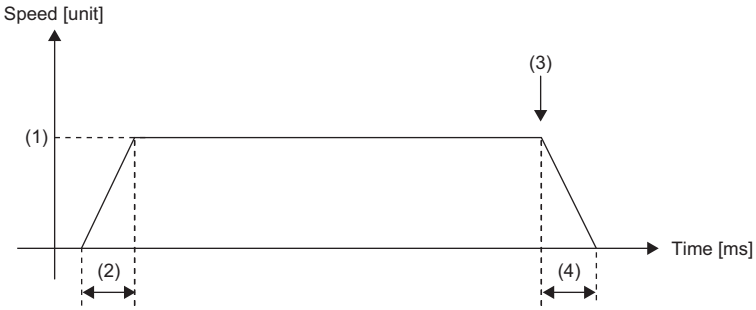
A velocity control command is sent to the servo amplifier for axis 3 (magazine unloading conveyor) to unload the magazine rack.

Axis 3 is stopped at magazine rack detection sensor ON.

FB to be used	Control details
MC_MoveVelocity_CCLinkIEFBasic_F	Unloads the magazine rack when it is filled up.
MC_Halt_CCLinkIEFBasic_F	Stops unloading operation when the magazine rack is unloaded completely.



(1) Magazine rack
(2) Magazine rack mount section

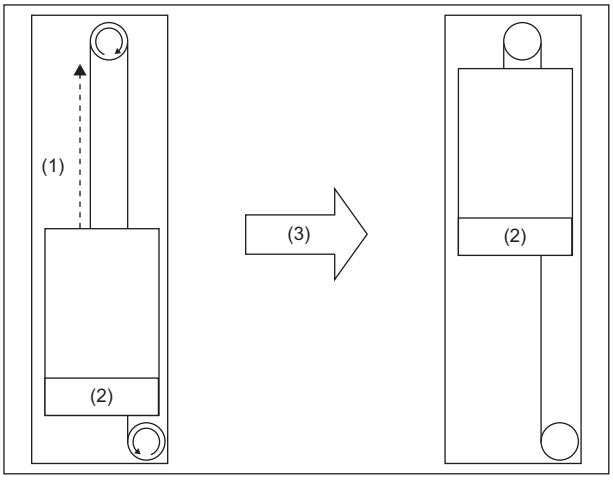


(1) Command speed
(2) Acceleration time
(3) Deceleration and stop when sensor 2 is turned on
(4) Deceleration time

■Returning the magazine rack mount section (axis 2)

The magazine rack mount section is returned to the position in which the magazine rack can be loaded.

FB to be used	Control details
MC_MoveAbsolute_CCLinkIEFBasic_F	When the magazine rack unloading operation stops, moves the mount section into a position in which a magazine rack can be mounted.



(1) Absolute positioning
(2) Magazine rack mount section
(3) Completion of moving the mount section to the position in which the magazine rack can be mounted

Process flow

The following describes a process flow from the wiring and parameter settings of FX5 CPU module and the servo amplifiers to the use of FBs.

1. FB library registration

Register the FB library. For the operating procedure, refer to the following.

GX Works3 Operating Manual

2. Servo amplifier setting

Set the servo parameters. (☞ Page 19 Parameter Settings)

3. Wiring

For details on the wiring method, refer to the manual for the servo amplifier used.

4. CPU module setting

Set CC-Link IEF Basic and the global labels. (☞ Page 19 Parameter Settings)

5. Programming

Create programs. (☞ Page 89 Programming)

Programming

This section describes programs used in the application example.

In the following programs, only the circuits required to operate each function are described, and such a circuit as an interlock for safety is not included. Add such a circuit as an interlock according to your device.

Label list

• Global Labels

	Label Name	Data Type		Class	Assign (Device/Label)
1	StorageRequest	Bit	...	VAR_GLOBAL	Y0
2	Sensor1	Bit	...	VAR_GLOBAL	X0
3	Sensor2	Bit	...	VAR_GLOBAL	X1
4	StorageCompletion	Bit	...	VAR_GLOBAL	X2
5	StartHalt	Bit	...	VAR_GLOBAL	X13
6	StartMoveRel	Bit	...	VAR_GLOBAL	X15
7	StartTorque1	Bit	...	VAR_GLOBAL	X17
8	StartTorque2	Bit	...	VAR_GLOBAL	X20
9	StartReset	Bit	...	VAR_GLOBAL	X21
10	ForcedStop	Bit	...	VAR_GLOBAL	X22
11	JOGJnchingForward	Bit	...	VAR_GLOBAL	X24
12	JOGJnchingReversal	Bit	...	VAR_GLOBAL	X25
13	StartMoveAdd	Bit	...	VAR_GLOBAL	M10
14	CurrentPosition	Double Word [Signed]	...	VAR_GLOBAL	W26
15	G_stLinkIEF	stRemoteReg	...	VAR_GLOBAL	Detailed Setting

• Local labels

	Label Name	Data Type		Class	Constant
1	MC_Power_CCLinkIEFBasic_F_1	MC_Power_CCLinkIEFBasic_F	...	VAR	
2	MC_Power_CCLinkIEFBasic_F_2	MC_Power_CCLinkIEFBasic_F	...	VAR	
3	MC_Power_CCLinkIEFBasic_F_3	MC_Power_CCLinkIEFBasic_F	...	VAR	
4	MCv_Home_CCLinkIEFBasic_F_1	MCv_Home_CCLinkIEFBasic_F	...	VAR	
5	MC_Halt_CCLinkIEFBasic_F_1	MC_Halt_CCLinkIEFBasic_F	...	VAR	
6	MC_Halt_CCLinkIEFBasic_F_2	MC_Halt_CCLinkIEFBasic_F	...	VAR	
7	MC_Halt_CCLinkIEFBasic_F_3	MC_Halt_CCLinkIEFBasic_F	...	VAR	
8	MC_Halt_CCLinkIEFBasic_F_4	MC_Halt_CCLinkIEFBasic_F	...	VAR	
9	MC_MoveAbsolute_CCLinkIEFBasic_F_1	MC_MoveAbsolute_CCLinkIEFBasic_F	...	VAR	
10	MC_MoveRelative_CCLinkIEFBasic_F_1	MC_MoveRelative_CCLinkIEFBasic_F	...	VAR	
11	MC_MoveRelative_CCLinkIEFBasic_F_2	MC_MoveRelative_CCLinkIEFBasic_F	...	VAR	
12	MC_MoveRelative_CCLinkIEFBasic_F_3	MC_MoveRelative_CCLinkIEFBasic_F	...	VAR	
13	MC_MoveAdditive_CCLinkIEFBasic_F_1	MC_MoveAdditive_CCLinkIEFBasic_F	...	VAR	
14	MC_MoveVelocity_CCLinkIEFBasic_F_1	MC_MoveVelocity_CCLinkIEFBasic_F	...	VAR	
15	MC_MoveVelocity_CCLinkIEFBasic_F_2	MC_MoveVelocity_CCLinkIEFBasic_F	...	VAR	
16	MC_MoveVelocity_CCLinkIEFBasic_F_3	MC_MoveVelocity_CCLinkIEFBasic_F	...	VAR	
17	MC_TorqueControl_CCLinkIEFBasic_F_1	MC_TorqueControl_CCLinkIEFBasic_F	...	VAR	
18	MC_TorqueControl_CCLinkIEFBasic_F_2	MC_TorqueControl_CCLinkIEFBasic_F	...	VAR	
19	MC_Reset_CCLinkIEFBasic_F_1	MC_Reset_CCLinkIEFBasic_F	...	VAR	
20	MC_Stop_CCLinkIEFBasic_F_1	MC_Stop_CCLinkIEFBasic_F	...	VAR	
21	Axis	AXIS_REF_CCLinkIEFBasic_F(1 ..3)	...	VAR	
22	OperationAxisNo	Word [Unsigned]/Bit String [16-bit]	...	VAR	
23	AxisNo	Word [Unsigned]/Bit String [16-bit]	...	VAR	
24	OperationMode	Word [Unsigned]/Bit String [16-bit]	...	VAR	
25	ExecutionMode	Word [Unsigned]/Bit String [16-bit]	...	VAR	
26	Distance	Double Word [Signed]	...	VAR	
27	Velocity	Double Word [Signed]	...	VAR	
28	Acceleration	Double Word [Signed]	...	VAR	
29	Deceleration	Double Word [Signed]	...	VAR	
30	PowerStatus	Bit(1 ..3)	...	VAR	
31	PowerBusy	Bit(1 ..3)	...	VAR	
32	PowerError	Bit(1 ..3)	...	VAR	
33	HomeDone	Bit	...	VAR	
34	HomeBusy	Bit	...	VAR	
35	HomeCommandAborted	Bit	...	VAR	
36	HomeError	Bit	...	VAR	
37	HaltDone	Bit(1 ..4)	...	VAR	
38	HaltBusy	Bit(1 ..4)	...	VAR	
39	HaltCommandAborted	Bit(1 ..4)	...	VAR	
40	HaltError	Bit(1 ..4)	...	VAR	
41	MoveAbsDone	Bit	...	VAR	
42	MoveAbsBusy	Bit	...	VAR	
43	MoveAbsCommandAborted	Bit	...	VAR	
44	MoveAbsError	Bit	...	VAR	
45	MoveRelDone	Bit(1 ..3)	...	VAR	
46	MoveRelBusy	Bit(1 ..3)	...	VAR	
47	MoveRelCommandAborted	Bit(1 ..3)	...	VAR	
48	MoveRelError	Bit(1 ..3)	...	VAR	
49	MoveVelInVelocity	Bit(1 ..3)	...	VAR	
50	MoveVelBusy	Bit(1 ..3)	...	VAR	
51	MoveVelCommandAborted	Bit(1 ..3)	...	VAR	
52	MoveVelError	Bit(1 ..3)	...	VAR	
53	ResetDone	Bit	...	VAR	
54	ResetBusy	Bit	...	VAR	
55	ResetError	Bit	...	VAR	
56	StopDone	Bit	...	VAR	
57	StopBusy	Bit	...	VAR	
58	StopError	Bit	...	VAR	
59	ErrorID	Word [Unsigned]/Bit String [16-bit](1 ..3)	...	VAR	

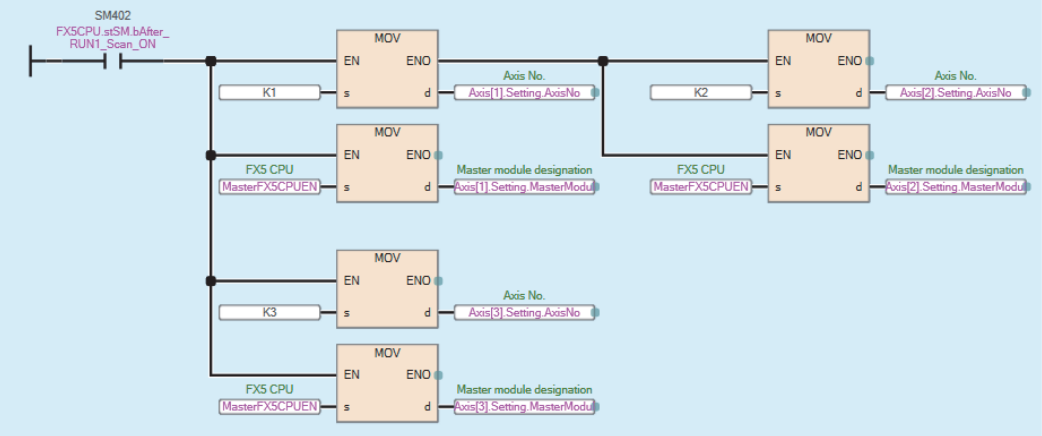
60	ExecJOG	Bit(1 ..3)	...	VAR	
61	StopJOG	Bit(1 ..3)	...	VAR	
62	ExecInching	Bit(1 ..3)	...	VAR	
63	RackDistance	Double Word [Signed]	...	VAR	
64	ReRackDistance	Double Word [Signed]	...	VAR	
65	FinalPosition	Double Word [Signed]	...	VAR	
66	CarryOutPosition	Double Word [Signed]	...	VAR	
67	MoveAddDistance	Double Word [Signed]	...	VAR	
68	MoveAddDone	Bit	...	VAR	
69	MoveAddBusy	Bit	...	VAR	
70	MoveAddCommandAborted	Bit	...	VAR	
71	MoveAddError	Bit	...	VAR	
72	Torque1	Double Word [Signed]	...	VAR	
73	Torque2	Double Word [Signed]	...	VAR	
74	TorqueRamp	Double Word [Signed]	...	VAR	
75	InTorque	Bit(1 ..3)	...	VAR	
76	TorqueBusy	Bit(1 ..3)	...	VAR	
77	TorqueCommandAborted	Bit(1 ..3)	...	VAR	
78	TorqueError	Bit(1 ..3)	...	VAR	
79	Step1	Bit	...	VAR	
80	Step2	Bit	...	VAR	
81	Step3	Bit	...	VAR	
82	Step4	Bit	...	VAR	
83	StartOperation	Bit	...	VAR	
84	NoBusy	Bit	...	VAR	
85	JOGBusy	Bit	...	VAR	
86	JOGHaltBusy	Bit	...	VAR	
87	InchingBusy	Bit	...	VAR	
88	NoAuto	Bit	...	VAR	
89	AllNoBusy	Bit	...	VAR	
90	NotMode	Word [Unsigned]/Bit String [16-bit]	...	VAR_CONSTANT	0
91	HomeMode	Word [Unsigned]/Bit String [16-bit]	...	VAR_CONSTANT	1
92	JOGMode	Word [Unsigned]/Bit String [16-bit]	...	VAR_CONSTANT	2
93	InchingMode	Word [Unsigned]/Bit String [16-bit]	...	VAR_CONSTANT	3
94	AutoMode	Word [Unsigned]/Bit String [16-bit]	...	VAR_CONSTANT	4
95	CyclicCom	Bit	...	VAR	

Programs

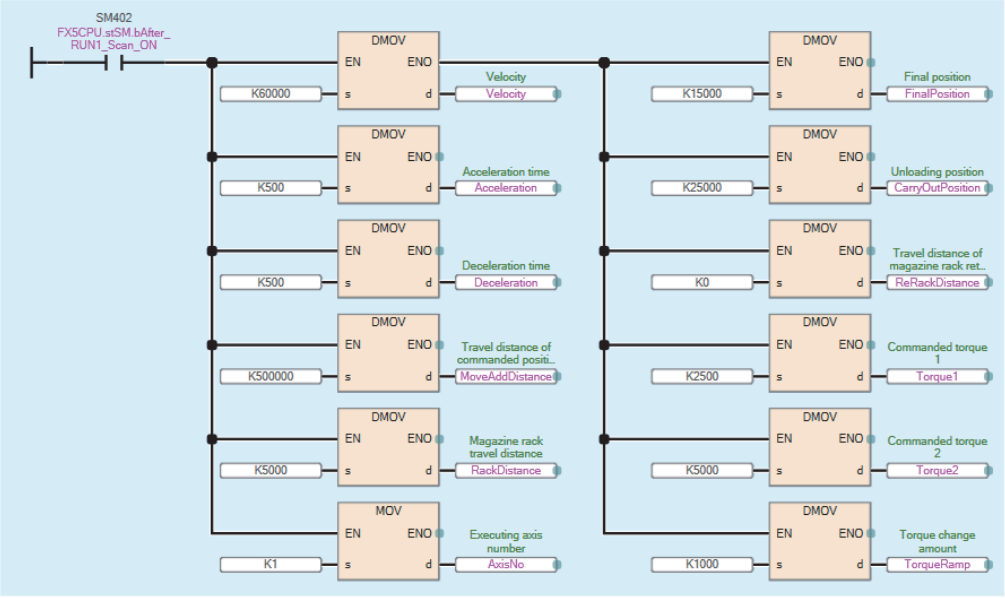
■Device initial setting

This program sets initial values relating to manual operation and automatic operation.

- Initialization of axis information (axis 1 to 3)



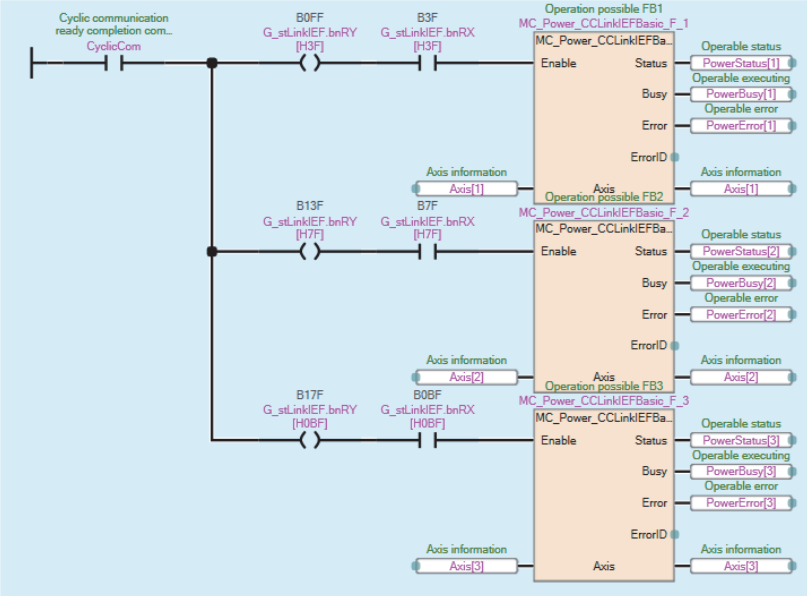
- Initialization of control parameter



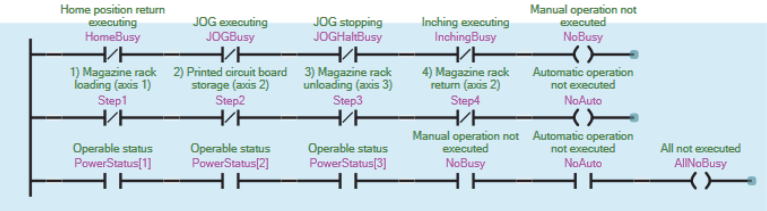
■Preparation for operation

This program transitions the status of the device to the operable state.

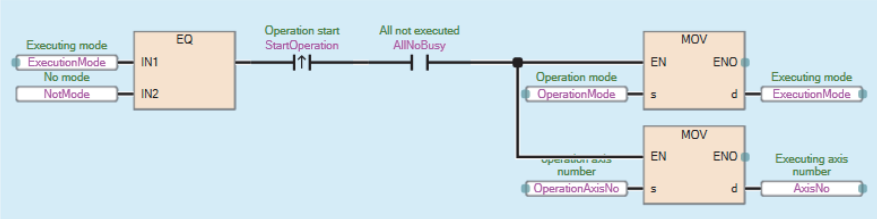
- Setting to operable (axes 1 to 3)



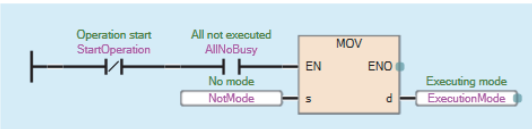
- Checking the execution status for manual operation (homing, JOG operation, inching operation) or automatic operation of each axis.



- Starting operation of a specified operation mode and axis number by turn on operation start if all the operations have not executed.



- Setting execution number to 0 by turning off operation start if all the operations have not executed.

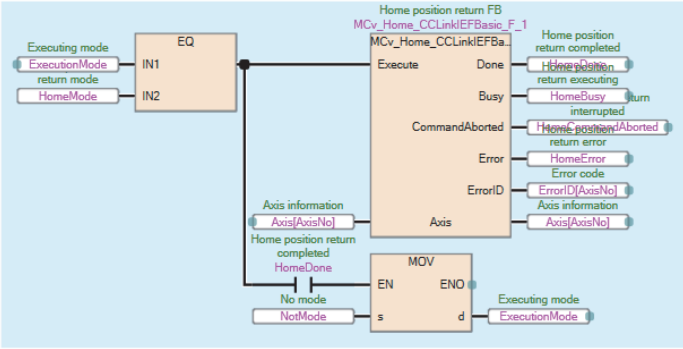


■Manual operation

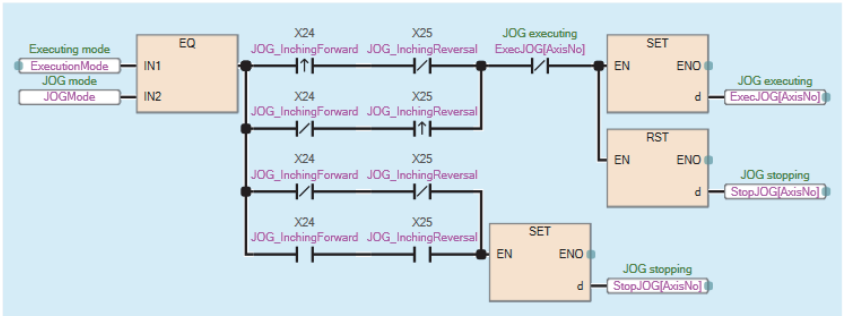
This program manually executes homing, JOG operation, inching operation, and operation to clear errors during maintenance.

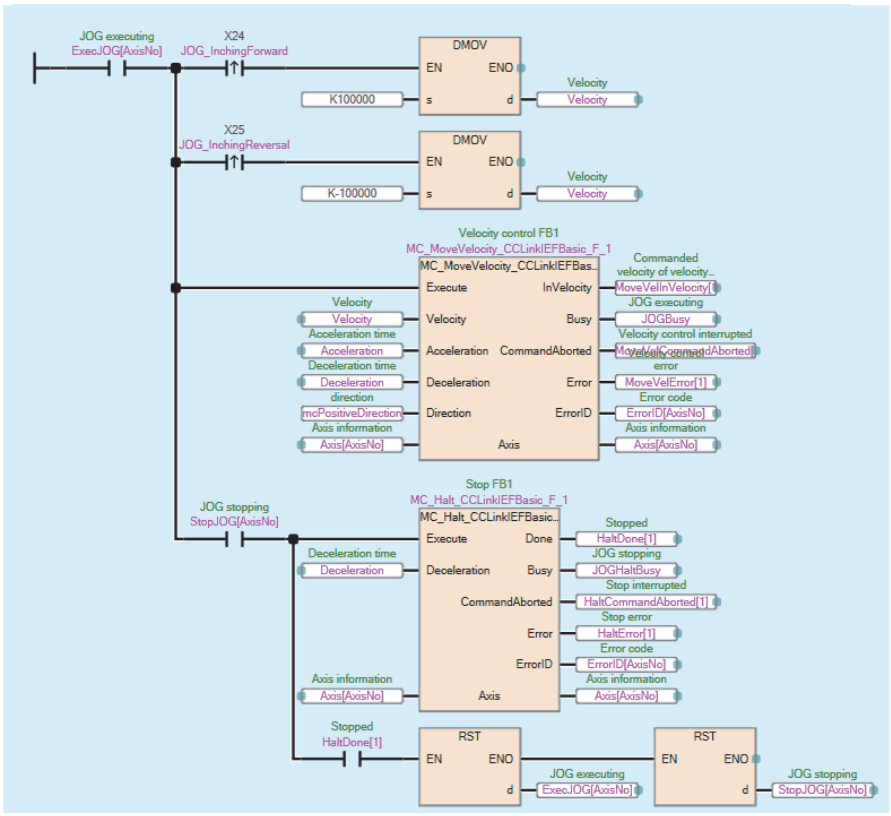
In this example, a program that controls only axis 1 is described. Other axes can also be controlled by switching the axis number

- Homing

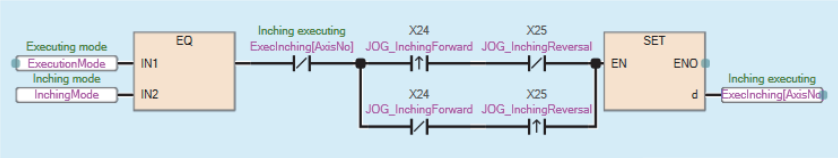


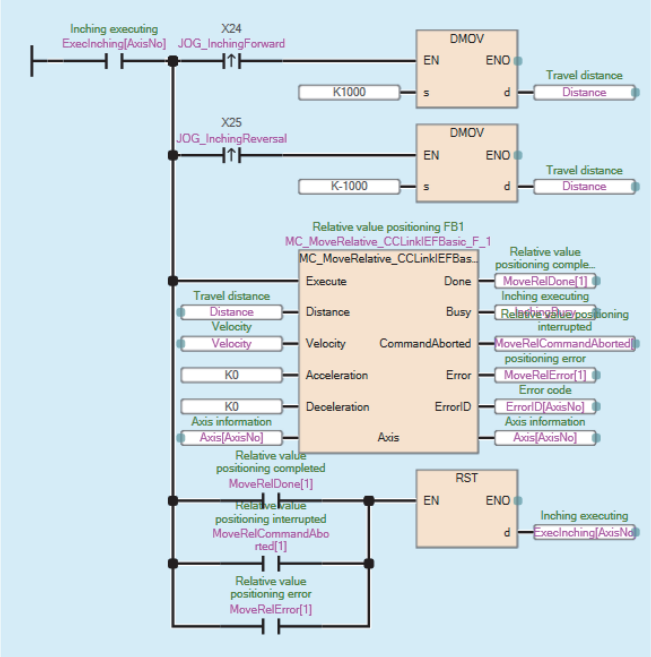
- JOG operation



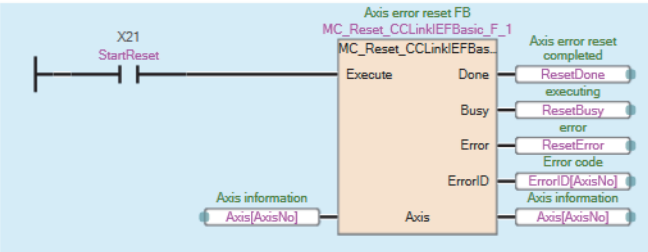


• Inching operation

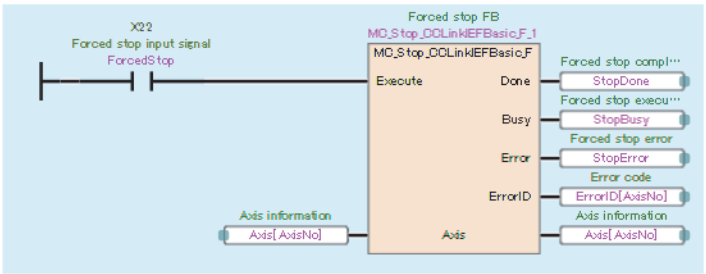




• Operation to clear errors

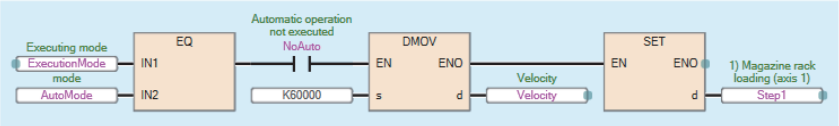


• Forced stop

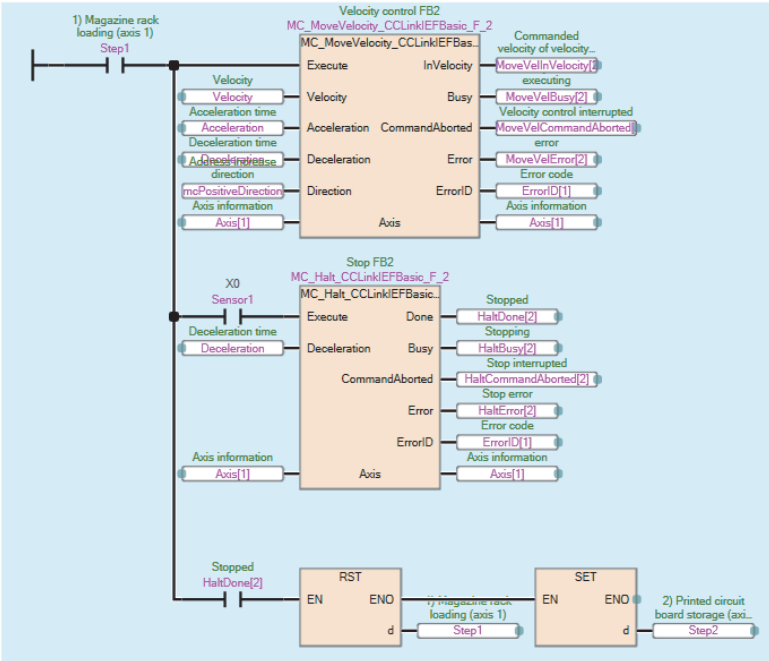


■Automatic operation

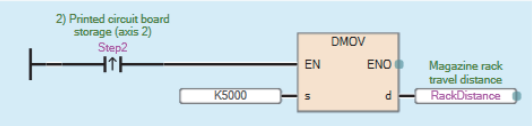
- Initialization of operating status

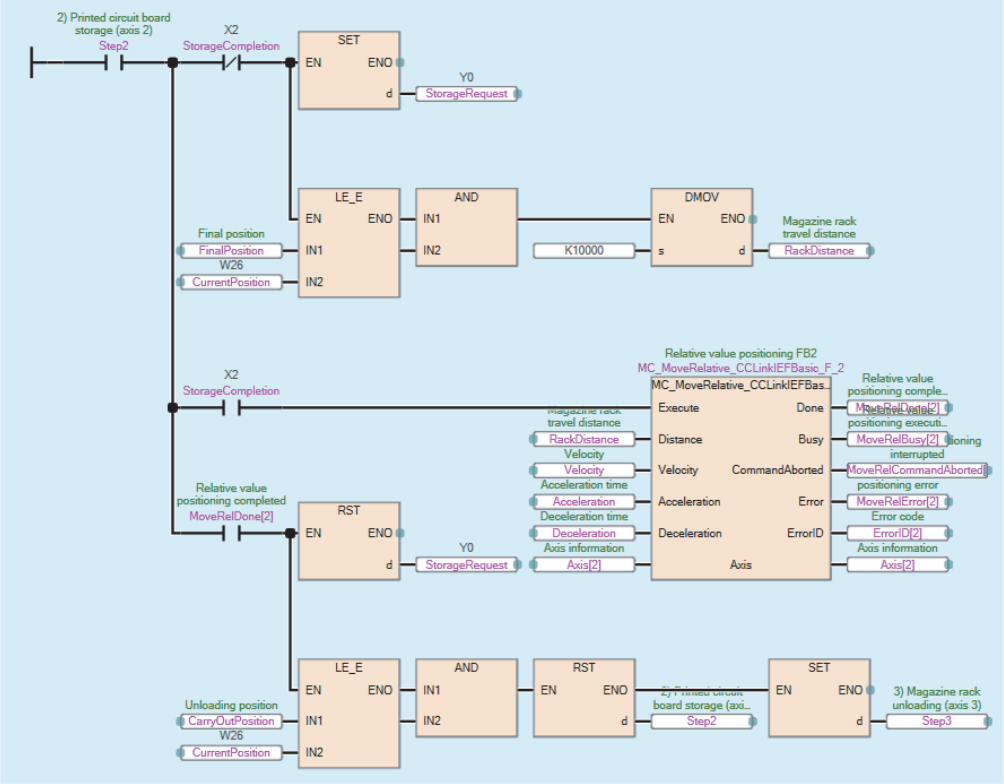


- Loading a magazine rack

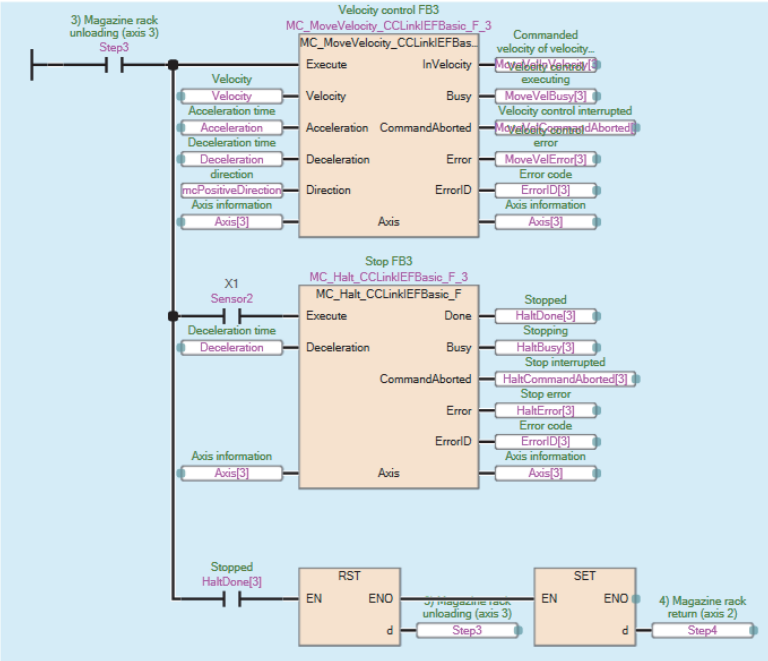


• Storing printed circuit boards

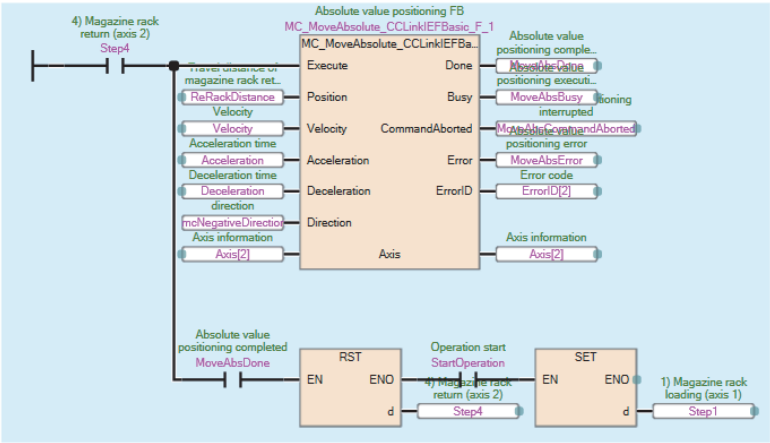




- Unloading a magazine rack

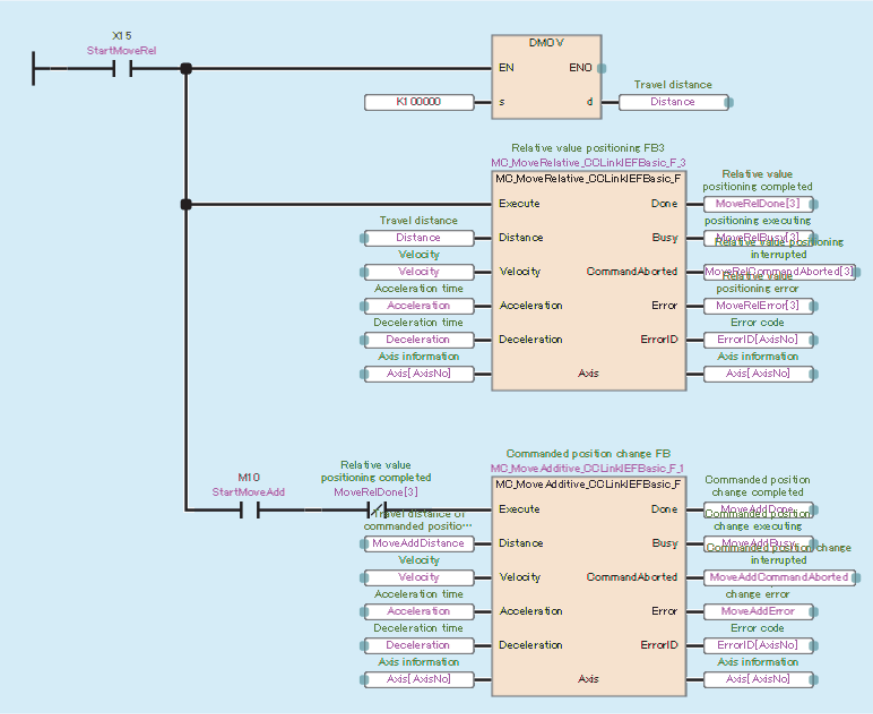


- Returning a magazine rack



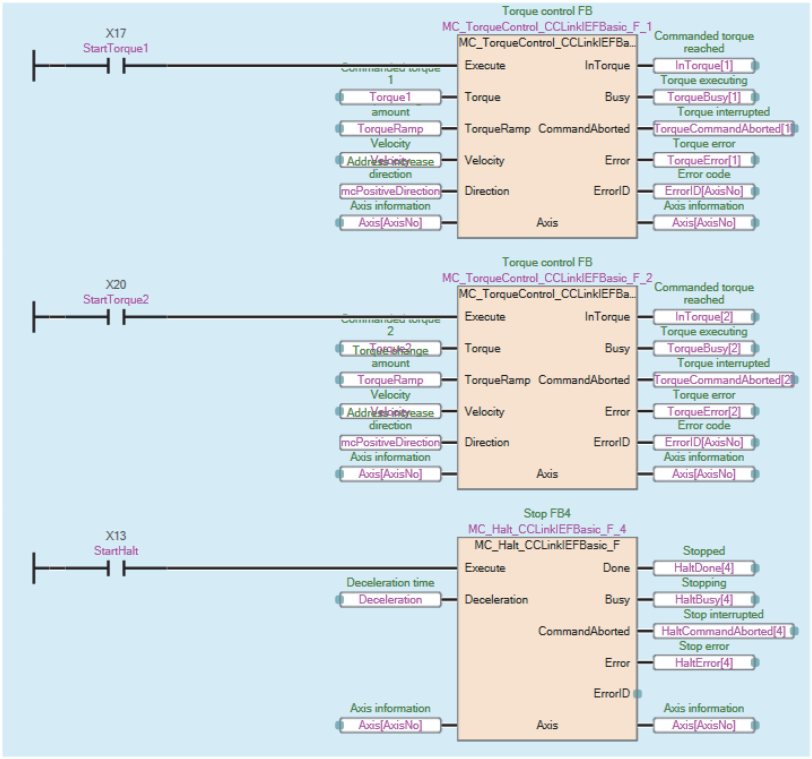
■Target position change

This program changes the target position for positioning while absolute positioning or relative positioning is being executed.



■Torque control

This program controls torque and changes the target torque during torque control. After that, performs pause operation.



4.2 Object Read and Write

This section describes how to change the servo amplifier mapping and read and write objects.

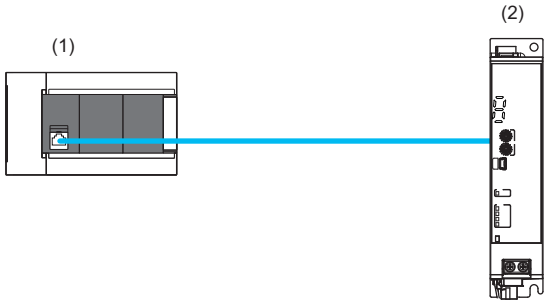
In this operation, the following FBs are used.

- MCv_ReadMultiObject_FX5CPUEN (Multiple object read)
- MCv_WriteMultiObject_FX5CPUEN (Multiple object write)
- MCv_ChangeMapping_FX5CPUEN (Mapping change)

Overview

This operation changes the servo amplifier mapping, sets the electronic gear, and reads the current value by using this FB library.

System configuration



(1) FX5U CPU module (master station)
(2) MR-JET-G (axis 1, port number: 5010)

Program configuration

No.	Item	Description	FB to be used
1	Mapping change	Adds monitoring information to [1st Transmit PDO Mapping (Obj.1A00H)].	MCv_ChangeMapping_FX5CPUEN MCv_ChangeMapping_FX5ENET
2	Torque limit value setting	Writes the forward rotation torque limit value and reverse rotation torque limit value to [Positive torque limit value (Obj.60E0H)] and [Negative torque limit value (Obj.60E1H)].	MCv_WriteMultiObject_FX5CPUEN MCv_WriteMultiObject_FX5ENET
3	Servo amplifier information read	Reads the current position, current speed, and current torque from [Position actual value (Obj.6064H: 00H)], [Velocity actual value (Obj.606CH: 00H)], and [Torque actual value (Obj.6077H: 00H)].	MCv_ReadMultiObject_FX5CPUEN MCv_ReadMultiObject_FX5ENET

■Mapping change

Use the mapping change FB to add objects to the default mapping of servo amplifiers.

• Mapping before/after change

○: Can be changed, ×: Cannot be changed, —: Not assigned

Link device	Before change				After change			Classification
	Object name	Index	Sub	Mapping	Object name	Index	Sub	
RWr0	Mode of operation on display	6061H	0	×	No change			Default mapping
	—	—	—	×				
RWr1	Statusword	6041H	0	×				
RWr2	Status DO1	2D11H	0	×				
RWr3	Status DO2	2D12H	0	×				
RWr4	Status DO3	2D13H	0	○				
RWr5	—	—	—	○				
RWr6 RWr7	Position actual value	6064H	0	○				
RWr8 RWr9	Velocity actual value	606CH	0	×				
RWrA RWrB	Following error actual value	60F4H	0	○				
RWrC	Torque actual value	6077H	0	×				
RWrD	—	—	—	○				
RWrE RWrF	Current alarm	2A41H	0	○				
RWr10	—	—	—	○	Effective load ratio	2B09H	0	Additional mapping
RWr11	—	—	—	○	Peak load ratio	2B0AH	0	
RWr12 RWr13	—	—	—	○	Servo motor speed	2B02H	0	
RWr14 RWr15	—	—	—	○	Within one-revolution position	2B0CH	0	
RWr16	—	—	—	○	Bus voltage	2B0FH	0	
RWr17	—	—	—	○	Internal temperature of encoder	2B25H	0	
RWr18	—	—	—	○	Unit power consumption	2B2DH	0	
RWr19 RWr1A	—	—	—	○	Unit total power consumption	2B2EH	0	
RWr1B	—	—	—	○	No change			No mapping
RWr1C	—	—	—	○				
RWr1D	—	—	—	○				
RWr1E	—	—	—	○				
RWr1F	—	—	—	○				

■Input label setting

• Set the mapping change targets.

Input labels	Description
MapSelect	
OFF	Sets the mapping change target to [1st Transmit PDO Mapping (Obj.1A00H)].

• Set Index, Subindex and Size.

Classification	Mapping measure object	Input labels				Description
		Array	Index	SubIndex	Size	
Default mapping	Mode of operation on display	0 to 12	0000H	0	0	This is the initial object placement. Automatically set by the servo amplifier when powered on. To not change from the default, set all input labels to 0.
	—					
	Statusword					
	Status DO 1					
	Status DO 2					
	Status DO 3					
	—					
	Position actual value					
	Velocity actual value					
	Following error actual value					
	Torque actual value					
	—					
	Current alarm					
Additional mapping	Effective load ratio	13	2B09H	0	2	Sets an object to be newly added.
	Peak load ratio	14	2B0AH	0	2	
	Servo motor speed	15	2B02H	0	4	
	Within one-revolution position	16	2B0CH	0	4	
	Bus voltage	17	2B0FH	0	2	
	Internal temperature of encoder	18	2B25H	0	2	
	Unit power consumption	19	2B2DH	0	2	
	Unit total power consumption	20	2B2EH	0	4	
No mapping	—	21 to 31	0000H	0	0	Does not change the mapping. Sets all input labels to 0.

■Torque limit value setting

Set the torque limit value by setting the following on the input label of the multiple object write FB.

(1): Forward rotation torque limit value = 200.0 [%]

(2): Reverse rotation torque limit value = 200.0 [%]

No.	Mapping measure object	Input labels				
		Array number	Index	SubIndex	Size	WriteData
(1)	Positive torque limitvalue	0	60E0H	0	2	2000
(2)	Negative torque limitvalue	1	60E1H	0	2	2000
—	None	2 to 31	0000H	0	0	0

■Servo amplifier information read

Mapping measure object	Input labels			Output labels
	Array number	Index	SubIndex	WriteData
Position actual value	0	6064H	0	Current position
Velocity actual value	1	606CH	0	Current speed
Torque actual value	2	6077H	0	Current torque
None	3 to 31	0000H	0	—

Process flow

The following describes a process flow from the wiring and parameter settings of FX5 CPU module and the servo amplifiers to the use of FBs.

1. FB library registration

Register the FB library. For the operating procedure, refer to the following.

GX Works3 Operating Manual

2. Servo amplifier setting

Set the servo parameters. (☞ Page 19 Parameter Settings)

3. Wiring

For details on the wiring method, refer to the manual for the servo amplifier used.

4. CPU module setting

Set CC-Link IEF Basic and the global labels. (☞ Page 19 Parameter Settings)

5. Programming

Create programs. (☞ Page 103 Programming)

Label list

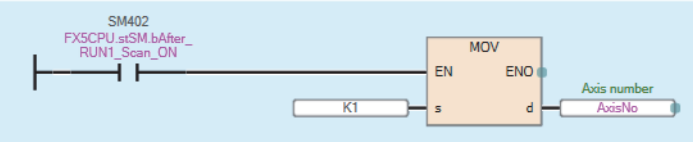
- Local labels

	Label Name	Data Type		Class
1	StartChangeMap	Bit	...	VAR
2	StartTorqueLimitSet	Bit	...	VAR
3	StartServoAmpDataRead	Bit	...	VAR
4	AxisNo	Word [Signed]	...	VAR
5	ChangeIndex	Word [Signed](0..31)	...	VAR
6	ChangeSubIndex	Word [Signed](0..31)	...	VAR
7	ChangeSize	Word [Signed](0..31)	...	VAR
8	ChangeDone	Bit	...	VAR
9	ChangeBusy	Bit	...	VAR
10	ChangeError	Bit	...	VAR
11	WriteIndex	Word [Signed](0..31)	...	VAR
12	WriteSubIndex	Word [Signed](0..31)	...	VAR
13	WriteSize	Word [Signed](0..31)	...	VAR
14	WriteData	Double Word [Signed](0..31)	...	VAR
15	WriteDone	Bit	...	VAR
16	WriteBusy	Bit	...	VAR
17	WriteError	Bit	...	VAR
18	ReadIndex	Word [Signed](0..31)	...	VAR
19	ReadSubIndex	Word [Signed](0..31)	...	VAR
20	ReadDone	Bit	...	VAR
21	ReadBusy	Bit	...	VAR
22	ReadError	Bit	...	VAR
23	ReadData	Double Word [Signed](0..31)	...	VAR
24	ErrorID	Word [Unsigned]/Bit String [16-bit]	...	VAR
25	MCv_ChangeMapping_FX5CPUE	MCv_ChangeMapping_FX5CPUEN	...	VAR
26	MCv_WriteMultiObject_FX5CPUE	MCv_WriteMultiObject_FX5CPUEN	...	VAR
27	MCv_ReadMultiObject_FX5CPUE	MCv_ReadMultiObject_FX5CPUEN	...	VAR

Programs

■Device initial setting

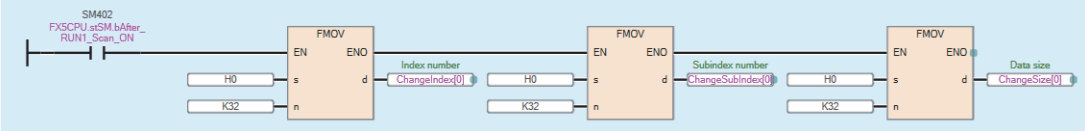
• Setting the axis number of the external device



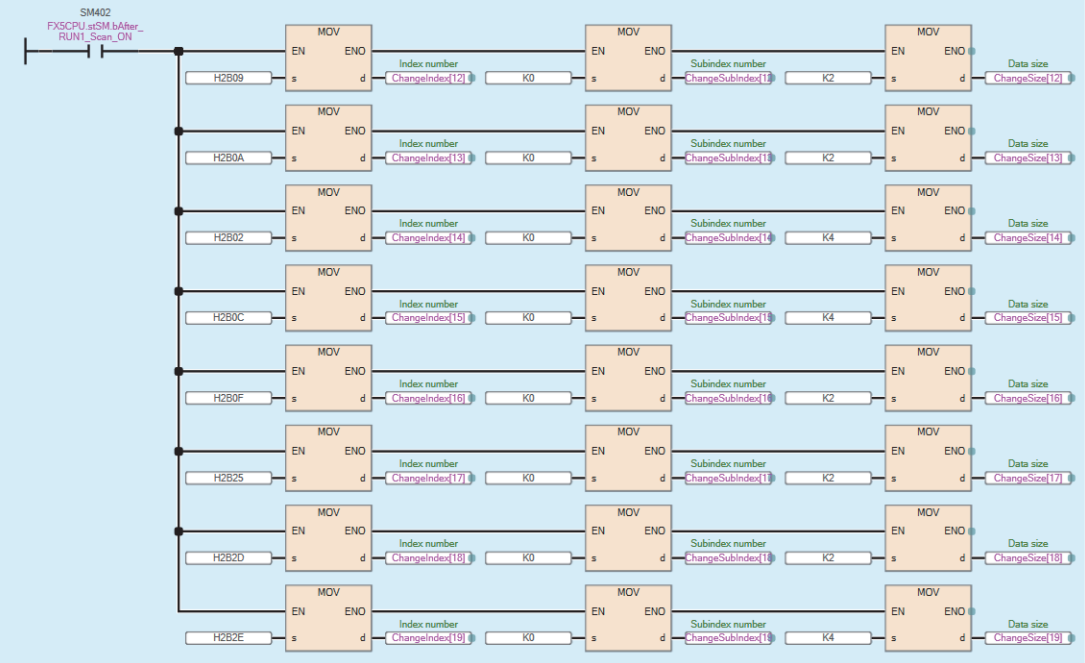
■Mapping change

This program changes the mapping (object index number, subindex number, data size).

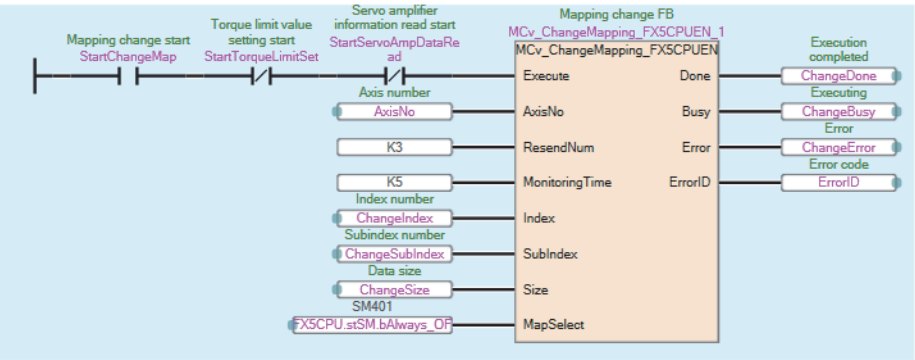
• Mapping initialization



• Mapping setting



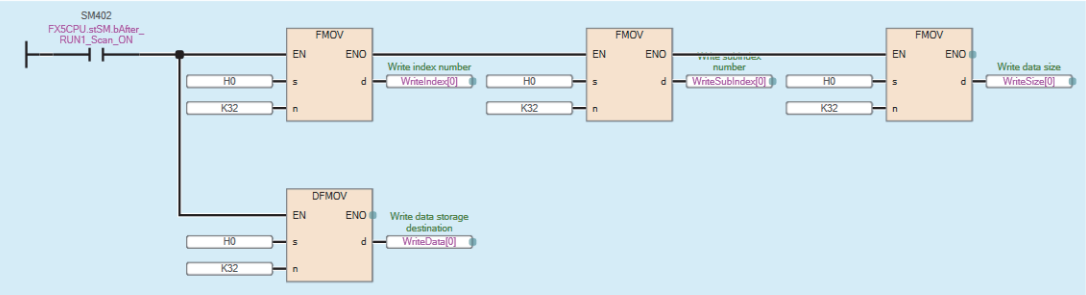
• Writing the specified object data to the servo amplifier



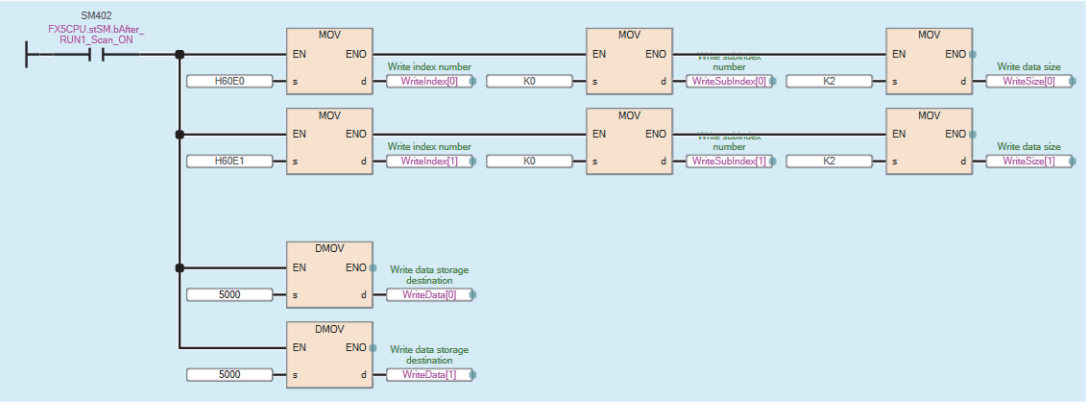
■Torque limit value setting

This program sets the object index number, subindex number, data size, and write data during write.

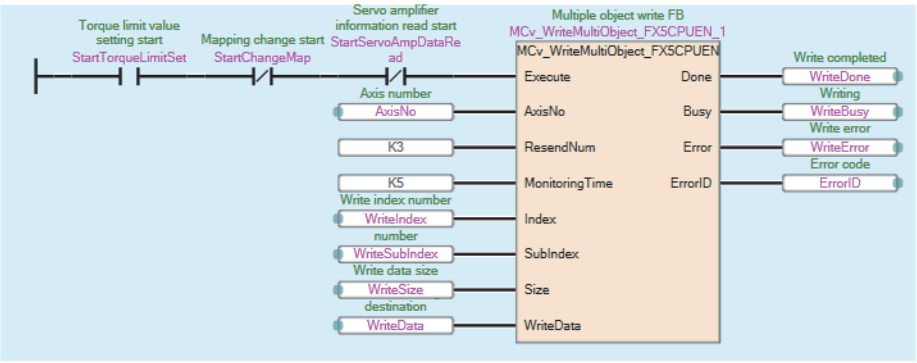
- Initialization of index number, subindex number, data size, and write data



- Setting the index number, subindex number, data size, and write data



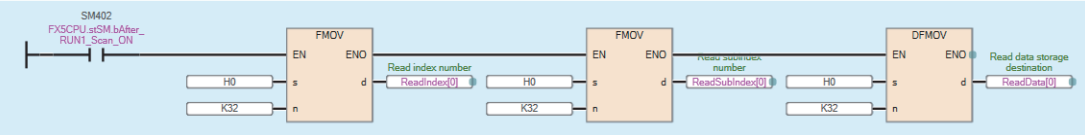
- Writing the specified object data to the servo amplifier



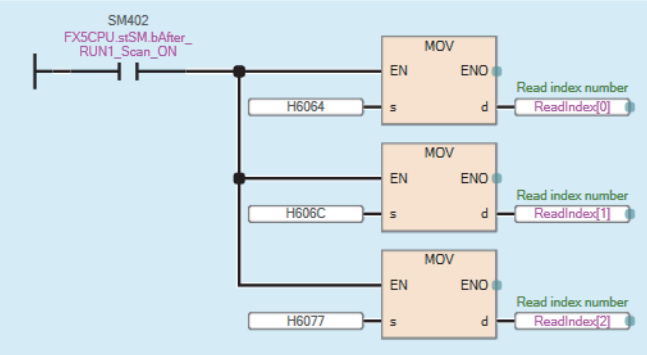
■Servo amplifier information read

This program sets the object index number and subindex number during read.

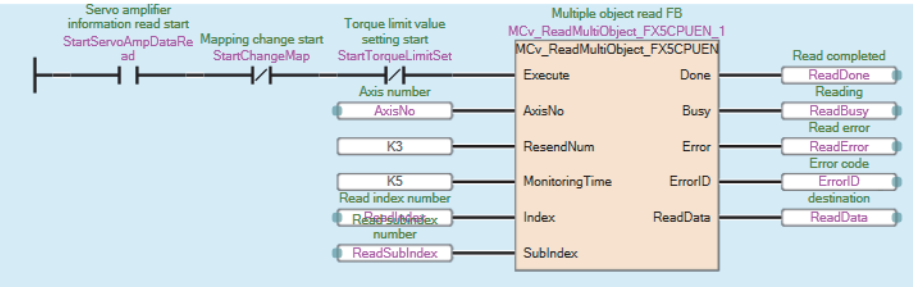
- Initialization of object index number, subindex number, data size, and read data



- Setting the index number



- Reading the object data of the servo amplifier



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REVISIONS

Revision date	Revision	Description
June 2021	A	First edition
October 2021	B	■Added target devices FX5-ENET, MR-J5-G ■Added or modified parts RELEVANT MANUALS, TERMS, GENERIC TERMS AND ABBREVIATIONS, Chapter 1, 2, 3, 4
November 2021	C	■Added or modified parts Section 1.2, 2.5, 3.8, 3.9, 4.1
April 2022	D	■Added or modified parts RELEVANT MANUALS, Section 2.1, 2.4, Chapter 3
July 2023	E	■Added or modified parts RELEVANT MANUALS, Section 2.7, 3.11, 3.12, 3.13

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