MITSUBISHI ELECTRIC

Programmable Controller

MELSEC iQ-R series MELSEC L series MELSEC Q series

Predefined Protocol Support For Positioning Function Block Library Reference (SMC Corporation)

SAFETY PRECAUTIONS

(Read these precautions before using this product.)

Before using this product, please read this reference carefully and pay full attention to safety to handle the product correctly.

The precautions given in this reference are concerned with this product only. For the safety precautions for the programmable controller system, refer to the user's manual for the CPU module used and MELSEC iQ-R Module Configuration Manual.

In this reference, the safety precautions are classified into two levels: "⚠ 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.

Under some circumstances, failure to observe the precautions given under "⚠ CAUTION" may lead to serious consequences.

Observe the precautions of both levels because they are important for personal and system safety.

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

CONDITIONS OF USE FOR THE PRODUCT

(1) MELSEC programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI ELECTRIC SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI ELECTRIC USER'S, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above restrictions, Mitsubishi Electric may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi Electric and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi Electric representative in your region.

(3) Mitsubishi Electric shall have no responsibility or liability for any problems involving programmable controller trouble and system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.

INTRODUCTION

Thank you for purchasing the Mitsubishi Electric MELSEC iQ-R series, MELSEC-Q series, and MELSEC-L series programmable controllers.
This reference describes function blocks which execute positioning control by connecting the MELSEC iQ-R series, MELSEC-Q series, or MELSEC-L series programmable controller to SMC controllers.
Before using this product, please read this reference carefully and develop familiarity with the functions and performance of the MELSEC iQ-R series, MELSEC-Q series, and MELSEC-L series programmable controllers to handle the product correctly.
When applying the program examples provided in this reference to an actual system, ensure the applicability and confirm that they will not cause system control problems.
Please make sure that the end users read this reference.

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RELEVANT MANUALS

Manual name [manual number]	Description	Available form
Predefined Protocol Support For Positioning Function Block Library Reference (SMC Corporation) [BCN-P5999-1373] (this reference)	Specifications, functions, and input/output labels of SMC controller function blocks	e-Manual PDF

Point

e-Manual refers to the Mitsubishi Electric FA electronic book manuals that can be browsed using a dedicated tool.

e-Manual has the following features:

- Required information can be cross-searched in multiple manuals.
- Other manuals can be accessed from the links in the manual.
- Hardware specifications of each part can be found from the product figures.
- Pages that users often browse can be bookmarked.
- Sample programs can be copied to an engineering tool.

TERMS

Unless otherwise specified, this reference uses the following terms.

Term	Description
Buffer memory	Memory in an intelligent function module to store data such as setting values and monitor values. For CPU modules, it refers to memory to store data such as setting values and monitor values of the Ethernet function, or data used for data communication of the multiple CPU system function.
Device	A memory of a CPU module to store data. Devices such as X, Y, M, D, and others are provided depending on the intended use.
Engineering tool	A tool used for setting up programmable controllers, programming, debugging, and maintenance.
Intelligent function module	A module that has functions other than an input or output, such as an A/D converter module and D/A converter module.
Process CPU	A CPU module that performs process control and sequence control. Process control function blocks and the online module change function can be executed. This module is also used with a redundant function module as a pair and configures a redundant system.

GENERIC TERM AND ABBREVIATION

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

Generic term/abbreviation	Description
SMC	An abbreviation for SMC Corporation.

1 OVERVIEW

A function block (FB) in this reference is for connecting the MELSEC iQ-R, MELSEC-Q, or MELSEC-L series programmable controller to SMC controllers via serial communication (MODBUS) and executing motor positioning control.

1.1 FB List

This section shows the FB list of this reference.
Note that this reference does not describe the FB version information which is indicated such as "_00A" at the end of an FB name.

MELSEC iQ-R series

FB name	Description
M+SMCStartHomePositioning_R	To move a motor to the initial position (return to origin).
M+SMCJogInching_R	To perform JOG or inching operation.
M+SMCReadStepData_R	To read the step data of the specified step data number.
M+SMCTeachingPosition_R	To set a designated position to the step data (target position) of the specified step data number.
M+SMCStartPositioning_R	To start positioning operation based on the step data of the specified step data number.
M+SMCMonitoring_R	To monitor a current position and alarms, and reset alarms.
M+SMCServoControl_R	To request a servo to turn ON or OFF.

MELSEC-Q/L series

FB name	Description
M+CPU-SMCPosiSp_StartHomePosi-ST	To move a motor to the initial position (return to origin).
M+CPU-SMCPosiSp_JogInching-ST	To perform JOG or inching operation.
M+CPU-SMCPosiSp_ReadStepData-ST	To read the step data of the specified step data number.
M+CPU-SMCPosiSp_Teaching-ST	To set a designated position to the step data (target position) of the specified step data number.
M+CPU-SMCPosiSp_StartPosi-ST	To start positioning operation based on the step data of the specified step data number.
M+CPU-SMCPosiSp_Monitoring-ST	To monitor a current position and alarms, and reset alarms.
M+CPU-SMCPosiSp_ServoControl-ST	To request a servo to turn ON or OFF.
M+CPU-SMCPosiSp_CPRTCL-ST	To execute an instruction for predefined protocol communication (G_CPRTCL) by using this FB in other MELSEC-Q/L series FBs. Do not use this FB in a user-created program as this is used only internally in other FBs.

Considerations

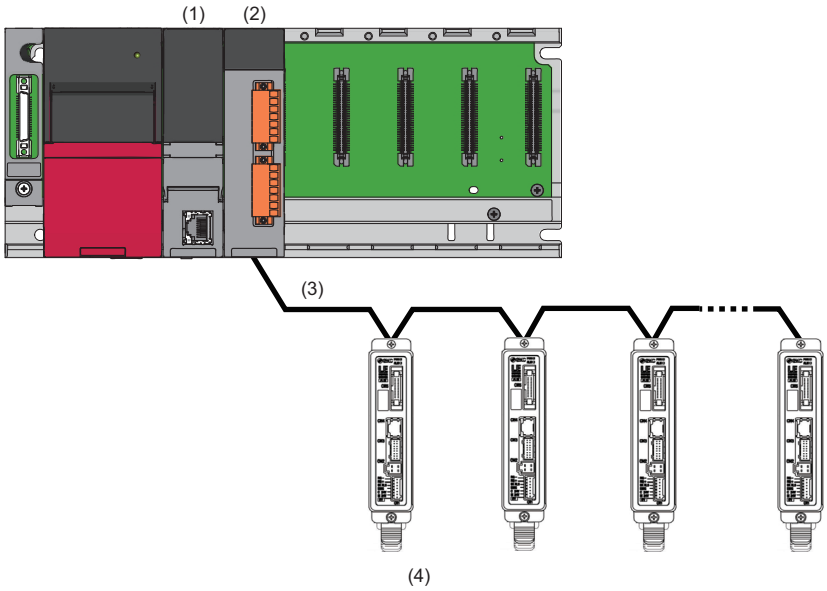
- To use FBs in this reference, it is necessary to write protocol setting data for a predefined protocol in advance by using the predefined protocol information write function of Predefined Protocol Support Tool For Positioning. (📖Predefined Protocol Support Tool For Positioning Operating Manual)
- When an execution command of an FB is turned ON, do not use the same channel of a serial communication module to communicate with a controller.
- All FBs use serial communication module buffer memories (user setting area); therefore, do not access to the following buffer memories:
  Un\G3072 to 5520

1.2 Acquisition Method

Please contact your local Mitsubishi Electric sales office or representative.

1.3 System Configuration

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



No.	Device name	Description
(1)	MELSEC iQ-R series programmable controller	Use a base unit, a power supply module, and a CPU module.
	MELSEC-Q series programmable controller	
	MELSEC-L series programmable controller	
(2)	Serial communication module	Use a serial communication module which has an RS-485 interface(s).
(3)	Serial communication (RS-485 connection)	Connect controllers. Maximum number of connectable controllers: 32
(4)	SMC controller	☞ Page 10 Supported models

For the specifications of modules to be used, refer to the user's manual of each module.

CPU module

Series	Generic term		Model
MELSEC iQ-R	RCPU		R00CPU, R01CPU, R02CPU, R04CPU, R04ENCPU, R08CPU, R08ENCPU, R08PCPU, R16CPU, R16ENCPU, R16PCPU, R32CPU, R32ENCPU, R32PCPU, R120CPU, R120ENCPU, R120PCPU
MELSEC-Q	QCPU	Universal model QCPU	Q00UJCPU, Q00UCPU, Q01UCPU, Q02UCPU, Q03UDCPU, Q03UDECPU, Q03UDVCPU, Q04UDHCPU, Q04UDEHCPU, Q04UDVCPU, Q04UDPVCPU, Q06UDHCPU, Q06UDEHCPU, Q06UDVCPU, Q06UDPVCPU, Q10UDHCPU, Q10UDEHCPU, Q13UDHCPU, Q13UDEHCPU, Q13UDVCPU, Q13UDPVCPU, Q20UDHCPU, Q20UDEHCPU, Q26UDHCPU, Q26UDEHCPU, Q26UDVCPU, Q26UDPVCPU, Q50UDEHCPU, Q100UDEHCPU
		Process CPU	Q02PHCPU, Q06PHCPU, Q12PHCPU, Q25PHCPU
MELSEC-L	LCPU		L02SCPU, L02SCPU-P, L02CPU, L02CPU-P, L06CPU, L06CPU-P, L26CPU, L26CPU-P, L26CPU-BT, L26CPU-PBT

Serial communication module

Series	Model	Available channel
MELSEC iQ-R	RJ71C24	CH2
	RJ71C24-R4	CH1, CH2
MELSEC-Q	QJ71C24N*1	CH2
	QJ71C24N-R4*1	CH2
MELSEC-L	LJ71C24	CH2

*1 The first five digits of the serial number are '11062' or higher.

Supported models

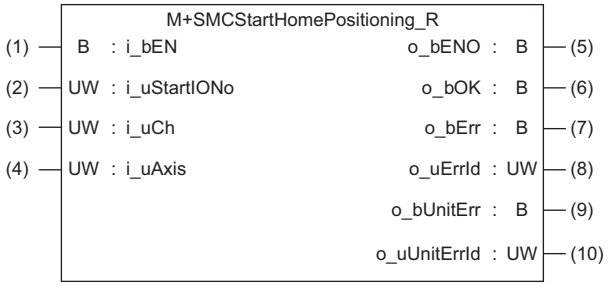
Manufacturer	Type	Series	Type and model
SMC Corporation	Controller/Step Data Input Type	LECP6	LECP6/LECA6
		LECA6	

2 DETAILS OF THE FB LIBRARY (MELSEC iQ-R SERIES)

2.1 M+SMCStartHomePositioning_R

Overview

Moves a motor to the initial position (return to origin).



Labels

Input label

No.	Label	Name	Data type	Range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_uStartIONo	Start I/O No.	Word [unsigned]	00H to FEH	Specify the value obtained by dividing the start input/output number of a target serial communication module by 16.
(3)	i_uCh	Target channel	Word [unsigned]	1, 2	Specify the channel of a serial communication module.
(4)	i_uAxis	Target axis	Word [unsigned]	1 to 32	Specify the controller ID.

Output label

No.	Label	Name	Data type	Initial value	Description
(5)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(6)	o_bOK	Normal completion	Bit	OFF	The ON state indicates that a return to origin is completed.
(7)	o_bErr	Error completion	Bit	OFF	The ON state indicates that an error has occurred in the FB.
(8)	o_uErrId	Error code	Word [unsigned]	0	The error code of an error occurred in the FB is stored.
(9)	o_bUnitErr	Unit error completion	Bit	OFF	The ON state indicates that an error has occurred in the module.
(10)	o_uUnitErrId	Unit error code	Word [unsigned]	0	The error code of an error occurred in the module is stored.

FB details

Available device

■ Serial communication module

Target module	Firmware version	Engineering tool
RJ71C24	—	GX Works3 Version 1.055H or later
RJ71C24-R4	—	GX Works3 Version 1.055H or later

■ CPU module

RCPU

Basic specifications

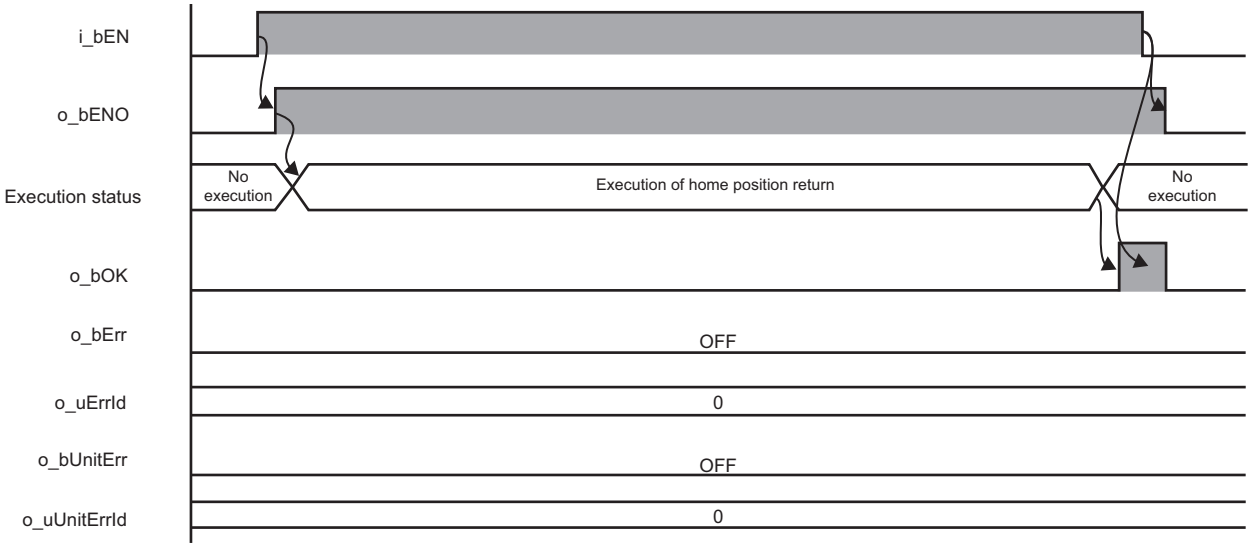
Item	Description
Language	Structured Text
Number of basic steps	2478 steps The number of steps of the FB embedded in a program varies depending on a CPU module used, the input and output definitions, and the option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual.
Number of points of a label used	• Label: 52 points (Word) • Latch label: 0 point (Word) The number of points of a label used that is embedded in a program varies depending on a device specified for an argument and the option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual.
Index register	Index register: 1 point (Z9)
FB dependence	No dependence
FB compilation method	Subroutine type
FB operation	Pulse execution (multiple scan execution type)

Processing

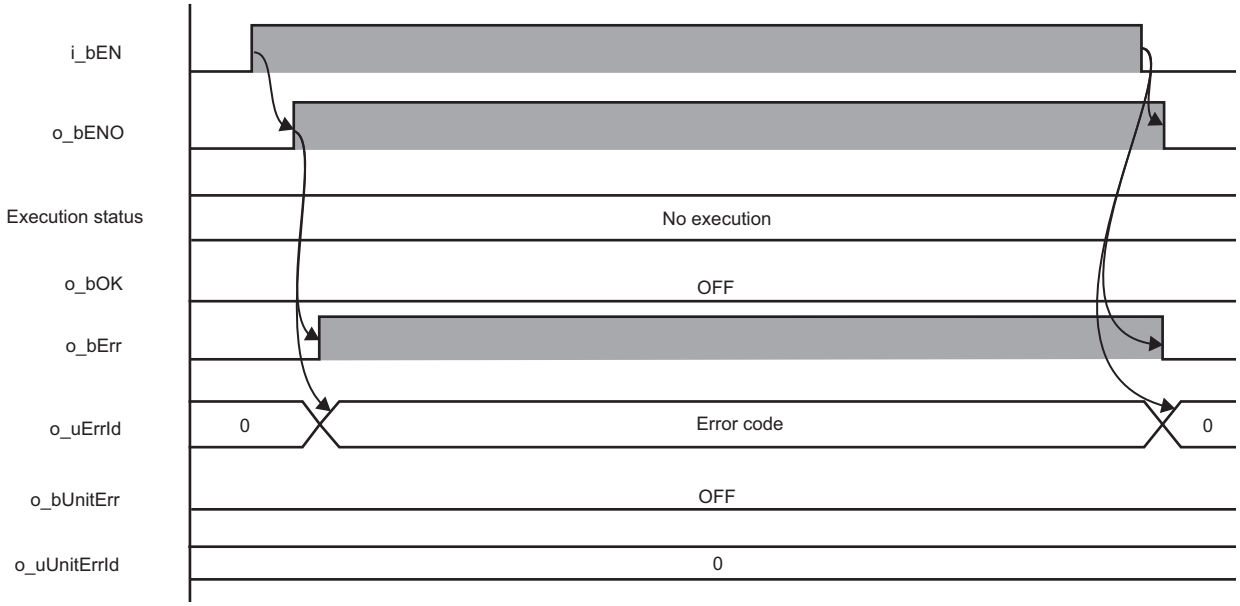
- Specify the start I/O number (a value obtained by dividing the start input/output number by 16) and channel of a serial communication module in i_uStartIONo (start I/O No.) and i_uCh (target channel) respectively.
- Specify the axis number (controller ID) of the operation target in i_uAxis (target axis).
- This FB executes a return to origin via Modbus communication at the rise of i_bEN (execution command).
  When the return to origin is completed, o_bOK (normal completion) is turned ON.
- When a value out of the range is set for the start I/O number, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '100H' is stored in o_uErrId (error code).
- When a value out of the range is set for the target channel, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '101H' is stored in o_uErrId (error code).
- When a value out of the range is set for the target axis, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '102H' is stored in o_uErrId (error code).
- When the connected device is not the operation target, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '200H' is stored in o_uErrId (error code).
- When turning OFF i_bEN (execution command) before o_bOK (normal completion), o_bErr (error completion), or o_bUnitErr (unit error completion) is turned ON, o_bErr (error completion) is turned ON for one scan only and the processing of the FB is interrupted. In addition, the error code '201H' is stored in o_uErrId (error code) for one scan.
- When turning ON i_bEN (execution command) of this FB while executing any of the following FBs, o_bErr (error completion) is turned ON and the processing of this FB is interrupted. In addition, the error code '202H' is stored in o_uErrId (error code).
  M+SMCStartHomePositioning_R
  M+SMCJogInching_R
  M+SMCStartPositioning_R
- When turning ON an alarm signal of a controller, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '203H' is stored in o_uErrId (error code). Check the status of the controller in M+SMCMonitoring_R.
- When turning ON i_bEN (execution command) of this FB while a servo of a target controller is OFF, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '204H' is stored in o_uErrId (error code).
- When an error occurs while sending/receiving a message to/from the predefined protocol, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. An error code is stored in o_uErrId (error code). For details on the error code, refer to 📖MELSEC iQ-R Serial Communication Module User's Manual(Application).
- When this FB receives an error code due to an error occurred in a controller, o_bUnitErr (unit error completion) is turned ON and the processing of the FB is interrupted. In addition, the received error code is stored in o_uUnitErrId (unit error code).

Timing chart of I/O signals

■ In normal completion



■ In error completion



Restrictions or precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because i_bEN (execution command) cannot be turned OFF and the normal operation cannot be performed. Always use this FB in programs that can turn OFF i_bEN (execution command).
- This FB requires the configuration of the ladder for every input label.
- Change the memory/device setting in the CPU parameter so that the capacity required to use this FB is secured. Otherwise, a compiling error may occur in GX Works3.
- After a return to origin is started by using this FB, when turning OFF i_bEN (execution command) before o_bOK (normal completion), o_bErr (error completion), or o_bUnitErr (unit error completion) is turned ON, a motor continues to operate until a return to origin is completed.
- This FB uses the CPRTCL instruction. For details, refer to 📖MELSEC iQ-R Programming Manual (Module Dedicated Instructions).
- Specify a value obtained by dividing the start input/output number, which is assigned to a serial communication module, by 16 in i_uStartIONo (start I/O No.). If the start input/output number is not assigned to the module, the stop error of the CPU (2820H) occurs.
- This FB uses the index register Z9. Do not use the Z9 in an interrupt program.
- Before operating an SMC controller, write the following parameters (module parameters of a serial communication module) to a module by using GX Works3.

Item		Setting value
Communication protocol setting		Predefined protocol
Communication speed setting		Set the value according to the setting of a device to be connected.
Transmission setting	Data bit	8
	Parity bit	None
	Stop bit	1
Communication control specification	Echo back enable/prohibit specification	Echo back prohibit

- Use the protocol send/receive setting of Predefined Protocol Support Tool For Positioning to change a communication timeout or the number of retries. (📖Predefined Protocol Support Tool For Positioning Operating Manual)

Performance value

The following table lists the performance values of this FB under the following conditions.

- FB compilation method: Subroutine type
- CPU module: R120CPU
- Serial communication module: RJ71C24-R4
- Controller (manufactured by SMC): LEY16AC-30-R16N
- Electric actuator (manufactured by SMC): LECA6N-LEY16AC-30
- Initial position: Home position (0.00 mm)

Time required for the processing*1	Maximum scan time	Number of scans required for the processing
564.000 ms	0.574 ms	1784 scans

*1 The time required from start to end of the processing.

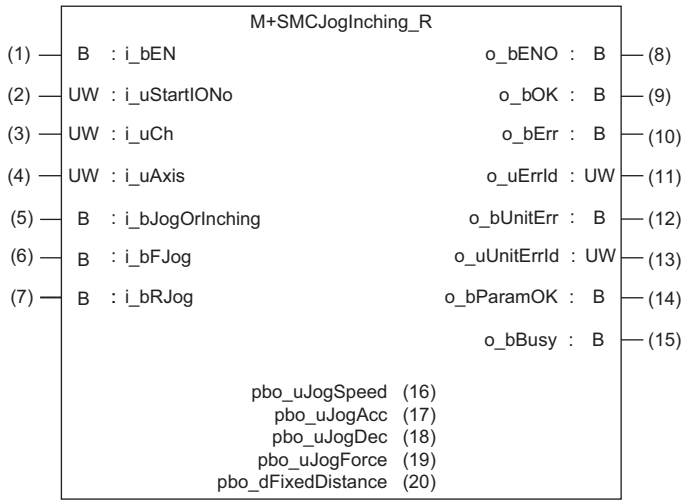
Error code

Error code	Description	Corrective action
100H	The value set for the start I/O number is out of the range.	Set a value within the range from 00H to FEH for the start I/O number and execute the FB again.
101H	The value set for the target channel is out of the range.	Set 1 or 2 for the target channel and execute the FB again.
102H	The value set for the target axis is out of the range.	Set a value within the range from 1 to 32 for the target axis and execute the FB again.
200H	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
201H	The execution command turned OFF during the processing.	Do not turn OFF i_bEN (execution command) until o_bOK (normal completion), o_bErr (error completion), or o_bUnitErr (unit error completion) is turned ON. (This error code is output for one scan only.)
202H	Another FB which may affect the operation of a motor is executing.	Stop the FB and execute this FB again. Target FB: • M+SMCStartHomePositioning_R • M+SMCJogInching_R • M+SMCStartPositioning_R For M+SMCJogInching_R, check that o_bParamOK (parameter setting completion flag) is turned ON and o_bBusy (busy signal) is turned OFF.
203H	Emergency stop or major failure is occurring.	Check the status of a controller in M+SMCMonitoring_R. After checking the status, remove the cause of the error and execute the FB again.
204H	Movement commands are executed while a servo is OFF.	Check the status of a controller in M+SMCMonitoring_R. To turn ON a servo, turn it ON with M+SMCServoControl_R.
Predefined protocol error code	An error code that occurs during communication.	For details, refer to the following: MELSEC iQ-R Serial Communication Module User's Manual(Application)

2.2 M+SMCJogInching_R

Overview

Performs JOG or inching operation.



Labels

Input label

No.	Label	Name	Data type	Range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_uStartIONo	Start I/O No.	Word [unsigned]	00H to FEH	Specify the value obtained by dividing the start input/output number of a target serial communication module by 16.
(3)	i_uCh	Target channel	Word [unsigned]	1, 2	Specify the channel of a serial communication module.
(4)	i_uAxis	Target axis	Word [unsigned]	1 to 32	Specify the controller ID.
(5)	i_bJogOrInching	JOG/Inching replacement	Bit	ON, OFF	ON: Inching operation OFF: JOG operation
(6)	i_bFJog	JOG + command	Bit	ON, OFF	Turn ON this label to perform the forward JOG or inching operation.
(7)	i_bRJog	JOG - command	Bit	ON, OFF	Turn ON this label to perform the reverse JOG or inching operation.

Output label

No.	Label	Name	Data type	Initial value	Description
(8)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(9)	o_bOK	Normal completion	Bit	OFF	The ON state indicates that the JOG operation is started, and the inching operation is completed normally.
(10)	o_bErr	Error completion	Bit	OFF	The ON state indicates that an error has occurred in the FB.
(11)	o_uErrId	Error code	Word [unsigned]	0	The error code of an error occurred in the FB is stored.
(12)	o_bUnitErr	Unit error completion	Bit	OFF	The ON state indicates that an error has occurred in the module.
(13)	o_uUnitErrId	Unit error code	Word [unsigned]	0	The error code of an error occurred in the module is stored.
(14)	o_bParamOK	Parameter setting completion flag	Bit	OFF	The ON state indicates that the initial settings until a motor is ready to operate is completed.
(15)	o_bBusy	Busy signal	Bit	OFF	The ON state indicates that a motor is operating.

Public variable

No.	Label	Name	Data type	Initial value	Description
(16)	pbo_uJogSpeed	JOG speed	Word [unsigned]	0*1	Set the JOG speed. For the inching operation, the specified speed is ignored. (Unit: mm/s)
(17)	pbo_uJogAcc	JOG ACC	Word [unsigned]	0*1	Set acceleration of the JOG or inching operation. (Unit: mm/s^2)
(18)	pbo_uJogDec	JOG DEC	Word [unsigned]	0*1	Set deceleration of the JOG or inching operation. (Unit: mm/s^2)
(19)	pbo_uJogForce	JOG Force	Word [unsigned]	0*1	Set force of the JOG or inching operation. (Unit: %)
(20)	pbo_dFixedDistance	Fixed distance	Double Word [signed]	0*1	Set the inching amount of movement. For the JOG operation, the set movement amount is ignored. (Unit: 0.01 mm/s)

*1 The actual initial value is the one acquired from a controller via communication.

FB details

Available device

■ Serial communication module

Target module	Firmware version	Engineering tool
RJ71C24	—	GX Works3 Version 1.055H or later
RJ71C24-R4	—	GX Works3 Version 1.055H or later

■ CPU module

RCPU

Basic specifications

Item	Description
Language	Structured Text
Number of basic steps	3591 steps The number of steps of the FB embedded in a program varies depending on a CPU module used, the input and output definitions, and the option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual.
Number of points of a label used	• Label: 68 points (Word) • Latch label: 0 point (Word) The number of points of a label used that is embedded in a program varies depending on a device specified for an argument and the option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual.
Index register	Index register: 1 point (Z9)
FB dependence	No dependence
FB compilation method	Subroutine type
FB operation	Real-time execution

Processing

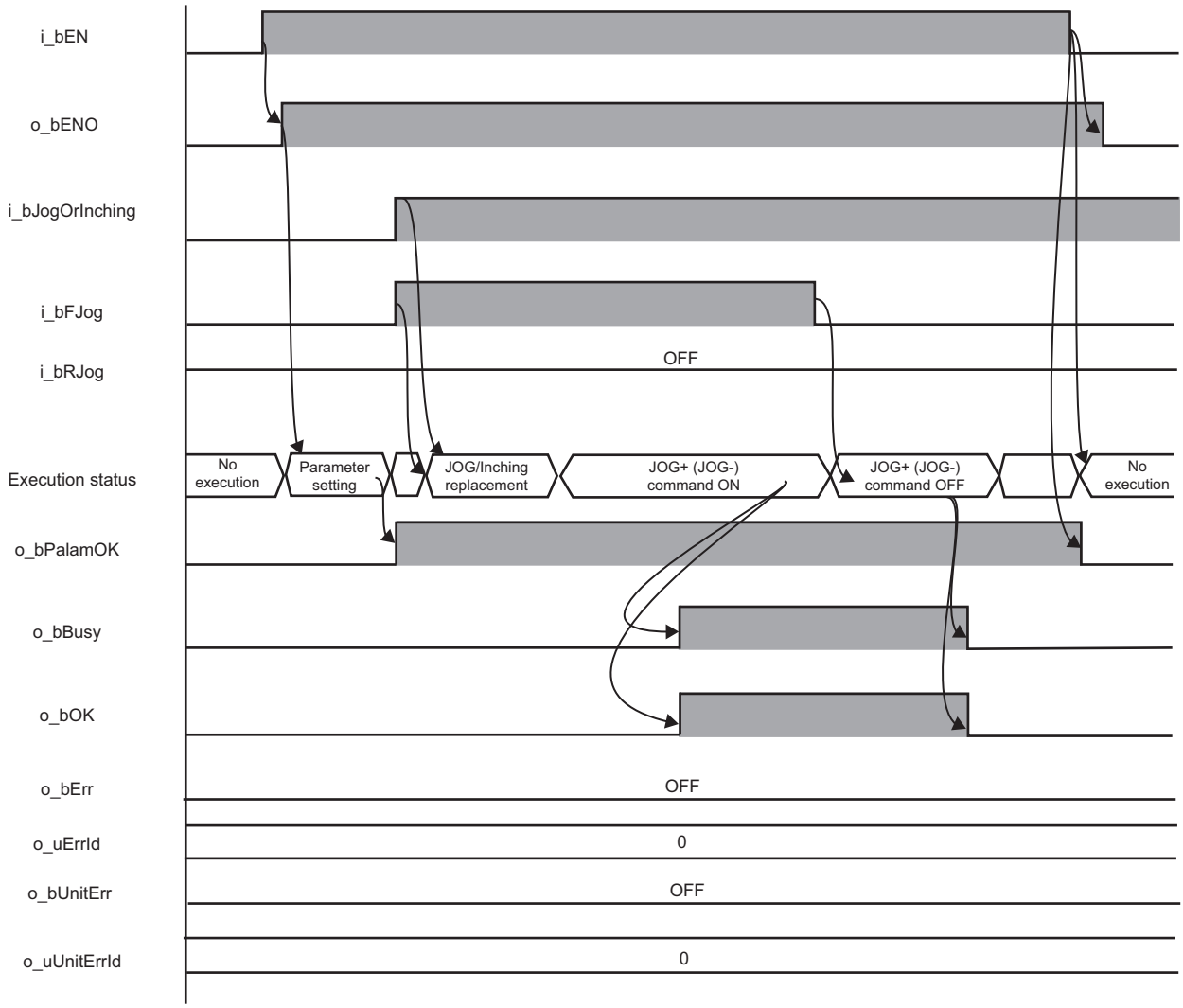
- Specify the start I/O number (a value obtained by dividing the start input/output number by 16) and channel of a serial communication module in i_uStartIONo (start I/O No.) and i_uCh (target channel) respectively.
- Specify the axis number (controller ID) of the operation target in i_uAxis (target axis).
- Set the following public variables to set parameters for the JOG or inching operation.

Label	Setting content
pbo_uJogSpeed	JOG speed
pbo_uJogAcc	JOG acceleration
pbo_uJogDec	JOG deceleration
pbo_uJogForce	JOG force
pbo_dFixedDistance	Fixed distance

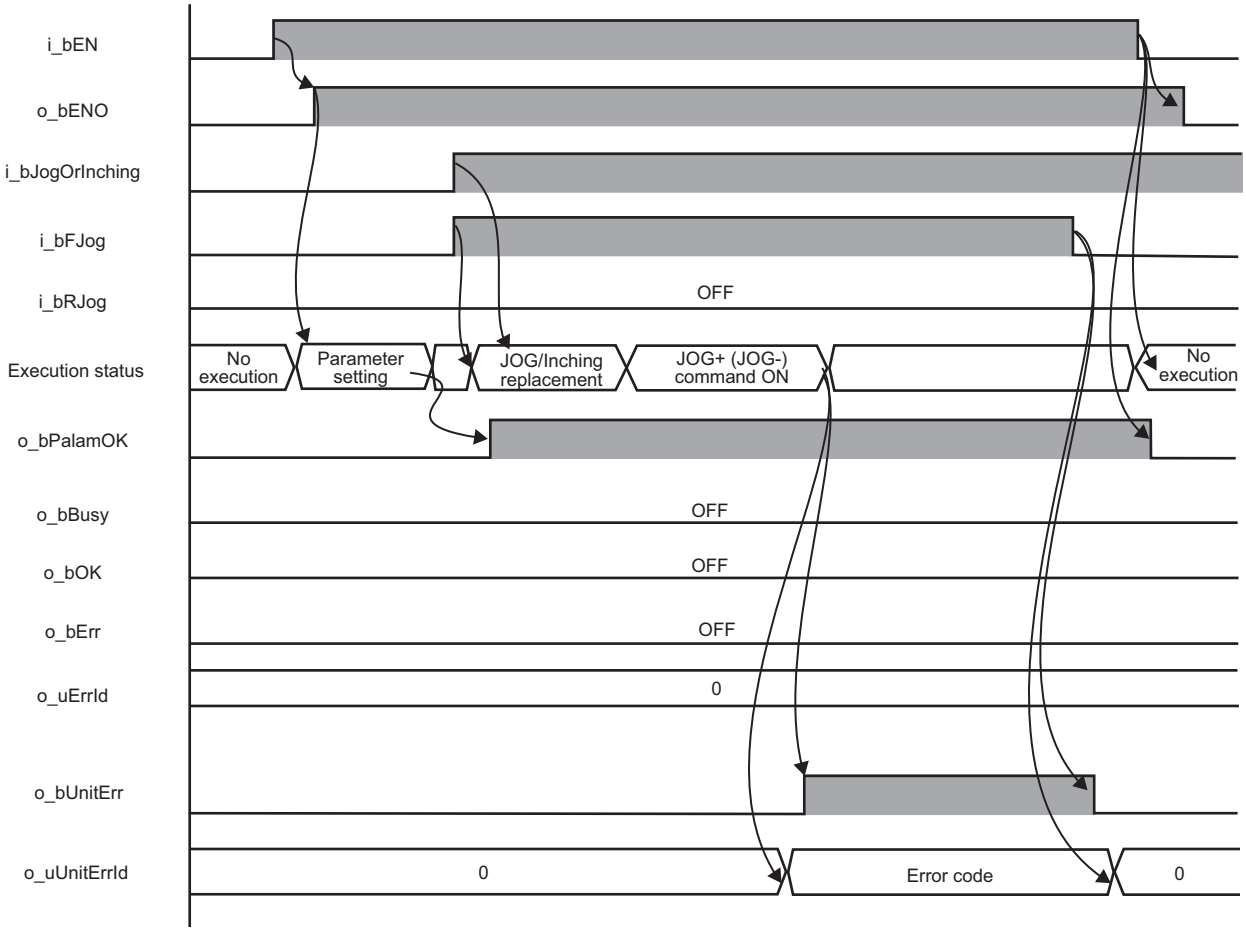
- This FB reads JOG parameters at the rise of i_bEN (execution command). When the JOG or inching operation is ready, o_bParamOK (parameter setting completion flag) is turned ON.
- The inching operation command is executed until the operation is completed by turning ON i_bJogOrInching (JOG/Inching replacement) and at the rise of i_bFJog (JOG + command) or i_bRJog (JOG - command). When the operation is completed, o_bOK (normal completion) is turned ON.
- The JOG operation command is executed while i_bJogOrInching (JOG/Inching replacement) is turned OFF and i_bFJog (JOG + command) or i_bRJog (JOG - command) is turned ON. o_bOK (normal completion) is turned ON at the start of the operation. When i_bFJog (JOG + command) or i_bRJog (JOG - command) is turned OFF, the operation decelerates to stop and o_bOK (normal completion) is turned OFF.
- o_bBusy (busy signal) is turned ON while a controller is operating (during the inching or JOG operation).
- The operation stops when both i_bFJog (JOG + command) and i_bRJog (JOG - command) are turned ON.
- The operation stops when i_bJogOrInching (JOG/Inching replacement) is turned ON during the JOG operation.
- When a value out of the range is set for the start I/O number, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '100H' is stored in o_uErrId (error code).
- When a value out of the range is set for the target channel, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '101H' is stored in o_uErrId (error code).
- When a value out of the range is set for the target axis, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '102H' is stored in o_uErrId (error code).
- When the connected device is not the operation target, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '200H' is stored in o_uErrId (error code).
- When turning ON i_bEN (execution command) of this FB while executing any of the following FBs, o_bErr (error completion) is turned ON and the processing of this FB is interrupted. In addition, the error code '202H' is stored in o_uErrId (error code).
  M+SMCStartHomePositioning_R
  M+SMCJogInching_R
  M+SMCStartPositioning_R
- When turning ON an alarm signal of a controller, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '203H' is stored in o_uErrId (error code). Check the status of the controller in M+SMCMonitoring_R.
- When turning ON i_bEN (execution command) of this FB while a servo of a target controller is OFF, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '204H' is stored in o_uErrId (error code).
- When an error occurs while sending/receiving a message to/from the predefined protocol, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. An error code is stored in o_uErrId (error code). For details on the error code, refer to 📖MELSEC iQ-R Serial Communication Module User's Manual(Application).
- When this FB receives an error code due to an error occurred in a controller, o_bUnitErr (unit error completion) is turned ON and the processing of the FB is interrupted. In addition, the received error code is stored in o_uUnitErrId (unit error code).

Timing chart of I/O signals

■ In normal completion



■ In error completion



Restrictions or precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because i_bEN (execution command) cannot be turned OFF and the normal operation cannot be performed. Always use this FB in programs that can turn OFF i_bEN (execution command).
- This FB requires the configuration of the ladder for every input label.
- Change the memory/device setting in the CPU parameter so that the capacity required to use this FB is secured. Otherwise, a compiling error may occur in GX Works3.
- Perform the JOG or inching operation after o_bParamOK (parameter setting completion flag) is turned ON.
- When a controller stops at the operation limit value, an error will not occur in this FB.
- When i_bFJog (JOG + command) or i_bRJog (JOG - command) is turned ON before o_bParamOK (parameter setting completion flag) is turned ON, JOG + (-) command is ignored. Turn ON the JOG + (-) command again.
- When i_bEN (execution command) is turned OFF during the JOG operation, o_bENO (execution status) is turned OFF after the operation stops. To turn ON i_bEN (execution command) again, check that o_bENO (execution status) is turned OFF in advance.
- This FB uses the CPRTCL instruction. For details, refer to 📖MELSEC iQ-R Programming Manual (Module Dedicated Instructions).
- Specify a value obtained by dividing the start input/output number, which is assigned to a serial communication module, by 16 in i_uStartIONo (start I/O No.). If the start input/output number is not assigned to the module, the stop error of the CPU (2820H) occurs.
- This FB uses the index register Z9. Do not use the Z9 in an interrupt program.
- Before operating an SMC controller, write the following parameters (module parameters of a serial communication module) to a module by using GX Works3.

Item		Setting value
Communication protocol setting		Predefined protocol
Communication speed setting		Set the value according to the setting of a device to be connected.
Transmission setting	Data bit	8
	Parity bit	None
	Stop bit	1
Communication control specification	Echo back enable/prohibit specification	Echo back prohibit

- Use the protocol send/receive setting of Predefined Protocol Support Tool For Positioning to change a communication timeout or the number of retries. (📖Predefined Protocol Support Tool For Positioning Operating Manual)

Performance value

The following table lists the performance values of this FB under the following conditions.

- FB compilation method: Subroutine type
- CPU module: R120CPU
- Serial communication module: RJ71C24-R4
- Controller (manufactured by SMC): LEY16AC-30-R16N
- Electric actuator (manufactured by SMC): LECA6N-LEY16AC-30
- JOG speed: 10.00 mm/s
- Inching amount of movement: 0.10 mm

Measuring range	Time required for the processing*1	Maximum scan time	Number of scans required for the processing
From when i_bEN (execution command) is turned ON to when o_bParamOK (parameter setting completion flag) is turned ON	67.700 ms	0.471 ms	212 scans
From when i_bFJog (JOG + command) or i_bRJog (JOG - command) is turned ON to when JOG operation starts	61.400 ms	0.619 ms	191 scans
From when i_bFJog (JOG + command) or i_bRJog (JOG - command) is turned ON to when inching movement completes	61.600 ms	0.536 ms	191 scans

*1 The time required from start to end of the processing.

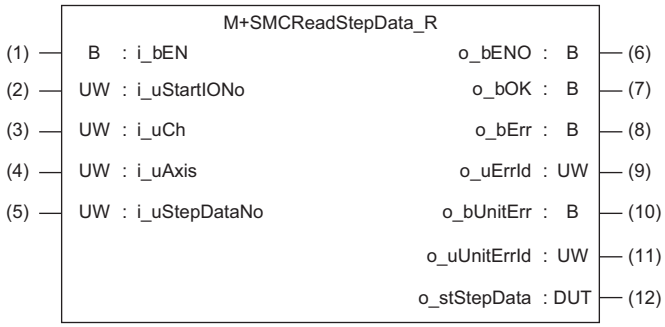
Error code

Error code	Description	Corrective action
100H	The value set for the start I/O number is out of the range.	Set a value within the range from 00H to FEH for the start I/O number and execute the FB again.
101H	The value set for the target channel is out of the range.	Set 1 or 2 for the target channel and execute the FB again.
102H	The value set for the target axis is out of the range.	Set a value within the range from 1 to 32 for the target axis and execute the FB again.
200H	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
202H	Another FB which may affect the operation of a motor is executing.	Stop the FB and execute this FB again. Target FB: • M+SMCStartHomePositioning_R • M+SMCJogInching_R • M+SMCStartPositioning_R For M+SMCJogInching_R, check that o_bParamOK (parameter setting completion flag) is turned ON and o_bBusy (busy signal) is turned OFF.
203H	Emergency stop or major failure is occurring.	Check the status of a controller in M+SMCMonitoring_R. After checking the status, remove the cause of the error and execute the FB again.
204H	Movement commands are executed while a servo is OFF.	Check the status of a controller in M+SMCMonitoring_R. To turn ON a servo, turn it ON with M+SMCServoControl_R.
Predefined protocol error code	An error code that occurs during communication.	For details, refer to the following: MELSEC iQ-R Serial Communication Module User's Manual(Application)

2.3 M+SMCReadStepData_R

Overview

Reads the step data of the specified step data number.



Labels

Input label

No.	Label	Name	Data type	Range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_uStartIONo	Start I/O No.	Word [unsigned]	00H to FEH	Specify the value obtained by dividing the start input/output number of a target serial communication module by 16.
(3)	i_uCh	Target channel	Word [unsigned]	1, 2	Specify the channel of a serial communication module.
(4)	i_uAxis	Target axis	Word [unsigned]	1 to 32	Specify the controller ID.
(5)	i_uStepDataNo	Step data No.	Word [unsigned]	0 to 63	Specify the step data number of step data from which the setting value is to be read.

Output label

No.	Label	Name	Data type	Initial value	Description
(6)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(7)	o_bOK	Normal completion	Bit	OFF	The ON state indicates that reading step data is completed.
(8)	o_bErr	Error completion	Bit	OFF	The ON state indicates that an error has occurred in the FB.
(9)	o_uErrId	Error code	Word [unsigned]	0	The error code of an error occurred in the FB is stored.
(10)	o_bUnitErr	Unit error completion	Bit	OFF	The ON state indicates that an error has occurred in the module.
(11)	o_uUnitErrId	Unit error code	Word [unsigned]	0	The error code of an error occurred in the module is stored.
(12)	o_stStepData	Step data	Structure (stSMCStepData)	—	For details, refer to the following: ☞ Page 105 Step data structure (stSMCStepData)

FB details

Available device

■ Serial communication module

Target module	Firmware version	Engineering tool
RJ71C24	—	GX Works3 Version 1.055H or later
RJ71C24-R4	—	GX Works3 Version 1.055H or later

■ CPU module

RCPU

Basic specifications

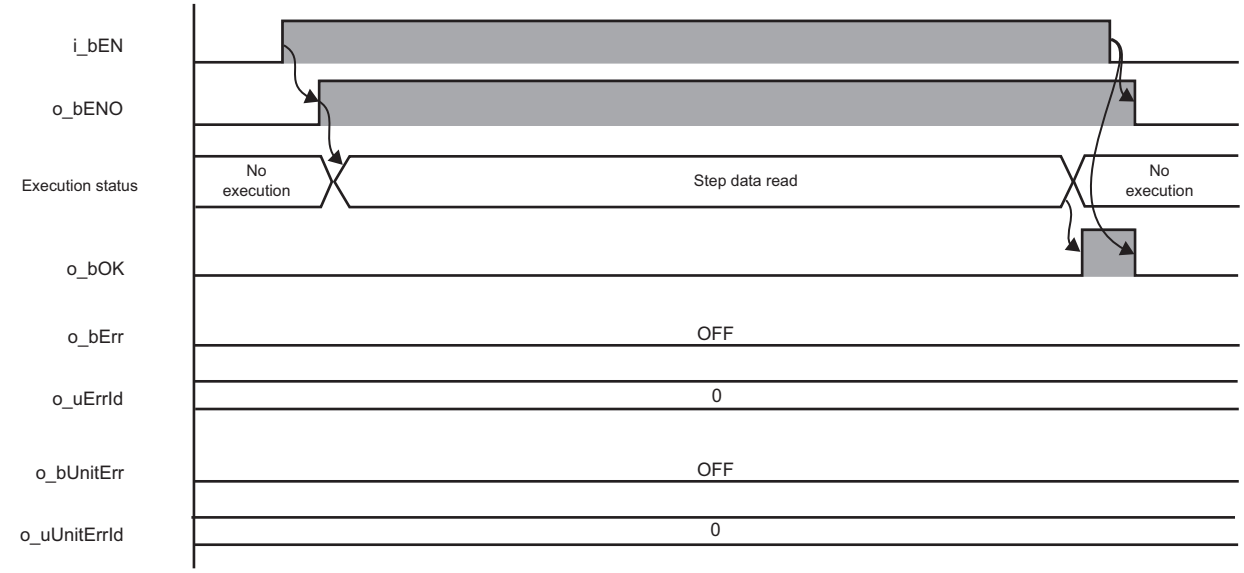
Item	Description
Language	Structured Text
Number of basic steps	1877 steps The number of steps of the FB embedded in a program varies depending on a CPU module used, the input and output definitions, and the option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual.
Number of points of a label used	• Label: 52 points (Word) • Latch label: 0 point (Word) The number of points of a label used that is embedded in a program varies depending on a device specified for an argument and the option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual.
Index register	Index register: 1 point (Z9)
FB dependence	No dependence
FB compilation method	Subroutine type
FB operation	Pulse execution (multiple scan execution type)

Processing

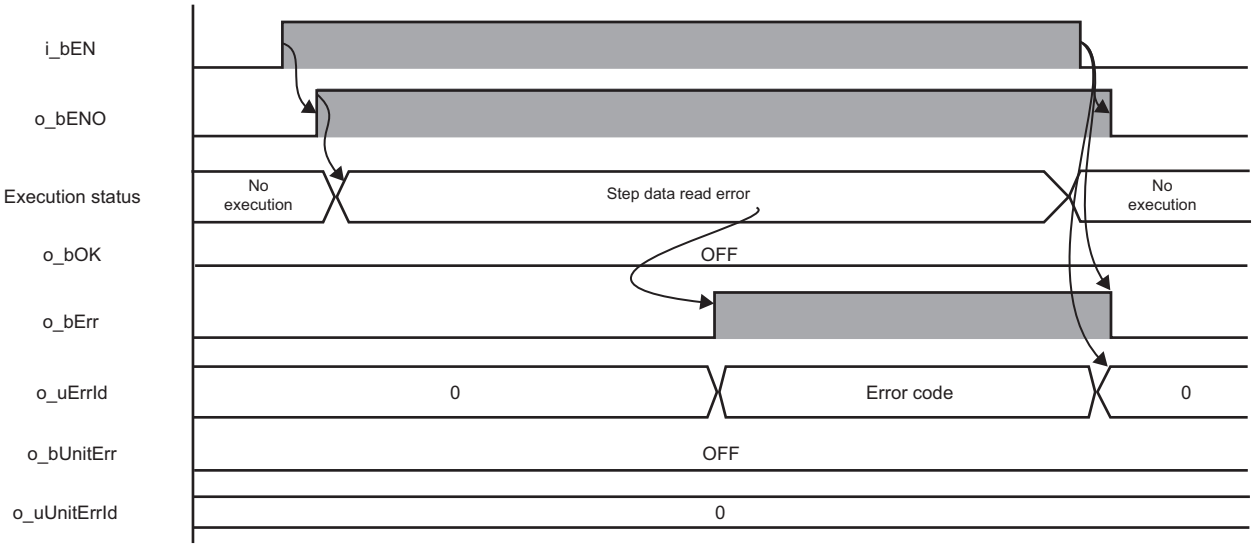
- Specify the start I/O number (a value obtained by dividing the start input/output number by 16) and channel of a serial communication module in i_uStartIONo (start I/O No.) and i_uCh (target channel) respectively.
- Specify the axis number (controller ID) of the operation target in i_uAxis (target axis).
- Specify the target step data number in i_uStepDataNo (step data No.).
- This FB reads step data of the specified step data number via Modbus communication at the rise of i_bEN (execution command). When the data reading is completed, o_bOK (normal completion) is turned ON.
- When a value out of the range is set for the start I/O number, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '100H' is stored in o_uErrId (error code).
- When a value out of the range is set for the target channel, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '101H' is stored in o_uErrId (error code).
- When a value out of the range is set for the target axis, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '102H' is stored in o_uErrId (error code).
- When a value out of the range is set for the step data number, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '105H' is stored in o_uErrId (error code).
- When the connected device is not the operation target, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '200H' is stored in o_uErrId (error code).
- When turning OFF i_bEN (execution command) before o_bOK (normal completion), o_bErr (error completion), or o_bUnitErr (unit error completion) is turned ON, o_bErr (error completion) is turned ON for one scan only and the processing of the FB is interrupted. In addition, the error code '201H' is stored in o_uErrId (error code) for one scan.
- When turning ON i_bEN (execution command) of this FB while executing the following FB, o_bErr (error completion) is turned ON and the processing of this FB is interrupted. In addition, the error code '202H' is stored in o_uErrId (error code).
  M+SMCReadStepData_R
- When an error occurs while sending/receiving a message to/from the predefined protocol, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. An error code is stored in o_uErrId (error code). For details on the error code, refer to 📖MELSEC iQ-R Serial Communication Module User's Manual(Application).
- When this FB receives an error code due to an error occurred in a controller, o_bUnitErr (unit error completion) is turned ON and the processing of the FB is interrupted. In addition, the received error code is stored in o_uUnitErrId (unit error code).

Timing chart of I/O signals

■ In normal completion



■ In error completion



Restrictions or precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because i_bEN (execution command) cannot be turned OFF and the normal operation cannot be performed. Always use this FB in programs that can turn OFF i_bEN (execution command).
- This FB requires the configuration of the ladder for every input label.
- Change the memory/device setting in the CPU parameter so that the capacity required to use this FB is secured. Otherwise, a compiling error may occur in GX Works3.
- This FB uses the CPRTCL instruction. For details, refer to MELSEC iQ-R Programming Manual (Module Dedicated Instructions).
- Specify a value obtained by dividing the start input/output number, which is assigned to a serial communication module, by 16 in i_uStartIONo (start I/O No.). If the start input/output number is not assigned to the module, the stop error of the CPU (2820H) occurs.
- This FB uses the index register Z9. Do not use the Z9 in an interrupt program.
- Before operating an SMC controller, write the following parameters (module parameters of a serial communication module) to a module by using GX Works3.

Item		Setting value
Communication protocol setting		Predefined protocol
Communication speed setting		Set the value according to the setting of a device to be connected.
Transmission setting	Data bit	8
	Parity bit	None
	Stop bit	1
Communication control specification	Echo back enable/prohibit specification	Echo back prohibit

- Use the protocol send/receive setting of Predefined Protocol Support Tool For Positioning to change a communication timeout or the number of retries. (Predefined Protocol Support Tool For Positioning Operating Manual)

Performance value

The following table lists the performance values of this FB under the following conditions.

- FB compilation method: Subroutine type
- CPU module: R120CPU
- Serial communication module: RJ71C24-R4
- Controller (manufactured by SMC): LEY16AC-30-R16N
- Electric actuator (manufactured by SMC): LECA6N-LEY16AC-30

Time required for the processing*1	Maximum scan time	Number of scans required for the processing
42.900 ms	0.491 ms	132 scans

*1 The time required from start to end of the processing.

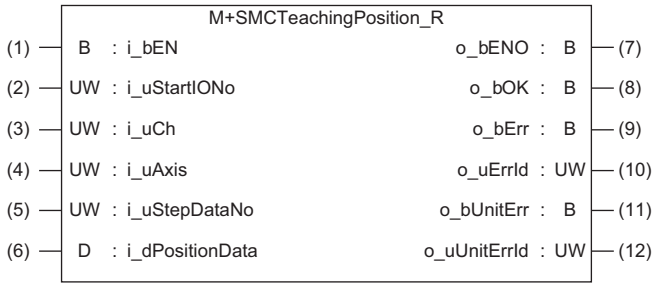
Error code

Error code	Description	Corrective action
100H	The value set for the start I/O number is out of the range.	Set a value within the range from 00H to FEH for the start I/O number and execute the FB again.
101H	The value set for the target channel is out of the range.	Set 1 or 2 for the target channel and execute the FB again.
102H	The value set for the target axis is out of the range.	Set a value within the range from 1 to 32 for the target axis and execute the FB again.
105H	The value set for the step data number is out of the range.	Set a value within the range from 0 to 63 for the step data number and execute the FB again.
200H	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
201H	The execution command turned OFF during the processing.	Do not turn OFF i_bEN (execution command) until o_bOK (normal completion), o_bErr (error completion), or o_bUnitErr (unit error completion) is turned ON. (This error code is output for one scan only.)
202H	Another FB which may affect the operation of this FB is executing.	Stop the FB and execute this FB again. Target FB: • M+SMCReadStepData_R
Predefined protocol error code	An error code that occurs during communication.	For details, refer to the following: MELSEC iQ-R Serial Communication Module User's Manual(Application)

2.4 M+SMCTeachingPosition_R

Overview

Sets the designated position to the step data (target position) of the specified step data number.



Labels

Input label

No.	Label	Name	Data type	Range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_uStartIONo	Start I/O No.	Word [unsigned]	00H to FEH	Specify the value obtained by dividing the start input/output number of a target serial communication module by 16.
(3)	i_uCh	Target channel	Word [unsigned]	1, 2	Specify the channel of a serial communication module.
(4)	i_uAxis	Target axis	Word [unsigned]	1 to 32	Specify the controller ID.
(5)	i_uStepDataNo	Step data No.	Word [unsigned]	0 to 63	Specify the step data number of step data to which the setting value is to be written.
(6)	i_dPositionData	Position data	Double Word [signed]	-999999 to 999999	Specify the target position data to be set.

Output label

No.	Label	Name	Data type	Initial value	Description
(7)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(8)	o_bOK	Normal completion	Bit	OFF	The ON state indicates that the step data setting is completed.
(9)	o_bErr	Error completion	Bit	OFF	The ON state indicates that an error has occurred in the FB.
(10)	o_uErrId	Error code	Word [unsigned]	0	The error code of an error occurred in the FB is stored.
(11)	o_bUnitErr	Unit error completion	Bit	OFF	The ON state indicates that an error has occurred in the module.
(12)	o_uUnitErrId	Unit error code	Word [unsigned]	0	The error code of an error occurred in the module is stored.

FB details

Available device

■ Serial communication module

Target module	Firmware version	Engineering tool
RJ71C24	—	GX Works3 Version 1.055H or later
RJ71C24-R4	—	GX Works3 Version 1.055H or later

■ CPU module

RCPU

Basic specifications

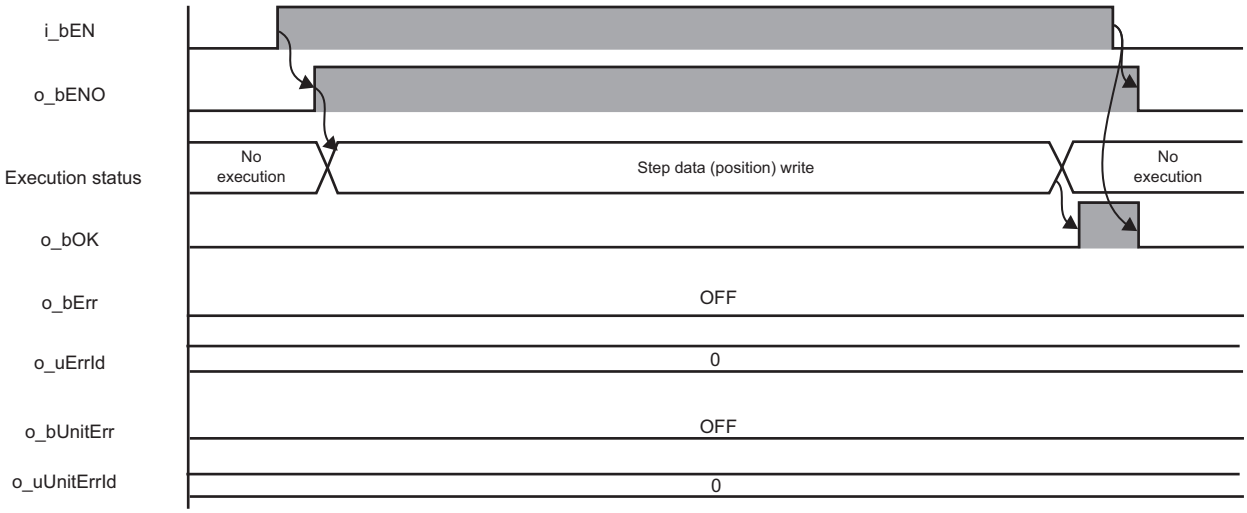
Item	Description
Language	Structured Text
Number of basic steps	1723 steps The number of steps of the FB embedded in a program varies depending on a CPU module used, the input and output definitions, and the option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual.
Number of points of a label used	• Label: 64 points (Word) • Latch label: 0 point (Word) The number of points of a label used that is embedded in a program varies depending on a device specified for an argument and the option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual.
Index register	Index register: 1 point (Z9)
FB dependence	No dependence
FB compilation method	Subroutine type
FB operation	Pulse execution (multiple scan execution type)

Processing

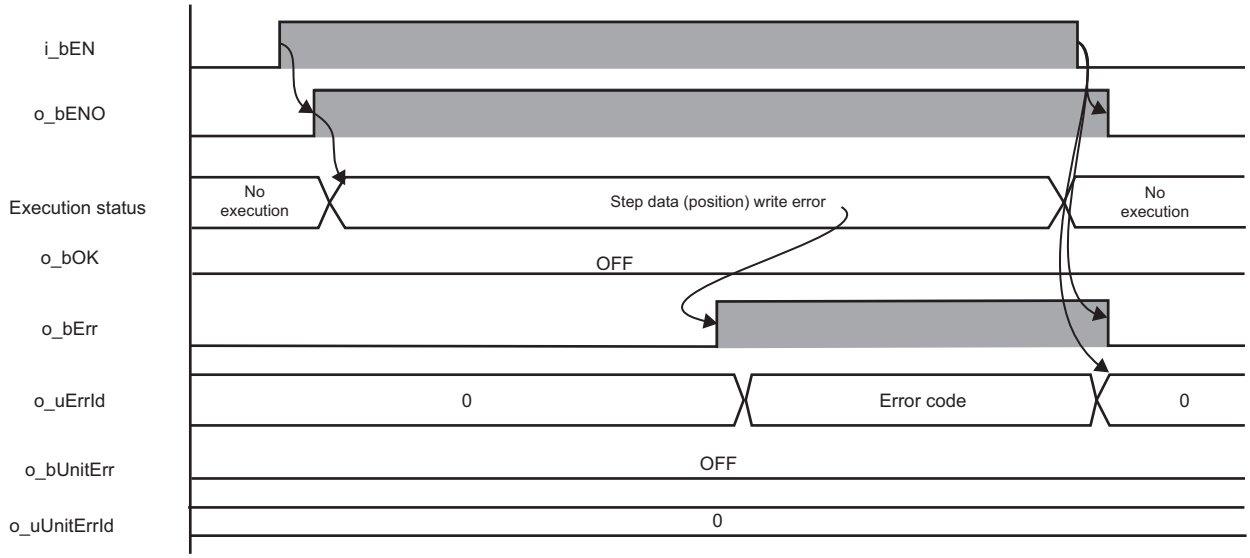
- Specify the start I/O number (a value obtained by dividing the start input/output number by 16) and channel of a serial communication module in i_uStartIONo (start I/O No.) and i_uCh (target channel) respectively.
- Specify the axis number (controller ID) of the operation target in i_uAxis (target axis).
- Specify the step data number of step data to be set in i_uStepDataNo (step data No.).
- Set data (position information) in i_dPositionData (position data).
- This FB rewrites position data of the specified step data number via Modbus communication at the rise of i_bEN (execution command). When the data rewriting is completed, o_bOK (normal completion) is turned ON.
- When a value out of the range is set for the start I/O number, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '100H' is stored in o_uErrId (error code).
- When a value out of the range is set for the target channel, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '101H' is stored in o_uErrId (error code).
- When a value out of the range is set for the target axis, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '102H' is stored in o_uErrId (error code).
- When a value out of the range is set for the step data number, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '105H' is stored in o_uErrId (error code).
- When a value out of the range is set for the position data, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '106H' is stored in o_uErrId (error code).
- When the connected device is not the operation target, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '200H' is stored in o_uErrId (error code).
- When turning OFF i_bEN (execution command) before o_bOK (normal completion), o_bErr (error completion), or o_bUnitErr (unit error completion) is turned ON, o_bErr (error completion) is turned ON for one scan only and the processing of the FB is interrupted. In addition, the error code '201H' is stored in o_uErrId (error code) for one scan.
- When turning ON i_bEN (execution command) of this FB while executing the following FB, o_bErr (error completion) is turned ON and the processing of this FB is interrupted. In addition, the error code '202H' is stored in o_uErrId (error code).
  M+SMCTeachingPosition_R
- When an error occurs while sending/receiving a message to/from the predefined protocol, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. An error code is stored in o_uErrId (error code). For details on the error code, refer to 📖MELSEC iQ-R Serial Communication Module User's Manual(Application).
- When this FB receives an error code due to an error occurred in a controller, o_bUnitErr (unit error completion) is turned ON and the processing of the FB is interrupted. In addition, the received error code is stored in o_uUnitErrId (unit error code).

Timing chart of I/O signals

■ In normal completion



■ In error completion



Restrictions or precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because i_bEN (execution command) cannot be turned OFF and the normal operation cannot be performed. Always use this FB in programs that can turn OFF i_bEN (execution command).
- This FB requires the configuration of the ladder for every input label.
- Change the memory/device setting in the CPU parameter so that the capacity required to use this FB is secured. Otherwise, a compiling error may occur in GX Works3.
- This FB uses the CPRTCL instruction. For details, refer to MELSEC iQ-R Programming Manual (Module Dedicated Instructions).
- Specify a value obtained by dividing the start input/output number, which is assigned to a serial communication module, by 16 in i_uStartIONo (start I/O No.). If the start input/output number is not assigned to the module, the stop error of the CPU (2820H) occurs.
- This FB uses the index register Z9. Do not use the Z9 in an interrupt program.
- Before operating an SMC controller, write the following parameters (module parameters of a serial communication module) to a module by using GX Works3.

Item		Setting value
Communication protocol setting		Predefined protocol
Communication speed setting		Set the value according to the setting of a device to be connected.
Transmission setting	Data bit	8
	Parity bit	None
	Stop bit	1
Communication control specification	Echo back enable/prohibit specification	Echo back prohibit

- Use the protocol send/receive setting of Predefined Protocol Support Tool For Positioning to change a communication timeout or the number of retries. (Predefined Protocol Support Tool For Positioning Operating Manual)

Performance value

The following table lists the performance values of this FB under the following conditions.

- FB compilation method: Subroutine type
- CPU module: R120CPU
- Serial communication module: RJ71C24-R4
- Controller (manufactured by SMC): LEY16AC-30-R16N
- Electric actuator (manufactured by SMC): LECA6N-LEY16AC-30

Time required for the processing*1	Maximum scan time	Number of scans required for the processing
36.300 ms	0.480 ms	114 scans

*1 The time required from start to end of the processing.

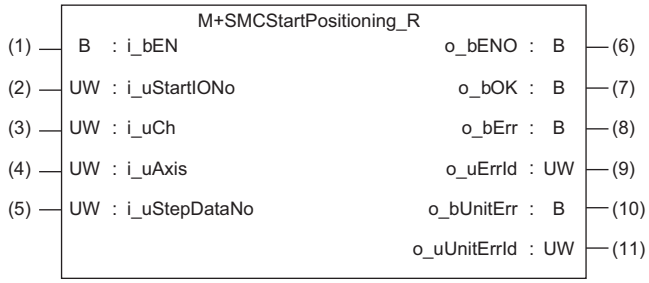
Error code

Error code	Description	Corrective action
100H	The value set for the start I/O number is out of the range.	Set a value within the range from 00H to FEH for the start I/O number and execute the FB again.
101H	The value set for the target channel is out of the range.	Set 1 or 2 for the target channel and execute the FB again.
102H	The value set for the target axis is out of the range.	Set a value within the range from 1 to 32 for the target axis and execute the FB again.
105H	The value set for the step data number is out of the range.	Set a value within the range from 0 to 63 for the step data number and execute the FB again.
106H	The value set for the position data is out of the range.	Set a value within the range from -999999 to 999999 for the position data and execute the FB again.
200H	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
201H	The execution command turned OFF during the processing.	Do not turn OFF i_bEN (execution command) until o_bOK (normal completion), o_bErr (error completion), or o_bUnitErr (unit error completion) is turned ON. (This error code is output for one scan only.)
202H	Another FB which may affect the operation of this FB is executing.	Stop the FB and execute this FB again. Target FB: • M+SMCTeachingPosition_R
Predefined protocol error code	An error code that occurs during communication.	For details, refer to the following: MELSEC iQ-R Serial Communication Module User's Manual(Application)

2.5 M+SMCStartPositioning_R

Overview

Starts positioning operation based on the step data of the specified step data number.



Labels

Input label

No.	Label	Name	Data type	Range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_uStartIONo	Start I/O No.	Word [unsigned]	00H to FEH	Specify the value obtained by dividing the start input/output number of a target serial communication module by 16.
(3)	i_uCh	Target channel	Word [unsigned]	1, 2	Specify the channel of a serial communication module.
(4)	i_uAxis	Target axis	Word [unsigned]	1 to 32	Specify the controller ID.
(5)	i_uStepDataNo	Step data No.	Word [unsigned]	0 to 63	Specify the step data number of step data whose positioning operation is to be executed.

Output label

No.	Label	Name	Data type	Initial value	Description
(6)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(7)	o_bOK	Normal completion	Bit	OFF	The ON state indicates that positioning operation is completed.
(8)	o_bErr	Error completion	Bit	OFF	The ON state indicates that an error has occurred in the FB.
(9)	o_uErrId	Error code	Word [unsigned]	0	The error code of an error occurred in the FB is stored.
(10)	o_bUnitErr	Unit error completion	Bit	OFF	The ON state indicates that an error has occurred in the module.
(11)	o_uUnitErrId	Unit error code	Word [unsigned]	0	The error code of an error occurred in the module is stored.

FB details

Available device

■ Serial communication module

Target module	Firmware version	Engineering tool
RJ71C24	—	GX Works3 Version 1.055H or later
RJ71C24-R4	—	GX Works3 Version 1.055H or later

■ CPU module

RCPU

Basic specifications

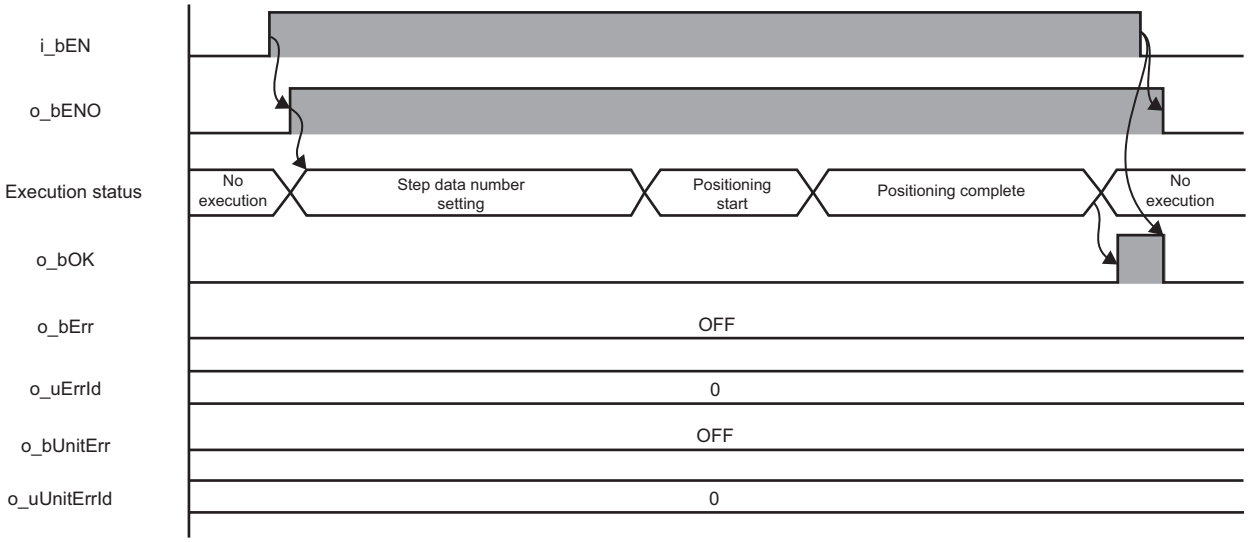
Item	Description
Language	Structured Text
Number of basic steps	2728 steps The number of steps of the FB embedded in a program varies depending on a CPU module used, the input and output definitions, and the option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual.
Number of points of a label used	• Label: 56 points (Word) • Latch label: 0 point (Word) The number of points of a label used that is embedded in a program varies depending on a device specified for an argument and the option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual.
Index register	Index register: 1 point (Z9)
FB dependence	No dependence
FB compilation method	Subroutine type
FB operation	Pulse execution (multiple scan execution type)

Processing

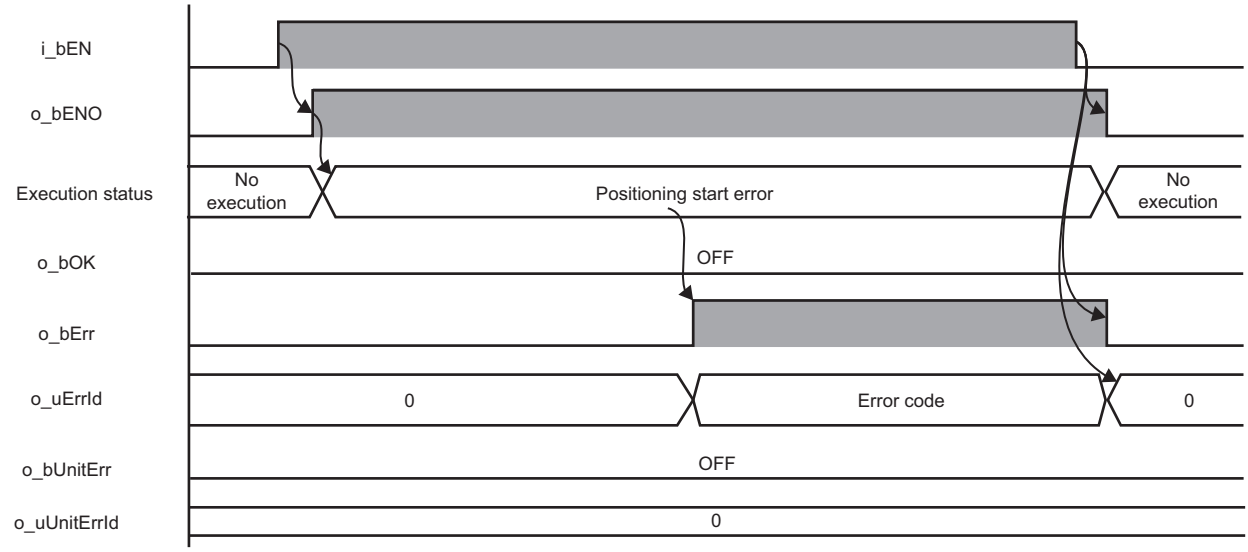
- Specify the start I/O number (a value obtained by dividing the start input/output number by 16) and channel of a serial communication module in i_uStartIONo (start I/O No.) and i_uCh (target channel) respectively.
- Specify the axis number (controller ID) of the operation target in i_uAxis (target axis).
- Set the step data number of step data to be executed in i_uStepDataNo (step data No.).
- This FB starts positioning operation of the specified step data number via Modbus communication at the rise of i_bEN (execution command). When the positioning operation is completed, o_bOK (normal completion) is turned ON.
- When a value out of the range is set for the start I/O number, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '100H' is stored in o_uErrId (error code).
- When a value out of the range is set for the target channel, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '101H' is stored in o_uErrId (error code).
- When a value out of the range is set for the target axis, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '102H' is stored in o_uErrId (error code).
- When a value out of the range is set for the step data number, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '105H' is stored in o_uErrId (error code).
- When the connected device is not the operation target, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '200H' is stored in o_uErrId (error code).
- When turning OFF i_bEN (execution command) before o_bOK (normal completion), o_bErr (error completion), or o_bUnitErr (unit error completion) is turned ON, o_bErr (error completion) is turned ON for one scan only and the processing of the FB is interrupted. In addition, the error code '201H' is stored in o_uErrId (error code) for one scan.
- When turning ON i_bEN (execution command) of this FB while executing any of the following FBs, o_bErr (error completion) is turned ON and the processing of this FB is interrupted. In addition, the error code '202H' is stored in o_uErrId (error code).
  M+SMCStartHomePositioning_R
  M+SMCJogInching_R
  M+SMCStartPositioning_R
- When turning ON an alarm signal of a controller, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '203H' is stored in o_uErrId (error code). Check the status of the controller in M+SMCMonitoring_R.
- When turning ON i_bEN (execution command) of this FB while a servo of a target controller is OFF, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '204H' is stored in o_uErrId (error code).
- When an error occurs while sending/receiving a message to/from the predefined protocol, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. An error code is stored in o_uErrId (error code). For details on the error code, refer to 📖MELSEC iQ-R Serial Communication Module User's Manual(Application).
- When this FB receives an error code due to an error occurred in a controller, o_bUnitErr (unit error completion) is turned ON and the processing of the FB is interrupted. In addition, the received error code is stored in o_uUnitErrId (unit error code).

Timing chart of I/O signals

■ In normal completion



■ In error completion



Restrictions or precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because i_bEN (execution command) cannot be turned OFF and the normal operation cannot be performed. Always use this FB in programs that can turn OFF i_bEN (execution command).
- This FB requires the configuration of the ladder for every input label.
- Change the memory/device setting in the CPU parameter so that the capacity required to use this FB is secured. Otherwise, a compiling error may occur in GX Works3.
- After this FB starts positioning operation, when turning OFF i_bEN (execution command) before o_bOK (normal completion), o_bErr (error completion), or o_bUnitErr (unit error completion) is turned ON, a motor continues to operate until a home position return is completed.
- This FB uses the CPRTCL instruction. For details, refer to MELSEC iQ-R Programming Manual (Module Dedicated Instructions).
- Specify a value obtained by dividing the start input/output number, which is assigned to a serial communication module, by 16 in i_uStartIONo (start I/O No.). If the start input/output number is not assigned to the module, the stop error of the CPU (2820H) occurs.
- This FB uses the index register Z9. Do not use the Z9 in an interrupt program.
- Before operating an SMC controller, write the following parameters (module parameters of a serial communication module) to a module by using GX Works3.

Item		Setting value
Communication protocol setting		Predefined protocol
Communication speed setting		Set the value according to the setting of a device to be connected.
Transmission setting	Data bit	8
	Parity bit	None
	Stop bit	1
Communication control specification	Echo back enable/prohibit specification	Echo back prohibit

- Use the protocol send/receive setting of Predefined Protocol Support Tool For Positioning to change a communication timeout or the number of retries. (Predefined Protocol Support Tool For Positioning Operating Manual)

Performance value

The following table lists the performance values of this FB under the following conditions.

- FB compilation method: Subroutine type
- CPU module: R120CPU
- Serial communication module: RJ71C24-R4
- Controller (manufactured by SMC): LEY16AC-30-R16N
- Electric actuator (manufactured by SMC): LECA6N-LEY16AC-30
- Initial position: Home position (0.00 mm)
- Step data execution setting:
  Target position: 0.00 mm
  Speed: 10.00 mm/s
  Acceleration: 0.1 G
  Deceleration: 0.1 G
  Other setting value: 0

Timing for turning execution command ON	Time required for the processing*1	Maximum scan time	Number of scans required for the processing
After executing a return to origin	156.000 ms	0.547 ms	489 scans

*1 The time required from start to end of the processing.

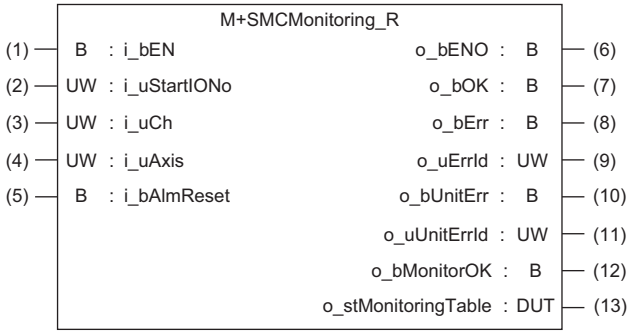
Error code

Error code	Description	Corrective action
100H	The value set for the start I/O number is out of the range.	Set a value within the range from 00H to FEH for the start I/O number and execute the FB again.
101H	The value set for the target channel is out of the range.	Set 1 or 2 for the target channel and execute the FB again.
102H	The value set for the target axis is out of the range.	Set a value within the range from 1 to 32 for the target axis and execute the FB again.
105H	The value set for the step data number is out of the range.	Set a value within the range from 0 to 63 for the step data number and execute the FB again.
200H	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
201H	The execution command turned OFF during the processing.	Do not turn OFF i_bEN (execution command) until o_bOK (normal completion), o_bErr (error completion), or o_bUnitErr (unit error completion) is turned ON. (This error code is output for one scan only.)
202H	Another FB which may affect the operation of a motor is executing.	Stop the FB and execute this FB again. Target FB: • M+SMCStartHomePositioning_R • M+SMCJogInching_R • M+SMCStartPositioning_R For M+SMCJogInching_R, check that o_bParamOK (parameter setting completion flag) is turned ON and o_bBusy (busy signal) is turned OFF.
203H	Emergency stop or major failure is occurring.	Check the status of a controller in M+SMCMonitoring_R. After checking the status, remove the cause of the error and execute the FB again.
204H	Movement commands are executed while a servo is OFF.	Check the status of a controller in M+SMCMonitoring_R. To turn ON a servo, turn it ON with M+SMCServoControl_R.
Predefined protocol error code	An error code that occurs during communication.	For details, refer to the following: MELSEC iQ-R Serial Communication Module User's Manual(Application)

2.6 M+SMCMonitoring_R

Overview

Monitors a current position and alarms, and resets the alarms.



Labels

Input label

No.	Label	Name	Data type	Range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_uStartIONo	Start I/O No.	Word [unsigned]	00H to FEH	Specify the value obtained by dividing the start input/output number of a target serial communication module by 16.
(3)	i_uCh	Target channel	Word [unsigned]	1, 2	Specify the channel of a serial communication module.
(4)	i_uAxis	Target axis	Word [unsigned]	1 to 32	Specify the controller ID.
(5)	i_bAlmReset	Reset alarm	Bit	ON, OFF	ON: An alarm is reset. OFF: An alarm does not operate.

Output label

No.	Label	Name	Data type	Initial value	Description
(6)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(7)	o_bOK	Normal completion	Bit	OFF	The ON state indicates that an alarm is cleared normally.
(8)	o_bErr	Error completion	Bit	OFF	The ON state indicates that an error has occurred in the FB.
(9)	o_uErrId	Error code	Word [unsigned]	0	The error code of an error occurred in the FB is stored.
(10)	o_bUnitErr	Unit error completion	Bit	OFF	The ON state indicates that an error has occurred in the module.
(11)	o_uUnitErrId	Unit error code	Word [unsigned]	0	The error code of an error occurred in the module is stored.
(12)	o_bMonitorOK	Monitoring status	Bit	OFF	The ON state indicates that a current position and alarms are monitored normally.
(13)	o_stMonitoringTable	Monitoring table	Structure (stSMCMonitoringTable)	—	For details, refer to the following: ☞ Page 106 Monitoring table structure (stSMCMonitoringTable)

FB details

Available device

■ Serial communication module

Target module	Firmware version	Engineering tool
RJ71C24	—	GX Works3 Version 1.055H or later
RJ71C24-R4	—	GX Works3 Version 1.055H or later

■ CPU module

RCPU

Basic specifications

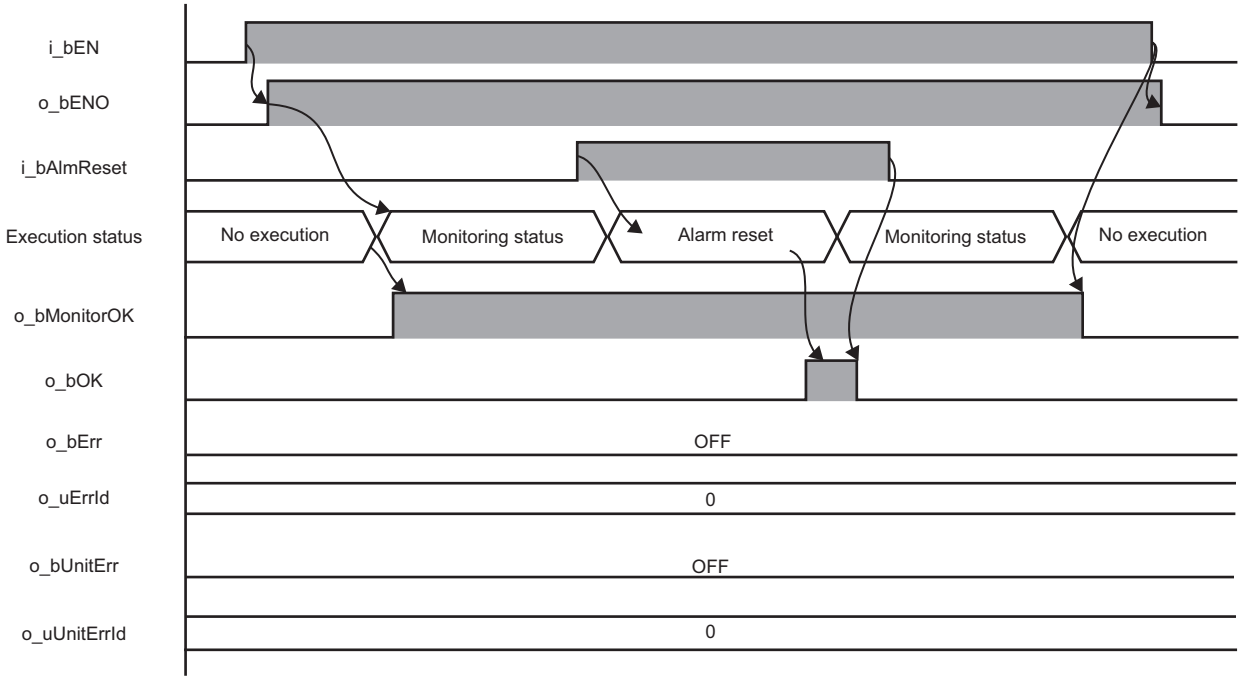
Item	Description
Language	Structured Text
Number of basic steps	3746 steps The number of steps of the FB embedded in a program varies depending on a CPU module used, the input and output definitions, and the option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual.
Number of points of a label used	• Label: 84 points (Word) • Latch label: 0 point (Word) The number of points of a label used that is embedded in a program varies depending on a device specified for an argument and the option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual.
Index register	Index register: 1 point (Z9)
FB dependence	No dependence
FB compilation method	Subroutine type
FB operation	Real-time execution

Processing

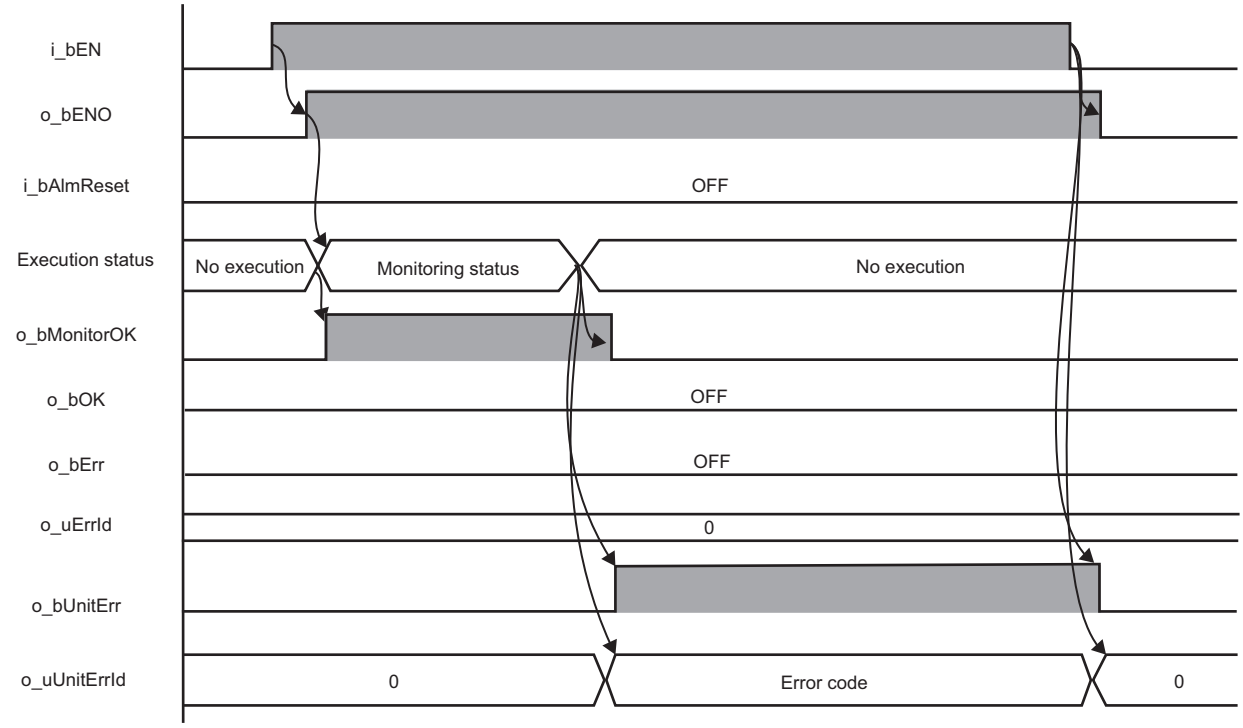
- Specify the start I/O number (a value obtained by dividing the start input/output number by 16) and channel of a serial communication module in i_uStartIONo (start I/O No.) and i_uCh (target channel) respectively.
- Specify the axis number (controller ID) of the operation target in i_uAxis (target axis).
- This FB starts monitoring the status of a target axis via Modbus communication at the rise of i_bEN (execution command). The monitoring data (such as a current position and alarm codes) is stored in o_stMonitoringTable (monitoring table).
- o_bMonitorOK (monitoring status) is turned ON while monitoring the target axis.
- The alarm is reset by turning ON i_bEN (execution command), and then turning ON i_bAlmReset (reset alarm) while the alarm is occurring. (Request signals of the JOG + and JOG - commands are also turned OFF when the alarm is reset.)
- o_bOK (normal completion) is turned ON when the alarm reset is completed.
- When a value out of the range is set for the start I/O number, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '100H' is stored in o_uErrId (error code).
- When a value out of the range is set for the target channel, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '101H' is stored in o_uErrId (error code).
- When a value out of the range is set for the target axis, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '102H' is stored in o_uErrId (error code).
- When the connected device is not the operation target, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '200H' is stored in o_uErrId (error code).
- When turning ON i_bEN (execution command) of this FB while executing the following FB, o_bErr (error completion) is turned ON and the processing of this FB is interrupted. In addition, the error code '202H' is stored in o_uErrId (error code).
  M+SMCMonitoring_R
- When an error occurs while sending/receiving a message to/from the predefined protocol, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. An error code is stored in o_uErrId (error code). For details on the error code, refer to 📖MELSEC iQ-R Serial Communication Module User's Manual(Application).
- When this FB receives an error code due to an error occurred in a controller, o_bUnitErr (unit error completion) is turned ON and the processing of the FB is interrupted. In addition, the received error code is stored in o_uUnitErrId (unit error code).

Timing chart of I/O signals

■ In normal completion



■ In error completion



Restrictions or precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because i_bEN (execution command) cannot be turned OFF and the normal operation cannot be performed. Always use this FB in programs that can turn OFF i_bEN (execution command).
- This FB requires the configuration of the ladder for every input label.
- Change the memory/device setting in the CPU parameter so that the capacity required to use this FB is secured. Otherwise, a compiling error may occur in GX Works3.
- If i_bEN (execution command) is turned OFF during monitoring, o_bENO (execution status) is turned OFF after monitoring stops. To turn ON i_bEN (execution command) again, check that o_bENO (execution status) is turned OFF, then execute the FB.
- This FB uses the CPRTCL instruction. For details, refer to 📖MELSEC iQ-R Programming Manual (Module Dedicated Instructions).
- Specify a value obtained by dividing the start input/output number, which is assigned to a serial communication module, by 16 in i_uStartIONo (start I/O No.). If the start input/output number is not assigned to the module, the stop error of the CPU (2820H) occurs.
- This FB uses the index register Z9. Do not use the Z9 in an interrupt program.
- Before operating an SMC controller, write the following parameters (module parameters of a serial communication module) to a module by using GX Works3.

Item		Setting value
Communication protocol setting		Predefined protocol
Communication speed setting		Set the value according to the setting of a device to be connected.
Transmission setting	Data bit	8
	Parity bit	None
	Stop bit	1
Communication control specification	Echo back enable/prohibit specification	Echo back prohibit

- Use the protocol send/receive setting of Predefined Protocol Support Tool For Positioning to change a communication timeout or the number of retries. (📖Predefined Protocol Support Tool For Positioning Operating Manual)

Performance value

The following table lists the performance values of this FB under the following conditions.

- FB compilation method: Subroutine type
- CPU module: R120CPU
- Serial communication module: RJ71C24-R4
- Controller (manufactured by SMC): LEY16AC-30-R16N
- Electric actuator (manufactured by SMC): LECA6N-LEY16AC-30

Measuring range	Time required for the processing*1	Maximum scan time	Number of scans required for the processing
From when i_bEN (execution command) turns ON to when o_bMonitorOK (monitoring status) turns ON	83.800 ms	0.576 ms	258 scans
From when i_bAlmReset (reset alarm) turns ON to when an alarm reset is completed	148.000 ms	0.601 ms	234 scans

*1 The time required from start to end of the processing.

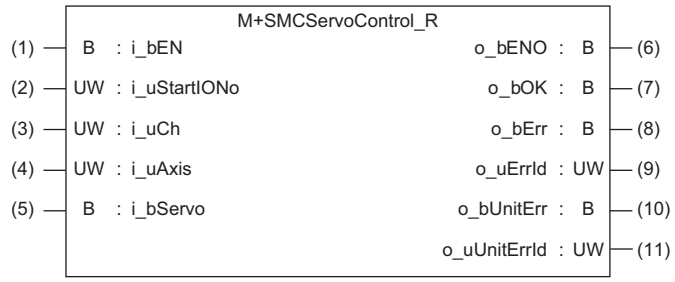
Error code

Error code	Description	Corrective action
100H	The value set for the start I/O number is out of the range.	Set a value within the range from 00H to FEH for the start I/O number and execute the FB again.
101H	The value set for the target channel is out of the range.	Set 1 or 2 for the target channel and execute the FB again.
102H	The value set for the target axis is out of the range.	Set a value within the range from 1 to 32 for the target axis and execute the FB again.
200H	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
202H	Another FB which may affect the operation of this FB is executing.	Stop the FB and execute this FB again. Target FB: • M+SMCMonitoring_R
Predefined protocol error code	An error code that occurs during communication.	For details, refer to the following: MELSEC iQ-R Serial Communication Module User's Manual(Application)

2.7 M+SMCServoControl_R

Overview

Requests a servo to turn ON or OFF.



Labels

Input label

No.	Label	Name	Data type	Range	Description
(1)	i_bEN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	i_uStartIONo	Start I/O No.	Word [unsigned]	00H to FEH	Specify the value obtained by dividing the start input/output number of a target serial communication module by 16.
(3)	i_uCh	Target channel	Word [unsigned]	1, 2	Specify the channel of a serial communication module.
(4)	i_uAxis	Target axis	Word [unsigned]	1 to 32	Specify the controller ID.
(5)	i_bServo	Servo ON/OFF replacement	Bit	ON, OFF	ON: Servo ON OFF: Servo OFF

Output label

No.	Label	Name	Data type	Initial value	Description
(6)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(7)	o_bOK	Normal completion	Bit	OFF	The ON state indicates that the execution of servo ON or OFF command is completed.
(8)	o_bErr	Error completion	Bit	OFF	The ON state indicates that an error has occurred in the FB.
(9)	o_uErrId	Error code	Word [unsigned]	0	The error code of an error occurred in the FB is stored.
(10)	o_bUnitErr	Unit error completion	Bit	OFF	The ON state indicates that an error has occurred in the module.
(11)	o_uUnitErrId	Unit error code	Word [unsigned]	0	The error code of an error occurred in the module is stored.

FB details

Available device

■ Serial communication module

Target module	Firmware version	Engineering tool
RJ71C24	—	GX Works3 Version 1.055H or later
RJ71C24-R4	—	GX Works3 Version 1.055H or later

■ CPU module

RCPU

Basic specifications

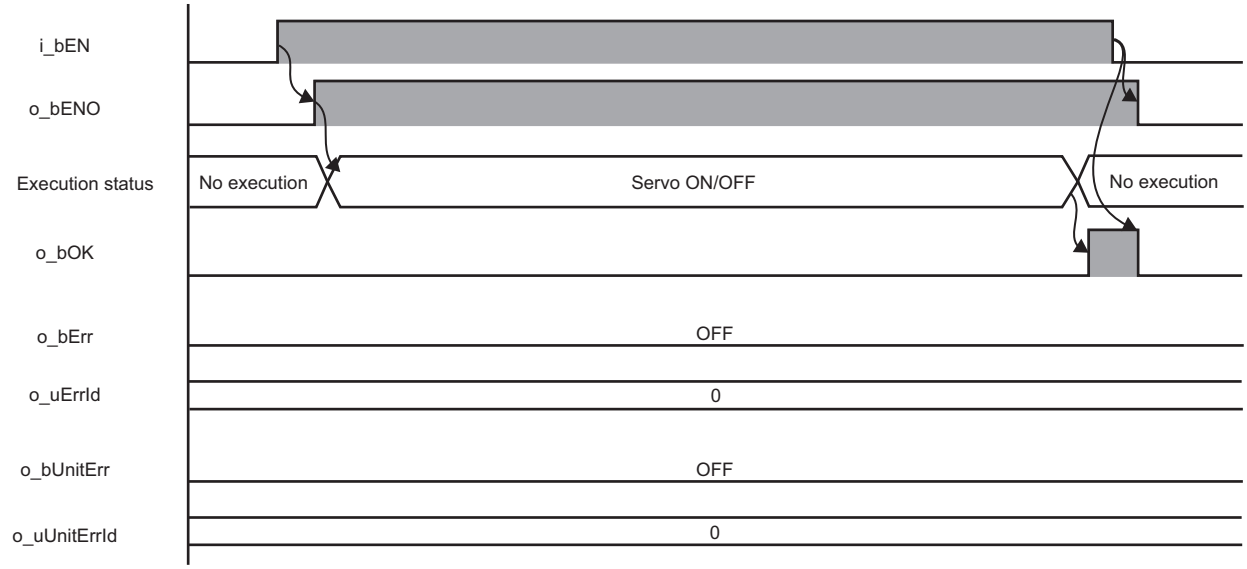
Item	Description
Language	Structured Text
Number of basic steps	1837 steps The number of steps of the FB embedded in a program varies depending on a CPU module used, the input and output definitions, and the option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual.
Number of points of a label used	• Label: 52 points (Word) • Latch label: 0 point (Word) The number of points of a label used that is embedded in a program varies depending on a device specified for an argument and the option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual.
Index register	Index register: 1 point (Z9)
FB dependence	No dependence
FB compilation method	Subroutine type
FB operation	Pulse execution (multiple scan execution type)

Processing

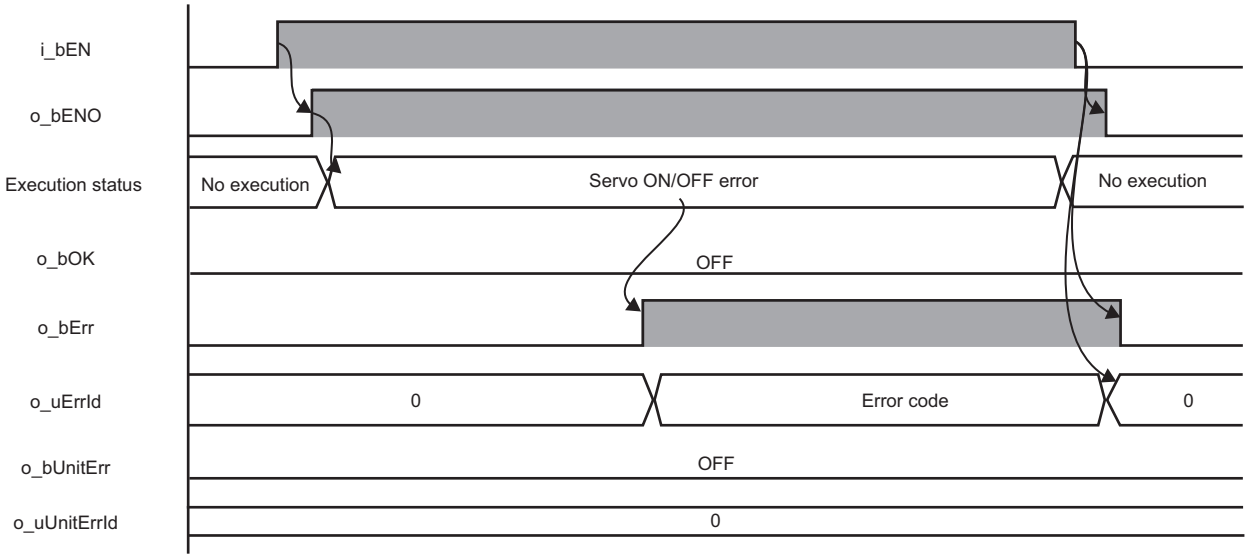
- Specify the start I/O number (a value obtained by dividing the start input/output number by 16) and channel of a serial communication module in i_uStartIONo (start I/O No.) and i_uCh (target channel) respectively.
- Specify the axis number (controller ID) of the operation target in i_uAxis (target axis).
- Set either to turn a servo ON or OFF in i_bServo (servo ON/OFF replacement).
- This FB turns ON or OFF a servo via Modbus communication at the rise of i_bEN (execution command).
  When the servo ON/OFF replacement is completed, o_bOK (normal completion) is turned ON.
- When a value out of the range is set for the start I/O number, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '100H' is stored in o_uErrId (error code).
- When a value out of the range is set for the target channel, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '101H' is stored in o_uErrId (error code).
- When a value out of the range is set for the target axis, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '102H' is stored in o_uErrId (error code).
- When the connected device is not the operation target, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '200H' is stored in o_uErrId (error code).
- When turning OFF i_bEN (execution command) before o_bOK (normal completion), o_bErr (error completion), or o_bUnitErr (unit error completion) is turned ON, o_bErr (error completion) is turned ON for one scan only and the processing of the FB is interrupted. In addition, the error code '201H' is stored in o_uErrId (error code) for one scan.
- When turning ON i_bEN (execution command) of this FB while executing the following FB, o_bErr (error completion) is turned ON and the processing of this FB is interrupted. In addition, the error code '202H' is stored in o_uErrId (error code).
  M+SMCServoControl_R
- When turning ON an alarm signal of a controller, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '203H' is stored in o_uErrId (error code). Check the status of the controller in M+SMCMonitoring_R.
- When an error occurs while sending/receiving a message to/from the predefined protocol, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. An error code is stored in o_uErrId (error code). For details on the error code, refer to 📖MELSEC iQ-R Serial Communication Module User's Manual(Application).
- When this FB receives an error code due to an error occurred in a controller, o_bUnitErr (unit error completion) is turned ON and the processing of the FB is interrupted. In addition, the received error code is stored in o_uUnitErrId (unit error code).

Timing chart of I/O signals

■ In normal completion



■ In error completion



Restrictions or precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because i_bEN (execution command) cannot be turned OFF and the normal operation cannot be performed. Always use this FB in programs that can turn OFF i_bEN (execution command).
- This FB requires the configuration of the ladder for every input label.
- Change the memory/device setting in the CPU parameter so that the capacity required to use this FB is secured. Otherwise, a compiling error may occur in GX Works3.
- This FB uses the CPRTCL instruction. For details, refer to 📖MELSEC iQ-R Programming Manual (Module Dedicated Instructions).
- Specify a value obtained by dividing the start input/output number, which is assigned to a serial communication module, by 16 in i_uStartIONo (start I/O No.). If the start input/output number is not assigned to the module, the stop error of the CPU (2820H) occurs.
- This FB uses the index register Z9. Do not use the Z9 in an interrupt program.
- Before operating an SMC controller, write the following parameters (module parameters of a serial communication module) to a module by using GX Works3.

Item		Setting value
Communication protocol setting		Predefined protocol
Communication speed setting		Set the value according to the setting of a device to be connected.
Transmission setting	Data bit	8
	Parity bit	None
	Stop bit	1
Communication control specification	Echo back enable/prohibit specification	Echo back prohibit

- Use the protocol send/receive setting of Predefined Protocol Support Tool For Positioning to change a communication timeout or the number of retries. (📖Predefined Protocol Support Tool For Positioning Operating Manual)

Performance value

The following table lists the performance values of this FB under the following conditions.

- FB compilation method: Subroutine type
- CPU module: R120CPU
- Serial communication module: RJ71C24-R4
- Controller (manufactured by SMC): LEY16AC-30-R16N
- Electric actuator (manufactured by SMC): LECA6N-LEY16AC-30

Input label i_bServo (Servo ON/OFF replacement)	Time required for the processing*1	Maximum scan time	Number of scans required for the processing
OFF	49.000 ms	0.469 ms	155 scans
ON	48.800 ms	0.472 ms	155 scans

*1 The time required from start to end of the processing.

Error code

Error code	Description	Corrective action
100H	The value set for the start I/O number is out of the range.	Set a value within the range from 00H to FEH for the start I/O number and execute the FB again.
101H	The value set for the target channel is out of the range.	Set 1 or 2 for the target channel and execute the FB again.
102H	The value set for the target axis is out of the range.	Set a value within the range from 1 to 32 for the target axis and execute the FB again.
200H	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
201H	The execution command turned OFF during the processing.	Do not turn OFF i_bEN (execution command) until o_bOK (normal completion), o_bErr (error completion), or o_bUnitErr (unit error completion) is turned ON. (This error code is output for one scan only.)
202H	Another FB which may affect the operation of this FB is executing.	Stop the FB and execute this FB again. Target FB: • M+SMCServoControl_R
203H	Emergency stop or major failure is occurring.	Check the status of a controller in M+SMCMonitoring_R. After checking the status, remove the cause of the error and execute the FB again.
Predefined protocol error code	An error code that occurs during communication.	For details, refer to the following: MELSEC iQ-R Serial Communication Module User's Manual(Application)

MEMO

3 DETAILS OF THE FB LIBRARY (MELSEC-Q/L SERIES)

3.1 Preparation for Using FB Library

This section explains advance preparation required for using MELSEC-Q/L series FB libraries.

Importing M+CPU-SMCPosiSp_CPRTCL-ST

M+CPU-SMCPosiSp_CPRTCL-ST is used internally in each FB of the MELSEC-Q/L series FB library.
M+CPU-SMCPosiSp_CPRTCL-ST must be imported in a project.
Do not use M+CPU-SMCPosiSp_CPRTCL-ST in a user-created program as this FB is used only internally in other FBs. For details on M+CPU-SMCPosiSp_CPRTCL-ST, refer to the following:
☞ Page 103 M+CPU-SMCPosiSp_CPRTCL-ST

Checking the start I/O number

When the start input/output number of a serial communication module is other than 0000H to 00F0H, add the G_CPRTCL instruction to a program of M+CPU-SMCPosiSp_CPRTCL-ST.
For details on M+CPU-SMCPosiSp_CPRTCL-ST, refer to the following:
☞ Page 103 M+CPU-SMCPosiSp_CPRTCL-ST

Ex.
When the start input/output number to which a serial communication module is mounted is 0FE0H

```
CASE iw_StartIONo OF
  0:
      G_CPRTCL(TRUE = FB_EN,H0,iw_Ch,K1,iow_18ControlData,ob_2CompDevice);
  1:
      G_CPRTCL(TRUE = FB_EN,H1,iw_Ch,K1,iow_18ControlData,ob_2CompDevice);
    (
    (
  15:
      G_CPRTCL(TRUE = FB_EN,H0F,iw_Ch,K1,iow_18ControlData,ob_2CompDevice);
  254:
      G_CPRTCL(TRUE = FB_EN, H0FE, iw_Ch, K1, iow_18ControlData, ob_2CompDevice);
    (
    (
END_CASE;
```

Describe a value, in which the start I/O number is divided by 16, in decimal (FEH = K254)

Add the G_CPRTCL instruction whose FEH is specified for the start I/O No.

3.2 M+CPU-SMCPosiSp_StartHomePosi-ST

Point

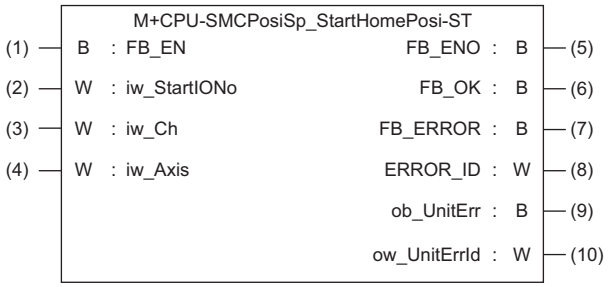
Advanced preparation is required for using this FB. For details, refer to the following:

☞ Page 57 Importing M+CPU-SMCPosiSp_CPRTCL-ST

☞ Page 57 Checking the start I/O number

Overview

Moves a motor to the initial position (return to origin).



Labels

Input label

No.	Label	Name	Data type	Range	Description
(1)	FB_EN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	iw_StartIONo	Start I/O No.	Word [signed]	00H to FEH	Specify the value obtained by dividing the start input/output number of a target serial communication module by 16.
(3)	iw_Ch	Target channel	Word [signed]	2	Specify the channel of a serial communication module.
(4)	iw_Axis	Target axis	Word [signed]	1 to 32	Specify the controller ID.

Output label

No.	Label	Name	Data type	Initial value	Description
(5)	FB_ENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(6)	FB_OK	Normal completion	Bit	OFF	The ON state indicates that a return to origin is completed.
(7)	FB_ERROR	Error completion	Bit	OFF	The ON state indicates that an error has occurred in the FB.
(8)	ERROR_ID	Error code	Word [signed]	0	The error code of an error occurred in the FB is stored.
(9)	ob_UnitErr	Unit error completion	Bit	OFF	The ON state indicates that an error has occurred in the module.
(10)	ow_UnitErrId	Unit error code	Word [signed]	0	The error code of an error occurred in the module is stored.

FB details

Available device

■ Serial communication module

Target module	Firmware version	Engineering tool
QJ71C24N*1	The first five digits of the serial number are '11062' or higher.	GX Works2 Version 1.570U or later
QJ71C24N-R4*1	The first five digits of the serial number are '11062' or higher.	GX Works2 Version 1.570U or later
LJ71C24*1	—	GX Works2 Version 1.570U or later

*1 Available only in CH2.

■ CPU module

- QCPU*1
- LCPU

*1 Universal model QCPUs and process CPUs only

Basic specifications

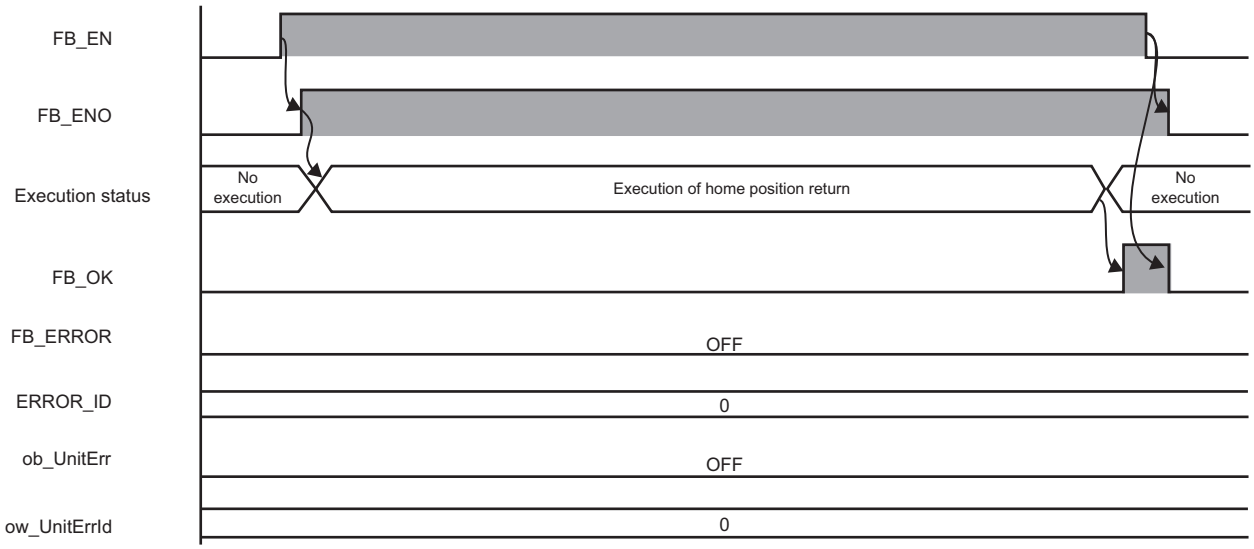
Item	Description
Language	Structured Text
Number of basic steps	2121 steps The number of steps of the FB which is embedded in a program varies depending on the CPU module being used, input/output definitions, and option settings of GX Works2. For the option settings of GX Works2, refer to the 📖GX Works2 Version 1 Operating Manual (Common).
Number of points of a label used	• Label: 52 points (Word), 24 points (Bit) • Latch label: 0 point (Word), 0 point (Bit) The number of points of a label used which is embedded in a program varies depending on the device specified for an argument and option settings of GX Works2. For the option settings of GX Works2, refer to 📖GX Works2 Version 1 Operating Manual (Common).
Index register	Index register: 1 point (Z9)
FB dependence	M+CPU-SMCPosiSp_StartHomePosi-ST └ M+CPU-SMCPosiSp_CPRTCL-ST
FB compilation method	Macro type
FB operation	Pulse execution (multiple scan execution type)

Processing

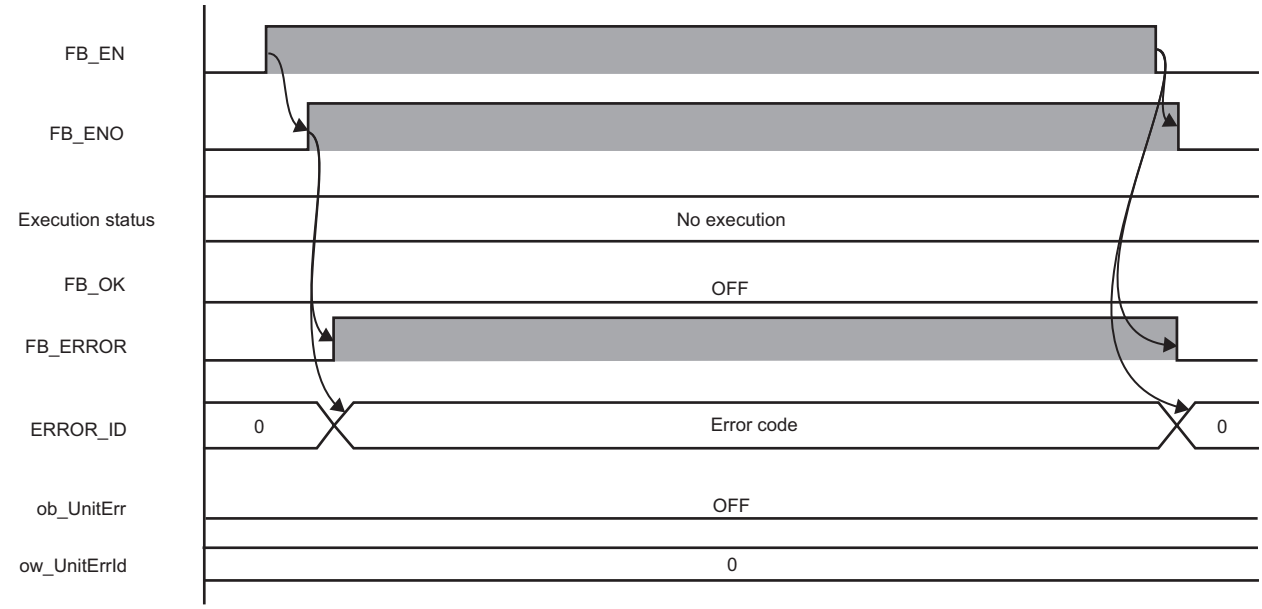
- Specify the start I/O number (a value obtained by dividing the start input/output number by 16) and channel of a serial communication module in iw_StartIONo (start I/O No.) and iw_Ch (target channel) respectively.
- Specify the axis number (controller ID) of the operation target in iw_Axis (target axis).
- This FB executes a return to origin via Modbus communication at the rise of FB_EN (execution command).
  When the return to origin is completed, FB_OK (normal completion) is turned ON.
- When a value out of the range is set for the start I/O number, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '100H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the target channel, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '101H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the target axis, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '102H' is stored in ERROR_ID (error code).
- When a value set for the start I/O number is not correctly applied in M+CPU-SMCPosiSp_CPRTCL-ST, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '110H' is stored in ERROR_ID (error code).
- When the connected device is not the operation target, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '200H' is stored in ERROR_ID (error code).
- When turning OFF FB_EN (execution command) before FB_OK (normal completion), FB_ERROR (error completion), or ob_UnitErr (unit error completion) is turned ON, FB_ERROR (error completion) is turned ON for one scan only and the processing of the FB is interrupted. In addition, the error code '201H' is stored in ERROR_ID (error code) for one scan.
- When turning ON FB_EN (execution command) of this FB while executing any of the following FBs, FB_ERROR (error completion) is turned ON and the processing of this FB is interrupted. In addition, the error code '202H' is stored in ERROR_ID (error code).
  M+CPU-SMCPosiSp_StartHomePosi-ST
  M+CPU-SMCPosiSp_JogInching-ST
  M+CPU-SMCPosiSp_StartPosi-ST
- When turning ON an alarm signal of a controller, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '203H' is stored in ERROR_ID (error code). Check the status of the controller in M+CPU-SMCPosiSp_Monitoring-ST.
- When turning ON FB_EN (execution command) of this FB while a servo of a target controller is OFF, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '204H' is stored in ERROR_ID (error code).
- When an error occurs while sending/receiving a message to/from the predefined protocol, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, an error code is stored in ERROR_ID (error code). For details on the error code, refer to 📖Q Corresponding Serial Communication Module User's Manual (Basic) or 📖MELSEC-L Serial Communication Module User's Manual (Basic).
- When this FB receives an error code due to an error occurred in a controller, ob_UnitErr (unit error completion) is turned ON and the processing of the FB is interrupted. In addition, the received error code is stored in ow_UnitErrId (unit error code).

Timing chart of I/O signals

■ In normal completion



■ In error completion



Restrictions or precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because FB_EN (execution command) cannot be turned OFF and the normal operation cannot be performed. Always use this FB in programs that can turn OFF FB_EN (execution command).
- This FB requires the configuration of the ladder for every input label.
- Change the device/label automatic-assign setting so that the capacity required to use this FB is secured. Otherwise, a compiling error may occur in GX Works2.
- After a return to origin is started by using this FB, when turning OFF FB_EN (execution command) before FB_OK (normal completion), FB_ERROR (error completion), or ob_UnitErr (unit error completion) is turned ON, a motor continues to operate until a return to origin is completed.
- This FB uses the G_CPRTCL instruction. For details, refer to MELSEC-Q/L Structured Programming Manual (Special Instructions).
- Specify a value obtained by dividing the start input/output number, which is assigned to a serial communication module, by 16 in iw_StartIONo (start I/O No.). If the start input/output number is not assigned to the module, a stop error (2110H) occurs in the CPU module.
- This FB uses the index register Z9. Do not use the Z9 in an interrupt program.
- Before operating an SMC controller, write the following intelligent function module data (parameters of a serial communication module) to a module in GX Works2.

Item			Setting value
Switch Setting	Transmission setting	Data bit	8
		Parity bit	None
		Stop bit	1
	Communication speed setting		Set the value according to the setting of a device to be connected.
	Communication protocol setting		Predefined protocol
Various Control Specification	Echo back enable/prohibit specification		1: Prohibited

- Use the protocol send/receive setting of Predefined Protocol Support Tool For Positioning (Q/L) to change a communication timeout or the number of retries. (Predefined Protocol Support Tool For Positioning Operating Manual)

Performance value

The following table lists the performance values of this FB under the following conditions.

- FB compilation method: Macro type
- CPU module: Q04UDVCPU
- Serial communication module: QJ71C24N
- Controller (manufactured by SMC): LECA6N-LEY16AC-30
- Electric actuator (manufactured by SMC): LEY16AC-30-R16N
- Initial position: Home position (0.00 mm)

Time required for the processing*1	Maximum scan time	Number of scans required for the processing
576.000 ms	0.705 ms	1730 scans

*1 The time required from start to end of the processing.

Error code

Error code	Description	Corrective action
100H	The value set for the start I/O number is out of the range.	Set a value within the range from 00H to FEH for the start I/O number and execute the FB again.
101H	The value set for the target channel is out of the range.	Set 2 for the target channel and execute the FB again.
102H	The value set for the target axis is out of the range.	Set a value within the range from 1 to 32 for the target axis and execute the FB again.
110H	The start I/O number of M+CPU-SMCPosiSp_CPRTCL-ST is out of the range.	Review the setting.
200H	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
201H	The execution command turned OFF during the processing.	Do not turn OFF FB_EN (execution command) until FB_OK (normal completion), FB_ERROR (error completion), or ob_UnitErr (unit error completion) is turned ON. (This error code is output for one scan only.)
202H	Another FB which may affect the operation of a motor is executing.	Stop the FB and execute this FB again. Target FB: • M+CPU-SMCPosiSp_StartHomePosi-ST • M+CPU-SMCPosiSp_JogInching-ST • M+CPU-SMCPosiSp_StartPosi-ST For M+CPU-SMCPosiSp_JogInching-ST, check that ob_ParamOK (parameter setting completion flag) is turned ON and ob_Busy (busy signal) is turned OFF.
203H	Emergency stop or major failure is occurring.	Check the status of a controller in M+CPU-SMCPosiSp_Monitoring-ST. After checking the status, remove the cause of the error and execute the FB again.
204H	Movement commands are executed while a servo is OFF.	Check the status of a controller in M+CPU-SMCPosiSp_Monitoring-ST. To turn ON a servo, turn it ON with M+CPU-SMCPosiSp_ServoControl-ST.
Predefined protocol error code	An error code that occurs during communication.	For details, refer to the following: MQ Corresponding Serial Communication Module User's Manual (Basic) MELSEC-L Serial Communication Module User's Manual (Basic)

3.3 M+CPU-SMCPosiSp_JogInching-ST

Point

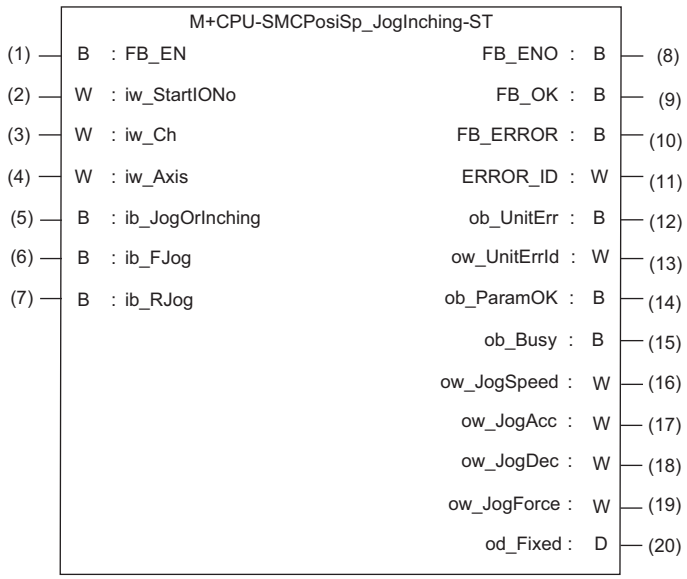
Advanced preparation is required for using this FB. For details, refer to the following:

☞ Page 57 Importing M+CPU-SMCPosiSp_CPRTCL-ST

☞ Page 57 Checking the start I/O number

Overview

Performs JOG or inching operation.



Labels

Input label

No.	Label	Name	Data type	Range	Description
(1)	FB_EN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	iw_StartIONo	Start I/O No.	Word [signed]	00H to FEH	Specify the value obtained by dividing the start input/output number of a target serial communication module by 16.
(3)	iw_Ch	Target channel	Word [signed]	2	Specify the channel of a serial communication module.
(4)	iw_Axis	Target axis	Word [signed]	1 to 32	Specify the controller ID.
(5)	ib_JogOrInching	JOG/Inching replacement	Bit	ON, OFF	ON: Inching operation OFF: JOG operation
(6)	ib_FJog	JOG + command	Bit	ON, OFF	Turn ON this label to perform the forward JOG or inching operation.
(7)	ib_RJog	JOG - command	Bit	ON, OFF	Turn ON this label to perform the reverse JOG or inching operation.

Output label

No.	Label	Name	Data type	Initial value	Description
(8)	FB_ENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(9)	FB_OK	Normal completion	Bit	OFF	The ON state indicates that the JOG operation is started, and the inching operation is completed normally.
(10)	FB_ERROR	Error completion	Bit	OFF	The ON state indicates that an error has occurred in the FB.
(11)	ERROR_ID	Error code	Word [signed]	0	The error code of an error occurred in the FB is stored.
(12)	ob_UnitErr	Unit error completion	Bit	OFF	The ON state indicates that an error has occurred in the module.
(13)	ow_UnitErrId	Unit error code	Word [signed]	0	The error code of an error occurred in the module is stored.
(14)	ob_ParamOK	Parameter setting completion flag	Bit	OFF	The ON state indicates that the initial settings until a motor is ready to operate is completed.
(15)	ob_Busy	Busy signal	Bit	OFF	The ON state indicates that a motor is operating.
(16)	ow_JogSpeed	JOG speed	Word [signed]	0	The JOG speed is stored. For the inching operation, the stored speed is ignored. (Unit: mm/s)
(17)	ow_JogAcc	JOG ACC	Word [signed]	0	Acceleration of the JOG or inching operation is stored. (Unit: mm/s^2)
(18)	ow_JogDec	JOG DEC	Word [signed]	0	Deceleration of the JOG or inching operation is stored. (Unit: mm/s^2)
(19)	ow_JogForce	JOG Force	Word [signed]	0	Force of the JOG or inching operation is stored. (Unit: %)
(20)	od_Fixed	Fixed distance	Double Word [signed]	0	The inching amount of movement is stored. For the JOG operation, the stored movement amount is ignored. (Unit: 0.01 mm/s)

FB details

Available device

■ Serial communication module

Target module	Firmware version	Engineering tool
QJ71C24N*1	The first five digits of the serial number are '11062' or higher.	GX Works2 Version 1.570U or later
QJ71C24N-R4*1	The first five digits of the serial number are '11062' or higher.	GX Works2 Version 1.570U or later
LJ71C24*1	—	GX Works2 Version 1.570U or later

*1 Available only in CH2.

■ CPU module

- QCPU*1
- LCPU

*1 Universal model QCPUs and process CPUs only

Basic specifications

Item	Description
Language	Structured Text
Number of basic steps	2790 steps The number of steps of the FB which is embedded in a program varies depending on the CPU module being used, input/output definitions, and option settings of GX Works2. For the option settings of GX Works2, refer to the GX Works2 Version 1 Operating Manual (Common).
Number of points of a label used	• Label: 64 points (Word), 30 points (Bit) • Latch label: 0 point (Word), 0 point (Bit) The number of points of a label used which is embedded in a program varies depending on the device specified for an argument and option settings of GX Works2. For the option settings of GX Works2, refer to GX Works2 Version 1 Operating Manual (Common).
Index register	Index register: 1 point (Z9)
FB dependence	M+CPU-SMCPosiSp_JogInching-ST └ M+CPU-SMCPosiSp_CPRTCL-ST
FB compilation method	Macro type
FB operation	Real-time execution

Processing

- Specify the start I/O number (a value obtained by dividing the start input/output number by 16) and channel of a serial communication module in iw_StartIONo (start I/O No.) and iw_Ch (target channel) respectively.
- Specify the axis number (controller ID) of the operation target in iw_Axis (target axis).
- Set the following labels to set parameters for the JOG or inching operation.

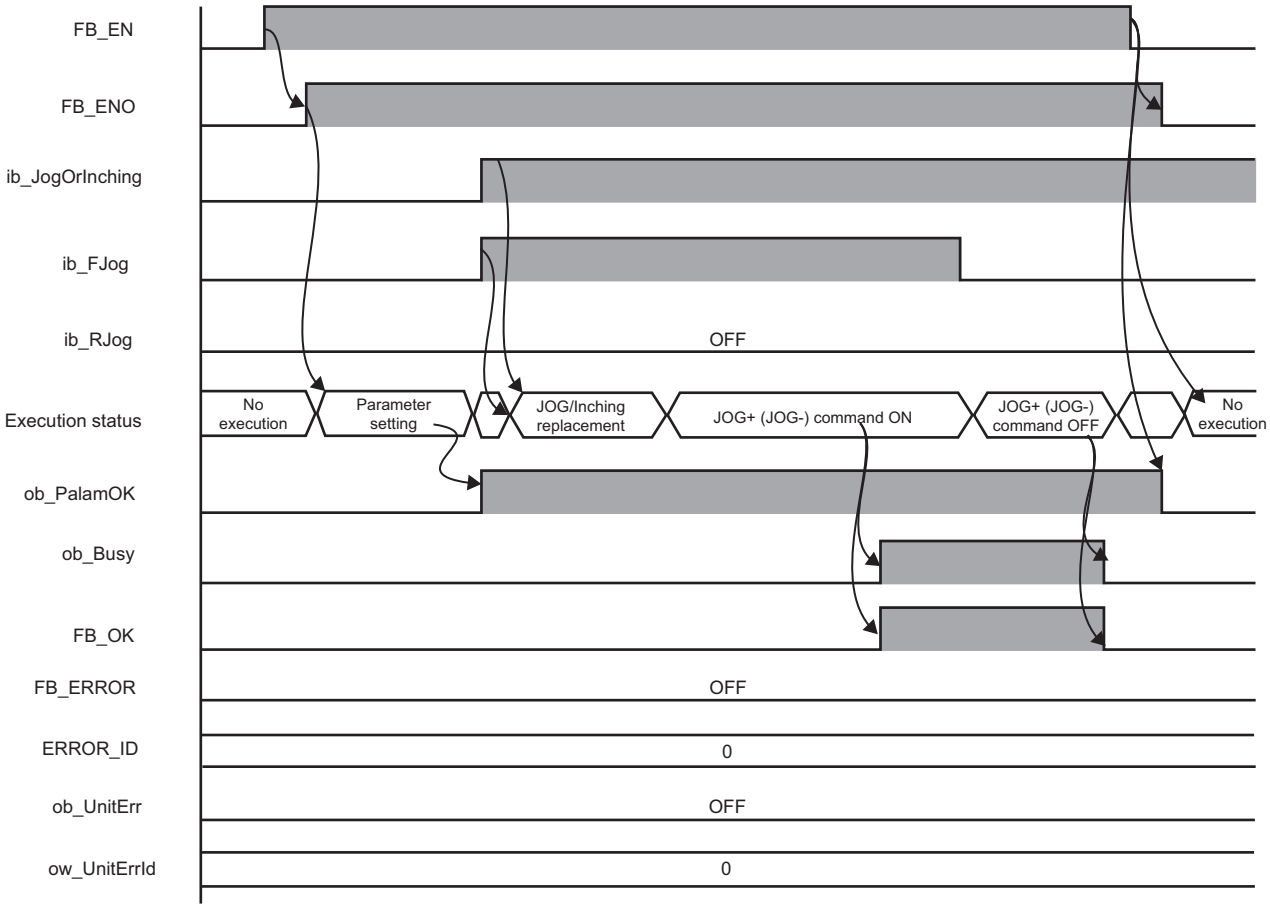
Label	Setting content
ow_JogSpeed	JOG speed
ow_JogAcc	JOG acceleration
ow_JogDec	JOG deceleration
ow_JogForce	JOG force
od_Fixed	Fixed distance

- This FB reads JOG parameters at the rise of FB_EN (execution command). When the JOG or inching operation is ready, ob_ParamOK (parameter setting completion flag) is turned ON.
- The inching operation command is executed until the operation is completed by turning ON ib_JogOrInching (JOG/Inching replacement) and at the rise of ib_FJog (JOG + command) or ib_RJog (JOG - command). When the operation is completed, FB_OK (normal completion) is turned ON.
- The JOG operation command is executed while ib_JogOrInching (JOG/Inching replacement) is turned OFF and ib_FJog (JOG + command) or ib_RJog (JOG - command) is turned ON. FB_OK (normal completion) is turned ON at the start of the operation. When ib_FJog (JOG + command) or ib_RJog (JOG - command) is turned OFF, the operation decelerates to stop and FB_OK (normal completion) is turned OFF.
- ob_Busy (busy signal) is turned ON while a controller is operating (during the inching or JOG operation).
- The operation stops when both ib_FJog (JOG + command) and ib_RJog (JOG - command) are turned ON.
- The operation stops when ib_JogOrInching (JOG/Inching replacement) is turned ON during the JOG operation.
- When a value out of the range is set for the start I/O number, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '100H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the target channel, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '101H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the target axis, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '102H' is stored in ERROR_ID (error code).
- When a value set for the start I/O number is not correctly applied in M+CPU-SMCPosiSp_CPRTCL-ST, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '110H' is stored in ERROR_ID (error code).
- When the connected device is not the operation target, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '200H' is stored in ERROR_ID (error code).

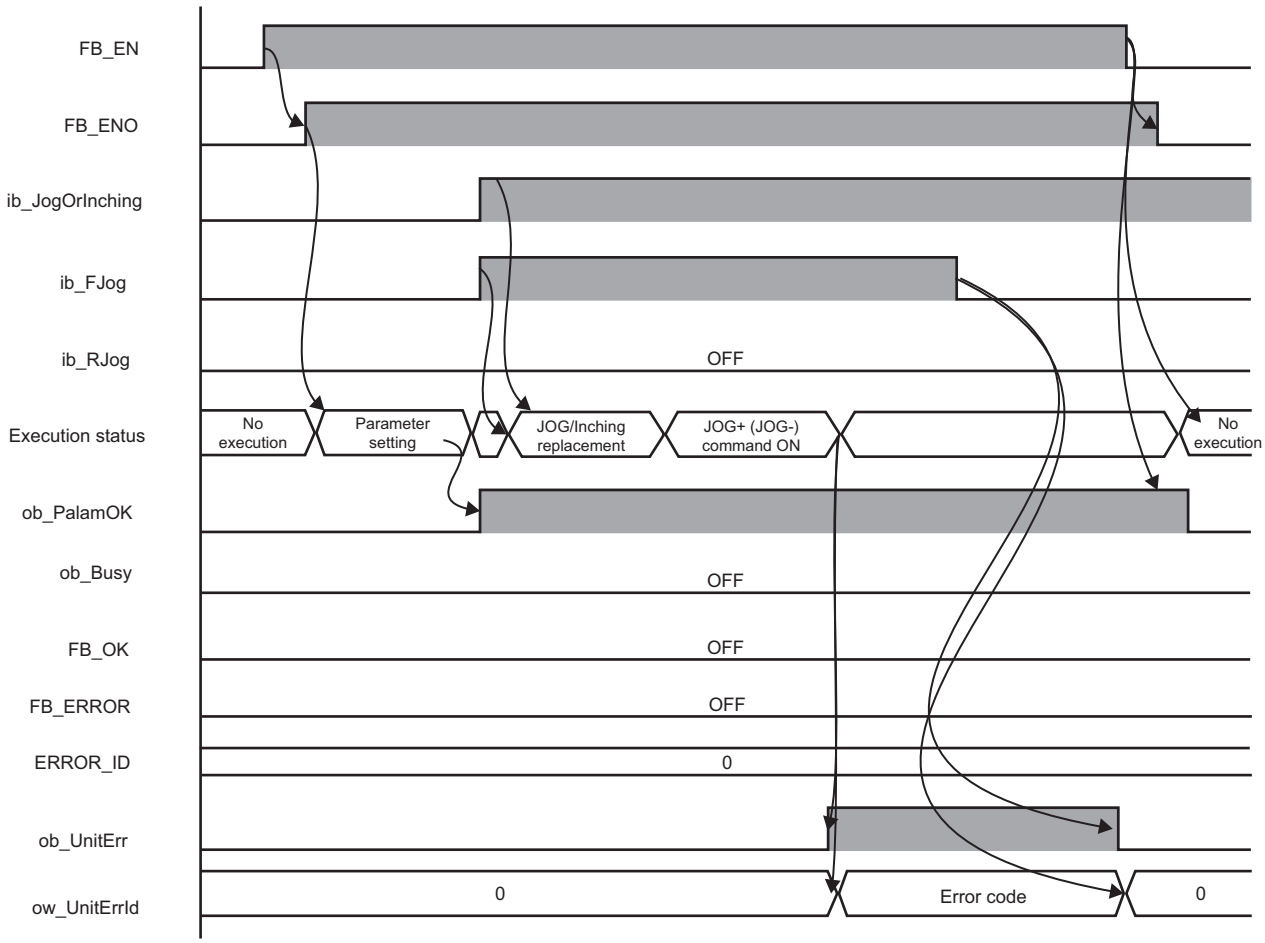
- When turning ON FB_EN (execution command) of this FB while executing any of the following FBs, FB_ERROR (error completion) is turned ON and the processing of this FB is interrupted. In addition, the error code '202H' is stored in ERROR_ID (error code).
  M+CPU-SMCPosiSp_StartHomePosi-ST
  M+CPU-SMCPosiSp_JogInching-ST
  M+CPU-SMCPosiSp_StartPosi-ST
- When turning ON an alarm signal of a controller, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '203H' is stored in ERROR_ID (error code). Check the status of the controller in M+CPU-SMCPosiSp_Monitoring-ST.
- When turning ON FB_EN (execution command) of this FB while a servo of a target controller is OFF, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '204H' is stored in ERROR_ID (error code).
- When an error occurs while sending/receiving a message to/from the predefined protocol, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, an error code is stored in ERROR_ID (error code). For details on the error code, refer to 📖IQ Corresponding Serial Communication Module User's Manual (Basic) or 📖MELSEC-L Serial Communication Module User's Manual (Basic).
- When this FB receives an error code due to an error occurred in a controller, ob_UnitErr (unit error completion) is turned ON and the processing of the FB is interrupted. In addition, the received error code is stored in ow_UnitErrId (unit error code).

Timing chart of I/O signals

■ In normal completion



■ In error completion



Restrictions or precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because FB_EN (execution command) cannot be turned OFF and the normal operation cannot be performed. Always use this FB in programs that can turn OFF FB_EN (execution command).
- This FB requires the configuration of the ladder for every input label.
- Change the device/label automatic-assign setting so that the capacity required to use this FB is secured. Otherwise, a compiling error may occur in GX Works2.
- Perform the JOG or inching operation after ob_ParamOK (parameter setting completion flag) is turned ON.
- When a controller stops at the operation limit value, an error will not occur in this FB.
- When turning ON ib_FJog (JOG + command) or ib_RJog (JOG - command) before ob_ParamOK (parameter setting completion flag) is turned ON, JOG + (-) command is ignored. Turn ON the JOG + (-) command again.
- When FB_EN (execution command) is turned OFF during the JOG operation, FB_ENO (execution status) is turned OFF after the operation stops. To turn ON FB_EN (execution command) again, check that FB_ENO (execution status) is turned OFF in advance.
- This FB uses the G_CPRTCL instruction. For details, refer to 📖MELSEC-Q/L Structured Programming Manual (Special Instructions).
- Specify a value obtained by dividing the start input/output number, which is assigned to a serial communication module, by 16 in iw_StartIONo (start I/O No.). If the start input/output number is not assigned to the module, a stop error (2110H) occurs in the CPU module.
- This FB uses the index register Z9. Do not use the Z9 in an interrupt program.
- Before operating an SMC controller, write the following intelligent function module data (parameters of a serial communication module) to a module in GX Works2.

Item			Setting value
Switch Setting	Transmission setting	Data bit	8
		Parity bit	None
		Stop bit	1
	Communication speed setting		Set the value according to the setting of a device to be connected.
	Communication protocol setting		Predefined protocol
Various Control Specification	Echo back enable/prohibit specification		1: Prohibited

- Use the protocol send/receive setting of Predefined Protocol Support Tool For Positioning (Q/L) to change a communication timeout or the number of retries. (📖Predefined Protocol Support Tool For Positioning Operating Manual)

Performance value

The following table lists the performance values of this FB under the following conditions.

- FB compilation method: Macro type
- CPU module: Q04UDVCPU
- Serial communication module: QJ71C24N
- Controller (manufactured by SMC): LECA6N-LEY16AC-30
- Electric actuator (manufactured by SMC): LEY16AC-30-R16N
- JOG speed: 10.00 mm/s
- Inching amount of movement: 0.10 mm

Measuring range	Time required for the processing*1	Maximum scan time	Number of scans required for the processing
From when FB_EN (execution command) is turned ON to when ob_ParamOK (parameter setting completion flag) is turned ON	80.100 ms	0.600 ms	232 scans
From when ib_FJog (JOG + command) or ib_RJog (JOG - command) is turned ON to when JOG operation is started	73.300 ms	0.747 ms	211 scans
From when ib_FJog (JOG + command) or ib_RJog (JOG - command) is turned ON to when inching movement is completed	73.000 ms	0.747 ms	211 scans

*1 The time required from start to end of the processing.

Error code

Error code	Description	Corrective action
100H	The value set for the start I/O number is out of the range.	Set a value within the range from 00H to FEH for the start I/O number and execute the FB again.
101H	The value set for the target channel is out of the range.	Set 2 for the target channel and execute the FB again.
102H	The value set for the target axis is out of the range.	Set a value within the range from 1 to 32 for the target axis and execute the FB again.
110H	The start I/O number of M+CPU-SMCPosiSp_CPRTCL-ST is out of the range.	Review the setting.
200H	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
202H	Another FB which may affect the operation of a motor is executing.	Stop the FB and execute this FB again. Target FB: • M+CPU-SMCPosiSp_StartHomePosi-ST • M+CPU-SMCPosiSp_JogInching-ST • M+CPU-SMCPosiSp_StartPosi-ST For M+CPU-SMCPosiSp_JogInching-ST, check that ob_ParamOK (parameter setting completion flag) is turned ON and ob_Busy (busy signal) is turned OFF.
203H	Emergency stop or major failure is occurring.	Check the status of a controller in M+CPU-SMCPosiSp_Monitoring-ST. After checking the status, remove the cause of the error and execute the FB again.
204H	Movement commands are executed while a servo is OFF.	Check the status of a controller in M+CPU-SMCPosiSp_Monitoring-ST. To turn ON a servo, turn it ON with M+CPU-SMCPosiSp_ServoControl-ST.
Predefined protocol error code	An error code that occurs during communication.	For details, refer to the following: 📖Q Corresponding Serial Communication Module User's Manual (Basic) 📖MELSEC-L Serial Communication Module User's Manual (Basic)

3.4 M+CPU-SMCPosiSp_ReadStepData-ST

Point

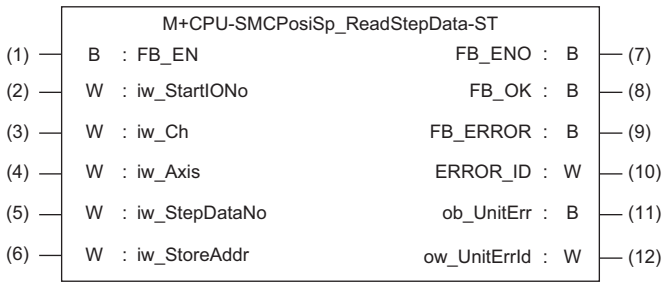
Advanced preparation is required for using this FB. For details, refer to the following:

☞ Page 57 Importing M+CPU-SMCPosiSp_CPRTCL-ST

☞ Page 57 Checking the start I/O number

Overview

Reads the step data of the specified step data number.



Labels

Input label

No.	Label	Name	Data type	Range	Description
(1)	FB_EN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	iw_StartIONo	Start I/O No.	Word [signed]	00H to FEH	Specify the value obtained by dividing the start input/output number of a target serial communication module by 16.
(3)	iw_Ch	Target channel	Word [signed]	2	Specify the channel of a serial communication module.
(4)	iw_Axis	Target axis	Word [signed]	1 to 32	Specify the controller ID.
(5)	iw_StepDataNo	Step data No.	Word [signed]	0 to 63	Specify the step data number of step data from which the setting value is to be read.
(6)	iw_StoreAddr	Address to store step data	Word [signed]	0 to FFFFH	Specify the start number of D device, which stores step data values, in hexadecimal. For details on the step data, refer to the following: ☞ Page 108 Step data

Output label

No.	Label	Name	Data type	Initial value	Description
(7)	FB_ENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(8)	FB_OK	Normal completion	Bit	OFF	The ON state indicates that reading step data is completed.
(9)	FB_ERROR	Error completion	Bit	OFF	The ON state indicates that an error has occurred in the FB.
(10)	ERROR_ID	Error code	Word [signed]	0	The error code of an error occurred in the FB is stored.
(11)	ob_UnitErr	Unit error completion	Bit	OFF	The ON state indicates that an error has occurred in the module.
(12)	ow_UnitErrId	Unit error code	Word [signed]	0	The error code of an error occurred in the module is stored.

FB details

Available device

■ Serial communication module

Target module	Firmware version	Engineering tool
QJ71C24N*1	The first five digits of the serial number are '11062' or higher.	GX Works2 Version 1.570U or later
QJ71C24N-R4*1	The first five digits of the serial number are '11062' or higher.	GX Works2 Version 1.570U or later
LJ71C24*1	—	GX Works2 Version 1.570U or later

*1 Available only in CH2.

■ CPU module

- QCPU*1
- LCPU

*1 Universal model QCPUs and process CPUs only

Basic specifications

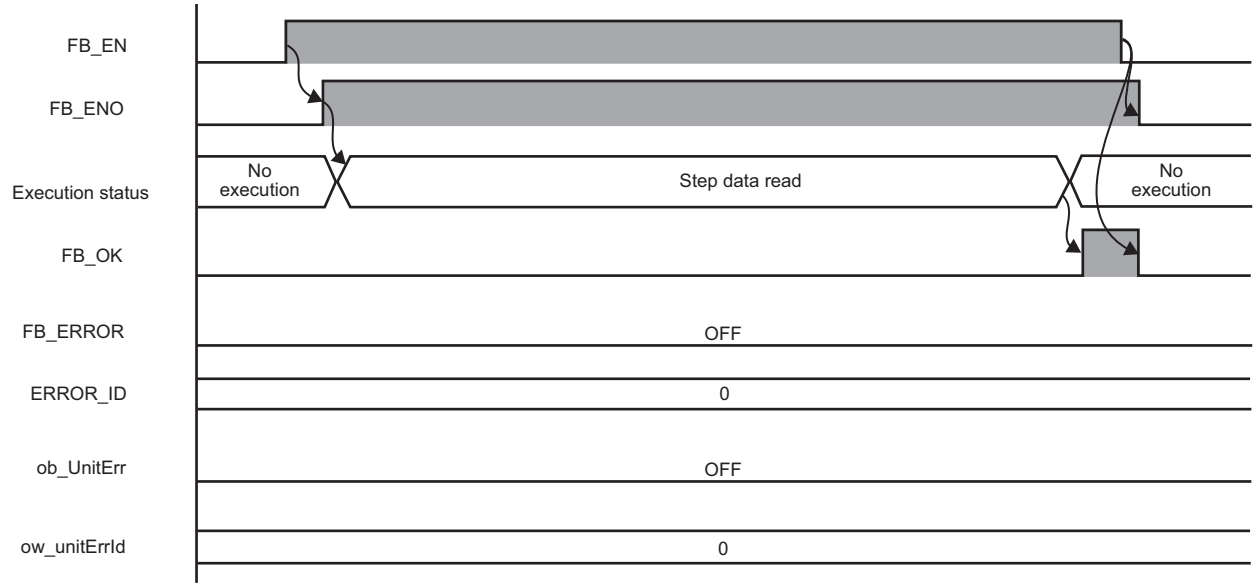
Item	Description
Language	Structured Text
Number of basic steps	1579 steps The number of steps of the FB which is embedded in a program varies depending on the CPU module being used, input/output definitions, and option settings of GX Works2. For the option settings of GX Works2, refer to the GX Works2 Version 1 Operating Manual (Common).
Number of points of a label used	• Label: 75 points (Word), 18 points (Bit) • Latch label: 0 point (Word), 0 point (Bit) The number of points of a label used which is embedded in a program varies depending on the device specified for an argument and option settings of GX Works2. For the option settings of GX Works2, refer to GX Works2 Version 1 Operating Manual (Common).
Index register	Index register: 2 points (Z9 and Z8)
FB dependence	M+CPU-SMCPosiSp_ReadStepData-ST └ M+CPU-SMCPosiSp_CPRTCL-ST
FB compilation method	Macro type
FB operation	Pulse execution (multiple scan execution type)

Processing

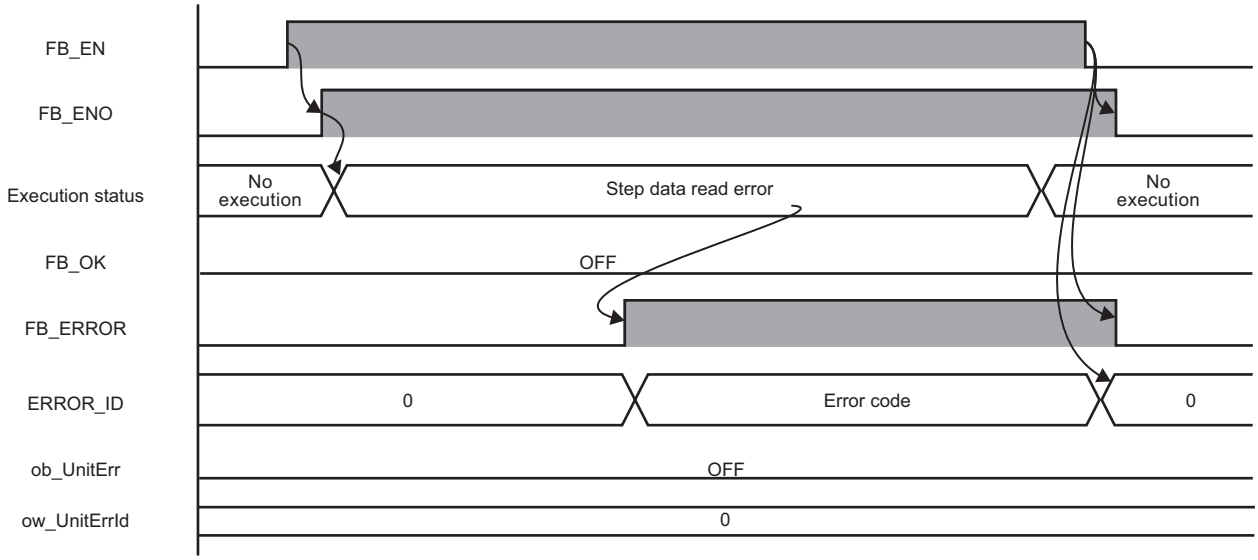
- Specify the start I/O number (a value obtained by dividing the start input/output number by 16) and channel of a serial communication module in iw_StartIONo (start I/O No.) and iw_Ch (target channel) respectively.
- Specify the axis number (controller ID) of the operation target in iw_Axis (target axis).
- Specify the step data number of step data to be read in iw_StepDataNo (step data No.).
- Step data is stored in the device position specified in iw_StoreAddr (address to store step data).
- This FB reads step data of the specified step data number via Modbus communication at the rise of FB_EN (execution command). When reading the step data is completed, FB_OK (normal completion) is turned ON.
- When a value out of the range is set for the start I/O number, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '100H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the target channel, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '101H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the target axis, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '102H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the step data number, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '105H' is stored in ERROR_ID (error code).
- When a value set for the start I/O number is not correctly applied in M+CPU-SMCPosiSp_CPRTCL-ST, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '110H' is stored in ERROR_ID (error code).
- When the connected device is not the operation target, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '200H' is stored in ERROR_ID (error code).
- When turning OFF FB_EN (execution command) before FB_OK (normal completion), FB_ERROR (error completion), or ob_UnitErr (unit error completion) is turned ON, FB_ERROR (error completion) is turned ON for one scan only and the processing of the FB is interrupted. In addition, the error code '201H' is stored in ERROR_ID (error code) for one scan.
- When turning ON FB_EN (execution command) of this FB while executing the following FB, FB_ERROR (error completion) is turned ON and the processing of this FB is interrupted. In addition, the error code '202H' is stored in ERROR_ID (error code).
  M+CPU-SMCPosiSp_ReadStepData-ST
- When an error occurs while sending/receiving a message to/from the predefined protocol, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, an error code is stored in ERROR_ID (error code). For details on the error code, refer to 📖Q Corresponding Serial Communication Module User's Manual (Basic) or 📖MELSEC-L Serial Communication Module User's Manual (Basic).
- When this FB receives an error code due to an error occurred in a controller, ob_UnitErr (unit error completion) is turned ON and the processing of the FB is interrupted. In addition, the received error code is stored in ow_UnitErrId (unit error code).

Timing chart of I/O signals

■ In normal completion



■ In error completion



Restrictions or precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because FB_EN (execution command) cannot be turned OFF and the normal operation cannot be performed. Always use this FB in programs that can turn OFF FB_EN (execution command).
- This FB requires the configuration of the ladder for every input label.
- Change the device/label automatic-assign setting so that the capacity required to use this FB is secured. Otherwise, a compiling error may occur in GX Works2.
- This FB uses the G_CPRTCL instruction. For details, refer to MELSEC-Q/L Structured Programming Manual (Special Instructions).
- Specify a value obtained by dividing the start input/output number, which is assigned to a serial communication module, by 16 in iw_StartIONo (start I/O No.). If the start input/output number is not assigned to the module, a stop error (2110H) occurs in the CPU module.
- This FB uses index registers (Z9 and Z8). Do not use the Z9 and Z8 in an interrupt program.
- Before operating an SMC controller, write the following intelligent function module data (parameters of a serial communication module) to a module in GX Works2.

Item			Setting value
Switch Setting	Transmission setting	Data bit	8
		Parity bit	None
		Stop bit	1
	Communication speed setting		Set the value according to the setting of a device to be connected.
	Communication protocol setting		Predefined protocol
Various Control Specification	Echo back enable/prohibit specification		1: Prohibited

- Use the protocol send/receive setting of Predefined Protocol Support Tool For Positioning (Q/L) to change a communication timeout or the number of retries. (Predefined Protocol Support Tool For Positioning Operating Manual)

Performance value

The following table lists the performance values of this FB under the following conditions.

- FB compilation method: Macro type
- CPU module: Q04UDVCPU
- Serial communication module: QJ71C24N
- Controller (manufactured by SMC): LECA6N-LEY16AC-30
- Electric actuator (manufactured by SMC): LEY16AC-30-R16N

Time required for the processing*1	Maximum scan time	Number of scans required for the processing
48.300 ms	0.600 ms	145 scans

*1 The time required from start to end of the processing.

Error code

Error code	Description	Corrective action
100H	The value set for the start I/O number is out of the range.	Set a value within the range from 00H to FEH for the start I/O number and execute the FB again.
101H	The value set for the target channel is out of the range.	Set 2 for the target channel and execute the FB again.
102H	The value set for the target axis is out of the range.	Set a value within the range from 1 to 32 for the target axis and execute the FB again.
105H	The value set for the step data number is out of the range.	Set a value within the range from 0 to 63 for the step data number and execute the FB again.
110H	The start I/O number of M+CPU-SMCPosiSp_CPRTCL-ST is out of the range.	Review the setting.
200H	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
201H	The execution command turned OFF during the processing.	Do not turn OFF FB_EN (execution command) until FB_OK (normal completion), FB_ERROR (error completion), or ob_UnitErr (unit error completion) is turned ON. (This error code is output for one scan only.)
202H	Another FB which may affect the operation of this FB is executing.	Stop the FB and execute this FB again. Target FB: • M+CPU-SMCPosiSp_ReadStepData-ST
Predefined protocol error code	An error code that occurs during communication.	For details, refer to the following: 📖IQ Corresponding Serial Communication Module User's Manual (Basic) 📖MELSEC-L Serial Communication Module User's Manual (Basic)

3.5 M+CPU-SMCPosiSp_Teaching-ST

Point

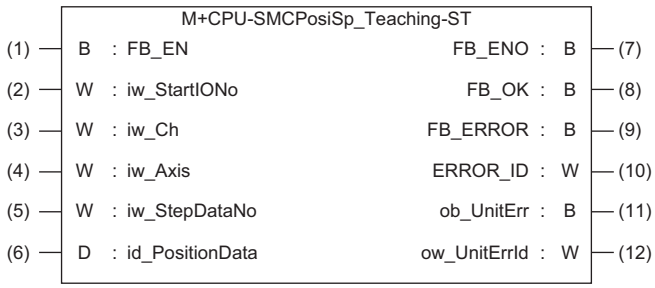
Advanced preparation is required for using this FB. For details, refer to the following:

☞ Page 57 Importing M+CPU-SMCPosiSp_CPRTCL-ST

☞ Page 57 Checking the start I/O number

Overview

Sets the designated position to the step data (target position) of the specified step data number.



Labels

Input label

No.	Label	Name	Data type	Range	Description
(1)	FB_EN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	iw_StartIONo	Start I/O No.	Word [signed]	00H to FEH	Specify the value obtained by dividing the start input/output number of a target serial communication module by 16.
(3)	iw_Ch	Target channel	Word [signed]	2	Specify the channel of a serial communication module.
(4)	iw_Axis	Target axis	Word [signed]	1 to 32	Specify the controller ID.
(5)	iw_StepDataNo	Step data No.	Word [signed]	0 to 63	Specify the step data number of step data to which the setting value is to be written.
(6)	id_PositionData	Position data	Double Word [signed]	-999999 to 999999	Specify the target position data to be set.

Output label

No.	Label	Name	Data type	Initial value	Description
(7)	FB_ENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(8)	FB_OK	Normal completion	Bit	OFF	The ON state indicates that the step data setting is completed.
(9)	FB_ERROR	Error completion	Bit	OFF	The ON state indicates that an error has occurred in the FB.
(10)	ERROR_ID	Error code	Word [signed]	0	The error code of an error occurred in the FB is stored.
(11)	ob_UnitErr	Unit error completion	Bit	OFF	The ON state indicates that an error has occurred in the module.
(12)	ow_UnitErrId	Unit error code	Word [signed]	0	The error code of an error occurred in the module is stored.

FB details

Available device

■ Serial communication module

Target module	Firmware version	Engineering tool
QJ71C24N[*1]	The first five digits of the serial number are '11062' or higher.	GX Works2 Version 1.570U or later
QJ71C24N-R4[*1]	The first five digits of the serial number are '11062' or higher.	GX Works2 Version 1.570U or later
LJ71C24[*1]	—	GX Works2 Version 1.570U or later

*1 Available only in CH2.

■ CPU module

- QCPU[*1]
- LCPU

*1 Universal model QCPUs and process CPUs only

Basic specifications

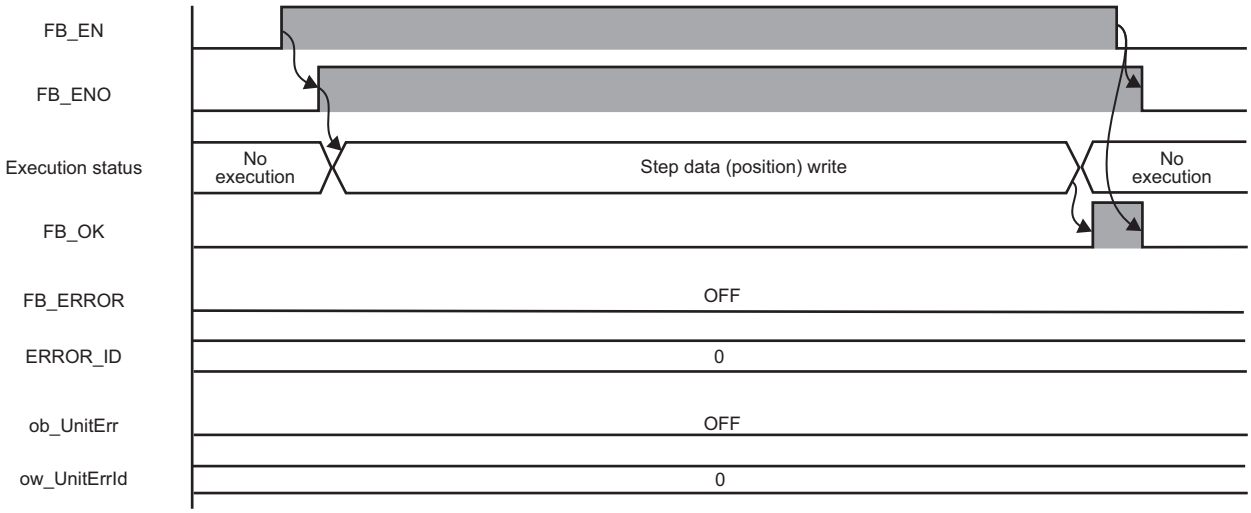
Item	Description
Language	Structured Text
Number of basic steps	1521 steps The number of steps of the FB which is embedded in a program varies depending on the CPU module being used, input/output definitions, and option settings of GX Works2. For the option settings of GX Works2, refer to the 📖GX Works2 Version 1 Operating Manual (Common).
Number of points of a label used	• Label: 63 points (Word), 18 points (Bit) • Latch label: 0 point (Word), 0 point (Bit) The number of points of a label used which is embedded in a program varies depending on the device specified for an argument and option settings of GX Works2. For the option settings of GX Works2, refer to 📖GX Works2 Version 1 Operating Manual (Common).
Index register	Index register: 1 point (Z9)
FB dependence	M+CPU-SMCPosiSp_Teaching-ST └ M+CPU-SMCPosiSp_CPRTCL-ST
FB compilation method	Macro type
FB operation	Pulse execution (multiple scan execution type)

Processing

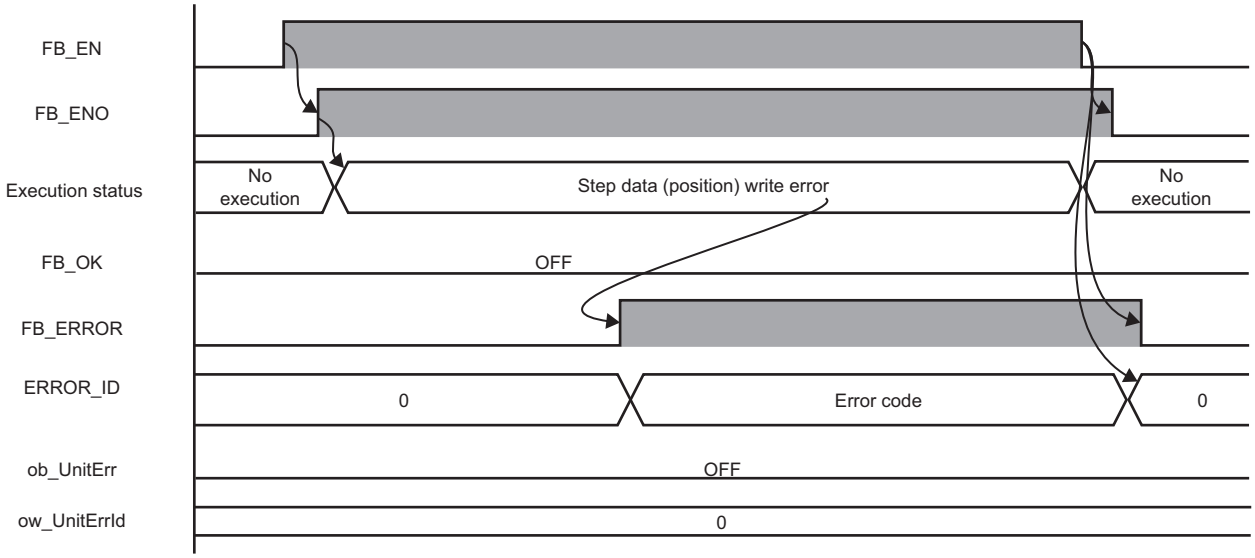
- Specify the start I/O number (a value obtained by dividing the start input/output number by 16) and channel of a serial communication module in iw_StartIONo (start I/O No.) and iw_Ch (target channel) respectively.
- Specify the axis number (controller ID) of the operation target in iw_Axis (target axis).
- Specify the step data number of step data to be written in iw_StepDataNo (step data No.).
- Set position information in id_PositionData (position data).
- This FB rewrites position data of the specified step data number via Modbus communication at the rise of FB_EN (execution command). When the data rewriting is completed, FB_OK (normal completion) is turned ON.
- When a value out of the range is set for the start I/O number, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '100H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the target channel, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '101H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the target axis, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '102H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the step data number, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '105H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the position data, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '106H' is stored in ERROR_ID (error code).
- When a value set for the start I/O number is not correctly applied in M+CPU-SMCPosiSp_CPRTCL-ST, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '110H' is stored in ERROR_ID (error code).
- When the connected device is not the operation target, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '200H' is stored in ERROR_ID (error code).
- When turning OFF FB_EN (execution command) before FB_OK (normal completion), FB_ERROR (error completion), or ob_UnitErr (unit error completion) is turned ON, FB_ERROR (error completion) is turned ON for one scan only and the processing of the FB is interrupted. In addition, the error code '201H' is stored in ERROR_ID (error code) for one scan.
- When turning ON FB_EN (execution command) of this FB while executing the following FB, FB_ERROR (error completion) is turned ON and the processing of this FB is interrupted. In addition, the error code '202H' is stored in ERROR_ID (error code).
  M+CPU-SMCPosiSp_Teaching-ST
- When an error occurs while sending/receiving a message to/from the predefined protocol, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, an error code is stored in ERROR_ID (error code). For details on the error code, refer to 📖IQ Corresponding Serial Communication Module User's Manual (Basic) or 📖MELSEC-L Serial Communication Module User's Manual (Basic).
- When this FB receives an error code due to an error occurred in a controller, ob_UnitErr (unit error completion) is turned ON and the processing of the FB is interrupted. In addition, the received error code is stored in ow_UnitErrId (unit error code).

Timing chart of I/O signals

■ In normal completion



■ In error completion



Restrictions or precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because FB_EN (execution command) cannot be turned OFF and the normal operation cannot be performed. Always use this FB in programs that can turn OFF FB_EN (execution command).
- This FB requires the configuration of the ladder for every input label.
- Change the device/label automatic-assign setting so that the capacity required to use this FB is secured. Otherwise, a compiling error may occur in GX Works2.
- This FB uses the G_CPRTCL instruction. For details, refer to MELSEC-Q/L Structured Programming Manual (Special Instructions).
- Specify a value obtained by dividing the start input/output number, which is assigned to a serial communication module, by 16 in iw_StartIONo (start I/O No.). If the start input/output number is not assigned to the module, a stop error (2110H) occurs in the CPU module.
- This FB uses the index register Z9. Do not use the Z9 in an interrupt program.
- Before operating an SMC controller, write the following intelligent function module data (parameters of a serial communication module) to a module in GX Works2.

Item			Setting value
Switch Setting	Transmission setting	Data bit	8
		Parity bit	None
		Stop bit	1
	Communication speed setting		Set the value according to the setting of a device to be connected.
	Communication protocol setting		Predefined protocol
Various Control Specification	Echo back enable/prohibit specification		1: Prohibited

- Use the protocol send/receive setting of Predefined Protocol Support Tool For Positioning (Q/L) to change a communication timeout or the number of retries. (Predefined Protocol Support Tool For Positioning Operating Manual)

Performance value

The following table lists the performance values of this FB under the following conditions.

- FB compilation method: Macro type
- CPU module: Q04UDVCPU
- Serial communication module: QJ71C24N
- Controller (manufactured by SMC): LECA6N-LEY16AC-30
- Electric actuator (manufactured by SMC): LEY16AC-30-R16N

Time required for the processing*1	Maximum scan time	Number of scans required for the processing
42.900 ms	0.600 ms	125 scans

*1 The time required from start to end of the processing.

Error code

Error code	Description	Corrective action
100H	The value set for the start I/O number is out of the range.	Set a value within the range from 00H to FEH for the start I/O number and execute the FB again.
101H	The value set for the target channel is out of the range.	Set 2 for the target channel and execute the FB again.
102H	The value set for the target axis is out of the range.	Set a value within the range from 1 to 32 for the target axis and execute the FB again.
105H	The value set for the step data number is out of the range.	Set a value within the range from 0 to 63 for the step data number and execute the FB again.
106H	The value set for the position data is out of the range.	Set a value within the range from -999999 to 999999 for the position data and execute the FB again.
110H	The start I/O number of M+CPU-SMCPosiSp_CPRTCL-ST is out of the range.	Review the setting.
200H	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
201H	The execution command turned OFF during the processing.	Do not turn OFF FB_EN (execution command) until FB_OK (normal completion), FB_ERROR (error completion), or ob_UnitErr (unit error completion) is turned ON. (This error code is output for one scan only.)
202H	Another FB which may affect the operation of this FB is executing.	Stop the FB and execute this FB again. Target FB: • M+CPU-SMCPosiSp_Teaching-ST
Predefined protocol error code	An error code that occurs during communication.	For details, refer to the following: 📖Q Corresponding Serial Communication Module User's Manual (Basic) 📖MELSEC-L Serial Communication Module User's Manual (Basic)

3.6 M+CPU-SMCPosiSp_StartPosi-ST

Point

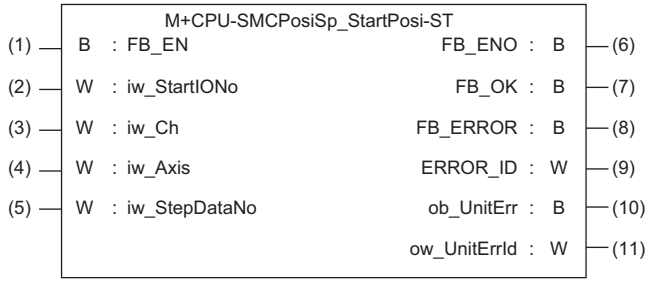
Advanced preparation is required for using this FB. For details, refer to the following:

☞ Page 57 Importing M+CPU-SMCPosiSp_CPRTCL-ST

☞ Page 57 Checking the start I/O number

Overview

Starts positioning operation based on the step data of the specified step data number.



Labels

Input label

No.	Label	Name	Data type	Range	Description
(1)	FB_EN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	iw_StartIONo	Start I/O No.	Word [signed]	00H to FEH	Specify the value obtained by dividing the start input/output number of a target serial communication module by 16.
(3)	iw_Ch	Target channel	Word [signed]	2	Specify the channel of a serial communication module.
(4)	iw_Axis	Target axis	Word [signed]	1 to 32	Specify the controller ID.
(5)	iw_StepDataNo	Step data No.	Word [signed]	0 to 63	Specify the step data number of step data whose positioning operation is to be executed.

Output label

No.	Label	Name	Data type	Initial value	Description
(6)	FB_ENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(7)	FB_OK	Normal completion	Bit	OFF	The ON state indicates that positioning operation is completed.
(8)	FB_ERROR	Error completion	Bit	OFF	The ON state indicates that an error has occurred in the FB.
(9)	ERROR_ID	Error code	Word [signed]	0	The error code of an error occurred in the FB is stored.
(10)	ob_UnitErr	Unit error completion	Bit	OFF	The ON state indicates that an error has occurred in the module.
(11)	ow_UnitErrId	Unit error code	Word [signed]	0	The error code of an error occurred in the module is stored.

FB details

Available device

■ Serial communication module

Target module	Firmware version	Engineering tool
QJ71C24N[*1]	The first five digits of the serial number are '11062' or higher.	GX Works2 Version 1.570U or later
QJ71C24N-R4[*1]	The first five digits of the serial number are '11062' or higher.	GX Works2 Version 1.570U or later
LJ71C24[*1]	—	GX Works2 Version 1.570U or later

*1 Available only in CH2.

■ CPU module

- QCPU[*1]
- LCPU

*1 Universal model QCPUs and process CPUs only

Basic specifications

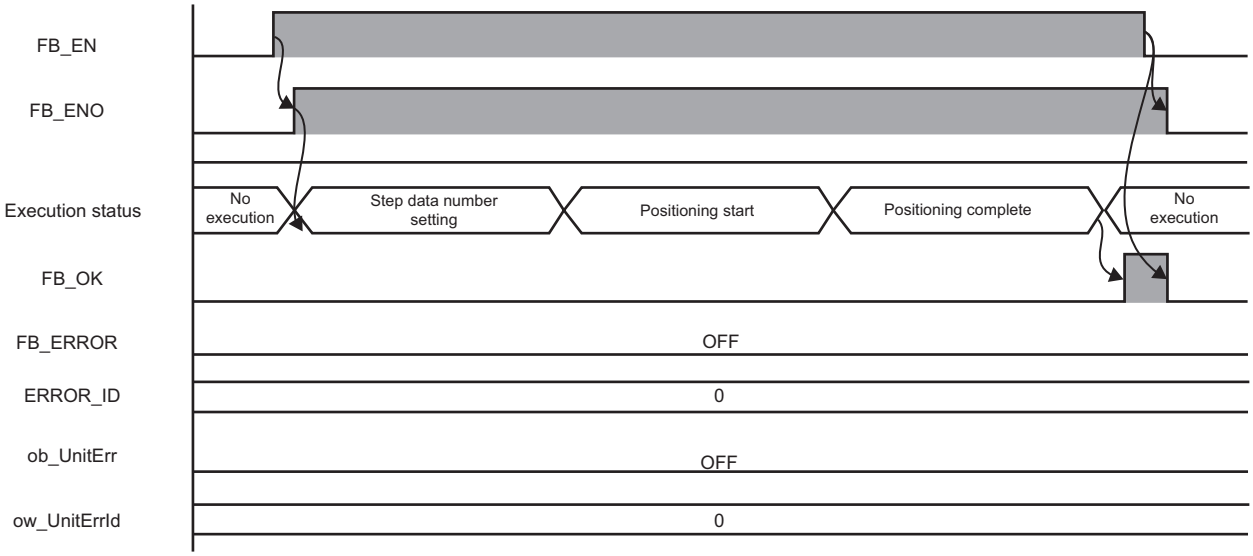
Item	Description
Language	Structured Text
Number of basic steps	2321 steps The number of steps of the FB which is embedded in a program varies depending on the CPU module being used, input/output definitions, and option settings of GX Works2. For the option settings of GX Works2, refer to the 📖GX Works2 Version 1 Operating Manual (Common).
Number of points of a label used	• Label: 55 points (Word), 24 points (Bit) • Latch label: 0 point (Word), 0 point (Bit) The number of points of a label used which is embedded in a program varies depending on the device specified for an argument and option settings of GX Works2. For the option settings of GX Works2, refer to 📖GX Works2 Version 1 Operating Manual (Common).
Index register	Index register: 1 point (Z9)
FB dependence	M+CPU-SMCPosiSp_StartPosi-ST └ M+CPU-SMCPosiSp_CPRTCL-ST
FB compilation method	Macro type
FB operation	Pulse execution (multiple scan execution type)

Processing

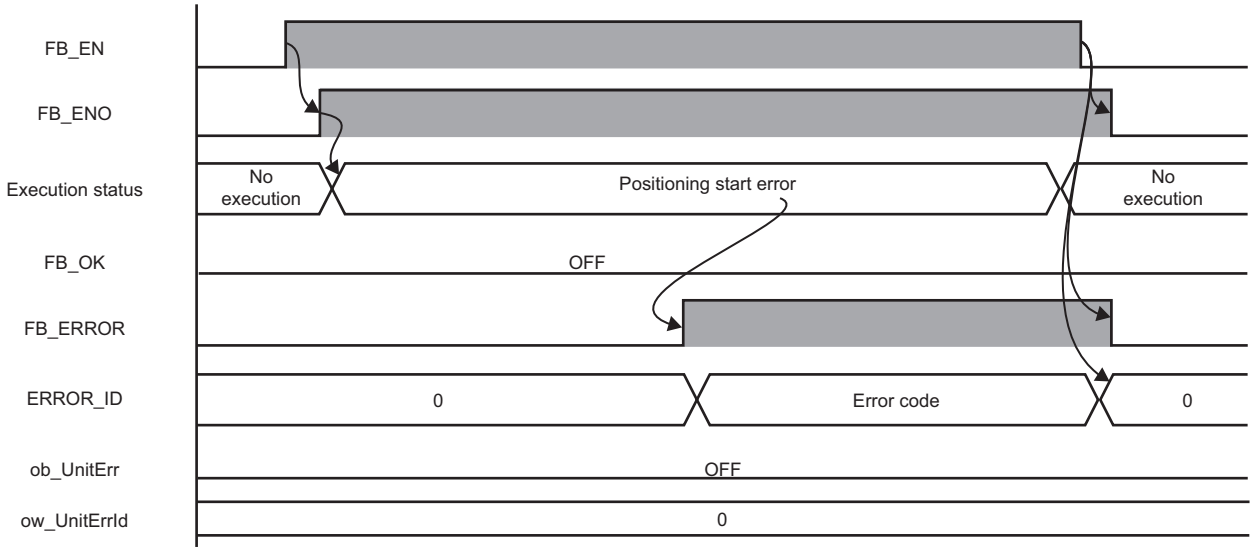
- Specify the start I/O number (a value obtained by dividing the start input/output number by 16) and channel of a serial communication module in iw_StartIONo (start I/O No.) and iw_Ch (target channel) respectively.
- Specify the axis number (controller ID) of the operation target in iw_Axis (target axis).
- Set the step data number to be executed in iw_StepDataNo (step data No.).
- This FB starts positioning operation of the specified step data number via Modbus communication at the rise of FB_EN (execution command).
  When the positioning operation is completed, FB_OK (normal completion) is turned ON.
- When a value out of the range is set for the start I/O number, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '100H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the target channel, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '101H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the target axis, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '102H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the step data number, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '105H' is stored in ERROR_ID (error code).
- When a value set for the start I/O number is not correctly applied in M+CPU-SMCPosiSp_CPRTCL-ST, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '110H' is stored in ERROR_ID (error code).
- When the connected device is not the operation target, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '200H' is stored in ERROR_ID (error code).
- When turning OFF FB_EN (execution command) before FB_OK (normal completion), FB_ERROR (error completion), or ob_UnitErr (unit error completion) is turned ON, FB_ERROR (error completion) is turned ON for one scan only and the processing of the FB is interrupted. In addition, the error code '201H' is stored in ERROR_ID (error code) for one scan.
- When turning ON FB_EN (execution command) of this FB while executing any of the following FBs, FB_ERROR (error completion) is turned ON and the processing of this FB is interrupted. In addition, the error code '202H' is stored in ERROR_ID (error code).
  M+CPU-SMCPosiSp_StartHomePosi-ST
  M+CPU-SMCPosiSp_JogInching-ST
  M+CPU-SMCPosiSp_StartPosi-ST
- When turning ON an alarm signal of a controller, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '203H' is stored in ERROR_ID (error code). Check the status of the controller in M+CPU-SMCPosiSp_Monitoring-ST.
- When turning ON FB_EN (execution command) of this FB while a servo of a target controller is OFF, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '204H' is stored in ERROR_ID (error code).
- When an error occurs while sending/receiving a message to/from the predefined protocol, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, an error code is stored in ERROR_ID (error code). For details on the error code, refer to 📖IQ Corresponding Serial Communication Module User's Manual (Basic) or 📖MELSEC-L Serial Communication Module User's Manual (Basic).
- When this FB receives an error code due to an error occurred in a controller, ob_UnitErr (unit error completion) is turned ON and the processing of the FB is interrupted. In addition, the received error code is stored in ow_UnitErrId (unit error code).

Timing chart of I/O signals

■ In normal completion



■ In error completion



Restrictions or precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because FB_EN (execution command) cannot be turned OFF and the normal operation cannot be performed. Always use this FB in programs that can turn OFF FB_EN (execution command).
- This FB requires the configuration of the ladder for every input label.
- Change the device/label automatic-assign setting so that the capacity required to use this FB is secured. Otherwise, a compiling error may occur in GX Works2.
- After positioning operation is started by using this FB, when turning OFF FB_EN (execution command) before FB_OK (normal completion), FB_ERROR (error completion), or ob_UnitErr (unit error completion) is turned ON, a motor continues to operate until a home position return is completed.
- This FB uses the G_CPRTCL instruction. For details, refer to 📖MELSEC-Q/L Structured Programming Manual (Special Instructions).
- Specify a value obtained by dividing the start input/output number, which is assigned to a serial communication module, by 16 in iw_StartIONo (start I/O No.). If the start input/output number is not assigned to the module, a stop error (2110H) occurs in the CPU module.
- This FB uses the index register Z9. Do not use the Z9 in an interrupt program.
- Before operating an SMC controller, write the following intelligent function module data (parameters of a serial communication module) to a module in GX Works2.

Item			Setting value
Switch Setting	Transmission setting	Data bit	8
		Parity bit	None
		Stop bit	1
	Communication speed setting		Set the value according to the setting of a device to be connected.
	Communication protocol setting		Predefined protocol
Various Control Specification	Echo back enable/prohibit specification		1: Prohibited

- Use the protocol send/receive setting of Predefined Protocol Support Tool For Positioning (Q/L) to change a communication timeout or the number of retries. (📖Predefined Protocol Support Tool For Positioning Operating Manual)

Performance value

The following table lists the performance values of this FB under the following conditions.

- FB compilation method: Macro type
- CPU module: Q04UDVCPU
- Serial communication module: QJ71C24N
- Controller (manufactured by SMC): LECA6N-LEY16AC-30
- Electric actuator (manufactured by SMC): LEY16AC-30-R16N
- Initial position: Home position (0.00 mm)
- Step data execution setting:
  Target position: 10.00 mm
  Positioning width: 0.1 mm
  Speed: 10.00 mm/s
  Acceleration: 0.1 G
  Deceleration: 0.1 G
  Other setting value: 0

Timing for turning execution command ON	Time required for the processing*1	Maximum scan time	Number of scans required for the processing
After executing a return to origin	133.000 ms	0.600 ms	381 scans

*1 The time required from start to end of the processing.

Error code

Error code	Description	Corrective action
100H	The value set for the start I/O number is out of the range.	Set a value within the range from 00H to FEH for the start I/O number and execute the FB again.
101H	The value set for the target channel is out of the range.	Set 2 for the target channel and execute the FB again.
102H	The value set for the target axis is out of the range.	Set a value within the range from 1 to 32 for the target axis and execute the FB again.
105H	The value set for the step data number is out of the range.	Set a value within the range from 0 to 63 for the step data number and execute the FB again.
110H	The start I/O number of M+CPU-SMCPosiSp_CPRTCL-ST is out of the range.	Review the setting.
200H	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
201H	The execution command turned OFF during the processing.	Do not turn OFF FB_EN (execution command) until FB_OK (normal completion), FB_ERROR (error completion), or ob_UnitErr (unit error completion) is turned ON. (This error code is output for one scan only.)
202H	Another FB which may affect the operation of a motor is executing.	Stop the FB and execute this FB again. Target FB: • M+CPU-SMCPosiSp_StartHomePosi-ST • M+CPU-SMCPosiSp_JogInching-ST • M+CPU-SMCPosiSp_StartPosi-ST For M+CPU-SMCPosiSp_JogInching-ST, check that ob_ParamOK (parameter setting completion flag) is turned ON and ob_Busy (busy signal) is turned OFF.
203H	Emergency stop or major failure is occurring.	Check the status of a controller in M+CPU-SMCPosiSp_Monitoring-ST. After checking the status, remove the cause of the error and execute the FB again.
204H	Movement commands are executed while a servo is OFF.	Check the status of a controller in M+CPU-SMCPosiSp_Monitoring-ST. To turn ON a servo, turn it ON with M+CPU-SMCPosiSp_ServoControl-ST.
Predefined protocol error code	An error code that occurs during communication.	For details, refer to the following: 📖IQ Corresponding Serial Communication Module User's Manual (Basic) 📖MELSEC-L Serial Communication Module User's Manual (Basic)

3.7 M+CPU-SMCPosiSp_Monitoring-ST

Point

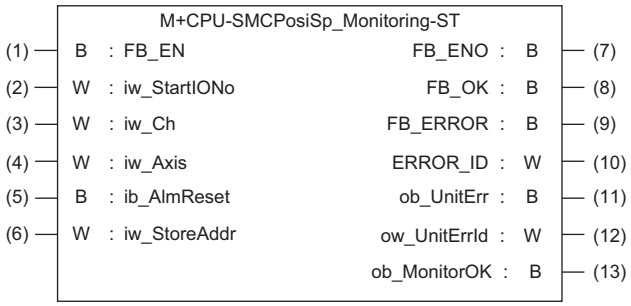
Advanced preparation is required for using this FB. For details, refer to the following:

☞ Page 57 Importing M+CPU-SMCPosiSp_CPRTCL-ST

☞ Page 57 Checking the start I/O number

Overview

Monitors a current position and alarms, and resets the alarms.



Labels

Input label

No.	Label	Name	Data type	Range	Description
(1)	FB_EN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	iw_StartIONo	Start I/O No.	Word [signed]	00H to FEH	Specify the value obtained by dividing the start input/output number of a target serial communication module by 16.
(3)	iw_Ch	Target channel	Word [signed]	2	Specify the channel of a serial communication module.
(4)	iw_Axis	Target axis	Word [signed]	1 to 32	Specify the controller ID.
(5)	ib_AlmReset	Reset alarm	Bit	ON, OFF	ON: An alarm is reset. OFF: An alarm does not operate.
(6)	iw_StoreAddr	Address to store monitor data	Word [signed]	0 to FFFFH	Specify the start number of D device, which stores monitor data values, in hexadecimal. For details on the monitor data, refer to the following: ☞ Page 108 Monitoring table

Output label

No.	Label	Name	Data type	Initial value	Description
(7)	FB_ENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(8)	FB_OK	Normal completion	Bit	OFF	The ON state indicates that an alarm is cleared normally.
(9)	FB_ERROR	Error completion	Bit	OFF	The ON state indicates that an error has occurred in the FB.
(10)	ERROR_ID	Error code	Word [signed]	0	The error code of an error occurred in the FB is stored.
(11)	ob_UnitErr	Unit error completion	Bit	OFF	The ON state indicates that an error has occurred in the module.
(12)	ow_UnitErrId	Unit error code	Word [signed]	0	The error code of an error occurred in the module is stored.
(13)	ob_MonitorOK	Monitoring status	Bit	OFF	The ON state indicates that a current position and alarms are monitored normally.

FB details

Available device

■ Serial communication module

Target module	Firmware version	Engineering tool
QJ71C24N*1	The first five digits of the serial number are '11062' or higher.	GX Works2 Version 1.570U or later
QJ71C24N-R4*1	The first five digits of the serial number are '11062' or higher.	GX Works2 Version 1.570U or later
LJ71C24*1	—	GX Works2 Version 1.570U or later

*1 Available only in CH2.

■ CPU module

- QCPU*1
- LCPU

*1 Universal model QCPUs and process CPUs only

Basic specifications

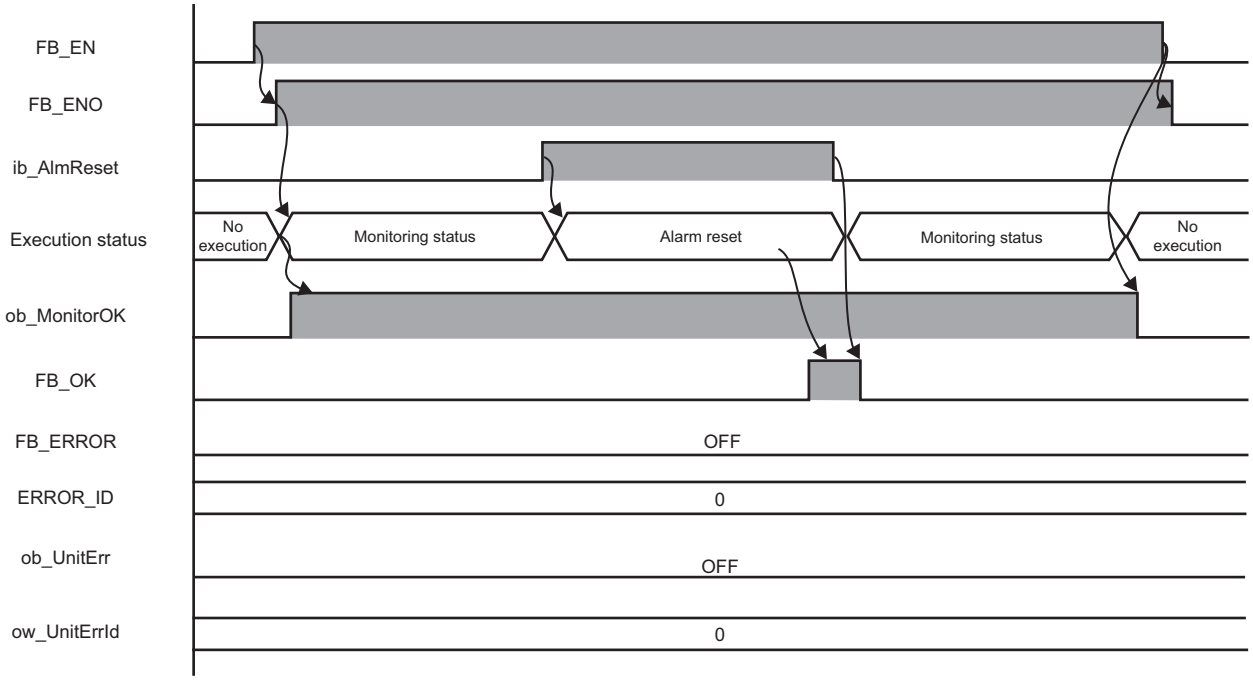
Item	Description
Language	Structured Text
Number of basic steps	2968 steps The number of steps of the FB which is embedded in a program varies depending on the CPU module being used, input/output definitions, and option settings of GX Works2. For the option settings of GX Works2, refer to the GX Works2 Version 1 Operating Manual (Common).
Number of points of a label used	• Label: 66 points (Word), 23 points (Bit) • Latch label: 0 point (Word), 0 point (Bit) The number of points of a label used which is embedded in a program varies depending on the device specified for an argument and option settings of GX Works2. For the option settings of GX Works2, refer to GX Works2 Version 1 Operating Manual (Common).
Index register	Index register: 2 points (Z9 and Z8)
FB dependence	M+CPU-SMCPosiSp_Monitoring-ST └ M+CPU-SMCPosiSp_CPRTCL-ST
FB compilation method	Macro type
FB operation	Real-time execution

Processing

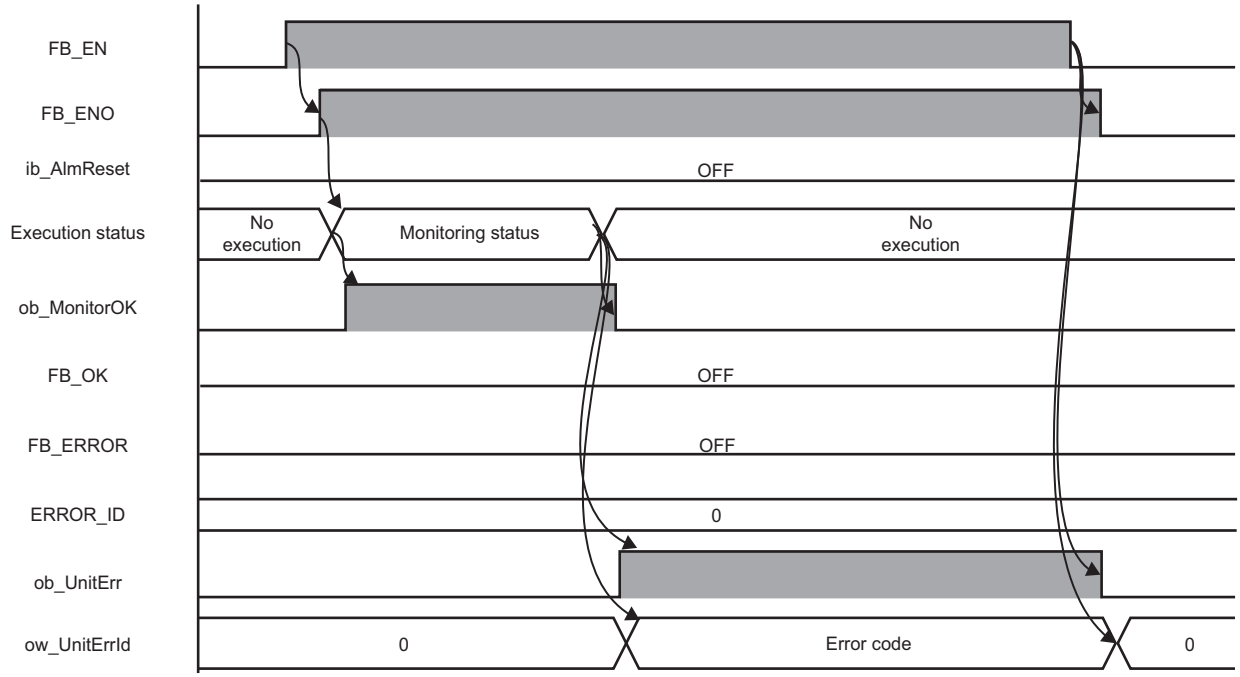
- Specify the start I/O number (a value obtained by dividing the start input/output number by 16) and channel of a serial communication module in iw_StartIONo (start I/O No.) and iw_Ch (target channel) respectively.
- Specify the axis number (controller ID) of the operation target in iw_Axis (target axis).
- The monitoring data (such as a current position and alarm codes) is stored in the device position specified in iw_StoreAddr (address to store monitor data).
- This FB starts monitoring the status of a target axis via Modbus communication at the rise of FB_EN (execution command). The monitoring data (such as a current position and alarm codes) is stored in a monitoring table (☞ Page 108 Monitoring table).
- ob_MonitorOK (monitoring status) is turned ON while monitoring the target axis.
- The alarm is reset by turning ON FB_EN (execution command), and then turning ON ib_AlmReset (reset alarm) while the alarm is occurring. (Request signals of the JOG + and JOG - commands are also turned OFF when the alarm is reset.)
- FB_OK (normal completion) is turned ON when the alarm reset is completed.
- When a value out of the range is set for the start I/O number, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '100H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the target channel, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '101H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the target axis, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '102H' is stored in ERROR_ID (error code).
- When a value set for the start I/O number is not correctly applied in M+CPU-SMCPosiSp_CPRTCL-ST, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '110H' is stored in ERROR_ID (error code).
- When the connected device is not the operation target, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '200H' is stored in ERROR_ID (error code).
- When turning ON FB_EN (execution command) of this FB while executing the following FB, FB_ERROR (error completion) is turned ON and the processing of this FB is interrupted. In addition, the error code '202H' is stored in ERROR_ID (error code).
  M+CPU-SMCPosiSp_Monitoring-ST
- When an error occurs while sending/receiving a message to/from the predefined protocol, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, an error code is stored in ERROR_ID (error code). For details on the error code, refer to 📖IQ Corresponding Serial Communication Module User's Manual (Basic) or 📖MELSEC-L Serial Communication Module User's Manual (Basic).
- When this FB receives an error code due to an error occurred in a controller, ob_UnitErr (unit error completion) is turned ON and the processing of the FB is interrupted. In addition, the received error code is stored in ow_UnitErrId (unit error code).

Timing chart of I/O signals

■ In normal completion



■ In error completion



Restrictions or precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because FB_EN (execution command) cannot be turned OFF and the normal operation cannot be performed. Always use this FB in programs that can turn OFF FB_EN (execution command).
- This FB requires the configuration of the ladder for every input label.
- Change the device/label automatic-assign setting so that the capacity required to use this FB is secured. Otherwise, a compiling error may occur in GX Works2.
- If FB_EN (execution command) is turned OFF during monitoring, FB_ENO (execution status) is turned OFF after monitoring stops. To turn ON FB_EN (execution command) again, check that FB_ENO (execution status) is turned OFF, then execute the FB.
- This FB uses the G_CPRTCL instruction. For details, refer to MELSEC-Q/L Structured Programming Manual (Special Instructions).
- Specify a value obtained by dividing the start input/output number, which is assigned to a serial communication module, by 16 in iw_StartIONo (start I/O No.). If the start input/output number is not assigned to the module, a stop error (2110H) occurs in the CPU module.
- This FB uses index registers (Z9 and Z8). Do not use the Z9 and Z8 in an interrupt program.
- Before operating an SMC controller, write the following intelligent function module data (parameters of a serial communication module) to a module in GX Works2.

Item			Setting value
Switch Setting	Transmission setting	Data bit	8
		Parity bit	None
		Stop bit	1
	Communication speed setting		Set the value according to the setting of a device to be connected.
	Communication protocol setting		Predefined protocol
Various Control Specification	Echo back enable/prohibit specification		1: Prohibited

- Use the protocol send/receive setting of Predefined Protocol Support Tool For Positioning (Q/L) to change a communication timeout or the number of retries. (Predefined Protocol Support Tool For Positioning Operating Manual)

Performance value

The following table lists the performance values of this FB under the following conditions.

- FB compilation method: Macro type
- CPU module: Q04UDVCPU
- Serial communication module: QJ71C24N
- Controller (manufactured by SMC): LECA6N-LEY16AC-30
- Electric actuator (manufactured by SMC): LEY16AC-30-R16N

Measuring range	Time required for the processing*1	Maximum scan time	Number of scans required for the processing
From when FB_EN (execution command) is turned ON to when ob_MonitorOK (monitoring status) is turned ON	101.000 ms	0.815 ms	281 scans
From when ib_AlmReset (reset alarm) is turned ON to when an alarm reset is completed	140.000 ms	0.815 ms	205 scans

*1 The time required from start to end of the processing.

Error code

Error code	Description	Corrective action
100H	The value set for the start I/O number is out of the range.	Set a value within the range from 00H to FEH for the start I/O number and execute the FB again.
101H	The value set for the target channel is out of the range.	Set 2 for the target channel and execute the FB again.
102H	The value set for the target axis is out of the range.	Set a value within the range from 1 to 32 for the target axis and execute the FB again.
110H	The start I/O number of M+CPU-SMCPosiSp_CPRTCL-ST is out of the range.	Review the setting.
200H	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
202H	Another FB which may affect the operation of this FB is executing.	Stop the FB and execute this FB again. Target FB: • M+CPU-SMCPosiSp_Monitoring-ST
Predefined protocol error code	An error code that occurs during communication.	For details, refer to the following: 📖Q Corresponding Serial Communication Module User's Manual (Basic) 📖MELSEC-L Serial Communication Module User's Manual (Basic)

3.8 M+CPU-SMCPosiSp_ServoControl-ST

Point

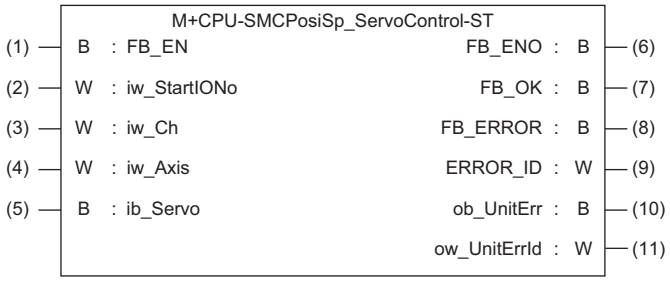
Advanced preparation is required for using this FB. For details, refer to the following:

☞ Page 57 Importing M+CPU-SMCPosiSp_CPRTCL-ST

☞ Page 57 Checking the start I/O number

Overview

Requests a servo to turn ON or OFF.



Labels

Input label

No.	Label	Name	Data type	Range	Description
(1)	FB_EN	Execution command	Bit	ON, OFF	ON: The FB is activated. OFF: The FB is not activated.
(2)	iw_StartIONo	Start I/O No.	Word [signed]	00H to FEH	Specify the value obtained by dividing the start input/output number of a target serial communication module by 16.
(3)	iw_Ch	Target channel	Word [signed]	2	Specify the channel of a serial communication module.
(4)	iw_Axis	Target axis	Word [signed]	1 to 32	Specify the controller ID.
(5)	ib_Servo	Servo ON/OFF replacement	Bit	ON, OFF	ON: Servo ON OFF: Servo OFF

Output label

No.	Label	Name	Data type	Initial value	Description
(6)	FB_ENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(7)	FB_OK	Normal completion	Bit	OFF	The ON state indicates that turning a servo ON or OFF is completed.
(8)	FB_ERROR	Error completion	Bit	OFF	The ON state indicates that an error has occurred in the FB.
(9)	ERROR_ID	Error code	Word [signed]	0	The error code of an error occurred in the FB is stored.
(10	ob_UnitErr	Unit error completion	Bit	OFF	The ON state indicates that an error has occurred in the module.
(11)	ow_UnitErrId	Unit error code	Word [signed]	0	The error code of an error occurred in the module is stored.

FB details

Available device

■ Serial communication module

Target module	Firmware version	Engineering tool
QJ71C24N*1	The first five digits of the serial number are '11062' or higher.	GX Works2 Version 1.570U or later
QJ71C24N-R4*1	The first five digits of the serial number are '11062' or higher.	GX Works2 Version 1.570U or later
LJ71C24*1	—	GX Works2 Version 1.570U or later

*1 Available only in CH2.

■ CPU module

- QCPU*1
- LCPU

*1 Universal model QCPUs and process CPUs only

Basic specifications

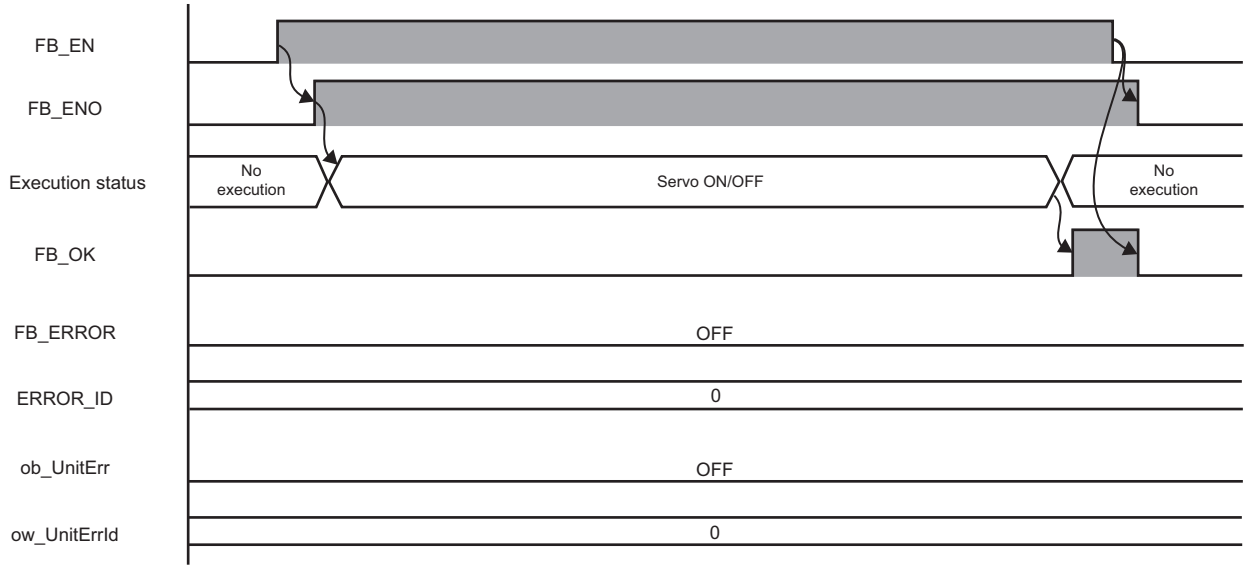
Item	Description
Language	Structured Text
Number of basic steps	1591 steps The number of steps of the FB which is embedded in a program varies depending on the CPU module being used, input/output definitions, and option settings of GX Works2. For the option settings of GX Works2, refer to the GX Works2 Version 1 Operating Manual (Common).
Number of points of a label used	• Label: 51 points (Word), 19 points (Bit) • Latch label: 0 point (Word), 0 point (Bit) The number of points of a label used which is embedded in a program varies depending on the device specified for an argument and option settings of GX Works2. For the option settings of GX Works2, refer to GX Works2 Version 1 Operating Manual (Common).
Index register	Index register: 1 point (Z9)
FB dependence	M+CPU-SMCPosiSp_ServoControl-ST └ M+CPU-SMCPosiSp_CPRTCL-ST
FB compilation method	Macro type
FB operation	Pulse execution (multiple scan execution type)

Processing

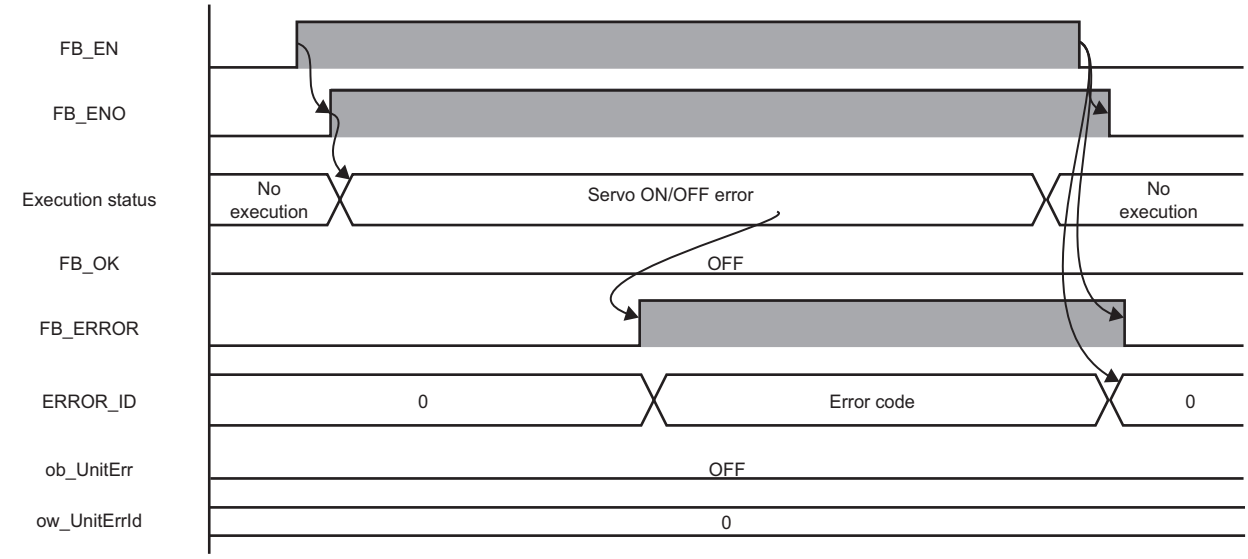
- Specify the start I/O number (a value obtained by dividing the start input/output number by 16) and channel of a serial communication module in iw_StartIONo (start I/O No.) and iw_Ch (target channel) respectively.
- Specify the axis number (controller ID) of the operation target in iw_Axis (target axis).
- Set either to turn a servo ON or OFF in ib_Servo (servo ON/OFF replacement).
- This FB turns ON or OFF a servo via Modbus communication at the rise of FB_EN (execution command).
  When the servo ON/OFF replacement is completed, FB_OK (normal completion) is turned ON.
- When a value out of the range is set for the start I/O number, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '100H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the target channel, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '101H' is stored in ERROR_ID (error code).
- When a value out of the range is set for the target axis, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '102H' is stored in ERROR_ID (error code).
- When a value set for the start I/O number is not correctly applied in M+CPU-SMCPosiSp_CPRTCL-ST, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '110H' is stored in ERROR_ID (error code).
- When the connected device is not the operation target, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '200H' is stored in ERROR_ID (error code).
- When turning OFF FB_EN (execution command) before FB_OK (normal completion), FB_ERROR (error completion), or ob_UnitErr (unit error completion) is turned ON, FB_ERROR (error completion) is turned ON for one scan only and the processing of the FB is interrupted. In addition, the error code '201H' is stored in ERROR_ID (error code) for one scan.
- When turning ON FB_EN (execution command) of this FB while executing the following FB, FB_ERROR (error completion) is turned ON and the processing of this FB is interrupted. In addition, the error code '202H' is stored in ERROR_ID (error code).
  M+CPU-SMCPosiSp_ServoControl-ST
- When turning ON an alarm signal of a controller, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '203H' is stored in ERROR_ID (error code). Check the status of the controller in M+CPU-SMCPosiSp_Monitoring-ST.
- When an error occurs while sending/receiving a message to/from the predefined protocol, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, an error code is stored in ERROR_ID (error code). For details on the error code, refer to 📖IQ Corresponding Serial Communication Module User's Manual (Basic) or 📖MELSEC-L Serial Communication Module User's Manual (Basic).
- When this FB receives an error code due to an error occurred in a controller, ob_UnitErr (unit error completion) is turned ON and the processing of the FB is interrupted. In addition, the received error code is stored in ow_UnitErrId (unit error code).

Timing chart of I/O signals

■ In normal completion



■ In error completion



Restrictions or precautions

- This FB does not include error recovery processing. Program the error recovery processing separately in accordance with the required system operation.
- This FB cannot be used in an interrupt program.
- Do not use this FB in programs that are executed only once, such as a subroutine program or FOR-NEXT loop, because FB_EN (execution command) cannot be turned OFF and the normal operation cannot be performed. Always use this FB in programs that can turn OFF FB_EN (execution command).
- This FB requires the configuration of the ladder for every input label.
- Change the device/label automatic-assign setting so that the capacity required to use this FB is secured. Otherwise, a compiling error may occur in GX Works2.
- This FB uses the G_CPRTCL instruction. For details, refer to MELSEC-Q/L Structured Programming Manual (Special Instructions).
- Specify a value obtained by dividing the start input/output number, which is assigned to a serial communication module, by 16 in iw_StartIONo (start I/O No.). If the start input/output number is not assigned to the module, a stop error (2110H) occurs in the CPU module.
- This FB uses the index register Z9. Do not use the Z9 in an interrupt program.
- Before operating an SMC controller, write the following intelligent function module data (parameters of a serial communication module) to a module in GX Works2.

Item			Setting value
Switch Setting	Transmission setting	Data bit	8
		Parity bit	None
		Stop bit	1
	Communication speed setting		Set the value according to the setting of a device to be connected.
	Communication protocol setting		Predefined protocol
Various Control Specification	Echo back enable/prohibit specification		1: Prohibited

- Use the protocol send/receive setting of Predefined Protocol Support Tool For Positioning (Q/L) to change a communication timeout or the number of retries. (Predefined Protocol Support Tool For Positioning Operating Manual)

Performance value

The following table lists the performance values of this FB under the following conditions.

- FB compilation method: Macro type
- CPU module: Q04UDVCPU
- Serial communication module: QJ71C24N
- Controller (manufactured by SMC): LECA6N-LEY16AC-30
- Electric actuator (manufactured by SMC): LEY16AC-30-R16N

Input label ib_Servo (Servo ON/OFF replacement)	Time required for the processing*1	Maximum scan time	Number of scans required for the processing
OFF	58.500 ms	0.600 ms	172 scans
ON	57.700 ms	0.600 ms	171 scans

*1 The time required from start to end of the processing.

Error code

Error code	Description	Corrective action
100H	The value set for the start I/O number is out of the range.	Set a value within the range from 00H to FEH for the start I/O number and execute the FB again.
101H	The value set for the target channel is out of the range.	Set 2 for the target channel and execute the FB again.
102H	The value set for the target axis is out of the range.	Set a value within the range from 1 to 32 for the target axis and execute the FB again.
110H	The start I/O number of M+CPU-SMCPosiSp_CPRTCL-ST is out of the range.	Review the setting.
200H	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
201H	The execution command turned OFF during the processing.	Do not turn OFF FB_EN (execution command) until FB_OK (normal completion), FB_ERROR (error completion), or ob_UnitErr (unit error completion) is turned ON. (This error code is output for one scan only.)
202H	Another FB which may affect the operation of this FB is executing.	Stop the FB and execute this FB again. Target FB: • M+CPU-SMCPosiSp_ServoControl-ST
203H	Emergency stop or major failure is occurring.	Check the status of a controller in M+CPU-SMCPosiSp_Monitoring-ST. After checking the status, remove the cause of the error and execute the FB again.
Predefined protocol error code	An error code that occurs during communication.	For details, refer to the following: 📖IQ Corresponding Serial Communication Module User's Manual (Basic) 📖MELSEC-L Serial Communication Module User's Manual (Basic)

3.9 M+CPU-SMCPosiSp_CPRTCL-ST

Overview

Executes an instruction for predefined protocol communication (G_CPRTCL) by using this FB in other MELSEC-Q/L series FBs.

FB details

Basic specifications

Item	Description
FB compilation method	Macro type
FB operation	Pulse execution (multiple scan execution type)

Processing

This FB is called from the following FBs and executes an instruction for predefined protocol communication (G_CPRTCL).

- M+CPU-SMCPosiSp_StartHomePosi-ST
- M+CPU-SMCPosiSp_JogInching-ST
- M+CPU-SMCPosiSp_ReadStepData-ST
- M+CPU-SMCPosiSp_Teaching-ST
- M+CPU-SMCPosiSp_StartPosi-ST
- M+CPU-SMCPosiSp_Monitoring-ST
- M+CPU-SMCPosiSp_ServoControl-ST

Restrictions or precautions

- Do not use this FB in a user-created program as this is used only internally in other FBs.
- This FB uses the G_CPRTCL instruction. For details, refer to 📖MELSEC-Q/L Structured Programming Manual (Special Instructions).
- When the start input/output number of a serial communication module which executes the G_CPRTCL instruction is other than 00H to F0H, the start input/output number needs to be set after adding the G_CPRTCL instruction to a program. For details, refer to the following:

☞ Page 57 Checking the start I/O number

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APPENDIX

Appendix 1 Table Information (MELSEC iQ-R Series)

Step data structure (stSMCStepData)

The following shows the list of step data structure (stSMCStepData).

Label	Name	Data type	Range	Description
uMoveMethod	Movement MOD	Word [unsigned]	1, 2	The movement method is stored. 1: With the absolute coordinates (ABS) 2: With the relative coordinates (INC)
uSpeed	Speed	Word [unsigned]	1 to 65535	The speed to move to the target position is stored. (Unit: mm/s)
dPosition	Position	Double Word [signed]	-2147483647 to 2147483647	The target position is stored. (Unit: 0.01 mm)
uAcceleration	Acceleration	Word [unsigned]	1 to 65535	The acceleration to reach to 'Speed' is stored. (Unit: mm/s^2)
uDeceleration	Deceleration	Word [unsigned]	1 to 65535	The deceleration to reach to 'Speed' is stored. (Unit: mm/s^2)
uPushingForce	Pushing force	Word [unsigned]	0 to 100	The value to define the positioning operation or pushing operation is stored. 0: Positioning operation 1 to 100: Pushing operation torque setting (Unit: %)
uTriggerLV	Trigger LV	Word [unsigned]	0 to 100	When a motor generates a force over this value during the pushing operation, INP will be turned ON. A value equal to or less than the pushing force is stored in this parameter. (Unit: %)
uPushingSpeed	Pushing speed	Word [unsigned]	1 to 65535	The movement speed during the pushing operation is stored. (Unit: mm/s)
uMovingForce	Moving force	Word [unsigned]	0 to 300	The maximum force during the positioning operation is stored. (Unit: %)
dArea1	Area1	Double Word [signed]	-2147483647 to 2147483647	Conditions where the AREA output will be turned ON is stored. (Unit: 0.01 mm) If the position is within the range between the Area1 and Area2, the AREA output will be turned ON.
dArea2	Area2	Double Word [signed]	-2147483647 to 2147483647	
udInPosition	In position	Double Word [unsigned]	1 to 2147483647	The following range/distance is stored according to the operation, either positioning or pushing. (Unit: 0.01 mm) • Positioning operation: Positioning range • Pushing operation: Pushing distance

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Monitoring table structure (stSMCMonitoringTable)

The following shows the list of monitoring table structure (stSMCMonitoringTable).

Label	Name	Data type	Range	Description
dCurrentPosition	Current position	Double Word [signed]	-2147483648 to 2147483647	The current position is stored. (Unit: 0.01 mm)
uCurrentSpeed	Current speed	Word [unsigned]	0 to 65535	The current speed is stored. (Unit: mm/s)
uCurrentForce	Current force	Word [unsigned]	0 to 300	The current force is stored. (Unit: %)
dTTargetPosition	Target position	Double Word [signed]	-2147483648 to 2147483647	The target position is stored. (Unit: 0.01 mm)
uStepDataNo	Step data No.	Word [unsigned]	0 to 63	The step data number where the operation is in progress or completed is stored.
uz8AlarmCode	Alarm code	Word [unsigned]/Bit string [16-bit] (0..7)*1	0 to 255	The current alarm number is stored.*2
uStatusFlg	Status flags	Word [unsigned]	☞ Page 106 Details of status flags	Status flags are stored.
uChangeFlg1	Status change flag 1	Word [unsigned]	☞ Page 107 Status change flag 1	The status change flag 1 is stored.
uChangeFlg2	Status change flag 2	Word [unsigned]	☞ Page 107 Status change flag 2	The status change flag 2 is stored.

*1 Array

*2 Up to eight alarm numbers are stored if multiple alarms occur at the same time.

Details of status flags

Flag name		Description
Name	Bit	
OUT0	0	When an operation is started, the bit corresponding to the number of active step data will be turned ON. These signals will be updated when DRIVE is turned ON. When RESET is turned ON, these signals are turned OFF. During the alarm, these signals output the alarm group. During the pushing operation, if a motor runs over the defined pushing distance, these signal will be turned OFF.
OUT1	1	
OUT2	2	
OUT3	3	
OUT4	4	
OUT5	5	
—	6	Not available
—	7	
BUSY	8	This signal is ON while a motor is operating during the positioning operation.*1
SVRE	9	When a servo is OFF, this signal is OFF. When the servo is ON, this signal is ON.
SETON	10	When a motor is in the SETON status (the position information is established), this signal is turned ON. When the position status is not established, this terminal is OFF.
INP	11	The condition when INP is ON depends on the motor operation. • Return to origin: After stopping the motor operation (turning OFF BUSY), this signal turns ON when the motor is within the range defined in the home position±"Default positioning range" in the basic parameter. • During positioning operation: This signal turns ON when the current position is within the step data "Position"±"In position." • During pushing operation: This signal turns ON when the pushing force exceeds the value set in the step data "Trigger LV."*2
AREA	12	When a motor is within the range between "Area1" and "Area2" in the step data, this signal will be turned ON. The range changes depending on the active step data.
WAREA	13	When the motor is within the output range between "W-AREA1" and "W-AREA2" of basic parameter, this signal will be turned ON.
ESTOP	14	During activation of Teaching box stop switch, this signal is OFF. During the normal operation, this is ON. This is synchronized to the EMG terminal.
ALARM	15	When there are no alarms, this signal is ON. When there are alarms, this is OFF.

*1 During the pushing operation without movement (no movement but the motor generating the pushing force), BUSY is OFF. BUSY stays ON for 50 ms or longer after the operation starts even if the positioning operation is completed within 50 ms.

*2 If the stop is input from the EMG or RESET terminal or the stop-switch on the Teaching Box during pushing operation, the motor stops (BUSY (X48) turns OFF). And if the motor stops within the range of "Position"±"In position" defined in step data, output signal "INP" turns ON.

Status change flag 1

Flag name		Description
Name	Bit	
IN0	0	Signals to specify the step data number of step data.
IN1	1	
IN2	2	
IN3	3	
IN4	4	
IN5	5	
—	6	Not available
—	7	
HOLD	8	If this signal is ON during operation, the speed decreases ay maximum deceleration speed of the basic parameter until the electric actuator stops. The remaining stroke will be on hold as long as this signal is ON and when this signal is turned OFF, the motor restarts to travel the remaining stroke.
SVON	9	This signal turns a servo ON. When this signal is ON, the servo will be turned ON. When this is OFF, the servo will be turned OFF.
DRIVE	10	When DRIVE is turned ON, the system scans IN0 to IN5 and starts the operation. Then, when this signal is turned OFF, the number of the active step data will be output via OUT0 to OUT5.
RESET	11	A signal to reset the alarm and the operation. After RESET, the speed decreases at maximum deceleration speed of the basic parameter until the motor stops. INP and OUT0 to OUT5 will be turned OFF (however, if the motor stopped within the in-position range, the INP will be turned ON).
SETUP	12	When SVRE is ON, the SETUP operation (return to origin operation) will be performed. During the SETUP operation, BUSY will be turned ON and after completion of the SETUP operation, SETON and INP will be turned ON.
JOG(-)	13	A signal to jog in the negative direction.
JOG(+)	14	A signal to jog in the positive direction.
FLGTH	15	A signal to switch the JOG and inching operations. (ON for the inching operation)

Status change flag 2

Flag name		Description
Name	Bit	
Input invalid flag	0	0: Parallel input operation mode (The parallel output terminals operate normally.) 1: Serial input operation mode (The parallel output terminals are not allowed to output.)
—	1 to 15	Not available

Appendix 2 Table Information (MELSEC-Q/L Series)

Step data

The following table shows the list of step data when the start number of D device specified for iw_StoreAddr (address to store step data) is D0.
Add the value of the start number of D device, which is specified for step data starting position, to the following device numbers.

Device	Item	Data type	Range	Description
D0	Movement MOD	Word [unsigned]	1, 2	The movement method is stored. 1: With the absolute coordinates (ABS) 2: With the relative coordinates (INC)
D1	Speed	Word [unsigned]	1 to 65535	The speed to move to the target position is stored. (Unit: mm/s)
D2	Position	Double Word [signed]	-2147483647 to 2147483647	The target position is stored. (Unit: 0.01 mm)
D4	Acceleration	Word [unsigned]	1 to 65535	The acceleration to reach to 'Speed' is stored. (Unit: mm/s²)
D5	Deceleration	Word [unsigned]	1 to 65535	The deceleration to reach to 'Speed' is stored. (Unit: mm/s²)
D6	Pushing force	Word [unsigned]	0 to 100	The value to define the positioning operation or pushing operation is stored. 0: Positioning operation 1 to 100: Pushing operation torque setting (Unit: %)
D7	Trigger LV	Word [unsigned]	0 to 100	When a motor generates a force over this value during the pushing operation, INP will be turned ON. A value equal to or less than the pushing force is stored in this parameter. (Unit: %)
D8	Pushing speed	Word [unsigned]	1 to 65535	The movement speed during the pushing operation is stored. (Unit: mm/s)
D9	Moving force	Word [unsigned]	0 to 300	The maximum force during the positioning operation is stored. (Unit: %)
D10	Area1	Double Word [signed]	-2147483647 to 2147483647	Conditions where the AREA output will be turned ON is stored. (Unit: 0.01 mm) If the position is within the range between the Area1 and Area2, the AREA output will be turned ON.
D12	Area2	Double Word [signed]	-2147483647 to 2147483647	
D14	In position	Double Word [unsigned]	1 to 2147483647	The following range/distance is stored according to the operation, either positioning or pushing. (Unit: 0.01 mm) • Positioning operation: Positioning range • Pushing operation: Pushing distance

Monitoring table

The following table shows the list of monitor data when the start number of D device specified for iw_StoreAddr (address to store monitor data) is D0.
Add the value of the start number of D device, which is specified for monitor data starting position, to the following device numbers.

Device	Item	Data type	Range	Description
D0	Current position	Double Word [signed]	-2147483648 to 2147483647	The current position is stored. (Unit: 0.01 mm)
D2	Current speed	Word [unsigned]	0 to 65535	The current speed is stored. (Unit: mm/s)
D3	Current force	Word [unsigned]	0 to 300	The current force is stored. (Unit: %)
D4	Target position	Double Word [signed]	-2147483648 to 2147483647	The target position is stored. (Unit: 0.01mm)
D6	Step data No.	Word [unsigned]	0 to 63	The step data number where the operation is in progress or completed is stored.
D8	Alarm	Word [unsigned] (0..7)*1	0 to 255	The current alarm number is stored.*2
D15	Status flags	Word [unsigned]	☞ Page 106 Details of status flags	Status flags are stored.

Device	Item	Data type	Range	Description
D16	Status change flag 1	Word [unsigned]	☞ Page 107 Status change flag 1	The status change flag 1 is stored.
D17	Status change flag 2	Word [unsigned]	☞ Page 107 Status change flag 2	The status change flag 2 is stored.

*1 Array

*2 Up to eight alarm numbers are stored if multiple alarms occur at the same time.

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INSTRUCTION INDEX

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