MITSUBISHI ELECTRIC

Programmable Controller

MELSEC iQ-R series MELSEC L series MELSEC Q series

Predefined Protocol Support For Positioning Function Block Library Reference (IAI 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) Mitsubishi 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 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'S USER, 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 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 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 representative in your region.

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 IAI 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.

CONTENTS

RELEVANT MANUALS

Manual name [manual number]	Description	Available form
Predefined Protocol Support For Positioning Function Block Library Reference (IAI Corporation) [BCN-P5999-1179] (this reference)	Specifications, functions, and input/output labels of IAI 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 and abbreviation	Description
IAI	An abbreviation for IAI 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 IAI controllers via serial communication (Modbus RTU) and executing electric actuator 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+IAIStartHomePositioning_R	To move an electric actuator to the initial position (home position return).
M+IAIJogInching_R	To perform JOG or inching operation.
M+IAIReadPositionTable_R	To read the data of the specified position table.
M+IAITeachingPosition_R	To set a designated position to the specified position table (target position).
M+IAIStartPositioning_R	To execute positioning operation based on the specified position table data.
M+IAIMonitoring_R	To monitor a current position and alarms, and reset alarms.
M+IAIServoControl_R	To request a servo to turn ON or OFF.

MELSEC-Q/L series

FB name	Description
M+CPU-IAIPosiSp_StartHomePosi-ST	To move an electric actuator to the initial position (home position return).
M+CPU-IAIPosiSp_JogInching-ST	To perform JOG or inching operation.
M+CPU-IAIPosiSp_ReadPosiTable-ST	To read the data of the specified position table.
M+CPU-IAIPosiSp_TeachingPosi-ST	To set a designated position to the specified position table (target position).
M+CPU-IAIPosiSp_StartPosi-ST	To execute positioning operation based on the specified position table data.
M+CPU-IAIPosiSp_Monitoring-ST	To monitor a current position and alarms, and reset alarms.
M+CPU-IAIPosiSp_ServoControl-ST	To request a servo to turn ON or OFF.
M+CPU-IAIPosiSp_CPRTCL-ST	To execute an instruction for predefined protocol communication (G_CPRTCL) by being called from other FBs. Do not use this FB in a user-created program as this is used only internally in other FBs.

Considerations

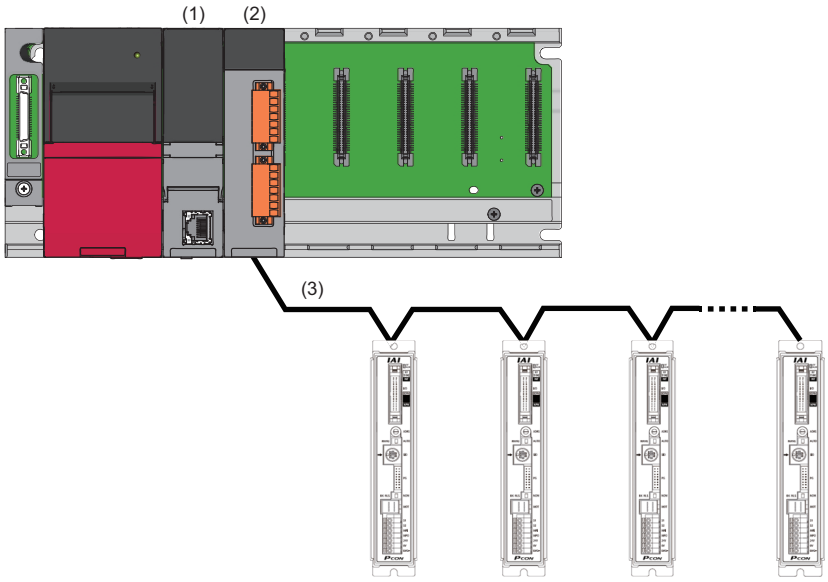
- To use FBs in this reference, it is necessary to write protocol setting data for a predefined protocol in advance by using the predefined protocol information write function of Predefined Protocol Support Tool For Positioning. (📖Predefined Protocol Support Tool For Positioning Operating Manual)
- When 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:
  MELSEC iQ-R series: Un\G3072 to 5600
  MELSEC-Q/L series: 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	To 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	To use a serial communication module which has an RS-422/485 interface(s).
(3)	Serial communication (RS-485 connection)	To connect controllers. Maximum number of connectable controllers: 16
(4)	IAI 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
IAI Corporation	Built-in Controller Type Actuator	RCP6S	RCP6S[*1]
		ERC3	ERC3
		ERC2	ERC2 (SE)
	Controller	PCON	PCON-CA PCON-CB PCON-CFA PCON-CFB PCON-C PCON-SE PCON-CF PCON-CY PCON-CYB
		DCON	DCON-CA DCON-CB DCON-CYB
		ACON	ACON-CA ACON-CB ACON-C ACON-SE ACON-CY ACON-CYB
		SCON	SCON-CA SCON-CAL SCON-CB SCON-CB-F[*2] SCON-C

*1 Reading from or writing to the positioning data using the following FBs is not supported. Use Teaching Pendant or PC Software developed by IAI Corporation to read from or write to the positioning data.
M+IAIReadPositionTable_R, M+IAITeachingPosition_R
M+CPU-IAIPosiSp_ReadPosiTable-ST, and M+CPU-IAIPosiSp_TeachingPosi-ST

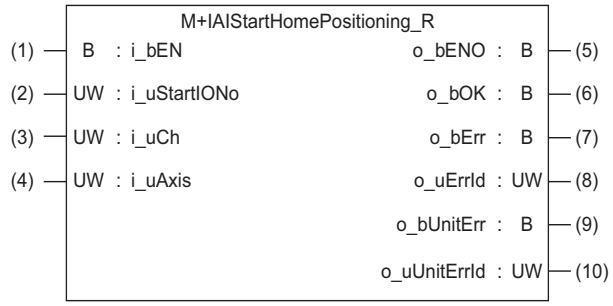
*2 Reading from or writing to the positioning data using the following FBs is not supported. Use Teaching Pendant or PC Software developed by IAI Corporation to read from or write to the positioning data.
M+IAIStartHomePositioning_R, M+IAIReadPositionTable_R, M+IAITeachingPosition_R
M+CPU-IAIPosiSp_StartHomePosi-ST, M+CPU-IAIPosiSp_ReadPosiTable-ST, and M+CPU-IAIPosiSp_TeachingPosi-ST

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

2.1 M+IAIStartHomePositioning_R

Overview

Moves an electric actuator to the initial position (home position return).



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 I/O number to which a target serial communication module is mounted 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 16	Specify the value obtained by incrementing the axis number set in a controller by one.

Output label

No.	Label	Name	Data type	Default value	Description
(5)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(6)	o_bOK	Normal completion	Bit	OFF	The ON state indicates that a home position return 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

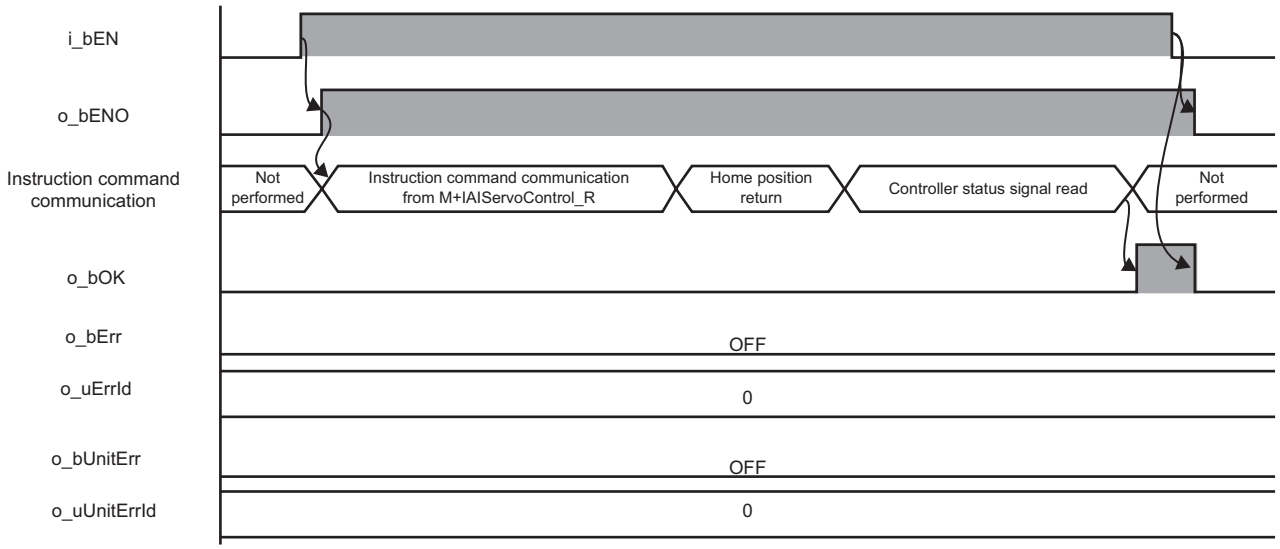
Item	Description
Language	ST
Number of basic steps	3585 Steps The number of steps of the FB embedded in a program varies depending on a CPU module used, the input and output definitions, and the option settings of GX Works3. For the option settings of GX Works3, refer to 📖GX Works3 Operating Manual.
Number of points of a label used	• Label: 72 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.
FB dependence	M+IAIStartHomePositioning_R └ M+IAIServoControl_R
FB compilation method	Subroutine type
FB operation	Pulse execution (multiple scan execution type)

Processing

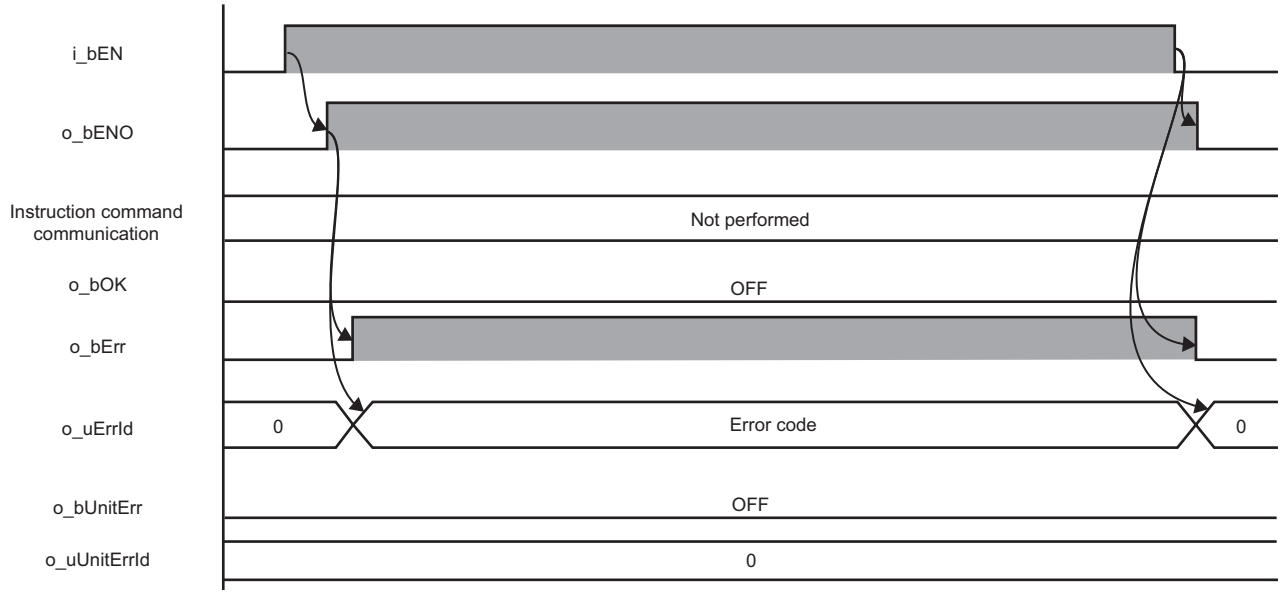
- Specify the axis number of the operation target in i_uAxis (target axis).
- This FB switches from PIO to Modbus communication at the rise of i_bEN (execution command), and executes a home position return.
- o_bOK (normal completion) is turned ON when a home position return is completed.
- When a value 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 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. 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. In addition, the error code '202H' is stored in o_uErrId (error code).
  M+IAIStartHomePositioning_R, M+IAIJogInching_R, M+IAIStartPositioning_R, and M+IAIServoControl_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 an electric actuator, 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 home position return 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, an electric actuator 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 the start I/O number assigned to a serial communication module in i_uStartIONo (start I/O No.). If the start I/O number which is not assigned to the module is specified, 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 electric actuator, 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 an electric actuator controller to be used.
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: PCON-CB
- Electric actuator: RCP3-TA4C-I-28P-4-20-P3-P
- Electric actuator initial position: Home position (0.00 mm)

Time required for the processing*1	Maximum scan time	Number of scans required for the processing
1380.000 ms	0.428 ms	6877 scans

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

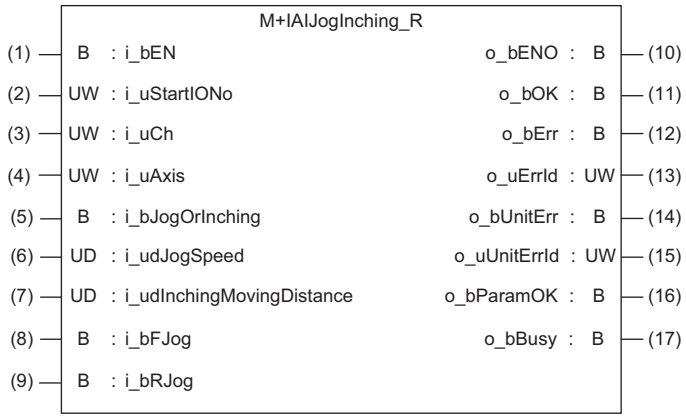
Error code

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 16 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	Other FB which may affect the operation of an electric actuator is executing.	Stop the FB which may affect the operation of the electric actuator other than this FB, and execute this FB again. Target FB: • M+IAIStartHomePositioning_R • M+IAIJogInching_R • M+IAIStartPositioning_R • M+IAIServoControl_R For M+IAIJogInching_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+IAIMonitoring_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)

2.2 M+IAIJogInching_R

Overview

Executes 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 I/O number to which a target serial communication module is mounted 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 16	Specify the value obtained by incrementing the axis number set in a controller by one.
(5)	i_bJogOrInching	JOG/Inching replacement	Bit	ON, OFF	ON: Inching operation OFF: JOG operation
(6)	i_udJogSpeed	JOG speed	Double Word [unsigned]	1 to 999999	Specify the JOG speed. For the inching operation, the specified speed is ignored. (Unit: 0.01 mm/s)
(7)	i_udInchingMovingDistance	Inching amount of movement	Double Word [unsigned]	1 to 999999	Specify the inching amount of movement For the JOG operation, the specified movement amount is ignored. (Unit: 0.01 mm/s)
(8)	i_bFJog	JOG + command	Bit	ON, OFF	Turn ON this label to perform the forward JOG or inching operation.
(9)	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	Default value	Description
(10)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(11)	o_bOK	Normal completion	Bit	OFF	The ON state indicates that the JOG operation is started, and the inching operation is completed normally.
(12)	o_bErr	Error completion	Bit	OFF	The ON state indicates that an error has occurred in the FB.
(13)	o_uErrId	Error code	Word [unsigned]	0	The error code of an error occurred in the FB is stored.
(14)	o_bUnitErr	Unit error completion	Bit	OFF	The ON state indicates that an error has occurred in the module.
(15)	o_uUnitErrId	Unit error code	Word [unsigned]	0	The error code of an error occurred in the module is stored.
(16)	o_bParamOK	Parameter setting completion flag	Bit	OFF	The ON state indicates that the initial settings until an electric actuator is ready to operate is completed.
(17)	o_bBusy	Busy signal	Bit	OFF	The ON state indicates that an electric actuator is operating.

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	ST
Number of basic steps	5576 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: 88 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.
FB dependence	M+IAIJogInching_R └ M+IAIServoControl_R
FB compilation method	Subroutine type
FB operation	Real-time execution

Processing

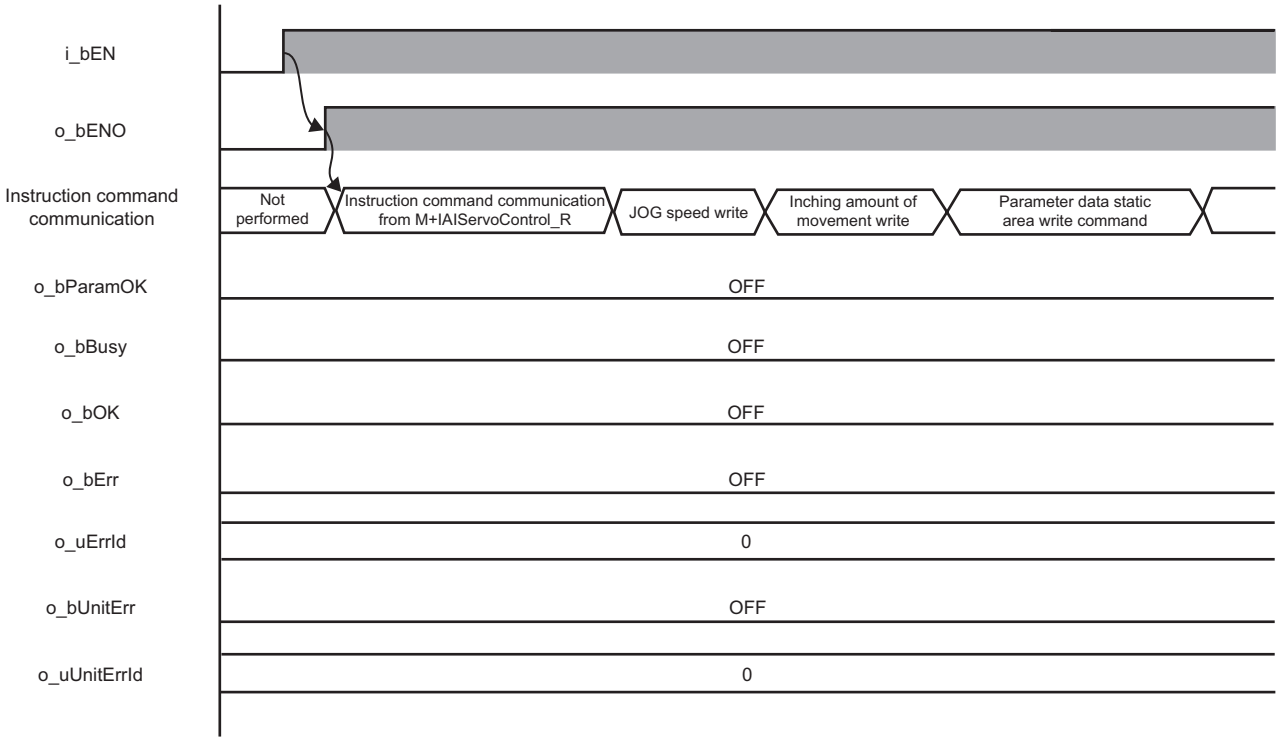
- Specify the axis number of the operation target in i_uAxis (target axis).
- The movement amount of inching operation is set to i_udInchingMovingDistance (inching amount of movement).
- The JOG operation speed is set to i_udJogSpeed (JOG speed).
- This FB switches from PIO to Modbus communication at the rise of i_bEN (execution command), and writes i_udJogSpeed (JOG speed) and i_udInchingMovingDistance (inching amount of movement) to the parameter data of a controller.
- When the JOG or inching operation becomes ready to operate after writing parameter data and resetting software, o_bParamOK (parameter setting completion flag) is turned ON.
- o_bBusy (busy signal) is turned ON while an electric actuator is operating.
- 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.
- For the inching operation, the operation decelerates to stop when turning ON the command which moves an electric actuator in the reverse direction while the actuator is operating.
- 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.
- For the JOG operation, the operation decelerates to stop when turning ON both i_bFJog (JOG + command) and i_bRJog (JOG - command). The ON operation is started by turning OFF either one of the commands.
- The operation decelerates to stop when i_bJogOrInching (JOG/Inching replacement) is changed during the operation of i_bFJog (JOG + command) or i_bRJog (JOG - command).
- 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 JOG speed, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '103H' is stored in o_uErrId (error code).
- When a value out of the range is set for the inching amount of movement, o_bErr (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '104H' 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_bParamOK (parameter setting completion flag) is turned ON, o_bErr (error completion) is turned ON for one scan only. 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. In addition, the error code '202H' is stored in o_uErrId (error code).
  M+IAIStartHomePositioning_R, M+IAIJogInching_R, M+IAIStartPositioning_R, and M+IAIServoControl_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 an electric actuator, 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

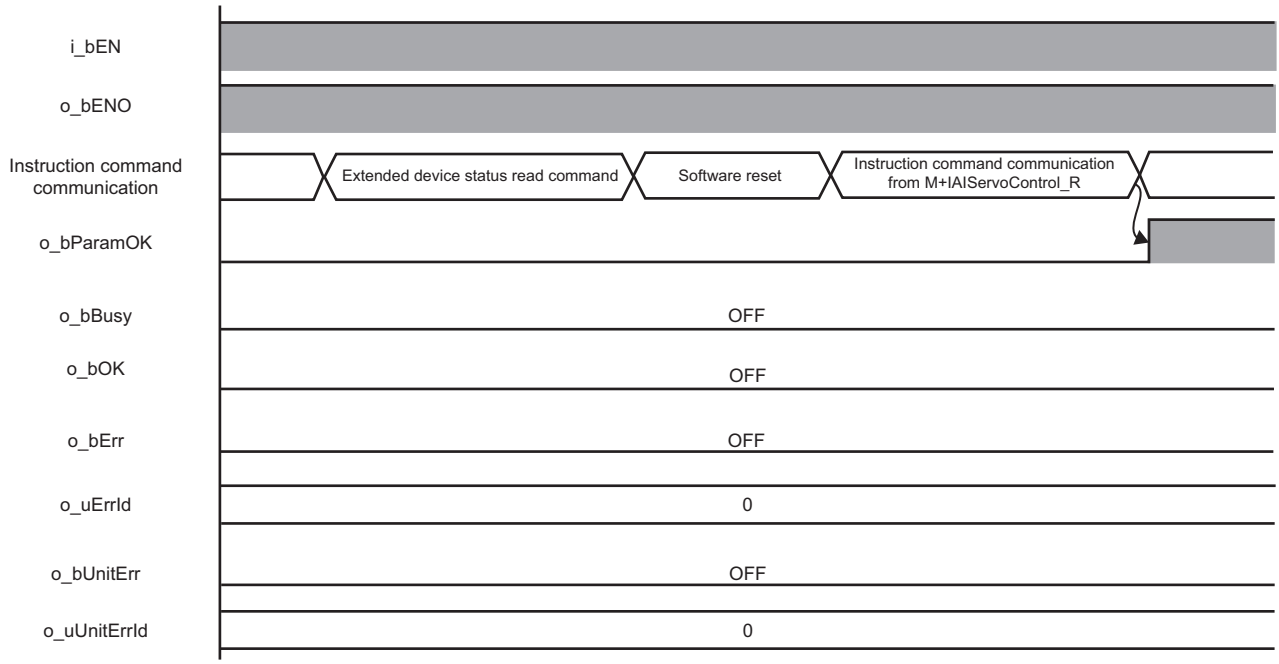
• From the rise of i_bEN (execution command) to parameter data static area write command

The program is executed once at the rise of i_bEN (execution command).



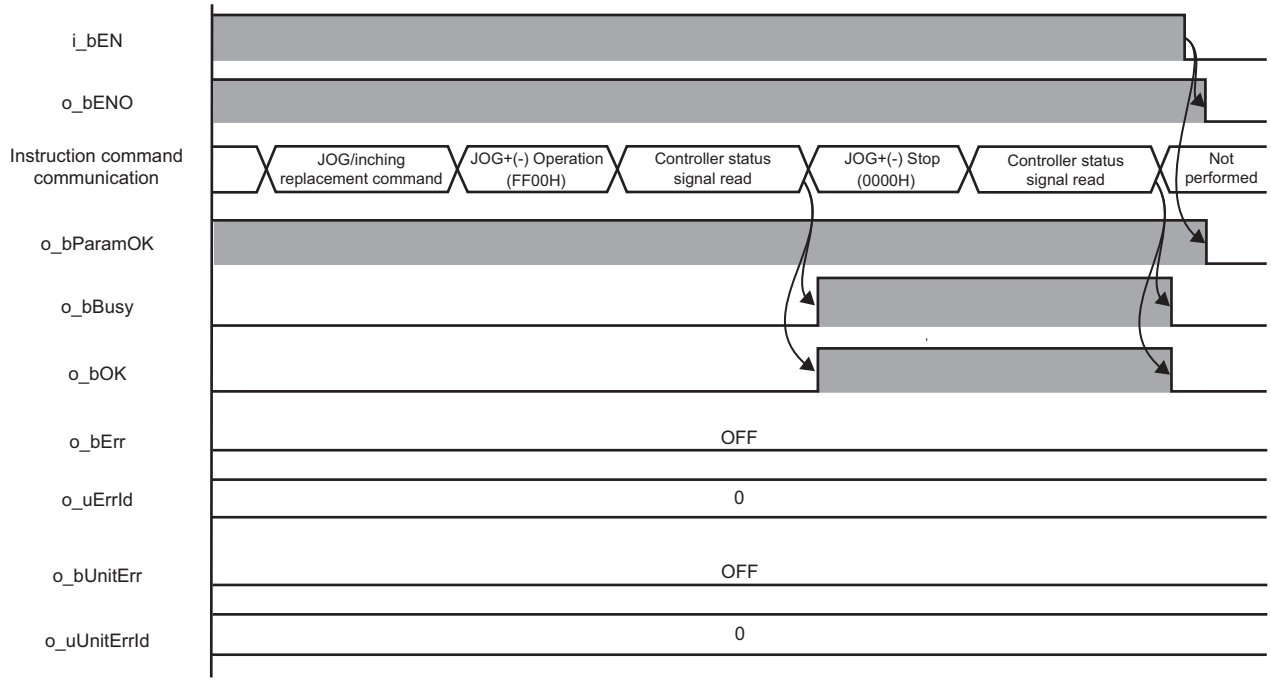
• From extended device status read command to servo ON command

The program is executed once at the rise of i_bEN (execution command).

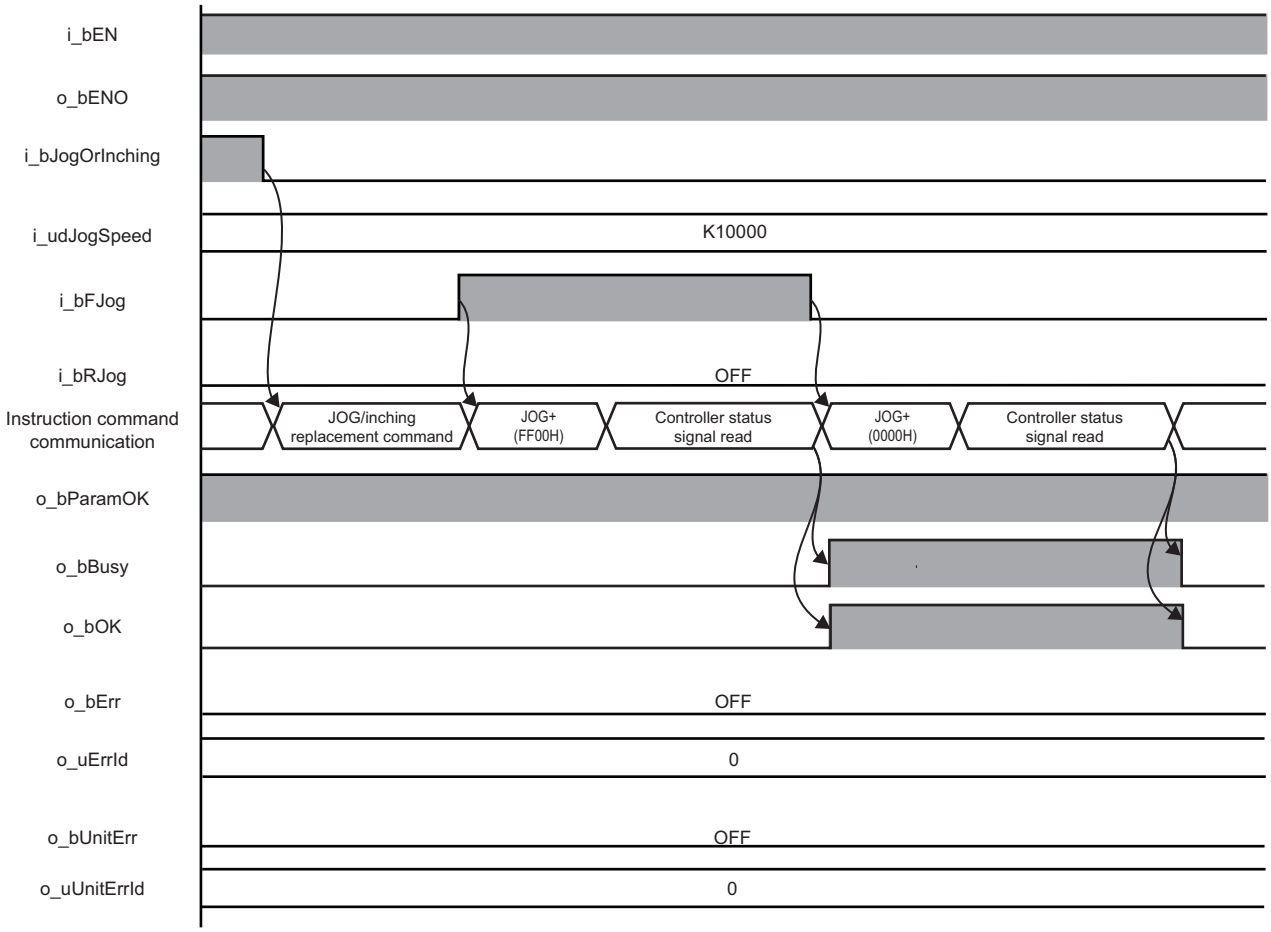


• From JOG/Inching replacement command to when i_bEN (execution command) is turned OFF (Example: JOG operation)

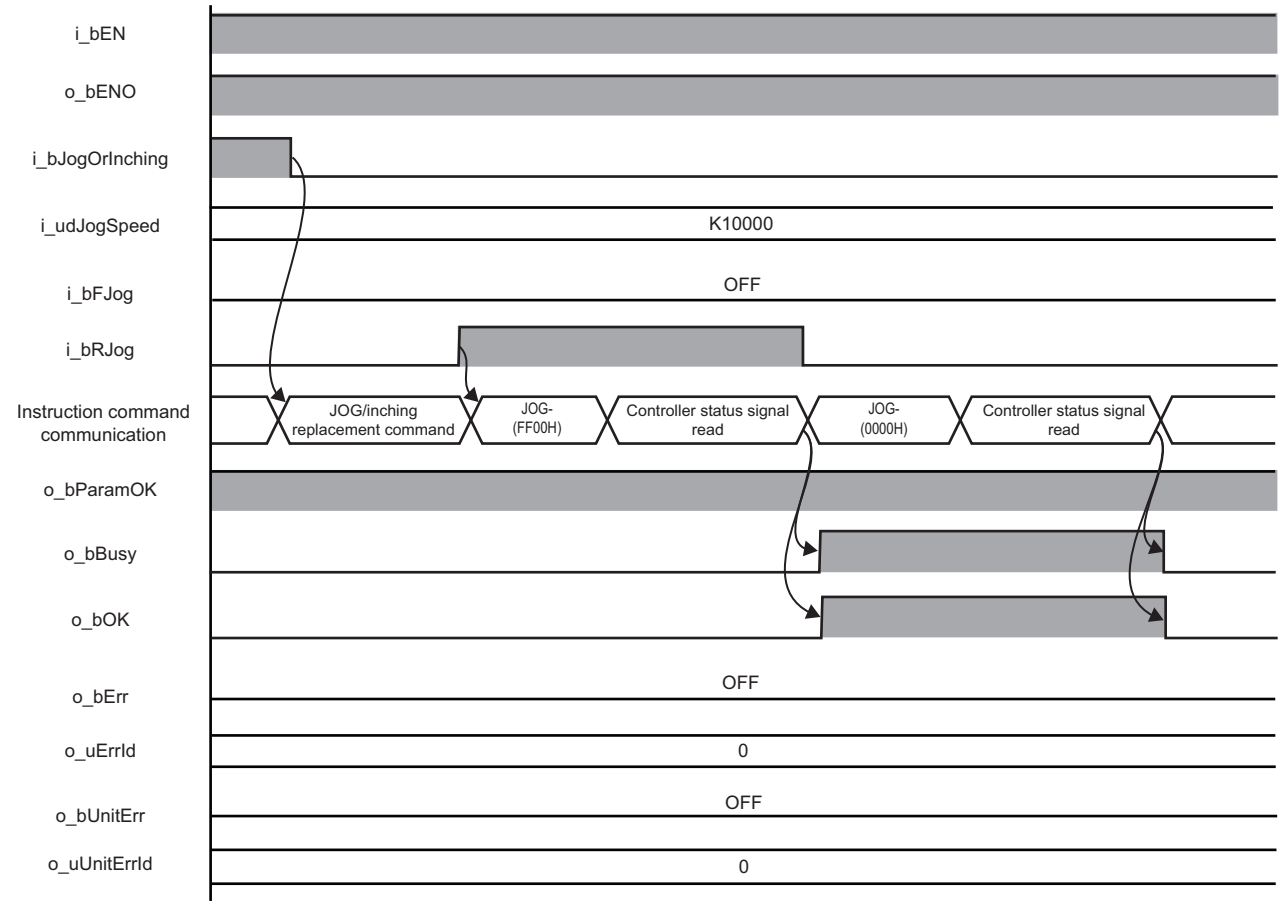
The following processing is executed repeatedly while i_bEN (execution command) is turned ON.



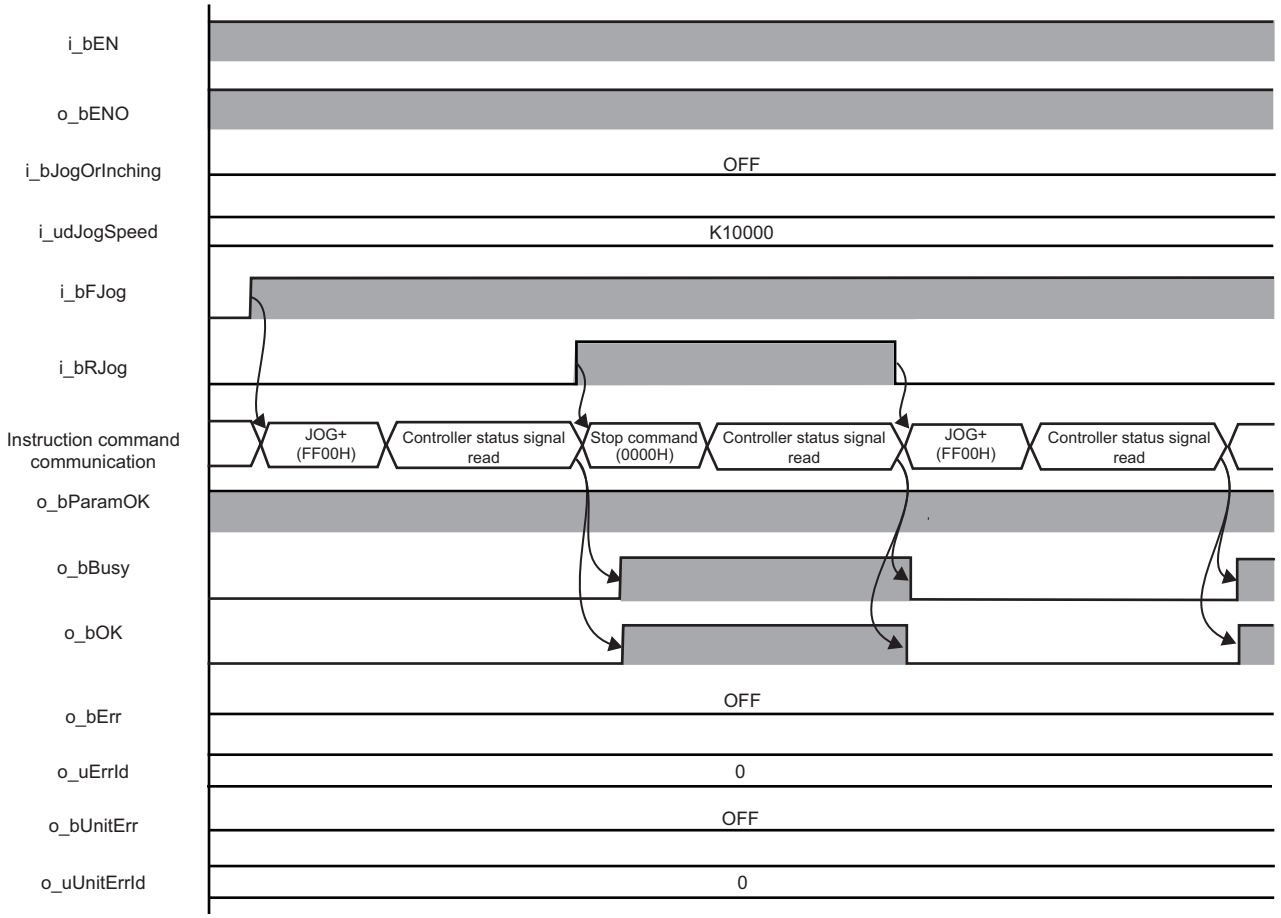
• For JOG operation (JOG + command)



• For JOG operation (JOG - command)

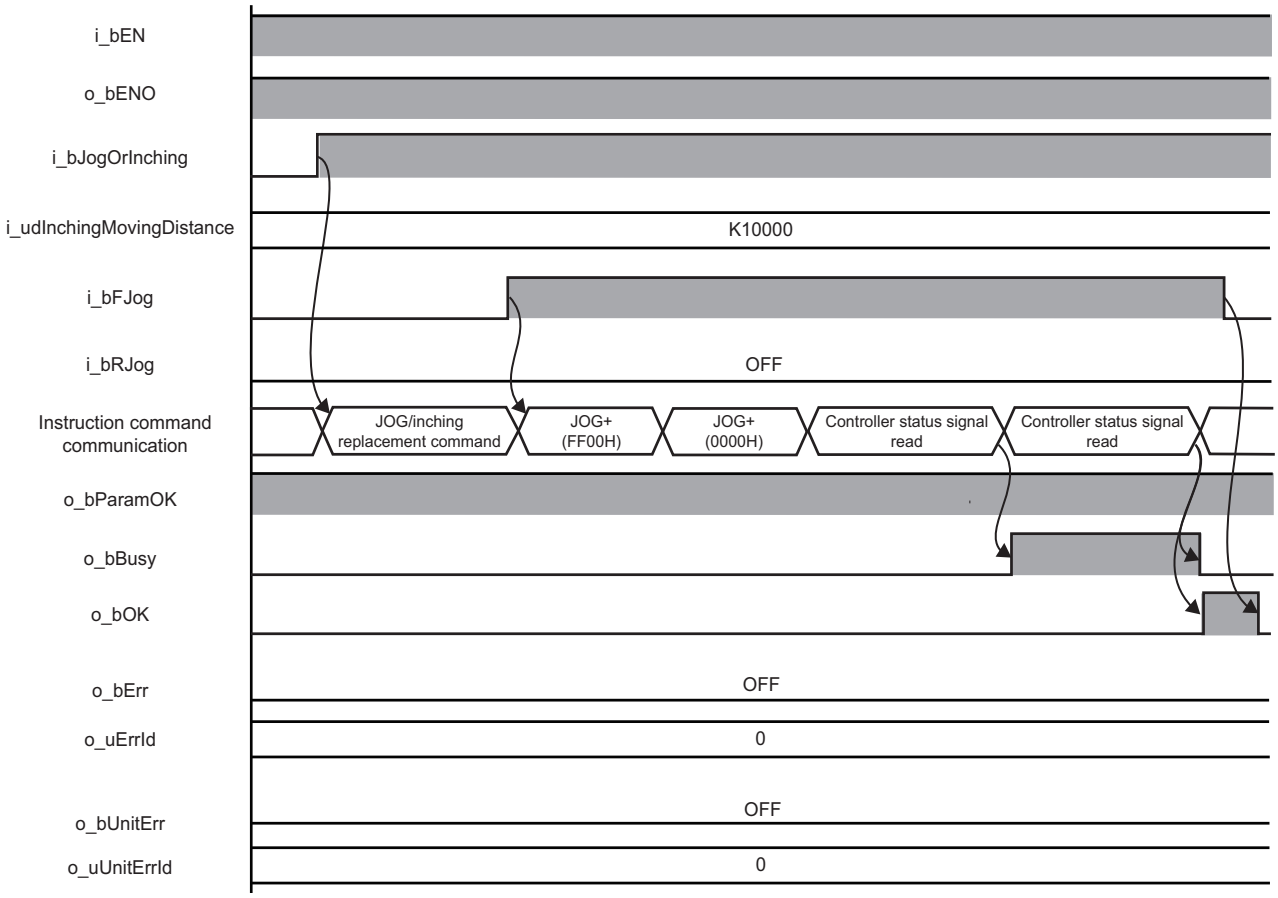


• For JOG operation (when both JOG + command and JOG - command are turned ON simultaneously)



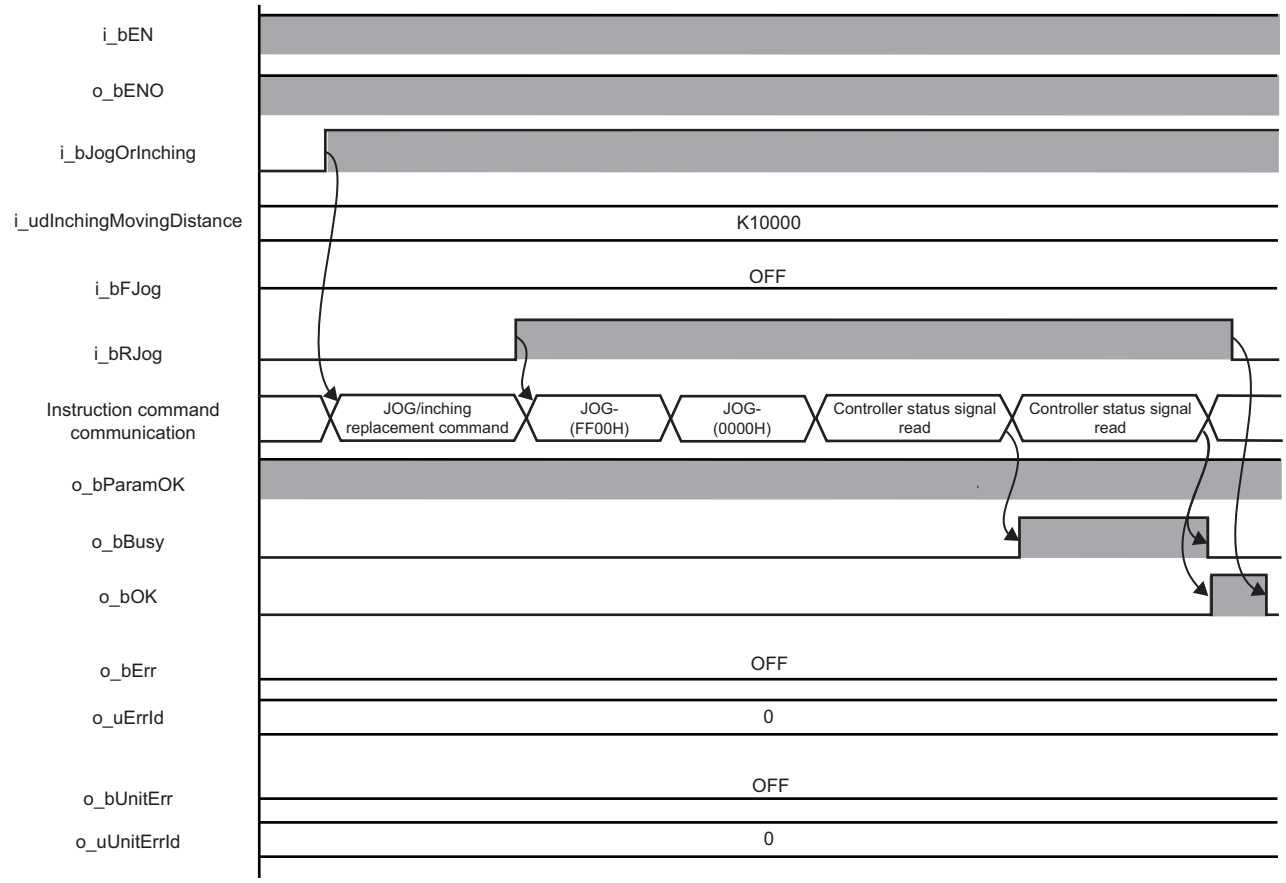
• For inching operation (JOG + command)

When i_bFJog (JOG + command) is turned OFF before o_bOK (normal completion) is turned ON, o_bOK (normal completion) is turned ON for one scan only.

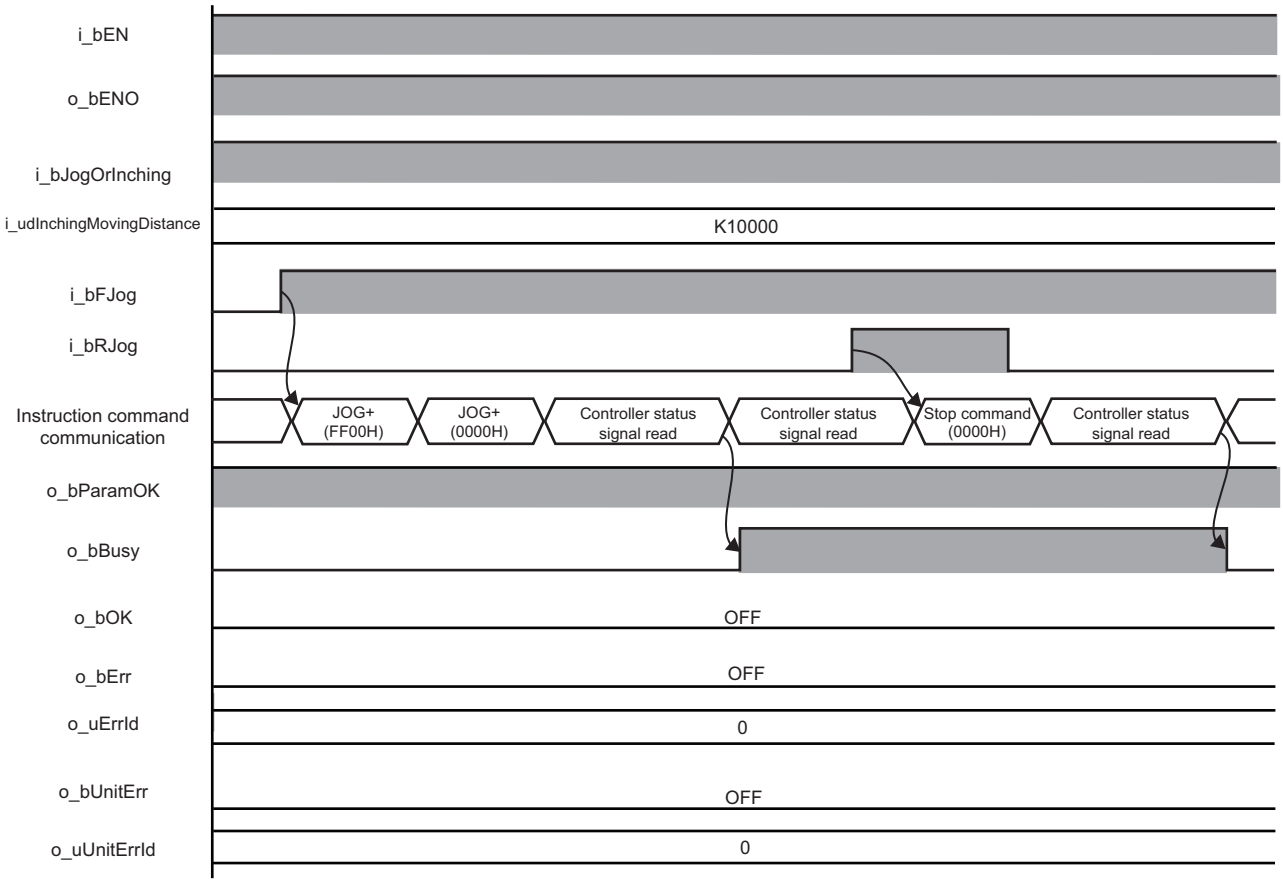


• For inching operation (JOG - command)

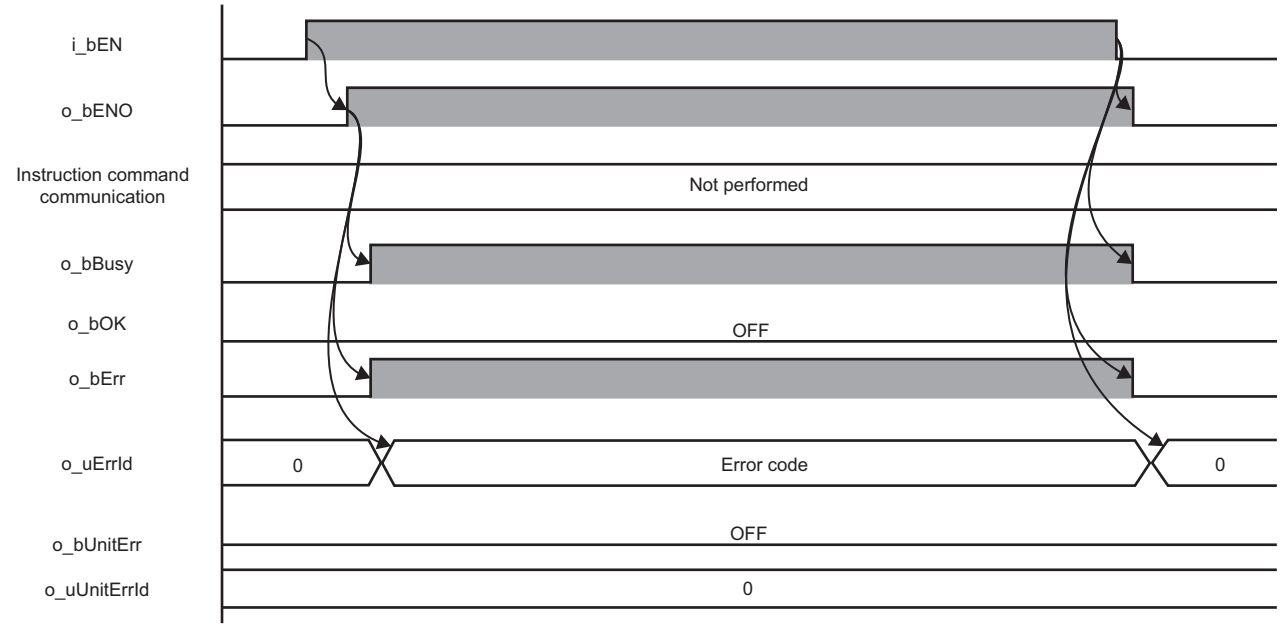
When i_bRJog (JOG - command) is turned OFF before o_bOK (normal completion) is turned ON, o_bOK (normal completion) is turned ON for one scan only.



• For inching operation (when both JOG + command and JOG - command are turned ON simultaneously)



■ 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 writes to the non-volatile memory. For details, refer to the IAI Corporation manuals related to serial communication (Modbus version).
- By turning ON i_bEN (execution command), this FB restarts the controller after turning OFF the servo. It takes 2000 ms to restart.
- If the time from when a controller is restarted to when the controller is ready for communication takes more than 2100 ms, this FB is completed with an error. In this case, set the time to the buffer memory (Un\G5520). The waiting time for this FB is Un\G5520 × 100 ms. When the waiting time is set for less than 2100 ms, the time is automatically changed to 2100 ms.
- JOG speed and inching amount of movement cannot be changed while i_bEN (execution command) is turned ON. For changing the JOG speed or inching amount of movement, execute the FB again.
- Execute a home position return after o_bParamOK (parameter setting completion flag) is turned ON. Otherwise a critical error may occur when an electric actuator exceeds the operation limit value.
- When the electric actuator 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 turning OFF i_bEN (execution command) while an electric actuator is operating, the actuator continues to operate. Prepare a program for the operation of the actuator separately in accordance with the required system operation.
- This FB uses the CPRTCL instruction. For details, refer to 📖MELSEC iQ-R Programming Manual (Module Dedicated Instructions).
- Specify the start I/O number assigned to a serial communication module in i_uStartIONo (start I/O No.). If the start I/O number which is not assigned to the module is specified, 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 electric actuator, 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 an electric actuator controller to be used.
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: PCON-CB
- Electric actuator: RCP3-TA4C-I-28P-4-20-P3-P
- JOG speed: 10.00 mm/sec
- 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	3110.000 ms	0.437 ms	19719 scans
From when i_bFJog (JOG + command) or i_bRJog (JOG - command) is turned ON to when JOG operation starts	17.200 ms	0.448 ms	78 scans
From when i_bFJog (JOG + command) or i_bRJog (JOG - command) is turned ON to when inching movement completes	49.200 ms	0.469 ms	238 scans

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

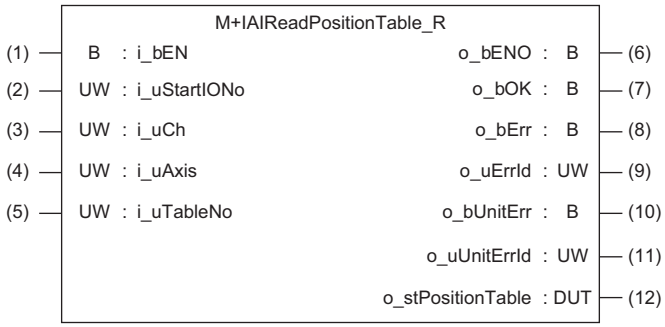
Error code

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 16 for the target axis and execute the FB again.
103H	The value set for the JOG speed is out of the range.	Set a value within the range from 1 to 999999 for the JOG speed and execute the FB again.
104H	The value set for the inching amount of movement is out of the range.	Set a value within the range from 1 to 999999 for the inching amount of movement 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_bParamOK (parameter setting completion flag) is turned ON. (This error code is output for one scan only.)
202H	Other FB which may affect the operation of an electric actuator is executing.	Stop the FB which may affect the operation of the electric actuator other than this FB, and execute this FB again. Target FB: • M+IAIStartHomePositioning_R • M+IAIJogInching_R • M+IAIStartPositioning_R • M+IAIServoControl_R
203H	Emergency stop or major failure is occurring.	Check the status of a controller in M+IAIMonitoring_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)

2.3 M+IAIReadPositionTable_R

Overview

Reads the data of the specified position table.



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 I/O number to which a target serial communication module is mounted 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 16	Specify the value obtained by incrementing the axis number set in a controller by one.
(5)	i_uTableNo	Position table No.	Word [unsigned]	0 to 767	Specify the position table number from which the setting value is read.

Output label

No.	Label	Name	Data type	Default value	Description
(6)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(7)	o_bOK	Normal completion	Bit	OFF	The ON state indicates that reading position 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_stPositionTable	Position table	Structure (stPositionTable)	—	For details, refer to the following: ☞ Page 102 Position table structure (stPositionTable)

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

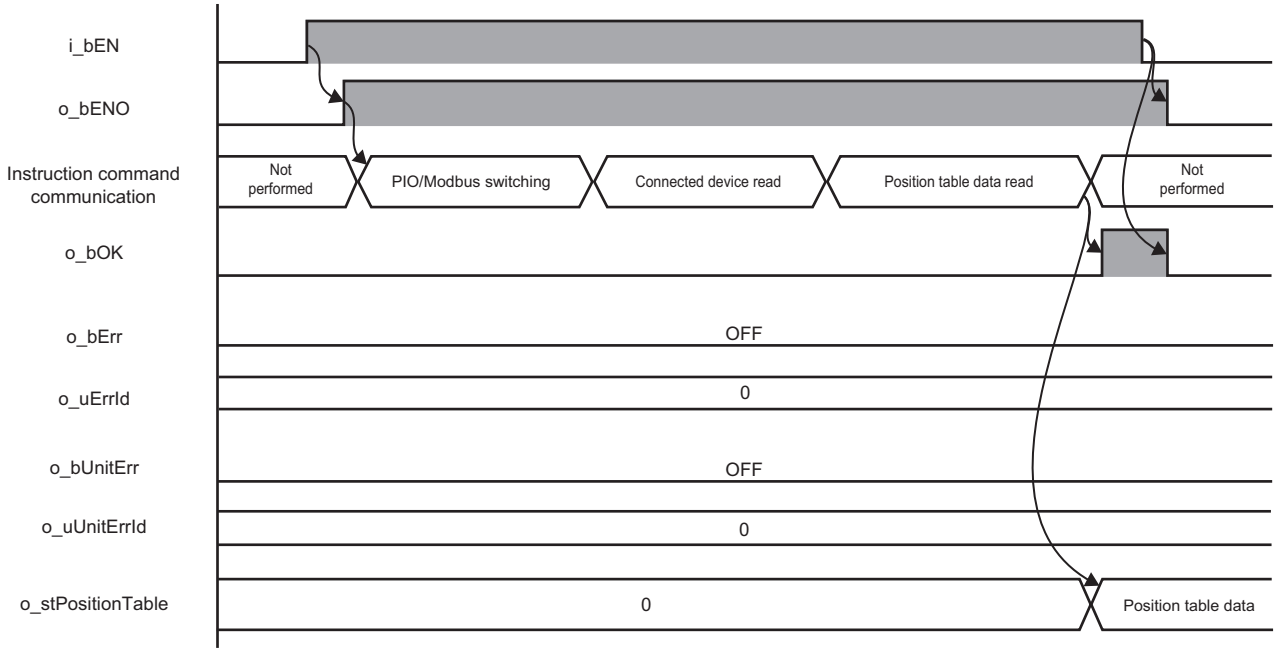
Item	Description
Language	ST
Number of basic steps	2250 Steps The number of steps of the FB embedded in a program varies depending on a CPU module used, the input and output definitions, and the option settings of GX Works3. For the option settings of GX Works3, refer to 📖GX Works3 Operating Manual.
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.
FB dependence	No dependence
FB compilation method	Subroutine type
FB operation	Pulse execution (multiple scan execution type)

Processing

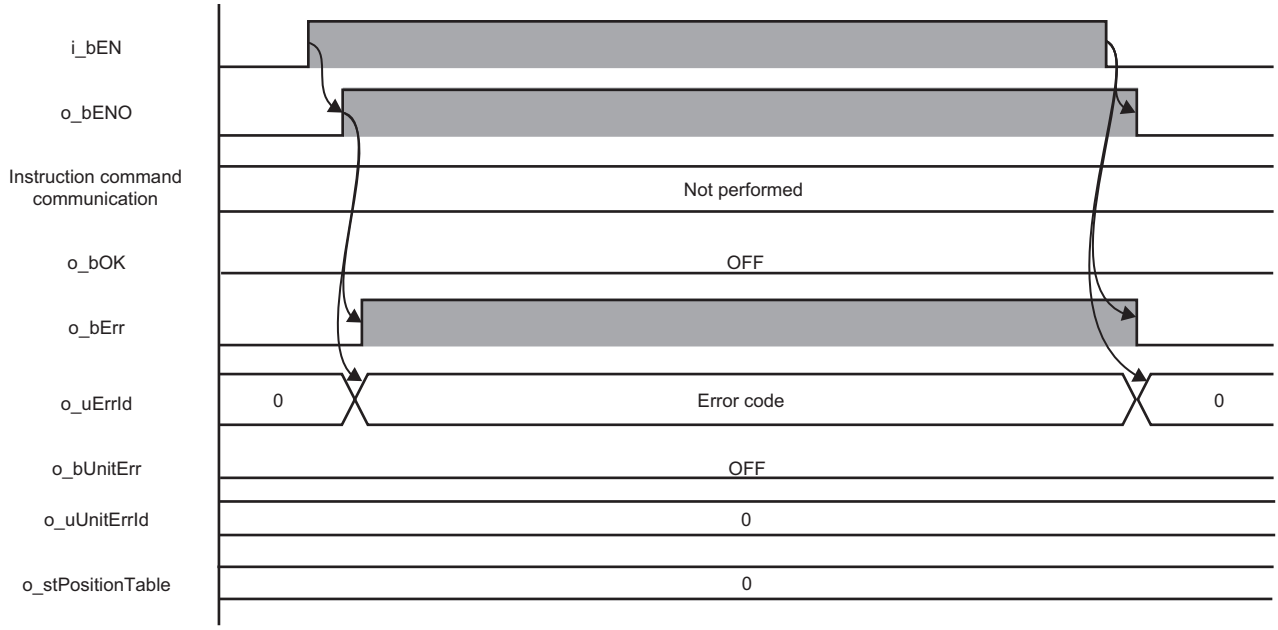
- Specify the axis number of the operation target in i_uAxis (target axis).
- Specify the position table number to be read in i_uTableNo (position table No.).
- This FB switches from PIO to Modbus communication at the rise of i_bEN (execution command), and reads the setting data of the specified position table number of a controller.
- o_bOK (normal completion) is turned ON when reading the position table 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 a value out of the range is set for the position table 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. In addition, the error code '201H' is stored in o_uErrId (error code) for one scan.
- 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 an electric actuator, 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 the start I/O number assigned to a serial communication module in i_uStartIONo (start I/O No.). If the start I/O number which is not assigned to the module is specified, 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 electric actuator, 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 an electric actuator controller to be used.
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: PCON-CB
- Electric actuator: RCP3-TA4C-I-28P-4-20-P3-P

Time required for the processing*1	Maximum scan time	Number of scans required for the processing
56.300 ms	0.379 ms	280 scans

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

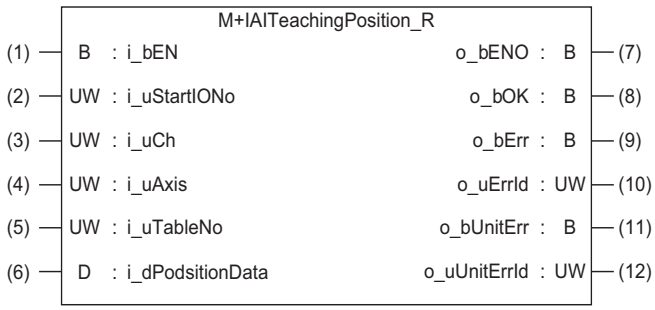
Error code

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 16 for the target axis and execute the FB again.
105H	The position table number is out of the range.	Set a value within the range from 0 to 767 for the position table 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.)
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+IAITeachingPosition_R

Overview

Sets the designated position to the specified position table (target position).



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 I/O number to which a target serial communication module is mounted 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 16	Specify the value obtained by incrementing the axis number set in a controller by one.
(5)	i_uTableNo	Position table No.	Word [unsigned]	0 to 767	Specify the position table number to which the setting value is 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	Default value	Description
(7)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(8)	o_bOK	Normal completion	Bit	OFF	The ON state indicates that the position 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	ST
Number of basic steps	2069 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: 44 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.
FB dependence	No dependence
FB compilation method	Subroutine type
FB operation	Pulse execution (multiple scan execution type)

Processing

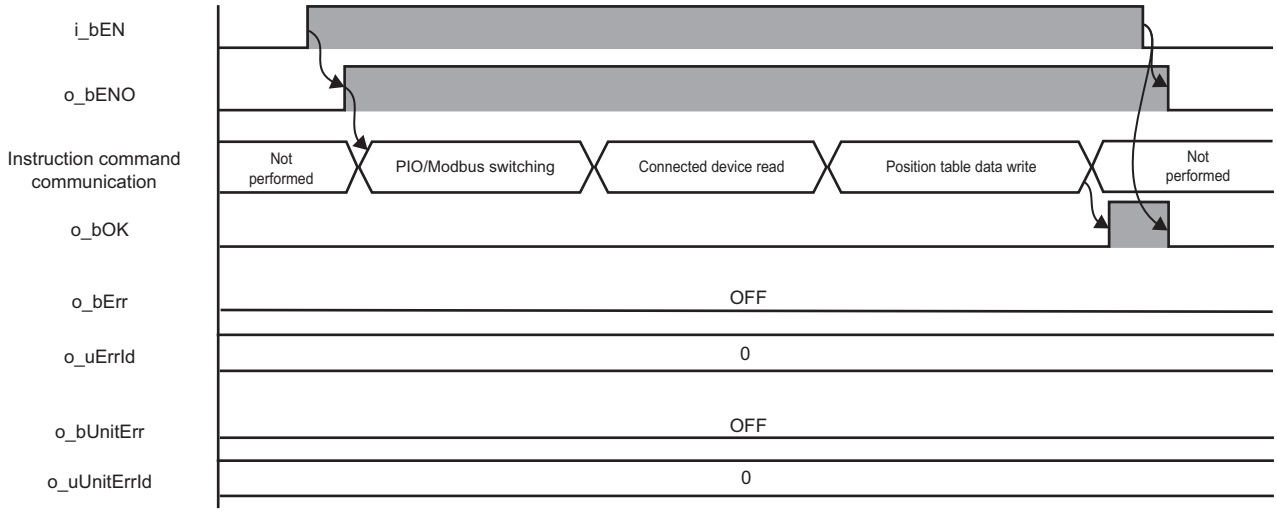
- Specify the axis number of the operation target in i_uAxis (target axis).
- Specify the position table number to be set in i_uTableNo (position table No.).
- This FB switches from PIO to Modbus communication at the rise of i_bEN (execution command), and sets i_dPositionData (position data) to the target position of the specified position table number of a controller. For details on the position table, refer to the IAI Corporation manuals related to serial communication (Modbus version).
- o_bOK (normal completion) is turned ON when the position table setting 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 a value out of the range is set for the position table 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. 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. In addition, the error code '202H' is stored in o_uErrId (error code).
  M+IAIStartPositioning_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).

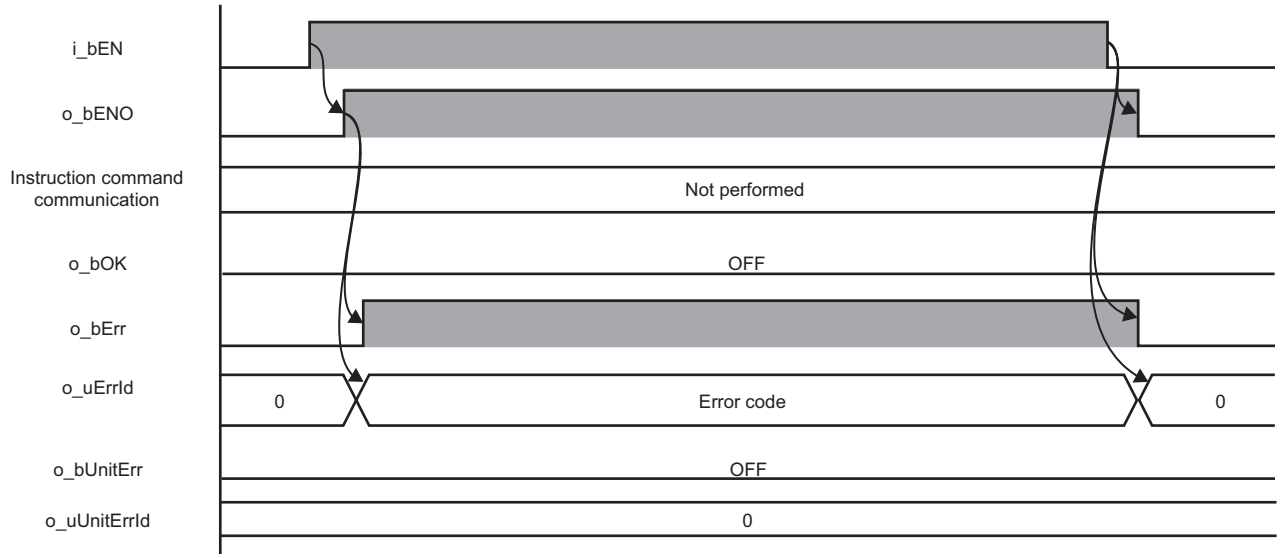
- When this FB receives an error code due to an error occurred in an electric actuator, o_bUnitErr (unit error completion) is turned ON and the processing of the FB is interrupted. In addition, the received error code is stored in o_uUnitErrId (unit error code).

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 writes to the non-volatile memory. For details, refer to the IAI Corporation manuals related to serial communication (Modbus version).
- This FB uses the CPRTCL instruction. For details, refer to MELSEC iQ-R Programming Manual (Module Dedicated Instructions).
- Specify the start I/O number assigned to a serial communication module in i_uStartIONo (start I/O No.). If the start I/O number which is not assigned to the module is specified, 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 electric actuator, 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 an electric actuator controller to be used.
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: PCON-CB
- Electric actuator: RCP3-TA4C-I-28P-4-20-P3-P

Time required for the processing*1	Maximum scan time	Number of scans required for the processing
53.000 ms	0.373 ms	272 scans

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

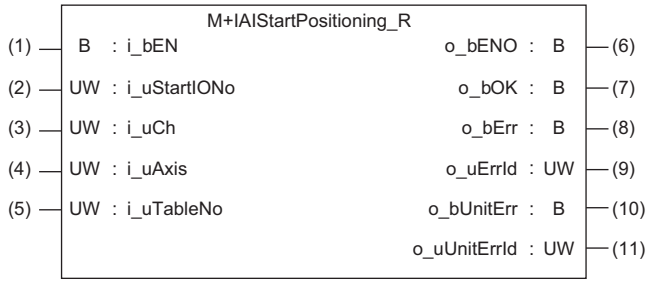
Error code

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 16 for the target axis and execute the FB again.
105H	The position table number is out of the range.	Set a value within the range from 0 to 767 for the position table number and execute the FB again.
106H	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	Other FB which may affect the operation of an electric actuator is executing.	After stopping M+IAIStartPositioning_R, 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)

2.5 M+IAIStartPositioning_R

Overview

Executes positioning operation based on the specified position table data.



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 I/O number to which a target serial communication module is mounted 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 16	Specify the value obtained by incrementing the axis number set in a controller by one.
(5)	i_uTableNo	Position table No.	Word [unsigned]	0 to 767	Specify the position table number whose positioning operation is executed.

Output label

No.	Label	Name	Data type	Default value	Description
(6)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(7)	o_bOK	Normal completion	Bit	OFF	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

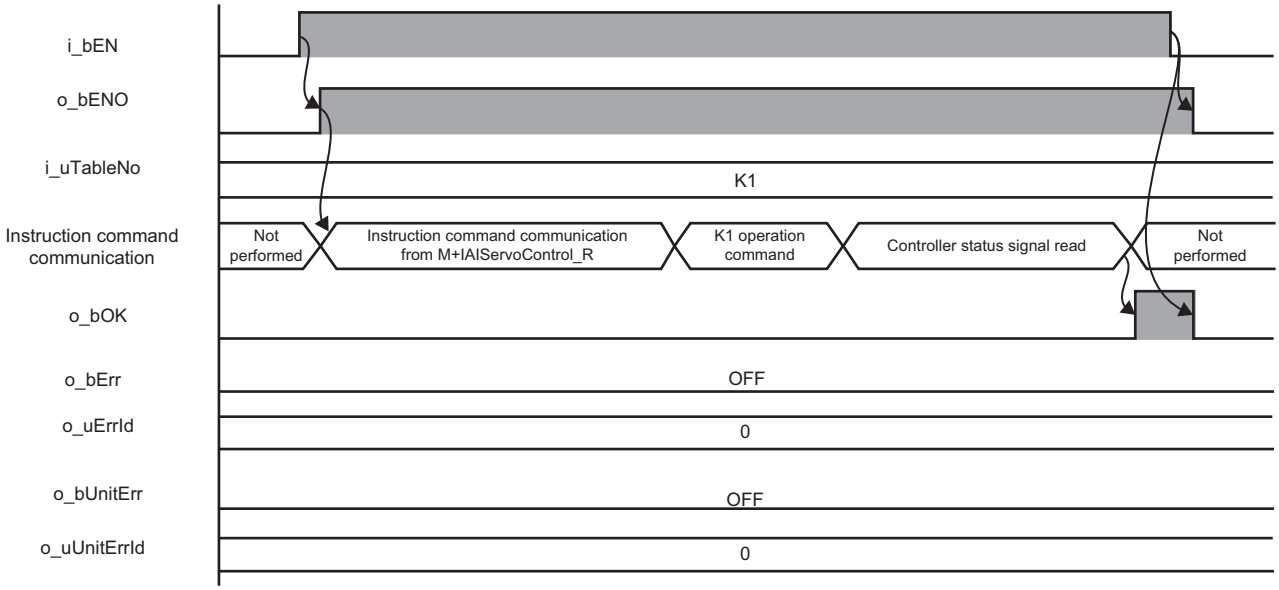
Item	Description
Language	ST
Number of basic steps	4110 Steps The number of steps of the FB embedded in a program varies depending on a CPU module used, the input and output definitions, and the option settings of GX Works3. For the option settings of GX Works3, refer to 📖GX Works3 Operating Manual.
Number of points of a label used	• Label: 76 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.
FB dependence	M+IAIStartPositioning_R └ M+IAIServoControl_R
FB compilation method	Subroutine type
FB operation	Pulse execution (multiple scan execution type)

Processing

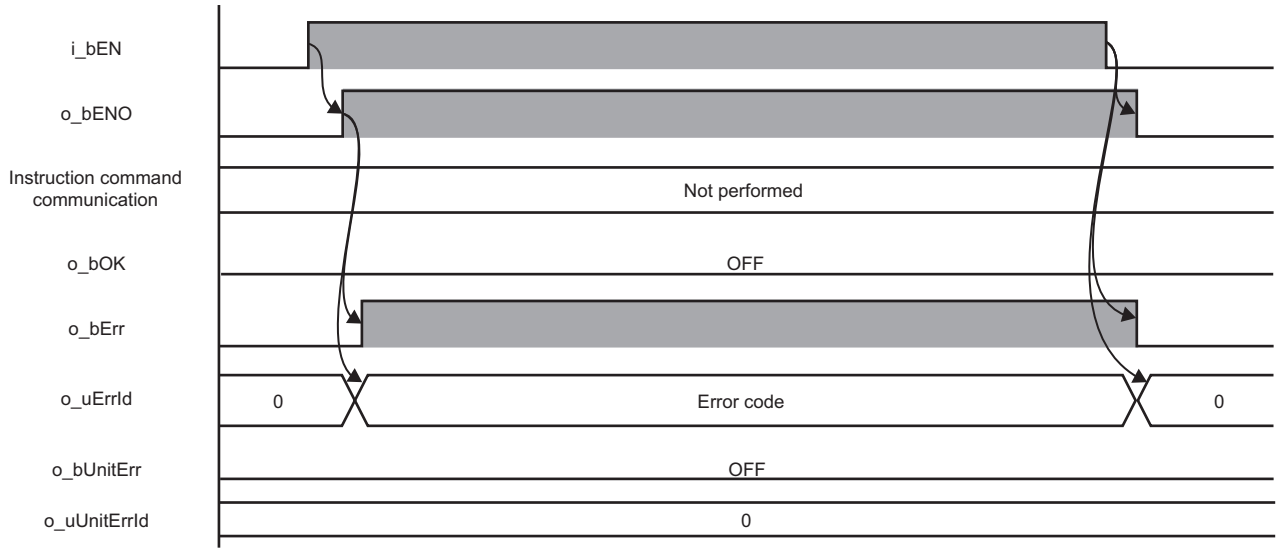
- Specify the axis number of the operation target in i_uAxis (target axis).
- Set the position table number to be executed in i_uTableNo (position table No.).
- This FB switches from PIO to Modbus communication at the rise of i_bEN (execution command), and starts positioning operation.
- o_bOK (normal completion) is turned ON when positioning operation 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 a value out of the range is set for the position table 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. 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. In addition, the error code '202H' is stored in o_uErrId (error code).
  M+IAIStartHomePositioning_R, M+IAIJogInching_R, M+IAITeachingPosition_R, M+IAIStartPositioning_R, and M+IAIServoControl_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 an electric actuator, 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 positioning operation 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, an electric actuator continues to operate until a home position return is completed.
- After turning ON the power, when this FB is operated without executing a home position return, positioning operation is performed automatically after executing the home position return.
- This FB uses the CPRTCL instruction. For details, refer to MELSEC iQ-R Programming Manual (Module Dedicated Instructions).
- Specify the start I/O number assigned to a serial communication module in i_uStartIONo (start I/O No.). If the start I/O number which is not assigned to the module is specified, 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 electric actuator, 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 an electric actuator controller to be used.
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: PCON-CB
- Electric actuator: RCP3-TA4C-I-28P-4-20-P3-P
- Electric actuator initial position: Home position (0.00 mm)
- Position table execution setting:
  Target position: 10.00 mm
  Positioning width: 0.1 mm
  Speed: 10.00 mm/sec
  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
Immediately after power supply ON	3080.000 ms	0.426 ms	15291 scans
After executing home position return	1170.000 ms	0.428 ms	5812 scans

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

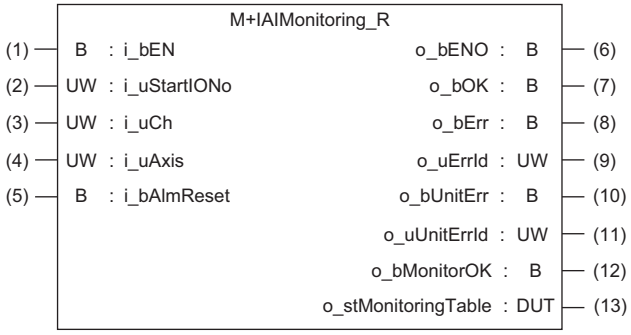
Error code

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 16 for the target axis and execute the FB again.
105H	The position table number is out of the range.	Set a value within the range from 0 to 767 for the position table 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	Other FB which may affect the operation of an electric actuator is executing.	Stop the FB which may affect the operation of the electric actuator other than this FB, and execute this FB again. Target FB: • M+IAIStartHomePositioning_R • M+IAIJogInching_R • M+IAITeachingPosition_R • M+IAIStartPositioning_R • M+IAIServoControl_R For M+IAIJogInching_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+IAIMonitoring_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)

2.6 M+IAIMonitoring_R

Overview

Monitors a current position and alarms, and reset 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 I/O number to which a target serial communication module is mounted 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 16	Specify the value obtained by incrementing the axis number set in a controller by one.
(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	Default value	Description
(6)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(7)	o_bOK	Normal completion	Bit	OFF	The ON state indicates that 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 (stMonitoringTable)	—	For details, refer to the following: ☞ Page 102 Monitoring table structure (stMonitoringTable)

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

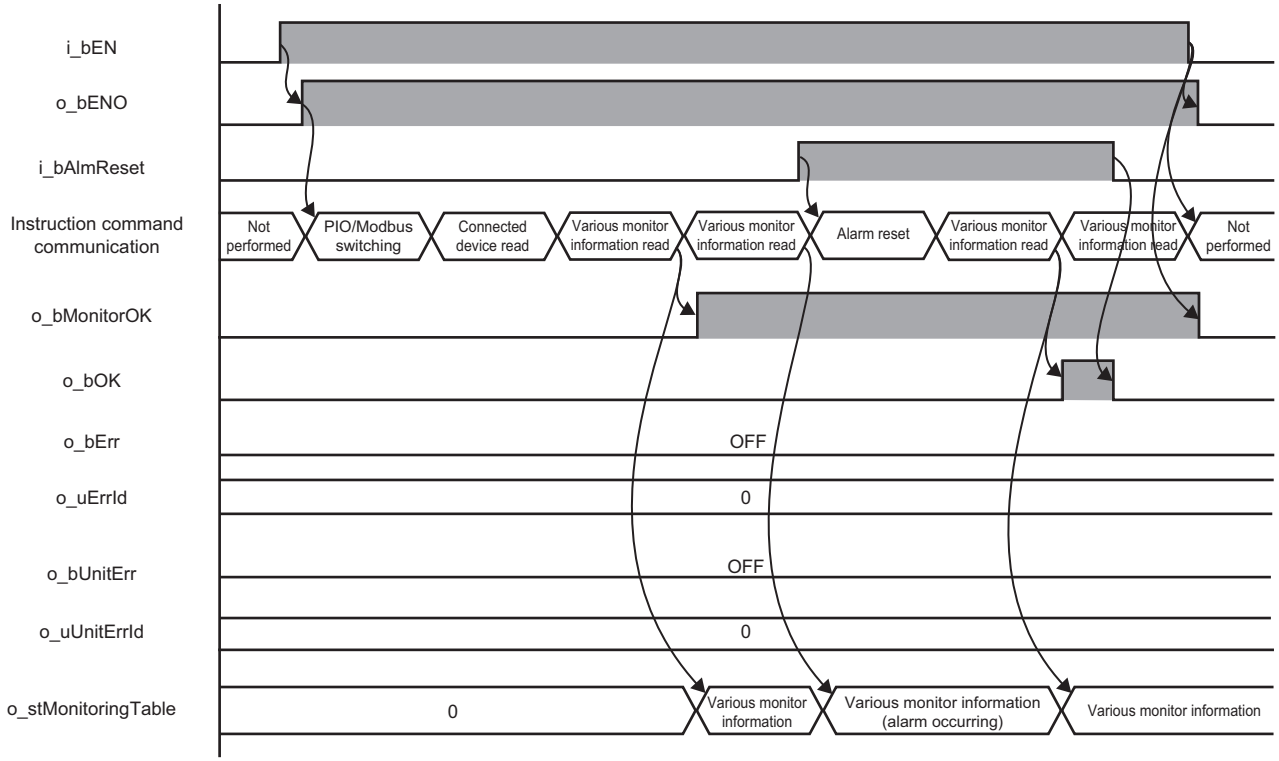
Item	Description
Language	ST
Number of basic steps	2645 Steps The number of steps of the FB embedded in a program varies depending on a CPU module used, the input and output definitions, and the option settings of GX Works3. For the option settings of GX Works3, refer to GX Works3 Operating Manual.
Number 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.
FB dependence	No dependence
FB compilation method	Subroutine type
FB operation	Real-time execution

Processing

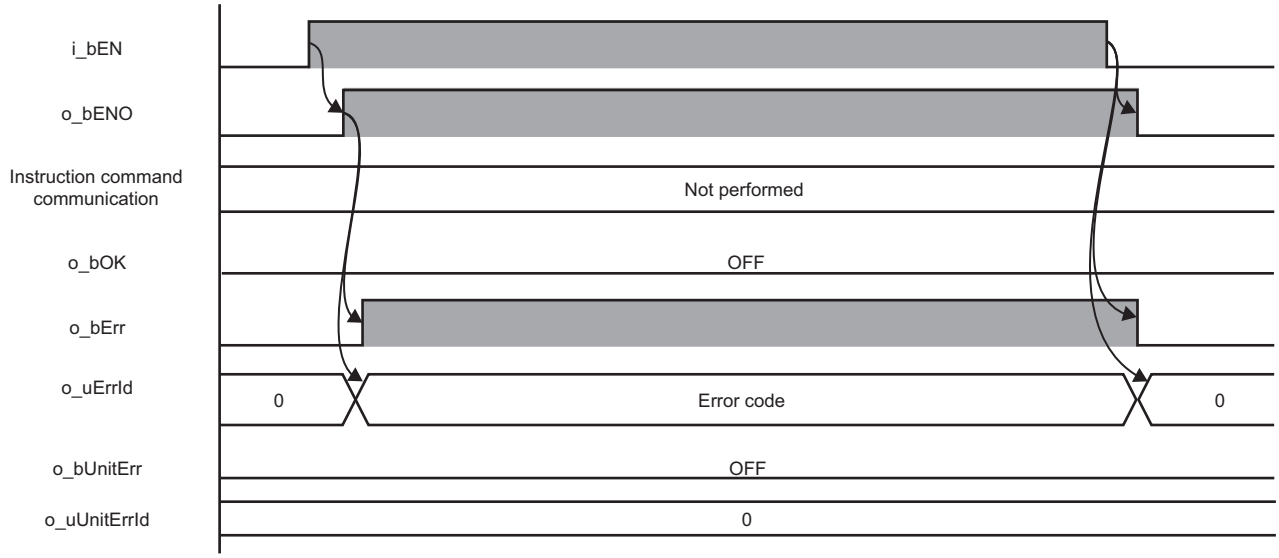
- Specify the axis number of the operation target in i_uAxis (target axis).
- This FB switches from PIO to Modbus communication at the rise of i_bEN (execution command), and starts monitoring for a controller target axis. The monitoring data (such as a current position and alarm codes) is stored in o_stMonitoringTable (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.
- 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 OFF i_bEN (execution command) before monitoring is started, o_bErr (error completion) is turned ON for one scan only. In addition, the error code '201H' is stored in o_uErrId (error code) for one scan.
- 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 an electric actuator, 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 the start I/O number assigned to a serial communication module in i_uStartIONo (start I/O No.). If the start I/O number which is not assigned to the module is specified, 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 electric actuator, 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 an electric actuator controller to be used.
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: PCON-CB
- Electric actuator: RCP3-TA4C-I-28P-4-20-P3-P

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	78.400 ms	0.377 ms	392 scans
From when i_bAlmReset (reset alarm) turns ON to when an alarm reset is completed	60.700 ms	0.499 ms	229 scans

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

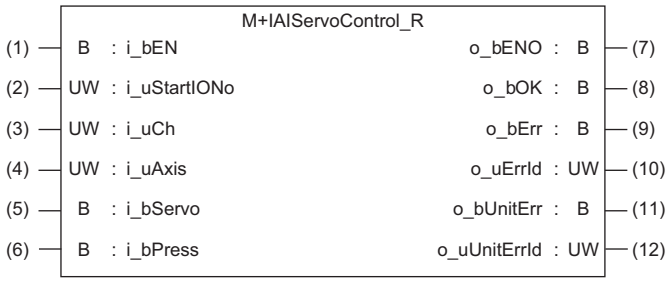
Error code

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 16 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 monitoring starts. (This error code is output for one scan only.)
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+IAIServoControl_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 I/O number to which a target serial communication module is mounted 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 16	Specify the value obtained by incrementing the axis number set in a controller by one.
(5)	i_bServo	Servo ON/OFF replacement	Bit	ON, OFF	ON: Servo ON OFF: Servo OFF
(6)	i_bPress	Servo press ON/OFF replacement	Bit	ON, OFF	ON: Servo press ON OFF: Servo press OFF

Output label

No.	Label	Name	Data type	Default value	Description
(7)	o_bENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(8)	o_bOK	Normal completion	Bit	OFF	The ON state indicates that the execution of servo ON or OFF command (servo press ON or OFF command) 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

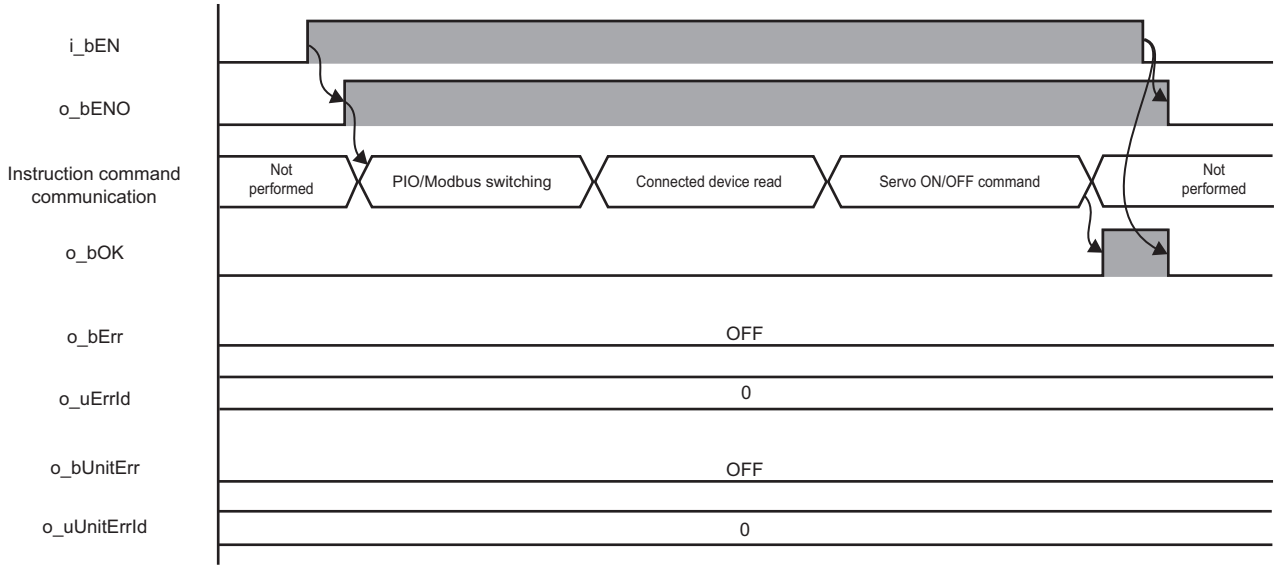
Item	Description
Language	ST
Number of basic steps	2300 Steps The number of steps of the FB embedded in a program varies depending on a CPU module used, the input and output definitions, and the option settings of GX Works3. For the option settings of GX Works3, refer to 📖GX Works3 Operating Manual.
Number of points of a label used	• Label: 36 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.
FB dependence	No dependence
FB compilation method	Subroutine type
FB operation	Pulse execution (multiple scan execution type)

Processing

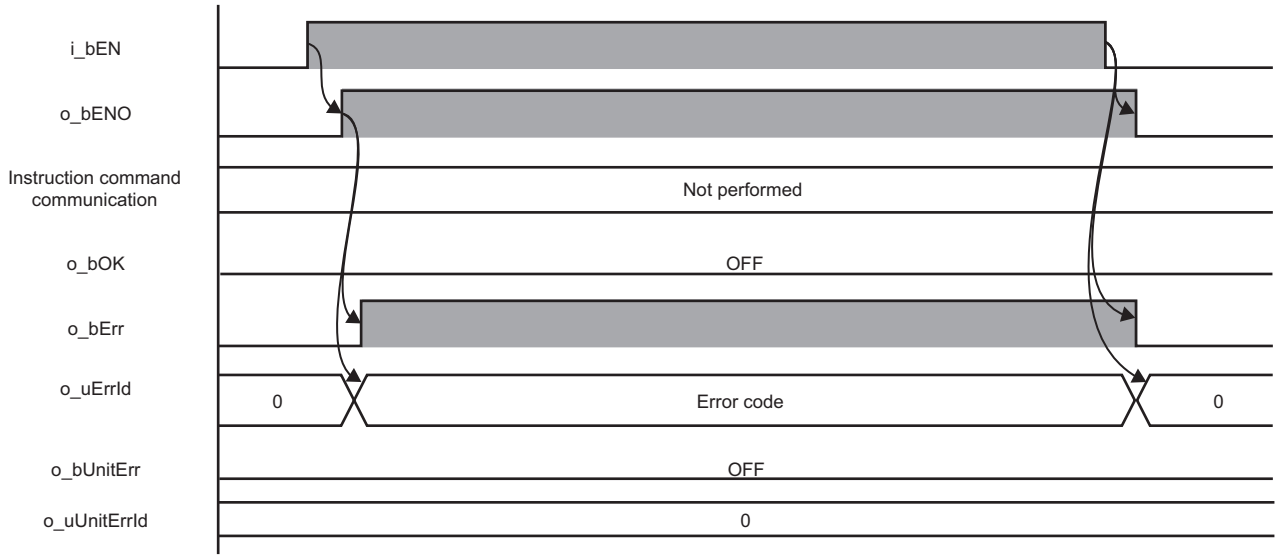
- Specify the axis number of the operation target in i_uAxis (target axis).
- This FB switches from PIO to Modbus communication at the rise of i_bEN (execution command). The FB requests a servo to turn ON when i_bServo (servo ON/OFF replacement) is turned ON, and requests to turn OFF when i_bServo is turned OFF. In addition, the FB requests a servo press to turn ON when i_bPress (servo press ON/OFF replacement) is turned ON, and requests to turn OFF when i_bPress is turned OFF. Note whether the servo turns ON or OFF is not checked with this FB. Check the servo status using M+IAIMonitoring_R. (☞ Page 44 M+IAIMonitoring_R)
- At the completion of the servo ON/OFF command execution, 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. 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. In addition, the error code '202H' is stored in o_uErrId (error code).
  M+IAIStartHomePositioning_R, M+IAIJogInching_R, M+IAIStartPositioning_R, and M+IAIServoControl_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 an electric actuator, 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 the start I/O number assigned to a serial communication module in i_uStartIONo (start I/O No.). If the start I/O number which is not assigned to the module is specified, the stop error of the CPU (2820H) occurs.
- This FB uses the index register Z9. Do not use the Z9 in an interrupt program.
- This FB must satisfy the following conditions in the monitoring table. (☞ Page 102 Monitoring table structure (stMonitoringTable))
  Bit 10 in device status 1 (Major failure status): 0
  Bit 15 in device status 1 (EMG status): 0
  Bit 15 in device status 2 (Enable): 1
  Bit 17 in system status (Auto servo OFF): 0
  If the conditions are not satisfied, o_bOK (normal completion) turns ON but a servo is not turned ON or OFF. For details, refer to the IAI Corporation manuals related to serial communication (Modbus version).
- Before operating an electric actuator, 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 an electric actuator controller to be used.
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: PCON-CB
- Electric actuator: RCP3-TA4C-I-28P-4-20-P3-P

Input label		Time required for the processing*1	Maximum scan time	Number of scans required for the processing
i_bServo (Servo ON/OFF replacement)	i_bPress (Servo press ON/OFF replacement)			
OFF	OFF	48.800 ms	0.384 ms	250 scans
ON	OFF	49.000 ms	0.384 ms	251 scans
ON	ON	48.900 ms	0.386 ms	249 scans
OFF	ON	49.100 ms	0.392 ms	250 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 16 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	Other FB which may affect the operation of an electric actuator is executing.	Stop the FB which may affect the operation of the electric actuator other than this FB, and execute this FB again. Target FB: • M+IAIStartHomePositioning_R • M+IAIJogInching_R • M+IAIStartPositioning_R • M+IAIServoControl_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)

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-IAIPosiSp_CPRTCL-ST

M+CPU-IAIPosiSp_CPRTCL-ST is used internally in each FB of the MELSEC-Q/L series FB library.
M+CPU-IAIPosiSp_CPRTCL-ST must be imported in a project.
Do not use M+CPU-IAIPosiSp_CPRTCL-ST in a user-created program as this FB is used only internally in other FBs. For details on M+CPU-IAIPosiSp_CPRTCL-ST, refer to the following:
☞ Page 101 M+CPU-IAIPosiSp_CPRTCL-ST

Checking the start I/O number

When the start I/O number of a serial communication module is other than 0000H to 00F0H, add the G_CPRTCL instruction to a program of M+CPU-IAIPosiSp_CPRTCL-ST.
For details on M+CPU-IAIPosiSp_CPRTCL-ST, refer to the following:
☞ Page 101 M+CPU-IAIPosiSp_CPRTCL-ST

Ex.
When the start I/O 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-IAIPosiSp_StartHomePosi-ST

Point

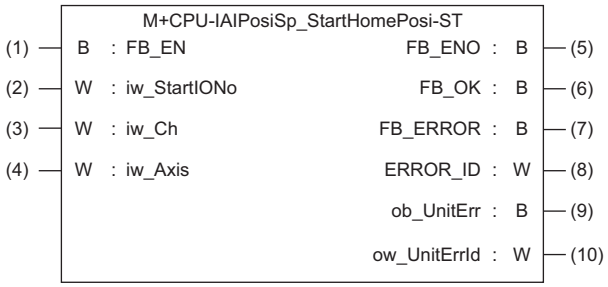
Advanced preparation is required for using this FB. For details, refer to the following:

☞ Page 55 Importing M+CPU-IAIPosiSp_CPRTCL-ST

☞ Page 55 Checking the start I/O number

Overview

Moves an electric actuator to the initial position (home position return).



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 I/O number to which a target serial communication module is mounted 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 16	Specify the value obtained by incrementing the axis number set in a controller by one.

Output label

No.	Label	Name	Data type	Default 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 home position return 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	ST
Number of basic steps	3744 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: 0.08K points (Word), 0.04K 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).
FB dependence	M+CPU-IAIPosiSp_StartHomePosi-ST └ M+CPU-IAIPosiSp_ServoControl-ST └ M+CPU-IAIPosiSp_CPRTCL-ST
FB compilation method	Macro type
FB operation	Pulse execution (multiple scan execution type)

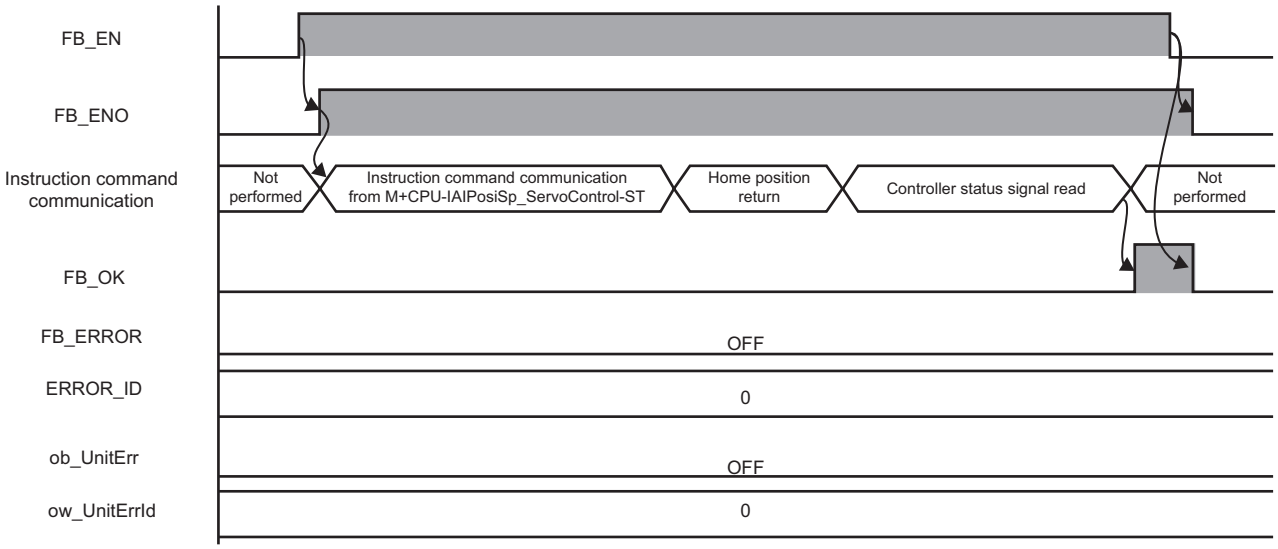
Processing

- Before executing this FB, check that the G_CPRTCL instruction which is executed for the specified start I/O number exists in the M+CPU-IAIPosiSp_CPRTCL-ST program. (☞ Page 55 Checking the start I/O number, ☞ Page 101 M+CPU-IAIPosiSp_CPRTCL-ST)
- Specify the axis number of the operation target in iw_Axis (target axis).
- This FB switches from PIO to Modbus communication at the rise of FB_EN (execution command) and executes a home position return.
- FB_OK (normal completion) is turned ON when a home position return 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 '10' 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 '11' 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 '12' 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 '20' 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. In addition, the error code '21' is stored in ERROR_ID (error code) for one scan.

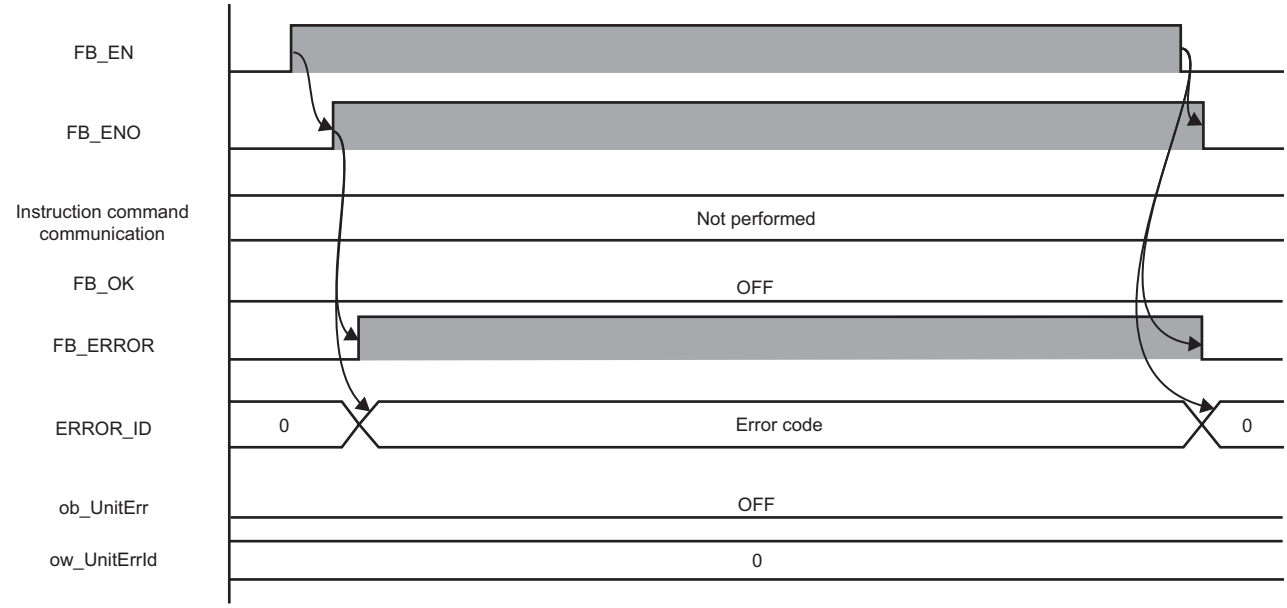
- When turning ON FB_EN (execution command) of this FB while executing any of the following FBs, FB_ERROR (error completion) is turned ON. In addition, the error code '22' is stored in ERROR_ID (error code).
  M+CPU-IAIPosiSp_StartHomePosi-ST, M+CPU-IAIPosiSp_JogInching-ST, M+CPU-IAIPosiSp_StartPosi-ST, and M+CPU-IAIPosiSp_ServoControl-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 an electric actuator, 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.
- After a home position return 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, an electric actuator 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 the start I/O number assigned to a serial communication module in iw_StartIONo (start I/O No.). If the start I/O number which is not assigned to the module is specified, 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 electric actuator, 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 rate setting		Set the value according to the setting of an electric actuator controller to be used.
	Communication protocol setting		Predefined protocol
Various Control Specification	Echo back permit/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: —
- Electric actuator: ERC3-SA5C-I-42P-12-50-SE-P-CN
- Electric actuator initial position: Home position (0.00 mm)

Time required for the processing*1	Maximum scan time	Number of scans required for the processing
1620.000 ms	0.847 ms	5610 scans

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

Error code

Error code (Decimal)	Description	Corrective action
10	The value set for the start I/O number is out of the range.	Set the start I/O number to which a serial communication module is mounted and execute FB again.
11	The value set for the target channel is out of the range.	Set 2 for the target channel and execute the FB again.
12	The value set for the target axis is out of the range.	Set a value within the range from 1 to 16 for the target axis and execute the FB again.
20	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
21	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.)
22	Other FB which may affect the operation of an electric actuator is executing.	Stop the FB which may affect the operation of the electric actuator other than this FB, and execute this FB again. Target FB: • M+CPU-IAIPosiSp_StartHomePosi-ST • M+CPU-IAIPosiSp_JogInching-ST • M+CPU-IAIPosiSp_StartPosi-ST • M+CPU-IAIPosiSp_ServoControl-ST For M+CPU-IAIPosiSp_JogInching-ST, check that ob_ParamOK (parameter setting completion flag) is turned ON and ob_Busy (busy signal) is turned OFF.
23	Emergency stop or major failure is occurring.	Check the status of a controller in M+CPU-IAIPosiSp_Monitoring-ST. After checking the status, remove the cause of the error and execute the FB again.
24	The G_CPRTCL instruction which is executed for the specified start I/O number is not defined.	Add the G_CPRTCL instruction, which is executed for the specified start I/O number, to the M+CPU-IAIPosiSp_CPRTCL-ST program. For details, refer to the following: ☞ Page 55 Checking the start I/O number
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)

3.3 M+CPU-IAIPosiSp_JogInching-ST

Point

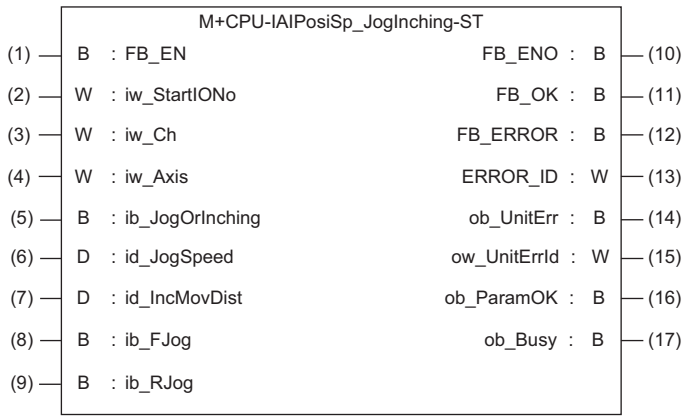
Advanced preparation is required for using this FB. For details, refer to the following:

☞ Page 55 Importing M+CPU-IAIPosiSp_CPRTCL-ST

☞ Page 55 Checking the start I/O number

Overview

Executes 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 I/O number to which a target serial communication module is mounted 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 16	Specify the value obtained by incrementing the axis number set in a controller by one.
(5)	ib_JogOrInching	JOG/Inching replacement	Bit	ON, OFF	ON: Inching operation OFF: JOG operation
(6)	id_JogSpeed	JOG speed	Double Word [signed]	1 to 999999	Specify the JOG speed. For the inching operation, the specified speed is ignored. (Unit: 0.01 mm/s)
(7)	id_IncMovDist	Inching amount of movement	Double Word [signed]	1 to 999999	Specify the inching amount of movement For the JOG operation, the specified movement amount is ignored. (Unit: 0.01 mm/s)
(8)	ib_FJog	JOG + command	Bit	ON, OFF	Turn ON this label to perform the forward JOG or inching operation.
(9)	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	Default value	Description
(10)	FB_ENO	Execution status	Bit	OFF	ON: The execution command is ON. OFF: The execution command is OFF.
(11)	FB_OK	Normal completion	Bit	OFF	The ON state indicates that the JOG operation is started, and the inching operation is completed normally.
(12)	FB_ERROR	Error completion	Bit	OFF	The ON state indicates that an error has occurred in the FB.
(13)	ERROR_ID	Error code	Word [signed]	0	The error code of an error occurred in the FB is stored.
(14)	ob_UnitErr	Unit error completion	Bit	OFF	The ON state indicates that an error has occurred in the module.
(15)	ow_UnitErrId	Unit error code	Word [signed]	0	The error code of an error occurred in the module is stored.
(16)	ob_ParamOK	Parameter setting completion flag	Bit	OFF	The ON state indicates that the initial settings until an electric actuator is ready to operate is completed.
(17)	ob_Busy	Busy signal	Bit	OFF	The ON state indicates that an electric actuator is operating.

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	ST
Number of basic steps	6289 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: 0.07K points (Word), 0.04K point (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).
FB dependence	M+CPU-IAIPosiSp_JogInching-ST └ M+CPU-IAIPosiSp_ServoControl-ST └ M+CPU-IAIPosiSp_CPRTCL-ST
FB compilation method	Macro type
FB operation	Real-time execution

Processing

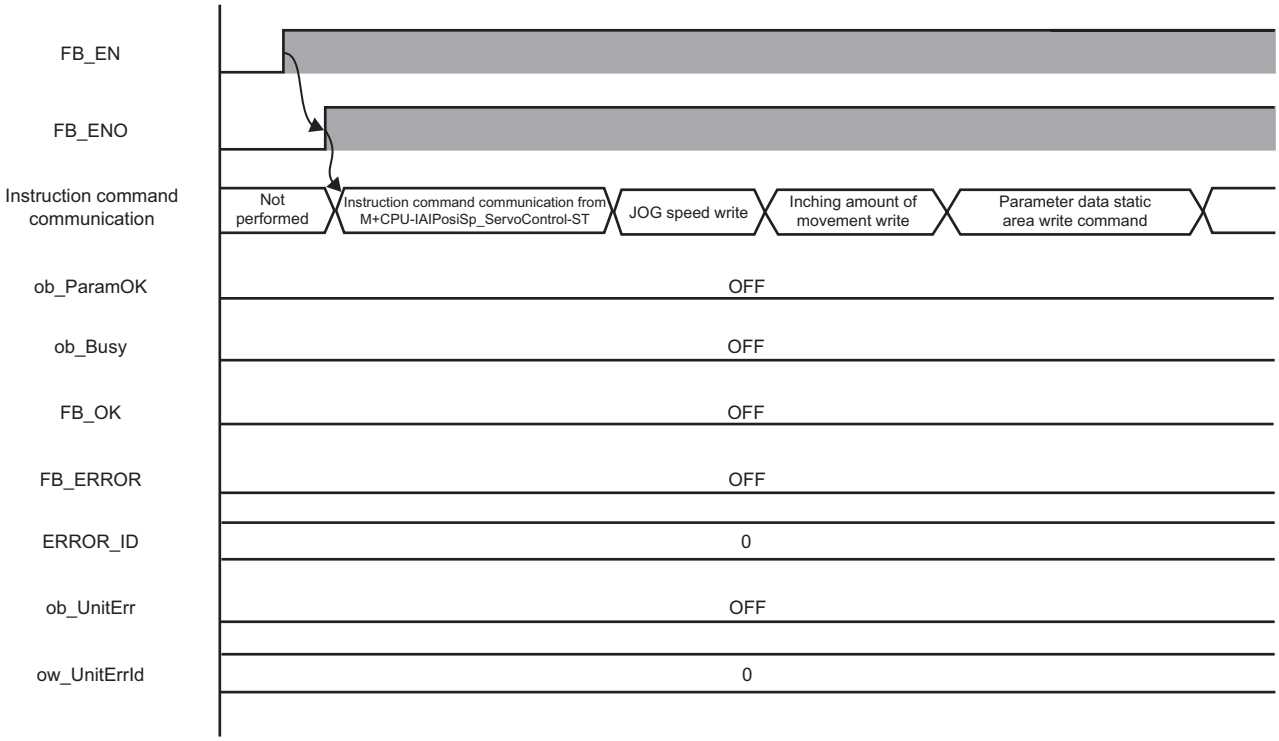
- Before executing this FB, check that the G_CPRTCL instruction which is executed for the specified start I/O number exists in the M+CPU-IAIPosiSp_CPRTCL-ST program. (☞ Page 55 Checking the start I/O number, ☞ Page 101 M+CPU-IAIPosiSp_CPRTCL-ST)
- Specify the axis number of the operation target in iw_Axis (target axis).
- The movement amount of inching operation is set to id_IncMovDist (inching amount of movement).
- The JOG operation speed is set to id_JogSpeed (JOG speed).
- This FB switches from PIO to Modbus communication at the rise of FB_EN (execution command) and writes id_JogSpeed (JOG speed) and id_IncMovDist (inching amount of movement) to the parameter data of a controller.
- When the JOG or inching operation becomes ready to operate after writing parameter data and resetting software, ob_ParamOK (parameter setting completion flag) is turned ON.
- ob_Busy (busy signal) is turned ON while an electric actuator is operating.
- 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.
- For the inching operation, the operation decelerates to stop when turning ON the command which moves an electric actuator in the reverse direction while the actuator is operating.
- 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.
- For the JOG operation, the operation decelerates to stop when turning ON both ib_FJog (JOG + command) and ib_RJog (JOG - command). The ON operation is started by turning OFF either one of the commands.
- The operation decelerates to stop when ib_JogOrInching (JOG/Inching replacement) is changed during the operation of ib_FJog (JOG + command) or ib_RJog (JOG - command).
- 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 '10' 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 '11' 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 '12' is stored in ERROR_ID (error code).
- When a value out of the range is set for the JOG speed, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '13' is stored in ERROR_ID (error code).
- When a value out of the range is set for the inching amount of movement, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '14' 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 '20' is stored in ERROR_ID (error code).
- When turning OFF FB_EN (execution command) before ob_ParamOK (parameter setting completion flag) is turned ON, FB_ERROR (error completion) is turned ON for one scan only. In addition, the error code '21' 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. In addition, the error code '22' is stored in ERROR_ID (error code).
  M+CPU-IAIPosiSp_StartHomePosi-ST, M+CPU-IAIPosiSp_JogInching-ST, M+CPU-IAIPosiSp_StartPosi-ST, and M+CPU-IAIPosiSp_ServoControl-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 an electric actuator, 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

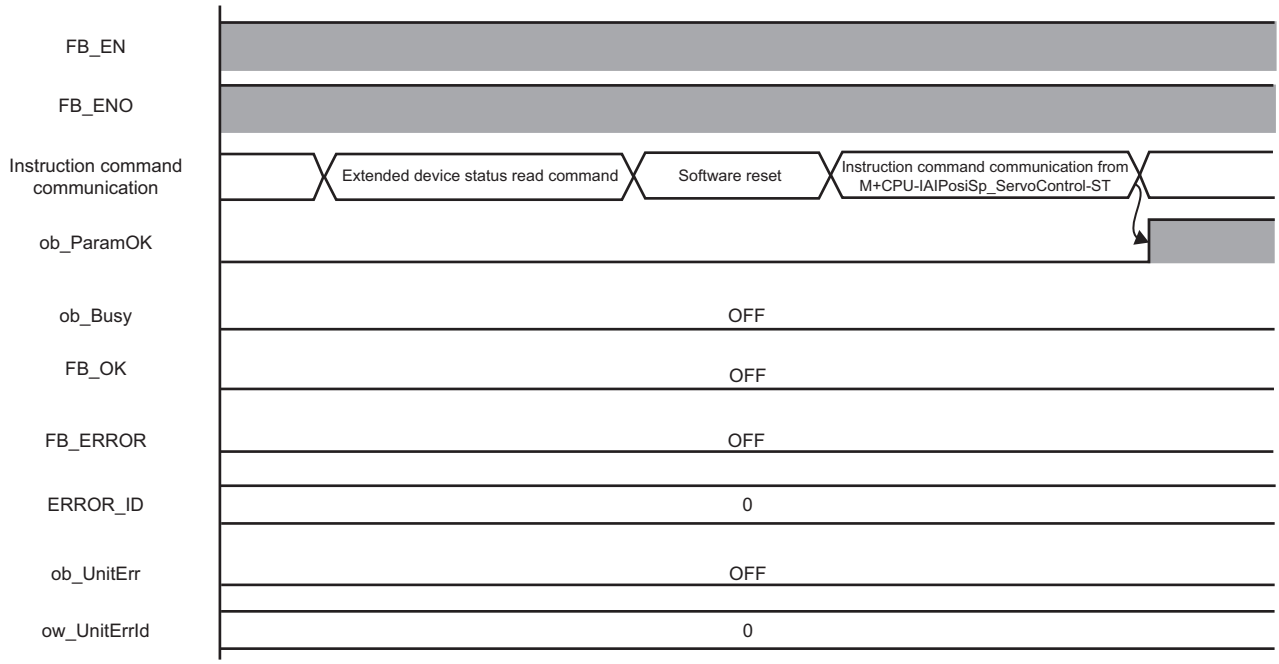
• From the rise of FB_EN (execution command) to parameter data static area write command

The program is executed once at the rise of FB_EN (execution command).



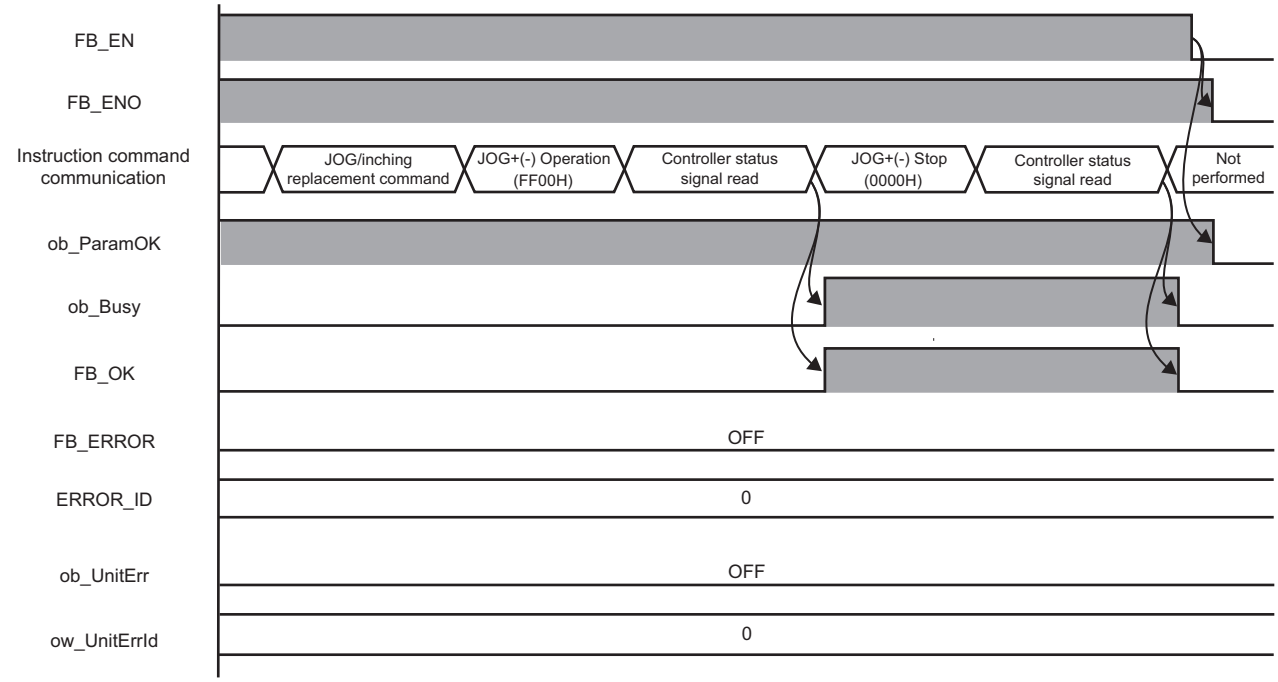
• From extended device status read command to servo ON command

The program is executed once at the rise of FB_EN (execution command).

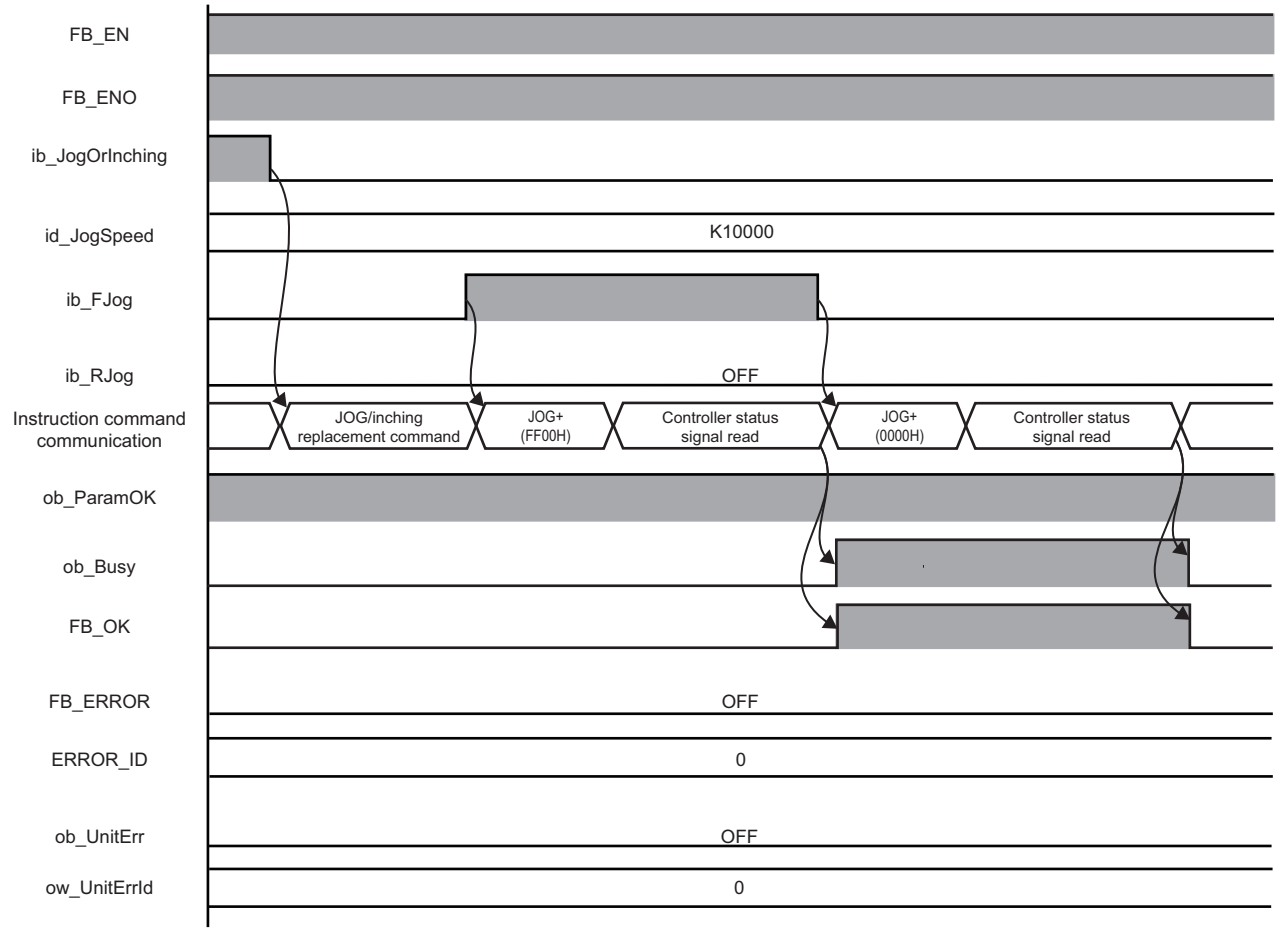


• From JOG/Inching replacement command to when FB_EN (execution command) is turned OFF (Example: JOG operation)

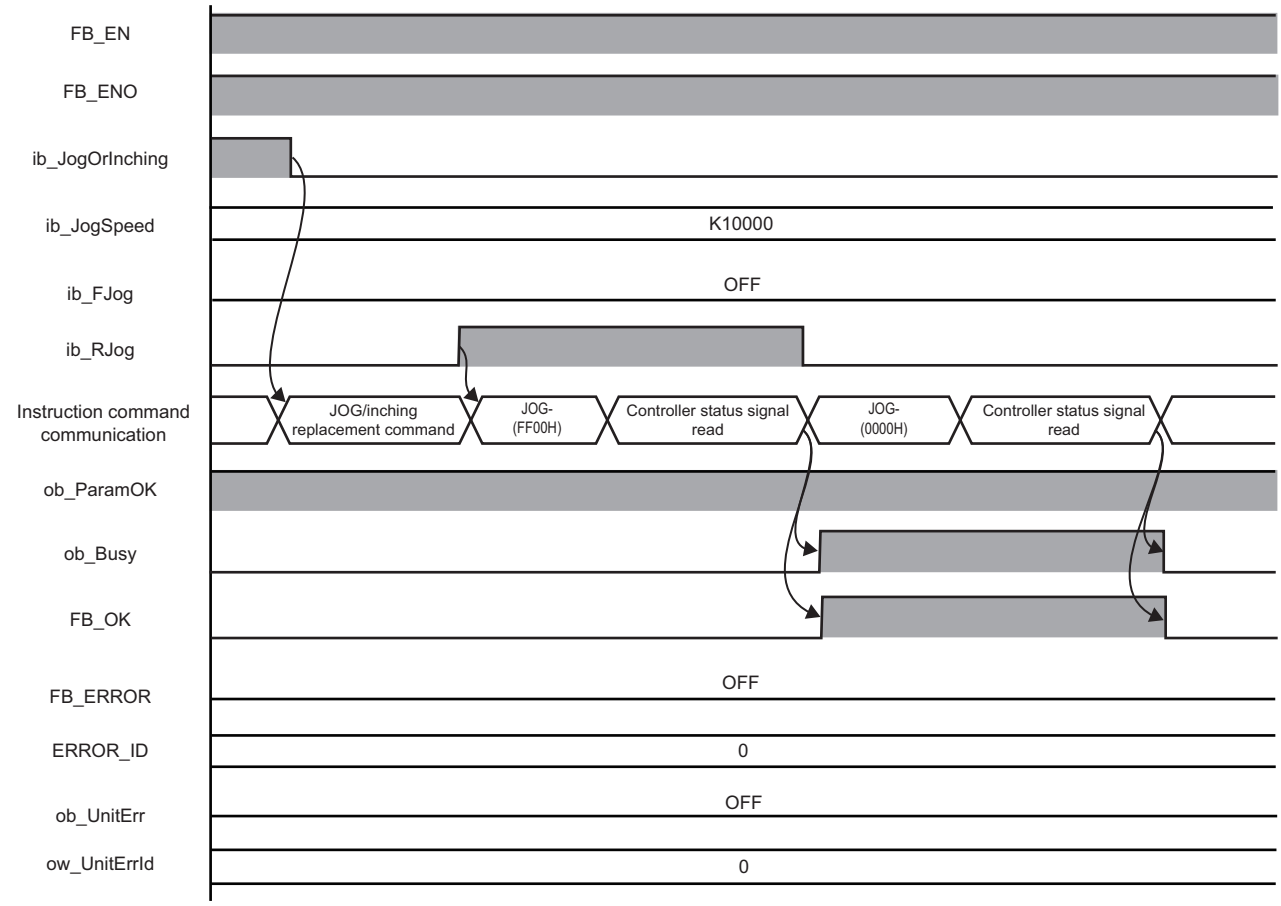
The following processing is executed repeatedly while FB_EN (execution command) is turned ON.



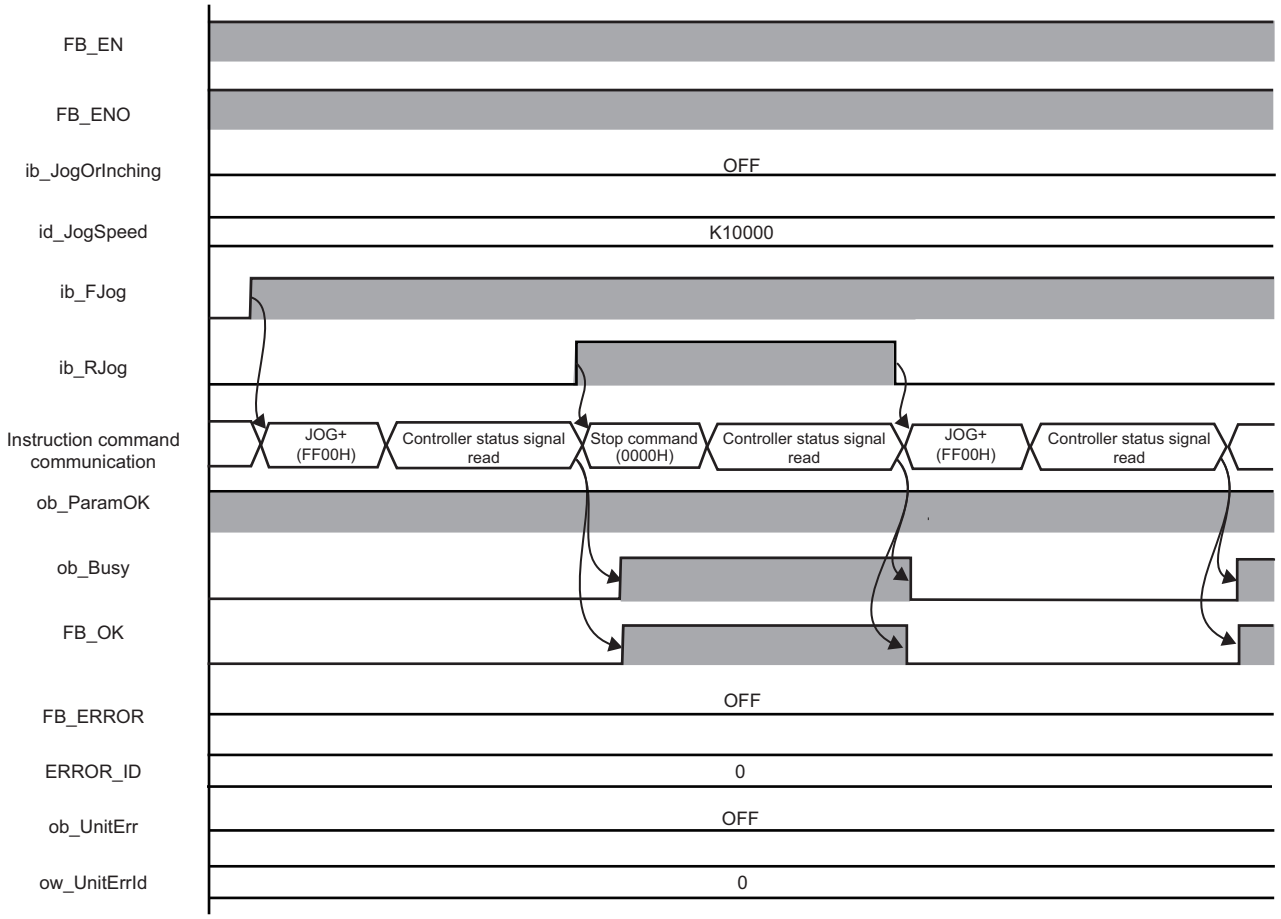
• For JOG operation (JOG + command)



• For JOG operation (JOG - command)

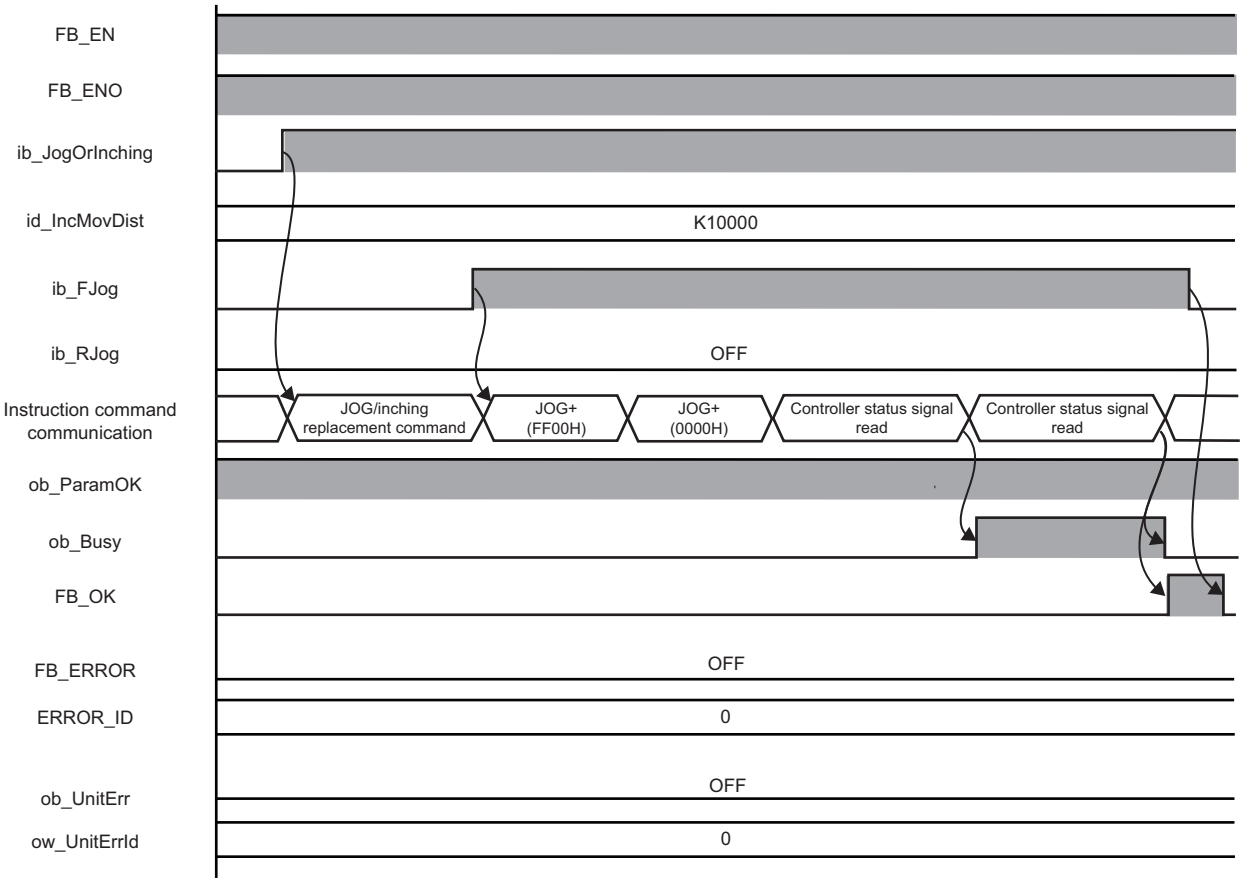


• For JOG operation (when both JOG + command and JOG - command are turned ON simultaneously)



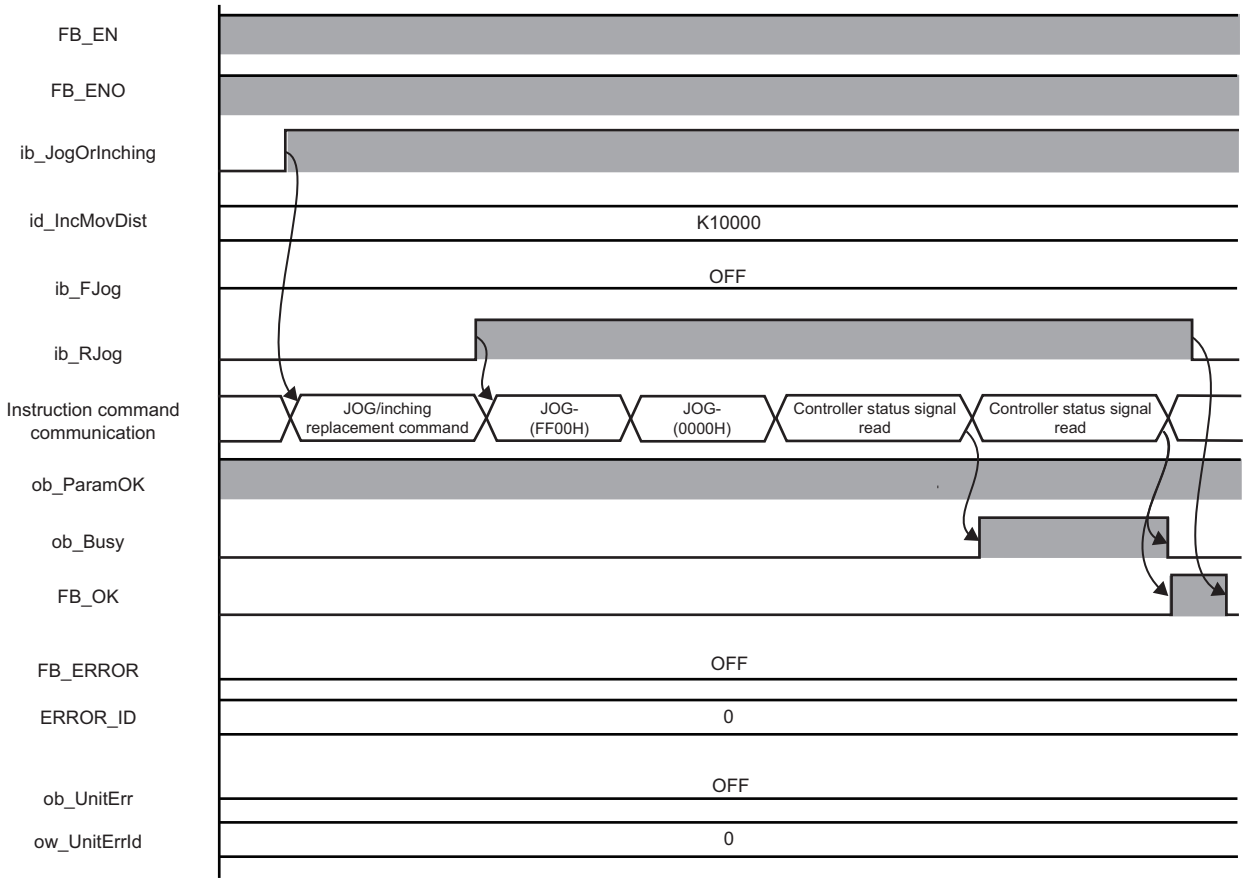
• For inching operation (JOG + command)

When ib_FJog (JOG + command) is turned OFF before FB_OK (normal completion) is turned ON, FB_OK (normal completion) is turned ON for one scan only.

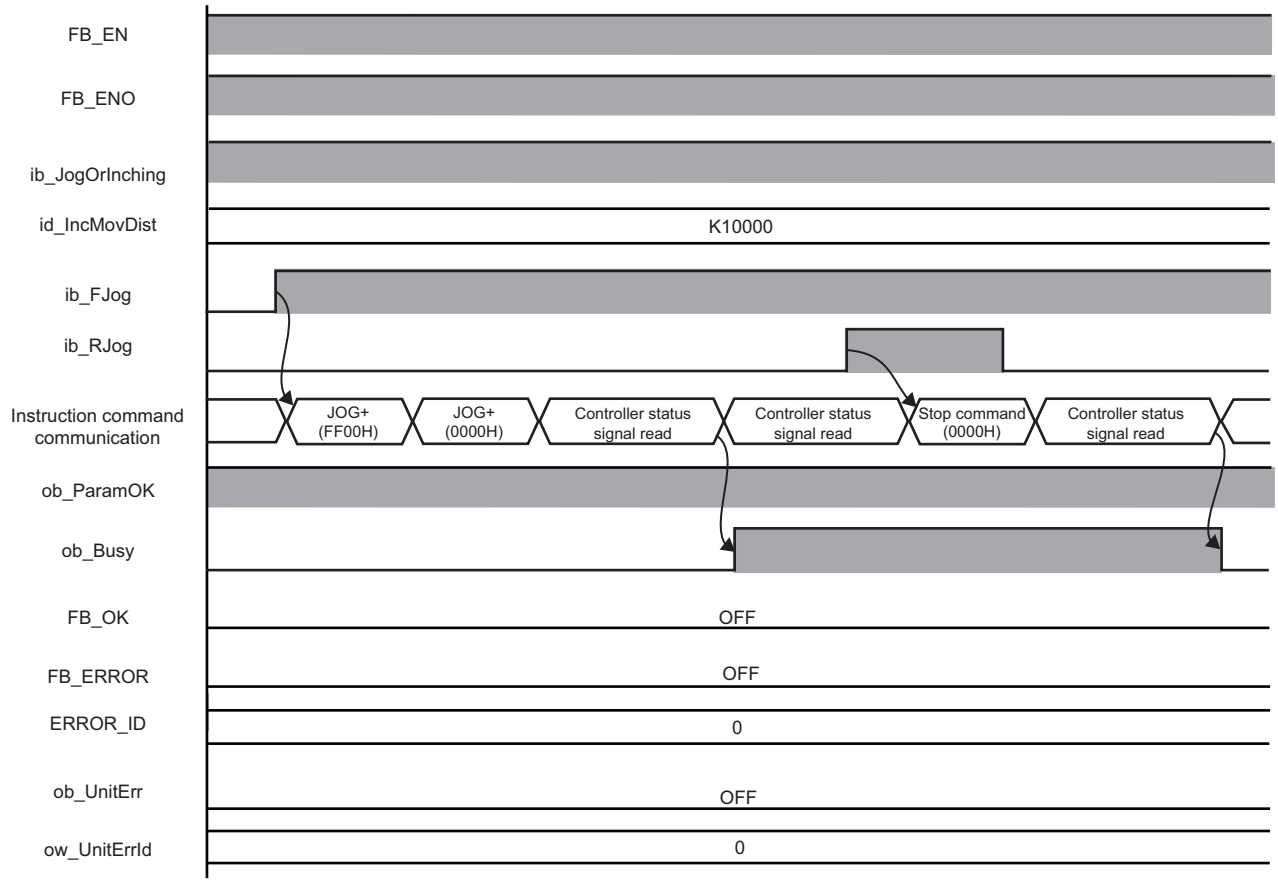


• For inching operation (JOG - command)

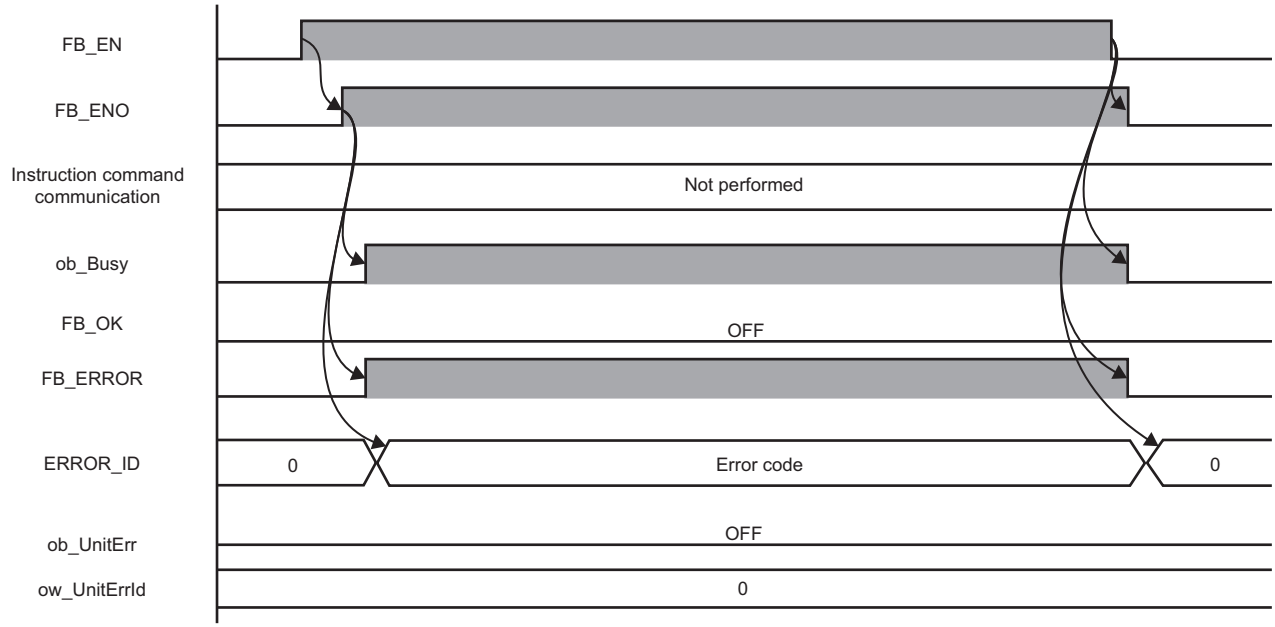
When ib_RJog (JOG - command) is turned OFF before FB_OK (normal completion) is turned ON, FB_OK (normal completion) is turned ON for one scan only.



• For inching operation (when both JOG + command and JOG - command are turned ON simultaneously)



■ 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.
- This FB writes to the non-volatile memory. For details, refer to the IAI Corporation manuals related to serial communication (Modbus version).
- By turning ON FB_EN (execution command), this FB restarts the controller after turning OFF the servo. It takes 2000 ms to restart.
- If the time from when a controller is restarted to when the controller is ready for communication takes more than 2100 ms, this FB is completed with an error. In this case, set the time to the buffer memory (Un\G5520). The waiting time for this FB is Un\G5520 × 100 ms. When the waiting time is set for less than 2100 ms, the time is automatically changed to 2100 ms.
- JOG speed and inching amount of movement cannot be changed while FB_EN (execution command) is turned ON. For changing the JOG speed or inching amount of movement, execute the FB again.
- Execute a home position return after ob_ParamOK (parameter setting completion flag) is turned ON. Otherwise a critical error may occur when an electric actuator exceeds the operation limit value.
- When the electric actuator 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 turning OFF FB_EN (execution command) while an electric actuator is operating, the actuator continues to operate. Prepare a program for the operation of the actuator separately in accordance with the required system operation.
- This FB uses the G_CPRTCL instruction. For details, refer to 📖MELSEC-Q/L Structured Programming Manual (Special Instructions).
- Specify the start I/O number assigned to a serial communication module in iw_StartIONo (start I/O No.). If the start I/O number which is not assigned to the module is specified, 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 electric actuator, 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 rate setting		Set the value according to the setting of an electric actuator controller to be used.
	Communication protocol setting		Predefined protocol
Various Control Specification	Echo back permit/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: —
- Electric actuator: ERC3-SA5C-I-42P-12-50-SE-P-CN
- JOG speed: 10.00 mm/sec
- 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	2680.000 ms	0.915 ms	12475 scans
From when ib_FJog (JOG + command) or ib_RJog (JOG - command) is turned ON to when JOG operation is started	21.000 ms	0.895 ms	65 scans
From when ib_FJog (JOG + command) or ib_RJog (JOG - command) is turned ON to when inching movement is completed	59.900 ms	0.847 ms	195 scans

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

Error code

Error code (Decimal)	Description	Corrective action
10	The value set for the start I/O number is out of the range.	Set the start I/O number to which a serial communication module is mounted and execute FB again.
11	The value set for the target channel is out of the range.	Set 2 for the target channel and execute the FB again.
12	The value set for the target axis is out of the range.	Set a value within the range from 1 to 16 for the target axis and execute the FB again.
13	The value set for the JOG speed is out of the range.	Set a value within the range from 1 to 999999 for the JOG speed and execute the FB again.
14	The value set for the inching amount of movement is out of the range.	Set a value within the range from 1 to 999999 for the inching amount of movement and execute the FB again.
20	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
21	The execution command turned OFF during the processing.	Do not turn OFF FB_EN (execution command) until ob_ParamOK (parameter setting completion flag) is turned ON. (This error code is output for one scan only.)
22	Other FB which may affect the operation of an electric actuator is executing.	Stop the FB which may affect the operation of the electric actuator other than this FB, and execute this FB again. Target FB: • M+CPU-IAIPosiSp_StartHomePosi-ST • M+CPU-IAIPosiSp_JogInching-ST • M+CPU-IAIPosiSp_StartPosi-ST • M+CPU-IAIPosiSp_ServoControl-ST
23	Emergency stop or major failure is occurring.	Check the status of a controller in M+CPU-IAIPosiSp_Monitoring-ST. After checking the status, remove the cause of the error and execute the FB again.
24	The G_CPRTCL instruction which is executed for the specified start I/O number is not defined.	Add the G_CPRTCL instruction, which is executed for the specified start I/O number, to the M+CPU-IAIPosiSp_CPRTCL-ST program. For details, refer to the following: ☞ Page 55 Checking the start I/O number
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-IAIPosiSp_ReadPosiTable-ST

Point

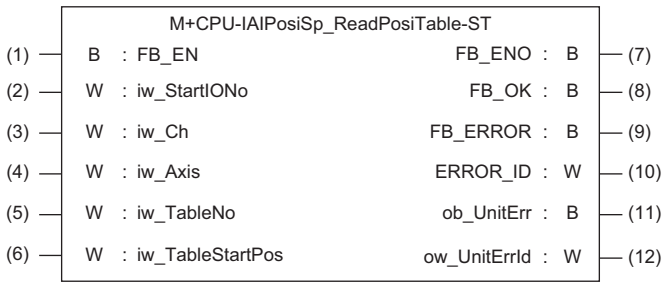
Advanced preparation is required for using this FB. For details, refer to the following:

☞ Page 55 Importing M+CPU-IAIPosiSp_CPRTCL-ST

☞ Page 55 Checking the start I/O number

Overview

Reads the data of the specified position table.



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 I/O number to which a target serial communication module is mounted 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 16	Specify the value obtained by incrementing the axis number set in a controller by one.
(5)	iw_TableNo	Position table No.	Word [signed]	0 to 767	Specify the position table number from which the setting value is read.
(6)	iw_TableStartPos	Position table starting position	Word [signed]	0 to FFFFH	Specify the start number of D device, which stores position table values, in hexadecimal. For details on the position table, refer to the following: ☞ Page 104 Position table

Output label

No.	Label	Name	Data type	Default 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 position 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

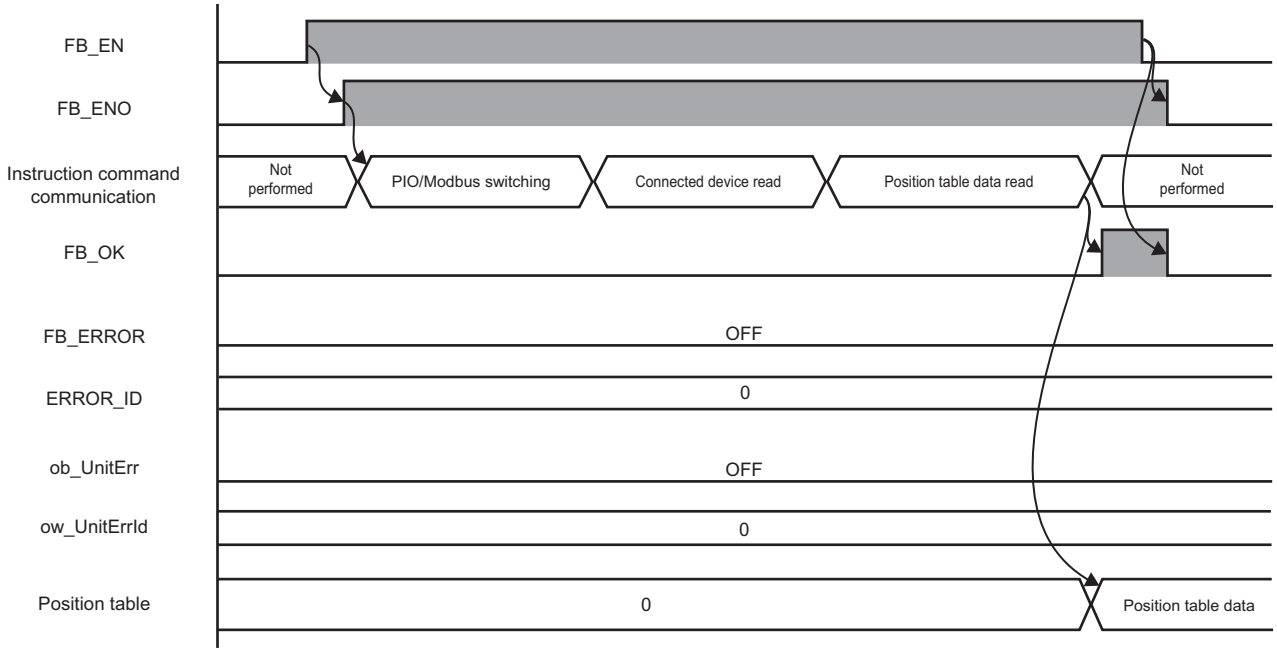
Item	Description
Language	ST
Number of basic steps	2075 steps The number of steps of the FB which is embedded in a program varies depending on the CPU module being used, input/output definitions, and option settings of GX Works2. For the option settings of GX Works2, refer to the 📖GX Works2 Version 1 Operating Manual (Common).
Number of points of a label used	• Label: 0.04K points (Word), 0.01K 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).
FB dependence	M+CPU-IAIPosiSp_ReadPosiTable-ST └ M+CPU-IAIPosiSp_CPRTCL-ST
FB compilation method	Macro type
FB operation	Pulse execution (multiple scan execution type)

Processing

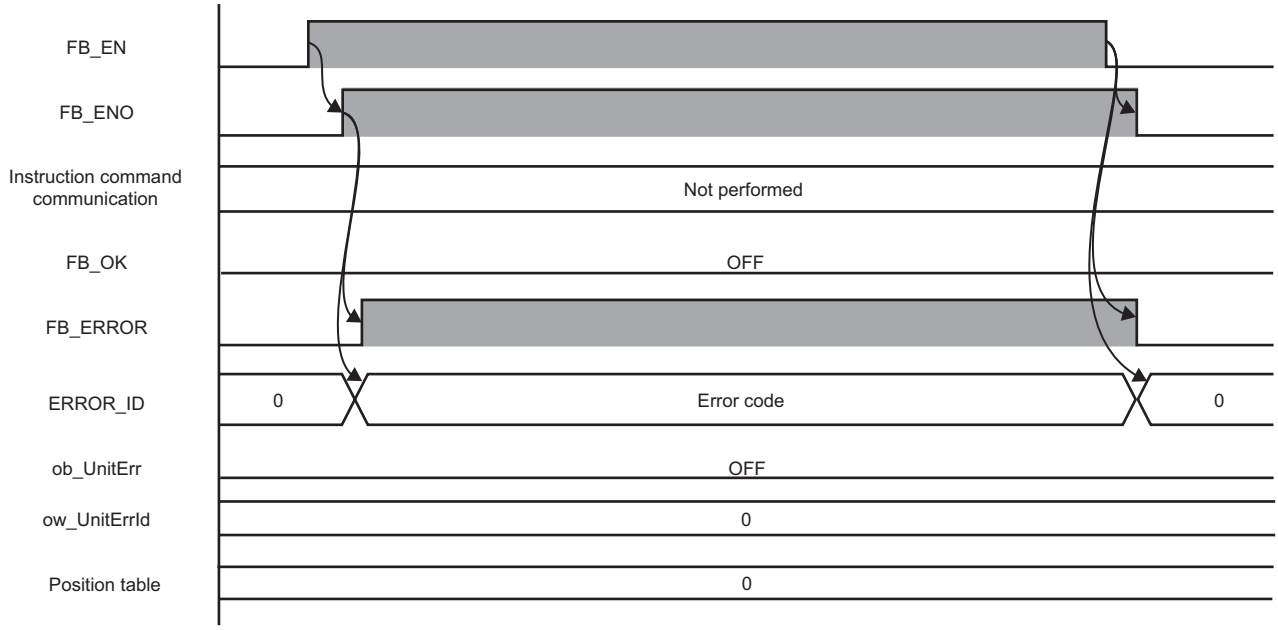
- Before executing this FB, check that the G_CPRTCL instruction which is executed for the specified start I/O number exists in the M+CPU-IAIPosiSp_CPRTCL-ST program. (☞ Page 55 Checking the start I/O number, ☞ Page 101 M+CPU-IAIPosiSp_CPRTCL-ST)
- Specify the axis number of the operation target in iw_Axis (target axis).
- Specify the position table number to be read to iw_TableNo (position table No.).
- This FB switches from PIO to Modbus communication at the rise of FB_EN (execution command) and reads the setting data of the specified position table number of a controller.
- FB_OK (normal completion) is turned ON when reading the position table 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 '10' 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 '11' 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 '12' is stored in ERROR_ID (error code).
- When a value out of the range is set for the position table number, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '15' 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 '20' 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. In addition, the error code '21' is stored in ERROR_ID (error code) for one scan.
- 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 an electric actuator, 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.
- This FB uses the G_CPRTCL instruction. For details, refer to MELSEC-Q/L Structured Programming Manual (Special Instructions).
- Specify the start I/O number assigned to a serial communication module in iw_StartIONo (start I/O No.). If the start I/O number which is not assigned to the module is specified, a stop error (2110H) occurs in the CPU module.
- This FB uses the index register (Z9 and Z8). Do not use the Z9 and Z8 in an interrupt program.
- Before operating an electric actuator, 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 rate setting		Set the value according to the setting of an electric actuator controller to be used.
	Communication protocol setting		Predefined protocol
Various Control Specification	Echo back permit/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: —
- Electric actuator: ERC3-SA5C-I-42P-12-50-SE-P-CN

Time required for the processing*1	Maximum scan time	Number of scans required for the processing
65.000 ms	0.815 ms	247 scans

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

Error code

Error code (Decimal)	Description	Corrective action
10	The value set for the start I/O number is out of the range.	Set the start I/O number to which a serial communication module is mounted and execute FB again.
11	The value set for the target channel is out of the range.	Set 2 for the target channel and execute the FB again.
12	The value set for the target axis is out of the range.	Set a value within the range from 1 to 16 for the target axis and execute the FB again.
15	The position table number is out of the range.	Set a value within the range from 0 to 767 for the position table number and execute the FB again.
20	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
21	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.)
24	The G_CPRTCL instruction which is executed for the specified start I/O number is not defined.	Add the G_CPRTCL instruction, which is executed for the specified start I/O number, to the M+CPU-IAIPosiSp_CPRTCL-ST program. For details, refer to the following: ☞ Page 55 Checking the start I/O number
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)

3.5 M+CPU-IAIPosiSp_TeachingPosi-ST

Point

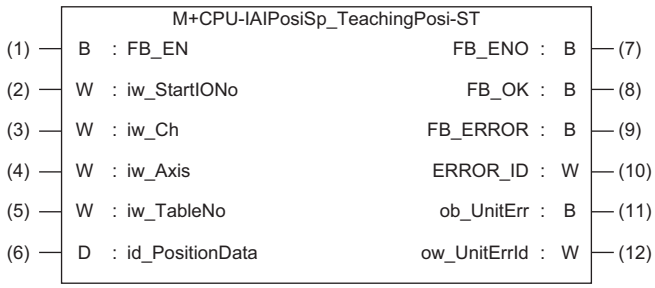
Advanced preparation is required for using this FB. For details, refer to the following:

☞ Page 55 Importing M+CPU-IAIPosiSp_CPRTCL-ST

☞ Page 55 Checking the start I/O number

Overview

Sets the designated position to the specified position table (target position).



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 I/O number to which a target serial communication module is mounted 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 16	Specify the value obtained by incrementing the axis number set in a controller by one.
(5)	iw_TableNo	Position table No.	Word [signed]	0 to 767	Specify the position table number to which the setting value is 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	Default 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 position 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	ST
Number of basic steps	2017 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: 0.04K points (Word), 0.01K 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).
FB dependence	M+CPU-IAIPosiSp_TeachingPosi-ST └ M+CPU-IAIPosiSp_CPRTCL-ST
FB compilation method	Macro type
FB operation	Pulse execution (multiple scan execution type)

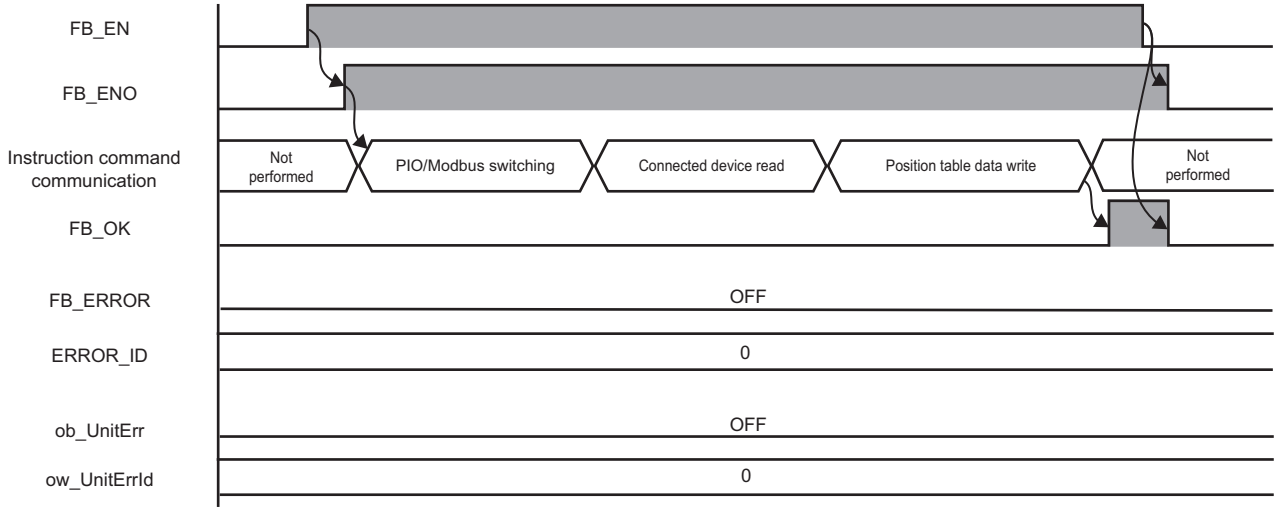
Processing

- Before executing this FB, check that the G_CPRTCL instruction which is executed for the specified start I/O number exists in the M+CPU-IAIPosiSp_CPRTCL-ST program. (☞ Page 55 Checking the start I/O number, ☞ Page 101 M+CPU-IAIPosiSp_CPRTCL-ST)
- Specify the axis number of the operation target in iw_Axis (target axis).
- Specify the position table number to be set for iw_TableNo (position table No.).
- This FB switches from PIO to Modbus communication at the rise of FB_EN (execution command) and sets id_PositionData (position data) to the target position of the specified position table number of a controller. For details on the position table, refer to the IAI Corporation manuals related to serial communication (Modbus version).
- FB_OK (normal completion) is turned ON when the position table setting 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 '10' 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 '11' 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 '12' is stored in ERROR_ID (error code).
- When a value out of the range is set for the position table number, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '15' 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 '16' is stored in ERROR_ID (error code).

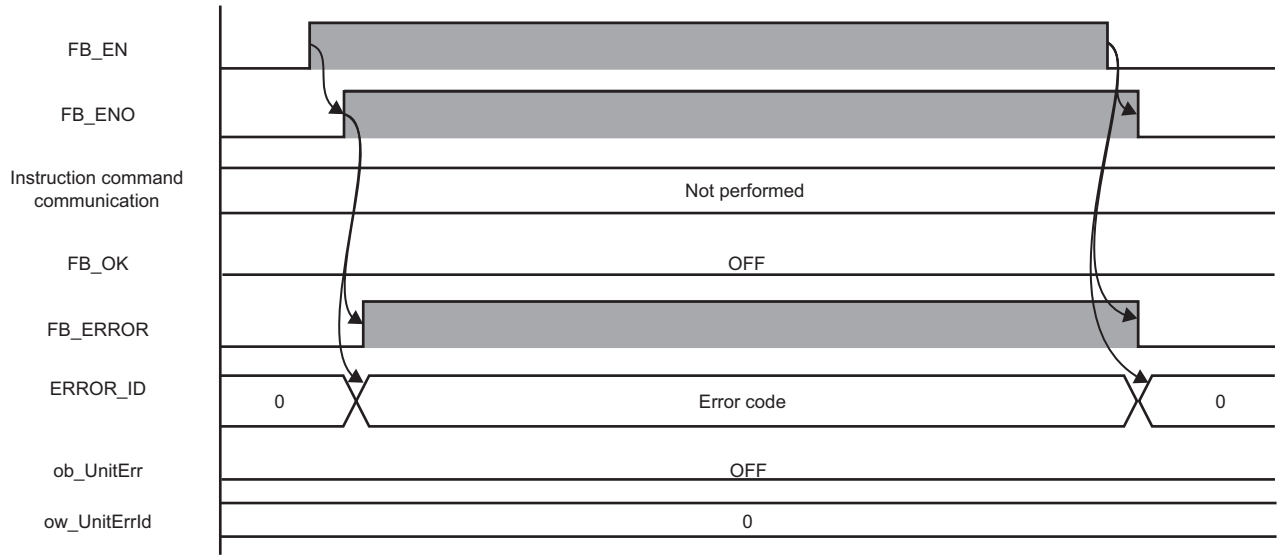
- When the connected device is not the operation target, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '20' is stored in ERROR_ID (error code).
- When turning OFF FB_EN (execution command) before FB_OK (normal completion), FB_ERROR (error completion), or ob_UnitErr (unit error completion) is turned ON, FB_ERROR (error completion) is turned ON for one scan only. In addition, the error code '21' 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. In addition, the error code '22' is stored in ERROR_ID (error code).
  M+CPU-IAIPosiSp_StartPosi-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 an electric actuator, 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.
- This FB writes to the non-volatile memory. For details, refer to the IAI Corporation manuals related to serial communication (Modbus version).
- This FB uses the G_CPRTCL instruction. For details, refer to MELSEC-Q/L Structured Programming Manual (Special Instructions).
- Specify the start I/O number assigned to a serial communication module in iw_StartIONo (start I/O No.). If the start I/O number which is not assigned to the module is specified, 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 electric actuator, 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 rate setting		Set the value according to the setting of an electric actuator controller to be used.
	Communication protocol setting		Predefined protocol
Various Control Specification	Echo back permit/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: —
- Electric actuator: ERC3-SA5C-I-42P-12-50-SE-P-CN

Time required for the processing*1	Maximum scan time	Number of scans required for the processing
63.000 ms	0.815 ms	243 scans

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

Error code

Error code (Decimal)	Description	Corrective action
10	The value set for the start I/O number is out of the range.	Set the start I/O number to which a serial communication module is mounted and execute FB again.
11	The value set for the target channel is out of the range.	Set 2 for the target channel and execute the FB again.
12	The value set for the target axis is out of the range.	Set a value within the range from 1 to 16 for the target axis and execute the FB again.
15	The position table number is out of the range.	Set a value within the range from 0 to 767 for the position table number and execute the FB again.
16	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.
20	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
21	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.)
22	Other FB which may affect the operation of an electric actuator is executing.	After stopping M+CPU-IAIPosiSp_StartPosi-ST, execute the FB again.
24	The G_CPRTCL instruction which is executed for the specified start I/O number is not defined.	Add the G_CPRTCL instruction, which is executed for the specified start I/O number, to the M+CPU-IAIPosiSp_CPRTCL-ST program. For details, refer to the following: ☞ Page 55 Checking the start I/O number
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-IAIPosiSp_StartPosi-ST

Point

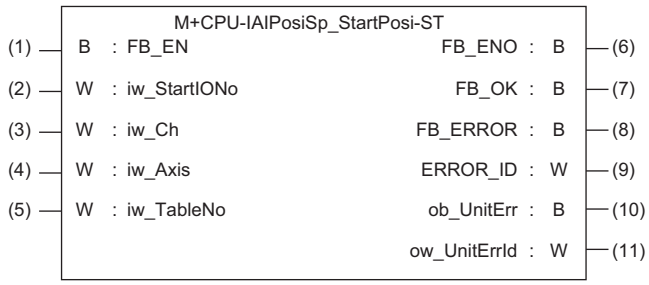
Advanced preparation is required for using this FB. For details, refer to the following:

☞ Page 55 Importing M+CPU-IAIPosiSp_CPRTCL-ST

☞ Page 55 Checking the start I/O number

Overview

Executes positioning operation based on the specified position table data.



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 I/O number to which a target serial communication module is mounted 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 16	Specify the value obtained by incrementing the axis number set in a controller by one.
(5)	iw_TableNo	Position table No.	Word [signed]	0 to 767	Specify the position table number whose positioning operation is executed.

Output label

No.	Label	Name	Data type	Default 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

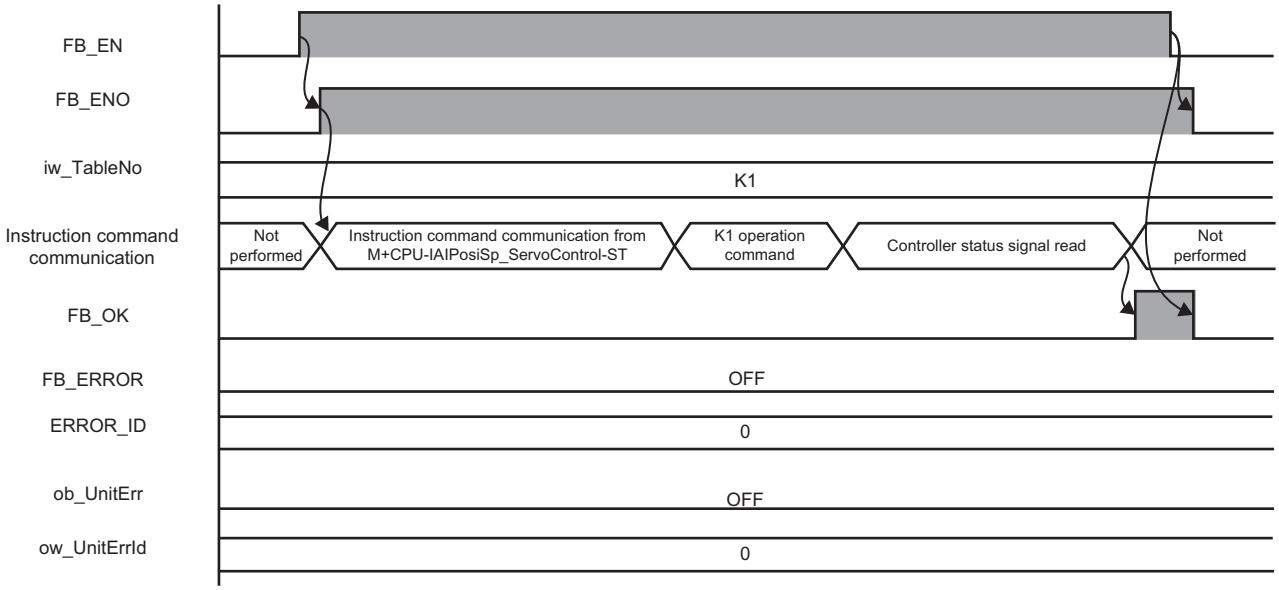
Item	Description
Language	ST
Number of basic steps	4483 steps The number of steps of the FB which is embedded in a program varies depending on the CPU module being used, input/output definitions, and option settings of GX Works2. For the option settings of GX Works2, refer to the 📖GX Works2 Version 1 Operating Manual (Common).
Number of points of a label used	• Label: 0.08K points (Word), 0.04K 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).
FB dependence	M+CPU-IAIPosiSp_StartPosi-ST └ M+CPU-IAIPosiSp_ServoControl-ST └ M+CPU-IAIPosiSp_CPRTCL-ST
FB compilation method	Macro type
FB operation	Pulse execution (multiple scan execution type)

Processing

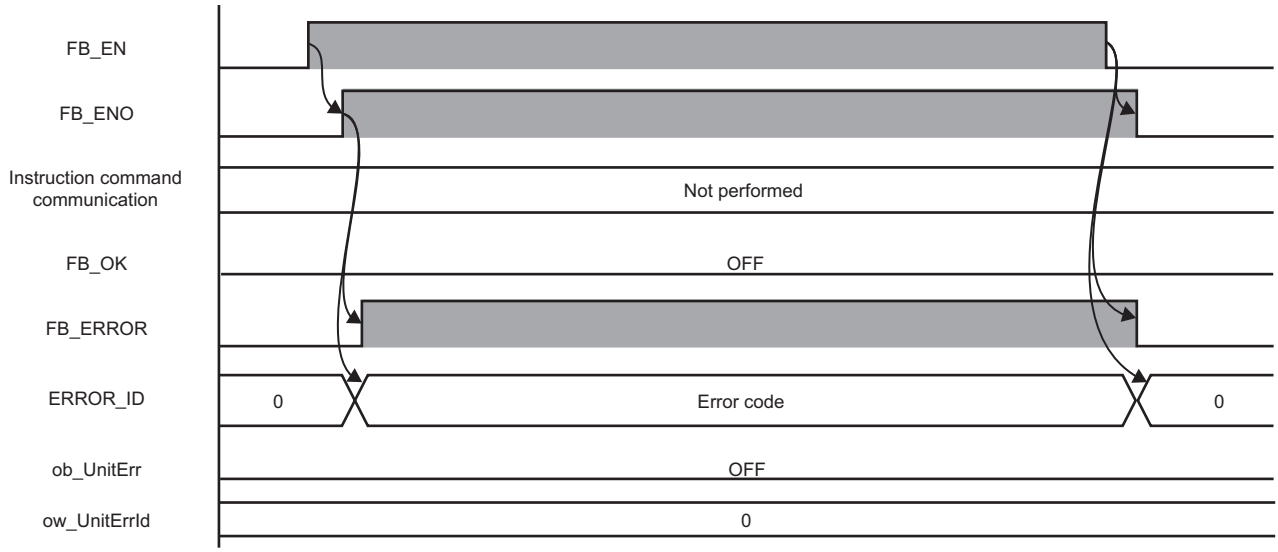
- Before executing this FB, check that the G_CPRTCL instruction which is executed for the specified start I/O number exists in the M+CPU-IAIPosiSp_CPRTCL-ST program. (☞ Page 55 Checking the start I/O number, ☞ Page 101 M+CPU-IAIPosiSp_CPRTCL-ST)
- Specify the axis number of the operation target in iw_Axis (target axis).
- Set the position table number to be executed in iw_TableNo (position table No.).
- This FB switches from PIO to Modbus communication at the rise of FB_EN (execution command) and starts positioning operation.
- FB_OK (normal completion) is turned ON when positioning operation 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 '10' 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 '11' 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 '12' is stored in ERROR_ID (error code).
- When a value out of the range is set for the position table number, FB_ERROR (error completion) is turned ON and the processing of the FB is interrupted. In addition, the error code '15' 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 '20' 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. In addition, the error code '21' 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. In addition, the error code '22' is stored in ERROR_ID (error code).
  M+CPU-IAIPosiSp_StartHomePosi-ST, M+CPU-IAIPosiSp_JogInching-ST, M+CPU-IAIPosiSp_TeachingPosi-ST, M+CPU-IAIPosiSp_StartPosi-ST, and M+CPU-IAIPosiSp_ServoControl-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 an electric actuator, 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.
- 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, an electric actuator continues to operate until a home position return is completed.
- After turning ON the power, when this FB is operated without executing a home position return, positioning operation is performed automatically after executing the home position return.
- This FB uses the G_CPRTCL instruction. For details, refer to 📖MELSEC-Q/L Structured Programming Manual (Special Instructions).
- Specify the start I/O number assigned to a serial communication module in iw_StartIONo (start I/O No.). If the start I/O number which is not assigned to the module is specified, 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 electric actuator, 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 rate setting		Set the value according to the setting of an electric actuator controller to be used.
	Communication protocol setting		Predefined protocol
Various Control Specification	Echo back permit/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: —
- Electric actuator: ERC3-SA5C-I-42P-12-50-SE-P-CN
- Electric actuator initial position: Home position (0.00 mm)
- Position table execution setting:
  Target position: 10.00 mm
  Positioning width: 0.1 mm
  Speed: 25.00 mm/sec
  Acceleration: 0.3 G
  Deceleration: 0.3 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
Immediately after power supply ON	2590.000 ms	0.915 ms	8949 scans
After executing home position return	628.000 ms	0.800 ms	1851 scans

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

Error code

Error code (Decimal)	Description	Corrective action
10	The value set for the start I/O number is out of the range.	Set the start I/O number to which a serial communication module is mounted and execute FB again.
11	The value set for the target channel is out of the range.	Set 2 for the target channel and execute the FB again.
12	The value set for the target axis is out of the range.	Set a value within the range from 1 to 16 for the target axis and execute the FB again.
15	The position table number is out of the range.	Set a value within the range from 0 to 767 for the position table number and execute the FB again.
20	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
21	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.)
22	Other FB which may affect the operation of an electric actuator is executing.	Stop the FB which may affect the operation of the electric actuator other than this FB, and execute this FB again. Target FB: • M+CPU-IAIPosiSp_StartHomePosi-ST • M+CPU-IAIPosiSp_JogInching-ST • M+CPU-IAIPosiSp_TeachingPosi-ST • M+CPU-IAIPosiSp_StartPosi-ST • M+CPU-IAIPosiSp_ServoControl-ST For M+CPU-IAIPosiSp_JogInching-ST, check that ob_ParamOK (parameter setting completion flag) is turned ON and ob_Busy (busy signal) is turned OFF.
23	Emergency stop or major failure is occurring.	Check the status of a controller in M+CPU-IAIPosiSp_Monitoring-ST. After checking the status, remove the cause of the error and execute the FB again.
24	The G_CPRTCL instruction which is executed for the specified start I/O number is not defined.	Add the G_CPRTCL instruction, which is executed for the specified start I/O number, to the M+CPU-IAIPosiSp_CPRTCL-ST program. For details, refer to the following: ☞ Page 55 Checking the start I/O number
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)

3.7 M+CPU-IAIPosiSp_Monitoring-ST

Point

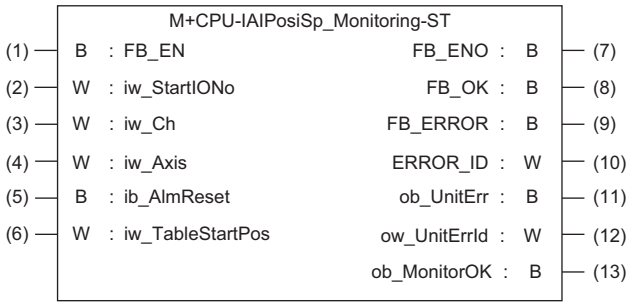
Advanced preparation is required for using this FB. For details, refer to the following:

☞ Page 55 Importing M+CPU-IAIPosiSp_CPRTCL-ST

☞ Page 55 Checking the start I/O number

Overview

Monitors a current position and alarms, and reset 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 I/O number to which a target serial communication module is mounted 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 16	Specify the value obtained by incrementing the axis number set in a controller by one.
(5)	ib_AlmReset	Reset alarm	Bit	ON, OFF	ON: An alarm is reset OFF: An alarm does not operate
(6)	iw_TableStartPos	Monitoring table starting position	Word [signed]	0 to FFFFH	Specify the start number of D device, which stores monitoring table values, in hexadecimal. For details on the monitoring table, refer to the following: ☞ Page 105 Monitoring table

Output label

No.	Label	Name	Data type	Default 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

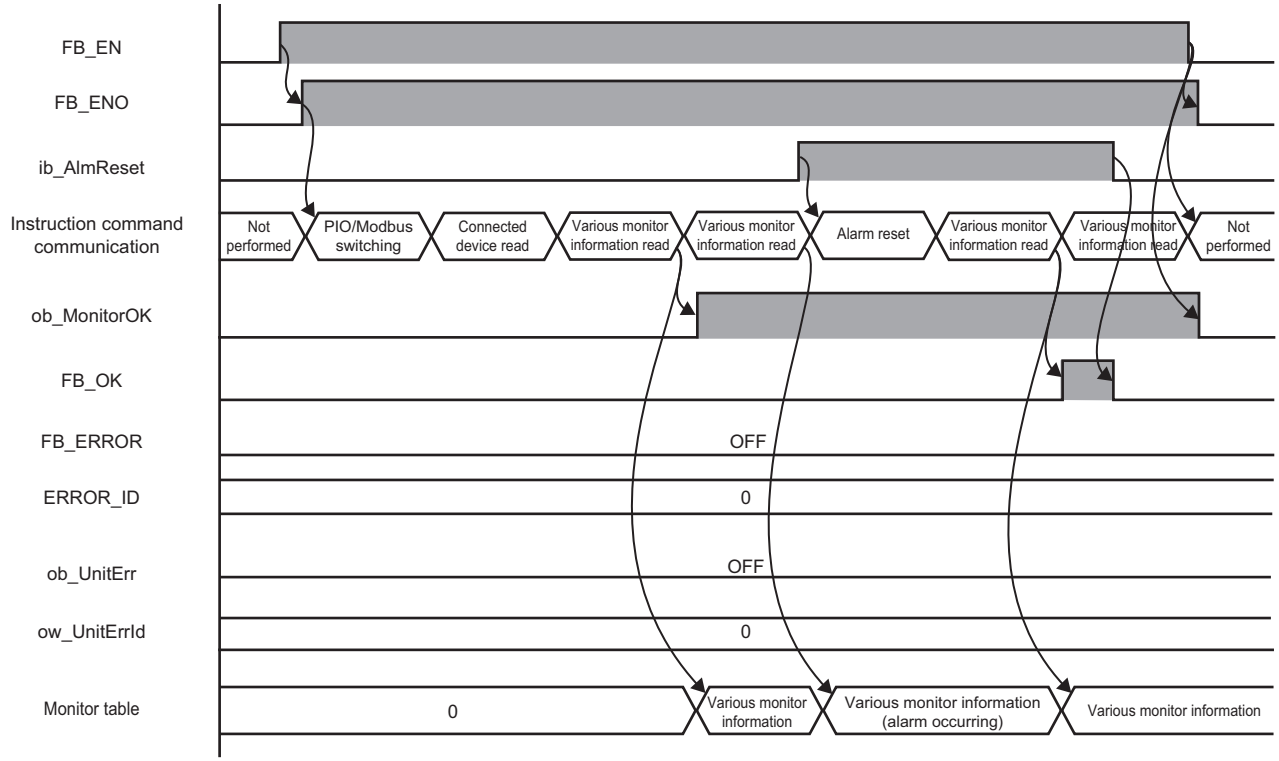
Item	Description
Language	ST
Number of basic steps	2511 steps The number of steps of the FB which is embedded in a program varies depending on the CPU module being used, input/output definitions, and option settings of GX Works2. For the option settings of GX Works2, refer to the GX Works2 Version 1 Operating Manual (Common).
Number of points of a label used	• Label: 0.03K points (Word), 0.02K 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).
FB dependence	M+CPU-IAIPosiSp_Monitoring-ST └ M+CPU-IAIPosiSp_CPRTCL-ST
FB compilation method	Macro type
FB operation	Real-time execution

Processing

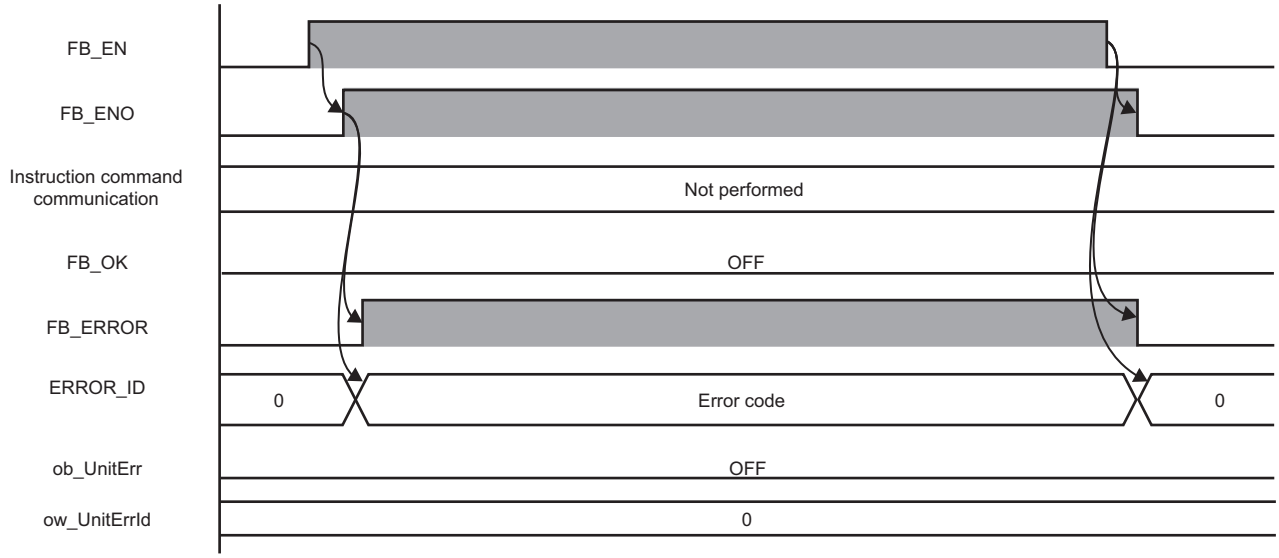
- Before executing this FB, check that the G_CPRTCL instruction which is executed for the specified start I/O number exists in the M+CPU-IAIPosiSp_CPRTCL-ST program. (☞ Page 55 Checking the start I/O number, ☞ Page 101 M+CPU-IAIPosiSp_CPRTCL-ST)
- Specify the axis number of the operation target in iw_Axis (target axis).
- This FB switches from PIO to Modbus communication at the rise of FB_EN (execution command) and starts monitoring for a controller target axis. The monitoring data (such as a current position and alarm codes) is stored in a device after the D device specified in iw_TableStartPos (monitoring table starting position). For details on the monitoring table, refer to ☞ Page 105 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.
- 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 '10' 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 '11' 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 '12' 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 '20' is stored in ERROR_ID (error code).
- When turning OFF FB_EN (execution command) before monitoring is started, FB_ERROR (error completion) is turned ON for one scan only. In addition, the error code '21' is stored in ERROR_ID (error code) for one scan.
- 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 an electric actuator, 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.
- This FB uses the G_CPRTCL instruction. For details, refer to 📖MELSEC-Q/L Structured Programming Manual (Special Instructions).
- Specify the start I/O number assigned to a serial communication module in iw_StartIONo (start I/O No.). If the start I/O number which is not assigned to the module is specified, a stop error (2110H) occurs in the CPU module.
- This FB uses the index register (Z9 and Z8). Do not use the Z9 and Z8 in an interrupt program.
- Before operating an electric actuator, 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 rate setting		Set the value according to the setting of an electric actuator controller to be used.
	Communication protocol setting		Predefined protocol
Various Control Specification	Echo back permit/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: —
- Electric actuator: ERC3-SA5C-I-42P-12-50-SE-P-CN

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	91.700 ms	0.700 ms	330 scans
From when ib_AlmReset (reset alarm) is turned ON to when an alarm reset is completed	73.800 ms	0.785 ms	169 scans

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

Error code

Error code (Decimal)	Description	Corrective action
10	The value set for the start I/O number is out of the range.	Set the start I/O number to which a serial communication module is mounted and execute FB again.
11	The value set for the target channel is out of the range.	Set 2 for the target channel and execute the FB again.
12	The value set for the target axis is out of the range.	Set a value within the range from 1 to 16 for the target axis and execute the FB again.
20	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
21	The execution command turned OFF during the processing.	Do not turn OFF FB_EN (execution command) until monitoring starts. (This error code is output for one scan only.)
24	The G_CPRTCL instruction which is executed for the specified start I/O number is not defined.	Add the G_CPRTCL instruction, which is executed for the specified start I/O number, to the M+CPU-IAIPosiSp_CPRTCL-ST program. For details, refer to the following: ☞ Page 55 Checking the start I/O number
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-IAIPosiSp_ServoControl-ST

Point

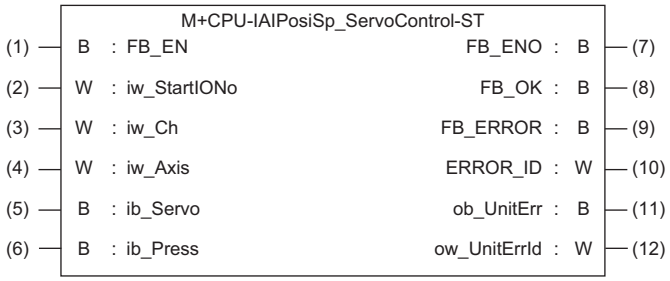
Advanced preparation is required for using this FB. For details, refer to the following:

☞ Page 55 Importing M+CPU-IAIPosiSp_CPRTCL-ST

☞ Page 55 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 I/O number to which a target serial communication module is mounted 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 16	Specify the value obtained by incrementing the axis number set in a controller by one.
(5)	ib_Servo	Servo ON/OFF replacement	Bit	ON, OFF	ON: Servo ON OFF: Servo OFF
(6)	ib_Press	Servo press ON/ OFF replacement	Bit	ON, OFF	ON: Servo press ON OFF: Servo press OFF

Output label

No.	Label	Name	Data type	Default 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 execution of servo ON or OFF command (servo press ON or OFF command) 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	ST
Number of basic steps	2264 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: 0.03K points (Word), 0.02K 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).
FB dependence	M+CPU-IAIPosiSp_ServoControl-ST └ M+CPU-IAIPosiSp_CPRTCL-ST
FB compilation method	Macro type
FB operation	Pulse execution (multiple scan execution type)

Processing

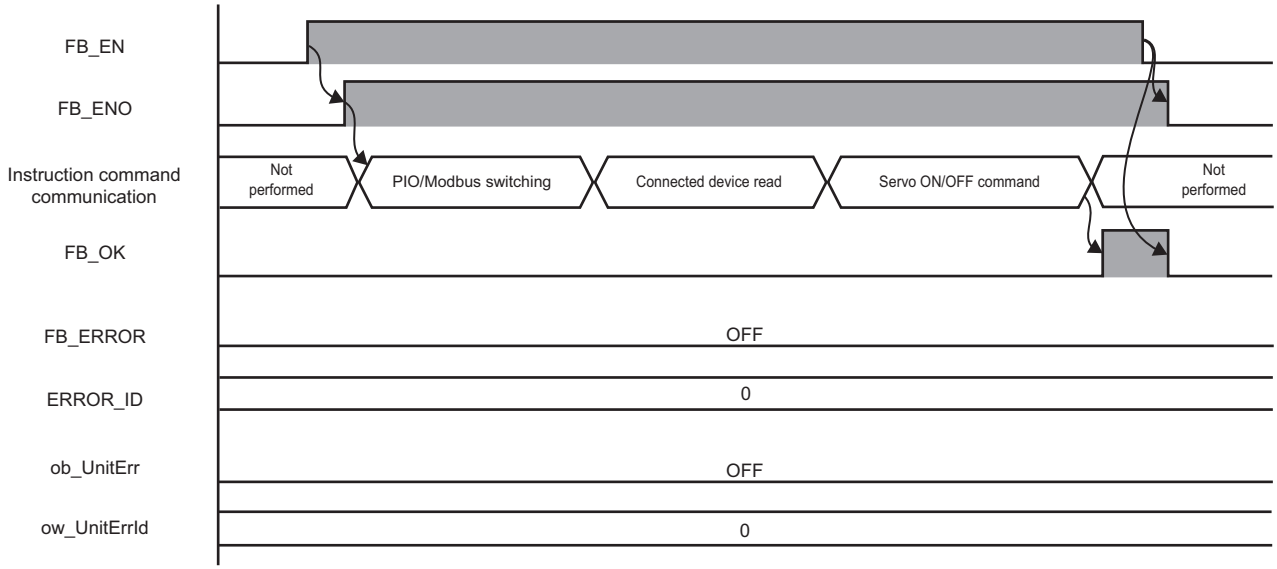
- Before executing this FB, check that the G_CPRTCL instruction which is executed for the specified start I/O number exists in the M+CPU-IAIPosiSp_CPRTCL-ST program. (☞ Page 55 Checking the start I/O number, ☞ Page 101 M+CPU-IAIPosiSp_CPRTCL-ST)
- Specify the axis number of the operation target in iw_Axis (target axis).
- This FB switches from PIO to Modbus communication at the rise of FB_EN (execution command). The FB requests a servo to turn ON when ib_Servo (servo ON/OFF replacement) is turned ON, and requests to turn OFF when ib_Press is turned OFF. In addition, the FB requests a servo press to turn ON when ib_Press (servo press ON/OFF replacement) is turned ON, and requests to turn OFF when ib_Press is turned OFF. Note whether the servo turns ON or OFF is not checked with this FB. Check the servo status using M+CPU-IAIPosiSp_Monitoring-ST. (☞ Page 90 M+CPU-IAIPosiSp_Monitoring-ST)
- At the completion of the servo ON/OFF command execution, 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 '10' 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 '11' 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 '12' 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 '20' 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. In addition, the error code '21' is stored in ERROR_ID (error code) for one scan.

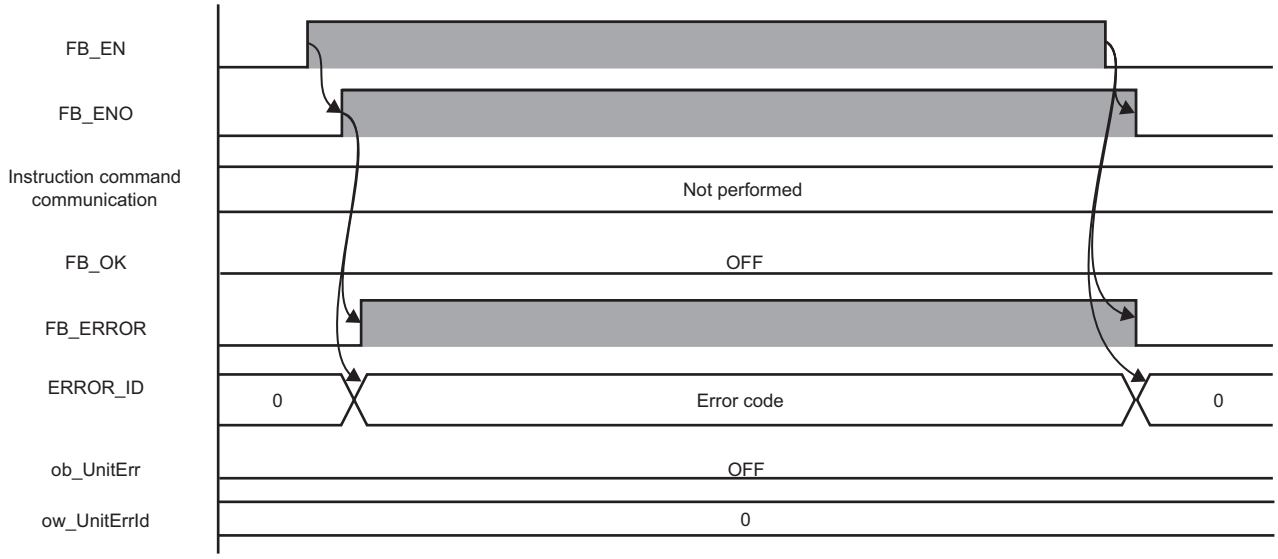
- When turning ON FB_EN (execution command) of this FB while executing any of the following FBs, FB_ERROR (error completion) is turned ON. In addition, the error code '22' is stored in ERROR_ID (error code).
  M+CPU-IAIPosiSp_StartHomePosi-ST, M+CPU-IAIPosiSp_JogInching-ST, M+CPU-IAIPosiSp_StartPosi-ST, and M+CPU-IAIPosiSp_ServoControl-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 an electric actuator, 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.
- This FB uses the G_CPRTCL instruction. For details, refer to MELSEC-Q/L Structured Programming Manual (Special Instructions).
- Specify the start I/O number assigned to a serial communication module in iw_StartIONo (start I/O No.). If the start I/O number which is not assigned to the module is specified, 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.
- This FB must satisfy the following conditions in the monitoring table. (☞ Page 105 Monitoring table)
  Bit 10 in device status 1 (Major failure status): 0
  Bit 15 in device status 1 (EMG status): 0
  Bit 15 in device status 2 (Enable): 1
  Bit 17 in system status (Auto servo OFF): 0
  If the conditions are not satisfied, FB_OK (normal completion) turns ON but a servo is not turned ON or OFF. For details, refer to the IAI Corporation manuals related to serial communication (Modbus version).
- Before operating an electric actuator, 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 rate setting		Set the value according to the setting of an electric actuator controller to be used.
	Communication protocol setting		Predefined protocol
Various Control Specification	Echo back permit/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: —
- Electric actuator: ERC3-SA5C-I-42P-12-50-SE-P-CN

Input label		Time required for the processing*1	Maximum scan time	Number of scans required for the processing
ib_Servo (Servo ON/OFF replacement)	ib_Press (Servo press ON/OFF replacement)			
OFF	OFF	59.400 ms	0.700 ms	224 scans
ON	OFF	58.800 ms	0.700 ms	225 scans
ON	ON	58.800 ms	0.700 ms	222 scans
OFF	ON	60.200 ms	0.700 ms	222 scans

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

Error code

Error code (Decimal)	Description	Corrective action
10	The value set for the start I/O number is out of the range.	Set the start I/O number to which a serial communication module is mounted and execute FB again.
11	The value set for the target channel is out of the range.	Set 2 for the target channel and execute the FB again.
12	The value set for the target axis is out of the range.	Set a value within the range from 1 to 16 for the target axis and execute the FB again.
20	An unsupported device is connected.	Review and correct the connected device and execute the FB again.
21	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.)
22	Other FB which may affect the operation of an electric actuator is executing.	Stop the FB which may affect the operation of the electric actuator other than this FB, and execute this FB again. Target FB: • M+CPU-IAIPosiSp_StartHomePosi-ST • M+CPU-IAIPosiSp_JogInching-ST • M+CPU-IAIPosiSp_StartPosi-ST • M+CPU-IAIPosiSp_ServoControl-ST
24	The G_CPRTCL instruction which is executed for the specified start I/O number is not defined.	Add the G_CPRTCL instruction, which is executed for the specified start I/O number, to the M+CPU-IAIPosiSp_CPRTCL-ST program. For details, refer to the following: ☞ Page 55 Checking the start I/O number
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-IAIPosiSp_CPRTCL-ST

Overview

This FB executes the G_CPRTCL instruction by using the FB in each MELSEC-Q/L series FB.

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-IAIPosiSp_StartHomePosi-ST
- M+CPU-IAIPosiSp_JogInching-ST
- M+CPU-IAIPosiSp_ReadPosiTable-ST
- M+CPU-IAIPosiSp_TeachingPosi-ST
- M+CPU-IAIPosiSp_StartPosi-ST
- M+CPU-IAIPosiSp_Monitoring-ST
- M+CPU-IAIPosiSp_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 I/O number of a serial communication module which executes the G_CPRTCL instruction is other than 00H to F0H, the start I/O number needs to be set after adding the G_CPRTCL instruction to a program. For details, refer to the following:

☞ Page 55 Checking the start I/O number

APPENDIX

Appendix 1 Table Information (MELSEC iQ-R Series)

Position table structure (stPositionTable)

The following shows the list of position table structure (stMonitoringTable).

Label	Name	Data type	Range	Description
dTargetPosition	Target position	Double Word [signed]	-999999 to 999999	To store the set target position [0.01 mm units] in the specified position table number.
udPositioningWidth	Positioning width	Double Word [unsigned]	1 to 999999	To store the set positioning width [0.01 mm units] in the specified position table number.
udSpeed	Speed command	Double Word [unsigned]	1 to 999999	To store the set speed [0.01 mm/s units] in the specified position table number.
dZoneBoundaryPlus	Individual zone boundary plus side	Double Word [signed]	-999999 to 999999	To store the set individual zone boundary plus side [0.01 mm units] in the specified position table number.
dZoneBoundaryMinus	Individual zone boundary minus side	Double Word [signed]	-999999 to 999999	To store the set individual zone boundary minus side [0.01 mm units] in the specified position table number.
uAcceleration	Acceleration command	Word [unsigned]	0001H to 012CH	To store the set acceleration [0.01 G units] in hexadecimal in the specified position table number.
uDeceleration	Deceleration command	Word [unsigned]	0001H to 012CH	To store the set deceleration [0.01 G units] in hexadecimal in the specified position table number.
uPressingCurrentLimit	Pressing current limit value	Word [unsigned]	0033H to 01FEH (0033H to 00B2H) The range may varies depending on the model of an electric actuator.	To store the set pressing current limit value in hexadecimal in the specified position table number.
uLoadCurrentThreshold	Load current threshold	Word [unsigned]	0 to the value depending on the setting range of an electric actuator.	To store the set load current threshold value in hexadecimal in the specified position table number.
uControlFlag	Control flag specification	Word [unsigned]	0000H to 30FEH • Bit 1: Push-motion operation • Bit 2: Forward direction (reverse direction) after approach • Bit 3: Pitch feed • Bit 4 and 5: Parameter set • Bit 6 and 7: Acceleration pattern • Bit 12 and 13: Vibration control • Others: Not used	To store the set control flag in hexadecimal in the specified position table number.*1

*1 For details, refer to the IAI Corporation manuals related to serial communication (Modbus version).

Monitoring table structure (stMonitoringTable)

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

Label	Name	Data type	Range	Description
uAlmDetailCode	Alarm detail code	Word [unsigned]	0000H to FFFFH	To store the latest alarm detail code in hexadecimal. '0000H' is stored when no alarm is generated.
uAlmAddress	Alarm address	Word [unsigned]	0000H to FFFFH	To store the latest alarm address in hexadecimal. 'FFFFH' is stored when no alarm is generated.
uAlmCode	Alarm code	Word [unsigned]	0000H to FFFFH	To store the latest alarm code in hexadecimal. '0000H' is stored when no alarm is generated.
udAlmTime	Alarm occurrence time	Double Word [unsigned]	0 to 4294967295	To store the latest alarm occurrence time. (Passed time from the origin time or power ON [s])
dCurrentPosition	Current position monitor	Double Word [signed]	-999999 to 999999	To store a current position in 0.01 mm units.

Label	Name	Data type	Range	Description
uCurrentAlmCode	Current alarm code	Word [unsigned]	0000H to FFFFH	To store the current alarm code in hexadecimal. '0000H' is stored when no alarm is generated.
uInputPort	Input port	Word [unsigned]	0000H to FFFFH	To store the input port value of a controller in hexadecimal.*1
uOutputPort	Output port	Word [unsigned]	0000H to FFFFH	To store the output port value of a controller in hexadecimal.*1
uStatus1	Device status1	Word [unsigned]	0000H to FFFFH	To store the controller status in hexadecimal.*1
uStatus2	Device status2	Word [unsigned]	0000H to FFFFH	To store the controller status in hexadecimal.*1
uExtendedDeviceStatus	Extended device status	Word [unsigned]	0000H to FFFFH	To store the controller status (extended device) in hexadecimal.*1
udSystemStatus	System status	Double Word [unsigned]	00000000H to FFFFFFFFH	To store the internal operation status of a controller.*1
dCurrentSpeed	Current speed	Double Word [signed]	-999999 to 999999	To store the monitor data of actual motor speed in 0.01 mm/s units.
dElectricCurrentValue	Electric current value	Double Word [signed]	-2147483648 to 2147483647	To store the monitor data of the motor current (torque current command value) in 1 mA units.
dDeviation	Deviation	Double Word [signed]	-2147483648 to 2147483647	To store the deviation over a 1 ms period between the position command value and the feedback value (actual position) in 1 pulse units.
udSystemOpeTime	System operating time	Double Word [unsigned]	0 to 4294967295	To store the total time since the controller power is turned ON in 1 ms units.
uSpecialInputPort	Special input port	Word [unsigned]	0000H to FFFFH	To store the status of input ports other than the normal input port.*1
uZoneStatus	Zone status	Word [unsigned]	0000H to FFFFH	To store the status of zone output in hexadecimal.*1
uDoneOrRunProgramNo	Positioning completed position No. status/Running program No.	Word [unsigned]	0 to 1023	To store the positioning completed position No. or running program number.
uExpansionSystemStaus	Extended system status	Word [unsigned]	0000H to FFFFH	To store the internal operation status of a controller (extended device) in hexadecimal.*1

*1 For details, refer to the IAI Corporation manuals related to serial communication (Modbus version).

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

Position table

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

Device	Item	Data type	Range	Description
D0	Target position	Double Word [signed]	-999999 to 999999	To store the set target position [0.01 mm units] in the specified position table number.
D1				
D2	Positioning width	Double Word [signed]	1 to 999999	To store the set positioning width [0.01 mm units] in the specified position table number.
D3				
D4	Speed command	Double Word [signed]	1 to 999999	To store the set speed [0.01 mm/s units] in the specified position table number.
D5				
D6	Individual zone boundary plus side	Double Word [signed]	-999999 to 999999	To store the set individual zone boundary plus side [0.01 mm units] in the specified position table number.
D7				
D8	Individual zone boundary minus side	Double Word [signed]	-999999 to 999999	To store the set individual zone boundary minus side [0.01 mm units] in the specified position table number.
D9				
D10	Acceleration command	Word [signed]	0001H to 012CH	To store the set acceleration [0.01 G units] in hexadecimal in the specified position table number.
D11	Deceleration command	Word [signed]	0001H to 012CH	To store the set deceleration [0.01 G units] in hexadecimal in the specified position table number.
D12	Pressing current limit value	Word [signed]	0033H to 01FEH (0033H to 00B2H) The range may varies depending on the model of an electric actuator.	To store the set pressing current limit value in hexadecimal in the specified position table number.
D13	Load current threshold	Word [signed]	0 to the value depending on the setting range of an electric actuator.	To store the set load current threshold value in hexadecimal in the specified position table number.
D14	Control flag specification	Word [signed]	0000H to 30FEH • Bit 1: Push-motion operation • Bit 2: Forward direction (reverse direction) after approach • Bit 3: Pitch feed • Bit 4 and 5: Parameter set • Bit 6 and 7: Acceleration pattern • Bit 12 and 13: Vibration control • Others: Not used	To store the set control flag in hexadecimal in the specified position table number.*1

*1 For details, refer to the IAI Corporation manuals related to serial communication (Modbus version).

Monitoring table

The following table shows the list of monitoring table when the start number of D device specified for iw_TableStartPos (monitoring table starting position) is D0.

Add the value of the start number of D device, which is specified for monitoring table starting position, to the following device numbers.

Device	Name	Data type	Range	Description
D0	Alarm detail code	Word [signed]	0000H to FFFFH*1	To store the latest alarm detail code in hexadecimal. '0000H' is stored when no alarm is generated.
D1	Alarm address	Word [signed]	0000H to FFFFH*1	To store the latest alarm address in hexadecimal. 'FFFFH' is stored when no alarm is generated.
D2	Alarm code	Word [signed]	0000H to FFFFH*1	To store the latest alarm code in hexadecimal. '0000H' is stored when no alarm is generated.
D3	Alarm occurrence time	Double Word [signed]	0 to 4294967295*1	To store the latest alarm occurrence time. (Passed time from the origin time or power ON [s])
D4				
D5	Current position monitor	Double Word [signed]	-999999 to 999999	To store a current position in 0.01 mm units.
D6				
D7	Current alarm code	Word [signed]	0000H to FFFFH*1	To store the current alarm code in hexadecimal. '0000H' is stored when no alarm is generated.
D8	Input port	Word [signed]	0000H to FFFFH*1	To store the input port value of a controller in hexadecimal.*2
D9	Output port	Word [signed]	0000H to FFFFH*1	To store the output port value of a controller in hexadecimal.*2
D10	Device status1	Word [signed]	0000H to FFFFH*1	To store the controller status in hexadecimal.*2
D11	Device status2	Word [signed]	0000H to FFFFH*1	To store the controller status in hexadecimal.*2
D12	Extended device status	Word [signed]	0000H to FFFFH*1	To store the controller status (extended device) in hexadecimal.*2
D13	System status	Double Word [signed]	00000000H to FFFFFFFFH*1	To store the internal operation status of a controller.*2
D14				
D15	Current speed	Double Word [signed]	-999999 to 999999	To store the monitor data of actual motor speed in 0.01 mm/s units.
D16				
D17	Electric current value	Double Word [signed]	-2147483648 to 2147483647	To store the monitor data of the motor current (torque current command value) in 1 mA units.
D18				
D19	Deviation	Double Word [signed]	-2147483648 to 2147483647	To store the deviation over a 1 ms period between the position command value and the feedback value (actual position) in 1 pulse units.
D20				
D21	System operating time	Double Word [signed]	0 to 4294967295*1	To store the total time since the controller power is turned ON in 1 ms units.
D22				
D23	Special input port	Word [signed]	0000H to FFFFH*1	To store the status of input ports other than the normal input port.*2
D24	Zone status	Word [signed]	0000H to FFFFH*1	To store the status of zone output in hexadecimal.*2
D25	Positioning completed position No. status/Running program No.	Word [signed]	0 to 1023	To store the positioning completed position No. or running program number.
D26	Extended system status	Word [signed]	0000H to FFFFH*1	To store the internal operation status of a controller (extended device) in hexadecimal.*2

*1 An unsigned value is stored. If a stored value is negative, replace it to an unsigned value.

*2 For details, refer to the IAI Corporation manuals related to serial communication (Modbus version).

MEMO

INSTRUCTION INDEX

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REVISIONS

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

Revision date	*Manual number	Description
June 2019	BCN-P5999-1179-A	First edition
June 2020	BCN-P5999-1179-B	■Added or modified parts SAFETY PRECAUTIONS, TERMS, Section 1.1, Section 1.3, Chapter 3, Appendix 2

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